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US-CHINA TRADE WAR: ANALYSIS OF ITS IMPACT ON AUTOMOTIVE, TECH AND AGRICULTURE INDUSTRIES IN BOTH STATES AND WORLDWIDE ACCORDING TO THE INPUT-OUTPUT MODEL

Relatore: Chiar.mo
Prof. Raffaele Giammetti
Correlatore: Chiar.ma
Prof. Alessia Lo Turco

Tesi di Laurea di:
Yevheniia Stoianova

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ABSTRACT

L'obiettivo di questa tesi è analizzare l'impatto che la guerra commerciale tra gli Stati Uniti e Cina ha avuto sull' industria automobilistica, tecnologica e agricola in entrambi i paesi e nel mondo.

Nel primo capitolo della tesi è stata brevemente descritta la storia delle relazioni commerciali tra gli Stati Uniti e la Cina. Si è poi discusso delle ragioni che hanno portato all'emergere di una guerra commerciale tra i due stati (contesto per l'attuazione delle tariffe). Nel capitolo viene anche fornita una panoramica delle tariffe e si motiva la scelta delle industrie prese ad oggetto di indagine. I risultati del capitolo 1 sono stati utilizzati per l'analisi nella parte rimanente del lavoro.

Il secondo capitolo è dedicato a un'analisi input-output degli impatti economici della guerra commerciale USA-Cina sia su questi due paesi che a livello globale. L'approccio di ricerca definito è una rappresentazione settoriale di tre paesi: Cina, Stati Uniti, resto del mondo. Le conclusioni generali basate sui risultati dell'analisi I-O sono state utilizzate per le raccomandazioni del terzo capitolo della tesi.

Il terzo capitolo è dedicato alle previsioni per il possibile futuro sviluppo economico di tre industrie e all'elaborazione di raccomandazioni per Stati Uniti, Cina e il resto del mondo in merito al miglioramento delle performance economiche di queste industrie. Durante l'elaborazione di questo capitolo è stata combinata un'analisi

statistica con la teoria. È stato applicato l'approccio statistico dell'estrazione ipotetica. L'analisi dello scenario ha permesso di rispondere a domande come: cosa succede se gli Stati Uniti e la Cina smettono di commerciare in prodotti del settore i-esimo.

INTRODUCTION

The goal of this thesis is to analyze the impact that the trade war between the United States and China has had on the automotive, technology and agricultural industries in both countries and around the world.

In the first chapter of the thesis the history of trade relations between the United States and China was briefly described. The reasons that led to the emergence of a trade war between the two states were then discussed (context for the implementation of tariffs). The chapter also provides an overview of the tariffs and motivates the choice of the industries under investigation. The results of chapter 1 were used for the analysis in the remaining part of the work.

The second chapter is devoted to an input-output analysis of the economic impacts of the US-China trade war both on these two countries and globally. The defined research approach is a sectoral representation of three countries: China, United States, rest of the world. The general conclusions based on the results of the I-O analysis were used for the recommendations of the third chapter of the thesis.

The third chapter is devoted to forecasts for the possible future economic development of three industries and to the elaboration of recommendations for the United States, China and the rest of the world regarding the improvement of the economic performance of these industries. Statistical analysis was combined with theory in the development of this chapter. The statistical approach of hypothetical

extraction was applied. The analysis of the scenario made it possible to answer questions such as: what happens if the United States and China stop trading in products of the i-th sector.

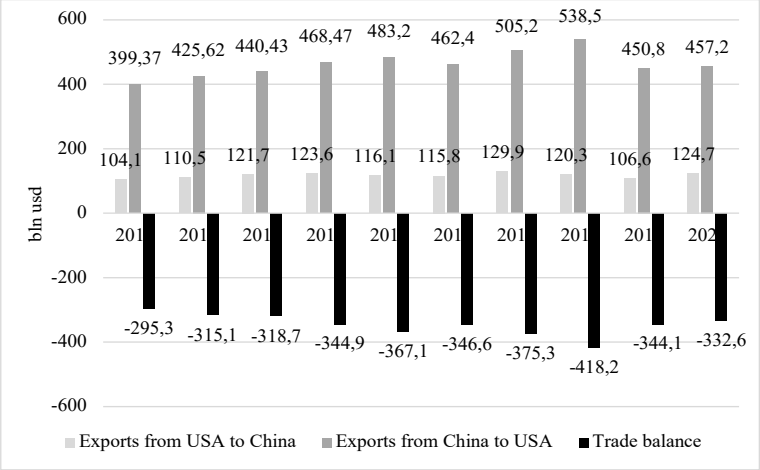
CHAPTER 1 THEORETICAL BASE: CAUSES OF THE US-CHINA TRADE WAR, TARIFF OVERVIEW, INDUSTRIES CHOICE

1.1 A brief history of trade relations between the United States and China

The trade war between China and the USA arose on the basis of economic confrontation in the competition between these countries on the world market. The main driver of increasing trade conflict is the process of globalization. Globalization is a rather complex, complex and contradictory phenomenon, which at the same time promotes both strengthening of cooperation and strengthening of competition. Since at the beginning of the XXI century regionalization of economic activity has become a companion of globalization, trade is developing within territorial and economic associations on the basis of mutual liberalization of trade, movement of capital and labor force. Along with promoting integration, regionalization leads to increased competition contradictions, and countries, even within groupings, differ in their level of economic development (Yukon Huang, 2021).

Ian Coxhead looked at the main causes of the trade war between China and the US. Among the main factors of the growth of economic confrontation between these countries on the world market, the following can be named: political contradictions, violations of human rights, tariff barriers and their regulation. High-level meetings between the Biden administration and their Chinese counterparts have ended in

open disagreements on issues from Xinjiang to the South China Sea, from state-trading companies to spyware. American officials very often resort to criticism of China's policy in the field of international trade regulation. The index of tension between the US and China has risen to historically high levels. In order to assess the protectionist measures of the USA and the PRC in the paradigm of waging a trade war, it is advisable to provide a preliminary statistical analysis of trade relations between the two countries. Indicators of the balance of foreign trade between the United States and the People's Republic of China are shown in picture 1.1.

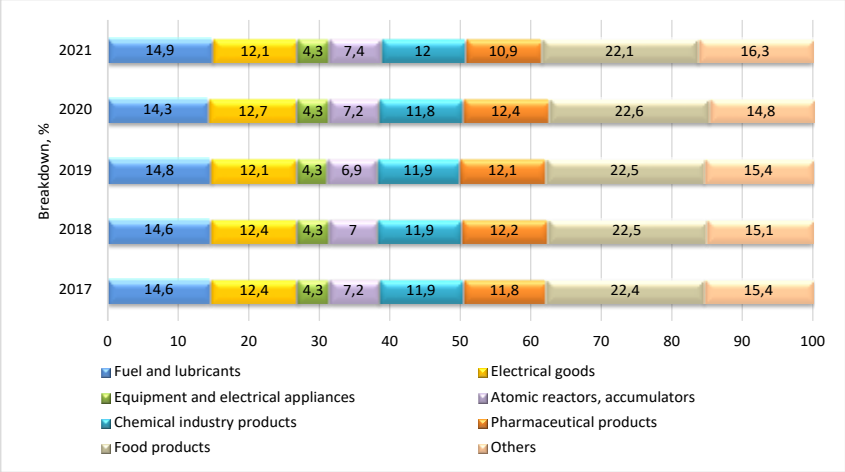


Picture 1.1 - Indicators of the balance of foreign trade between the United States and the People's Republic of China for 2016-2021, billion dollars[1]

[1] Value of U.S. exports to China from 2011 to 2021. URL: https://www.statista.com/statistics/277584/value-of-us-exports-to-china-since-2007/
Volume of U.S. imports of trade goods from China from 1985 to 2021. URL: https://www.statista.com/statistics/187675/volume-of-us-imports-of-trade-goods-from-china-since-1985/

As we can see from picture. 1.1, in the bilateral trade relations between the USA and China, the trend of a negative foreign trade balance on the side of the USA is quite clear. That is, the US exports to China less than it imports. The trend towards an increase in the negative balance was particularly noticeable in 2016-2018. However, starting in 2019, the administration of Donald Trump began to implement protectionist measures to limit Chinese imports, as a result of which the negative balance of the US foreign trade managed to be reduced from 443 billion dollars in 2018 year to 332.5 billion dollars in 2020.

On the picture 1.2 it is shown the product structure of US exports to China.

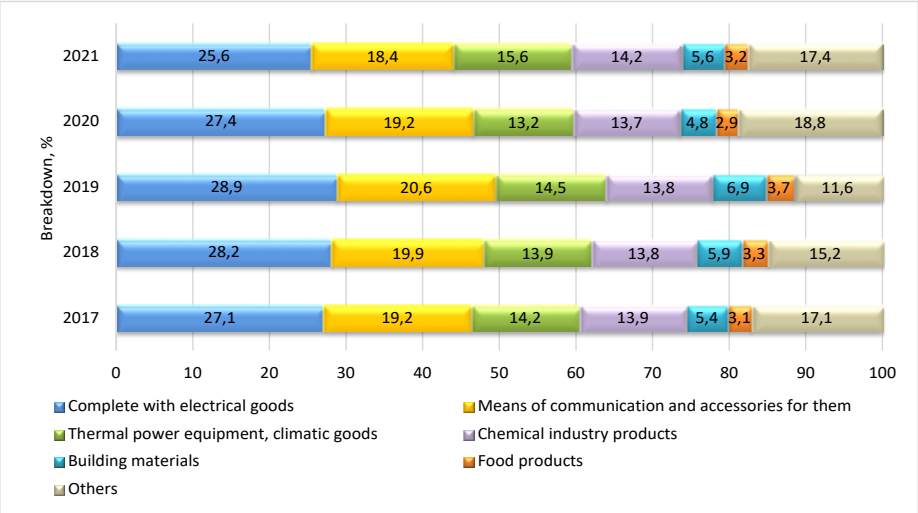


Picture 1.2 - Commodity structure of US exports to China in 2016-2020 yy, %[2]

[2] USA Imports and Exports. Trends Economy. URL: https://trendeconomy.com/data/h2/UnitedStatesOfAmerica/TOTAL
China. Trade Data URL: https://wits.worldbank.org/CountryProfile/en/Country/CHN/StartYear/2016/EndYear/2019/TradeFlow/Import/Indicator/MPRT-TRD-VL/Partner/BY-REGION/Product/Total

As can be seen from the picture 1.2, US exports to China are mainly focused on such product groups as fuel and lubricants, electrical engineering products, chemical industry products, pharmaceutical products, and food products.

At the same time, the indicators of the commodity structure of China's exports to the USA are given on the picture 1.3. Statistical data show that the USA is quite dependent on the supply from China of components for electrical goods, means of communication and components for them, heating and climate equipment, etc.



Picture 1.3 - Commodity structure of China exports to US in 2016-2020 yy, %[3]

China Imports and Exports. Trends Economy. URL: https://trendeconomy.com/data/h2?commodity=TOTAL&reporter=China&trade_flow=Export,Import&partner=World&indicator=TV,YoY&time_period=2016,2017,2018,2019,2020

[3] USA Imports and Exports. Trends Economy. URL: https://trendeconomy.com/data/h2/UnitedStatesOfAmerica/TOTAL

China. Trade Data URL: https://wits.worldbank.org/CountryProfile/en/Country/CHN/StartYear/2016/EndYear/2019/TradeFlow/Import/Indicator/MPRT-TRD-VL/Partner/BY-REGION/Product/Total

China Imports and Exports. Trends Economy. URL: https://trendeconomy.com/data/h2?commodity=TOTAL&reporter=China&trade_flow=Export,Import&partner=World&indicator=TV,YoY&time_period=2016,2017,2018,2019,2020

It can be said that the current round of trade restrictions and protectionist confrontations (primarily between the world's two largest economies), which has gained rapid momentum since the beginning of Trump's presidency, is not just a response to the contradictory trends of deglobalization, but is nothing more than another phase of the struggle for dominance in the new the industrial structure of the world, as well as the rationalization of production chains [10].

The current confrontation between the PRC and the USA, which many experts consider a trade war, actually has a deeper basis, if we compare the political formula of protectionism formulated by Trump in his inaugural speech on January 20, 2017, and the actual content of the toolkit and its sectoral orientation. The Trump administration has clearly realized the danger of losing technological leadership in the coming decades, so it is trying to break (or at least block) those production chains where the dependence of American companies on Chinese manufacturers is significant (Abdullahi K T, 2019).

Preparations for the introduction of sanctions against China began after the Office of the US Trade Representative prepared a report on China's technology transfer policy in March 2018. After lengthy hearings and consultations, tariffs on 818 items of Chinese imports came into effect. Subsequently, the list of items was supplemented, and a number of such American giants as Apple, Dell and Hewlett Packard criticized the expanded list, because it would lead to an increase in the prices of the products of the already mentioned companies, since the component

base for them is made in China. As a result, a consensus decision was made to exclude about 300 items from the list (in particular, consumer electronics products ("smart" watches and Bluetooth devices); certain chemicals for the production of industrial products, textiles and agriculture; certain health and safety products) (Steinbock D, 2019).

It is quite obvious that by applying such approaches when forming/correcting the list of sanctioned goods, the US is putting pressure primarily on China's high-tech industry, taking into account the interests of national companies. Such a practice on the part of the US is not an innovation - as an argument, experts cite analogies in the behavior of the US towards Japan in the 1980s. Similar accusations (of biased course setting, aggressive Japanese protectionism, industrial espionage, etc.) were also made at the time. The current situation with the introduction of sanctions against Chinese goods is somewhat different: if until recently, including thanks to the monetary policy of maintaining a stable CNY exchange rate, China was the world center of offshoring and a workshop for the manufacture of many types of products, now its priorities are shifting (and not without reason) towards global dominance (Scott R.E, 2018).

Currently, the emphasis is on the development of certain sectors, which are considered a priority and require significant investments, and again, in the context of the expansion of China's global economic power ("One Belt One Road", "Made in China-2025" projects). Thanks to a consistent and large-scale industrial policy,

in the last decade China managed to qualitatively change the industrial base, powerful national high-tech brands (Meizu, ZTE, Huawei, etc.) "grew up". In the trade war with the USA, China implements an active defense strategy aimed primarily at mitigating the negative consequences of the confrontation for national producers and actively launches mechanisms to stimulate/support them. Thus, the government of the People's Republic of China has set a goal of reducing dependence on imports of basic components and materials. In particular, only 18% of the chips needed by China's economy are produced domestically, and only half of them are produced by local manufacturers. The Chinese government plans to increase the share of locally produced chips to 40% in 2020 and up to 70% in 2025, as well as to increase the competitiveness of industry due to the implementation of innovative projects within the framework of the Made in China 2025 Program. For this, 10 priority directions were singled out, in particular: agricultural machinery, transport and power equipment, vehicles using new types of energy[4].

For the launch of new infrastructure projects from the beginning of 2017 local authorities in China issued bonds worth more than $180 billion. In addition, to stimulate entrepreneurial activity at the government level, a decision was made to reduce the tax burden. VAT for industry was reduced from 16% to 13%, tariffs for

[4] China Imports and Exports. Trends Economy. URL: https://trendeconomy.com/data/h2?commodity=TOTAL&reporter=China&trade_flow=Export,Import&partner=World&indicator=TV,YoY&time_period=2016,2017,2018,2019,2020

railway transportation were reduced, and the criteria for receiving certain tax benefits were simplified. The government plans to reduce average tariffs for electricity and port fees. At the same time as these measures, the criteria for bank lending to entrepreneurs were changed: the People's Bank of China adjusted the credit line bar for small business entities from 5 to 10 million yuan ($1.5 million) (Knoerich J, 2018).

The modern practice of organizing international trade relations involves the use of a fairly wide range of export promotion methods. The experience of the USA and China is the most indicative for the development of the export strategy in the world market. Let's consider in more detail the main features of the formation of export promotion policy in the above countries. In the USA, a multi-level national system of export support has been formed with a significant number of institutions performing various functions (Steinbock D, 2019).

Defining the system of state bodies for export support, we note that special attention is paid to strengthening the coordination of the activities of national support institutes, significantly expanding financial support for exporters, developing and applying new mechanisms and tools for promoting their activities, stimulating the participation of small and medium-sized businesses in export activities, providing

them effective information and consulting services and other promising areas of support (Appendix 1)[5].

China was able to become a world leader in the export industry thanks to the wide use of state export support mechanisms, especially in the financial sphere, as well as the strengthening of institutions and the improvement of tools for this support, the list of which is given in Appendix 2.

The key state body responsible for the development and implementation of foreign economic policy is the Ministry of Commerce of the People's Republic of China, which performs important administrative and coordinating functions related to the activities of subordinate organizations and other institutions, both in the country and abroad[6].

Therefore, the international trade confrontation between the United States and China is a consequence of both the economic consequences of competitive pressure from Chinese goods on the American market and one of the directions of ensuring the economic security of the United States. The USA is quite dependent on the supply from China of components for electrical goods, means of communication and components for them, thermal energy and climate equipment, etc. In the trade war with the USA, China implements an active defense strategy aimed primarily at

[5] U.S. International Trade in Goods and Services, Excel. Bureau of Economic Analysis: веб-сайт. URL: https://www.bea.gov/inter- national/index.htm#trade

[6] Ministry of commerce in China URL: http://www.mofcom.gov.cn

mitigating the negative consequences of the confrontation for national producers and actively launches mechanisms to stimulate/support them.

1.2 The reasons that led to the emergence of a trade war between the two states (Background for the implementation of the tariffs)

A trade war can be called a confrontation between countries that have common trade ties, with the help of establishing tariff and non-tariff restrictions with the aim of reducing imports, import substitution, changing the geographical and commodity structure of trade (Stiglitz, J. E., 2017).

Scientists identified the main determinants of the international and commercial conflict situation between the countries - commercial partners, which was demonstrated in the Appendix 3.

D. Steinbock characterizes the content of the trade war through its systemic nature and the corresponding consequences for national economies. According to the author, the international trade war is a systemic complex of protectionist measures aimed at blocking the access of the goods of the relevant country (or group of countries) to the domestic market.

There is specifics of the impact of the trade war between China and the United States on the world economy. According to the scientist, the main focus of the growing tension in bilateral trade relations was the desire of both countries to dominate the world economic space. The policy of Washington pursued the

principle of "America First". The USA tried to concentrate the vector of economic efforts on the expansion of international markets at the expense of expanding the boundaries of the activities of transnational corporations. At the same time, China began to consolidate its economic position at the end of the 20th century. At the beginning of the 21st century, the main focus of the efforts of the Chinese economy was concentrated on strengthening its position within the Asia-Pacific region (Steinbock D., 2019).

Taking into account some statistical data given in the article by Steinbock D. (2019), it is possible to draw conclusions about the significant preponderance of Chinese investments in the strategic development initiatives of the “Indo-Pacific Economic Vision”. One of the main conclusions is a warning about the potential impact of worsening trade relations between the two countries on the world economy. The protracted trade war between China and the US is a potential driver of global economic recession in the future.

Raffaele Giammetti, Luca Papia, Désirée Teobaldelli and Davide Ticchia (2022) assessed the impact of the factors of the economic crisis in the European region in 2020-2021. The research carried out quite clearly describes the network effects that arise in the process of international trade. The growth of competition and the emergence of contradictions in the economic and political sectors become unconditional drivers for the strengthening of protectionist policies (Giammetti R., Papia L., Teobaldelli D., Ticchia D., 2022)

The protectionist policy involves the use of customs and tariff methods and the establishment of non-tariff restrictions. These measures allow exporters to supply the world market with the maximum possible number of products and, limiting imports, to invite to the national market not goods, but technologies. Measures of state protectionism are aimed at reducing interest in imported products, mainly due to an increase in their price. At the same time, the measures of modern protectionism assume the maximum involvement of advanced innovative developments on the territory of the state, the creation of conditions for the implementation of advanced technical solutions within the national economy. The Appendix 4 presents the classification of the main tariff and non-tariff instruments of trade policy implemented within the framework of protectionism.

Today, the politics of free trade and protectionism are linked. Developed countries increase the role of free trade, but also actively use protectionism in order to protect and increase the competitiveness of the national economy. There is no country that does not use tariff or non-tariff instruments in international trade practice. Countries once again began to protect their internal market from external interference.

It has been established that currently the role of selective protectionism is increasing, and the number of non-tariff restrictions is increasing. Policy of protectionism and policy of free trade are not carried out in their pure form. The world markets use mixed forms of foreign trade policy that unite them. The application of various forms of trade policy helps to adapt more effectively to the

conditions of the global economy. The strengthening of world globalization conditions the development and application of measures of an effective policy of protectionism on the part of the state, which will help to develop domestic production and increase the competitiveness of national goods and services.

In world practice, you can often find situations where the policy of protectionism is completely selfish: governments and specific political figures simply help those economic groups that ensured their coming to power or a quarrel with which may threaten the retention of power. An important conclusion follows from this: if we see that certain industries are being supported in some country or group of countries, this does not mean that this is done in the interests of the development of the national economy. And even more so, this does not mean that we should adopt such "world experience". In 2016-2020, a striking example of such a situation was the US foreign trade policy under Donald Trump. The trade wars initiated by him were waged in the interests of industries, primarily steel and automobile manufacturing, whose support he mobilized during his election campaign, while supporting the high-tech industries of Silicon Valley was not a priority for the Trump administration. Does this mean that high-tech companies do not make a significant contribution to the development of the American economy? Of course not. It's just that the representatives of high-tech industries in the last presidential elections "bet on the wrong candidate" (Amiti, M, S J Redding, and D Weinstein, 2019).

But even if protectionist decisions are dictated by the motive of development, this does not mean that they will give the desired result. Mistakes may be made when choosing support objects - industries and projects. The price of protectionism for consumers may exceed the gain for producers. Moreover, the support of one group of domestic producers can turn into losses for another.

In order for protectionism to really produce positive results for the development of the national economy, it must provide a long-term solution to those problems that prevented national producers from successfully competing with foreign ones. The logic here is clear. If we see imports successfully competing with domestic production, it means that domestic producers are not efficient enough to compete successfully for the domestic market. So, foreign manufacturers have some competitive advantages. These can be advantages in terms of quality, costs, access to resources, terms of supply, and so on. Within the framework of the protectionist policy, it is necessary to understand how to increase the competitiveness of national producers at least to the level of foreign ones, or better - to a higher level, so that it will be possible to export the product in the future. It can be said that the key condition under which the protectionist policy can contribute to economic development is the increase in the competitiveness of national producers. If, despite the support provided, the competitiveness of national products in comparison with foreign goods and services does not increase, it means that incomes are simply redistributed in favor of national producers. They rhyme with subsidies from

taxpayers' funds, consumers pay more for their products. A black hole is formed in the economy due to the support of an inefficient industry that continuously claims support without any chance of catching up with foreign competitors.

Thus, the policy of protectionism in most cases is beneficial for the national economy. The use of protectionism supports domestic industries, increases the level of employment of the population, improves the balance of payments, increases the number of sales of national goods and services, increases revenues to the local budget due to the additional profit of domestic producers, which ensures the economic stability and security of the country, etc.

1.3 The overview of the tariffs and explanation of the industries' choice for the further analysis

The impact of tariff policy on the development of international trade is very important. The choice of methods of tariff and non-tariff regulation of imports directly affects the possibilities of restricting trade in certain groups of goods. In this paragraph, it is necessary to analyze the main methods of tariff regulation for individual groups of goods.

The impact of tariffs is mixed. The increase in tariffs inevitably leads to an increase in the level of burden on importers, however, producers of goods within the country receive price advantages over imported goods. However, a negative consequence of the increase in tariffs is the strengthening of inflationary trends. On the other

hand, lowering tariffs has a positive effect on inflation regulation. However, such a policy can seriously harm domestic producers.

Today, MFN tariffs have a certain negative effect on the development of US industry, in particular on the rate of employment. However, the impact of this type of customs tariffs cannot cause significant economic damage. Such tariffs have weighted and moderate rates that are not able to significantly influence the pricing policy in the relevant product categories. Unlike MFN, retaliatory tariffs pose the greatest danger to the economy. Today, the existence of MFN is causing serious losses to American companies and workers, with certain regions and industries being hit (Durant Alex, 2022).

In response to US tariff regulation measures, China introduced retaliatory tariffs on agricultural products and seafood. An easier situation was observed for the mechanical engineering sector. Retaliatory tariffs were introduced here for a relatively short period of time and failed to affect the market infrastructure within the automotive industry. Currently, China cannot build a complete manufacturing cycle for a number of technological goods and is highly dependent on imports from the US. However, in the agricultural market, China is the largest export market for the US. A number of agricultural products (in particular, soybeans and pork) were affected by the relevant tariffs. China is implementing mirror tariffs on agricultural products from the US in response to rising tariffs on machinery goods imported from China (Durant Alex, 2022).

The existence of a close relationship between indicators of economic activity in China's industrial regions and the policy of strengthening tariff barriers has been proven by a number of studies.

Chor Davin and Li Bingjing (2021) conducted an analysis of the impact of the tariff war between the US and China in terms of the impact on the Chinese economy. The authors concluded that China's downward regulation of MFN tariffs can compensate for the negative impact of retaliatory tariffs from the US. Tariffs imposed by the US on exports from China have negative consequences for the work of Chinese industry in the short term. However, it is also worth considering that tariff barriers can be both causes and consequences for the relevant political processes. The aggravation of the political confrontation between the US and China against the background of threats to Taiwan has a direct consequence of the use of tariff methods as a tool of economic pressure on China. It is also important to consider that China's tariff policy was also affected by the Covid-19 pandemic. China has used the rise in tariffs to revive some sectors of the economy related to local food production. To fulfill the tasks in this direction, Chinese manufacturers began to search for alternative sources of imports to slow down the growth of prices for agricultural raw materials (Chor Davin, Li Bingjing, 2021).

It should be added that the introduction of tariff barriers has a negative impact on the pace of economic development not only in China, but also in the United States. It is worth considering the basic principles of international trade development. A

country that implements a policy of increasing customs tariffs is bound to have negative consequences in the form of pressure from inflationary factors. On the other hand, protectionism at the level of individual industries can have positive short-term effects on the level of employment in the respective industries (Fajgelbaum, P D, P K Goldberg, P J Kennedy, and A K Khandelwal, 2019).

The US's use of tariff regulation methods for a number of technological goods (in particular, automotive products) imported from China has negative consequences for the country's economy. The presence of a negative effect is explained by the specifics of creating a value chain for various groups of high-tech goods. For example, the increase in customs tariffs on a number of Chinese components stimulates the growth of the cost of American production. Prices for final consumption goods begin to rise, which causes a mirror decrease in demand for American products. The population of the states begins to prefer imported goods. Therefore, in this case, inflationary effects are not the only ones that negatively affect American industry. Another negative consequence is the reduction of production volumes, which further increases the cost of production. This is due to scale effects (Amiti, M, S J Redding, and D Weinstein, 2019).

The above is supported by research by Amiti, M, S J Redding, and D Weinstein (2019). They tried to empirically substantiate the dependence of prices on the change of various factors in the chain of creation of added value under the condition of increasing tariffs on a number of imported goods. The results of the authors'

research show that the negative impact of protectionism policy applies not only to Chinese imports, but to any import. Another important factor is the rate of increase in customs tariffs. That is, the faster the increase in customs tariffs, the stronger the inflationary consequences will be. The authors proved that the increase in tariffs is fully reflected in the mirror increase in prices in the US domestic market (Amiti, M, S J Redding, and D Weinstein, 2019).

The escalation of the tariff war between the US and China was especially noticeable in 2018-2019. The decrease in international trade between the US and China was not the only consequence of the introduction of numerous customs barriers. The decrease in trade volumes between the US and China was accompanied by a parallel increase in bilateral trade flows between other countries of the world. Foreign countries increased the volume of international trade with the United States, and the growth of the total volume of world exports was generally positive. The introduction of a policy of rising tariffs between the US and China has created trade opportunities for other countries. The growth of international trade flows among other countries was observed in 2018-2019 precisely for those groups of goods for which there was an increase in tariffs between the United States and China. It can be concluded that the reduction of mutual imports between both of these countries was accompanied by a search for a replacement. American manufacturers were looking for alternatives to Chinese goods that had increased in price. A similar process was typical for Chinese manufacturers. This forced the US and China to

increase the volume of imports of the corresponding goods that fell under tariff restrictions from third countries (Gorman Linda, 2022).

The above is also confirmed by the results of a study conducted by Fajgelbaum, P D, Kennedy P J, Goldberg P K and Khandelwal A K. From the trade war between the US and China, the countries whose economies were most integrated into the global goods market benefited the most. This is explained by the fact that highly developed countries are able to flexibly redirect the necessary resources to strengthen international trade flows. The presence of significant amounts of foreign investments and strengthening of production by long-term export agreements with the USA and China are determining factors of the superiority of developed countries in international trade. Developed countries performed the function of import substitution for goods items that were previously included in international trade between the United States and China. France saw an increase in exports after the US imposed tariff restrictions on a number of Chinese components for the automotive industry. However, the opposite economic effect could be observed in South Africa and the Philippines. The increase in tariffs reduced the exports of these countries to the US, but stimulated the growth of exports to China (Fajgelbaum, P D, P K Goldberg, P J Kennedy, and A K Khandelwal, 2020).

Thus, based on the above, we can draw conclusions about a clear relationship between the policy of increasing tariffs and the rate of economic growth. Increasing the level of integration of international commodity flows enables countries to

balance at the level of average MFN tariffs, thereby providing favorable conditions for the development of international trade relations. The example of the USA and China clearly shows that a sharp increase in tariffs has serious consequences for the inflationary processes within each of the countries that begin to introduce tariff barriers. Local producers of goods also experience the short-term effect of reduced demand for their goods if they are focused on importing raw materials and materials that have been subject to rising tariffs. In the second chapter of the paper, for the purpose of conducting an empirical study, it is recommended to analyze the indicators of international trade and tariff restrictions on the example of the automotive, tech and agricultural industries of the United States and China.

Conclusions

Thus, the measures of protectionism of a modern state with a developed market economy in a unified system provide for the protection of the domestic producer and the formation of conditions for the reproduction and preservation of competitiveness and, thereby, strengthening the position of the state in the world economy. The policy of protectionism is introduced by the state to protect the domestic market from foreign competition. Protectionism was first used during the initial accumulation of capital, the emergence and development of manufacturing production. At this time, market relations begin to develop, entrepreneurs appear. Moneylenders and merchants became the first owners of large capitals. The sources

of initial capital were: trade wars; formation of the colonial system; the creation of trading and banking capital, a system of protectionism and government loans.

In the trade war with the US, China implements an active defense strategy aimed primarily at mitigating the negative consequences of the confrontation for national manufacturers and actively launches mechanisms to stimulate/support them. It is quite obvious that by applying such approaches when forming/correcting the list of sanctioned goods, the US is putting pressure primarily on China's high-tech industry, taking into account the interests of national companies.

CHAPTER 2 AN INPUT-OUTPUT ANALYSIS OF THE ECONOMIC IMPACTS OF US-CHINA TRADE WAR IN BOTH STATES AND GLOBALLY (3 MOST AFFECTED INDUSTRIES: AUTOMOTIVE, TECH AND AGRICULTURE)

2.1. Data collection

In this question, the statistical data contained on the TradeMap website were used for the analysis [7]. The period from 2012 to 2021 was chosen for the analysis.

In the course of the analysis, a preliminary analysis of the dynamics of export indicators was carried out, as well as the construction of an I-O table for Network analysis.

The raw statistics are given in Annexes 5-10. Annexes 5-6 represent statistical data on the dynamics of export indicators of Automotive industry products from the USA to China and other countries of the world. Appendices 7-8 represent statistical data on the dynamics of exports of Tech industry products from the USA to China and other countries of the world. Annexes 9-10 provide information on exports of Agriculture industry products from the USA to China and other countries of the world.

[7] Bilateral trade between United States of America and China: https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c842%7c%7c156%7c%7c87%7c%7c%7c4%7c1%7c1%7c2%7c2%7c1%7c1%7c1%7c1%7c1

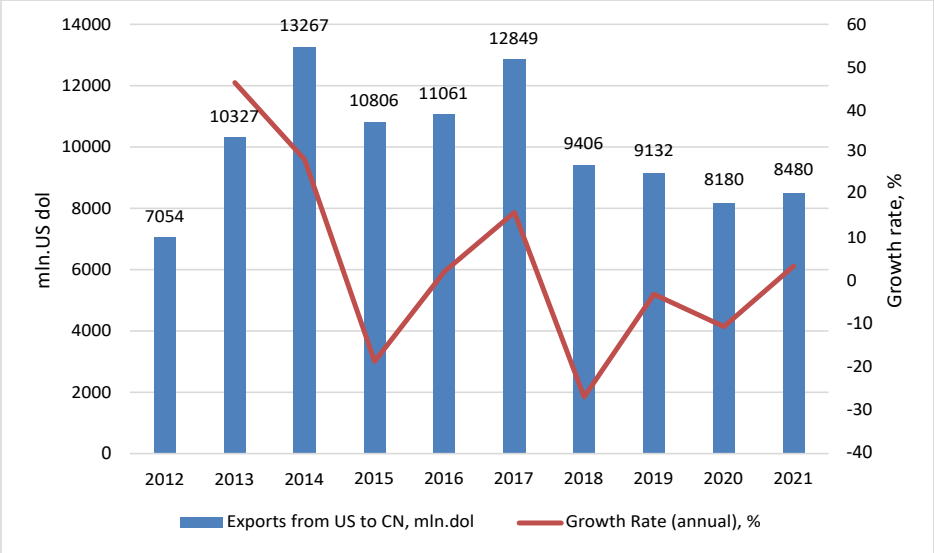
2.2 Automotive sector (I-O analysis)

In this issue, an analysis of the main indicators characterizing the international trade of the USA and China in the mechanical engineering sector was carried out. Today, the automobile industry is an important branch of the USA, which forms its exports to various countries of the world. At the same time, many companies are located in China that produce components and parts used by US engineering companies to manufacture final products.

The research hypothesis in this subsection is that the trade war between the US and China has the effect of reducing intermediate consumption. At the same time, the volume of imports of spare parts and parts to the USA from other countries of the world is increasing.

2.2.1 Analysis of US exports to China and vice versa

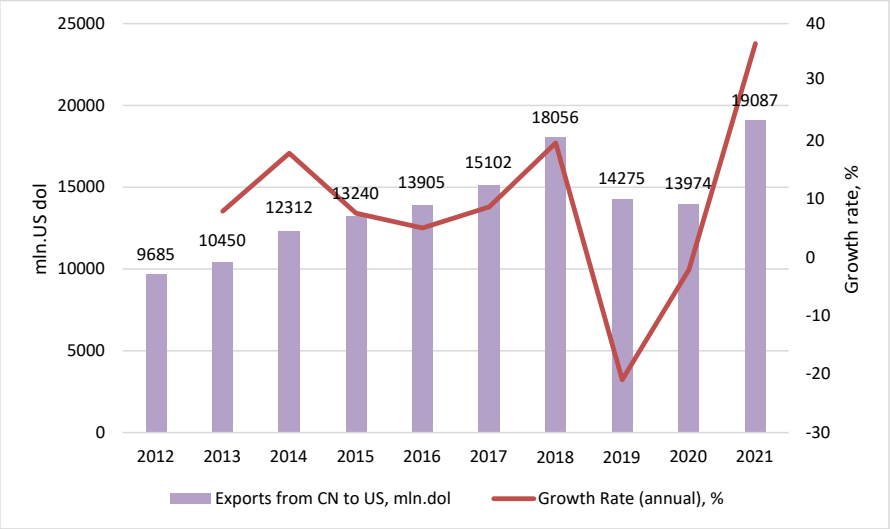
In this matter, it is first necessary to consider the dynamics of the volume of export of machine-building products from the USA to China, as well as to evaluate the structure of foreign trade in this group of goods. For this purpose, a time series was constructed reflecting exports from the USA to China for 2012-2021 (pict. 2.1).



Pict. 2.1. Dynamics of exports of automotive commodities from the USA to China for 2012-2021.

Statistical data make it possible to conclude that the total volume of exports of engineering products from the USA to China had wave-like trends. In 2012-2014, it was possible to observe the growth of exports from 7,054 million dollars to 13,267 million dollars. In particular, in 2012-2013, the growth rate of export volumes was 46.4%. In 2013-2014, the rate of increase in the volume of exports of mechanical engineering products was 28.5%. In 2015, it was possible to observe a decrease in the volume of exports to 10,806 million dollars or by 18.6%. 2016 did not reveal any particular trends in the dynamics of exports, which increased by only 2.4%. Later in 2018, the volume of exports of American manufacturers to China began to decrease further. In 2017-2018, export volumes decreased by 26.8%, in 2018-2019 the decrease was 2.9%, in 2020 - 10.4%, in 2021 there was a slight increase in

exports by 3.7%. The above indicators indicate a gradual reduction in the presence of American manufacturers in the Chinese market of machine-building products. The indicators of the export of automotive commodities from China to the USA for 2012-2021 are shown in pict. 2.2.

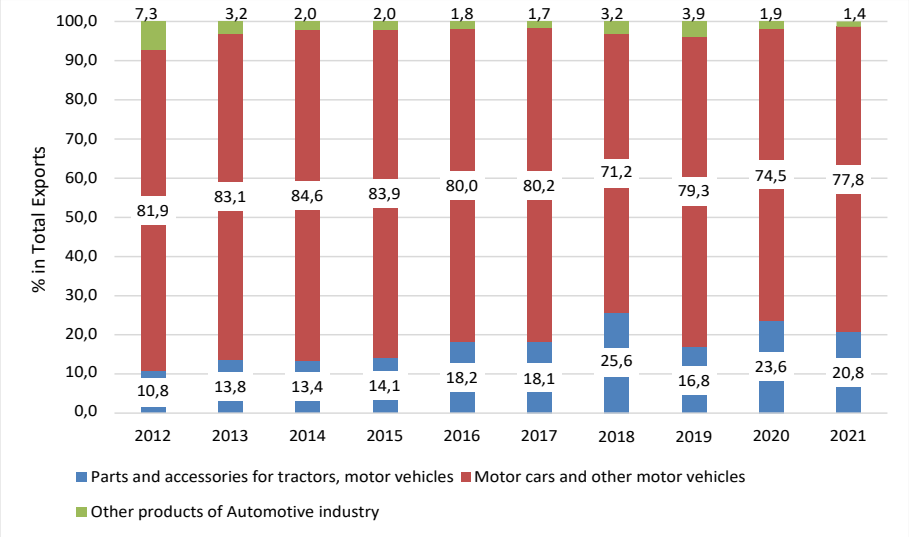


Pict. 2.2. Dynamics of exports of automotive commodities from China to the USA for 2012-2021.

The total volume of exports of automotive commodities from China to the USA had wave-like trends, however, they were more stable compared to the data in pict. 2.1. In 2012-2018, it was possible to notice an increase in exports from 9,685 million dollars to 18,056 million dollars. In particular, in 2012-2013, the growth rate of export volumes was 7.9%. In 2013-2014, the rate of increase in the volume of exports of mechanical engineering products was 17.8%. In 2015, it was possible to observe an increase in the volume of exports to 13,240 million dollars or by 7.5%.

In 2016, it was possible to observe an increase in the volume of exports to 13,905 million dollars, or by 5.0%. In the following year, 2018, a further increase in the volume of exports of products of Chinese manufacturers to the USA began to occur by 19.6. In 2018-2019, export volumes decreased by 20.9%, in 2020 the decrease was 2.1%, in 2021 there was a significant increase in export growth by 36.6%, which was caused by a certain shortage of Chinese goods on the US market . The above indicators indicate a more stable position of China in the US market compared to the position of US manufacturers in the Chinese market.

It is also important to consider the structure of the export of engineering products from the USA to China. The relevant indicators are shown in pict. 2.3.



Pict. 2.3. The structure of the export of automotive commodities from the USA to China for 2012-2021., %

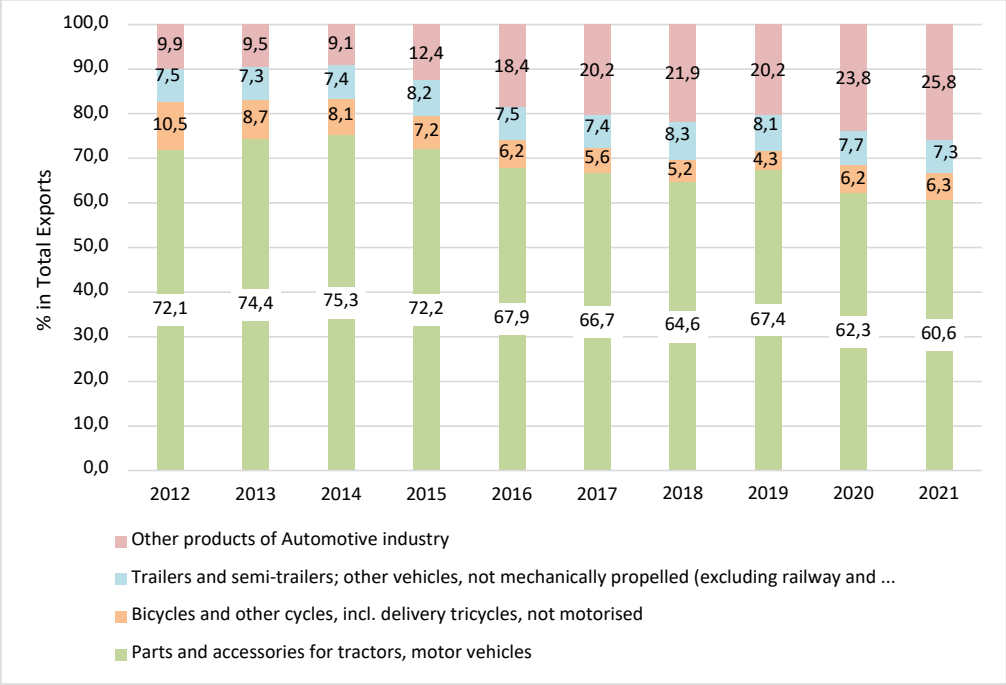
As can be seen from statistical data, in general, for the years 2012-2021, Motor cars and other motor vehicles accounted for the largest share of US exports to China. In 2012, this product group accounted for 81.9% of the total volume of exports from the USA to China within the general range of automotive products. In 2021, the share of this product group decreased to 77.8%. It is possible to notice the growth of the share of Parts and accessories for tractors, motor vehicles in the overall structure of exports, starting from 2015. In 2015, the share of the product group "Parts and accessories for tractors, motor vehicles" was 14.1%, in 2018 - 25.6% (it was the maximum during the entire observation period). In 2021, this product group accounted for 20.8%.

Other product groups accounted for from 7 to 1% of the total volume of US exports within the machinery industry. The increase in the export of spare parts and the decrease in the share of finished products indicate the existence of certain problems with the export of finished products. American spare parts in China's automotive industry are mainly used for the assembly of aggregate electrical systems of cars. Some problems for the export of finished products are the introduced tariff restrictions.

Let's consider the structure of the export of mechanical engineering products from China to the USA. The relevant indicators are shown in pict. 2.4.

For the years 2012-2021, the largest specific weight in China's exports to the USA was "Parts and accessories for tractors, motor vehicles for the transport of ten or

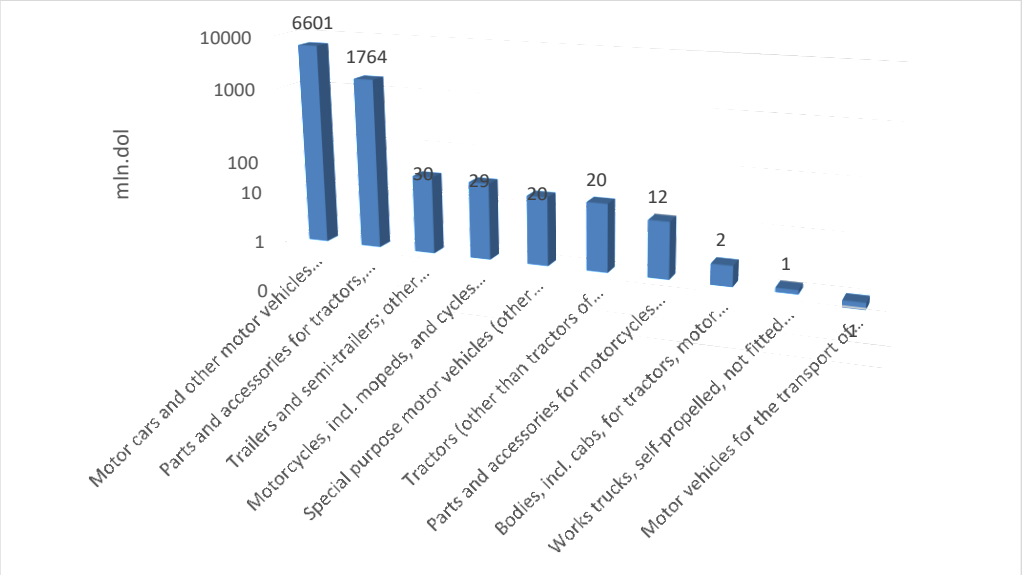
more persons". In 2012, this product group accounted for 72.1% of the total volume of exports from China to the USA within the general range of automotive products. In 2021, the share of this product group decreased to 60.6%. Other product groups accounted for from 9.9 to 25.8% of the total volume of China's exports within the machinery industry. It can be concluded that there was an increase in the share of exports of other commodity items from China to the USA, which include the following: "Carriages for disabled persons, whether or not motorized or otherwise mechanically propelled"; "Baby carriages and parts thereof; "Parts and accessories for motorcycles and bicycles and for carriages for disabled persons".



Pict. 2.4. The structure of the export of automotive commodities from China to the USA for 2012-2021, %

It is also important to pay attention to the rating indicators of various products in the structure of export formation within the framework of automotive products (pict. 2.5).

As we can see, the positions "Motor cars and other motor vehicles principally designed for the transport of persons" and "Parts and accessories for tractors, motor vehicles for the transport of ten or more persons" were the main ones in the structure of American exports of engineering products.



Pict. 2.5. Ranking of exports of automotive commodities from the USA to China in 2021

2.2.2 Input-Output analysis of bilateral US-CN exports

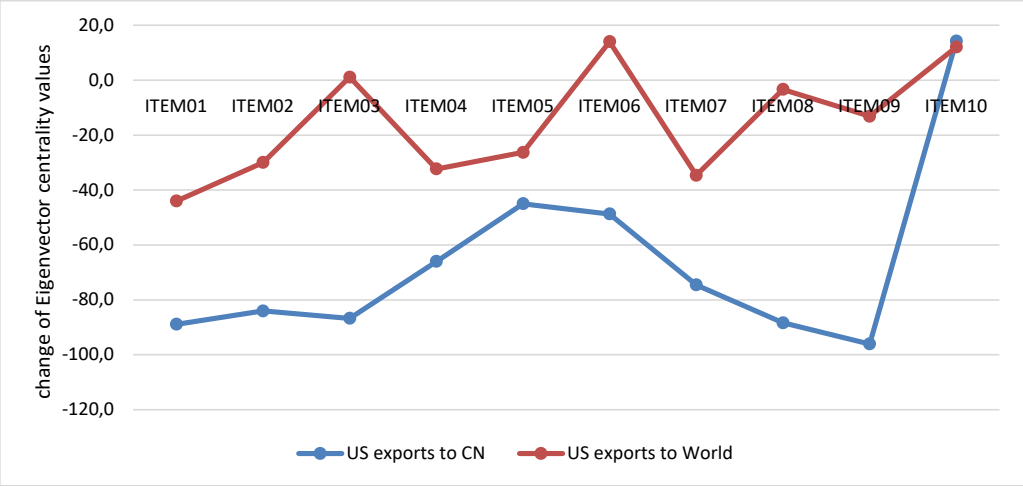
It is worth carrying out a network analysis of the indicators of the export of mechanical engineering products from the USA and China. For this purpose, the Input-Output matrix was constructed. Using the EIG method in the MATLAB program, eigenvector centrality values were determined for indicators of exports from the USA to China and other regions of the world. For different years, these values are listed below in the table. 2.1.

Table 2.1 – Eigenvector centrality values for indicators of exports of engineering products from the USA to China and other countries of the world for 2012-2021.

Item group	Item code	US exports to CN			US exports to rest World (except CN)		
		e2012	e2021	Δ%	e2012	e2021	Δ%
Motor vehicles for the transport of goods, incl. chassis with engine and cab	ITEM01	0,0063	0,0007	-88,9	0,0443	0,0248	-44,0
Works trucks, self-propelled, not fitted with lifting or handling equipment, of the type used	ITEM02	0,0075	0,0012	-84,0	0,0527	0,0369	-30,0
Bodies, incl. cabs, for tractors, motor vehicles for the transport of ten or more persons,	ITEM03	0,0188	0,0025	-86,7	0,0806	0,0815	1,1
Parts and accessories for motorcycles and	ITEM04	0,0353	0,012	-66,0	0,1265	0,0856	-32,3

bicycles and for carriages for disabled persons							
Tractors (other than tractors of heading 8709)	ITEM05	0,036	0,0198	-45,0	0,2257	0,1663	-26,3
Special purpose motor vehicles (other than those principally designed for the transport	ITEM06	0,0396	0,0203	-48,7	0,3724	0,4245	14,0
Motorcycles, incl. mopeds, and cycles fitted with an auxiliary motor, with or without side-cars;	ITEM07	0,1135	0,0289	-74,5	0,8073	0,5276	-34,6
Trailers and semi-trailers; other vehicles, not mechanically propelled	ITEM08	0,2578	0,0301	-88,3	1,7075	1,6500	-3,4
Parts and accessories for tractors, motor vehicles for the transport of ten or more persons,	ITEM09	0,7589	0,0301	-96,0	4,1032	3,564	-13,1
Motor cars and other motor vehicles principally designed for the transport of persons, incl.	ITEM10	5,7807	6,6007	14,2	4,8804	5,4682	12,0

It is also important to compare the Eigenvector centrality values for two options: the first option refers to the volume of exports of automotive products from the USA to China, and the second option refers to exports from the USA to other countries. The comparison is shown in pict. 2.6.



Pict. 2.6. Comparison of changes in Eigenvector centrality values for indicators of exports from the USA to China and other countries of the world

It can be concluded that changes in Eigenvector centrality for indicators expressing exports from the USA to China are less pronounced, compared to changes in a similar indicator for exports from the USA to other countries of the world. At the same time, the rate of decrease of Eigenvector centrality for the first case was significantly lower compared to the indicators characterizing Eigenvector centrality for indicators of exports from the USA to other regions of the world. Also, for some goods (Bodies, incl. cabs, for tractors, motor vehicles for the transport of ten or more persons; Special purpose motor vehicles (other than those principally

designed for the transport), the change in Eigenvector centrality values had a positive value, which indicated strengthening of the position of the USA in the world market in the following product groups. For the Eigenvector centrality values related to the trade between the USA and China, the values of the rates of change in 2012-2021 were always below 0. The largest drop in export activity was characteristic of the product group " Parts and accessories for tractors, motor vehicles for the transport of ten or more persons».

In the table 2.2. the indicators of the dynamics of Eigenvector centrality values for the volumes of exports of various products of the automotive sector from China to the USA and other countries of the world for 2012-2021 are given.

Table 2.2 – Eigenvector centrality values for indicators of exports of mechanical engineering products from China to the USA and other countries of the world for 2012-2021.

Item group	Item code	CN exports to US			CN exports to rest World (except US)		
		e2012	e2021	Δ%	e2012	e2021	Δ%
Special purpose motor vehicles (other than those principally designed for the transport	ITEM01	0,0041	0,0002	-95,1	0,0336	0,0901	-44,0
Tractors (other than tractors of heading 8709)	ITEM02	0,0196	0,0023	-88,3	0,0779	0,1339	-30,0

Carriages for disabled persons, whether or not motorised or otherwise mechanically propelled	ITEM03	0,1493	0,0276	-81,5	0,1484	0,1485	1,1
Baby carriages and parts thereof, n.e.s.	ITEM04	0,494	0,0447	-91,0	0,1708	0,2391	-32,3
Parts and accessories for motorcycles and bicycles and for carriages for disabled persons	ITEM05	0,1505	0,0624	-58,5	0,2175	0,5153	-26,3
Bicycles and other cycles, incl. delivery tricycles, not motorised	ITEM06	0,2065	0,1196	-42,1	0,2192	0,568	14,0
Trailers and semi-trailers; other vehicles, not mechanically propelled (excluding railway and	ITEM07	0,2792	0,1401	-49,8	0,4269	1,1182	-34,6
Motor cars and other motor vehicles principally designed for the transport of persons, incl.	ITEM08	0,7244	0,1738	-76,0	0,4619	1,2316	-3,4
Motorcycles, incl. mopeds, and cycles fitted with an auxiliary motor, with or without side-cars	ITEM09	1,0217	0,1819	-82,2	0,5355	2,4389	-13,1
Parts and accessories for tractors, motor vehicles for the	ITEM10	6,9804	1,156	-83,4	1,5654	4,5566	12,0

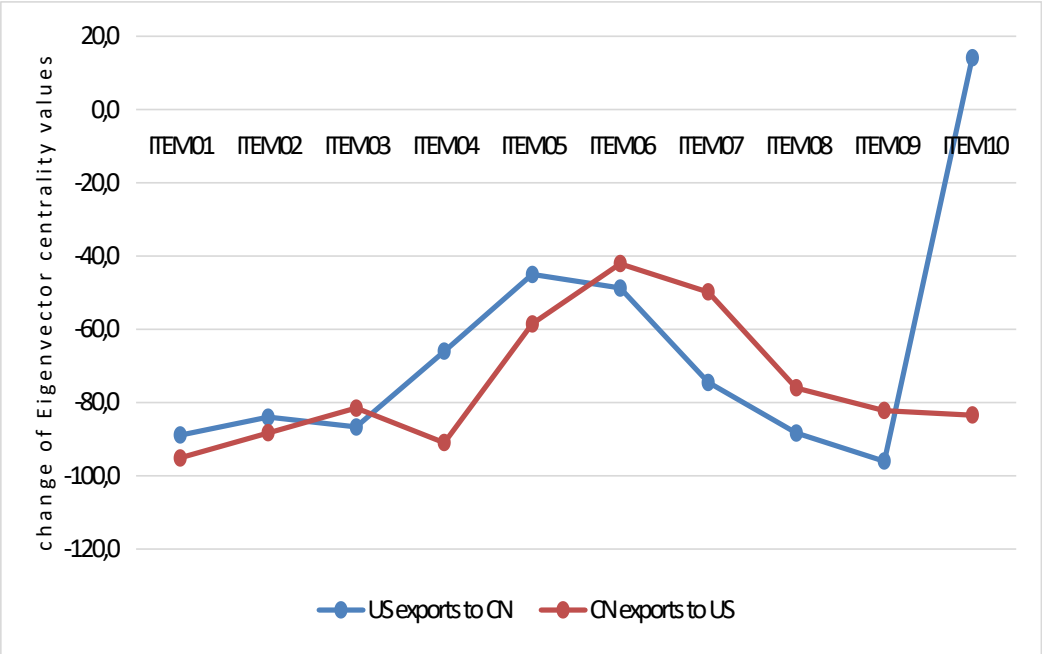
transport of ten or more persons							

In the table 2.2 the dynamics of Eigenvector centrality for indicators expressing exports from China to the USA is similar to the dynamics of this indicator from table 2.1. Changes in centrality value values are less pronounced, compared to changes in a similar indicator for exports from China to other countries of the world. At the same time, the rate of decline of Eigenvector centrality for indicators of exports from China to other regions of the world (compared to the USA) was significantly lower compared to the indicators characterizing Eigenvector centrality for indicators of exports from the USA to other regions of the world. For some products, the change in Eigenvector centrality values had a positive value. Such goods included the following:

- Carriages for disabled persons, whether or not motorized or otherwise mechanically propelled – the change in Eigenvector centrality values (CN exports to rest World (except US)) was +1.1%;
- Bicycles and other cycles, incl. delivery tricycles, not motorized – the change in Eigenvector centrality values (CN exports to rest World (except US)) was +14.0%;
- Parts and accessories for tractors, motor vehicles for the transport of ten or more persons – the change in Eigenvector centrality values (CN exports to rest World (except US)) was +12.0%.

The given dynamics make it possible to draw conclusions about the growth of exports of the above-mentioned goods to world markets. For the Eigenvector centrality values related to exports from China to the USA, the values of the rates of change in 2012-2021 were always below 0.

On pict. 2.7 shows a comparison of the change in Eigenvector centrality for two groups of indicators - the first group characterizes exports from the USA to China, the second group contains data on exports from China to the USA.



Pict. 2.7. Comparison of changes in Eigenvector centrality values for export indicators from the USA to China and vice versa

It can be concluded that the imposed trade restrictions for exports between both countries had a mirror character for almost most types of goods. For goods ITEM01

(Special purpose motor vehicles), ITEM02 (Tractors) and ITEM03 (Carriages for disabled persons), the impact of trade restrictions had almost the same consequences on the volume of exports within these goods for both countries. For the product group ITEM10 (Parts and accessories for tractors, motor vehicles for the transport of ten or more persons), restrictions on the import of this product category introduced by China did not have corresponding consequences on the part of the USA. On the contrary, the USA increased the volume of imports of this product group from China for 2012-2021.

Then, PageRank was evaluated in the MatLab program in order to identify internal interdependencies between the export of various product groups of automotive products from the USA to China and other countries. To determine PageRank, two variables were used - s and t, which characterize the value of Eigenvector centrality within the framework of the two given cases as of 2012 and 2021. Eigenvector centrality value was selected as individual parameters for the variables. The combination of parameters for the variables s and t according to the corresponding parameters represents a separate node (cluster). Also, each node was assigned a corresponding name that corresponded to the product group code. The source code for running the command in the MatLab program looked like this:

```
s = [1 2 3 5 7 7 8 9 9 10];

t = [3 3 4 5 6 9 9 10 10 10];
```

```
names = {'ITEM01', 'ITEM02', 'ITEM03', 'ITEM04', 'ITEM05',
'ITEM06', 'ITEM07', 'ITEM08', 'ITEM09', 'ITEM010'};
G = digraph(s,t,[],names)
```

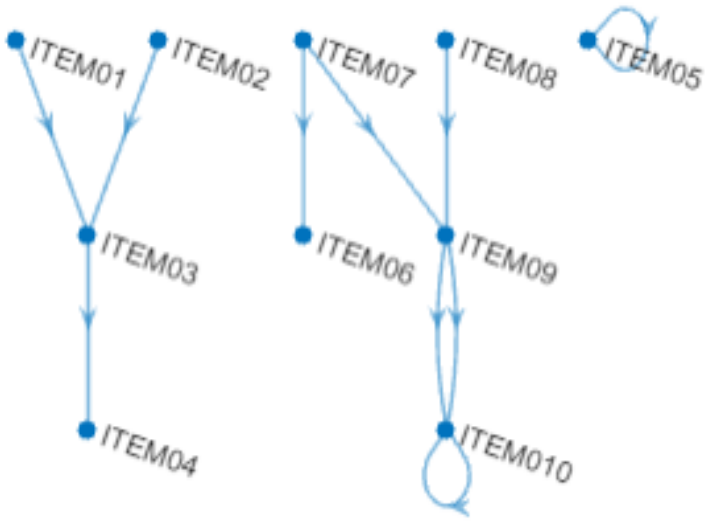
After running the code, the following result was obtained:

```
G =

  digraph with properties:

    Edges: [10×1 table]
    Nodes: [10×1 table]
```

Also, for the purpose of graphical interpretation of the data, a plot was constructed using the following MatLab code:

```
plot(G,'Layout','layered', ...
    'NodeLabel',{ 'ITEM01', 'ITEM02', 'ITEM03', 'ITEM04',
'ITEM05', 'ITEM06', 'ITEM07', 'ITEM08', 'ITEM09', 'ITEM010'})
```

After running the code, the following result was obtained:



Pict. 2.8. Graphic interpretation of PageRank for foreign trade indicators between the United States to China and the rest of the world in 2021

2.2.3 Conclusions

Based on the results of calculations of PageRank values in the MatLab program, the following conclusions can be reached:

Trade restrictions imposed by China on a number of products of the US automotive industry had a negative effect in the form of a drop in exports from the US to China. A particularly sharp drop in exports from the USA to China was observed in 2017-2018, as export volumes decreased by 26.8% during this period. In subsequent years, the decline in exports was not so pronounced. At the same time, the USA managed to successfully displace the Chinese market with the markets of other

regions of the world for such product groups as "Bodies, incl. cabs, for tractors, motor vehicles for the transport of ten or more persons" and "Special purpose motor vehicles".

The high centrality in the direction of exports from China to the rest of the world indicated that Chinese exporters tried to compensate for the partial loss of the US market at the expense of the markets of other countries. Their efforts were successful within the following product groups: Carriages for disabled persons, whether or not motorized or otherwise mechanically propelled; Bicycles and other cycles, incl. delivery tricycles, not motorized; Parts and accessories for tractors, motor vehicles for the transport of ten or more persons.

The high centrality in the direction of exports from China to the US for a number of product groups emphasizes that these products are very important to the US economy. Therefore, the USA increased the export of these groups of goods, which in particular include the item "Parts and accessories for tractors, motor vehicles for the transport of ten or more persons"

The evaluation of PageRank indicators gives reason to conclude that the introduction of certain trade restrictions by the USA on product categories ITEM01 (Special purpose motor vehicles), ITEM02 (Tractors) had an indirect effect on the reduction of exports also for product groups ITEM03 (Carriages for disabled persons) and ITEM04 (Baby carriages and parts thereof). The restriction on the product group ITEM10 (Motor cars and other motor vehicles mainly designed for

the transport of persons) had a negative impact in the form of a reduction in the export of the following related product categories: "Special purpose motor vehicles", "Motorcycles, incl. mopeds, and cycles fitted with an auxiliary motor", "Trailers and semi-trailers" and "Parts and accessories for tractors, motor vehicles for the transport".

2.3 Tech sector (I-O analysis)

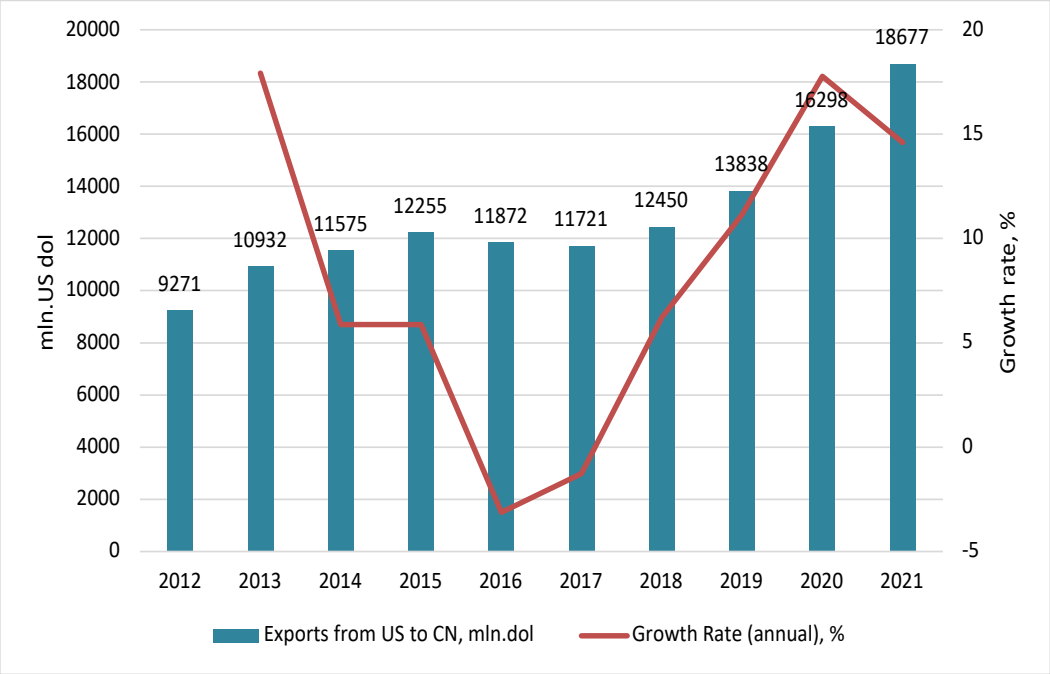
The task of the research in this paragraph is to evaluate the indicators characterizing the indicators of mutual exports between the USA and China in the technology sector. The technology sector includes a number of industries that produce electronics and related goods, as well as services in the field of technology (including engineering services, IT services, etc.). To simplify the analysis, we took only the export indicators for goods from the Tech sector category for research.

The hypothesis of the research in this subsection is that imposed trade restrictions on a number of items of technological products also have a negative impact on the export performance of adjacent product groups. Substitution of export markets in the long term makes it possible to level the situation and improve the balance of foreign trade for the country against which trade sanctions have been imposed.

2.3.1 Analysis of US exports to China and vice versa

In this matter, it is first necessary to consider the dynamics of export volumes of tech industry products from the USA to China, as well as to evaluate the structure of foreign trade in various groups of technological goods. For this purpose, a time series was constructed reflecting exports from the USA to China for 2012-2021 (pict. 2.9).

Statistical data make it possible to conclude that the total volumes of exports of commodities of tech industry from the USA to China had a pronounced upward trend. In 2012-2013, it was possible to observe an increase in exports from 9,271 million dollars to 10,932 million dollars, and in 2013-2014, the increase occurred to 11,575 million dollars. Growth rates of export volumes were 17.9% and 5.9% in 2012-2014, respectively.

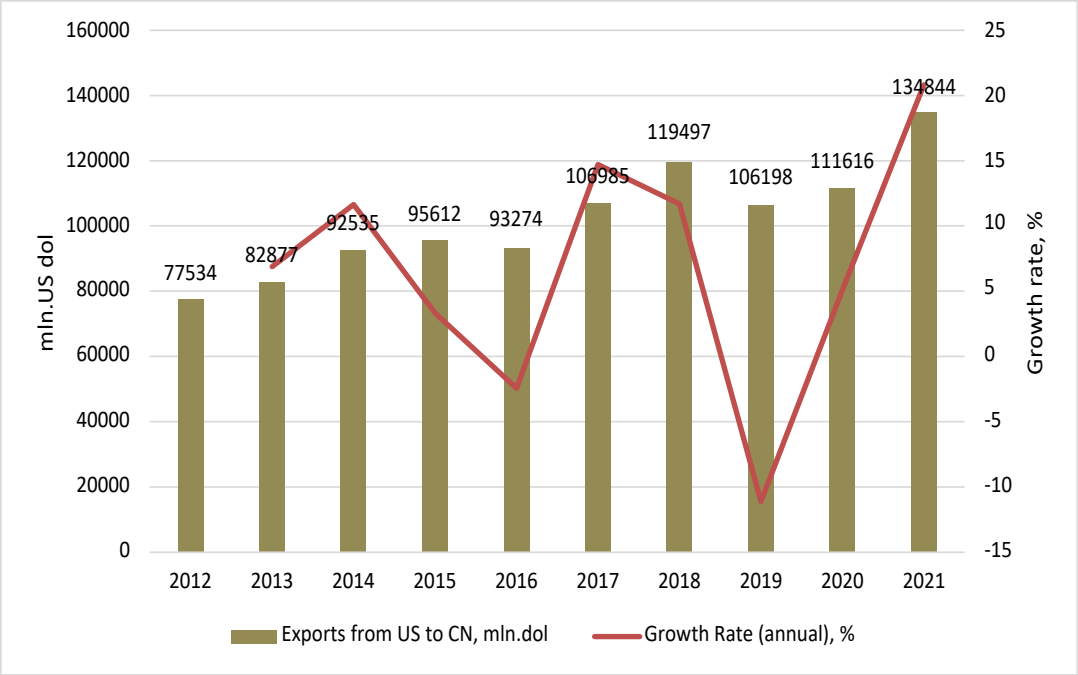


Pict. 2.9. Dynamics of exports of commodities of tech industry from the USA to China for 2012-2021.

In 2014-2015, the growth rate of export volumes in the tech industry was 5.9%. The years 2016-2017 were characterized by a slight stagnation of exports from the USA to China in the tech industry. In 2016, the decrease in exports amounted to 3.1%, and in 2017 - 1.3%. In the subsequent years 2018-2021, the export of the tech industry gradually increased, increasing the positive trend. In 2017-2018, export volumes increased by 6.2%, in 2018-2019 the growth was 11.1%, in 2020 tech industry exports increased by 17.8%, in 2021 the growth was 14.6%. It is worth adding that despite the trade war between the US and China, the latter was still unable to abandon a number of technological American goods. This can be

explained by the high dependence of the Chinese tech industry on American components.

The indicators of exports of tech industry products from China to the USA for 2012-2021 are shown in pict. 2.10.



Pict. 2.10. Dynamics of exports of commodities of tech industry from China to the USA for 2012-2021.

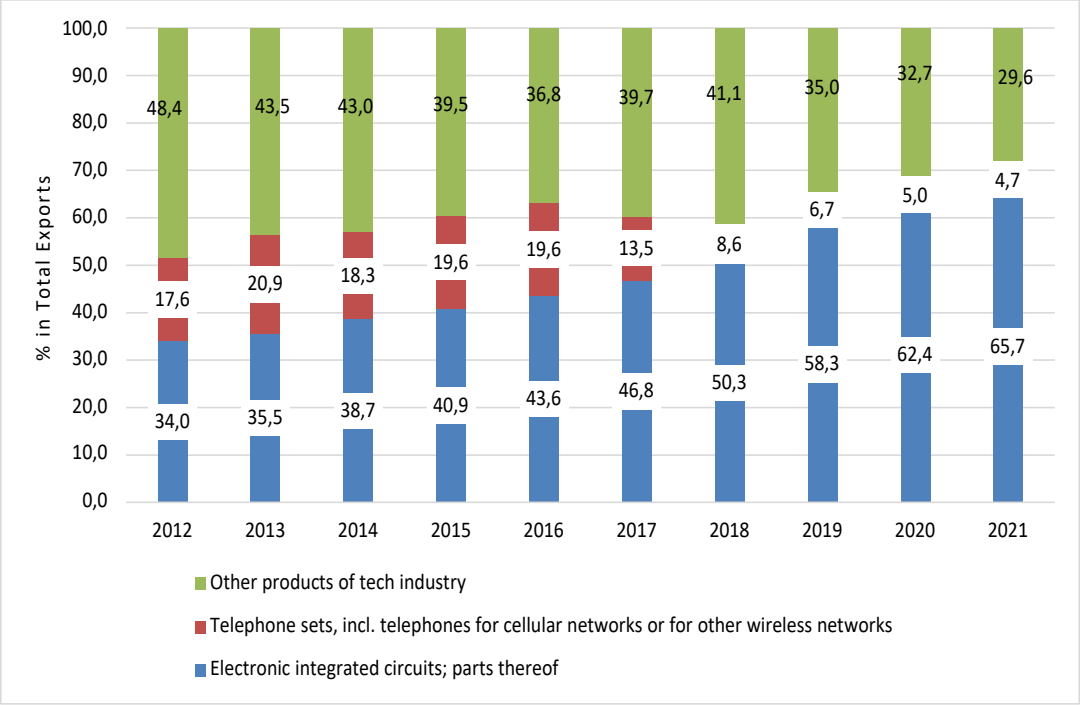
It is worth noting that in the indicators of exports from China to the USA within the framework of the tech industry, it is not possible to identify any stable trend. However, if we take a general look at the dynamics of exports for 2012-2021, it can be seen that a slight decline in the import of products of Chinese tech industry manufacturers to the USA was replaced by a revival of the dynamics of trade. This

is a rather interesting trend, given the repeated statements of US officials about strengthening trade barriers with China. The total volume of tech industry exports from China to the US was less stable compared to US-China exports. In 2012-2015, it was possible to notice the growth of imports into the USA of products of Chinese manufacturers from 77,534 million dollars (2012) to 95,612 million dollars (2015). In particular, in 2012-2013, the growth rate of exports of tech industry products was 6.9%. In 2013-2014, the growth rate of export volumes was 11.7%. In 2015, it was possible to observe an increase in the volume of exports by 3.3%.

In 2016, it was possible to observe a decrease in the volume of exports to 93,274 million dollars, or by 2.4%. In the following year, in 2018, the volume of exports of Chinese manufacturers to the USA began to increase by 14.7%. In 2018-2019, export volumes decreases by 11.7% mainly due to trade restrictions introduced by the Trump administration. The COVID-19 pandemic forced Chinese manufacturers of commodities of tech industry to reduce production volumes in 2020, but this did not affect the decrease in exports to the USA - in 2020, exports increased by 5.1%, and in 2021 there was a significant increase in exports by 20, 8%, which was caused by a certain shortage of Chinese goods in the US market after the first year of the COVID-19 pandemic. The given indicators allow us to conclude that the USA occupied a more stable position on the Chinese market in the commodities of tech industry segment. However, within the US itself there was also a large shortage of Chinese goods due to trade barriers introduced in 2019.

It is also important to consider the structure of exports of commodities of tech industry from the USA to China. The relevant indicators are shown in pict. 2.11.

As can be observed from the statistical data, in general, for the years 2012-2021, the largest specific weight in US exports to China was made up of such product groups as "Electronic integrated circuits; parts thereof" and "Telephone sets, incl. telephones for cellular networks or for other wireless networks". For the product group "Telephone sets, incl. telephones for cellular networks or for other wireless networks" in 2012 accounted for 17.6% of the total volume of exports from the USA to China within the general range of tech industry products.

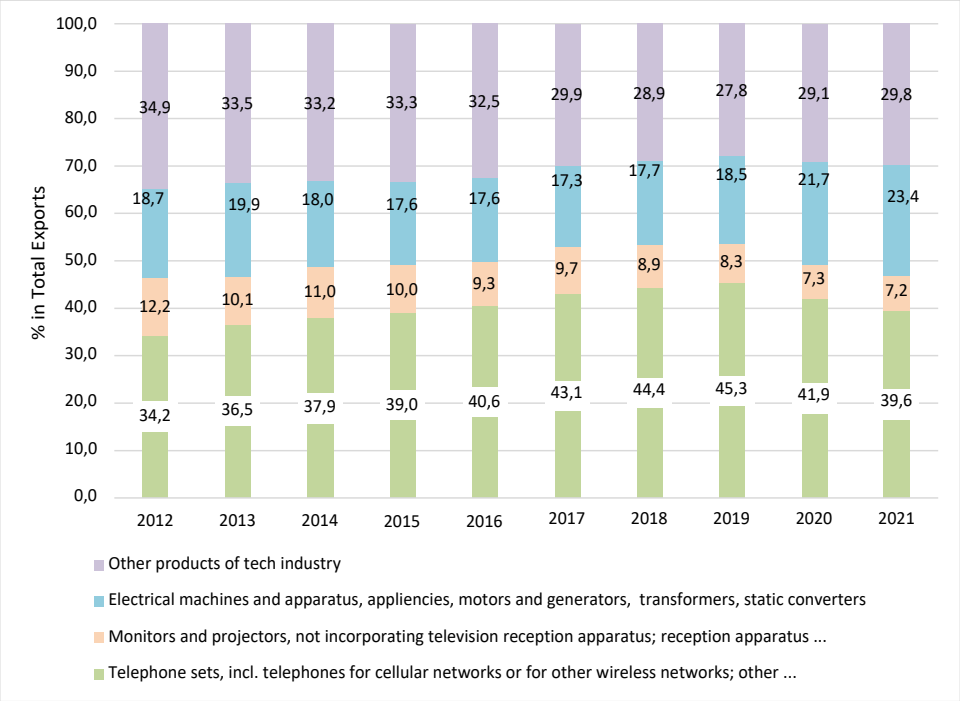


Pict. 2.11. The structure of exports of commodities of tech industry from the USA to China for 2012-2021, %

In 2021, the share of this product group decreased to 4.7%. It is possible to notice the increase in the share of the product group "Electronic integrated circuits; parts thereof" in the overall export structure, starting from 2015. In 2015, the share of this group of goods was 40.9%, in 2018 – 50.3%. In 2021, this product group accounted for 65.7% (it was the maximum during the entire observation period).

Other commodity groups accounted for 30 to 48% of the total volume of US exports within the commodities of tech industry. We can say that the share of other goods in the aggregate has been constantly decreasing, giving way to integrated microcircuits and computer components. Despite the significant scale of China's high-tech industries, this country still remains very vulnerable to the shortage of some important parts of microelectronics. The specificity of the logistics chain in the production of technically complex products is the monopoly of the United States and its partners on some types of spare parts and components of electrical goods. Some problems for the export of finished products are the introduced tariff restrictions.

Consider the structure of exports of commodities of tech industry from China to the USA. The relevant indicators are shown in pict. 2.12.

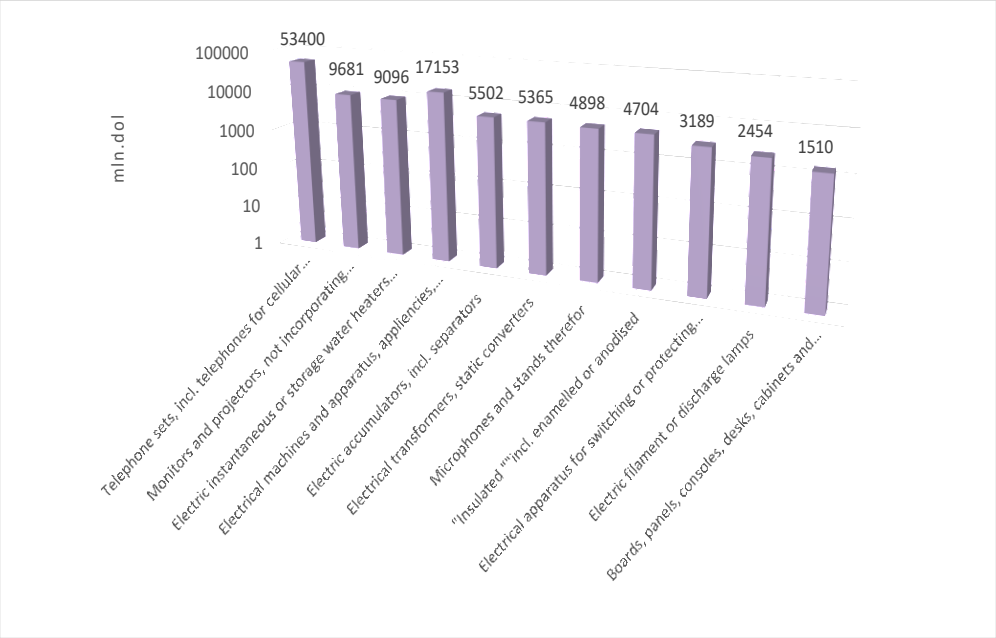


Pict. 2.12. The structure of exports of commodities of tech industry from China to the USA for 2012-2021, %

For the years 2012-2021, the largest specific weight in China's exports to the USA was "Telephone sets, incl. telephones for cellular networks or for other wireless networks". In 2012, this product group accounted for 34.2% of the total volume of exports from China to the USA within the general range of commodities of tech industry. In 2021, the share of this product group increased to 39.6%. Other product groups accounted for 29.8 to 34.9% of the total volume of China's exports within the framework of high-tech industries. It can be concluded that there was an increase in the share of exports of other product items from China to the USA, which include the following: "Electric instantaneous or storage water heaters and

immersion heaters", "Electrical machines and apparatus, appliances, motors and generators", "Electric accumulators", "Electrical transformers, static converters", "Microphones and stands therefor", "Electrical apparatus for switching or protecting electrical circuits, or for making connections", "Electric filament or discharge lamps".

It is also important to pay attention to the indicators of the rating of various products in the structure of the formation of exports within the framework of products of high-tech industries (pict. 2.13).



Pict. 2.13. The ranking of exports of commodities of tech industry from the USA to China in 2021

As we can see, the positions "Telephone sets, incl. telephones for cellular networks or for other wireless networks", "Monitors and projectors, not incorporating

television reception apparatus", "Electric instantaneous or storage water heaters and immersion heaters", "Electrical machines and apparatus, appliances, motors and generators", "Electric accumulators, incl. Separators", "Electrical transformers, static converters", "Microphones and stands therefor" were the main ones in the structure of American exports of tech industry products.

2.3.2 Input-Output analysis of bilateral US-CN exports

Subsequently, the Input-Output matrix was constructed. Using the EIG method in the MATLAB program, eigenvector centrality values were determined for indicators of exports from the USA to China and other regions of the world. For different years, these values are listed below in the table. 2.3.

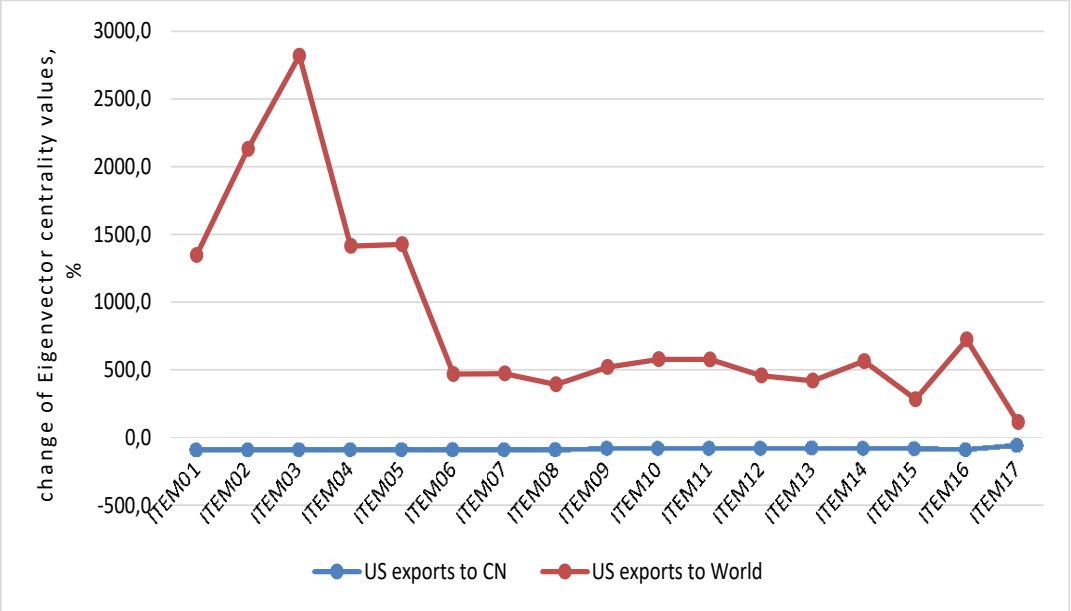
Table 2.3 – Eigenvector centrality values for indicators of exports of commodities of tech industry from the USA to China and other countries of the world for 2012-2021.

Item group	Item code	US exports to CN			US exports to rest World (except CN)		
		e2012	e2021	Δ%	e2012	e2021	Δ%
Electronic integrated circuits; parts thereof	ITEM01	0,0695	0,0028	-96,0	0,0044	0,0637	1347,7
Telephone sets, incl. telephones for cellular networks or for other wireless networks	ITEM02	0,0954	0,003	-96,9	0,0051	0,1138	2131,4

Diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices	ITEM03	0,1235	0,0065	-94,7	0,0053	0,1548	2820,8
Electrical apparatus for switching or protecting electrical circuits, or for making connections	ITEM04	0,1365	0,0067	-95,1	0,0103	0,156	1414,6
Electric motors and generators (excluding generating sets)	ITEM05	0,1374	0,007	-94,9	0,0117	0,1786	1426,5
Boards, panels, consoles, desks, cabinets and other bases, equipped with two or more apparatus	ITEM06	0,1497	0,0078	-94,8	0,0359	0,204	468,2
"Discs, tapes, solid-state non-volatile storage devices, ""smart cards"" and other media for	ITEM07	0,1541	0,0082	-94,7	0,0439	0,2513	472,4
"Insulated ""incl. enamelled or anodised"" wire, cable ""incl. coaxial cable"" and other insulated	ITEM08	0,1824	0,0083	-95,4	0,0525	0,2586	392,6
Electrical transformers, static converters, e.g. rectifiers, and inductors; parts thereof	ITEM09	0,255	0,0365	-85,7	0,0647	0,4016	520,7
Industrial or laboratory electric furnaces and ovens, incl. those functioning by induction	ITEM10	0,285	0,0455	-84,0	0,0732	0,4959	577,5

"Electrical capacitors, fixed, variable or adjustable ""pre-set""; parts thereof"	ITEM11	0,3233	0,0482	-85,1	0,0857	0,5799	576,7
Parts suitable for use solely or principally with transmission and reception apparatus	ITEM12	0,3255	0,0501	-84,6	0,1188	0,6617	457,0
Printed circuits	ITEM13	0,346	0,0617	-82,2	0,1324	0,6878	419,5
Electric sound or visual signalling apparatus, e.g. bells, sirens, indicator panels	ITEM14	0,4479	0,07	-84,4	0,1434	0,9533	564,8
Electrical ignition or starting equipment of a kind used for spark-ignition or compression-ignition	ITEM15	0,6712	0,0874	-87,0	0,2564	0,9812	282,7
Monitors and projectors, not incorporating television reception apparatus; reception apparatus	ITEM16	1,6328	0,0882	-94,6	0,3749	3,0895	724,1
Electric generating sets and rotary converters	ITEM17	3,1521	1,2265	-61,1	1,8982	4,0552	113,6

It is also important to compare the Eigenvector centrality values for two options: the first option refers to the volume of exports of tech industry products from the USA to China, and the second option refers to exports from the USA to other countries, excluding China. The comparison is shown in pict. 2.14.



Pict. 2.14. Change in Eigenvector centrality values for indicators of exports from the USA to China and other countries of the world (excluding China),%

It can be concluded that changes in Eigenvector centrality for indicators expressing exports from the US to China indicated a high level of sustainability of US exports to China. There were almost no significant changes in Eigenvector centrality indicators for each type of product. The value of Eigenvector centrality in 2021 for a number of products decreased by 60-90% compared to 2012. A different situation is observed in the Eigenvector centrality indicators for exports from the USA to other regions of the world (excluding China). By goods ITEM01 (Electronic integrated circuits; parts thereof", ITEM02 (Telephone sets, incl. telephones for cellular networks or for other wireless networks) and ITEM03 (Diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices)

positions of the USA on the markets of other countries As for the rest of the goods, there was also an increase in the positions of the US, but this strengthening was of a less pronounced nature.

It can be concluded that the rate of decrease of Eigenvector centrality for the export direction US → CN was consistently less than 0. At the same time, the Eigenvector values for exports in the direction US → World (except CN) had positive values. The given indicators allow us to conclude that the USA tried to replace partially lost niches in the Chinese market. For the main product positions in the tech industry segment, this task was successful and even exceeded. A decrease in the stability of exports from the USA to other countries could be observed only in the position "Electric generating sets and rotary converters".

In the table 2.4. the indicators of the dynamics of Eigenvector centrality values for the volumes of exports of various products of the automotive sector from China to the USA and other countries of the world for 2012-2021 are given.

Table 2.4 – Eigenvector centrality values for indicators of exports of tech industry products from China to the USA and other countries of the world for 2012-2021.

Item group	Item code	CN exports to US			CN exports to rest World (except US)		
		e2012	e2021	Δ%	e2012	e2021	Δ%
Telephone sets, incl. telephones for cellular networks or	ITEM01	0,0818	0,0565	-30,9	0,0504	0,0237	-53,0

for other wireless networks							
Monitors and projectors, not incorporating television reception apparatus	ITEM02	0,0942	0,0744	-21,0	0,0706	0,03447	-51,2
Electric instantaneous or storage water heaters and immersion heaters	ITEM03	0,1045	0,0772	-26,1	0,144	0,0648	-55,0
Electrical machines and apparatus, appliencies, motors and generators	ITEM04	0,108	0,081	-25,0	0,187	0,0707	-62,2
Electric accumulators, incl. separators	ITEM05	0,1303	0,1147	-12,0	0,2446	0,0952	-61,1
Electrical transformers, static converters	ITEM06	0,1324	0,147	11,0	0,2928	0,1611	-45,0
Microphones and stands therefor	ITEM07	0,1465	0,151	3,1	0,3075	0,11806	-61,6
"Insulated ""incl. enamelled or anodised	ITEM08	0,1475	0,2454	66,4	0,3776	0,1957	-48,2
Electrical apparatus for switching or protecting electrical circuits, or for making connections	ITEM09	0,1733	0,3189	84,0	0,7147	0,2308	-67,7

Electric filament or discharge lamps	ITEM10	0,21	0,4704	124,0	0,8125	0,248	-69,5
Boards, panels, consoles, desks, cabinets and other bases, equipped with two or more apparatus	ITEM11	0,2739	0,4898	78,8	0,818	0,2812	-65,6
Electronic integrated circuits; parts thereof	ITEM12	0,2849	0,5365	88,3	0,9742	0,3027	-68,9
Parts suitable for use solely or principally with transmission and reception apparatus	ITEM13	0,336	0,5502	63,8	1,3631	0,343	-74,8
Diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices	ITEM14	0,4143	0,9096	119,6	2,1293	0,4798	-77,5
Parts suitable for use solely or principally with electric motors and generators	ITEM15	0,6992	0,9681	38,5	2,1456	0,4858	-77,4
Reception apparatus for radio-broadcasting, whether or not combined, in the same housing	ITEM16	0,9493	1,7153	80,7	2,6226	1,5383	-41,3

Video recording or reproducing apparatus, whether or not incorporating a video tuner	ITEM17	2,6512	5,34	101,4	5,4831	2,0424	-62,8

In the table 2.4 dynamics of Eigenvector centrality for indicators expressing exports from China to the USA have certain differences from the behavior of the indicator in the table. 2.3. Changes in centrality values for exports in the direction CN → US are more positive, compared to changes in the same indicator for exports in the direction CN → World (except US). At the same time, the rate of decrease of Eigenvector centrality for indicators of exports from China to other regions of the world (compared to the USA) was significantly lower compared to the indicators characterizing Eigenvector centrality for indicators of exports from China to the USA. For some goods that were exported from China to the USA, the change in Eigenvector centrality values had a positive value. Such goods included the following:

- Electrical transformers, static converters – the change was +11.0%;
- Microphones and stands therefor – the change was +3.1%;
- Insulated ""incl. enamelled or anodised – the change was +66.4%;
- Electrical apparatus for switching or protecting electrical circuits, or for making connections – the change was +84.0%;
- Electric filament or discharge lamps – the change was +124.0%;

- Boards, panels, consoles, desks, cabinets and other bases, equipped with two or more apparatus – the change was +78.8%;

- Electronic integrated circuits; parts thereof – the change was +88.3%;

- Parts suitable for use solely or mainly with transmission and reception apparatus – the change was +63.8%;

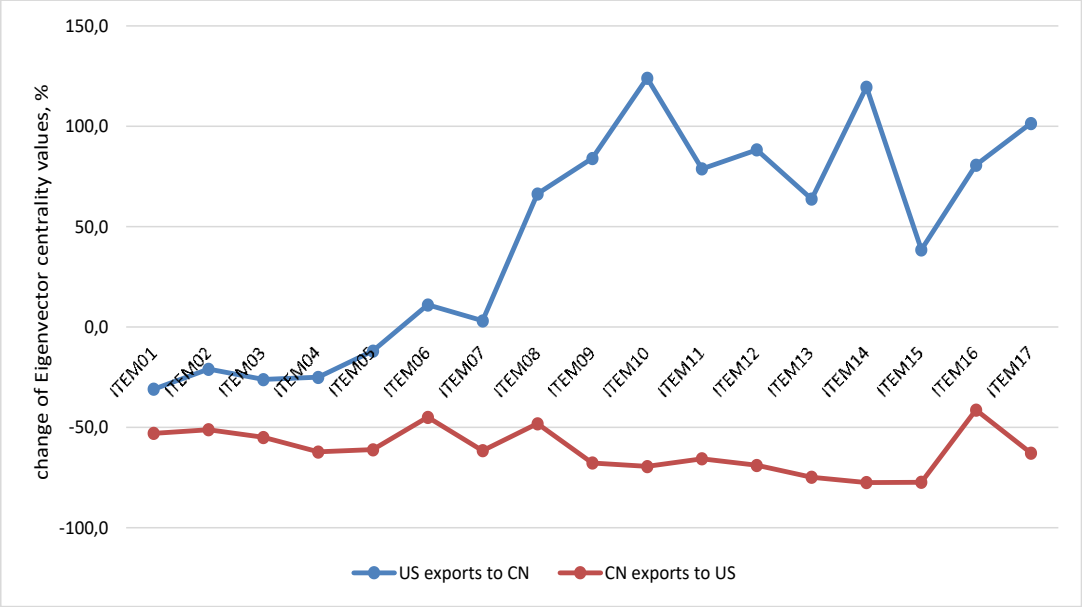
- Diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices – the change was +119.6%;

- Parts suitable for use solely or principally with electric motors and generators – the change was +38.5%;

- Reception apparatus for radio-broadcasting, whether or not combined, in the same housing – the change was +80.7%.

The given dynamics make it possible to draw conclusions about the growth of exports of the above-mentioned goods from China to the USA despite existing trade restrictions. For the Eigenvector centrality values, which related to the export of tech industry products from China to other regions of the world (except the USA), the values of the rates of change in 2012-2021 were always below 0.

On pict. 2.15 shows a comparison of the change in Eigenvector centrality for two groups of indicators - the first group characterizes exports from the USA to China, the second group contains data on exports from China to the USA.



Pict. 2.15. Comparison of changes in Eigenvector centrality values for export indicators from the USA to China and vice versa

As evidenced by the results of the assessment of changes in Eigenvector centrality indicators, the impact of trade restrictions on the export of tech industry products between the United States and China had an asymmetric nature. The decrease in exports from China to the United States due to the introduced trade barriers was not accompanied by a similar decrease in the volume of exports from the United States for the same type of goods. This suggests that the goods exported by the USA constitute mainly intermediate consumption and fill the links of the production cycle on the territory of China. On the other hand, products exported from China are ready-made and do not require additional processing (assembly). Asymmetry in the application of trade restrictions was most characteristic of the following product

groups: "Insulated ""incl. enamelled or anodised"" wire, cable ""incl. coaxial cable"" and other insulated", "Electrical transformers, static converters, e.g. rectifiers, and inductors; parts thereof", "Industrial or laboratory electric furnaces and ovens, incl. those functioning by induction", "Electrical capacitors, fixed, variable or adjustable ""pre-set""; parts thereof", "Parts suitable for use solely or principally with transmission and reception apparatus", "Printed circuits", "Electric sound or visual signaling apparatus, e.g. bells, sirens, indicator panels", "Electrical ignition or starting equipment of a kind used for spark-ignition or compression-ignition", "Monitors and projectors, not incorporating television reception apparatus; reception apparatus".

After that, PageRank was evaluated in the MatLab program in order to identify internal interdependencies between the export of various commodity groups of tech industry products from the USA to China and other countries. The source code for running the command in the MatLab program looked like this:

```
s = [1 1 1 1 1 1 1 1 4 5 5 6 7 7 9 9 9];

t = [1 1 1 2 2 5 6 7 7 7 7 8 8 8 9 9 9];

names = {'ITEM01', 'ITEM02', 'ITEM03', 'ITEM04', 'ITEM05', 'ITEM06', 'ITEM07', 'ITEM08', 'ITEM09',

'ITEM010', 'ITEM011', 'ITEM012', 'ITEM013', 'ITEM014', 'ITEM015', 'ITEM016', 'ITEM017'};

G = digraph(s,t,[],names)
```

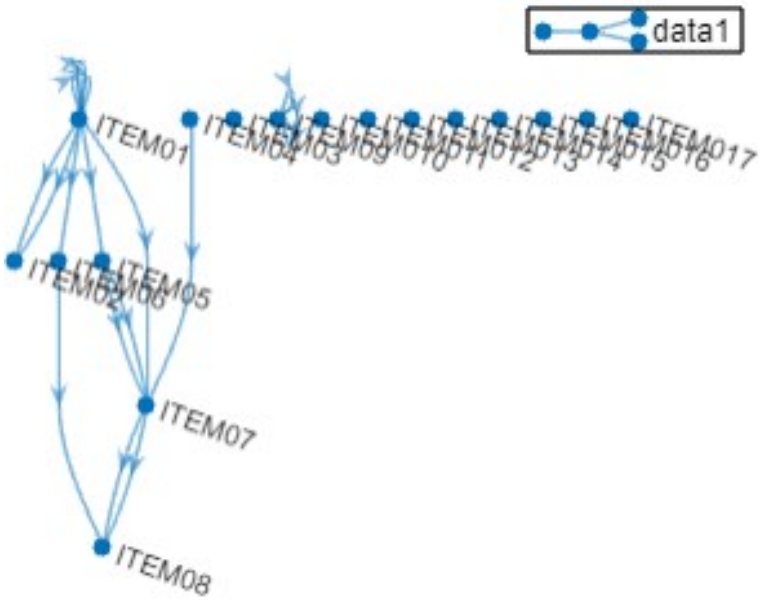
After running the code, the following result was obtained:

```
G =

  digraph with properties:

    Edges: [17×1 table]
    Nodes: [17×1 table]
```

Also, for the purpose of graphical interpretation of the data, a plot was constructed using the following MatLab code:

```
plot(G,'Layout','layered', ...
    'NodeLabel',{ 'ITEM01', 'ITEM02', 'ITEM03', 'ITEM04', 'ITEM05',
'ITEM06', 'ITEM07', 'ITEM08', 'ITEM09', 'ITEM010', 'ITEM011', 'ITEM012',
'ITEM013', 'ITEM014', 'ITEM015', 'ITEM016', 'ITEM017'})
```

After running the code, the following result was obtained:



Pict. 2.16. Graphic interpretation of PageRank for foreign trade indicators between the United States to China and the rest of the world in 2021

The conducted PageRank analysis for indicators of foreign trade between the USA to China and the rest of the world allows us to conclude about the impact of restrictions on the export of product groups 'ITEM01', 'ITEM02', 'ITEM04' and 'ITEM06' on the export of such goods as ITEM07' and ' ITEM08'. For the rest of the product groups, trade restrictions, as can be seen from the graph, had a cyclical nature. This means that the restrictions imposed by the country on the export of the corresponding category of goods simply led to a reduction in exports on the part of this country.

2.3.3 Conclusions

Based on the results of calculations of PageRank values in the MatLab program, the following conclusions can be reached:

The USA held a more stable position on the Chinese market in the commodities of tech industry segment. However, within the US itself there was also a large shortage of Chinese goods due to trade barriers introduced in 2019.

The conducted analysis allows us to conclude that the USA tried to replace partially lost niches in the Chinese market. For the main product positions in the tech industry segment, this task was successful and even exceeded. A decrease in the stability of exports from the USA to other countries could be observed only in the position "Electric generating sets and rotary converters".

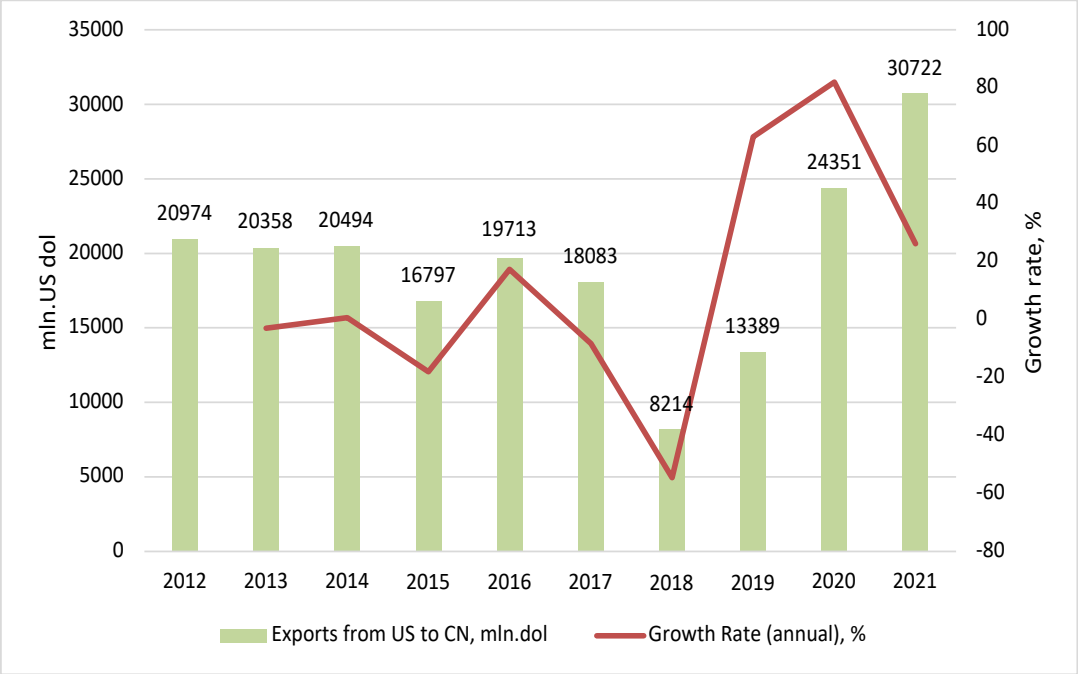
2.4 Agriculture sector (I-O analysis)

This paragraph analyzes indicators of foreign trade between the United States and China in the field of agricultural production. The agricultural sector includes a number of industries that manufacture both raw materials for khachry products and directly processed agricultural products.

The research hypothesis in this section is that the USA has certain advantages in exporting products of the agrarian sector of the economy to the US markets. China tried to substitute American goods due to imposed trade restrictions, but food shortages and the consequences of the COVID-19 pandemic did not allow it to effectively substitute products from the United States.

2.4.1 Analysis of US exports to China and vice versa

At the initial stage of the research, an analysis of the dynamics of agricultural sector export volumes from the USA to China was carried out. Important attention was paid to the analysis of the structure of foreign trade in different groups of food industry products. For this purpose, a time series was constructed reflecting exports from the USA to China for 2012-2021 (pict. 2.17).



Pict. 2.17. Dynamics of exports of commodities of agriculture sector from the USA to China for 2012-2021.

It can be seen that during 2012-2018 the volume of exports of agricultural products from the USA to China had a stable negative trend. At the same time, a very sharp drop in foreign trade with China was observed precisely in 2018, when China imposed numerous restrictions on the import of American food products. In 2012-2014, it was possible to observe relatively stable indicators of the volume of export of agricultural raw materials and food to China - the average volume per year was about 20 billion dollars. In 2015, there was the first sharp drop in exports to the level of 17 billion dollars. The rate of change in export volumes was -18%, respectively. The years 2016-2017 were characterized by a partial recovery of

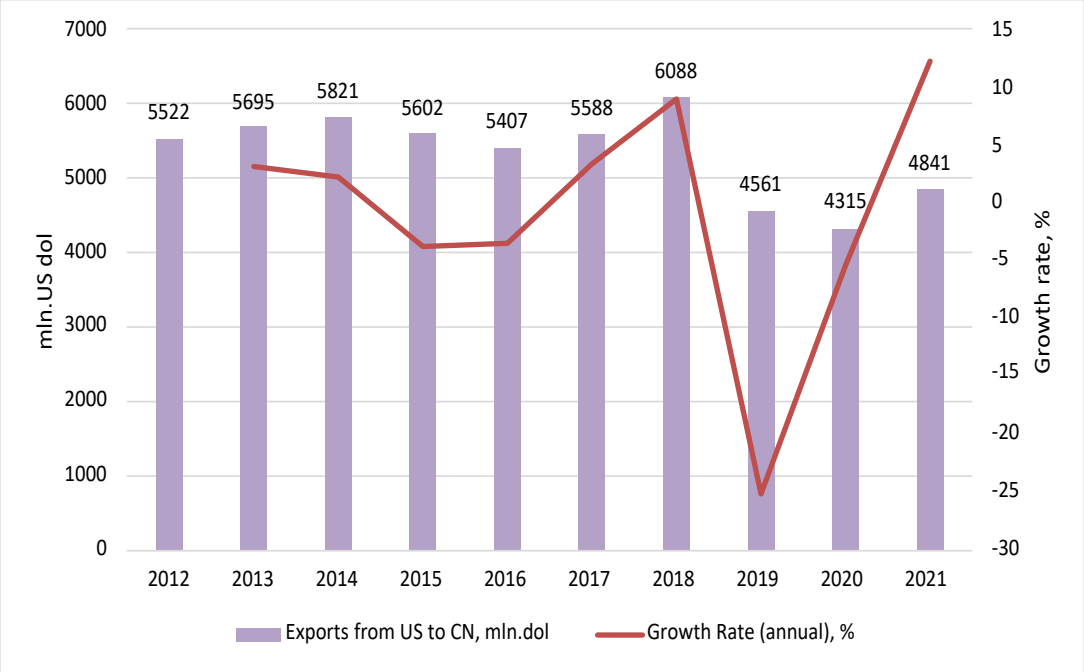
export potential from the USA to China in the agriculture sector. In 2016, export growth amounted to 17.4%, and in 2017, the situation changed again, with a decrease in exports by 8.3%. A very sharp decline in exports can be seen in 2018, which generally reflected the impact of trade restrictions from China.

In the subsequent years 2019-2021, the export of the agriculture sector gradually increased, increasing the positive trend. In 2018-2019, export volumes increased by 63.0%, in 2019-2020 the growth was 81.9%, in 2021 the growth was 26.2%. Despite the trade war between the United States and China, in 2021 it was possible to see the maximum volume of exports of American products to the Chinese market for the entire study period from 2012 to 2021. This can be explained by the high dependence of the Chinese food market on American producers.

Indicators of exports of agriculture sector products from China to the USA for 2012-2021 are shown in pict. 2.18.

A greater level of stability can be observed in the export of Chinese agricultural products to the USA, compared to the situation of American exports to China. During 2012-2018, the total volume of Chinese exports to the US market fluctuated within 20% and did not exceed 5-6 billion dollars annually. Since 2019, export volumes have decreased, which was a consequence of the strengthening of trade restrictions. For example, in 2019, the volume of exports of Chinese manufacturers to the US market decreased by 25.1%. This decrease was the maximum for the

entire period from 2012 to 2021. In 2020, an additional decrease of 5.4% could be observed.



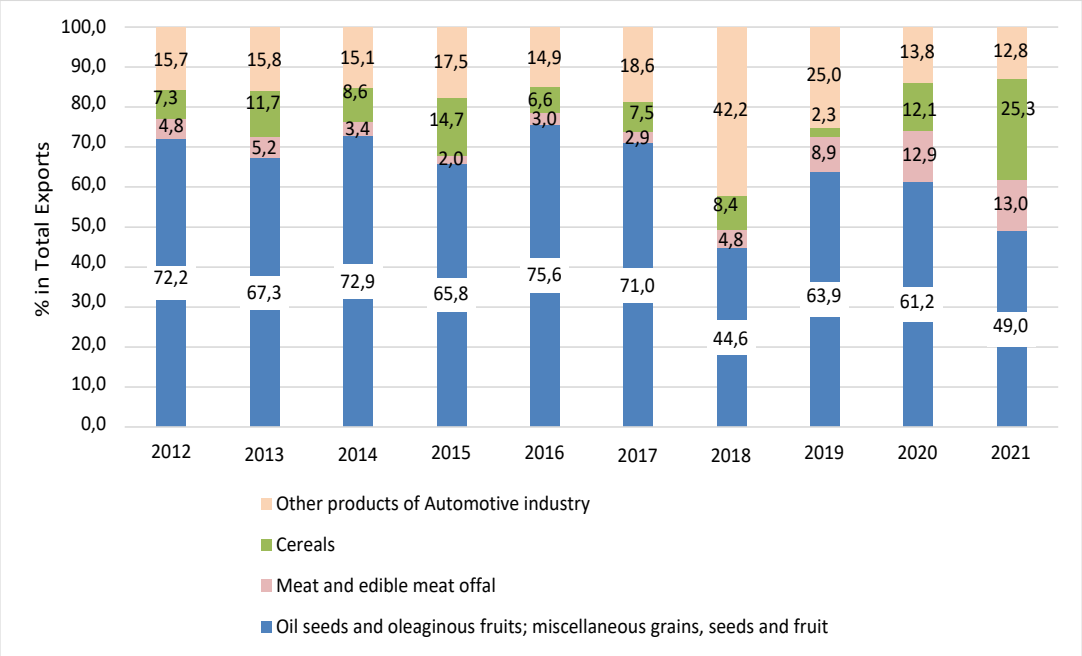
Pict. 2.18. Dynamics of exports of commodities of agriculture sector from China to the USA for 2012-2021.

However, in 2021, a positive trend in the volume of exports of agricultural products from China has already been outlined. For this year, exports increased by 12.2%, reaching 4.8 billion dollars.

It can be seen that the volumes of exports of the agriculture sector from China to the USA were more stable compared to exports in the USA-China direction. The COVID-19 pandemic has led to the deterioration of logistics chains in the production of agricultural products, which forced Chinese producers of

commodities of agriculture sector to reduce production volumes in 2020. In our opinion, this can be considered one of the main reasons for the decline in Chinese exports to the US. The given indicators allow us to conclude that China occupied a more stable position on the US market in the commodities of agriculture sector segment. However, China still remains very dependent on American imports, which is largely due to the shortage of food in the country's market.

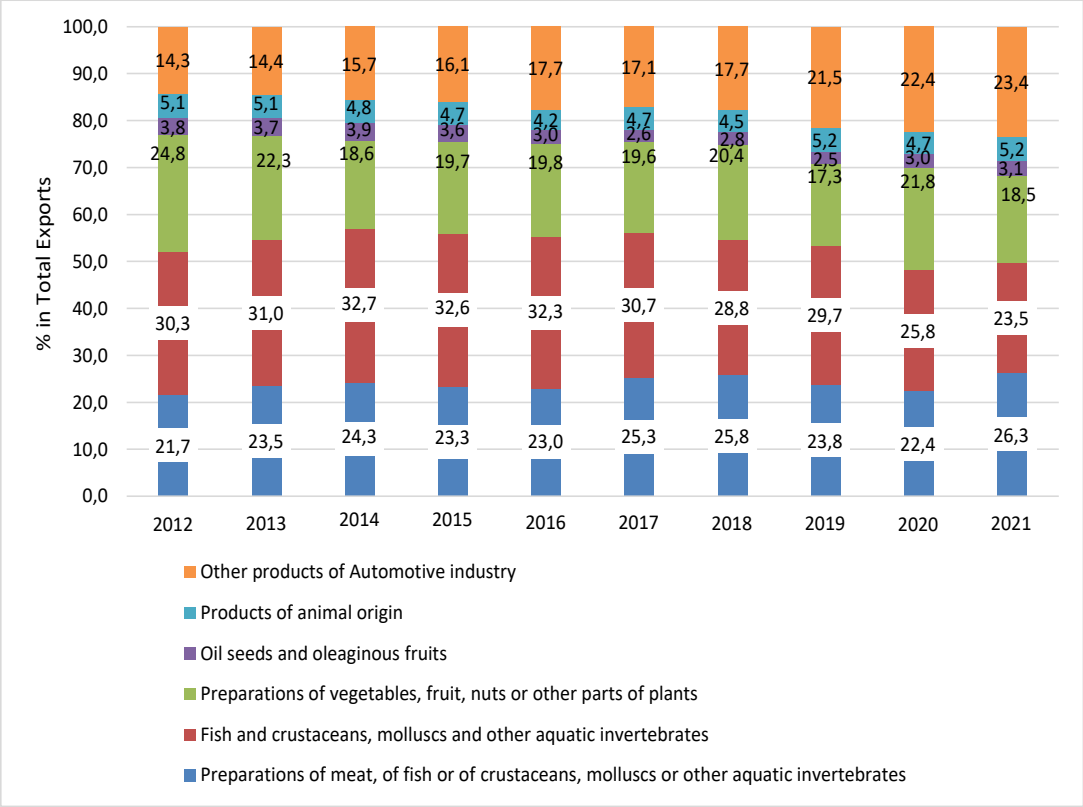
It is also important to consider the structure of exports of commodities of agriculture sector from the USA to China. The relevant indicators are shown in pict. 2.19.



Pict. 2.19. The structure of exports of commodities of agriculture sector from the USA to China for 2012-2021, %

As can be observed from the statistical data, in general, for the years 2012-2021, the largest specific weight in US exports to China was made up of such product groups as "Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit", "Fish and crustaceans, molluscs and other aquatic invertebrates", "Meat and edible meat offal", "Cereals". For the product group "Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit" in 2012 accounted for 72.2% of the total volume of exports from the USA to China within the general range of agriculture sector products. In 2021, the share of this product group decreased to 49.9%. It is possible to notice the increase in the share of the "Cereals" product group in the overall structure of exports, starting from 2018. In 2012, the share of this group of goods was 7.3%, in 2018 – 8.4%. In 2021, this product group accounted for 25.3% (it was the maximum during the entire observation period).

Let's consider the structure of exports of commodities of agriculture sector from China to the USA. The relevant indicators are shown in pict. 2.20.



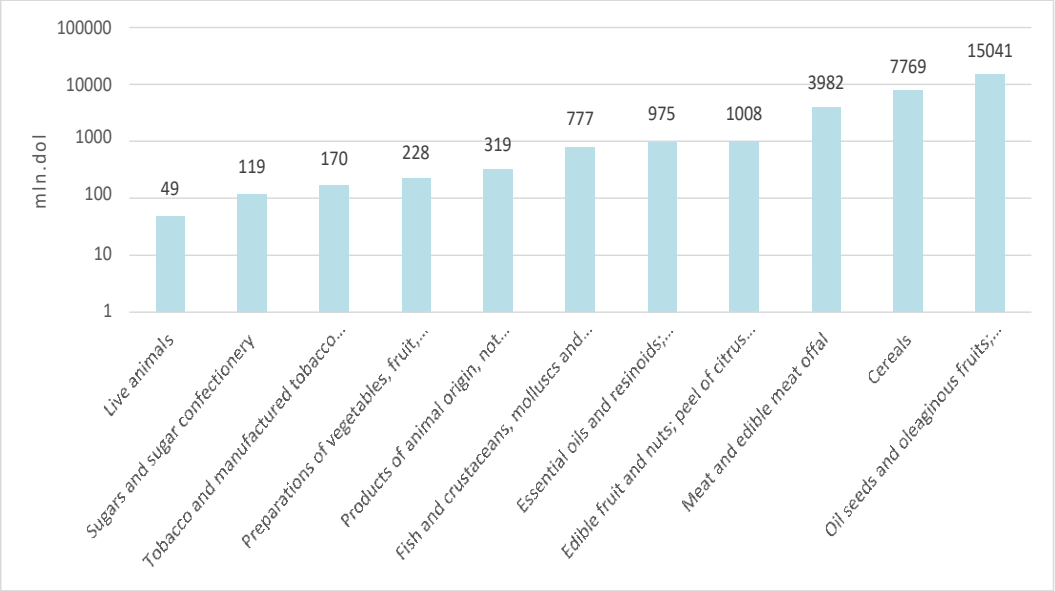
Pict. 2.20. Structure of exports of commodities of agriculture sector from China to the USA for 2012-2021, %

For the years 2012-2021, the largest specific weight in China's exports to the USA was "Fish and crustaceans, molluscs and other aquatic invertebrates". In 2012, this commodity group accounted for 30.3% of the total volume of exports from China to the USA within the general range of commodities of agriculture sector. In 2021, the share of the given product group decreased to 23.5%, giving way to another product group - "Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates". Other product groups accounted for 14.3 to 23.4% of China's

total agricultural exports. It can be concluded that there was an increase in the share of exports of other commodity items from China to the USA, which include the following: "Beverages, spirits and vinegar", "Wool, fine or coarse animal hair; horsehair yarn and woven fabric", "Cocoa and cocoa preparations", "Silk", "Vegetable plaiting materials; vegetable products not elsewhere specified or included", "Live animals", "Meat and edible meat offal", "Tobacco and manufactured tobacco substitutes".

It can be said that the share of other goods as a whole remained relatively stable, but the exception is 2018, when 42% of exports were concentrated in other groups of goods that are different from those listed above. Other commodity groups accounted for 12.8 to 42% of the total volume of US exports within the commodities of agriculture sector. It can be assumed that the trade restrictions on exports to China from the USA on a number of types of agricultural products could be compensated by the fact that China began to more actively import other types of products that could replace the corresponding goods. China's economy remains highly vulnerable to fluctuations in food supply chains. We can also see that China is dependent on imports of American grain products and products of the oil industry.

It is also important to pay attention to the indicators of the rating of various goods in the structure of the formation of exports within the framework of products of high-tech industries (pict. 2.21).



Pict. 2.21. Ranking of exports of commodities of agriculture sector from the USA to China in 2021

As we can see, the structure of American exports of agricultural products was dominated by the following commodity positions: "Fish and crustaceans, molluscs and other aquatic invertebrates", "Essential oils and resinoids; perfumery, cosmetic or toilet preparations", "Edible fruit and nuts; peel of citrus fruit or melons", "Meat and edible meat offal", "Cereals", "Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit".

2.4.2 Input-Output analysis of bilateral US-CN exports

Using the EIG method in the MATLAB program, eigenvector centrality values were determined for indicators of the export of agricultural products from the USA

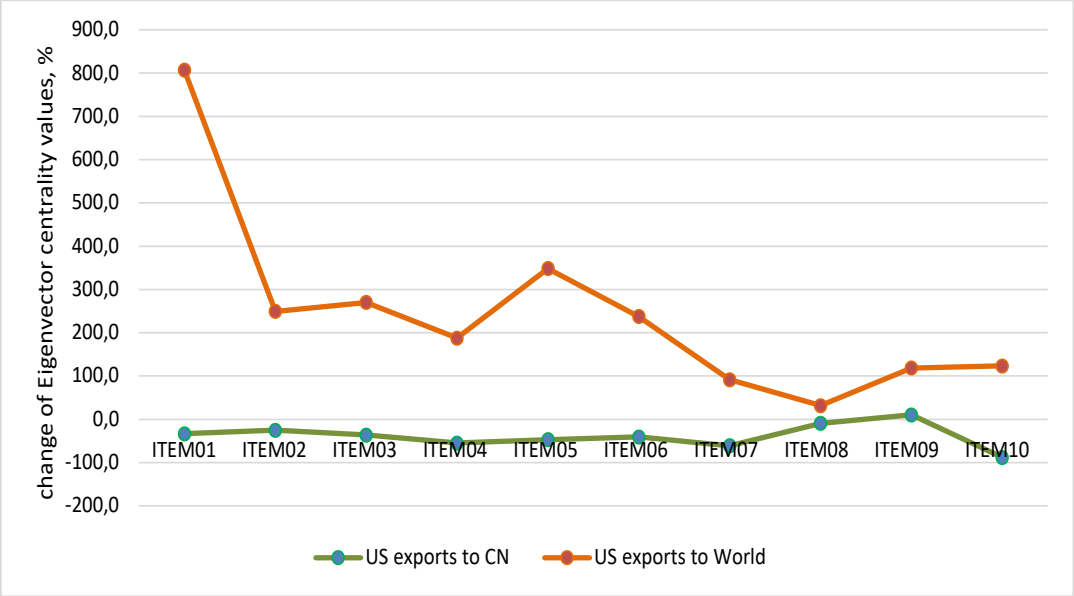
to China and other regions of the world. For different years, these values are listed below in the table. 2.5.

Table 2.5 – Eigenvector centrality values for indicators of exports of commodities of agriculture sector from the USA to China and other countries of the world for 2012-2021.

Item group	Item code	US exports to CN			US exports to rest World (except CN)		
		e2012	e2021	Δ%	e2012	e2021	Δ%
Coffee, tea, maté and spices	ITEM01	0,0021	0,0014	-33,3	0,0102	0,0925	806,9
Ships, boats and floating structures	ITEM02	0,0036	0,0027	-25,0	0,0285	0,0996	249,5
Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	ITEM03	0,005	0,0032	-36,0	0,0292	0,1081	270,2
Cocoa and cocoa preparations	ITEM04	0,0073	0,0033	-54,8	0,0427	0,1229	187,8
Preparations of cereals, flour, starch or milk; pastrycooks' products	ITEM05	0,0077	0,0041	-46,8	0,0432	0,1938	348,6
Animal or vegetable fats and oils and their cleavage products; prepared edible fats	ITEM06	0,0081	0,0048	-40,7	0,0574	0,1939	237,8
Live animals	ITEM07	0,0125	0,0049	-60,8	0,1191	0,2283	91,7
Sugars and sugar confectionery	ITEM08	0,0131	0,0119	-9,2	0,1747	0,2301	31,7

Tobacco and manufactured tobacco substitutes	ITEM09	0,0154	0,017	10,4	0,1869	0,4084	118,5
Preparations of vegetables, fruit, nuts or other parts of plants	ITEM10	0,0191	0,00228	-88,1	0,189	0,4223	123,4
Products of animal origin, not elsewhere specified or included	ITEM11	0,0261	0,0319	22,2	0,2412	0,4273	77,2
Fish and crustaceans, molluscs and other aquatic invertebrates	ITEM12	0,0354	0,0777	119,5	0,3106	0,4781	53,9
Essential oils and resinoids; perfumery, cosmetic or toilet preparations	ITEM13	0,0538	0,0975	81,2	0,3216	1,2587	291,4
Edible fruit and nuts; peel of citrus fruit or melons	ITEM14	0,1002	0,1008	0,6	0,327	1,4087	330,8
Meat and edible meat offal	ITEM15	0,1114	0,3982	257,5	0,4375	1,8021	311,9
Cereals	ITEM16	0,1535	0,7769	406,1	1,2687	1,8224	43,6
Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit	ITEM17	1,5147	1,5041	-0,7	2,3436	2,2777	-2,8

For Eigenvector centrality values, two calculation options were compared: the first option refers to the volume of exports of agriculture sector products from the USA to China, and the second option refers to exports from the USA to other countries, excluding China. The comparison is shown in pict. 2.22.



Pict. 2.22. Change in Eigenvector centrality values for indicators of exports from the USA to China and other countries of the world (excluding China),%

Changes in Eigenvector centrality for indicators expressing the export of agricultural products from the USA to China indicate ambiguity in the dynamics of trade flows. For most goods, the value of Eigenvector centrality in the export direction US → CN could be observed with negative values of growth. The value of Eigenvector centrality in 2021 for a number of products decreased by 30-80% compared to 2012. In particular, it can be assumed that the introduction of additional trade restrictions affected the reduction of Eigenvector centrality for US exports in the following product groups:

- "Coffee, tea, maté and spices" - reduction by 33.3%;
- "Ships, boats and floating structures" - reduction by 25.0

- "Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates" - reduction by 36.0

- "Cocoa and cocoa preparations" - reduction by 54.8

- "Preparations of cereals, flour, starch or milk; pastrycooks' products" - reduction by 46.8

- "Animal or vegetable fats and oils and their cleavage products; prepared edible fats" - reduction by 40.7%

- "Live animals" - reduction by 60.8%

- "Preparations of vegetables, fruit, nuts or other parts of plants" - reduction by 88.1%.

However, along with the reduction of exports in a number of positions, some product groups were not limited in exports. According to these product groups, it is possible to notice the growth of the export potential of the USA in the Chinese market. These groups include the following:

- "Tobacco and manufactured tobacco substitutes" - growth of Eigenvector centrality by 10.4%;

- "Products of animal origin, not elsewhere specified or included" - growth of Eigenvector centrality by 22.2%;

- "Fish and crustaceans, molluscs and other aquatic invertebrates" - growth of Eigenvector centrality by 119.5%;

- "Essential oils and resinoids; perfumery, cosmetic or toilet preparations" - growth of Eigenvector centrality by 81.2%;

- "Edible fruit and nuts; peel of citrus fruit or melons" - growth of Eigenvector centrality by 0.6%;

- "Meat and edible meat offal" - growth of Eigenvector centrality by 257.5%;

- "Cereals" - growth of Eigenvector centrality by 406.1%.

It can be concluded that the rate of decline in Eigenvector centrality for the US → CN export direction was positive for many of the commodity items listed above. This gives reason to assert that the mentioned goods are critically important for the Chinese economy, therefore, against the background of the introduction of trade barriers, China still cannot refuse to import important and scarce food products.

In the table 2.6. the indicators of the dynamics of Eigenvector centrality values for the volumes of exports of various products of the automotive sector from China to the USA and other countries of the world for 2012-2021 are given.

Table 2.6 – Eigenvector centrality values for indicators of exports of agriculture sector products from China to the USA and other countries of the world for 2012-2021.

Item group	Item code	CN exports to US			CN exports to rest World (except US)		
		e2012	e2021	Δ%	e2012	e2021	Δ%
Preparations of meat, of fish or of crustaceans,	ITEM01	0,0042	0,0004	-90,5	0,0077	0,0186	141,6

molluscs or other aquatic invertebrates							
Fish and crustaceans, molluscs and other aquatic invertebrates	ITEM02	0,0086	0,0025	-70,9	0,0126	0,0395	213,5
Preparations of vegetables, fruit, nuts or other parts of plants	ITEM03	0,0089	0,0041	-53,9	0,0292	0,0557	90,8
Products of animal origin, not elsewhere specified or included	ITEM04	0,01	0,0152	52,0	0,0647	0,0639	-1,2
Preparations of cereals, flour, starch or milk; pastrycooks' products	ITEM05	0,0173	0,0161	-6,9	0,1863	0,071	-61,9
Sugars and sugar confectionery	ITEM06	0,0352	0,0415	17,9	0,2212	0,087	-60,7
Edible fruit and nuts; peel of citrus fruit or melons	ITEM07	0,0415	0,0477	14,9	0,2626	0,1689	-35,7
Coffee, tea, maté and spices	ITEM08	0,0448	0,0488	8,9	0,3472	0,1705	-50,9
Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder	ITEM09	0,137	0,1501	9,6	0,4208	0,1886	-55,2
Beverages, spirits and vinegar	ITEM10	0,1452	0,2315	59,4	0,4395	0,2036	-53,7
Wool, fine or coarse animal hair; horsehair yarn and woven fabric	ITEM11	0,157	0,2361	50,4	0,5244	0,2099	-60,0

Cocoa and cocoa preparations	ITEM12	0,1782	0,2417	35,6	0,5777	0,2805	-51,4
Silk	ITEM13	0,2115	0,2462	16,4	0,5866	0,3958	-32,5
Vegetable plaiting materials; vegetable products not elsewhere specified or included	ITEM14	0,2789	0,2529	-9,3	0,8174	0,6097	-25,4
Live animals	ITEM15	1,1975	0,8965	-25,1	1,1233	0,7376	-34,3
Meat and edible meat offal	ITEM16	1,3719	1,1354	-17,2	1,1676	0,9902	-15,2
Tobacco and manufactured tobacco substitutes	ITEM17	1,6742	1,2748	-23,9	2,0707	1,0442	-49,6

Changes in centrality values for exports in the direction CN → US are more positive, compared to changes in the same indicator for exports in the direction CN → World (except US). At the same time, the rate of decrease of Eigenvector centrality for indicators of exports from China to other regions of the world (compared to the USA) was significantly lower compared to the indicators characterizing Eigenvector centrality for indicators of exports from China to the USA. The given dynamics make it possible to draw conclusions about the growth of exports of the above-mentioned goods from China to the USA despite existing trade restrictions. For some goods that were exported from China to the USA, the change in Eigenvector centrality values had a positive value. Such goods included the following:

- Sugars and sugar confectionery – growth by +17.9%;

- Edible fruit and nuts; peel of citrus fruit or melons – growth by +14.9%;

- Coffee, tea, maté and spices – growth by +8.9%;

- Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder – growth by +9.6%;

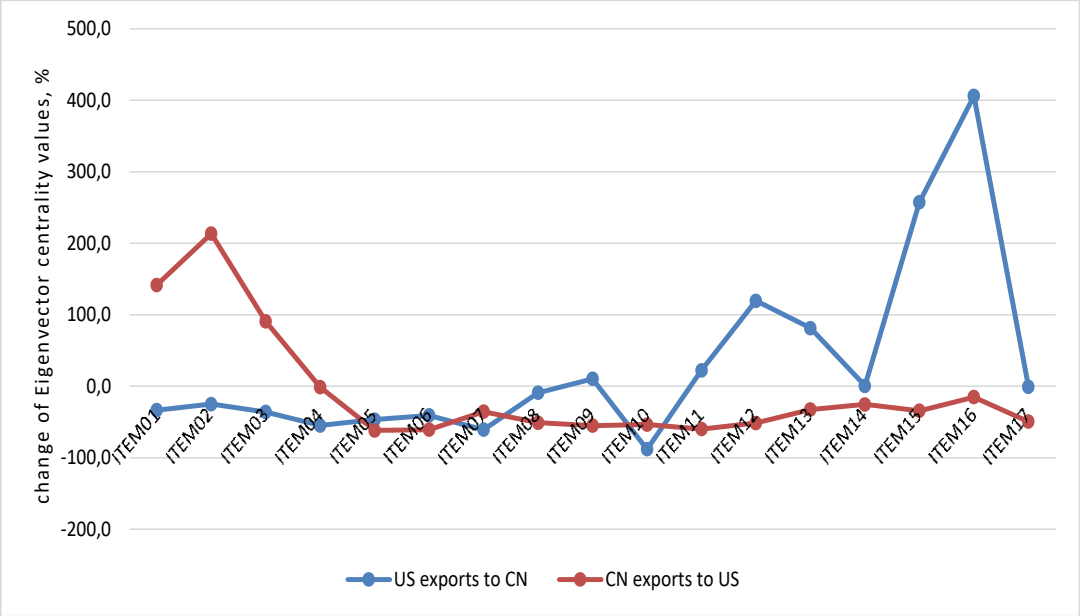
- Beverages, spirits and vinegar – growth by +59.4%;

- Wool, fine or coarse animal hair; horsehair yarn and woven fabric – growth by +35.6%;

- Cocoa and cocoa preparations – growth by +16.4%;

Pict. 2.23 shows a comparison of the change in Eigenvector centrality for two groups of indicators - the first group characterizes exports from the USA to China, the second group contains data on exports from China to the USA.

As evidenced by the results of the assessment of changes in Eigenvector centrality indicators, the impact of trade restrictions on the export of agriculture sector products between the USA and China was asymmetric. For the Eigenvector centrality values, which related to the export of agriculture sector products from China to other regions of the world (except the USA), the values of the rates of change in 2012-2021 were always below 0.



Pict. 2.23. Comparison of changes in Eigenvector centrality values for export indicators from the USA to China and vice versa

The source code for running the command in MatLab to determine PageRank was as follows:

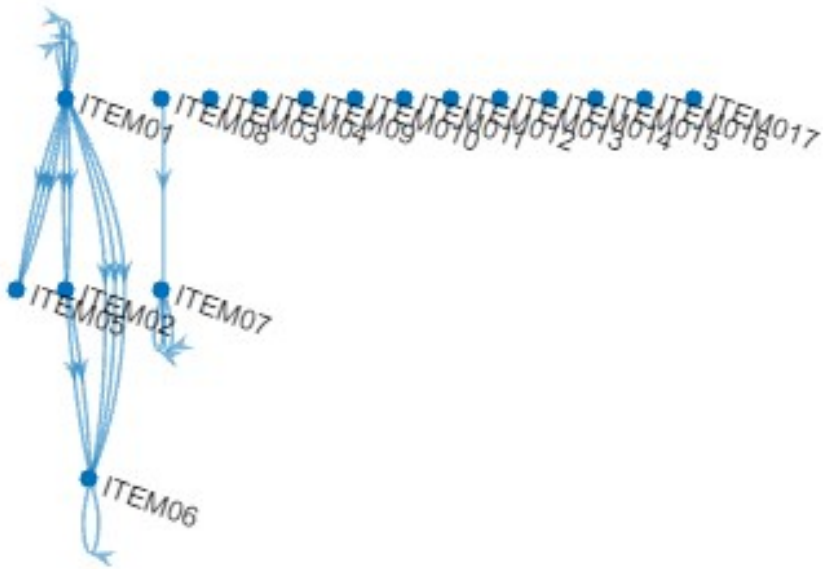
```
s = [1 1 1 1 1 1 1 1 1 1 2 2 6 7 7 8];

t = [1 1 1 2 2 5 5 5 6 6 6 6 6 6 7 7 7];

names = {'ITEM01', 'ITEM02', 'ITEM03', 'ITEM04', 'ITEM05',

'ITEM06', 'ITEM07', 'ITEM08', 'ITEM09', 'ITEM010', 'ITEM011',

'ITEM012', 'ITEM013', 'ITEM014', 'ITEM015', 'ITEM016', 'ITEM017'};

G = digraph(s,t,[],names)
```

The decline observed over the years in eigenvector values and in PageRank values should be carefully considered given the formal definitions of the two measures of

centrality. Also, for the purpose of graphical interpretation of the data, a plot was constructed using the following MatLab code:

```
plot(G,'Layout','layered', ...
    'NodeLabel',{ 'ITEM01', 'ITEM02', 'ITEM03', 'ITEM04',
'ITEM05', 'ITEM06', 'ITEM07', 'ITEM08', 'ITEM09', 'ITEM010',
'ITEM011', 'ITEM012', 'ITEM013', 'ITEM014', 'ITEM015', 'ITEM016',
'ITEM017'})
```

After running the code, the following result was obtained:



Pict. 2.24. Graphic interpretation of PageRank for foreign trade indicators between the United States to China and the rest of the world in 2021

The conducted PageRank analysis for indicators of foreign trade between the USA to China and the rest of the world allows us to conclude about the impact of restrictions on the export of commodity groups 'ITEM01', 'ITEM06', 'ITEM07' on exports of such goods as ITEM02' and 'ITEM05'. For the rest of the product groups, trade restrictions, as can be seen from the graph, had a cyclical nature.

2.4.3 Conclusions

Based on the results of calculations of PageRank values in the MatLab program, the following conclusions can be reached:

Despite the trade war between the United States and China, in 2021 it was possible to see the maximum volume of exports of American products to the Chinese market for the entire study period from 2012 to 2021. This can be explained by the high dependence of the Chinese food market on American producers.

A greater level of stability can be observed in the export of Chinese agricultural products to the USA, compared to the situation of American exports to China. During 2012-2018, the total volume of Chinese exports to the US market fluctuated within 20% and did not exceed 5-6 billion dollars annually. Since 2019, export volumes have decreased, which was a consequence of the strengthening of trade restrictions.

It can be assumed that the trade restrictions on exports to China from the USA on a number of types of agricultural products could be compensated by the fact that

China began to more actively import other types of products that could replace the corresponding goods. China's economy remains highly vulnerable to fluctuations in food supply chains. We can also see that China is dependent on imports of American grain products and products of the oil industry. However, along with the reduction of exports in a number of positions, some product groups were not limited in exports. According to these product groups, it is possible to notice the growth of the export potential of the USA in the Chinese market. It can be concluded that the rate of decline in Eigenvector centrality for the US → CN export direction was positive for many of the commodity items listed above. This gives reason to assert that the mentioned goods are critically important for the Chinese economy, therefore, against the background of the introduction of trade barriers, China still cannot refuse to import important and scarce food products.

CHAPTER 3 POSSIBLE FUTURE ECONOMIC DEVELOPMENT OF 3 INDUSTRIES AND RECOMMENDATIONS FOR THE US, CHINA AND ROW REGARDING ECONOMIC IMPROVEMENT OF THESE INDUSTRIES

3.1 Automotive sector – the use of hypothetical extraction method for predictions and recommendations for the US, China and globally

In this chapter it is worth justifying the possible options for the development of the Automotive sector in the USA and China, taking into account both their current trends and possible changes in the market situation in the future. Possible future economic development of 3 industries and recommendations for the US, China and the rest of World regarding economic improvement of these industries involved the use of the hypothetical extraction technique.

In the context of our research, it is important to determine the possible impact on the economy of China and the United States, when the volume of trade between them decreases to zero level in various specified industries. This exclusion effect relates to the researched problem to the extent that we can answer the question of the possibility of export substitution within different regions and branches of the economy. In order to develop practical recommendations for the normalization of international trade and the circumvention of trade barriers, the following question must be answered: what will happen if industries in the United States and China

stop importing and exporting the relevant groups of goods. Therefore, to answer this question, we use a modified version of the standard hypothetical extraction method.

As a rule, the hypothetical extraction method is used to assess the importance of industry i within the regional and global economy. The procedure consists in removing the i-th row and column of the Input-Output matrix A, and then using the Leontiev model to calculate the reduced outputs obtained when i=0 and compare them with the total output before removal (Dietzenbacher, E., and Lahr, M. L. (2013). Based on this approach, in our particular case, the mechanical engineering industry i requires that the i-th row and column of the matrix A be equal to zero (Miller, R. E., and Lahr, M. L. (2001). We should denote this matrix as $\mathbf{A}*$ Thus, the calculated new vector of added value of the sector will be:

$$\mathbf{v} = \mathbf{V}(\mathbf{I}-\mathbf{A}*) - \mathbf{1Fi} = \mathbf{LFi} \quad (1)$$

However, this general case can be easily extended to a multi-regional input and output system with C countries R regions and N production sectors to quantify the impact of disruptions in global value chains (GVCs) on value added caused by a hypothetical allocation of trade flows between regions/countries. In our case, we rely on Los, B., Timmer, M. P., and Vries, G. J. de. (2015) and try to simulate the impact of trade wars between the US and China by zeroing out trade flows between these countries in some sectors of the economy.

Using partitioned matrices, the coefficient matrix **A** can be briefly represented as:

$$\mathbf{A} = \begin{bmatrix} \mathbf{A}^{E_1^1 E_1^1} & \mathbf{A}^{E_1^1 E_1^2} & \cdots & \mathbf{A}^{E_1^1 E_{25}^{246}} & \mathbf{A}^{E_1^1 R} & \mathbf{A}^{E_1^1 O} \\ \mathbf{A}^{E_1^2 E_1^1} & \mathbf{A}^{E_1^2 E_1^2} & \cdots & \mathbf{A}^{E_1^2 E_{25}^{246}} & \mathbf{A}^{E_1^2 R} & \mathbf{A}^{E_1^2 O} \\ \vdots & \vdots & \ddots & \vdots & \vdots & \vdots \\ \mathbf{A}^{E_{25}^{246} E_1^1} & \mathbf{A}^{E_{25}^{246} E_1^2} & \cdots & \mathbf{A}^{E_{25}^{246} E_{25}^{246}} & \mathbf{A}^{E_{25}^{246} R} & \mathbf{A}^{E_{25}^{246} O} \\ \mathbf{A}^{R E_1^1} & \mathbf{A}^{R E_1^2} & \cdots & \mathbf{A}^{R E_{25}^{246}} & \mathbf{A}^{RR} & \mathbf{A}^{RO} \\ \mathbf{A}^{O E_1^1} & \mathbf{A}^{O E_1^2} & \cdots & \mathbf{A}^{O E_{25}^{246}} & \mathbf{A}^{OR} & \mathbf{A}^{OO} \end{bmatrix} \quad (2)$$

where E stands for selected countries, R stands for remaining countries in the respective region, and O stands for countries outside the region. Blocks are divided by regions (superscripts) and countries (subscripts).

Extracting intermediate trade flows within and to the US and China requires that the resource import and export matrices be replaced by zero-filled matrices of the appropriate dimension, such that the normalized matrix $\mathbf{A}*'$ consists of inner matrix blocks and zero elsewhere:

$$\mathbf{A}^{*'} = \begin{bmatrix} \mathbf{A}^{E_1^1 E_1^1} & \mathbf{A}^{E_1^1 E_1^2} & \cdots & 0 & 0 & 0 \\ \mathbf{A}^{E_1^2 E_1^1} & \mathbf{A}^{E_1^2 E_1^2} & \cdots & 0 & 0 & 0 \\ \vdots & \vdots & \ddots & \vdots & \vdots & \vdots \\ 0 & 0 & \cdots & \mathbf{A}^{E_{25}^{246} E_{25}^{246}} & 0 & 0 \\ 0 & 0 & \cdots & 0 & \mathbf{A}^{RR} & 0 \\ 0 & 0 & \cdots & 0 & 0 & \mathbf{A}^{OO} \end{bmatrix} \quad (3)$$

In order to study the impact of the exclusion of international commodity flows through the USA and China within the framework of the creation of value chains,

we use this matrix (formula 3) and estimate a new vector of added value pl to the relevant sectors of the economy. As explained in Giammetti, R. (2020), the relative change before and after extraction $(\mathbf{v}*-\mathbf{v})/\mathbf{v}$ can be seen as a measure of the vulnerability of a sector, region or country to GVC-related shocks. Here we use this indicator to investigate the extent to which the US and EU countries are subject to complete removal of value chains in such industries as Automotive sector, Tech sector, Agriculture sector.

We extend the general case of complete disruption of value chains under GVC to study the effects of partial disruption. In particular, we assume two intermediate cases: (1) the case where the interruption of intermediate flows involves only foreign countries, thus leaving the supply of resources between the US and China unchanged; and (2) the case where the interruption of intermediate value chains involves only supplies between the US and the EU, leaving input relations with countries outside the listed countries unchanged.

In the first case (1), the blocks of the matrix **A** relating to the import and export of resources between the USA and the EU and other countries outside the region are set to zero:

$$\mathbf{A}^{*''} = \begin{bmatrix} \mathbf{A}^{E_1^1 E_1^1} & \mathbf{A}^{E_1^1 E_1^2} & \cdots & \mathbf{A}^{E_1^1 E_{25}^{246}} & \mathbf{A}^{E_1^1 R} & 0 \\ \mathbf{A}^{E_1^2 E_1^1} & \mathbf{A}^{E_1^2 E_1^2} & \cdots & \mathbf{A}^{E_1^2 E_{25}^{246}} & \mathbf{A}^{E_1^2 R} & 0 \\ \vdots & \vdots & \ddots & \vdots & \vdots & \vdots \\ \mathbf{A}^{E_{25}^{246} E_1^1} & \mathbf{A}^{E_{25}^{246} E_1^2} & \cdots & \mathbf{A}^{E_{25}^{246} E_{25}^{246}} & \mathbf{A}^{E_{25}^{246} R} & 0 \\ \mathbf{A}^{R E_1^1} & \mathbf{A}^{R E_1^2} & \cdots & \mathbf{A}^{R E_{25}^{246}} & \mathbf{A}^{RR} & 0 \\ 0 & 0 & \cdots & 0 & 0 & \mathbf{A}^{OO} \end{bmatrix} \quad (4$$

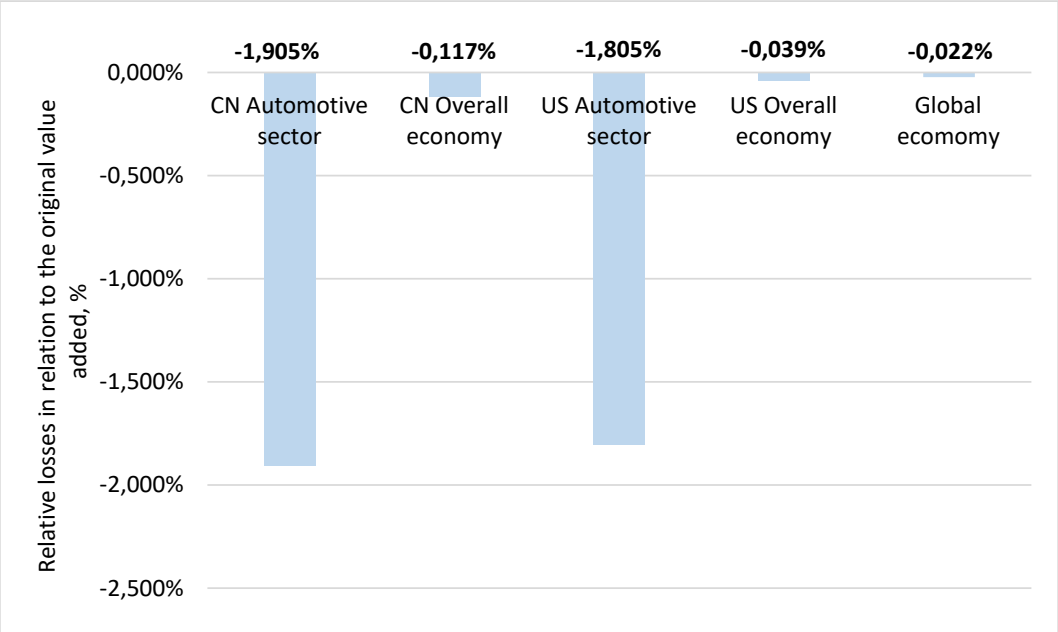
In case (2), the matrix blocks **A** relating to the supply of goods of the relevant sectors of the economy between the USA and China are reset to zero.

$$\mathbf{A}^{*'''} = \begin{bmatrix} \mathbf{A}^{E_1^1 E_1^1} & \mathbf{A}^{E_1^1 E_1^2} & \cdots & 0 & 0 & \mathbf{A}^{E_1^1 O} \\ \mathbf{A}^{E_1^2 E_1^1} & \mathbf{A}^{E_1^2 E_1^2} & \cdots & 0 & 0 & \mathbf{A}^{E_1^2 O} \\ \vdots & \vdots & \ddots & \vdots & \vdots & \vdots \\ 0 & 0 & \cdots & \mathbf{A}^{E_{25}^{246} E_{25}^{246}} & 0 & \mathbf{A}^{E_{25}^{246} O} \\ 0 & 0 & \cdots & 0 & \mathbf{A}^{RR} & \mathbf{A}^{RO} \\ \mathbf{A}^{O E_1^1} & \mathbf{A}^{O E_1^2} & \cdots & \mathbf{A}^{O E_{25}^{246}} & \mathbf{A}^{OR} & \mathbf{A}^{OO} \end{bmatrix} \quad (5)$$

Again, we use $\mathbf{A}*''$ and $\mathbf{A}*'''$ in formula (1) to calculate the new value added and then the relative change in value added before the exclusion was made.

Matlab was used to carry out calculations in accordance with the methodology described above. The sample of Matlab script for calculations of the hypothetical extraction effect is defined in Appendix 11 (for Automotive sector of economy). We interpret and explain the results of the obtained calculations.

First of all, it is worth characterizing relative losses in relation to the original value added (%). The results of the comparison of the obtained indicators in different directions and combinations are shown in Pict. 3.1.



Pict. 3.1. Graphic interpretation for the indicator "relative losses in relation to the original value added" within the limits of hypothetical extraction for the Automotive sector of USA and China.

Based on the obtained results, we see that the removal of international trade flows in the Automotive sector of USA and China will have the following consequences:

- reduction of the volume of gross added value of the Automotive sector of China by 1.905%

- reduction of the volume of gross added value of the Automotive sector of USA by 1.805%

- reduction of the volume of gross added in the economy of China as a whole by 0.117%

- reduction of the volume of gross added in the US economy as a whole by 0.039%

- reduction of the volume of gross added in the global economy by 0.022%

It can be concluded that as a result of the leveling of trade flows in the Automotive sector of the USA and China, results were obtained that testify to the asymmetric impact of the trade war on the economies of both countries within the studied industry. It can be seen that the reduction of gross value added in China occurred by 1.905%, and in the USA - by 1.805%. That is, the level of reduction in the economic effect of the trade war at the level of the Automotive sector of the USA and China is almost equal for both countries. However, the level of impact of trade neutralization on the overall economy for the US and China is unsettling. The reduction in gross value added for the Chinese economy is 0.117%, and for the US economy - 0.039%. That is, China's economy receives almost three times worse economic effect compared to the USA. This can be explained by the specifics of the formation of equal cross-industry ties within the Automotive sector itself. For the US and China, these connections may be different, which determines the differences in the structure of the industrial complex of both countries. For example, we can describe the given situation with the following case. The US supplies certain

components for cars to China's engineering industry (in particular, we are talking about electronics for cars). China, in turn, supplies machine-building products to the US market and other countries around the world. When we zero out the volume of automotive electronics exports from the US to China, the Chinese automotive industry receives quite a lot of stress. At the same time, not only it, but also other related industries. The production volumes of these industries are significantly reduced, which negatively affects the formation of gross added value in the Chinese economy as a whole. On the other hand, the decrease in the volume of exports from China to the US in various categories of the automotive industry does not cause significant stress in the US economy, since this country can carry out import substitution of Chinese goods.

It is important to analyze in more detail the features of the impact of the extraction effect on the example of a case where the leveling of foreign trade between the USA and China in the automobile industry occurs. Appendix 12 shows the results of the assessment of the impact of the zeroing of automotive exports from China on the volumes of gross added value in various sectors of the US economy.

Based on the calculations, we can conclude that the top 10 US industries that may be affected by a reduction in Chinese exports in the engineering sector include the following: Manufacture of motor vehicles, trailers and semi-trailers - $2,530.6 million, Wholesale trade , except of motor vehicles and motorcycles - $696.4 million, Legal and accounting activities; activities of head offices; management

consultancy activities - $603.1 million, Manufacture of fabricated metal products, except machinery and equipment - $289.5 million, Administrative and support service activities - $234.7 million, Manufacture of basic metals - $174.3 million, Manufacture of computer, electronic and optical products - $153.7 million, Manufacture of machinery and equipment n.e.c. - $153.4 million, Manufacture of rubber and plastic products - $144.9 million, Manufacture of chemicals and chemical products - $128.9 million.

It can be concluded that the sectors that are directly related to the automobile industry suffer first of all. Second, there is a reduction in gross added value in sectors of the economy that are suppliers of raw materials for the automotive industry. Those industries that do not have direct links with the automotive industry will experience less of a negative effect in the form of reduced added value.

Appendix 13 shows the results of the assessment of the impact of the withdrawal of exports from the USA in the automotive industry on the volumes of gross added value in various sectors of the Chinese economy.

Based on the calculations, we can conclude that the top 10 industries in China that may be affected by a reduction in the export of automotive products from the USA include the following: Manufacture of motor vehicles, trailers and semi-trailers - $4322.4 million, Wholesale trade , except of motor vehicles and motorcycles – $1,098 million, Mining and quarrying - $729.7 million, Financial service activities, except insurance and pension funding - $586.4 million, Manufacture of basic metals

- $544.7 million, Land transport and transport via pipelines - $360.4 million, Manufacture of machinery and equipment n.e.c. - $332.9 million, Legal and accounting activities; activities of head offices; management consultancy activities - $281.1 million, Crop and animal production, hunting and related service activities - $252.6 million, Electricity, gas, steam and air conditioning supply - $250.4 million.

It can be concluded that if the export of automotive products from the USA to China is stopped, the mechanical engineering industry in the Chinese economy, as well as the auto wholesale industry, will be affected first of all. Second, there will be a reduction in added value in service sectors, in particular insurance services and car rental.

Characterizing the potential impact of the trade war between the USA and China on the potential development of the automotive industry sector, it is worth stopping at the assessment of the consequences for the global economy. According to the calculations, if trade flows between the USA and China in the field of automobile construction are excluded, the overall value added in the world economy will decrease by 0.022%. Taking into account the scale of the world economy, this figure is about $2,351 million. In general, the indicated reduction of added value in the world economy is comparatively smaller than the reduction of this indicator in the USA or China. This effect is caused by the fact that when exports between countries are reduced, part of the product flows are simply redirected. At the same time, part

of the added value may be lost due to additional transaction costs, but a reduction in exports in one country has a certain resulting effect on the reduction of gross added value in the world economy.

The improvement of economic forecasts regarding the prospects for exiting the difficult economic situation in the automotive field of should be based on the latest trends and vectors of development of the world economy. The following factors currently play a rather important role in the development of international trade between the United States and China: 1) the impact of international political instability (including Russia's war against Ukraine, as well as the aggravation of contradictions between the United States and China in Taiwan; 2) the consequences of the COVID-19 pandemic; 3) economic recession, which can last several years and is reinforced by the crisis in the market of energy raw materials.

The following are the main prerequisites that should be included in the development of strategic priorities for improving foreign trade in the automotive sector:

1) Analysis, identification and improvement of loosely structured connections of business processes between separate export-forming links within the automotive industry. Problems with the weak interrelation of indicators of the prerequisites for achieving the strategic goals of export development and the expected result. This problem is related to the fact that the current financial and economic model of the export strategy of the USA and China does not take into account a number of hidden factors, and there is a significant risk of an increase in

the influence of these factors, especially in conditions of uncertainty (the COVID-19 pandemic). For example, the problem of increasing the volume of exports of products with low added value requires a comprehensive study of the reasons at the level of individual business entities: optimization of sales geography, personnel training, price policy and many other heterogeneous circumstances that are taken into account in the financial and economic justification of export activity, but not the influence of factors characterizing the increase in the level of quarantine restrictions is taken into account.

2) Modern initiatives of the US government in the direction of export promotion have a certain system of strategic control, however, the process of analyzing the implementation of strategic initiatives is very inertial. The heads of the relevant state administration bodies receive information about problems in export activities with a delay. This leads to a distortion in time of the real situation.

3) Modern export support plans, in our opinion, are weakly adaptive to changes in external conditions. Absence of a direct connection between the set strategic goals and the operational parameters of the exporters' work. For example, the strategic goal of increasing export volumes, although it may be clear, is clear, but in conditions when exporters will not have sufficient resources for production growth, this goal will have a declarative nature. The need to increase the key indicators of export efficiency for domestic business requires taking into account

changes in operational parameters, but operational parameters are far from always taken into account in strategic states.

3.2 Tech sector - the use of hypothetical extraction method for predictions and recommendations for the US, China and globally

A similar approach was used for the Tech sector analysis described in the previous question. The use of Matlab allows you to perform calculations that are the basis for the formation of relevant conclusions. According to the example in Appendix 11, the scripts were launched, but taking into account the data ranges related to the Tech sector. We analyze and explain the obtained results.

By analogy with the previous question, it is necessary to characterize the indicator of relative losses in relation to the original value added (%). The results of the comparison of the obtained indicators in different directions and combinations are shown in Pict. 3.2.

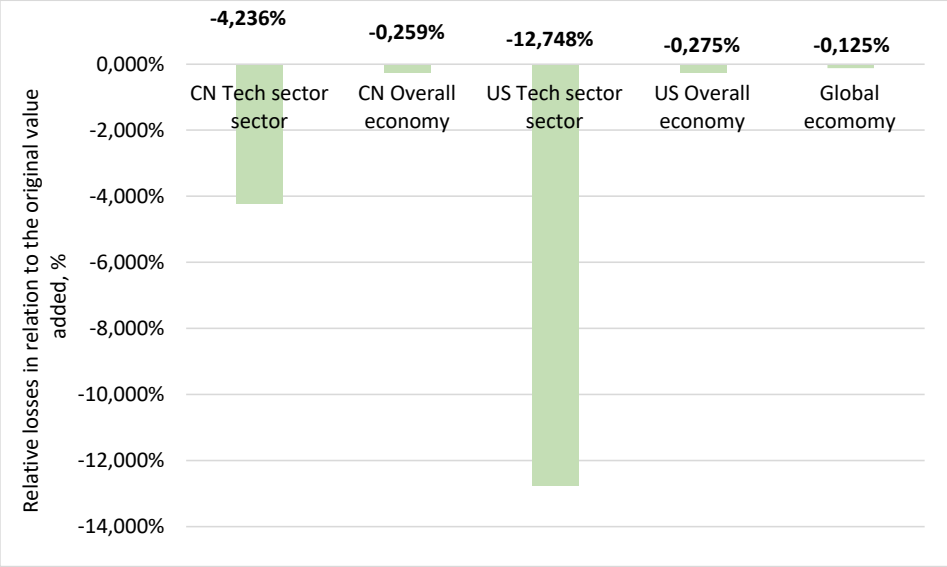
Based on the obtained results, we see that the withdrawal of international trade flows in the Tech sector of USA and China will have the following consequences:

- reduction of the volume of gross added value of the Tech sector of China by 4.236%;
- reduction of the volume of gross added value of the Tech sector of USA by 12.748%;

- reduction of the volume of gross added in the economy of China as a whole by 0.259%;

- reduction of the volume of gross added in the US economy as a whole by 0.275%;

- reduction of the volume of gross added in the global economy by 0.125%.



Pict. 3.2. Graphic interpretation for the indicator "relative losses in relation to the original value added" within the limits of hypothetical extraction for the Tech sector of USA and China.

It can be concluded that as a result of the leveling of trade flows in the Tech sector of the USA and China, results were obtained that testify to the asymmetric impact of the trade war on the economies of both countries within the studied industry. It can be seen that the reduction of gross value added in China occurred by 4.236%,

and in the USA - by 12.748%. That is, the level of reduction in the economic effect of the trade war at the level of the Tech sector of the USA and China is different for these countries. The consequences of the reduction in gross value added in the US are more extensive, compared to the reduction in the gross value added of the Tech sector in China. The results of the analysis from Section 2 show that the export of electronics and other goods of the electrical engineering industry from China is more differentiated compared to the export of similar goods from the USA. In our opinion, this may be the main factor behind such a difference in the reduction of the gross value added of the electrical industry for both countries.

The leveling of trade flows between the US and China leads to an almost equal reduction in gross value added in the economies of both countries. In China, the reduction in value added is 0.259%, and in the US - 0.275%. If we compare the results of the reduction of added value in the economies of the USA and China in the automotive industries, we can see that the influence of the Tech sector is more pronounced. The reasons for this effect may be several of the following factors:

- the American electrical engineering industry is more dependent on imports of components from China than the other way around;
- Compared to the USA, China has a more differentiated supply scheme of components and spare parts for the production of goods;
- production in the USA is highly specialized, therefore, in the event of a leveling off of supplies from China, a significant supply deficit is formed in the US market.

It is worth analyzing the peculiarities of the impact of the extraction effect on the example of a case when there is a leveling of foreign trade between the USA and China in the Tech sector.

Appendix 14 shows the results of evaluating the impact of zeroing exports by the Tech sector from China on the volume of gross added value in various sectors of the US economy.

Based on the calculations, we can conclude that the top 10 US industries that may be affected by a reduction in Chinese exports in the Tech sector include the following: Manufacture of motor vehicles, trailers and semi-trailers - $5,626.7 million, Wholesale trade , except of motor vehicles and motorcycles - $1548.4 million, Legal and accounting activities; activities of head offices; management consultancy activities - $1,340.9 million, Manufacture of fabricated metal products, except machinery and equipment - $643.6 million, Administrative and support service activities - $521.8 million, Manufacture of basic metals - $387.5 million, Manufacture of computer, electronic and optical products - $341.7 million, Manufacture of machinery and equipment n.e.c. - $41.1 million, Manufacture of rubber and plastic products - $322.1 million, Manufacture of chemicals and chemical products - $286.5 million, Land transport and transport via pipelines - $284.4 million.

It can be seen that the leveling of trade in electrical goods has the greatest impact on the reduction of gross added value, primarily in the automotive industry. Thus,

the reduction of gross added value for machine-building products is $5,626.7 million, and the reduction of added value for electrical goods (computer, electronic and optical products) is only $341.7 million. From the above indicators, it can be concluded that the intermediate consumption of Tech sector products is concentrated mainly in the machine-building industry of the USA. This fact shows that the US economy is very sensitive to imports from China of many electrical goods. Many productions are now geographically diversified and most of them are located in the Asian region, in particular in China.

It can also be seen that in the US there is a significant decrease in gross value added in a number of industries that are not directly related to the technical sector. Hypothetically, the US engineering industry is quite strongly related to wholesale trade and consulting, which accompanies commodity flows. Therefore, the decrease in the rate of economic growth in the technical and machine-building sector is also reflected in wholesale trade and cosnalting. In this case, we can talk about a certain butterfly effect, which occurs in various industries that are associated with sectors experiencing a decrease in commodity flows. It is also possible to observe a reduction in the gross added value in the sectors of the economy that act as suppliers of raw materials for the technical sector.

Appendix 15 shows the results of assessing the impact of the withdrawal of exports from the US in the technical sector on the volume of gross added value in various sectors of the Chinese economy.

Based on the calculations, we can conclude that the top 10 industries in China that may be affected by a reduction in the export of technical sector products from the USA include the following: Manufacture of computer, electronic and optical products - $30,536.5 million, Manufacture of machinery and equipment n.e.c. - $7757.1 million, Manufacture of electrical equipment - $5155.2 million, Financial service activities, except insurance and pension funding - $4142.4 million, Computer programming, consultancy and related activities; information service activities - $3848.0 million, Manufacture of motor vehicles, trailers and semi-trailers - $2546.1 million, Electricity, gas, steam and air conditioning supply - $2352.0 million, Retail trade, except of motor vehicles and motorcycles - $1985.6 million, Telecommunications - $1784.3 million, Wholesale trade, except of motor vehicles and motorcycles - $1768.9 million.

It can be concluded that if the export of technical goods from the USA to China is stopped, the manufacture of computers, electronic and optical products will be affected first of all. Also, a rather strong reduction will occur for the technical equipment manufacturing sectors. There will be a strong impact on the mechanical engineering industry in the Chinese economy, as well as wholesale and retail trade in electrical goods. Second, there will be a reduction in added value in service sectors, in particular insurance services and car rental. This trend is explained by the fact that the manufacturing sector of technological products is deeply integrated into other sectors of the economy. Therefore, in the case of a decrease in foreign

trade between the United States and China in the technical sector, the consequence is a reduction in gross value added, primarily in those industries that are integrated with the technological sector. At the same time, we should not forget that the Tech Sector structure also includes software development services. The consumers of this segment are precisely the financial sector and the service sector. Therefore, it is possible to observe the significance of the reduction of the gross added value in the above industries in case of leveling (exclusion) of export-import flows in the technological sector.

It is also worth characterizing the impact of the leveling of trade between the US and China in the technological sector on the world economy. It can be noted that the decrease is relatively significant and amounts to 0.125%. If compared with the Automotive sector, the decrease in gross added value is 6 times greater in the Tech Sector. This effect is explained by the greater level of integration of the Tech Sector into various branches of the global economy.

It is worth justifying the prospects for the development of international trade in technological products under the conditions of strengthening the policy of protectionism. In 2018, the US-China trade conflict escalated, and many countries overestimated geopolitical risks. Microelectronics, which is heavily dependent on Taiwan, has become one of the key topics of deglobalization. The US government allocated $52 billion for the development of its own microelectronics production and the placement of TSMC and Samsung plants on its territory. The European

Union allocated a comparable amount for the creation of advanced production in Europe - it will be handled by Intel in Magdeburg, Germany. Japan and some other countries allocated the smallest, but significant amounts for their economies. At the same time, it is not about the complete localization of the entire production cycle, but only about shifting the emphasis in the geographical distribution of the final stages of production. It is not about new developments in production equipment, nor about a fundamental change in the geography of the supply chain: modern microelectronics is still a very globalized industry.

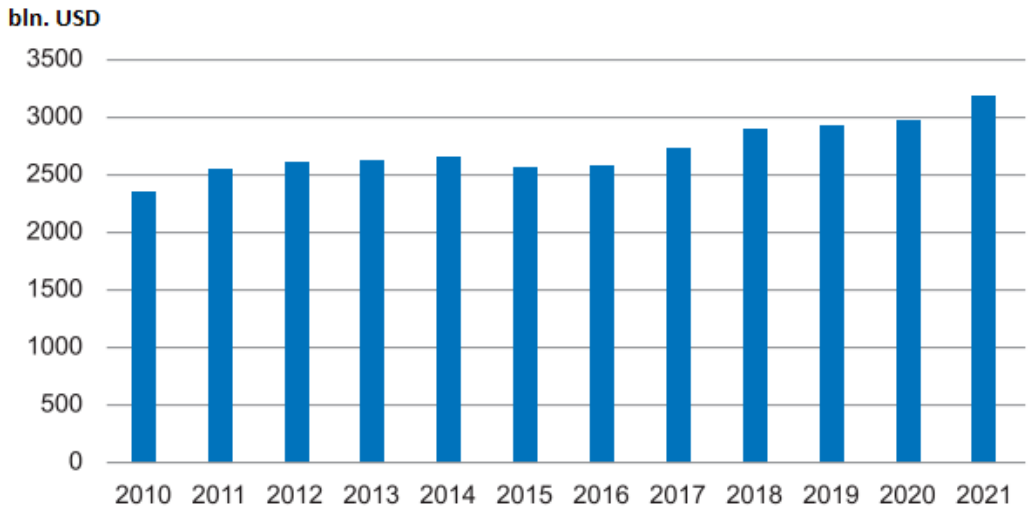
The only exception is China, which for many years has been working on a program of almost complete import substitution of microelectronics, including all necessary mechanical engineering. However, after making some serious progress in closing the gap and localizing production, in the last couple of years China is clearly struggling to make the last few steps. If we compare the Chinese industry with the global industry, then TSMC has already started to produce microcircuits with 4nm standards, and in China for several years now the best available design standards have remained 14nm, and manufactured using ASML equipment. China's own 28 nm lithography has been in its final stages for several years now, and Huawei has begun to build a "Western-independent" production of microcircuits according to 45 nm standards. The successes and failures of the Chinese approach demonstrate the difficulty of the task of import substitution even for the world's largest economy.

Although the outbreak of COVID-19 has caused serious damage to the global economy, many analysts have predicted that the electronics segment has mostly benefited from this epidemic due to a sharp increase in purchases of electronic equipment by both consumers and businesses. This has prompted many companies and industry experts to predict positive market growth in 2022-2023.

As the epidemic spread and people around the world were forced to self-isolate, consumers began buying new consumer electronics and communication tools to support the transition to remote work. However, it is worth noting that this demand is extremely unstable and may negatively affect consumer preferences in the future. At the same time, many providers of communication services, cloud services and online stores have had to scale to meet the growing demand. The telecommunications industry has already benefited from the deployment of 5G networks, resulting in an increase in equipment for network and service infrastructure. This is likely to continue for the next few years. If further world events lead to long-term changes in society, such as the rise of online education, the use of telemedicine and working from home, then electronic equipment will increasingly be seen as a necessity and the demand for it will continue to grow.

Quite significant risks for international trade today are the energy crisis and political instability caused by Russia's war against Ukraine. Therefore, there are fears that due to high demand and concerns about possible supply disruptions, many companies across the electronics value chain will increase their orders. This will

not only artificially inflate demand, but may also distort its further forecasts. Electronics has experienced a similar situation in previous downturns, such as the 2001 telecommunications collapse, when companies overbooked based on unrealistic forecasts. Some experts worry that the same thing could happen again. Changes in the global electronics market since 2010 are shown in pict. 3.3. It should be explained that the IT industry is represented here in terms of electronics, that is, software for electronic devices.



Pict. 3.3 - Production volume of the global electronics market in 2010-2021.

If we turn to another source, namely the review of the German Electrical and Electronic Manufacturers' Association (ZVEI), we will get the following data. Global production in 2019 was 4,509 billion euros, that is, taking into account the exchange rate of December 2020 - $ 5,496 billion. This forecast was published in August 2020, and as you can see, the German colleagues expect a significant

decline in the industry in 2020 by 2.2 %, but then growth of 4.5% is expected. For markets in developing countries, the volume of which in 2019 amounted to 2,550 billion euros, the ZVEI forecast for the current year predicts a decrease of 1%, and an increase of 7% for the next year (ZVEI Report).

Based on ZVEI forecasts, none of the electronics sectors showed growth this year. The largest decline will be observed in such sectors as equipment for the collection, processing and transmission of information (–6%) and communication equipment (–5%). A less significant drop is expected in the field of automation (-3%), electromedicine (-3%) and energy equipment (-2%) (ZVEI Report).

In general, the beginning of 2022 could have an extremely negative impact on Chinese manufacturers. As development and production lines were halted, there was talk that perhaps COVID would inspire companies to rethink their reliance on China and relocate a number of production sites. As we know, for companies producing household electronics, autumn is the beginning of new product cycles and the opportunity to choose production partners in different regions. Despite the expectations, this season everything remains the same: companies prefer to work with reliable partners and do not take big steps outside of China. As for the risk of the virus spreading, China and many parts of Asia have maintained tight controls on it, so the mass shutdowns of entire factories that we saw in early 2020 seem unlikely. Changing a production partner even within a company is considered a big partnership risk. Due to travel restrictions, it was almost impossible to evaluate new

partners, so most preferred to work with teams they knew. As for socio-political risk, which includes everything from tariffs to worsening political relations, the question remains open for now.

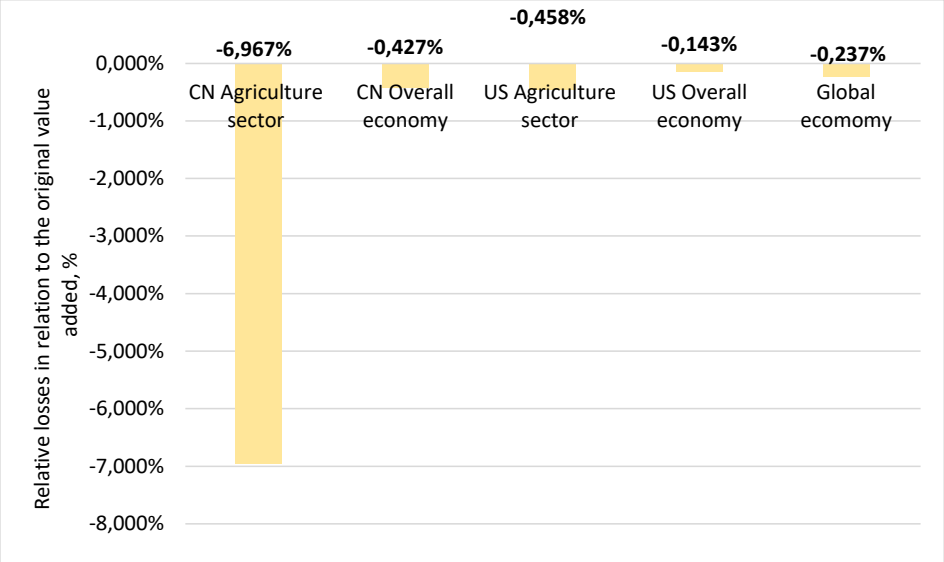
3.3 Agriculture sector - the use of hypothetical extraction method for predictions and recommendations for the US, China and globally

For the analysis of the Agriculture sector, a similar approach was used, which is described in the previous question. By analogy with the previous question, it is necessary to characterize the indicator of relative losses in relation to the original value added (%). The results of the comparison of the obtained indicators in different directions and combinations are shown in Pict. 3.4.

Based on the obtained results, we see that the withdrawal of international trade flows in the Agriculture sector of the USA and China will have the following consequences:

- reduction of the volume of gross added value of the Agriculture sector of China by 6.967%
- reduction of the volume of gross added value of the Agriculture sector of USA by 0.458%
- reduction of the volume of gross added in the economy of China as a whole by 0.427%
- reduction of the volume of gross added in the US economy as a whole by 0.143%

- reduction of the volume of gross added in the global economy by 0.237%.

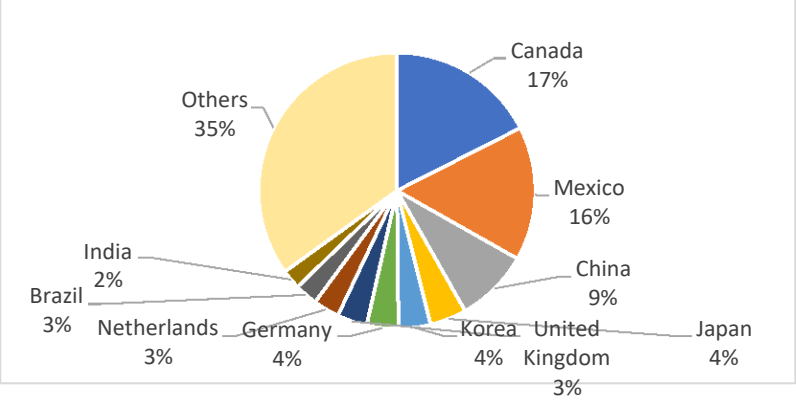


Pict. 3.4. Graphical interpretation for the indicator "relative losses in relation to the original value added" within the limits of hypothetical extraction for the Agriculture sector of USA and China.

It can be concluded that as a result of the leveling of trade flows in the Agriculture sector of the USA and China, results were obtained that testify to the uneven impact of the trade war on the economies of both countries within the studied industry. It can be seen that the reduction of gross value added in China occurred by 6.967%, and in the USA - by 0.458%. That is, the level of reduction in the economic effect of the trade war at the level of the Agriculture sector of the USA and China is different for these countries. The consequences of the reduction of the gross value added in the USA are almost imperceptible, compared to the reduction of the gross

value added of the Agriculture sector in China. The main reason for this may be that the export of agricultural products from the USA is more differentiated compared to the export of similar goods from China. This may be the main factor behind such a difference in the reduction of the gross added value of the agricultural sector for both countries.

The main reason for the resistance of the US agricultural sector to the exclusion of trade flows with China is that the US agricultural sector has a very significant differentiation of geographical directions (Pict. 3.5).



Pict. 3.5. Geographic export directions for the Agriculture sector of USA

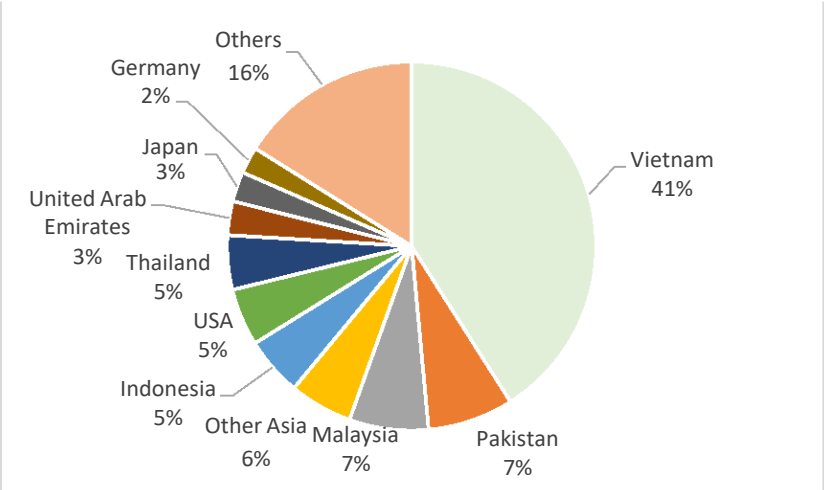
Source: TrendEconomy. URL:

https://trendeconomy.com/data/h2?commodity=0909&reporter=UnitedStatesOfAmerica&trade_flow=Export,Import&partner=World&indicator=TV,YoY&time_period=2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021

We can see that China accounts for 9% of American agricultural exports. At the same time, in contrast to China, in the USA 33% of exports are made to neighboring countries - Canada and Mexico. Also, 10% of exports go to EU countries. That is,

even in the case of the exclusion of China from commodity flows, the United States will have a slight reduction in gross value added. This is due to the ability of the US to easily replace China with other geographic areas.

As for China, the USA accounts for only 5% of the total volume of exports (Pict. 3.6).



Pict. 3.6. Geographical export destinations for the Agriculture sector of China

Source: TrendEconomy. URL: https://trendeconomy.com/data/h2?commodity=0909&reporter=China&trade_flow=Export,Import&partner=World&indicator=TV,YoY&time_period=2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021

Based on the given data, the question arises why, when the trade in agricultural products between the USA and China is leveled off, the gross added value in China decreases almost 15 times more than in the USA.

The main assumption can be the dependence of the gross added value not only on the geographical distribution of exports and the country's ability to substitute for the corresponding direction, but also on the specifics of the use of imported products in adjacent sectors of the economy. Given the peculiarities of the structure of US agricultural exports to China, which was discussed in Chapter 2, a clear difference can be observed for both countries. The US exports to China very basic products that are the basis for the manufacture of most food products (oil, grain and grain products, meat, etc.). At the same time, Chinese exports consist mainly of goods that are not strategically important (wool, teas, herbs and spices, etc.).

The leveling of trade flows between the US and China leads to an uneven reduction in gross value added in the economies of both countries. In China, the reduction in value added is 0.427%, and in the US - 0.143%. The reasons for this effect may be several of the following factors:

- Chinese industry is more import dependent on the export of agricultural products from the USA than vice versa;
- Compared to China, the USA has a more differentiated scheme for exporting agricultural products, and it can also easily replace China's imports;
- in the case of the leveling of supplies from the USA, a certain shortage of supply for basic khach products is formed on the Chinese market.

It is worth analyzing the peculiarities of the impact of the extraction effect on the example of a case where there is a leveling of foreign trade between the USA and

China in the Agriculture sector. Appendix 16 shows the results of the assessment of the impact of zeroing exports by the Agriculture sector from China on the volumes of gross added value in various sectors of the US economy.

Based on the calculations, we can conclude that the top 10 US industries that may experience a reduction in the event of a leveling off of Chinese exports in the Agriculture sector include the following: Manufacture of food products, beverages and tobacco products - $1,096.3 million, Crop and animal production, hunting and related service activities - $278.5 million, Manufacture of textiles, wearing apparel and leather products - $185.1 million, Fishing and aquaculture - $148.7 million, Manufacture of fabricated metal products, except machinery and equipment - $138.1 million, Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials - $91.4 million, Other service activities - $84.4 million, Other professional, scientific and technical activities; veterinary activities - $71.3 million, Retail trade, except of motor vehicles and motorcycles - $64.1 million.

It can be seen that the leveling of trade in agricultural products to the greatest extent affects the reduction of the gross added value primarily in the food industry. Thus, the reduction in gross value added for the food industry is $1,096.3 million, and the reduction in value added for animal husbandry is only $278.5 million. From the above indicators, it can be concluded that the intermediate consumption of Agriculture sector products is concentrated mainly in the food industry of the USA.

Appendix 17 shows the results of the assessment of the impact of the withdrawal of exports from the USA in the agricultural sector on the volume of gross added value in various sectors of the Chinese economy.

Based on the calculations, we can conclude that the top list of Chinese industries that may be affected by a reduction in the export of agricultural products from the USA includes the following: Manufacture of food products, beverages and tobacco products - $9,255.5 million, Crop and animal production, hunting and related service activities - $2546.9 million, Manufacture of textiles, wearing apparel and leather products - $2205.6 million, Fishing and aquaculture - $1058.7 million. This fact shows that China's economy is very sensitive to imports from the US of many types of agricultural products.

It is also worth characterizing the impact of the leveling of trade in agricultural products between the USA and China in the technological sector on the world economy. It can be noted that the decrease is very significant and amounts to 0.237%. If compared with the Automotive sector and the Tech Sector, the decrease in gross added value is greater. This effect is explained by the higher level of integration of the Agriculture Sector into various branches of the world economy.

Experts explain that the main reason for the record increase in import costs is the increase in farmers' expenses for the purchase of fertilizers and fuel. "Our forecasts indicate that the situation on the food markets will be tense," says FAO economist Upali Galketi Aratchilage. - This trend is caused by a sharp rise in raw material

prices, fears about the weather and increased uncertainty in the markets due to the war in Ukraine. There can be no doubt that this will lead to record costs for food imports."

In a new report, FAO experts indicate that the overall increase in global food import costs this year will be driven most by rising prices for animal fats and oils and grains.

According to FAO estimates, the most vulnerable and least developed countries will have to cut their food import costs by at least five percent this year. Reduction of purchases will affect grain, oil crops and meat. Sub-Saharan African countries will be the first to suffer (FAO data).

To prevent even greater food shortages in low-income countries, the UN agency recommends creating a global mechanism to support the balance of payments of vulnerable countries. FAO data indicate that for the first time in four years, world grain production will decline instead of increase in 2022. However, this will not affect the amount of grain consumed by humans - the reduction will affect fodder grain and rice, which are used as animal feed (FAO data).

World wheat stocks are expected to increase "slightly" in 2022 due to an expected increase in the amount of grain stored in China, Russia and Ukraine. World corn yields and demand will reach a new record, driven by increases in ethanol production in Brazil and the United States, as well as starch in China. According to FAO forecasts, global consumption of vegetable oils will exceed production,

despite the expected leveling off of demand. In Argentina, the European Union, and the United States, meat production will decrease this year. At the same time, world meat exports are expected to grow by 1.4 percent, due to an eight percent increase in pork production in China.

World milk production in 2022 will grow more slowly than in previous years, due to a decrease in the number of dairy cows and lower profits in a number of major producing regions. The global volume of sugar production will increase after a three-year decline, primarily due to positive dynamics in India, Thailand and the EU. Commercial fisheries are projected by FAO to increase by only 0.2 percent. The total amount of export earnings from fishing and aquaculture will increase by 2.8 percent, while production volumes will decrease by 1.9 percentage points (FAO data).

According to statistics, in 2021-2022 Ukraine ranked seventh in the world in terms of wheat production - 33 million tons. Only Australia, the USA, Russia, India, China - and the EU in first place, if you add up the total production of its member states - produced more (FAO data).

Regarding the production of corn, Ukraine ranks sixth. More corn was grown from mid-2021 to mid-2022 only in Argentina, the EU, Brazil, China and - above all - in the USA. Ukraine ranks fourth in the world in terms of barley production. Only Australia, Russia and the EU are ahead. Grain supplies were blocked due to Russia's blockade of Ukrainian ports. This raised fears of shortages around the world and

led to a sharp rise in prices. By mid-May, export prices for wheat and corn reached an unheard-of high level - according to the UN, with serious consequences, especially in Africa, the Middle East and Asia, where the food situation has already been significantly worsened by the coronavirus pandemic and its consequences.

However, the grain market has weakened again since then. According to the estimates of the Food and Agricultural Organization of the United Nations (FAO), despite the war of the Russian Federation against Ukraine, the world grain harvest this year is likely to be only slightly smaller than in 2021. And the prospect of an agreement reached between Ukraine and Russia gave rise to hope for a new export of Ukrainian grain (FAO data).

According to the agreement reached in Turkey, 20-25 million tons of grain, currently blocked in Ukraine, will finally be able to be exported. Exports of Russian grain and fertilizers, limited by sanctions against Russia, should also be eased again. Among other things, the agreement provides for the creation of safe corridors in the Black Sea between Ukraine and the Bosphorus. Ships in these corridors and their respective ports cannot be attacked. The export of grain will be monitored in the coordination center in Istanbul under the leadership of the UN and in which representatives of Russia, Ukraine and Turkey will work. The agreement between Ukraine and Russia is important for global food security. After all, their grain is urgently needed on the world market - especially in Asia and Africa. During

Russia's war against Ukraine, the UN warned of the worst food crisis in recent decades.

3.4 Predictions and reccomendations for the US, China and ROW

Based on the conducted analysis we can draw some possible predictions for the future of the trade war between the US and China :

1. Continued negotiations and possible resolution: Both the US and China have indicated that they want to continue negotiating to resolve the trade war. While there have been multiple rounds of negotiations in the past, a possible resolution is still possible. In the future, we may see both sides come to an agreement that would reduce tariffs and restore trade relations.

2. Escalation: The trade war could continue to escalate, with both the US and China imposing further tariffs on each other's goods. This would lead to increased economic disruption and higher costs for businesses and consumers, potentially causing more job losses and slower economic growth.

3. Reorientation of trade flows: The trade war has led to many businesses diversifying their supply chains and looking for alternative markets. As a result, some of the trade flows that were disrupted by the trade war could be permanently reoriented, which could lead to a fundamental change in global trade patterns.

4. Increased focus on domestic production: The trade war has also led some businesses to focus more on domestic production and sourcing. This could lead to

increased investment in domestic industries, which would have positive effects on the job market and economic growth.

Overall, the future of the trade war is uncertain, but it is likely that both the US and China will continue to feel the effects of the conflict. It is important for both sides to work towards a resolution that benefits their respective economies and the global economy.

Coherently we can give some ways to minimize the negative effects of trade war between 2 countries:

1. Negotiate a resolution: The best way to minimize the negative effects of the trade war is for both countries to negotiate a resolution that reduces tariffs and restores trade relations. This would help to reduce uncertainty and restore confidence in the global economy.

2. Diversify trade: Businesses can diversify their trade flows and look for alternative markets. This would help to reduce the impact of the trade war on their businesses and minimize disruptions to their supply chains.

3. Increase domestic production: Businesses can also focus more on domestic production and sourcing to reduce their reliance on foreign inputs. This would have positive effects on the job market and economic growth.

4. Reduce non-tariff barriers: Both the US and China could work to reduce non-tariff barriers to trade, such as regulatory barriers and standards. This would help to increase trade and reduce costs for businesses.

5. Provide support for affected industries: Governments can provide support for industries that have been affected by the trade war, such as through subsidies, tax breaks, or other forms of assistance. This would help to reduce job losses and promote economic growth.

Overall, minimizing the negative effects of the trade war requires a coordinated effort between governments, businesses, and other stakeholders. Finding a resolution that benefits both the US and China is the best way to restore confidence in the global economy and promote long-term economic stability and growth.

CONCLUSIONS

The international trade confrontation between the United States and China is a consequence of both the economic consequences of competitive pressure from Chinese goods on the American market and one of the directions for ensuring the economic security of the United States. The USA is quite dependent on the supply from China of components for electrical goods, means of communication and components for them, thermal energy and climate equipment, etc. In the trade war with the USA, China implements an active defense strategy aimed primarily at mitigating the negative consequences of the confrontation for national producers and actively launches mechanisms to stimulate/support them.

In the course of the study, indicators of US foreign trade were analyzed. The USA has a negative balance of foreign trade and is a country that mainly consumes resources, producing products with high added value for the foreign and domestic markets. In 2019-2020, the economic indicators of the development of foreign trade worsened due to the economic crisis caused by the coronavirus pandemic. Characterizing the product structure of US exports, it should be noted that four product groups accounted for the largest share of exports: fuel and lubricants, transport and spare parts; nuclear reactors and batteries; products of the chemical industry. During 2016-2020, China had a positive foreign trade balance and is a country that actively both exports goods to the foreign market and consumes

significant amounts of imported resources. In 2020, despite the coronavirus pandemic, China managed not only not to reduce the volume of exports and GDP, in particular, but also to increase exports by 3.7%, while GDP grew by 3.1% in 2020. The reduction in imports in 2019-2020 was associated with the introduction of mirror sanctions in relation to US sanctions on foreign trade.

Characterizing the potential impact of the trade war between the USA and China on the potential development of the automotive industry sector, it is worth stopping at the assessment of the consequences for the global economy. According to the calculations, if trade flows between the USA and China in the field of automobile construction are excluded, the overall value added in the world economy will decrease by 0.022%. Taking into account the scale of the world economy, this figure is about $2,351 million. In general, the indicated reduction of added value in the world economy is comparatively smaller than the reduction of this indicator in the USA or China. This effect is caused by the fact that when exports between countries are reduced, part of the product flows are simply redirected. At the same time, part of the added value may be lost due to additional transaction costs, but a reduction in exports in one country has a certain resulting effect on the reduction of gross added value in the world economy.

It can be seen that the leveling of trade in electrical goods has the greatest effect on the reduction of gross added value, primarily in the automotive industry. Thus, the reduction of gross added value for machine-building products is $5,626.7 million,

and the reduction of added value for electrical goods (computer, electronic and optical products) is only $341.7 million. From the above indicators, it can be concluded that the intermediate consumption of Tech sector products is concentrated mainly in the machine-building industry of the USA. This fact shows that the US economy is very sensitive to imports from China of many electrical goods. Many productions are now geographically diversified and most of them are located in the Asian region, in particular in China.

Based on the given data, the question arises why, when the trade in agricultural products between the USA and China is leveled off, the gross added value in China decreases almost 15 times more than in the USA. The main assumption can be the dependence of the gross added value not only on the geographical distribution of exports and the country's ability to substitute for the corresponding direction, but also on the specifics of the use of imported products in adjacent sectors of the economy. Given the peculiarities of the structure of US agricultural exports to China, which was discussed in Chapter 2, a clear difference can be observed for both countries. The US exports to China very basic products that are the basis for the manufacture of most food products (oil, grain and grain products, meat, etc.). At the same time, Chinese exports consist mainly of goods that are not strategically important (wool, teas, herbs and spices, etc.).

The leveling of trade flows between the US and China leads to an uneven reduction in gross value added in the economies of both countries. In China, the reduction in

value added is 0.427%, and in the US - 0.143%. It can be seen that the leveling of trade in agricultural products to the greatest extent affects the reduction of the gross added value primarily in the food industry. Thus, the reduction in gross value added for the food industry is $1,096.3 million, and the reduction in value added for animal husbandry is only $278.5 million. From the above indicators, it can be concluded that the intermediate consumption of Agriculture sector products is concentrated mainly in the food industry of the USA. It can be stated that the decrease is very significant and is 0.237%. if compared with the Automotive sector and the Tech Sector, the decrease in gross added value is greater. This effect is explained by the higher level of integration of the Agriculture Sector into various branches of the world economy.

Based on the conducted analysis we established some possible predictions for the future of the trade war between the US and China :

1. Continued negotiations and possible resolution.
2. Escalation.
3. Reorientation of trade flows.
4. Increased focus on domestic production.

Coherently we provided some ways to minimize the negative effects of trade war between 2 countries:

1. Negotiate a resolution.
2. Diversify trade.

3. Increase domestic production.

4. Reduce non-tariff barriers.

5. Provide support for affected industries.

Overall, minimizing the negative effects of the trade war requires a coordinated effort between governments, businesses, and other stakeholders. Finding a resolution that benefits both the US and China is the best way to restore confidence in the global economy and promote long-term economic stability and growth.

REFERENCES:

Abdullahi K.T. (2019) Study on the Rise of China as a Dangerous Superpower. 2019. URL: https://www.researchgate.net/publication/330543814_Study_on_the_Rise_of_China_as_a_Dangerous_Superpower/citations

Amiti, M, S J Redding, and D Weinstein (2019), "The impact of the 2018 trade war on U.S. price and welfare", Journal of Economic Perspectives 33(4): 187-210

Benedict Oramah, Richman Dzene. (2019) Globalisation and the Recent Trade Wars: Linkages and Lessons. Wiley Online Library. https://onlinelibrary.wiley.com/doi/10.1111/1758-5899.12707

Bu M. China in 2020: A New Type of Superpower. 2015. URL: http://www.jstor.org/stable/10.7864/j.ctt127wj9.1

China Council for the Promotion of International Trade, CCPIT URL: http://en.ccpit.org

China Development Bank (CDB) URL: http://www.cdb.com.cn

China Imports and Exports. Trends Economy. URL: https://trendeconomy.com/data/h2?commodity=TOTAL&reporter=China&trade_flow=Export,Import&partner=World&indicator=TV,YoY&time_period=2016,2017,2018,2019,2020

China Investment Promotion Agency URL: http://www.fdi.gov.cn/

China. Trade Data URL: https://wits.worldbank.org/CountryProfile/en/Country/CHN/StartYear/2016/EndYear/2019/TradeFlow/Import/Indicator/MPRT-TRD-VL/Partner/BY-REGION/Product/Total

Chor Davin, Li Bingjing. (2021) The impact of the US-China tariff war on China's economy: New evidence from night-time lights. https://cepr.org/voxeu/columns/impact-us-china-tariff-war-chinas-economy-new-evidence-night-time-lights

Duffy R. Neoliberalising nature: Global networks and ecotourism development in Madagasgar. Journal of Sustainable Tourism. 2008. Vol. 16(3). P. 327–344.

Durant Alex. (2022) U.S.-China Trade War Hurt American Industries and Workers. https://taxfoundation.org/us-china-tariffs-trade-war/

Fajgelbaum, P D, P K Goldberg, P J Kennedy, and A K Khandelwal (2019), "The return to protectionism", VoxEU.org, 7 November.

Fajgelbaum, P D, P K Goldberg, P J Kennedy, and A K Khandelwal (2020), "The return to protectionism", Quarterly Journal of Economics 135(1): 1-55.

GDP of China. URL: https://tradingeconomics.com/china/gdp

GDP of USA. URL: https://tradingeconomics.com/united-states/gdp

Gorman Linda (2022). How the US-China Trade War Affected the Rest of the World. URL: https://www.nber.org/digest/202204/how-us-china-trade-war-affected-rest-world

Huang B. China: Five facts about outward direct investment and their implication for future trend [Electronic resource] / B. Huang, A. Ortiz, T. Rodrigo, Le Xia. – 2018. – Mode of access: https://externalcontent.blob.core.windows.net/pdfs/201903_edit_ChinaWatch21st mar.pdf

Ian Coxhead. The US-China Trade War and Prospects for ASEAN Economies. University of Wisconsin-Madison. 2022. URL: https://www.ide.go.jp/English/ResearchColumns/Columns/2022/ian_coxhead.html

International Trade Administration URL: http://www.trade.gov/

International U.S. Commercial Service Offices URL: https://www.trade.gov/us-commercial-service-office-map

Kimberly Amadeo. Trade Wars and Their Effect on the Economy and You. 2022. URL: https://www.thebalancemoney.com/trade-wars-definition-how-it-affects-you-4159973

Knoerich J. (2018) Has outward foreign direct investment contributed to the development of the Chinese economy. 2018. URL: https://unctad.org/en/PublicationChapters/diaeia2016d1a1_en.pdf

Manning R. Will Global Trade Survive 2018? Foreign Policy: URL: http://foreignpolicy.com/2018/01/05/will-global- trade-survive-2018/

Mattoo A., Staiger R. Trade Wars: What do they Mean? Why are they Happening Now? What are the Costs? NBER Working Paper. April 2019. No. F02,F13 URL: https://www.nber.org/system/files/workingpapers/w25762/w25762.pdf

Mattoo A., Staiger R. Trade Wars: What do they Mean? Why are they Happening Now? What are the Costs? NBER Working Paper. April 2019. No. F02,F13 URL: https://www.nber.org/system/files/working.papers/w25762/w25762.pdf

Ministry of commerce in China URL: http://www.mofcom.gov.cn

Office of the United States Trade Representative : веб-сайт. URL: https://ustr.gov/about-us/benefits-trade

Official website of China Global Investment Tracker URL: https://www.aei.org/china-global-investment-tracker/

Official website of Chinese National Bureau of Statistics URL: http://www.stats.gov.cn

Official website of International Monetary Fund URL: https://www.imf.org

Official website of World Bank URL: https://www.worldbank.org/

Raffaele Giammettia, Luca Papia, Désirée Teobaldelli, Davide Ticchia (2022) The network effect of deglobalisation on European regions. Cambridge Journal of Regions, Economy and Society, Volume 15, Issue 2, July 2022, Pages 207–235, https://doi.org/10.1093/cjres/rsac006

Sanner R., Yiu L. International economic diplomacy: mutations in post-modern times. Netherlands institute of international relations. 2019. URL:

https://www.clingendael.org/sites/default/files/pdfs/20030100_cli_paper_dip_issue84.pdf

Scott R.E.(2018) Record U.S. trade deficit in 2018 reflects failure of Trump's trade policies. Economic Policy Institute: веб-сайт. URL: https://www.epi.org/blog/record-u-s-trade-deficit-in-2018-reflects-failure-of-trumps-trade-policies/

STATISTA: Estimated growth rates for the global electronics industry from 2020 to 2022, by region URL: https://www.statista.com/statistics/268396/estimated-growth-rates-for-the-electronics-industry-by-region/

Steinbock D. U.S.-China Trade War and Its Global Impacts. World Century Publishing Corporation and Shanghai Institutes for International Studies. 2019. No4. URL: https://www.worldscientific.com/doi/pdf/10.1142/S2377740018500318

Steinbock D. U.S.-China Trade War and Its Global Impacts. World Century Publishing Corporation and Shanghai Institutes for International Studies. 2019. No4. URL: https://www.worldscientific.com/doi/pdf/10.1142/S2377740018500318

Stiglitz, J. E. (2017) Globalisation: Time to Look at Historic Mistakes to Plot the Future. Available from: https://www.theguardian.com/business/2017/dec/05/globalisation-time-look-at-past-plot-the-future-joseph-stiglitz

The Export-Import Bank of China URL: http://www.eximbank.gov.cn

The U.S. Commercial Service URL: http://www.trade.gov/cs

The U.S. Department of Commerce URL: https://www.commerce.gov/

Top Trading Partners. United State Census Bureau: веб-сайт. URL: https://www.census.gov/foreign-trade/statistics/highlights/op/top1812yr.html#exports

U.S. International Trade in Goods and Services, Excel. Bureau of Economic Analysis: веб-сайт. URL: https://www.bea.gov/inter- national/index.htm#trade

United States of America. Trade Data URL: https://wits.worldbank.org/CountryProfile/en/Country/USA/Year/LTST/TradeFlow/Export/Partner/by-country/Product/64-67_Footwear

USA Imports and Exports. Trends Economy. URL: https://trendeconomy.com/data/h2/UnitedStatesOfAmerica/TOTAL

Yukon Huang. The U.S.-China Trade War Has Become a Cold War. 2021. URL: https://carnegieendowment.org/2021/09/16/u.s.-china-trade-war-has-become-cold-war-pub-85352

ZVEI Report. German Electrical and Electronic Manufacturers' Association URL: https://www.zvei.org/en/

APPENDECIES

Appendix 1

Characteristics of state support for exports in the USA

№	Institutions	Areas of tasks performed by each institution in the process of export support				
		Formation of the legislative framework	Coordination and information measures in the field of export	Measures of administrative regulation of export	Measures of financial stimulation of exports	Diplomatic export support
1	Ministry of Trade	+		+		
2	State Department		+			+
3	Office for export support		+			+
4	Ministry of Agriculture	+			+	+
5	US President's Export Council		+	+		+
6	Export promotion centers					+

Appendix 2

Characteristics of state support for exports in China

№	Institutions	Areas of tasks performed by each institution in the process of export support

		Formation of the legislative framework	Coordination and information measures in the field of export	Measures of administrative regulation of export	Measures of financial stimulation of exports	Diplomatic export support
1	Ministry of Commerce of the People's Republic of China	+	+	+		
2	Department of export support, trade representative offices		+	+		+
3	China Investment Promotion Agency		+	+	+	
4	China Council for the Promotion of International Trade		+		+	+
5	Eximbank of China, Sinosure				+	
6	Export insurance agency				+	
7	China Development Bank				+	

Appendix 3

Table - Typification of determinants of international commercial conflicts

Terms	*Description*
The motive of the country that caused the dispute	Protectionist, political, ideological, ecological, economic, social.
Subjects	The state, companies, integration groups, international organizations.
Reasons	The desire to support one's own, the manufacturer's goods, to protect his own interests, mostly, economic, the desire to capture new markets or to destroy a competitor.
The objective field of dispute: means of internal and external economic policy of today's country, which they discriminate against that. partner;	tariff, non-tariff or mixed means of foreign policy; tools of internal, economic, and political politics, which discriminate against foreign producers; export production. products of a certain branch of the country; export and import of goods and services of a certain country; total national export of the country.
Scales	Local, subregional, regional, transcontinental, global.
Duration	Infant (up to 2–3 months), medium (from 3 to 15 months), up to age (over 15 months).
Method of settlement	Negotiations, consultations, mediation, international court, international arbitration, mechanisms of regional international organizations,
Degrees of deterioration of situations	Conflicting situation in trade, international dispute, international conflict and international war.
Effects	Economic, social, technological.

Appendix 4

Table - Classification of trade policy instruments

Methods		**Measures of trade regulations**	**Objects of regulation**	
Tariffs		Customs fees Tariff quota	-	Imports
Non-Tariffs	Quantative	Quotation Licensing	Exports	Imports
	Hidden	Voluntary restrictions Government Procurement Requirements for the content of local components Technical barriers	-	Imports
	Funancial	Taxes and fees Export subsidies Export lending Dumping	Exports	-

Appendix 5

Exports (automotive) from United States of America's to China

Product label	Th.USD									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Motor vehicles for the transport of goods, incl. chassis with engine and cab	257753	80417	29112	3474	1471	32856	130052	182328	60383	721
Works trucks, self-propelled, not fitted with lifting or handling equipment, of the type used ...	36001	7502	5629	5604	3310	2262	2713	1805	1266	1231
Bodies, incl. cabs, for tractors, motor vehicles for the transport of ten or more persons, ...	7479	9094	7842	3589	3458	3638	7224	4191	1963	2497
Parts and accessories for motorcycles and bicycles and for carriages for disabled persons, ...	6298	6131	6651	3701	5323	3897	6701	10087	8349	11994
Tractors (other than tractors of heading 8709)	39566	32587	86705	46470	49693	9340	4233	7615	6312	19758
Special purpose motor vehicles (other than those principally designed for the transport of ...	113469	129724	71308	106216	87113	106568	88036	97874	34369	20289
Motorcycles, incl. mopeds, and cycles fitted with an auxiliary motor, with or without side-cars; ...	18826	21443	14278	10473	7372	8565	11528	16333	13888	28906
Trailers and semi-trailers; other vehicles, not mechanically propelled (excluding railway and ...	35296	40123	46910	41577	38646	49609	47851	31827	27684	30066

Parts and accessories for tractors, motor vehicles for the transport of ten or more persons, ...	758869	1420313	1779171	1522732	2012608	2330142	2412107	1538607	1934438	1764341
Motor cars and other motor vehicles principally designed for the transport of persons, incl. ...	5780734	8579281	11219704	9061833	8851643	10302144	6695546	7241290	6091123	6600662

*Source:

https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c842%7c%7c156%7c%7c87%7c%7c%7c4%7c1%7c1%7c2%7c2%7c1%7c1%7c1%7c1%7c1

Exports (automotive) from United States of America's to World

Product label	Th.USD									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Motor vehicles for the transport of goods, incl. chassis with engine and cab	17332477	15810964	14093611	12403632	12912056	15784018	15473617	17566424	13988672	16499944
Works trucks, self-propelled, not fitted with lifting or handling equipment, of the type used ...	479253	375284	398258	351445	299703	269930	303339	287345	222823	248099
Bodies, incl. cabs, for tractors, motor vehicles for the transport of ten or more persons, ...	534747	531223	611597	754271	930773	1071667	1216833	867112	780064	369247
Parts and accessories for motorcycles and bicycles and for carriages for disabled persons, ...	811869	804388	807703	794292	714520	694348	704915	749749	621422	814983
Tractors (other than tractors of heading 8709)	8112285	6204889	6073683	5076692	3972606	4629377	5844589	6017830	3973223	5275953
Special purpose motor vehicles (other than those principally designed for the transport of ...	2369999	2445283	2151041	1828909	1660590	1465881	1795135	1710647	1448972	1663293

Motorcycles, incl. mopeds, and cycles fitted with an auxiliary motor, with or without side-cars; ...	1283704	1380990	1415592	1241105	1287963	1273483	1275007	1158128	604356	856215
Trailers and semi-trailers; other vehicles, not mechanically propelled (excluding railway and ...	3759334	4126693	4073835	3468149	3194108	3571060	4153340	3779432	2744669	4245253
Parts and accessories for tractors, motor vehicles for the transport of ten or more persons, ...	41790665	43071211	42741289	44046489	43182384	45202613	45697492	43145813	33263785	35640080
Motor cars and other motor vehicles principally designed for the transport of persons, incl. ...	54584710	57299622	61675661	55365825	53837602	53568288	51428857	56451074	45967269	54681915

*Source:

https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c842%7c%7c156%7c%7c87%7c%7c%7c4%7c1%7c1%7c2%7c2%7c1%7c1%7c1%7c1%7c1

Appendix 6

Exports (automotive) from China to USA

Product label	Th.USD									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Special purpose motor vehicles (other than those principally designed for the transport of ...	19620	13701	6186	1097	1961	3259	801	2391	1294	2238
Tractors (other than tractors of heading 8709)	4125	4909	3047	14543	42742	82813	94620	25587	11211	22832
Carriages for disabled persons, whether or not motorised or otherwise mechanically propelled ...	150543	123792	145172	155800	152234	175782	195365	204310	169836	275654
Baby carriages and parts thereof, n.e.s.	279223	307975	339514	332938	332095	343718	373462	374647	333639	446948
Parts and accessories for motorcycles and bicycles and for carriages for disabled persons, ...	206483	237689	283835	305842	299976	309753	352235	394474	417550	624479
Bicycles and other cycles, incl. delivery tricycles, not motorised	1021722	913803	1001666	952682	863207	852844	932495	615420	860003	1196053

Trailers and semi-trailers; other vehicles, not mechanically propelled (excluding railway and ...	724430	768082	917230	1083731	1036053	1123697	1505952	1150087	1077506	1401176
Motor cars and other motor vehicles principally designed for the transport of persons, incl. ...	149315	153538	195207	337205	1372876	1665858	2056069	1062203	1223899	1738452
Motorcycles, incl. mopeds, and cycles fitted with an auxiliary motor, with or without side-cars; ...	149366	150395	147588	494041	361960	468373	887299	820466	1171337	1819299
Parts and accessories for tractors, motor vehicles for the transport of ten or more persons, ...	6980399	7776484	9272392	9562447	9441584	10076118	11658086	9625771	8708217	11560176

*Source:

https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c842%7c%7c156%7c%7c87%7c%7c%7c4%7c1%7c1%7c2%7c2%7c1%7c1%7c1%7c1%7c1

Exports (automotive) from China to World

Product label	Th.USD									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Motor vehicles for the transport of goods, incl. chassis with engine and cab	1727956	1722043	1601324	1669450	1299814	1209279	1269817	1248372	874210	1339397
Works trucks, self-propelled, not fitted with lifting or handling equipment, of the type used ...	1488276	1323110	1645905	1582678	1025342	1297251	1457398	1430850	1327884	2391491
Bodies, incl. cabs, for tractors, motor vehicles for the transport of ten or more persons, ...	486120	472238	538729	547903	539803	596920	680079	729333	634634	901468
Parts and accessories for motorcycles and bicycles and for carriages for disabled persons, ...	1058509	1111008	1185975	1186208	1168388	1332672	1367710	1381274	1267562	1485064
Tractors (other than tractors of heading 8709)	4475846	5158288	6135514	5581015	5412925	5481206	5852945	6314172	7543813	11181822
Special purpose motor vehicles (other than those principally designed for the transport of ...	3196451	3189308	3580002	3515599	3142050	3145784	3284610	2876199	3686204	5153168
Motorcycles, incl. mopeds, and cycles fitted with an auxiliary motor, with or without side-cars; ...	2916923	3149571	3498607	3745925	3262997	3551651	4215854	4022596	3982614	5679623
Trailers and semi-trailers; other vehicles, not mechanically propelled (excluding railway and ...	4768433	4623371	4547591	4139694	4953605	7180424	8626679	8633018	9927709	24389059
Parts and accessories for tractors, motor vehicles	5504630	5820982	5728987	6117723	5961257	6670653	7560374	7647256	8599011	12316236

for the transport of ten or more persons, ...										
Motor cars and other motor vehicles principally designed for the transport of persons, incl. ...	22634079	25517522	28442983	28281680	28369679	31049571	34849548	33598205	32931218	45566117

*Source:

https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c842%7c%7c156%7c%7c87%7c%7c%7c4%7c1%7c1%7c2%7c2%7c1%7c1%7c1%7c1%7c1

Appendix 7

Exports (tech) from USA to China

Product label	Th.USD									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Electronic integrated circuits; parts thereof	3152075	3885237	4475499	5006296	5179487	5488302	6256970	8066515	10165306	12265290
Telephone sets, incl. telephones for cellular networks or for other wireless networks	1632846	2287504	2123038	2402505	2323677	1579821	1071535	923174	811416	881997
Diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices	671225	753080	901237	795363	610614	620504	772131	781821	870969	874266
Electrical apparatus for switching or protecting electrical circuits, or for making connections	447866	512543	531730	537091	561062	629274	661332	612364	626332	699792
Electric motors and generators (excluding generating sets)	154135	157475	173903	167474	157063	165893	203740	232960	484224	617382
Boards, panels, consoles, desks, cabinets and other bases, equipped with two or more apparatus	345999	438706	415525	459641	382586	388302	440966	458758	437866	500883
"Discs, tapes, solid-state non-volatile storage devices, ""smart cards"" and other media for	255050	312120	360753	402466	357797	382686	440339	389498	443779	481623
"Insulated ""incl. enamelled or anodised"" wire, cable ""incl. coaxial cable"" and other insulated	323280	378468	395662	358065	362081	452107	425634	430221	395407	454871

Electrical transformers, static converters, e.g. rectifiers, and inductors; parts thereof	325477	391587	365630	358168	325142	385991	463892	331037	362567	365348
Industrial or laboratory electric furnaces and ovens, incl. those functioning by induction	136475	79027	94106	125585	113890	107328	106756	91668	66190	82881
"Electrical capacitors, fixed, variable or adjustable ""pre-set""; parts thereof"	123514	73521	66945	50424	56278	78687	102056	67067	84767	81603
Parts suitable for use solely or principally with transmission and reception apparatus for ...	95383	94717	79339	97743	100277	116507	109565	110380	84325	77602
Printed circuits	137422	138881	147227	132240	127661	123101	97674	67524	90001	70185
Electric sound or visual signalling apparatus, e.g. bells, sirens, indicator panels, burglar ...	69453	64351	77767	62861	61852	65202	64414	65659	72279	67075
Electrical ignition or starting equipment of a kind used for spark-ignition or compression-ignition ...	285036	219469	50245	59863	58560	55704	51159	68325	42609	64663
Monitors and projectors, not incorporating television reception apparatus; reception apparatus ...	149690	96482	57715	97550	70671	73875	75065	52784	27061	30450

Electric generating sets and rotary converters	182396	194535	368954	217436	117557	48031	53067	84859	27492	27514
Other positions	783488	854391	889616	924176	905659	959943	1053875	1003730	1205638	1033998
TOTALS	**9270810**	**10932094**	**11574891**	**12254947**	**11871914**	**11721258**	**12450170**	**13838344**	**16298228**	**18677423**

*Source:

https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c842%7c%7c156%7c%7c87%7c%7c%7c4%7c1%7c1%7c2%7c2%7c1%7c1%7c1%7c1%7c1

Exports (tech) from USA to World

Product label	Th.USD									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Electronic integrated circuits; parts thereof	34385748	34544514	34475974	33482947	34772139	38193399	37867494	39858776	44152712	52816874
Telephone sets, incl. telephones for cellular networks or for other wireless networks	28809528	31252199	33810134	34771874	33832946	34025789	32442364	30704645	28076700	31777051
Diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices	6499560	6658941	7464905	7497939	7311540	7187781	7610168	6694628	6154606	7491139
Electrical apparatus for switching or protecting electrical circuits, or for making connections	8947200	9432603	10204339	10466047	10096485	10426985	11034545	10392485	9110320	10511973
Electric motors and generators (excluding generating sets)	3743041	3823369	4092230	4138318	4003862	4075959	4055830	4231253	4282571	4633055

Boards, panels, consoles, desks, cabinets and other bases, equipped with two or more apparatus	4597253	5315225	5701914	5655517	5432078	5806201	6091050	5993501	5005364	5459749
"Discs, tapes, solid-state non-volatile storage devices, ""smart cards"" and other media for	4931738	4770501	4452613	4036900	3955627	4351040	4898005	4851380	6258909	7359395
"Insulated ""incl. enamelled or anodised"" wire, cable ""incl. coaxial cable"" and other insulated	9544294	9806895	9875090	9654222	9436407	9924429	10366772	10081794	8301491	9988153
Electrical transformers, static converters, e.g. rectifiers, and inductors; parts thereof	5758611	6194866	6291033	6469404	5768110	5963971	6324475	5967867	5632039	6164574
Industrial or laboratory electric furnaces and	652462	555921	570048	651740	602645	633703	653297	601680	592189	720234

ovens, incl. those functioning by induction										
"Electrical capacitors, fixed, variable or adjustable ""pre-set""; parts thereof"	1633744	1603231	1584505	1466071	1426023	1674432	2069446	1767721	1698217	2121554
Parts suitable for use solely or principally with transmission and reception apparatus for ...	4515079	3927960	4102238	3382595	2925268	3126458	3099152	2997999	2800753	2590218
Printed circuits	1748508	1769302	1980226	1727340	1858366	1752486	1592217	1283166	1190302	1207965
Electric sound or visual signalling apparatus, e.g. bells, sirens, indicator panels, burglar ...	1749113	1720618	1851852	1840272	1855599	1891725	1934149	1895811	1507485	1615164
Electrical ignition or starting equipment of a kind used for spark-ignition or compression-ignition ...	2203723	2193061	2286973	2276418	2292368	2310327	2324052	2375320	1829764	1850428

Monitors and projectors, not incorporating television reception apparatus; reception apparatus ...	4916488	4209198	4424032	4675915	4572951	4804130	4562192	4216540	2606293	2616458
Electric generating sets and rotary converters	4339300	3479364	3773406	2785780	2003934	1263110	1410136	1697645	1382227	1587435
Other positions	24898987	25876653	26460027	25492609	25185376	26743405	27359109	27017848	22904235	24791138
TOTALS	**153874377**	**157134421**	**163401539**	**160471908**	**157331724**	**164155330**	**165694453**	**162630059**	**153486177**	**175302557**

*Source:

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Appendix 8

Exports (tech) from China to USA

Product label	Th.USD									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Telephone sets, incl. telephones for cellular networks or for other wireless networks	26512433	30252334	35038673	37300874	37830157	46152314	53086149	48118043	46767441	53399536
Monitors and projectors, not incorporating television reception apparatus	9493269	8355723	10136074	9608855	8717592	10395889	10686761	8855112	8167717	9681384
Electric instantaneous or storage water heaters and immersion heaters	4142681	4556316	5007587	5158283	5081791	5474278	6205972	6196565	7535153	9095849
Electrical machines and apparatus, appliencies, motors and generators	6991704	8306122	7599742	7601686	7434305	8955537	10562145	9772949	12468282	17153358
Electric accumulators, incl. separators	941823	926395	1303179	1508234	1553450	1565961	2003649	2266693	2913230	5501627
Electrical transformers, static converters	3360231	3606273	4069404	4095933	3910283	4037789	4406588	3708017	4188995	5365154

Microphones and stands therefor	2848515	3076693	3520506	3762061	3694227	4146698	4158491	3903480	4425536	4897502
"Insulated ""incl. enamelled or anodised	2738531	3112856	3614793	3760163	3678989	3966411	4363815	3223886	3636077	4703611
Electrical apparatus for switching or protecting electrical circuits, or for making connections	1465380	1590199	1779242	1892390	1973509	2225174	2461251	2268257	2407792	3189359
Electric filament or discharge lamps	1080035	1130281	1063273	856615	695309	2159549	2202290	1845386	2487424	2453508
Boards, panels, consoles, desks, cabinets and other bases, equipped with two or more apparatus	817908	947021	1111563	1389351	1451722	1529403	1809039	1797393	1413128	1510213
Electronic integrated circuits; parts thereof	1323734	2011768	2465068	2075357	1258029	1168245	1428386	963128	977390	1469638
Parts suitable for use solely or principally with transmission and reception apparatus	1732773	1820571	1807140	1883249	1696340	1572399	1662844	1278974	1059743	1147199
Diodes, transistors and similar	2100095	2087271	2638749	2375081	2103705	1270397	731212	732569	941045	809719

semiconductor devices; photosensitive semiconductor devices										
Parts suitable for use solely or principally with electric motors and generators	1045011	721768	791163	834178	796686	767577	820496	808623	690269	771886
Reception apparatus for radio-broadcasting, whether or not combined, in the same housing	1475045	1292055	1070743	1159406	1085773	831852	771749	405209	574700	744200
Video recording or reproducing apparatus, whether or not incorporating a video tuner	1302644	1160746	939994	1005951	913785	816179	718878	531599	509953	565366
Other positions	8162286	7922925	8578448	9344144	9398636	9949763	11417573	9521863	10451630	12384604
TOTALS	**77534098**	**82877317**	**92535341**	**95611811**	**93274288**	**106985415**	**119497288**	**106197746**	**111615505**	**134843713**

*Source:

https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c842%7c%7c156%7c%7cTOTAL%7c%7c%7c2%7c1%7c1%7c2%7c2%7c1%7c1%7c1%7c1%7c1

Exports (tech) from China to World

Product label	Th.USD									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Telephone sets, incl. telephones for cellular networks or for other wireless networks	153185303	174937881	195292423	213213495	201648531	219421769	240354409	223926831	223208412	257643835
Monitors and projectors, not incorporating television reception apparatus	27740371	26660935	30325817	28182063	28284139	31486964	33449973	31207375	31899669	39950805
Electric instantaneous or storage water heaters and immersion heaters	16410492	18513399	19326376	18813325	18407266	19623468	21116222	21859140	24973936	32174598
Electrical machines and apparatus, appliencies, motors and generators	34277002	39158481	36073717	36618297	34126902	36424745	41790769	43246942	49423248	65735402
Electric accumulators, incl. separators	7643677	7701223	9057772	10336833	10306589	11670344	14794343	16871271	20159080	33618467
Electrical transformers, static converters	23706672	28279206	27742814	26551608	24457256	25315264	26695158	27672389	30137946	39666278
Microphones and stands therefor	12804653	13435900	14936957	15784105	15151896	16314424	16348392	16573860	18496230	21005938

"Insulated ""incl. enamelled or anodised	17421591	19430256	22190862	21428503	21014000	22172823	23535045	22355219	22739527	29507512
Electrical apparatus for switching or protecting electrical circuits, or for making connections	11556263	12363783	14265575	13784132	13891633	14976399	16092760	16248835	17367200	22764068
Electric filament or discharge lamps	6593581	7515059	6429172	5475536	4831149	9186069	8435341	8047891	8902418	8932465
Boards, panels, consoles, desks, cabinets and other bases, equipped with two or more apparatus	4696492	5490918	6307533	6762190	6966357	7734689	9028333	9551109	8930805	11027652
Electronic integrated circuits; parts thereof	53745301	87880781	61213335	70124234	62324755	66507730	84666601	102102960	116989222	155301817
Parts suitable for use solely or principally with transmission and reception apparatus	11874218	11919231	13282324	11342462	11495771	13080038	13170290	13631136	14916598	19206006
Diodes, transistors and similar semiconductor devices; photosensitive	27337458	27870172	30637370	33556647	26930143	26774699	29054830	34562900	35655866	48792510

semiconductor devices										
Parts suitable for use solely or principally with electric motors and generators	3732730	3724825	4215491	3987130	3825568	4277076	4793922	5383743	4994912	7840041
Reception apparatus for radio-broadcasting, whether or not combined, in the same housing	4781611	4466829	4621871	4999001	4776650	4452320	3886826	3526031	3954576	4211541
Video recording or reproducing apparatus, whether or not incorporating a video tuner	6367811	5340128	4865576	5123713	3804159	3777397	3944098	3449945	3198823	2937565
Other positions	63097029	66293388	69887214	73948893	64499724	65588103	73128770	70131217	73900481	98526836
TOTALS	**486972255**	**560982395**	**570672199**	**600032167**	**556742488**	**598784321**	**664286082**	**670348794**	**709848949**	**898843336**

*Source:

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Appendix 9

Exports (Agro) from USA to China

Product label	Th.USD									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Coffee, tea, maté and spices	20894	18934	14284	13703	17407	22197	29303	19566	16704	14445
Ships, boats and floating structures	36138	33299	31848	23849	28852	25231	21579	12818	10694	26997
Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	80925	111735	87358	77401	54971	40476	55095	12107	23016	31610
Cocoa and cocoa preparations	49983	49768	39918	35330	31285	27597	34378	34893	24261	33131
Preparations of cereals, flour, starch or milk; pastrycooks' products	76708	46925	52762	87540	72938	89331	90905	99521	78542	41313
Animal or vegetable fats and oils and their cleavage products;	354142	190668	179482	57786	145505	64958	54741	39570	71272	47525
Live animals	72568	82313	48572	10244	6400	16727	14029	5277	19671	48656
Sugars and sugar confectionery	131248	118646	113463	74414	63246	79086	95664	76900	83565	119165
Tobacco and manufactured tobacco substitutes	125460	178786	216756	198089	172285	162683	158024	2861	253	169536
Preparations of vegetables, fruit,	191432	172654	175347	228496	266336	231674	293400	186154	163297	227867

nuts or other parts of plants										
Products of animal origin, not elsewhere specified or included	154324	163963	189566	266200	254085	267391	317097	295693	287012	318773
Fish and crustaceans, molluscs and other aquatic invertebrates	1113650	1094688	1150578	1007943	949231	1235726	1064293	862757	696723	777399
Essential oils and resinoids; perfumery, cosmetic or toilet preparations	260853	356716	355714	402369	401651	523701	711447	908142	934831	974875
Edible fruit and nuts; peel of citrus fruit or melons	537949	505911	323521	350213	379648	489100	450990	727568	839274	1008011
Meat and edible meat offal	1002236	1060512	704541	335616	584611	521900	391175	1186672	3147509	3981645
Cereals	1534977	2372629	1767062	2466361	1294794	1348224	688845	302662	2942511	7768771
Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit	15146749	13698765	14936961	11056362	14905440	12840552	3664387	8551457	14902935	15040949
Other positions	83615	101408	106225	105431	84307	96545	78956	64646	108686	91072
Total	**20973851**	**20358320**	**20493958**	**16797347**	**19712992**	**18083099**	**8214308**	**13389264**	**24350756**	**30721740**

*Source:

https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c842%7c%7c156%7c%7c87%7c%7c%7c4%7c1%7c1%7c2%7c2%7c1%7c1%7c1%7c1%7c1

Exports (Agro) from USA to World

Product label	Th.USD									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Coffee, tea, maté and spices	1295237	1184438	1224983	1217254	1221148	1170105	1148588	1093721	1044968	1095863
Ships, boats and floating structures	3533868	2677519	3400936	3132696	2342198	2164697	2604579	2370821	1998211	2309930
Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	1965870	2227514	2408903	2298304	2160183	2162382	2186698	2067755	1961980	2332801
Cocoa and cocoa preparations	1717001	1870355	2117070	1948838	2035011	1991055	1935862	1925616	1682692	1971151
Preparations of cereals, flour, starch or milk; pastrycooks' products	3887706	4194044	4254565	4280822	4055684	4066085	4158344	4281040	4276457	4264615
Animal or vegetable fats and oils and their cleavage products; prepared edible fats	4627662	3791208	3400967	3167653	3195651	3319106	3160658	3085712	3589233	4320695
Live animals	1189530	1019525	944407	758215	783977	1006995	1105392	1027931	965955	1277562
Sugars and sugar confectionery	2560100	2476821	2267758	1969469	1915557	2022363	2006370	1931061	1835352	2057905

Tobacco and manufactured tobacco substitutes	1657584	1909887	1805453	2077161	2297815	2179907	2324503	1804660	1047922	1165716
Preparations of vegetables, fruit, nuts or other parts of plants	4750359	5071678	5193694	5425736	5058994	4990335	5076793	4970914	4502981	5008567
Products of animal origin, not elsewhere specified or included	894879	1024331	1236528	1131606	1013436	1150732	1301722	1302786	1149932	1243700
Fish and crustaceans, molluscs and other aquatic invertebrates	5024709	5134103	5256621	5088511	4968660	5393759	5253279	4883256	4010945	4861823
Essential oils and resinoids; perfumery, cosmetic or toilet preparations	10452105	11133099	11551622	11807215	12049254	12954788	13614181	13837081	12345177	13562177
Edible fruit and nuts; peel of citrus fruit or melons	13263744	14533192	14858265	14458787	14054421	14880593	14697875	15083773	14303253	15095295
Meat and edible meat offal	16096227	16276932	17570517	14288343	14657760	16398642	17266108	17662209	18147642	22205465
Cereals	20616227	20300976	22850742	18816091	18938198	18613044	21021758	16923853	19338911	30546209
Oil seeds and oleaginous fruits; miscellaneous	29688507	26955339	28862025	23599315	27718131	26387756	22411370	23906961	30833296	33061730

grains, seeds and fruit										
Other positions	6027909	6375610	6486598	6273030	6556048	6752392	6497924	6647574	6646153	6984866
TOTALS	129249224	128156571	135691654	121739046	125022126	127604736	127772004	124806724	129681060	153366070

*Source:

https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c842%7c%7c156%7c%7c87%7c%7c%7c4%7c1%7c1%7c2%7c2%7c1%7c1%7c1%7c1%7c1

Appendix 10

Exports (Agro) from China to USA

Product label	Th.USD									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Coffee, tea, maté and spices	1197523	1338644	1414618	1305810	1241091	1412053	1570545	1085842	965368	1274760
Ships, boats and floating structures	1674239	1764850	1903906	1826246	1745351	1715355	1752028	1353386	1112676	1135359
Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	1371913	1272344	1085608	1103790	1070447	1093879	1239001	789000	941168	896495
Cocoa and cocoa preparations	278945	289139	280290	262011	227929	264763	275488	236919	202877	252891
Preparations of cereals, flour, starch or milk; pastrycooks' products	137038	152634	167311	170522	185514	183983	215364	194253	219882	246183
Animal or vegetable fats and oils and their cleavage products; prepared edible fats	156958	162983	184283	162855	177609	181123	199884	203805	200579	241736
Live animals	145166	142152	147351	160258	163648	142563	163078	156573	188905	236087
Sugars and sugar confectionery	178231	186725	223584	221089	218813	227622	238861	212798	216526	231461
Tobacco and manufactured tobacco substitutes	211532	208403	225890	203093	164490	147112	172674	114719	127699	150109

Preparations of vegetables, fruit, nuts or other parts of plants	41455	41520	45891	49865	62309	62904	86349	68062	33952	48835
Products of animal origin, not elsewhere specified or included	35164	37646	38869	37722	30726	40676	35365	16565	51932	47655
Fish and crustaceans, molluscs and other aquatic invertebrates	8601	8662	13194	26002	27225	33804	42656	43510	17347	41537
Essential oils and resinoids; perfumery, cosmetic or toilet preparations	44776	40902	35685	30240	29381	27221	33722	26208	12826	16053
Edible fruit and nuts; peel of citrus fruit or melons	10012	8511	8166	8917	10379	10703	10348	9938	13310	15189
Meat and edible meat offal	17279	19117	32077	22341	36164	27138	35027	33276	2602	4077
Cereals	4217	4105	4678	2425	2293	4136	3182	2976	3353	2505
Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit	8855	16409	9998	8560	13441	13279	14396	12820	3781	361
TOTALS	**5521904**	**5694746**	**5821399**	**5601746**	**5406810**	**5588314**	**6087968**	**4560650**	**4314783**	**4841293**

*Source:

https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c842%7c%7c156%7c%7cTOTAL%7c%7c%7c2%7c1%7c1%7c2%7c2%7c1%7c1%7c1%7c1%7c1

Appendix 11

Exports (Agro) from China to World

Product label	Th.USD									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Coffee, tea, maté and spices	8951553	8982206	8881919	8007538	7941930	9025330	10253046	9241434	9164993	11717103
Ships, boats and floating structures	11323257	12526363	14074262	13325035	13705666	13255372	13257220	12467028	10710803	11037668
Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	7562049	7852143	7634471	7390335	7342281	7691124	8051121	7837280	7610993	8272698
Cocoa and cocoa preparations	2057349	2200322	2292694	1771677	1772269	2309658	2533417	2393615	1826547	1958053
Preparations of cereals, flour, starch or milk; pastrycooks' products	1499717	1531678	1573199	1528407	1580240	1650517	1976027	2216131	2009528	2345256
Animal or vegetable fats and oils and their cleavage products; prepared edible fats	1265264	1451715	1540355	1562549	1707267	1759675	1828254	1861349	1702784	1931042
Live animals	3771731	4171873	4318152	5210495	5486744	5343137	5284633	6227061	7063596	6332811

Sugars and sugar confectionery	1942993	2245403	2452618	2537040	2981847	3183074	3285918	3633403	4035222	4189096
Tobacco and manufactured tobacco substitutes	2626582	2924864	3114042	2899599	2718629	2646093	2714272	2874926	2874555	2954779
Preparations of vegetables, fruit, nuts or other parts of plants	1386685	1341095	1651195	1993957	2203506	2220503	2369733	2081339	2023106	2085207
Products of animal origin, not elsewhere specified or included	2583912	2619247	2522052	2281247	2139088	1999467	2475896	2359750	1544596	1933511
Fish and crustaceans, molluscs and other aquatic invertebrates	332925	385986	475797	442386	425911	376015	403638	399295	327418	436475
Essential oils and resinoids; perfumery, cosmetic or toilet preparations	1706534	1630003	1516713	1270323	1159517	1114376	1140489	995610	511474	654761
Edible fruit and nuts; peel of citrus fruit or melons	91191	89260	103565	124732	122423	129394	127756	129763	157076	201074
Meat and edible meat offal	582866	580625	585572	597731	646748	561541	544086	510018	599665	560831
Cereals	980500	988524	1181933	1057537	902452	916721	867132	841004	710791	872352
Oil seeds and oleaginous	1261902	1321735	1283912	1351466	1376375	1326671	1405547	1419728	778778	710844

fruits; miscellaneous grains, seeds and fruit										
TOTALS	**49927010**	**52843042**	**55202451**	**53352054**	**54212893**	**55508668**	**58518185**	**57488734**	**53651925**	**58193561**

*Source:

https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c842%7c%7c156%7c%7cTOTAL%7c%7c%7c2%7c1%7c1%7c2%7c2%7c1%7c1%7c1%7c1%7c1

Appendix 12

Table – The results of the assessment of the impact of the zeroing of automotive exports from China on the volumes of gross added value in various sectors of the US economy

Indicators	Absolute value, mln $
Extraction from CN	**-4322,4**
Decreasing of US economy (overall)	**-6761,3**
i.e. by industries:	
Manufacture of motor vehicles, trailers and semi-trailers	-2530,6
Wholesale trade, except of motor vehicles and motorcycles	-696,4
Legal and accounting activities; activities of head offices; management consultancy activities	-603,1
Manufacture of fabricated metal products, except machinery and equipment	-289,5
Administrative and support service activities	-234,7
Manufacture of basic metals	-174,3
Manufacture of computer, electronic and optical products	-153,7
Manufacture of machinery and equipment n.e.c.	-153,4
Manufacture of rubber and plastic products	-144,9
Manufacture of chemicals and chemical products	-128,9
Land transport and transport via pipelines	-127,9
Real estate activities	-110,3
Mining and quarrying	-106,3
Financial service activities, except insurance and pension funding	-91,9
Public administration and defence; compulsory social security	-88,7
Computer programming, consultancy and related activities; information service activities	-77,7
Architectural and engineering activities; technical testing and analysis	-64,9
Electricity, gas, steam and air conditioning supply	-63,5
Manufacture of basic pharmaceutical products and pharmaceutical preparations	-55,2
Manufacture of other non-metallic mineral products	-52,4

Insurance, reinsurance and pension funding, except compulsory social security	-47,5
Telecommunications	-47,4
Accommodation and food service activities	-43,3
Warehousing and support activities for transportation	-42,5
Manufacture of electrical equipment	-42
Other service activities	-41,8
Manufacture of paper and paper products	-39,6
Advertising and market research	-36,2
Scientific research and development	-35,7
Manufacture of coke and refined petroleum products	-34,1
Activities auxiliary to financial services and insurance activities	-31,8
Manufacture of textiles, wearing apparel and leather products	-30
Manufacture of furniture; other manufacturing	-28,9
Manufacture of other transport equipment	-28,5
Publishing activities	-25,8
Wholesale and retail trade and repair of motor vehicles and motorcycles	-25,1
Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services	-24,5
Retail trade, except of motor vehicles and motorcycles	-23
Air transport	-22,3
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	-22,2
Motion picture, video and television programme production, sound recording and music publishing activities; programming and broadcasting activities	-20,9
Construction	-20,3
Postal and courier activities	-18,4
Crop and animal production, hunting and related service activities	-13,7
Manufacture of food products, beverages and tobacco products	-12,8
Printing and reproduction of recorded media	-11,7
Other professional, scientific and technical activities; veterinary activities	-11,6
Education	-8,2
Forestry and logging	-6,6

Human health and social work activities	-4,1
Water transport	-3,5
Fishing and aquaculture	-3,4
Repair and installation of machinery and equipment	-2,4
Water collection, treatment and supply	-2,2
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	-1,3

Appendix 13

Table – The results of the assessment of the impact of the withdrawal of exports from the USA in the automotive industry on the volumes of gross added value in various sectors of the Chinese economy

Indicators	Absolute value, mln $
Extraction from US	**-2530,6**
Decreasing of CN economy (overall)	**-12000,3**
i.e. by industries:	
Manufacture of motor vehicles, trailers and semi-trailers	-4322,4
Wholesale trade, except of motor vehicles and motorcycles	-1098
Mining and quarrying	-729,7
Financial service activities, except insurance and pension funding	-586,4
Manufacture of basic metals	-544,7
Land transport and transport via pipelines	-360,4
Manufacture of machinery and equipment n.e.c.	-332,9
Legal and accounting activities; activities of head offices; management consultancy activities	-281,1
Crop and animal production, hunting and related service activities	-252,6
Electricity, gas, steam and air conditioning supply	-250,4
Manufacture of chemicals and chemical products	-249,2
Manufacture of rubber and plastic products	-229
Retail trade, except of motor vehicles and motorcycles	-227
Manufacture of computer, electronic and optical products	-197,4
Manufacture of textiles, wearing apparel and leather products	-189,9
Real estate activities	-185,3
Other service activities	-182,2
Other professional, scientific and technical activities; veterinary activities	-163,6
Manufacture of fabricated metal products, except machinery and equipment	-156,6
Manufacture of electrical equipment	-134,7

Manufacture of food products, beverages and tobacco products	-133,6
Manufacture of other non-metallic mineral products	-126,9
Warehousing and support activities for transportation	-124,7
Manufacture of coke and refined petroleum products	-122,5
Accommodation and food service activities	-110,9
Water transport	-79,6
Telecommunications	-69,2
Scientific research and development	-68,9
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	-60,4
Public administration and defence; compulsory social security	-54,1
Manufacture of furniture; other manufacturing	-48
Manufacture of paper and paper products	-41,7
Forestry and logging	-36,1
Printing and reproduction of recorded media	-31,6
Construction	-28,4
Insurance, reinsurance and pension funding, except compulsory social security	-27,9
Fishing and aquaculture	-23,5
Manufacture of other transport equipment	-23,1
Education	-20,7
Air transport	-18,7
Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services	-12,6
Administrative and support service activities	-12,3
Manufacture of basic pharmaceutical products and pharmaceutical preparations	-12,1
Postal and courier activities	-12
Computer programming, consultancy and related activities; information service activities	-9,8
Human health and social work activities	-8,9
Water collection, treatment and supply	-8,2

Appendix 14

Table – The results of the assessment of the impact of the zeroing of exports by the Tech sector from China on the volumes of gross added value in various sectors of the US economy

Indicators	Absolute value, mln $
Extraction from CN	**-9610,7**
Decreasing of US economy (overall)	**-15033,5**
i.e. by industries:	
Manufacture of motor vehicles, trailers and semi-trailers	-5626,7
Wholesale trade, except of motor vehicles and motorcycles	-1548,4
Legal and accounting activities; activities of head offices; management consultancy activities	-1340,9
Manufacture of fabricated metal products, except machinery and equipment	-643,6
Administrative and support service activities	-521,8
Manufacture of basic metals	-387,5
Manufacture of computer, electronic and optical products	-341,7
Manufacture of machinery and equipment n.e.c.	-341,1
Manufacture of rubber and plastic products	-322,1
Manufacture of chemicals and chemical products	-286,5
Land transport and transport via pipelines	-284,4
Real estate activities	-245,2
Mining and quarrying	-236,3
Financial service activities, except insurance and pension funding	-204,4
Public administration and defence; compulsory social security	-197,2
Computer programming, consultancy and related activities; information service activities	-172,7
Architectural and engineering activities; technical testing and analysis	-144,4
Electricity, gas, steam and air conditioning supply	-141,3
Manufacture of basic pharmaceutical products and pharmaceutical preparations	-122,7

Manufacture of other non-metallic mineral products	-116,5
Insurance, reinsurance and pension funding, except compulsory social security	-105,7
Telecommunications	-105,3
Accommodation and food service activities	-96,2
Warehousing and support activities for transportation	-94,5
Manufacture of electrical equipment	-93,3
Other service activities	-92,9
Manufacture of paper and paper products	-88,0
Advertising and market research	-80,5
Scientific research and development	-79,5
Manufacture of coke and refined petroleum products	-75,9
Activities auxiliary to financial services and insurance activities	-70,8
Manufacture of textiles, wearing apparel and leather products	-66,7
Manufacture of furniture; other manufacturing	-64,2
Manufacture of other transport equipment	-63,5
Publishing activities	-57,3
Wholesale and retail trade and repair of motor vehicles and motorcycles	-55,7
Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services	-54,5
Retail trade, except of motor vehicles and motorcycles	-51,2
Air transport	-49,5
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	-49,5
Motion picture, video and television programme production, sound recording and music publishing activities; programming and broadcasting activities	-46,4
Construction	-45,2
Postal and courier activities	-40,9
Crop and animal production, hunting and related service activities	-30,5
Manufacture of food products, beverages and tobacco products	-28,6
Printing and reproduction of recorded media	-26,1
Other professional, scientific and technical activities; veterinary activities	-25,7
Education	-18,2

Forestry and logging	-14,6
Human health and social work activities	-9,2
Water transport	-7,7
Fishing and aquaculture	-7,6
Repair and installation of machinery and equipment	-5,2
Water collection, treatment and supply	-4,8
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	-2,9
Activities of extraterritorial organizations and bodies	0,0

Appendix 15

Table – The results of the assessment of the impact of the withdrawal of exports from the USA in the technical sector on the volumes of gross added value in various sectors of the Chinese economy

Indicators	Absolute value, mln $
Extraction from US	**-17878,2**
Decreasing of CN economy (overall)	**-84778,3**
i.e. by industries:	
Manufacture of computer, electronic and optical products	-30536,5
Manufacture of machinery and equipment n.e.c.	-7757,1
Manufacture of electrical equipment	-5155,2
Financial service activities, except insurance and pension funding	-4142,4
Computer programming, consultancy and related activities; information service activities	-3848,0
Manufacture of motor vehicles, trailers and semi-trailers	-2546,1
Electricity, gas, steam and air conditioning supply	-2352,0
Retail trade, except of motor vehicles and motorcycles	-1985,6
Telecommunications	-1784,3
Wholesale trade, except of motor vehicles and motorcycles	-1768,9
Manufacture of chemicals and chemical products	-1760,5
Manufacture of rubber and plastic products	-1617,9
Manufacture of basic metals	-1603,8
Land transport and transport via pipelines	-1394,9
Manufacture of textiles, wearing apparel and leather products	-1341,6
Real estate activities	-1309,4
Other service activities	-1287,4
Other professional, scientific and technical activities; veterinary activities	-1156,0
Manufacture of fabricated metal products, except machinery and equipment	-1106,6
Mining and quarrying	-951,7

Manufacture of food products, beverages and tobacco products	-944,0
Manufacture of other non-metallic mineral products	-896,2
Warehousing and support activities for transportation	-881,1
Manufacture of coke and refined petroleum products	-865,3
Accommodation and food service activities	-783,3
Water transport	-562,6
Crop and animal production, hunting and related service activities	-489,1
Scientific research and development	-486,8
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	-426,4
Public administration and defence; compulsory social security	-382,1
Manufacture of furniture; other manufacturing	-339,1
Manufacture of paper and paper products	-294,9
Forestry and logging	-255,3
Printing and reproduction of recorded media	-223,5
Construction	-200,9
Insurance, reinsurance and pension funding, except compulsory social security	-197,4
Fishing and aquaculture	-166,1
Manufacture of other transport equipment	-163,2
Education	-146,1
Air transport	-132,3
Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services	-89,3
Administrative and support service activities	-87,2
Manufacture of basic pharmaceutical products and pharmaceutical preparations	-85,6
Postal and courier activities	-84,8
Legal and accounting activities; activities of head offices; management consultancy activities	-69,1
Human health and social work activities	-62,6
Water collection, treatment and supply	-57,7

Appendix 16

Table – The results of the assessment of the impact of the zeroing of exports in the Agriculture sector from China on the volumes of gross added value in various sectors of the US economy

Indicators	Absolute value, mln $
Extraction from CN	**-641,8**
Decreasing of US economy (overall)	**-3039,3**
i.e. by industries:	
Manufacture of food products, beverages and tobacco products	-1096,3
Crop and animal production, hunting and related service activities	-278,5
Manufacture of textiles, wearing apparel and leather products	-185,1
Fishing and aquaculture	-148,7
Manufacture of fabricated metal products, except machinery and equipment	-138,1
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	-91,4
Other service activities	-84,4
Other professional, scientific and technical activities; veterinary activities	-71,3
Retail trade, except of motor vehicles and motorcycles	-64,1
Land transport and transport via pipelines	-63,5
Manufacture of chemicals and chemical products	-63,2
Manufacture of rubber and plastic products	-58,1
Electricity, gas, steam and air conditioning supply	-57,6
Manufacture of computer, electronic and optical products	-50,1
Mining and quarrying	-48,2
Real estate activities	-47,0
Manufacture of machinery and equipment n.e.c.	-46,2
Legal and accounting activities; activities of head offices; management consultancy activities	-41,5
Financial service activities, except insurance and pension funding	-39,7
Manufacture of electrical equipment	-34,2

Manufacture of other non-metallic mineral products	-33,9
Warehousing and support activities for transportation	-32,2
Manufacture of coke and refined petroleum products	-31,6
Accommodation and food service activities	-31,1
Water transport	-28,1
Telecommunications	-20,2
Scientific research and development	-17,6
Manufacture of basic metals	-17,5
Public administration and defence; compulsory social security	-15,3
Manufacture of furniture; other manufacturing	-13,7
Manufacture of paper and paper products	-12,2
Forestry and logging	-10,6
Printing and reproduction of recorded media	-9,2
Construction	-8,0
Insurance, reinsurance and pension funding, except compulsory social security	-7,2
Manufacture of other transport equipment	-7,1
Education	-6,0
Air transport	-5,9
Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services	-5,2
Administrative and support service activities	-4,8
Manufacture of basic pharmaceutical products and pharmaceutical preparations	-3,2
Postal and courier activities	-3,1
Computer programming, consultancy and related activities; information service activities	-3,1
Human health and social work activities	-3,0
Water collection, treatment and supply	-2,5

Appendix 17

Table - The results of the assessment of the impact of the withdrawal of exports from the USA in the agricultural sector on the volumes of gross added value in various sectors of the Chinese economy

Indicators	Absolute value, mln $
Extraction from US	**-15808,7**
Decreasing of CN economy (overall)	**-24728,7**
i.e. by industries:	
Manufacture of food products, beverages and tobacco products	-9255,5
Crop and animal production, hunting and related service activities	-2546,9
Manufacture of textiles, wearing apparel and leather products	-2205,6
Fishing and aquaculture	-1058,7
Manufacture of fabricated metal products, except machinery and equipment	-858,3
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	-637,5
Other service activities	-562,1
Other professional, scientific and technical activities; veterinary activities	-561,1
Retail trade, except of motor vehicles and motorcycles	-529,8
Land transport and transport via pipelines	-471,3
Manufacture of chemicals and chemical products	-467,8
Manufacture of rubber and plastic products	-403,3
Electricity, gas, steam and air conditioning supply	-388,6
Manufacture of computer, electronic and optical products	-336,3
Mining and quarrying	-324,3
Real estate activities	-284,1
Manufacture of machinery and equipment n.e.c.	-237,5
Legal and accounting activities; activities of head offices; management consultancy activities	-232,4
Financial service activities, except insurance and pension funding	-201,9
Manufacture of electrical equipment	-191,6

Manufacture of other non-metallic mineral products	-173,8
Warehousing and support activities for transportation	-173,2
Manufacture of coke and refined petroleum products	-158,2
Accommodation and food service activities	-155,4
Water transport	-153,5
Telecommunications	-152,7
Scientific research and development	-144,7
Manufacture of basic metals	-132,4
Public administration and defence; compulsory social security	-130,7
Manufacture of furniture; other manufacturing	-124,9
Manufacture of paper and paper products	-116,5
Forestry and logging	-109,7
Printing and reproduction of recorded media	-105,6
Construction	-104,4
Insurance, reinsurance and pension funding, except compulsory social security	-94,3
Manufacture of other transport equipment	-91,7
Education	-89,7
Air transport	-84,3
Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services	-81,5
Administrative and support service activities	-81,4
Manufacture of basic pharmaceutical products and pharmaceutical preparations	-76,3
Postal and courier activities	-74,3
Computer programming, consultancy and related activities; information service activities	-67,2
Human health and social work activities	-50,1
Water collection, treatment and supply	-47,0