

Ministry of Education and Science of Ukraine
Black Sea Universities Network

ODESA NATIONAL UNIVERSITY OF TECHNOLOGY

International Competition of
Student Scientific Works

BLACK SEA SCIENCE 2022 PROCEEDINGS



ODESA, ONUT 2022

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BLACK SEA SCIENCE 2022

Proceedings

Odesa, ONUT 2022

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INTRODUCTION

International Competition of Student Scientific Works “Black Sea Science” has been held annually since 2018 at the initiative of Odesa National University of Technology (formerly Odesa National Academy of Food Technologies) with the support of the Ministry of Education and Science of Ukraine. It has been supported by Black Sea Universities Network (the Association of 110 higher education institutions from 12 countries of the Black Sea Region) since 2019, and by Iseki-FOOD Association (European Integrating Food Science and Engineering Knowledge into the Food Chain Association) since 2020.

The goal of the competition is to expand international relations and attract students to research activities. It is held in the following fields:

- Food science and technologies
- Economics and administration
- Information technologies, automation and robotics
- Power engineering and energy efficiency
- Ecology and environmental protection

The jury includes both Ukrainian and foreign scientists. In the 4 years that the competition has been held, the jury included scientists from universities of 24 countries: Angola, Azerbaijan, Benin, Bulgaria, China, Czech Republic, France, Georgia, Germany, Greece, Israel, Italy, Kazakhstan, Latvia, Lithuania, Moldova, Pakistan, Poland, Romania, Serbia, Slovakia, Switzerland, Turkey, USA.

At the same time, every year the geography has expanded and the number of foreign jury members has increased: from 46 jury members representing 25 universities from 12 countries in 2018, to 73 jury members of the 46 universities from 19 countries in 2022.

More than a thousand student research papers have been submitted to the competition from both Ukrainian and foreign institutions from 25 countries: China, Poland, Mexico, USA, France, Greece, Germany, Canada, Costa Rica, Brazil, India, Pakistan, Israel, Macedonia, Lithuania, Latvia, Slovakia, Romania, Kyrgyzstan, Kazakhstan, Bulgaria, Moldova, Georgia, Turkey, Serbia.

The interest of foreign students in the competition grew every year. In 2018, the students representing 15 institutions from 7 countries have submitted 33 works. In 2021 the number of submitted works increased to 73, authored by the students of 40 institutions from 18 countries.

The competition is held in two stages. In the first stage, student research papers are reviewed by members of the jury who are experts in the relevant fields. In the second stage of the competition, the winners of the first stage have the opportunity to present their work to a wide audience in person or online.

All participants of the competition and their scientific supervisors are awarded appropriate certificates, and the scientific works of the winners are included in the electronic proceedings of the competition. Every year the competition receives a large number of positive responses from Ukrainian and foreign colleagues with the desire to participate in the coming years.

2. ECONOMICS AND **ADMINISTRATION**

US-CHINA TRADE WAR**Authors:** Sheptun Natalia, Martyniuk Ivan, Shulyarenko Eugene**Advisors:** Reznik Nadiia

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Abstract: *In this paper, we consider the trade war between the United States and China, and its impact on the world economy. The United States and China are the largest countries in international trade: China is the world's largest exporter and the United States is its importer. The United States has maintained the status of the world's leading economy since the middle of the twentieth century, but in recent decades, China has shown particularly rapid development, strengthening its leadership in world markets. We analyzed the historical course of the trade war between the United States and China, as well as the current accounts of these countries. The paper considers the tariff policies of countries, and substantiates their impact on relations between the United States and China.*

Theoretical definition of trade war World trade wars are closely linked to international trade, which in turn is an integral part of international economic relations. But international trade can be used not only for exchange but also as a means of political and economic pressure. The trade war is the highest level of tension between countries, due to the use of various trade policy measures.

As for economic relations between the United States and China, after China's membership in the World Trade Organization, the situation went in a direction that is not the most favorable for the United States. Although for China it was one of the crucial stages in laying the groundwork for rapid economic development. The main reason for the full-scale US trade war against China was the trade gap between the two countries, as the trade balance between the US and China had a gap of 460 billion US dollars. The state of the WTO, initiated by the United States and China, indicates that the parties are trying to reach some compromises and will depend, inter alia, on progress in implementing the Economic and Trade Agreement between the United States and the Government of the People's Republic of China. In the process of regulating the trade war between the United States and China, the signing of trade agreements is being considered, which will help reduce tariffs between these countries. The signing of agreements is influenced by the following indicators: economic problems in China's economy caused by the COVID-19 pandemic, plane crashes, animal disease outbreaks, export controls, World Trade Organization decisions, the long-term impact of tariffs, and so on. High tariffs on Chinese imports affect American consumers and some American companies suffer losses because import duties are paid by US importers rather than Chinese exporters.

The establishment of China's trade barriers will increase US exports, and agreements to increase China's purchases of US products will help reduce imports, which should improve the US trade balance

Keywords: *USA, China, imports, export, trade war, World Trade Organization, world economy, foreign economic activity, international trade, trade balance.*

I. INTRODUCTION

In today's world, it is difficult to imagine world trade without various conflicts between its actors, and in times of globalization, competition is becoming more intense. In the struggle for the best conditions for trade in goods, countries are embarking on the path of trade wars and conflicts, and in the last ten years alone we can count about a dozen such examples. The most striking and large-scale example is, of course, the trade war between the United States and China. Since China's accession to the World Trade Organization, the country's economy has grown to the second largest in the world after the United States. And over the past twenty years, China's influence on the world economy has expanded markedly, and at the same time, China has gradually shifted the United States from its position as a major supplier of goods to most countries. As long as China operated as a cheap factory and was a commodity appendage, its economic growth was welcomed by the United States. However, later, the situation changed and China became difficult to call a cheap factory, as with rapid economic growth, the cost of production increased rapidly. The conflict that can now be observed between the two world giants is a particularly relevant topic for study, as in a globalized world, it cannot affect only the two countries that are directly involved in it. This trade war affects and affects all the world's economies, and affects them to a greater or lesser extent.

II. LITERATURE ANALYSIS

Theoretical definition of trade war are closely linked to international trade, which in turn is an integral part of international economic relations. But international trade can be used not only for exchange but also as a means of political and economic pressure. The trade war is the highest level of tension between countries, due to the use of various trade policy measures. Trade disputes and conflicts lead to trade war [1, p. 110]. As for the term itself, a trade war is a trade rivalry between two or more countries, countries or regions, which is conducted with the aim of capturing foreign markets, or with the aim of preventing trade occupation of the national economy. Accordingly, trade war can be divided into offensive and defensive. [2, p. 4] The main methods of offensive trade war include:

- increasing export quotas;
- reduction of export customs tariffs;
- use of dumping prices;
- embargo and economic blockade;
- recognition of competitors' products as harmful to consumers or the environment, as well as the promotion of international standards and norms that restrict and prohibit competitors' products.

The main methods of defense trade war include:

- increase in import duties;
- reduction of import quotas;
- introduction of non-tariff restrictions;
- recognition of competitors' products as harmful to consumers or the environment.

The history of trade since the Age of Great Discovery has always been associated with trade wars. Trade wars are not a new phenomenon in history, and even more, are quite common. Both China and the United States already have a history of trade disputes. The most famous of these are the First and Second Opium Wars, as a result of which China lost part of its territory. For the United States, these are trade conflicts with Canada and Japan. Regarding the latter, the trade dispute between the United States and Japan is one of the longest-running trade disputes in modern trade history. They have continued to this day since World War II. For further analysis, it is necessary to determine the clear causes and conditions of the conflict between China and the United States. Causes of the conflict Over the past 20-25 years, trade and diplomatic relations between the United States and China have grown significantly.

The normalization of trade relations began in 2000, when US President Bill Clinton signed the China-US Relations Act, which gave China the status of a permanent normal trade relationship and paved the way for membership in the World Trade Organization (WTO). The law also establishes a congressional executive committee to ensure China's compliance with international human rights law, labor standards, and religious freedom, and establishes a working group to ban the import of Chinese products made in forced labor camps or prisons. The law also includes so-called «anti-dumping» measures designed to prevent the influx of low-cost Chinese goods into the United States, which could harm the American industry from producing the same goods. For China, gaining WTO membership was an extremely important step [3]. China wanted to join the WTO, as it would provide access to new trading partners and improve relations with existing ones, raising the prospects for improving living standards in the country and giving China a place at the table in a globalizing world. The United States also had certain expectations [4]. For example, for China to join the US-led liberal-democratic order and move away from its communist model. Thus, Clinton and others advocated China's accession for several reasons:

- China would have to change its policy to comply with WTO rules, reducing tariffs and guaranteeing intellectual property rights, among other things, then countries like the United States should not do much in return.

- The United States has argued that membership in an international organization such as the WTO will act as a test of China's communist government, accelerating its transition to a market economy and encouraging it to become more involved in setting global rules. This was not a new idea, Clinton's predecessor acted on the same assumption that free trade leads to democracy: «No country on earth has found a way to import goods and services in the world, stopping foreign ideas at the border» said George H.W. Bush.

- It would also legitimize the World Trade Organization itself: China was the largest trading country outside the organization, and the WTO could not really claim the role of a global organization without China. In general, the United States has seen some advantages and disadvantages in economic terms.

- Consumers generally benefited from joining the WTO because they could buy goods from China at lower prices.

- Corporations have benefited from expanded access to China's mass market. For example, in 2017, China accounted for about 20 percent of Apple's sales, and since

2001, the value of US agricultural exports to China has increased by 1,000 percent. However, unions in manufacturing and factories opposed the WTO accession agreement, arguing that cheaper labor in China would cost jobs in the United States. And they were right: between 1999 and 2011, almost 6 million jobs were lost in the United States. Meanwhile, China's economic impact has been extremely positive. [5]

- China's economy has become eight times bigger than in 2001. Trade in goods between the United States and China has increased more than thirty times, from \$ 8 billion in 1986 to more than \$ 578 billion in 2016. In 2006, China became the second largest economic partner of the United States after Canada, jumping over Mexico. China surpassed Germany, becoming the world's largest exporter of goods in 2009. And the visualization of a successful export-oriented strategy and an overall impressive economic. However, the political expectations set by the US Government have not materialized.

China has not come closer to democracy than the United States had hoped. In fact, huge economic successes have only legitimized the Chinese Communist Party, which President Xi Jinping believes is key to maintaining economic stability and enabling China to dominate technology-driven industries. China's tight state control extends to the Internet, which was to be the gateway to reform and innovation. China regulates the use of the Internet by restricting access to commerce and social media [7]. Over time, the current situation and supplemented by other political and economic factors formed the ground for a trade conflict. China's growth may serve as a chart below. However, the political expectations set by the US Government did not materialize. China has not come closer to democracy than the United States had hoped. In fact, huge economic successes have only legitimized the Chinese Communist Party, which President Xi Jinping believes is key to maintaining economic stability and enabling China to dominate technology-driven industries. China's tight state control extends to the Internet, which was to be the gateway to reform and innovation. China regulates the use of the Internet by restricting access to commerce and social media [7]. Over time, the current situation and supplemented by other political and economic factors formed the ground for a trade conflict.

February 7, 2020: China reduces tariffs on goods by \$ 75 billion, according to the first phase of the agreement. China's Treasury Department has announced it will cut tariffs on 1,717 US goods, cutting tariffs on some goods from 10 percent to 5 percent and others from 5 percent to 2.5 percent to take effect on February 14, 2020.

The tariff reduction will be applied to the list of additional tariffs, which came into force on September 1, in the amount of \$ 75 billion. The announcement corresponds to a reciprocal commitment by the United States under the first trade agreement to reduce tariffs from 15 to 7.5 percent on goods worth \$ 120 billion on the same date. 19 Crude oil, meat products and soybeans are among the products that benefit from tariff reductions. The reduction will reduce oil tariffs from 5 percent to 2.5 percent, soybean tariffs from 30 percent to 27.5 percent, and pork, beef and chicken tariffs will fall from 35 percent to 30 percent. February 17, 2020: China provides tariff concessions on 696 US goods to support purchases. According to the Chinese Tariff Commission, 696 US goods will be exempt from additional tariffs in China, as the Chinese government seeks to fulfill its commitments in a trade agreement with the

United States . 696 products include pork, beef, soybeans, wheat, corn, sorghum, ethanol, liquefied natural gas, crude oil, steel rails and some medical equipment. February 21, 2020: The Chinese Tariff Commission has released two new lists to exempt part of US imports from additional Chinese tariffs. Both lists will be valid for one year from February 28, 2020 to February 27, 2021. The lists will include 55 and 10 types of US goods, respectively, including timber, hydraulic motors, diaphragm pumps, aircraft parts, medical equipment and more.

Trade war is the highest degree of tension in trade relations between countries, trade war is conducted in order to capture the market of the opponent's state, or to prevent trade occupation of their own markets. As for economic relations between the United States and China, after China's membership in the World Trade Organization, the situation went in a direction that is not the most favorable for the United States. Although for China it was one of the crucial stages in laying the groundwork for rapid economic development. The main reason for the full-scale US trade war against China was the trade gap between the two countries, as the trade balance between the US and China had a gap of 460 billion US dollars. Another reason is the non-competitiveness of American companies. After all, they must reduce production costs to be able to match Chinese prices. The next formal reason is the insufficient level of protection of intellectual property rights in China, the lack of adequate practices and laws to protect foreign technology from illegal distribution in the country. And also, at the heart of the Sino-US trade war is actually a battle for global economic dominance. In total, there are five stages in the trade war since the beginning of 2018. During these stages, there have been endless changes in tariffs on various groups of goods and services, despite some lull now, tariffs remain high, and the results and consequences of the trade war can already be seen in different areas and in different regions.

The impact of the trade war on other countries developing countries will suffer the most from the confrontation between the United States and China. This will happen through:

- general slowdown in world economic activity;
- reduction of world trade and, consequently, exports, on which developing countries are overly dependent as small open economies;
- lower prices for basic customs goods, including metals, agricultural products, and other commodities amid concerns about the stability of demand; this, in turn, will negatively affect trade balances and exchange rates in developing countries;
- acceleration of inflation due to currency devaluation and related deterioration of inflation expectations due to a significant level of dollarization of economies;
- increasing volatility in world commodity and financial markets.

Deteriorating economic growth prospects in emerging markets will reduce investor demand for the assets of these countries, which will create conditions for capital outflows and, consequently, the devaluation of their national currencies.

Thus, according to the Institute of International Finance (IIF), only from the beginning of the trade war to September 2018, the volume of portfolio investment in developing countries decreased by 20.3 billion dollars. At the same time, the world's largest banks (Goldman Sachs, Citigroup, Morgan Stanley) have announced the sale of currencies of this group of countries, given the growing risks to the world economy.

However, the deterioration of financial conditions for emerging markets was not only due to the escalation of trade conflicts, but also due to tighter monetary policy of leading central banks.

Under such conditions, investors' interest in risky assets, including assets of developing countries, decreased, which increased the outflow of capital. Accordingly, the central banks of such countries have been forced to repeatedly raise key rates. Thus, the Bank of Indonesia even resorted to a precautionary increase in the period between regular meetings in order to stabilize the exchange rate against the background of tighter than expected monetary policy in the United States. In Russia and India, central banks were forced to break the cycle of lower key rates. In general, emerging market countries, with the exception of Argentina and Turkey, have been better prepared for deteriorating external conditions than in previous periods. This was facilitated by prudent macroeconomic policies, including monetary policies based on inflation targeting, which include flexible exchange rates, strengthening the institutional independence of the central bank, measures to ensure the strength of the financial system, and lack of fiscal dominance.

Since the beginning of 2019, external pressure on emerging markets has eased somewhat. This was facilitated, on the one hand, by a temporary truce in the trade dispute and, on the other hand, by softening the rhetoric of the leading central banks. However, a new wave of escalating trade disputes between the United States and China and harsher US rhetoric toward other countries, most notably Mexico, have negatively affected investor sentiment. Following the stabilization of US-China relations, financial conditions have eased, creating room for lower key rates in some emerging markets.

In countries where the contraction of external demand and the decline in trade will have a significant impact primarily on economic activity, central banks will be able to pursue softer monetary policies to stimulate domestic demand. This will be facilitated by a number of internal and external factors, namely:

- inflation within the target range;
- anchored inflation expectations at the central bank's target level and their low sensitivity to pro-inflation shocks, including exchange rate devaluations;
- low current account deficit (or surplus), sufficient reserves;
- investor confidence reflected in high credit ratings and low cost of external financing;
- low geopolitical risks.

This group includes the countries of Central and Eastern Europe and Chile. However, the scope for lowering nominal rates in these countries, especially in Poland and Hungary, is rather limited, as they currently do not exceed 2.5% per annum. Accordingly, active action by central banks is not expected.

III. OBJECT. SUBJECT. RESEARCH METHODS

The United States and China are the most involved in international trade: China is the world's largest exporter and the United States is its importer. The United States has held the status of the world's leading economy since the middle of the twentieth century, but in recent decades, China has shown particularly rapid development, gaining leadership in the markets of most countries. The loss of US export markets,

negative trade balances and dependence on imports from China continue to deepen, prompting US authorities to take protectionist measures and start a trade war. Undoubtedly, the trade war between the giant economic countries could have unexpected consequences for the entire world economy, which is why analyzing US trade flows with China and tracking their dynamics as protectionist measures deepen is very important.

The object of study is the trade war between the United States and China, and the subject, its impact on the world economy.

To study the impact of the trade war, we analyzed the current accounts of the United States and China, they can be seen a sharp decline in the surplus of this balance of payments in China by about 75% in 2018. This change is mainly the result of a significant increase in Chinese merchandise imports. The US deficit has also worsened significantly, indicating that Trump's tariff policy has only had negative consequences for the national economy, and one of the main goals of implementing tariff barriers - reducing the United States' trade deficit — has not been achieved.

Also for the study, we considered the dynamics of the trade balance between the United States and China.

China was the largest supplier of US goods in 2018, the main categories being electrical equipment, machinery, furniture and bedding, toys and sports equipment and plastics. China's total exports to other countries in the world had not decreased significantly in 2019, which means that China has opened new markets for its products, which were previously exported to the United States. China is also one of the largest exporters of agricultural products to the United States, leading supply categories include: processed fruits and vegetables, fruit and vegetable juices, snacks, spices and fresh vegetables. The United States estimated imports of services from China in 2018 at \$ 18.4 billion. Imports of leading services from China to the United States have been in the transportation, tourism, and research sectors. Looking at US export flows to China, which became the 3rd largest export market for US goods in 2018, we can see a significant decline over the past two years. The main categories of US exports to China in 2018 were: aircraft, machinery, electrical machinery, optical and medical instruments and vehicles. The total volume of agricultural exports to China in 2018 amounted to 9.3 billion dollars, which is the fourth largest market for agricultural exports from the United States. Leading categories of Chinese imports from the United States include soybeans, cotton, hides, skins, pork and pork products, and cereals. Analyzing the data, we can assume that, in theory, the establishment of China's trade barriers will increase US exports, and agreements to increase China's purchases of American products will help reduce imports, which should lead to improved US trade balance.

IV. RESULTS

Analyzing the current accounts of the United States and China, revealed significant changes in their structures and dynamics. First of all, due to the large-scale growth of China's imports, there was a sharp decline in the current account surplus of this country. Equally important, the US deficit has also shown a marked deepening, which is evidence that Trump's tariff policy has only led to negative consequences for the national economy. An analysis of bilateral trade relations between China and the

United States has shown that close trade cooperation between the two countries began to decline in 2018, as a result of tight bilateral tariff regulation. Observations of trade flows and balances of payments have shown that the trade war has not yet led to the inevitable consequences in the economies of the United States and China, but signs of recession are already clearly visible on trade balances.

The introduction of reciprocal restrictions did not improve the US foreign trade position, because, firstly, part of Chinese purchases, which were abandoned by US importers, were replaced by more expensive imports from other countries, and secondly, rising Chinese import prices led to increased costs of already American exporters who use imported components in their production. Based on the simulation results, we can conclude that the signing of new trade agreements between the United States and China with agreements to increase Chinese purchases of American products, which took place in late 2019, should help the United States improve its trade balance, as opposed to increasing import tariffs led to negative results. These research results can also be used to establish trade relations not only with the United States and China, but also with other countries. The introduction of new trade agreements and the reduction of tariff restrictions will increase trade between countries and improve economic relations between countries.

CONCLUSIONS

1. The consequences of the confrontation between the United States and China in the trade sphere have a significant impact on both individual countries and the world trade system as a whole, as evidenced by the participation of a large number of interested countries in disputes between these countries in the WTO.

2. The state of the WTO, initiated by the United States and China, indicates that the parties are trying to reach some compromises and will depend, inter alia, on progress in implementing the Economic and Trade Agreement between the United States and the Government of the People's Republic of China.

3. Indicators of China's purchase of American products under the first phase of the agreement were not reached. The state of trade between the United States and China has been affected by force majeure (COVID-19 pandemic, plane crashes, bird flu outbreaks in the United States) and export controls, World Trade Organization decisions, long-term effects of tariffs imposed by both sides.

4. China has offset the decline in supplies of American products by expanding imports from other countries, including Ukraine.

5. As a result of China's tariff measures, American farmers have suffered serious losses, forcing the US government to make significant allocations to support them.

6. High tariffs on Chinese imports also affect American consumers and some American companies that import Chinese products have suffered losses, which have led them to sue the US International Trade Court.

7. China is projected to continue to reduce its dependence on the United States in trade and economic terms, including through enhanced cooperation with other countries under the One Belt, One Road initiative.

8. At this stage, the trade truce between the United States and China is quite volatile, given that most of the issues remain unresolved.

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