The Political Economy of Food Trade in the US-China Trade Dispute: Soybean and Biofuels Policy During Trump's First Term

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Abstract

During Trump's first term, structural contradictions in the domestic political economy of the US and the challenges posed by China's economic rise have driven the rise of trade protectionism. The Trump administration's economic nationalist tendencies have further intensified the contradictions of the neoliberal food regime. As the world's most important economy and agricultural power, changes in US trade policy have contributed to the transition of the global agricultural trade system from free-market dominance to government intervention and regulation, and induced various forms of trade disputes. This has exacerbated tensions between national security and green agricultural trade, and has implications for sustainable agricultural practices. Focusing on US -China soybean trade and corn biofuel policy, this paper first uses factor and industry modeling theory to distinguish between the beneficiaries and detractors of US-China agricultural trade in order to explain the Trump administration's incentives for seeking to decouple trade with China. Second, the paper will explore the impact of trade disputes on national food security as well as green trade. In addition, this paper develops an actor-centered "network governance framework" to explain how trade conflicts change stakeholder actions in the context of oligopolistic competition and market concentration in agricultural trade. Evidence suggests that US trade sanctions policies against China are the result of domestic class alliance conflicts and transformation of social actors' preferences, which exacerbate conflicts between the realities and needs of national security, free trade in agriculture, and green and sustainable energy development. The US government's trade policy reflects concerns about China's relative gains, leading to a loss of trade profits and preventing the parties involved from finding a balance between the three objectives, which in turn has led to the plight of the biofuels and soybean industries. In the context of prioritizing national security and strategic interests, the government has replaced the dominance of large agribusiness in the neoliberal food system, and the goal of environmental sustainability has been marginalized by high-level politics. In contrast, China faced tensions in the trade war between policies of food security self-sufficiency and free and sustainable trade, but the state-capitalist model ensured policy coordination and coherence in trade diversion and supply chain adjustment. Despite raw material shortages and technological challenges, China was committed to playing a role in global environmental governance and promoting green trade objectives.

Keywords: US-china trade dispute, agricultural trade politics, soybean trade, biofuel policy

1 Introduction

Food security is often seen as part of national security (Sommerville et al., 2014), so food trade, as an important way of influencing food security, is vulnerable to interstate relations, and conflicts, trade disputes and tariff barriers, and sanctions are often manifestations of geopolitical influences on food trade. Changes in international political and economic power dynamics, loss of market and technological benefits due to bilateral trade asymmetries, and domestic economic development challenges are among the common causes of trade disputes (Freeman, 2004). Countries defend their national interests by erecting trade barriers through retaliatory tariffs and non-tariff measures, and by reducing the volume of trade to protect domestic production and consumption (Lee and Swagel, 1997). Global agricultural market spillovers from impaired interstate relations, such as sudden supply chain breaks and volatile crude oil and food prices, disrupt food production and consumption patterns (Demeke et al., 2009). Given the concentration of global food production in a few countries, countries that are dependent on food imports and self-sufficiency are more vulnerable to geopolitical events and fall into food crises (Mustafa, 2022), thus disrupting global food supply chains (Di Caracalla, 2022).

The deterioration of relations between China and US and the trade disputes are a manifestation of this neo-liberal food regime crisis. For the US, the immediate consequence of the trade war has been a traumatic experience for the agricultural trade and biofuel industry. China, the US's top soybean importer, shifted orders to South America (Puma, 2019). US farmers who depend on soybean production and have had to turn their attention to corn (Insights, 2019). As the world's largest and cheapest producer of corn ethanol, US ethanol production and trade has not grown significantly and was once in an industrial rut. This has been linked to the Trump administration's pro-fossil fuel policies. On the other hand, the continually deteriorating geopolitical relations between China and the United States have led the Communist Party to attempt to divert sources of imports and promote self-sufficient and self-sufficient food security policies. Challenges to political and economic developments at home and abroad have made China realise that it cannot completely disconnect from the US, the world's most important producer of soybeans and ethanol. With the Xi Jinping administration showing more obvious ambitions than its predecessors in terms of global environmental governance discourse, China is favouring a new energy policy with a strong focus on new sources of energy, such as biofuels, while guaranteeing food security.

This paper focuses on the impact of the U.S.-China trade war on agricultural trade and explores the following questions: Which political alliances are benefiting and which are hurting in the trade dispute? How does the trade war affect sustainable agricultural practices? I will first introduce the basic background of the US-China trade war and analyze the impact of the trade war on stakeholders using the factor model and production model theories of international political economy. This will be followed by a description of the relationship between biofuels and food trade in the context of the trade war. The next section will parse how agricultural and biofuel actors adjust their actions when affected by geopolitical factors

by constructing an analytical framework for network governance actors. The final section will set out the conclusions of the paper.

2 The US-China Trade War: Background, Causes and Impact on Agricultural Trade

2.1 US-China trade disagreements: an overview

As the world's two largest economies, the changing relationship between China and the United States maps the pattern of trade in the century. China's reform and opening-up policy in the 1990s dramatically opened up foreign investment and undertook a thoroughgoing reform of trade liberalisation (Bown, 2021).China began to gain a foothold in the global trade arena after its accession to the World Trade Organisation (WTO) in 2001. China's lower production costs, the government-controlled exchange rate of the renminbi, and the huge demand from the US consumer market have given Chinese goods a huge advantage, leaving the US in a long-term trade deficit with China (Insights, 2019). The Bush and Obama administrations have attempted to offset the negative impacts of Chinese industries for US domestic firms by filing WTO disputes such as wheat and corn policy disputes and raw material export restrictions in the aviation industry, as well as imposing countervailing duties, and have tried to promote China's gradual transition to Western-style liberalisation and marketisation in the process of integrating into world trade (Bown and Keynes, 2020). However, after President Xi Jinping came to power in 2013 state capitalism took an increasingly important role in the Chinese economy and strengthened the role of the government in economic and trade activities (Lardy, 2019). This signalled a trend in the Chinese economy that has not met Western expectations (Wu, 2016). In contrast to the more moderate economic and foreign policies of its predecessors, the Xi Jinping administration has actively competed for international discourse in all areas, which has led to a steady erosion of US hegemony. This has subsequently triggered widespread concern among US authorities about the threat to US national interests and international discourse posed by trade imbalances, unfair intellectual property and technological competition, and exchange rate manipulation (Liu and Woo, 2018).

In early 2018, the Trump administration condemned its predecessor's US-China trade policies upon taking office and began imposing significant anti-dumping and countervailing duties on Chinese goods. In response, China immediately launched countermeasures. The two sides then began multiple rounds of retaliatory tariff "wars" that once pushed relations between the two countries to freezing point. The areas of goods on which the US has imposed tariffs on China are centred on metals, machinery, chemicals, and electronics (Adjemian et al., 2021). The Trump administration argues that dependence on Chinese imports in these areas has led to a lack of industrial capacity in the US and threatened national security (Bown, 2021). China, in turn, has retaliated with tariffs to US agriculture, energy, and automobiles and parts (Bown, 2021). The most predictable of these is the agricultural sector, as China is one of the most significant buyers of US agricultural products such as soybeans (Cheng et al., 2023).

Prior to the announcement of tariffs against China, the Trump administration had anticipated that China's retaliatory tariffs would be focused on soybeans and planned to protect US agricultural interests by providing subsidies to affected farmers (Bown, 2021). The immediate consequence of the tariff war was a nearly 50 per cent plunge in US agricultural exports to China in 2018 (see Figure 1).

The course of the tariff war between the two countries was interspersed with various types of negotiations, with trade disagreements jumping back and forth between moderation and retaliation, and culminating in the adoption of the first phase of the agreement at the end of 2019#. It mainly included market access mechanisms in agricultural trade, technology and intellectual property, and the financial sector (Bisio et al., 2020). One of the outcomes of the agreement was China's resumption of purchases of some US agricultural products, and the value that China brought to the fulfilment of the agreement in agriculture was seen to outweigh energy and manufacturing, attributed to the US's relatively more dominant position in agricultural exports to China (Bown, 2020). China committed to importing more US soybeans during negotiations (Adjemian et al., 2021), and US soybean exports to China quickly returned to pre-trade war levels (see Figure 1). Export volumes of other agricultural products to China, such as corn and wheat, also quickly improved (Bown and Keynes, 2020). Yet the implementation of the agreement also faces challenges, as China's shift in soybean import strategy during the trade war has brought about structural changes in the global market for soybeans and indeed other crops.

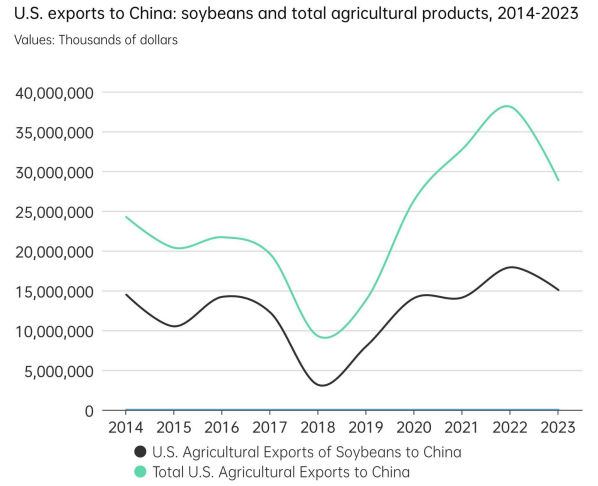


Figure 1 US exports to China: soybeans and total agricultural products, 2014-2023
Data Source: US Census Bureau Trade Data

2.2 Beneficiary or detriment?

2.2.1 Factor and Industry Modeling Theory

Rogowski's Framework for Analysis is a classic trade-politics factor model that analyzes how domestic politics and international trade policies affect each other. The model is based on the Heckscher-Ohlin (H-O) model of trade, in which a country's factor endowment determines whether it is free-trading or protectionist (Leamer, 1995), and the Stolper-Samuelson

Theorem, in which it is shown how trade affects the distribution of returns to the different factors of production (Deardorff, 1994). Framework develops these two theories with the central idea that the expansion or contraction of international trade alters political coalitions within countries, determining which groups support or oppose free trade (Rogowski, 2020). In other words, political conflicts within countries are closely related to national trade policies. Capital, labor, and land abundance determine the interests of different groups in the domestic political coalition on trade policy, i.e., some social groups support free trade and some support protectionism (Rogowski, 2020). This can lead to conflict and cooperation between different classes, which can have an impact on the reshaping of national trade policy. For example, in countries where capital is abundant and labor and land are in short supply, the beneficiaries of free trade are capitalists and the supporters of protectionism are labor and farmers. Capitalists export capital-intensive products for profit in capital-factor endowed countries and lobby governments to implement more liberal trade policies. For labor and farmers, however, labor and land shortages mean that imports of labor-intensive products, such as agricultural products, further undermine the wages of workers and land gains in their own countries. Labor and farmers formed class coalitions to express their dissatisfaction with the erosion of the benefits of free trade through protests, demonstrations, strikes, and other bottom-up methods.

In addition, Gourevitch's framework for the political sociological analysis of economic policy is the industry model based on the factor-specific model. That is, a country's trade policy is influenced by domestic industry interest groups, and different social actors with different preferences in economic policy form industry coalitions that determine different combinations of options for the country's economic policy (Gourevitch, 1986). For example, a free-market coalition of transnational capital and highly skilled individuals may support free trade (Milner, 1988); a statist coalition of state bureaucrats, military industries, and indigenous industries is biased in favor of neo-mercantilism(Solingen, 1994); a democratic labor coalition of workers and left-wing political parties is in favor of Keynesianism (Iversen et al., 2000); and a nationalist coalition of agricultural capitalists, right-wing nationalist coalition of agricultural capitalists and right-wing parties favored trade protectionism (Rogowski, 2020); and the planned economy coalition of national elites and socialist parties supported state planning.

2.2.2 Analysis based on the factor model

The US at the beginning of the 21st century thanks to economic globalization and liberalization has evolved into an advanced economy with ample capital technology, abundant land but scarce labor. The Trump administration's economic nationalist tendencies and China's challenge to US national political and economic security have led to a trade contraction, i.e., limiting imports and increasing exports. According to Rogowski's Framework, trade contraction occurs when owners and intensive users of abundant factors support ongoing trade protection, while users of scarce factors support trade freedom(Rogowski, 2020) . As a result, large multinational corporations in agriculture and finance capital suffer from Trump's trade policies because of their dependence on low-cost production of agricultural products in China and financial investment opportunities in the

Chinese market, which would be jeopardized by trade protectionism. However, the influx of low-cost products, and dumping from China, and the onslaught on intellectual property rights now, hurts traditional manufacturing. Trade protectionism would benefit them to reduce the impact of Chinese imports of agricultural products. Conversely, China has abundant labor and scarce capital relative to the US. The Trump administration's aggressive tariff policy has triggered a contraction of Chinese trade with the US. Large agricultural and finance capital will benefit from US trade policy, as trade protection for US goods will advance local agricultural finance capital, such as COFCO, to further benefit. Traditional agricultural and manufacturing interests, on the other hand, will suffer as they lose large orders to export primary agricultural products to the US.

2.2.3 Analysis Based on the Industry Model

According to Gourevitch's model, first, in terms of the preferences of industry interest groups, trade protection hurts the interests of the US agriculture and consumer goods industries, so the industry coalition of agricultural and consumer capitalists and farmers is more biased in favor of free trade. In contrast, large Chinese exporters and traditional agricultural manufacturers will suffer losses and support free trade with other regions, such as Brazil, to cushion the impact of US policies; conversely, US technology and military manufacturing, and China's domestic local supply industries will benefit because it offsets the overseas competition that comes with free trade. Second, in terms of the relationship between political parties and industry groups, the US Republican Party has benefited because the protection of tariff barriers promoted by the “America First” strategy has benefited the Rust Belt manufacturing industry, national security and protectionists, and has reaped the corresponding support. The Democrats represent the interests of technology capital and elites, and to some extent full protectionism is not in their interest, but rather a new mercantilism that restricts China's military and technological development but conditionally restores imports from other sectors, as exemplified by the Biden administration's policies. For the CCP, trade protection against the US helps it develop state-owned enterprises, restructure domestic industries, and develop a socialist market economy and state capitalism.

2.3 Changes in global soybean trade: China, US and Brazil

Soybeans play a pivotal role in the US-China trade war. The US and China are the world's leading exporters and importers of soybeans, respectively, and the continued deterioration of relations between the two countries has changed the soybean trading system (Cheng et al., 2023). Prior to 2018, soybeans sold to China accounted for about 70% of total US soybean exports, and soybeans were also the leading crop exported by the US to China (see Figures 2 and 3). The volatility of US soybean exports and imports is the most sensitive of all commodities to the impact of the US-China trade war (Cheng et al., 2023). The importance of soybeans in US exports to China makes them one of China's weapons in the trade war. In response to US tariffs on Chinese machinery and electronics, China imposed tariffs of up to 25 per cent on US soybean exports in 2018 (Adjemian et al., 2021). Despite the enormous impact of the trade war on soybean trade between the US and China, soybean flows to China still accounted for about 25% of total US soybean exports in 2018 (see Figure 2), much

higher than in other markets. This figure has gradually recovered to pre-2018 levels following the Phase I agreement, but the changes brought about by the trade war to the global soybean trade market are already having spillover effects.

After imposing retaliatory tariffs on US soybeans, China shifted most of its soybean orders to Brazil (Anderson, 2021). While this brings more economic development potential for Brazil, it creates challenges for fairer green and sustainable trade. Since 2017, Brazilian soybean exports to China have begun to increase significantly and reached their highest point in 2018 (57.4% of Brazil's total soybean exports)[1]. The indirect consequence is a negative impact on the natural environment of Brazil. This can be explained by the concept of coupling, whereby China's soybean import preference leads to an increase in the overall demand for Brazilian soybeans, altering Brazil's land use and biodiversity (Hertel et al., 2019, Wiedmann and Lenzen, 2018). This also raises concerns about China's neocolonialism in Brazil. That is, controlling the productivity and markets of other countries through economic and trade means, creating a power imbalance (de Lt Oliveira and McKay, 2021). As a form of "land grab", the purchase or lease of land by large corporations for soybean cultivation undermines the livelihoods of local smallholder communities. At the level of the natural environment, Brazil's comparative advantage in the soybean market has been expanded by Chinese demand, leading to a more homogeneous cropping pattern. Economic interests trend companies to convert forest land into arable land, thus affecting the use of land and water resources, with a negative impact on ecological sustainability (Baylis et al., 2021). Such as biosecurity threats, resource depletion, and deforestation (Clapp and Scott, 2018).

The trade war has had a widespread impact on the US soybean industry. US farmers were forced to stockpile far more soybeans than expected after China shifted its orders (Bown, 2021). Brazil replaced the US as the world's largest soybean producer in 2019 (Bandyopadhyay and Rajib, 2023)and eroded the global competitiveness and trade value of US soybeans relative to Brazil (Cowley, 2020). The most immediate impact of this is a decline in farmers' incomes. The disruption of the soybean market has caused US farmer bankruptcies to peak in recent years (Jones, 2019). Although the US government compensated for farmers' losses through massive financial subsidies, the resulting gains for farmers could not match the returns they received from the market (Insights, 2019). Brazilian soybean exports to China are still on the rise after the first phase of the agreement and have accelerated competition between the US and Brazil in the market (Dhoubhadel et al., 2023).

[1] Data sources: trase.earth. Available From:https://trase.earth/explore/supply-chain/brazil/soy?chartType=line&year=2020&indicator=volume&dimension=country_of_import&hideDomestic=false

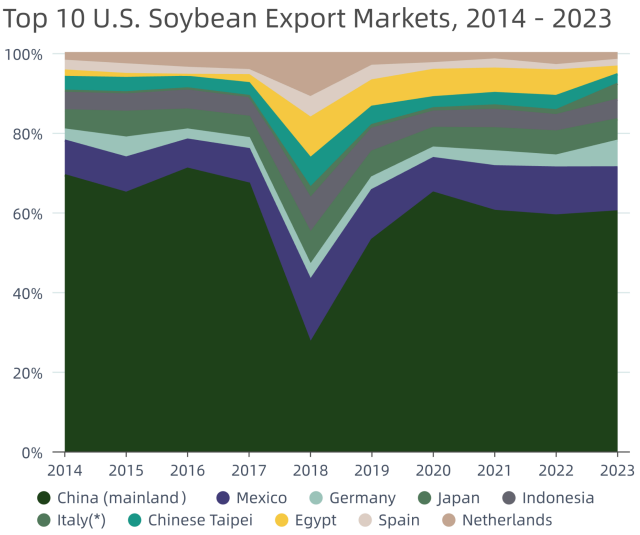


Figure 2 Top 10 U.S soybean export markets, 2014-2023
Data Source: US Census Bureau Trade Data, (*) denotes
a country that is a summarization of its component countries

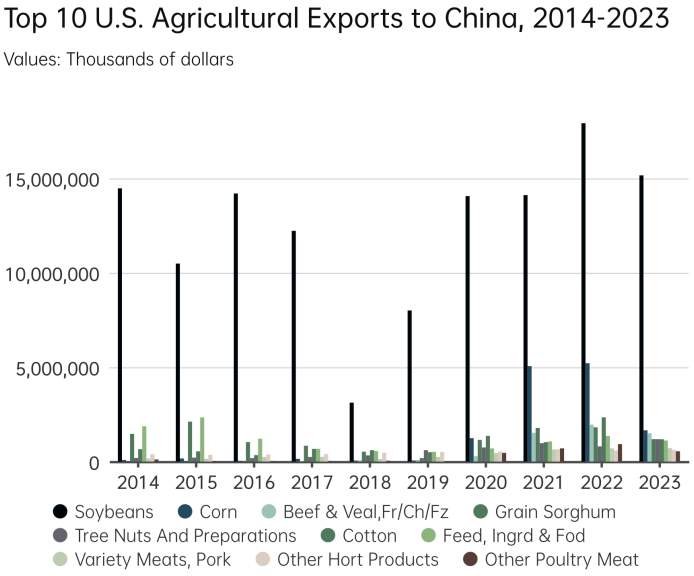


Figure 3 Top 10 U.S agricultural exports to China, 2014-2023
Data Source: US Census Bureau Trade Data

4 Biofuels and Food Trade in the Context of the Trade War

4.1 Biofuels and neoliberal food regimes

Biofuels are a type of renewable energy produced using agricultural crops, such as ethanol produced from corn and wheat (Demirbas, 2008). Biofuels were initially seen as an option for energy security, and the oil crisis in the mid to late 20th century made countries realise the need to find alternative sources of energy. The US and the EU have supported the development of biofuels through policy and legislation in response to geopolitical instability for security of supply and price volatility (Duffield et al., 2008). Entering the 21st century,

industrialised countries represented by the US were influenced by the Bush Doctrine, which advocated a policy of diversifying energy sources and reducing over-dependence on Middle Eastern oil (Shokri Kalehsar, 2021). This policy orientation has made the US the largest producer of ethanol biofuel in the world (Khanna et al., 2021).

In addition to energy security, the neo-liberal food regime has perpetuated the reliance on fossil fuels for agricultural trade activities, such as the transport process in food trade and the use of fertilizers in food production. This has had many negative impacts, such as environmental pollution, and political and economic development dilemmas. This has led more and more countries to favour the use of biofuels as an alternative (Demirbas, 2009). Market mechanisms and corporate forces dominate the neoliberal food regime (Clapp, 2023). McMichael (2009a) argues that agricultural production has become increasingly industrialised and intensive in order to secure capital reproduction and maximise profits, thus neglecting environmental protection issues. As a greener and more sustainable energy carrier, biofuels are seen as having the potential to help achieve green trade goals and minimise the environmental impacts associated with food production and consumption (Padhan et al., 2023). Furthermore, neo-liberal trade promotes the globalisation and liberalisation of agricultural and energy markets, and the huge demand for energy as a result of economic development has made many developing countries dependent on oil imports, thereby increasing pressure on foreign exchange (Laney, 2006). Fluctuations in oil prices not only trigger chain reactions such as food price fluctuations, but also expose the country to financial risks. Therefore, biofuels have the option of saving foreign exchange reserves and are favoured by many countries (Laney, 2006). In addition, the privatisation and deregulation of agriculture as one of the characteristics of neo-liberal trade has led to a few large transnational corporations dominating the production and distribution of food in a single model, making it very difficult for smallholder farmers to have the resources to compete with them (McMichael, 2005). This exacerbates the control of resources by big business, perpetuating distortions in agricultural markets and further triggering imbalances in regional socio-economic development (Clapp, 2023). Biofuel development can increase employment in rural areas and alleviate this imbalance through the development of an emerging energy industry (Pingali et al., 2008). This transition to a biofuel-driven trading system embodies the vision of balancing political, economic, environmental and social issues (Balat, 2007).

However, while alleviating the energy and environmental crises, biofuels are also changing the way food is produced and consumed (McMichael, 2009b). Increasingly, arable land is being used to grow biofuels rather than food for human consumption. This has led to an imbalance between food supply and demand and the distribution of arable land, and has exacerbated environmental sustainability issues, particularly the biodiversity crisis, as agriculture is a major driver of biodiversity loss. (McMichael, 2009b). In addition, biofuels are thought to have fuelled inflation to some extent (McMichael, 2009a). National policies and market bias towards biofuels have led to an increase in demand for their agricultural feedstock. The additional costs incurred in the production and transport of biofuels are eventually passed on to food consumers. The growing demand for biofuels has triggered investor speculation in agricultural futures markets, which has led to more dramatic food

price volatility (McMichael, 2009a). In an attempt to increase agricultural productivity, control food prices and guarantee national food security, countries in the Global North have subsidised biofuels for large-scale enterprises rather than small farmers (McMichael, 2008). Biofuels have thus been criticised for failing to address the imbalances created by the neoliberal food regime, further exposing the paralysis of multilateralism in agriculture and the shortcomings of market environmentalism, i.e., solving environmental problems through markets (McMichael, 2009b).

Impact on US corn and ethanol markets

Tariffs imposed by China on soybeans have forced US farmers to start growing other crops (Insights, 2019). Many farmers who grow both corn and soybeans have increased their corn production. Corn production has been climbing beyond 2019 (see Figure 4), with corn becoming the "only crop" in many US farmers' fields (Farabaugh, 2019). This is due to the higher returns from high-productivity corn in the context of the trade war. As an alternative crop with a large planting base, corn reduces the risk of agricultural investment in the face of geopolitical destruction of the US soybean industry (Mulvany, 2018).

Unlike soybeans, the primary use of US corn is not for export. More than 40% of US corn is used for ethanol production (see Figure 5). The US is the world's largest ethanol producer (see Figure 6). Before the Trump administration took office, the government introduced a series of policies to promote biofuels (Hoang et al., 2023), such as tax credits, federal subsidies and loans, and infrastructure support to promote energy security and rural development through emission reductions (Du et al., 2009). Ethanol production has also reduced the trade deficit by lowering the price of crude oil imports and raising the price of food exports, contributing to the US trade balance (Hochman et al., 2011).

Nevertheless, there is widespread criticism of the use of corn for biofuel production. The performance of ethanol produced from corn in meeting green sustainability goals is questionable.A study by Pimental and Patzek (2005) found that although corn ethanol is greener when burned, the fossil energy consumed in its production process may exceed the output of usable biofuel energy. That is, the production process of corn ethanol is more carbon-intensive than the use of petrol (Pimentel and Patzek, 2005). Additionally, increased orders for corn ethanol will initially drive up food prices significantly, with the potential threat of a food crisis and famine (Runge and Senauer, 2007).

The increase in corn production did not lead to a significant increase in ethanol production (see Figures 4 and 6), but rather exacerbated the plight of the US ethanol industry. One reason the shift in US energy policy prior to the trade war reduced ethanol market demand. In order to gain a voter base, Trump supported fossil fuel development, gaining support from traditional energy producing states and oil and gas interests (DiChristopher, 2017). After Trump took office, the US Environmental Protection Agency (EPA) successively exempted small refineries from the obligation to blend ethanol into fossil fuel production, affecting US domestic ethanol market demand (Insights, 2019). In addition, in order to make up for the

trade war's shortfall in soybean production, a large supply of corn was mismatched with reduced ethanol production capacity, triggering a further supply-demand imbalance. In addition, on the international market, the trade war has caused China's imports of US ethanol to reach a low in 2019 (see Figure 7), causing ethanol producers to adjust their production and export shares. Cheaper ethanol produced from sugarcane by US competitors such as Brazil could also gain ground while the US loses market share (Demirbas, 2008).

The impact of the trade war is not only on the production and consumption of corn and ethanol, but also on the ecosystem. The large-scale shift in crop production types and patterns from soybeans to corn poses a potential threat to the ecosystem. As a crop that requires extensive irrigation, widespread production of corn could exacerbate the risk of water scarcity. Intensive and intensive production may also cause soil degradation, erosion and biodiversity threats (Khanna et al., 2021). Although such changes are thought to diminish over time (Khanna et al., 2021), the long-term impact of corn ethanol on trade sustainability remains uncertain.

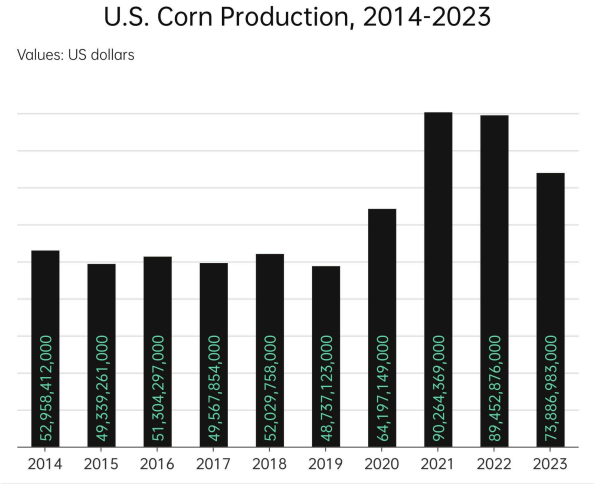


Figure 4 U.S corn production, 2014-2023
Data Source: US Census Bureau Trade Data

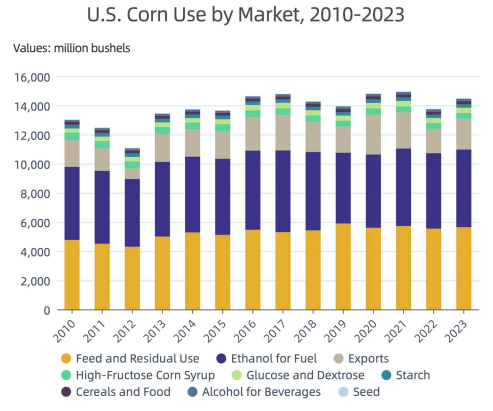


Figure 5 US Corn Use by Market, 2010-2023
Data Source: US Department of Agriculture Economic

Research Service - Feed Grains: Yearbook (Tables #4 and #31)

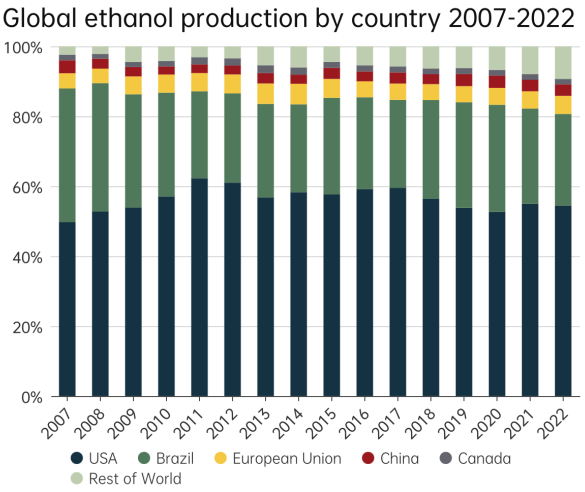


Figure 6 Global ethanol production by country, 2007-2022
Data Source: US Department of Energy

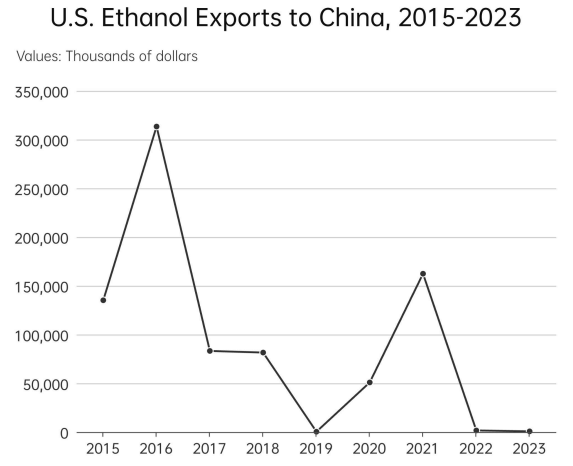


Figure 7 US Ethanol Exports to China, 2015-2023
Data Source: US Census Bureau Trade Data

4.2 China's biofuels and food security policy

China’s pursuit of food self-sufficiency has had dual impacts on free trade in agricultural products and the development of green biofuels. The Chinese government views domestic food security as a crucial national strategy to ensure political stability. President Xi Jinping has emphasized the importance of self-sufficiency with the phrase “Grains in hand, no worry in heart” (Tianren Sun, 2020), considering solving the food problem for the people as a prerequisite for national peace and development. When national interests are threatened, China focuses on domestic agricultural development and uses the volume of agricultural trade with the United States as a tool of counteraction. Despite sacrificing some agricultural trade benefits, China’s vast domestic demand, African swine fever, and limited water and land resources compel it to show a willingness to participate in agricultural free trade (Sheng and Song, 2019). Decoupling from the United States means finding alternative import countries, which increases costs and agricultural financial risks in the short term. These factors led

China to sign the Phase One Agreement with the United States, achieving a trade truce and resuming some imports. China's self-sufficiency policies conflict with the requirements of international agricultural trade, as the government promotes the self-sufficiency of one product by sacrificing the import of another to mitigate negative externalities. For example, sacrificing corn self-sufficiency to increase pork imports, thereby mitigating the impact of African swine fever (Li et al., 2018). Combined with the trade war, the pandemic, and the Ukraine crisis, this exacerbated China's feed deficit and posed risks to global food and biofuel markets (He et al., 2022). A study by He et al. (2022) found that China's feed deficit, coupled with corn import restrictions, has the potential to divert a portion of global corn exports to ethanol production. This could intensify the competition between food and biofuels in other regions, causing supply chain disruptions and price volatility.

As the world's fourth producer of ethanol biofuels (see Figure 6), China has been showing a strong interest in the biofuels market. China is increasing its voice in global environmental governance and the international arena by achieving green sustainability goals, and biofuels are an important tool for achieving the carbon neutral 2030 commitment made by China (He et al., 2022). Biofuels provide opportunities for poverty reduction and rural development in China through additional employment (Huang et al., 2012) and can help China gain a foothold in the electric vehicle market where demand is growing (Debnath et al., 2019). China has enacted the E10 biofuel policy in 2017, which mandates the use of 10% ethanol blended gasoline in more than 10 provinces by 2020 (Tao et al., 2011). However, lack of feedstock is the resistance that is preventing China from developing the ethanol fuel market (Li et al., 2018). Corn has been the main feedstock for the Chinese government's policy of promoting biofuels (Koizumi, 2015). Restrictions on corn imports due to China's self-sufficiency food security policy, as well as technological constraints on ethanol production and import restrictions due to the 45% tariff imposed on US ethanol have delayed the E10 mandate (He et al., 2022).

In the context of the trade war, food security is China's priority, not biofuels. In the short term, China's logjam on biofuels development may exacerbate concerns about food security in the context of geopolitical turmoil. Limited resources and the strategic importance of food make bioethanol non-competitive (Fu et al., 2019). Biofuels are often used as an adjunct to the Chinese government's pursuit of international green governance while ensuring domestic food security. In addition to this, China has recognised the importance of sustainable agriculture and biofuel prospects in securing domestic food security, and has addressed the potential food security issues that biofuels may pose through technological innovation and expanded outbound investments and acquisitions. That is, by investing offshore to address the competition between biofuels and food in terms of arable land and water resources, for example. However, the realisation of these initiatives is challenging in the wake of trade wars that have changed the structure of global food trade and renewable energy production and consumption. This challenge may be exacerbated by contradictions between domestic food security policies and real needs.

5 Network Governance Actor Analysis Framework

In this section, a framework for network governance actor analysis of food security and biofuels in the context of the US-China trade war will be constructed based on network governance theory. By identifying the relationships in which state and non-state actors influence each other, the framework explains why they make different choices under the influence of geopolitical conflicts and the impact of these choices on green trade and food security.

5.1 Network Governance Theory

Network governance is the network of actors involved in governance, which may be government departments, businesses, civil society organisations and other interest groups (Torfing, 2005). The formulation and implementation of policies and the resolution of public problems do not depend exclusively on the direction of government departments, but rather on the interaction of the various departments (Stoker, 1998). Networks are narrowly conceived as clusters of grid governance established by multiple actors in a tightly interconnected framework in order to collectively solve complex social problems (Sørensen and Torfing, 2018). Although there is no precise concept of 'governance', it can simply be attributed to the control, coordination and management of governmental and non-governmental institutions in response to policy issues (Frederickson et al., 2018). Network governance can be used to explain the respective roles and impacts of different actors in a network. Keith (2008) argues that factors such as the level of trust between actors, the nature of consensus and tasks, and the scale of participation in governance can explain the motivation, performance and impact of actors during contingencies, thus avoiding to some extent the failure of the explanatory power of network governance theory.

5.2 The logic of the framework

The framework will first identify specific actors and articulate actor norms, and then explain the impact of different actors on food trade and biofuels policy through three indicators: trust between actors, scale and influence, and consensus and nature of the task (Provan and Kenis, 2008).

By identifying actors, a clear understanding can be gained of how interactions between actors influence the process of policy decision-making (Rhodes, 2017). Actors have different interests, powers, obligations, resources and forms of participation. The main actors in the food and biofuels trade are governments, businesses, farmers, etc., and the roles they play are influenced by the political system, business and farmers' interests, among others. In addition, actors' interactions in network governance are guided by a number of "norms", which usually refer to a relatively complete institutionalised system, such as the US-China trade agreement, domestic food imports and exports, and biofuel regulations. Analysing these norms allows for an interpretation of the criteria by which actors adjust their actions.

Trust between actors includes the trust levels between governments, between governments and enterprises, between farmers and enterprises, and between farmers and governments. By explaining these differences in trust levels, changes in food trade and biofuel policies within the context of a trade war can be identified. Also, the scale and influence of each actor determine the extent of their impact on policy. For example, under a free trade system, large-scale American agricultural giants and Chinese state-owned enterprises may play a crucial role in trade policy. Additionally, the consensus and nature of the tasks determine the direction of policies, such as the changes in food trade and biofuel policies related to the consensus and objectives among governments, enterprises, and farmers.

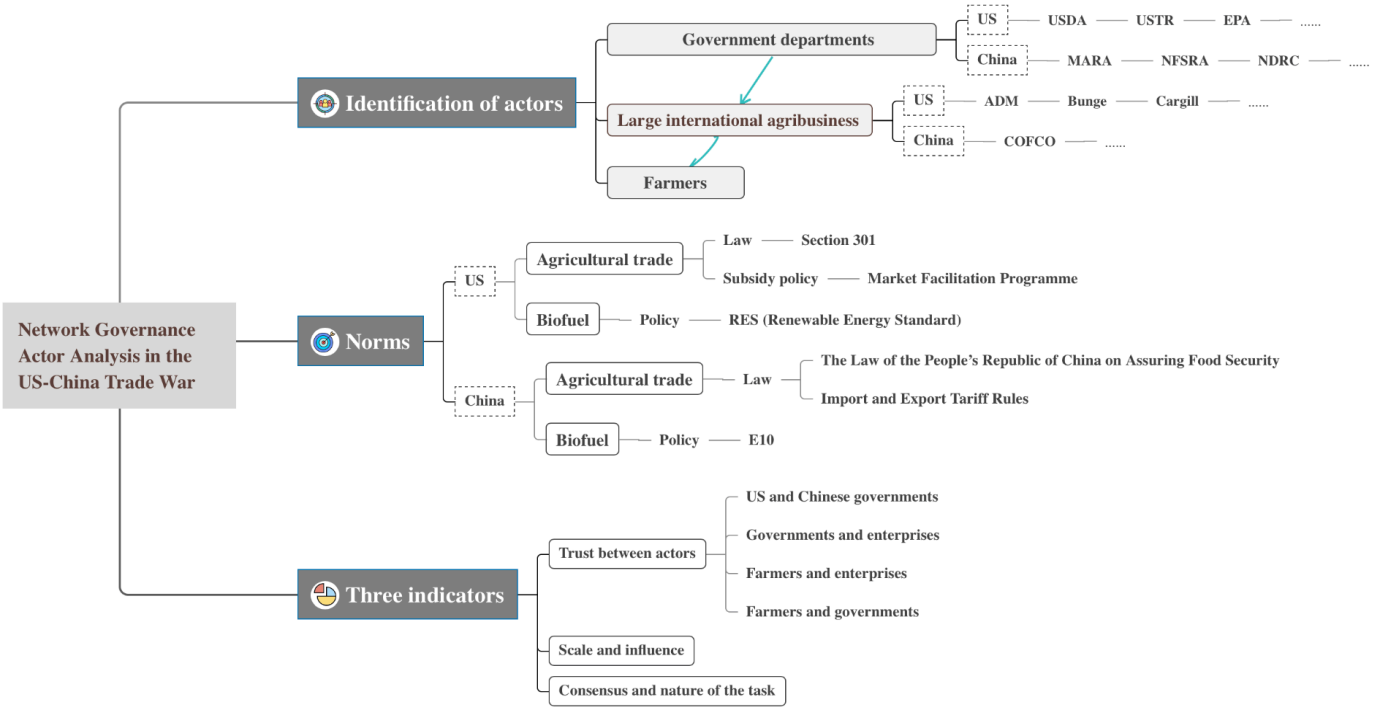


Figure 8 Network Governance Actor Analysis in the US-China Trade War

In the context of the US-China trade war, government departments play a decisive role in the relevant policies. Broadly speaking, the US and Chinese governments regulate trade policy with a view to safeguarding national interests. The Trump administration claims to conduct import controls and erect tariff barriers, among other things, in order to safeguard national security and protect the interests of capitalist interest groups, small, medium and large enterprises, and labourers. This has been accompanied by using science and technology, democracy and human rights as toolsto put pressure on China. The Trump administration has restricted the export of semiconductor materials to tech giants such as Huawei on the grounds that the country's core technological security is threatened (Bown, 2020), and has challenged the Chinese government through the issue of human rights for labourers in Xinjiang, the Hong Kong pro-democracy movement, and the Taiwan issue. For example, restricting cotton imports from Xinjiang and treating Hong Kong trade as a part of China (i.e., apply the tariff imposition regulations to Hong Kong.) (Bown and Keynes, 2020). The US has directly challenged the legitimacy of communist China's rule, and in defence of the party-state's interests, Xi's government has launched a counter-attack against the US amidst Western accusations about democracy and human rights. That is, destroying the US's largest soybean

export market through retaliatory tariffs on agriculture, as well as financial investment restrictions, movement control of people, and diplomatic counterattacks.

Narrowly speaking, the food and biofuels trade policy area of interest in this paper involves the US and Chinese agriculture and energy government administrations. Although the US is the initiator of the trade war, it has primarily challenged China in the areas of technology and military raw materials, and in the case of food and biofuels, the relevant government departments have been more passive. After Chinese tariffs took a toll on farmers' interests, the US Department of Agriculture (USDA) offered subsidies to affected farmers and ranchers. US Office of the Trade Representative (USTR) Imposes Tariffs on Chinese Goods, Restricts Military and Technology Investments and Seeks Dispute Resolution from the WTO (USDA, 2018). The US Environmental Protection Agency (EPA), in line with Trump's policy of supporting fossil fuel development, exempted more refineries from the requirement to comply with the Renewable Fuel Standard during the trade war. Weakening trade support for biofuels while China imposes tariffs on ethanol (Insights, 2019).

Relevant Chinese government departments followed the principle of agricultural self-sufficiency to ensure domestic food security during the trade war, and adjusted their grain trade and reserve strategies. The Ministry of Agriculture and Rural Affairs (MARA) of China introduced subsidies and low-priced purchasing policies, and adjusted the structure of agricultural cultivation through scientific and technological means to enhance the domestic supply of soybeans and corn to make up for the shortfall in imports of agricultural products affected by the trade war (He et al., 2021). National Food and Strategic Reserves Administration (NFSRA) is responsible for implementing the policy of self-sufficiency, increasing grain reserves and reducing dependence on single-country crop imports (Liu, 2019). China's National Development and Reform Commission (NDRC) is responsible for coordinating policies directly between the agriculture and energy sectors and providing industrial technical support to develop domestic biofuel research and development and agro-cultivation technologies (Covert, 2023).

In addition, large international agribusinesses control the resources for food and biofuel production and consumption under the neoliberal trade regime, although government trade and energy policies have altered corporate strategies under geopolitical influences. Archer Daniels Midland (ADM), Bunge and Cargill are among the agribusiness giants that have had a major impact in the trade war. ADM sells 70% of crops affected by Chinese tariffs to alternative markets such as Thailand (Cosgrove, 2019). Influenced by the Trump administration's biofuels policy, ADM was counting on China to acquire ethanol overcapacity. The plan was thwarted by trade conflict, and ADM had to announce its exit from the ethanol industry, reflecting the industry's plight in the US (Huffstutter, 2019). Bunge is the world's largest processor of soybean oilseeds. The trade war has caused Bunge's stock price to plummet and slowed the pace of its international agricultural investments (Meyer, 2019).Bunge has shifted some of its operations to Brazil and Argentina to offset the loss of orders from China, but its sale of biofuels in Brazil has been hampered by an overpowering local competitor (Sarkar, 2019). However, there are also US corporate giants that have

successfully adjusted their strategies in the trade war to grow profits. Cargill shifted its attention to alternative industries to cope with the loss of soybean profits and successfully bet on the global market demand for protein products to grow (Parker, 2019). In terms of Chinese corporations, COFCO is China's largest international agribusiness. During the trade war, COFCO diversified its import pattern between major grain producing regions such as South America and emerging markets in Asia and began to gradually reduce its dependence on a single market (COFCO, 2018). As a leading fuel ethanol producer in China, COFCO has vigorously developed its corn processing technology on the premise of reducing its dependence on US ethanol imports and has obtained more than 1,000 patents on biofuel technology[2].

Furthermore, the trade war has severely diminished the value of US soybeans and increased market uncertainty, making farmers reluctant to sell soybeans at low prices to large corporations such as ADM and Bunge (Sarkar, 2019). The USDA's Market Facilitation Program, which provides farmers with direct monetary grants, has provided short-term relief to farmers' financial pressures, but farmers generally want to sell when the price of soybeans recovered, resulting in massive hoarding. Some farmers have turned their attention to corn, which has a more stable market and domestic demand, to reduce risk. For Chinese farmers, the trade dispute has had a much lower impact on their earnings than for US farmers. The strong support for domestic production in China's food security policy has reduced the impact of international market volatility on farmers' earnings.

Norms in trade wars include relevant laws, government subsidy policies and bilateral trade agreements. The Office of the US Trade Representative (USTR) followed Trump's presidential memorandum by applying Section 301[3] of the Trade Act of 1974 to tariffs imposed on China, with the aim of mitigating the negative impacts of unfair foreign trade on US businesses. The US Department of Agriculture (USDA) provides subsidies to farmers and ranchers affected by China's retaliatory tariffs through its Market Facilitation Programme[4]. In terms of biofuels, the Renewable Energy Standard (RES) is an expansion of the Energy Independence and Security Act of 2007 that aims to reduce fossil fuel use (Schnepf and Yacobucci, 2010). However, this standard was partially exempted under the Trump administration. In addition, China has introduced "The Law of the People's Republic of China on Assuring Food Security,"[5] which provides legal protection for food self-sufficiency policies. The Tariff Commission of the State Council of the People's Republic of China has imposed large tariffs on US soybeans under the Import and Export Tariff Rules of the People's Republic of China[6]. In addition, the signing of the "Phase I Trade Agreement"

[2] Data source: COFCO BIOCHEMICAL

[3] According to President Trump's Memorandum of 18 August 2017, the US initiated an investigation under Section 301 of the Trade Act of 1974 into the Chinese government's alleged unfair trade practices. Available From:https://ustr.gov/about-us/policy-offices/press-office/press-releases/2018/march/following-president-trump%E2%80%99s-section

[4] Market Facilitation Program, proposed by USDA in 2018-2019

[5] The Law of the People's Republic of China on Assuring Food Security, published on 29 December 2023

[6] Import and Export Tariff Rules of the People's Republic of China (2019 Edition). Proposed by the Tariff Commission of the State Council of the People's Republic of China on 29 December 2018. Available From: https://gss.mof.gov.cn/gzdt/zhengcejiedu/201812/t20181229_3111630.htm

between the two countries, which provides for the resumption of import and export trade in selected agricultural products and biofuels, provides specific provisions and measures, signalling a pause in the wide-ranging agricultural trade dispute between the two countries.

With regard to the assessment of the level of trust between actors, this paper categorises it into three levels: low, medium and high. A higher rating indicates that the actors' actions are favourable to the stability of the food or biofuels market, and vice versa, making the market more challenging. It is clear that the level of trust between the US and Chinese governments is low, and the deterioration of relations between the two countries has triggered frequent trade restrictive measures that have triggered ripple effects in the food and biofuels markets. While the first phase of the agreement was signed to meet the needs of the two countries' domestic foreign trade and economic development, the low level of trust resulted in many commitments not being fully honoured. Intermittent incidents of political disagreement repeatedly raised market risks. Trust between the US government and businesses is moderate, and government policies have resulted in significant profit losses for businesses trading food and biofuels. However, the government has remedied this with supportive policies, and lobbying of the US government by corporate interests has helped the US to recover some of its trade with China. There is a high level of trust between the Chinese government and businesses; large companies such as COFCO are state-controlled and have established corporate party branches with close ties to the Communist Party Central Committee. This co-ordinated relationship has allowed the government and enterprises to fulfil their respective roles in a positive atmosphere, and the transfer of agricultural imports and the development of technology has gone smoothly. Both countries have a high level of farmer-government trust, and China and the United States have provided subsidies to farmers in response to trade disputes, respectively, which has provided protection for farmers' interests and agricultural stability. The US has a lower level of trust between farmers and businesses, and farmers have long been on unequal footing with large corporations under the neoliberal food system. Farmers' meagre interests in agricultural trade have led to their reluctance to incur greater losses from selling raw materials to large corporations in the context of geopolitical turmoil. On the contrary, Chinese farmers and firms have a high level of trust, and Chinese firms help farmers cope with market changes brought about by trade wars and provide technical assistance, reaching a win-win situation. In summary, trust between actors is higher in China than in the US, indicating lower agricultural losses in China than in the US in a trade war.

Level of trust between actors	US	China
US and Chinese governments	Low	
Government and enterprise	Moderate	High
Farmers and enterprises	Low	High
Farmers and governments	High	High

Figure 9 Level of trust between actors

The size and influence of the actors differ from the "inverted triangle" in the liberal food regime. That is, under geopolitical influences, corporations do not dominate the food regime, and government action is decisive for changes in agricultural markets (see Figure 10). Farmers and growers are at the end of the food and biofuel system and are forced by geopolitical shocks to change their planting or selling strategies in order to minimise losses.

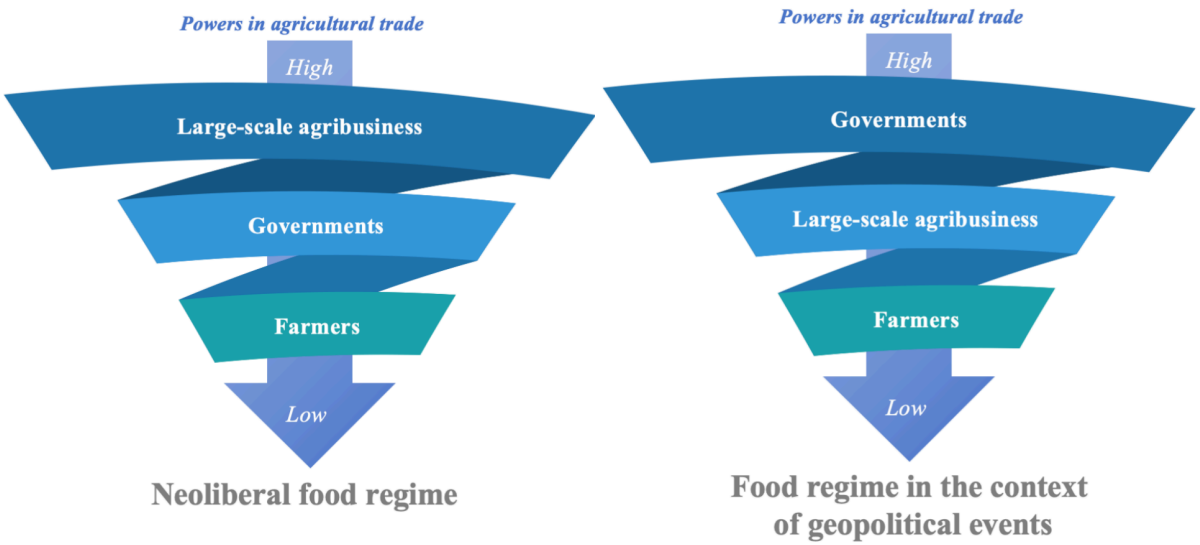


Figure 10 Power of actors in the food regime

With regard to consensus, the Trump administration has not reached a consensus with businesses and farmers on tariffs and biofuels policy, due to national security interests taking precedence over economic interests in the context of geopolitical conflict. This has resulted in losses for US agribusinesses and farmers, and has left the soybean and biofuels markets in limbo. In contrast, China's policy has been implemented in a top-down process, with national interests highly overlapping with those of state-owned enterprises. This model of state capitalism ensures the coherence and effectiveness of the policies put in place in response to the trade war. In addition, regarding the nature of the mandate, both the ethanol blending ratio programme and the tariff imposition, the US has introduced detailed timelines and implementation requirements. China's food security and biofuels policies also have clearer objectives, but the actual manner of implementation is more variable, which is related to the contradiction between policy and real needs.

6 Conclusion

During the US-China trade dispute, different stakeholders formed domestic class coalitions and industry coalitions based on factor incomes and industry incomes, respectively, and were damaged or benefited by the effects of the Trump administration's trade policies. That is, the trade contraction brought about by the trade war benefited abundant factor owners and users and impaired abundant and owners of scarce factors. In addition, capital and practitioners in US agriculture and consumer industries bear the losses from protectionism, and the trade conflict offsets the losses China inflicts on US military manufacturing. And China's domestic

supply industry will suffer as it loses significant orders and seeks alternative exporters. Conversely, the Republican Party benefits as a result in terms of the party's relationship with its domestic political coalition. While full-blown trade protectionism is not in the interests of the Democratic Party, it supports limiting China's military and technological development. For the CCP, trade protection has helped it pursue a “self-sufficient agricultural policy” and restructure its domestic economy.

Also, in terms of the global food regime, the power of the government in food and biofuel trade exceeded that of large agribusinesses. The US-China game actually reflects the tension between national security and the real needs of free trade in agriculture and green and sustainable energy development. While the US has been an irreplaceable leader in soybean and ethanol production, agricultural tariff barriers, market distortions, and resource allocation imbalances brought about by the trade war have exacerbated the risks of financial investment in agriculture. The process of greening US agriculture and energy has also encountered challenges during the trade war. Despite some farmers shifting their planting goals from soybeans to corn, the feedstock for ethanol, ethanol biofuel production has not been significantly boosted. The double whammy of Trump's energy policies and China's retaliatory tariffs has left the US biofuels industry in a quagmire. Large US agribusinesses have had to challenge their original agricultural practice strategies under the influence of geopolitics, and some have even abandoned their biofuel business, laying a hidden danger for the development of green trade.

For China, a self-sufficient food security strategy has boosted domestic production but weakened its competitiveness in free agricultural trade. The political economy model of "integration of party, state and enterprises" allowed for a successful diversion of soybean imports in a rapidly coordinated manner in the face of geopolitical risks. To maximise sustainable efficiency, government support for green agriculture and biofuels has driven technological progress. However, China's global trade influence in soybeans and corn remains insufficient, which contradicts self-sufficiency and has led it to re-engage with the US. The trade war's blow to the global food system and biofuels has come to an end, but green practices in global agriculture still face the long-term challenges of long-term supply chain restructuring, market price volatility, policy continuity, production restructuring, and reshaping the international trade landscape.

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