Araştırma Makalesi / Research Article

Trade Wars: The Cases of USA, Mexico, China

Serkan ŞENGÜL[1]

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Abstract

This paper analyzes trade wars and their potential macroeconomic effects with a hypothetical approach through the cases of the US, China and Mexico. The three main scenarios and retaliatory behaviors used in this analysis are the unilateral launch of a trade war by the US, a bilateral trade war between the parties, and an optimal equilibrium in line with the Nash equilibrium. The main conclusions of the study which are mainly focused on Trump era, are that it would not lead to any welfare gains, but rather to large welfare losses. Also, the optimum equilibrium provided by Nash equilibrium is the scenario that minimizes the total welfare loss.

Keywords: *Trade wars, Optimal tariffs, Nash, Protectionism*

JEL Codes: *F38, F41, P45, O50*

Ticaret Savaşları: ABD, Meksika, Çin Örnekleri

Öz

Bu çalışma, giderek daha sık gündeme gelen ticaret savaşlarını ve olası makroekonomik etkilerini ABD, Çin ve Meksika örnekleri üzerinden varsayımsal bir yaklaşımla analiz etmektedir. Bu analizde kullanılan üç ana senaryo ve misilleme davranışı, ABD'nin tek taraflı olarak ticaret savaşı başlatması, taraflar arasında iki taraflı bir ticaret savaşı ve Nash dengesine uygun

[1] PhD, sengulserkan77@gmail.com, ORCID ID: 0000-0001-9891-9477

bir optimal dengedir. Özellikle Trump dönemini konu alan çalışmanın ana sonuçları, herhangi bir refah kazancına değil, aksine büyük refah kayıplarına yol açacağıdır. Ayrıca, bir ticaret savaşında daha büyük ekonomiye sahip olan tarafın nispeten kazançlı çıkabileceği ve Nash dengesinin sağladığı optimum dengenin toplam refah kaybını en aza indiren senaryo olduğu sonucuna varılmıştır.

Anahtar Kelimeler: *Ticaret Savaşları, Optimal Denge, Nash, Korumacılık*

Jel Kodları: *F38, F41, P45, O50*

1. Introduction

The increase in the interdependence of countries in the international arena has also led to an increase in their trade competition with each other. In the last three decades, competition has intensified due to the efforts of industrially developed countries to become stronger domestic manufacturing and design centers, which has led to the intensification of trade disputes between these countries based on competition and budget balances.

Developed countries, which considered the removal of trade borders and liberalization in international trade as the main goal until the globalization process that started after the Second World War and accelerated in the 1980s, sought to bring new definitions to protectionism as a result of the consequences of globalization and the successive expansionist crises. In particular, the United States has engaged in increasing trade competition with its Far Eastern and European rivals against the risks of being threatened by other developed nations and weakening its competitiveness in industries such as aerospace and semiconductors, which are strategically important for national security and economy and require advanced technology. Such competition has often led to serious consequences, including trade conflicts, currency wars and even trade wars.

Trade wars can be defined as the unilateral or reciprocal imposition of new trade barriers and tariffs by two or more states to respond to and retaliate against the trade barriers they face, for a variety of reasons ranging from market competition for strategic products to maintaining current account balances.

It is known that the mutually restrictive arrangements that emerge during trade wars have far-reaching consequences, particularly on macroeconomic indicators, welfare, labor market, bilateral relations, sectoral balances and established value chains. In this respect, increasing protectionism and the frequently pronounced trade war phenomenon lead countries to develop more

independent policy approaches in the context of value chains and production compositions.

The literature on trade wars is based on a very comprehensive and broad theoretical framework, as examples on the subject date back to colonial times. In the theoretical framework, Johnson (1953) analyzed the case of trade wars based on the optimal equilibrium argument and was the first researcher to clearly show that while it is possible for large countries to benefit from a trade war, developing or small countries are always the losers in trade wars. The focal points of this research were associated with perfect competition, welfare-enhancing service functions and advalorem tariffs under a neo-classical framework. According to the so-called "Johnson example" in the literature, the national welfare of a large country tends to be better than free trade in Nash equilibrium, while the welfare of a small or developing country tends to decline (Bouet and Laborde, 2017).

Early literature studies of trade wars were based on the externalities of trade, i.e., through trade restrictions, countries change their trade strategies in line with the sphere of influence of their trading partners (Grossman and Maggi, 1997). However, this approach has not remained the only way to analyze trade retaliation and trade wars. Strategic trade policy is also a channel through which the characteristics of the trade policy equilibrium can be analyzed. For example, Brander and Spencer (1985) studied an export subsidy war between two countries in the context of Cournot competition in the case of export market competition. In this scenario, each country aims to allow national firms to earn more profits in an imperfectly competitive sector.

Among other studies in this area, Spencer (1986) examined research and development subsidies, and Eaton and Grossman (1986) studied policy equilibrium and Bertrand competition between two countries in which exports of oligopolistic firms are mutually taxed. Grossman and Maggi (1997) focus on a more complex framework in which governments first choose a policy, then firms build their productive capacity and firms set their prices. In this scenario, both Bertrand's and Cournot's competition style become applicable. In content, the model argues for the workability and efficiency of a simple policy, such as capacity subsidies, that increases a country's income regardless of the mode of competition.

Looking at the empirical side of the literature, it would be appropriate to state that studies that emphasize the historical perspective on trade wars have made important contributions to the literature. Conybeare (1987:3) defines trade wars as "a category of intense international conflicts in which states

interact, bargain and retaliate in the macroeconomic sphere in the context of economic objectives directly related to trade or service sectors, and in which the instruments used are based on restrictions on the free flow of goods". Conybeare mentions three different types of trade wars. The first one is the trade war that is considered to develop within the framework of the prisoners' dilemma fiction. In this scenario, cooperation is only beneficial if it is bilateral, but usually the dominant strategy is one of non-cooperation and confrontation. However, if everyone adopts this strategy, a situation can arise in which all sides suffer huge mutual losses, as in the case of the so-called "Chicken Wars" between the United States and the European Economic Community (EEC) during the 1960s (Conybeare, 1987).

The second type is trade wars between a large and a small country. In this scenario, as described by Conybeare (1987) in what is known as the "Johnson Case", only the larger country benefits from a trade war, while the smaller country suffers losses. As examples of this type of trade war, Conybeare (1987) cites the trade wars between France and Italy in 1886-1898, France and Switzerland in 1892-1895, and Germany and Russia in 1893-1894. In the examples, the first countries in the first row represent the strong side and the second countries represent the weak side, and the respective trade wars resulted in gains for the strong countries.

The last type of war is the trade war between multiple nations. The trade war triggered by the Smoot-Hawley Tariff Act of 1930 is presented by Conybeare (1987) as one of the best examples of this type. Ünay and Dilek (2018) state that the Smoot-Hawley Tariff Act and the developments resulting from this law have been researched with great interest by economists. This law is commemorated by the fact that in June 1930, eight months after the great Wall Street crash of October 1929, the US Congress decided to impose comprehensive tariffs on 20,000 imported goods. The average tariffs on imported goods subject to protection increased from 39 percent to 53 percent, while the share of total imports subject to protectionism in overall imports rose from 34 percent to 48 percent (Ünay and Dilek, 2018).

Canada retaliated against the US in May 1930, before the US Congress even passed the law, and many of the US trading partners retaliated against the US in the months immediately following the law. As a result, global trade collapsed from 1930 onwards, and the share of the US economy in world trade fell from 16 percent to 11 percent, especially between 1930 and 1935. Although US imports also fell by 40 percent after June 1930, part of this decline was attributed to the fall in US national income and the rest to

foreign retaliation and deflation, which increased the protectionist impact of Smoot-Hawley (Ertürk, 2007). Irwin (1991), who designed a simple general equilibrium model to analyze this event, calculates that this law resulted in a productivity loss of between 0.3 and 1.9 percent of the gross national product of the US.

While the primary objective of Bouet and Laborde (2010) is to provide a new assessment of the Doha Development Agenda, their study also examines the possible scenario of a multilateral trade war in which tariffs imposed by major economies between 2009 and 2014 would increase compared to the standard tariffs in that period. Bouet and Laborde find that if such a scenario were to materialize, world trade would shrink by 7.7 percent and world welfare would be reduced by USD 353 billion.

Hamilton and Whalley (1983) designed pure exchange models and production models in a two-good, two-country trade model with preferences and production functions and traditional functional forms. In their study, Hamilton and Whalley found that the Nash equilibrium is significantly higher than actual tariffs and that adopting the Nash equilibrium implies substantial welfare losses for trading partners.

A situation in which all trading partners suffer simultaneous losses from a conventional trade war has been seen as the more likely scenario in the trade war literature (Baumol and Blinder 1985); however, Kennan and Riezman (1988) have shown that the "Johnson Case" can also occur frequently in an exchange economy.

Ossa (2014) proposed a multi-sector and multi-country general equilibrium model of international trade in which governments impose import duties for the following reasons. These reasons are:

- Manipulation of terms of trade (Optimum equilibrium argument),
- Diverting potential profits that other countries could make (the strategic trade policy argument) and,
- Protection of politically influential industries (Political economy argument).

Ossa's model is based on data from 33 sectors and 7 regions. The author then examines the application of optimal tariffs (without retaliation) for each country and concludes that the average optimal tariff is 62.4 percent, implying an average welfare gain of 1.9 percent for the tariff-imposing economy and a welfare loss of 0.7 percent for other economies. Ossa (2014) then compared

these findings with a Nash equilibrium scenario in which the average tariff is 63.4 percent and the average welfare loss of each economy compared to free trade is 2.9 percent.

In a later paper, Ossa (2014) designs a new quantitative trade model based on the methods used by Costinot and Rodriguez-Clare (2014) and compares the results of applying the optimal equilibrium (welfare-maximizing tariffs without retaliation) to the Nash equilibrium for 10 countries and 33 industries. According to this model, the implementation of the optimal equilibrium leads to an average welfare gain of 2.4 percent for the implementing country and an average welfare loss of 0.6 percent for its trading partners. The Nash equilibrium model suggests a relatively high average loss of 3.5 percent, equivalent to about 50 percent for the United States and 40 percent for Canada.

In one of the latest paper, Şanlı and Ateş (2020) analyzed the variation of global trade's value within the GDP for the period between 1970 and 2019 in the context of tariffs, trade freedom index, dollar supply, and GDP. Trade and currency wars have a negative impact on global trade. Consequently, as trade and currency wars persist, tariffs will increase on one hand, manipulation of exchange rates will rise with fluctuations in the supply of the dollar, and as a result, both global trade and global GDP will continue to decrease.

In another study conducted by Dorius and Xie (2022), using a dynamic computable general equilibrium (CGE) model of global trade, we assess the consequences of the trade war between the United States and China. Through ex ante simulation analysis, they examine three different scenarios to comprehend the impact of the trade war on import tariffs, investment, and productivity. The intensification of the trade war leads to a decrease in the gross domestic product (GDP) of China and the USA by approximately -1.41% and -1.35%, respectively. Moreover, the trade war significantly diminishes imports and outputs in almost all sectors of both countries.

According to Baybatlı and Doğan's article (2021), which is an econometric study, it is evident that the United States displayed a protectionist stance by implementing additional customs tariffs on certain imported goods for its national security concerns, even in early 2018. In response, the Chinese economy, which holds the largest share in U.S. imports, also resorted to reciprocal protectionist measures, thus initiating a trade war. As a result, the economies of both countries were affected. The study first explains protectionism and the U.S.-China trade wars. Then, the impact of tariffs imposed by the United States and China is analyzed using the ARDL and FMOLS models. In this context, an increase in tariffs imposed by the United

States on China during the examined period suggests a reduction in China's economic growth.

Three main conclusions can be drawn from the literature review presented above. First, global tariff wars can be very harmful for all countries and the global economy in general. The second conclusion is that in bilateral trade wars, two possible outcomes are possible. In the general case, a bilateral trade war is detrimental to the welfare of both countries compared to the free trade scenario (or the starting point). In some trade conflicts, reminiscent of the Johnson case, the larger country increases its welfare (or GDP) while the smaller country suffers losses. Third, even in the case of Johnson, the realization of a trade war reduces global welfare.

The main objective of this study is to investigate the trade wars between the US, Mexico and China, especially in the Trump era, and to evaluate the results of different scenarios supported by data. In this context, it focuses on the tariffs preferred by countries, the effects on trade between countries and finally the possible macroeconomic consequences.

2. Optimal Equilibrium

In order to prevent the negative effects of contractions in foreign trade volumes, customs tariffs that maximize the net welfare gains resulting from improved terms of trade are defined by Seyidoğlu (2009) as the optimum equilibrium.

In line with this definition, the first issue to be examined is the extent to which it is possible for a country to create an increase in welfare even in a situation where it imposes tariffs. In order to examine such a situation properly, it can be assumed that the country has the capacity to produce and sell a product that is efficient in world markets, or in other words, that the country has the characteristics that meet the definition of a large country. In this case, the relevant country will be able to use its monopoly power to change the terms of trade to its advantage (Tekbaş and Yıldırım, 2016).

The factor that determines the market power of country X, which sets tariffs in foreign trade relations, is related to the evaluation of domestic demand and supply curves by comparing the existing supply and demand balances in foreign countries with domestic demand and supply curves and the correct determination of the position of domestic supply relative to the demand of international markets (Akçadağ and Alagöz, 2016). If domestic demand can be met uninterruptedly and sufficient quantities of products can be supplied to international markets, then it will be possible to talk about an efficient and

optimal equilibrium structure. However, there are other factors that make it difficult to reach an optimal equilibrium in international trade relations.

When a country with monopoly power sets a tariff, this leads to a positive change in the terms of trade. On the other hand, a decrease in the volume of trade is expected to occur, which is related to the elasticity of international demand. In this case, the determination of the net welfare effect that the country will face is dependent on which of these two factors has a larger sphere of influence. In this case, the country's ability to turn the net welfare effect in the positive direction depends on the determination of the optimum balance (Küçükaksoy, 2010).

3. Nash Equilibrium and Trade Wars

Nash equilibrium is a fundamental concept in game theory and one of the most widely used methods in the social sciences for predicting the outcome of a strategic interaction. A game (in strategic or normal form) consists of the following three elements: a set of players, a set of actions (or pure strategy) for each player, and a feedback (payoff) function for each player (Nash, 1951). Feedback functions represent each player's preferences over action profiles. Here, an action profile consists of only one list of actions for each player. The Nash equilibrium achieved by pure strategy is an action profile such that no single player can unilaterally deviate from this profile to achieve a higher payoff (Campbell and Miller, 2007).

In Nash equilibrium, in a game with N partners, if no partner's moves are sufficient to change the equilibrium condition in the game process and no change occurs at the equilibrium point, it means that Nash equilibrium has been reached in the relevant game framework. In a situation where Nash equilibrium is considered to have been reached, if a player attempts to change his/her position independently of the others, the utility of the new position will be lower than the utility of the old position (equilibrium) (Uysal, 2017).

It is seen that Nash equilibrium is a model that is frequently used to explain the trade wars that have emerged in the past with game theory. One of the most important reasons for this is that trade wars, which are usually initiated by the stronger trading partner, involve an action that ultimately leads to a certain loss of national welfare for both sides. Studies in this field have shown that Nash equilibrium plays a role in the process of mutually determining strategies in trade wars in order to minimize losses for both sides (Bagwell and Staiger, 2016).

As game theory suggests, as in any game that is repeated in successive turns, each player in the game has a right of action for retaliatory actions that punish the other player's "bad behavior" and will inevitably reach a Nash equilibrium where neither side can fully develop its ambitions. In this case, the payoffs of the parties will reach an equilibrium point when the behavior of the other players becomes predictable and both players take a cooperative approach, although not as much as the best alternative, but still significantly more lucrative compared to other alternatives (Felicio, 2018).

In the application part of this study, the studies using Nash equilibrium functions are evaluated with respect to the basic functions of the theory, and the relevant data are drawn from studies that have been conducted in the context of potential trade wars between the US, China and Mexico (Felicio, 208; Bouet, and Laborde, 2017; Balistreri and Hillberry, 2017; Bagwell and Staiger, 2016; Bchir et al. 2002) and GTAP (2018).

4. Trade War: The Cases of USA, Mexico, China

4.1. Background of the Trade War

The period from the end of 2016 until the first months of 2018 witnessed a dramatic change in the evolution of global trade. Following the referendum that approved the UK's exit from the European Union, Donald Trump's protectionist statements during the US presidential election campaign, threatening China, Mexico and Germany with import tariffs, and his victory in the election led to deepening concerns on a global scale. In his election speeches, Trump announced that he would "impose tariffs of 35 percent on imports from Mexico and 45 percent on imports from China to protect US industries from unfair foreign competition". One of the first decisions of the Trump administration upon taking office was in fact to sign an executive order approving the US exit from the Trans-Pacific Partnership. However, this message was largely symbolic, as the agreement had not yet been ratified by the US Congress (Ünay and Dilek, 2018).

As analyzed in the literature review presented above, trade wars are a topic that has generated considerable research in the field of international economics in the recent past. In general, to summarize briefly, the literature in this area focuses on the following three main points:

- A global trade war would result in significant welfare losses for all countries (Bouet and Laborde, 2017).

- A trade war between a large country and a small country may result in gains and losses for the large country, but the small country will suffer losses in any case (Conybeare, 1987).
- A trade war cannot be expected to produce gains for all countries involved at the same time. However, a cooperative strategy may offer the opportunity to lead to a welfare-enhancing and more favorable solution for all countries (Felicio, 2018). There are examples of both theoretical and empirical studies in the literature on these three outcomes.

4.2. US Trade Relations with Mexico and China

Firstly, look at the trade relations data among these three countries. The trends in US exports to China have significantly changed compared to the period of 2002-2011. Following China's accession to the World Trade Organization (WTO), non-manufactured goods exports from the US to China increased by an average of three billion dollars annually during the first decade. However, US exports to China from 2012 to 2017 showed weaker growth compared to the first ten years after China's WTO accession. Total exports grew by an average of 3.3 billion dollars over the past six years, which was much slower compared to the average export growth of 8.2 billion dollars per year from 2002 to 2011. On the other hand, imports from China experienced much faster growth, averaging a 13.3 billion dollar increase from 2012 to 2017 (U.S. Census Bureau).

The following statistic illustrates the share of aircraft, spacecraft, and related parts imported from the US to China from 2014 to 2018. In 2018, the share of aircraft, spacecraft, and related parts imported from the US accounted for approximately 50% of China's total imports. The United States and China are the world's largest economies with both short and long-term trade relationships. As of 2013, China became the third-largest export market for the US, following Canada and Mexico. Commodities exported from the US to China, except for 2009 due to the global financial crisis, have significantly increased in the past decade (U.S. Census Bureau). Countries engage in the exchange of goods to promote economic progress. China and the US acquire products they cannot produce domestically from each other through their economic ties, leading to an increase in bilateral trade in goods and services.

In 2013, China surpassed the US as the world's largest merchandise trader. That year, China's imports and exports exceeded four trillion US dollars. Except for 2009 and 2015-2016, there has been a fairly consistent increase in imports over the past decade. China's import of goods experienced

an approximately 11% decrease due to the global financial crisis in 2009 before reaching a positive growth in 2010. In 2015, China's imports declined by 13.2% due to various geopolitical conflicts and global uncertainty following disease outbreaks (U.S. Census Bureau). Socio-economic developments and adverse circumstances significantly influence the trade percentages, imports, and financial status of countries. Worldwide pandemics, political debates, and uncertainties have had a substantial impact on China's imports.

In 2019, US exports to China amounted to 106.63 billion US dollars. In the same year, China's import contribution to its gross domestic product (GDP) was around 14.5%. One year earlier, China's exports created a significant trade surplus, surpassing the country's imports by 351 billion US dollars. The ASEAN and European Union countries were China's most important trading partners in terms of imports in 2019, with imports valued at approximately 1.95 billion yuan and 1.91 billion yuan, respectively (U.S. Census Bureau). With its production capacity and import volume, China holds a prominent position globally. Due to its low-cost and diversified offerings, it has become a preferred destination for many countries.

When looking at the Mexico side, The United States exports a variety of products and services to Mexico. The main export items include automobiles, electronic goods, machinery, petroleum products, chemicals, and agricultural products. The U.S. holds a strong position in sectors such as the automotive industry, electronics, and the agricultural sector when exporting to Mexico. The U.S. exports to Mexico were approximately $196 billion in 2010, $236 billion in 2015, and remained unchanged in 2020. The impact of the trade wars that began in 2016 cannot be disregarded, and this period will be further examined in the later sections of the article.

On the import side, the United States imports various products and services from Mexico. Import items include automobiles, electronic goods, petroleum, textile products, furniture, and agricultural products. Mexico is one of the largest importers for the U.S. and holds a strong position in the U.S. market by offering competitive prices and production capacity in many sectors. In 2010, the U.S. recorded approximately $229 billion in imports from Mexico. This figure increased to $294 billion in 2015 and $358 billion in 2020.

The North American Free Trade Agreement (NAFTA) came into effect in 1994, liberalizing trade between the United States, Mexico, and Canada. This agreement helped drive significant momentum in trade between the U.S. and Mexico. Its successor, the United States-Mexico-Canada Agreement

(USMCA), came into effect in 2020, further strengthening trade relations. Trade volume between the U.S. and Mexico has significantly increased since the 2000s. Both export and import figures have shown substantial growth. Sectors such as the automotive industry, electronic goods, machinery, petroleum products, and agricultural products are the main components of trade. The trade between the U.S. and Mexico has been strengthened through value chain integration. Particularly, the automotive industry stands out with the division of production stages between the two countries and the cross-border supply chains for parts. The U.S.-Mexico trade balance generally indicates a trade deficit in favor of Mexico. While the U.S. exports more to Mexico, Mexico imports more from the U.S. Trade between the U.S. and Mexico is closely linked to direct investments and production facilities. U.S. companies establish production facilities in Mexico to benefit from cost advantages and labor resources.

This section of the paper also evaluates the US-China and US-Mexico trade conflicts that have emerged in the recent past and whose effects are still ongoing but have not yet been fully characterized as trade wars. In order to assess these cases properly, the first section first defines some basic characteristics and presents some data on trade between the US and China and between the US and Mexico. Data on the economic size of these three countries are important for interpreting the consequences of a potential trade war in the context of the literature review above (the Johnson case).

China and the United States are considered to be large countries with a population of 1,379 million and 324 million respectively in 2016, ranking as the top two countries in the world with a nominal GDP of USD 11.4 trillion and USD 18.6 trillion respectively. By comparison, Mexico's population in 2016 was 122 million and its GDP was only US$1.07 trillion (CIA, 2017). This translates into a scale of 1 to 17.4 when comparing the GDP of the US and Mexico and 1 to 10.7 when comparing the GDP of the US and China. While all three countries are WTO members, the US and Mexico have been members since the organization's inception (January 1, 1995), while China became a full member in 2001 (WTO, 2017).

Both trade partnership relationships (US-China and US-Mexico) are of great importance as they have high value and high shares in countries' foreign trade. However, this partnership is particularly important for Mexico, whose foreign trade with the United States represents 81 percent of total merchandise exports and 47 percent of total imports (UN Comtrade data). In 2016, 22 percent of total US exports to China consisted of transportation

equipment, 14.9 percent of agricultural products, and 14.8 percent of computer and electronic products. In the same year, the main goods imported by the US from China were computers and electronic products with 34.8 percent, electrical appliances, white goods and components with 8.8 percent, and other miscellaneous manufactured goods with 8.5 percent. The sectoral structure of US exports to Mexico in 2016 was relatively similar to that of exports to China, but agricultural products, which were a major item in exports to China, were replaced by chemical materials. Among the products that the US imports from Mexico, the transportation equipment sector accounts for 33.8 percent of total imports, representing a strategic value for Mexico and the US (ITA, 2017).

Both trade relationships are clearly suggestive in terms of their contribution to global value chains. According to the Value-Added Trade (VAT) database used by the Organization for Economic Cooperation and Development (OECD, 2017), both economies fall into a backward participation or vertical specialization position if their global participation index is close to the average index for emerging economies (OECD, 2017).

This corresponds to a relatively significant foreign value-added content of exports, where both countries import foreign inputs to produce intermediate or final goods and services for export. In comparative terms, forward participation in global value chains is relatively low in both countries. It should be noted here that forward participation is measured by domestic value added that is sent to third economies for re-export. That is, in this case, exported intermediate products are purchased from a second country, domestic value added is added and resold to a third country, transferring resources to the first economy.

When the average protection levels of countries are analyzed, tariffs are determined according to bilateral trade, so they may be somewhat far from fully reflecting the overall protectionism level of countries. However, according to the data prepared by GTAP (Global Trade Analysis Platform, 2018) for each country and region across all traded goods, it can be said that the United States in particular has a very low level of protectionism compared to other countries. According to the same data, the average protection applied to imports of Chinese goods from Canada is 4 percent, while the average protection applied to goods from Japan is 3 percent. The average US protection on goods imported from China is 3 percent, while the average US protection on Mexican goods is 0 percent due to the North American Free Trade Agreement (NAFTA). On the Chinese side, China imposes an import tariff of 5 percent

on goods imported from the US and Mexico, while Mexico's average tariff on goods imported from China is 6 percent and its average tariff on goods imported from the US is 0 percent. In terms of the US foreign trade, the fact that the US imposes a 5 percent tariff on goods exported by the US to China, whereas the US imposes a 3 percent tariff on goods imported from China is seen as a violation of the principle of reciprocity. On the other hand, it should be noted that since the end of World War II, this situation has been accepted as a principle adopted between the two countries in mutual foreign trade and foreign trade has been carried out in line with this principle throughout this whole process (WTO, 2018).

On the other hand, it is also evident from this data that China does not apply a higher tariff system, especially on goods imported from the United States. Japan, the Commonwealth of Caribbean States and Western Europe are kept out of the domestic market by China through higher tariffs due to some overlaps in their specialization structures. While US products are not subject to tariffs in accessing Mexico due to NAFTA, products from China, S. Korea and South Asian countries are clearly disadvantaged in terms of access to Mexico.

4.3. Assessment of Trade War Scenarios

This study aims to identify the change in the orientation of US foreign trade policy and its implications after US President Trump announced various increases in import tariffs for China and Mexico and started these increases on certain raw material groups with China in 2018. Trump's protectionist approach implied a 35 percent increase in import tariffs on products imported from Mexico and a 30 percent increase on products imported from China (Tucker, 2016).

All scenarios evaluated in this study assume an increase in import duties on all products imported into the US from China and Mexico (Aran, 2018), with the exception of oil, energy and mineral products, which are generally considered to be of strategic importance by US officials. On the other hand, to determine the degree of retaliation by these two trading partners, the following five scenarios are considered:

1. China, Mexico or both impose the same level of import tariffs on products imported from the US in response to the US tariff increase on products imported from these countries.
2. China, Mexico or both impose import duties on all imports from the United States so that the newly collected tariff revenue on those

imports is equal to the new tariff revenue collected by US agencies on those countries' exports.

3. For all imports from the United States, China, Mexico or both shall determine the import duty on all imports from the United States, based on the total volume of trade with the United States and the loss due to the new tariffs, so that the terms of trade are the same as before or the most equalizing import duty possible.
4. Identify an optimal equilibrium scenario in which each country imposes a welfare-maximizing tariff based on the tariff set by the other two countries.
5. Establish a Nash equilibrium between the parties that start a trade war in which each country retaliates in a welfare-optimal way according to the optimal equilibrium imposed by the belligerent.

In this paper, two important conclusions are expected to be reached in line with the assumptions derived from the above literature review. First, even taking into account the existing advantages in such a trade war, initiating a trade war does not seem to be the right policy to improve domestic welfare and gross domestic product (GDP), even for the US. Second, a trade war has the potential to cause significant damage, especially for Mexico, which is economically smaller than the United States and whose most important market for exports is the United States.

4.4. US Trade War Scenarios with China and Mexico

The various trade war scenarios, which are assumed to be initiated by US government actions based on trade conflicts, are presented below, each scenario being framed along three dimensions.

The first of these three dimensions defines which country or countries are the targets of additional tariffs imposed by the US. Here, we model a US trade policy change consisting of a 35 percentage point tariff on all goods imported from China or Mexico, or both, except energy goods.

The second dimension defines the type of retaliation imposed by the US trading partner(s). In this stage, a total of five retaliation options are considered and, in each case, it is assumed that equal tariffs are applied to each sector, except for energy products. The five retaliation options are presented below.

1) In the first scenario, the US government imposes trade retaliation using the same tariff rates and variations of restrictions on goods

imported from the US in the economies or sectors targeted by the tariff increase (35 percent retaliation scenario).

2) China and Mexico impose a tariff change on goods imported from the US that generates a change in customs revenue equal to the increase in tariff revenue received by the US (revenue-for-revenue retaliation scenario).

3) To offset the welfare losses resulting from US tariffs on imported goods, China and Mexico impose tariff changes on imported goods from the US that could lead to an equal welfare gain (Welfare-oriented retaliation scenario).

4) China and Mexico modify their tariffs on goods imported from the US in order to minimize the terms of trade (terms of trade minimizing scenario).

5) In the last scenario, China and Mexico do not retaliate, but the countries involved in the trade war impose tariff rates corresponding to the Nash equilibrium between them (Nash equilibrium scenario).

The process of expressing the Nash equilibrium works as follows. First, the welfare-maximizing optimal equilibrium is determined for the country whose goods are subject to import tariffs by taking into account the tariffs imposed by other countries, and then the same process is repeated for the other countries and this process continues until the theoretical tariff reaches zero. In this process, the same tariff is applied to all sectors except the energy sector for each country. Except for the first model, the new tariffs imposed by the retaliating parties and their modeling implications are adapted from the relevant analyses that form the basis of the study.

4.5. Assessment of US - Mexico Trade War Scenarios

4.5.1. Tariffs

Bouet and Laborde (2017) construct scenarios for the range of tariffs and options that could be retaliated against each tariff change by the trading partner. Under these scenarios, the US imposes a 35 percentage point increase in tariffs on all goods from Mexico except energy. The exception to this scenario is the Nash equilibrium scenario with full long-term capital mobility in which the US raises tariffs by only 13.4 percentage points. The Nash equilibrium scenario with no capital mobility leads to a higher tariff since it is associated with a less flexible supply of goods for both partners.

Mexico's degree of retaliation varies according to the country's short- and long-term objectives. If Mexico imposes trade retaliation in order to restore the dynamics of trade between the two countries, the tariff increases on US imports should be considerably higher because the trade war was initiated by the US and the retaliation is expected to be higher in response. A 35 percentage point increase in US tariffs on all products imported from Mexico would lead to a significant trade loss for the country's economy, since, as explained earlier, the United States accounts for more than 80 percent of Mexican exports.

On the other hand, it would be imperative for the Mexican government to impose a substantially increased tariff on US goods in order to recover the trade loss from US tariffs, especially since the US is the source of only 47 percent of Mexican imports. Such an increase in import duties would also be of a much higher value than a retaliation based on welfare objectives. Because of the negative shifts in the internal dynamics of trade, the difficulty of meeting terms-of-trade targets would be expected to make it harder to meet moderate targets on welfare-related costs.

If Mexico were to retaliate in line with the World Trade Organization's (WTO) recommendations on trade wars, which envisage a retaliation based on revenues from tariffs, then Mexico should be expected to raise tariffs on US imports at a rate slightly higher than the expected US tariff increase on Mexican goods. This is also related to the fact that the US has a trade deficit in bilateral trade between Mexico and the US. The Nash equilibrium tariffs calculated in the analysis are significantly lower compared to the other scenarios. According to the Nash equilibrium optimum, a tariff increase of 35 percentage points is not optimal for US welfare. For Mexico, the Nash equilibrium tariff increase is close to the tariff increase required to maximize welfare.

4.5.2. Impacts on Trade

The unilateral imposition of tariffs on Mexican imports reduces Mexico's total exports by 18 percent by volume. Mexico's retaliatory imposition of tariffs on imports from the United States creates a direct restriction on these goods, but in this case leads to an appreciation of the Mexican peso, further reducing Mexican exports so that the current account remains constant as a percentage of GDP. A similar effect occurs at a lower level for the United States. In the case of the United States, US tariffs and the appreciation of the US dollar lead to a decline in US exports of about 3 percent, while a possible

retaliation scenario by Mexico could increase this loss to 4.5 percent (Bouet and Laborde, 2017).

According to GTAP 2018 data, a 57 percent decline in Mexican exports to the United States would lead to an increase in the volume of Mexico's trade with other trading partners by between 40.6 percent and 71.7 percent due to a significant real depreciation of the Mexican currency. For example, in this case, Mexican exports to Canada increase by 67 percent. Nevertheless, this is only partial compensation for the loss of current exports to the United States. As in the previous scenario, Mexico's total exports decline by a significant 18 percent, while exports to the United States from the Central American Trade Association (CAFTA) region increase by 6.3 percent. Again, in this case, total US exports are significantly affected by increased competition from the export of cheap Mexican products in third markets as a result of tariff increases and the appreciation of the real exchange rate. Bilateral exports to Mexico fall by 21.8 percent in this case.

In the Nash equilibrium scenario, retaliation by Mexico is more moderate, so that the optimal balance imposed by the United States changes from 35.4 percent to 13.4 percent. If retaliation by Mexico is severe, the resulting disruption in trade flows will be significantly larger for both sides. Retaliatory behavior, in any case, ensures that the damage is offset from a mercantilist perspective. In this context, the revenue-oriented retaliation scenario leads to a very large destruction of bilateral trade between the US and Mexico, with exports from Mexico to the US falling by 64 percent and exports from the US to Mexico falling by 69 percent. On the other hand, the Nash equilibrium results for both exporters still lead to strongly negative trade outcomes. In this scenario, Mexican exports to the United States fall by 37 percent and U.S. exports to Mexico by 35 percent, implying a slightly smaller loss for the stronger of the two sides (GTAP, 2018).

4.5.3. Macroeconomic Consequences

In the macroeconomic assessment phase of the paper, the outputs of the analyses so far will be evaluated in terms of the macroeconomic effects of trade war and retaliation scenarios on the US and Mexican economies. One of the most striking facts at this point may be that, if not implemented carefully, Mexico's retaliation could have detrimental consequences for the country. Indeed, welfare losses and real GDP losses increase significantly in scenarios where Mexico's retaliatory tariffs against US goods are above 10 percent. Moreover, there is no loss in US welfare in the welfare-enhancing and Nash equilibrium scenarios in which Mexico does not retaliate, or a small decline

in US welfare in the scenario in which Mexico imposes very high tariffs on US goods.

The limited impact of these retaliatory tariffs on US foreign trade activities is not surprising for the reasons outlined in the literature review. The unilateral scenario in which US imports from Mexico decline by 57 percent, but US imports from other sources increase, leads to a reduction in total US imports of only 2.8 percent. However, this scenario also results in limited import substitution, leading to major distortions in the US trade orientation. The main reasons for this are that the Mexican economy is overly dependent on inputs imported from the United States due to the long-standing value chains between the United States and Mexico, and that a reduction in US imports would have a direct negative impact on US exports to Mexico. In any case, the net impact of the scenario on US GDP would be marginally positive or marginally negative.

This trade war case study points to two important policy implications. First, as exemplified by the history of trade relations, small countries do not have the capacity to retaliate against protectionism by large countries in order to prevent harm to the welfare of their own citizens or to harm large trading partners. The second implication is that the design of trade retaliation needs to be rational in order to maximize national welfare, and that non-retaliatory actions based on scenarios such as terms of trade, tariffs at the same level as the major trading partner, or tax increases can be particularly damaging to small partner countries.

4.6. Assessment of US - China Trade War Scenarios

4.6.1. Tariffs

According to Bouet and Laborde (2017), a 35 percentage point increase in import tariffs on Chinese products by the United States would cause China to suffer significant terms of trade losses and would require it to impose a relatively higher tariff on American products in order to restore its balance of trade. Since the volume of trade flows from the United States to China is about 35 percent lower than the volume of trade flows from China to the United States, the retaliation that would be required by China against the United States to collect an equal amount of import duties would lead to a higher import tariff than 35 percent.

The fact that welfare-maximizing tariffs are much lower again demonstrates that the US government would not maximize domestic welfare

by imposing a 35 percentage point increase in import tariffs on Chinese products.

When comparing the Nash equilibrium tariffs to other scenarios in a hypothetical trade war between the US and China, it is noteworthy that the Nash equilibrium tariff increase imposed by the US against China is twice as low as the increase imposed on Mexico (7 percent instead of 13.4 percent). The first plausible explanation for such a discrepancy is that the US tariff on Mexican products is currently 0 percent, while the current US tariff on Chinese products is about 3 percent.

A complementary explanation could be that US imports from China are more flexible than US imports from Mexico, so that the optimal US tariff on Chinese imports is lower. As explained in the previous example, optimal retaliatory tariffs decline as we move from the short-term to the long-term scenario.

4.6.2. Impacts on Trade

With respect to the impact on total exports of both countries, a US-China trade war would mean a trade devastation shared relatively equally between the US and China. Compared to the US-Mexico scenarios, the effects of a US-China trade war would be much larger in terms of their impact on third parties, as both economies are close in size and both sides have regionally identified the Pacific basin as a trade target area. The global trade distortion that would result from a trade war between two major economies is even more pronounced in a US-China trade war.

In the scenario where the US imposes unilateral tariffs on China, it is to reduce the flow of goods from China to the US by 75 percent. This policy also leads to the US turning to new markets for imports of the relevant products, such as Southeast Asia, Japan and South Korea, and China finding new destinations such as Mexico, CAFTA and Canada in search of export markets. Such a scenario, if realized, could have a domino effect on all bilateral trade relations globally. For example, according to this scenario, an increase in exports from Southeast Asia to the US could have a negative impact on exports from Southeast Asia to China and Japan (Bouet and Laborde, 2017).

In the scenario where China responds to the US with a revenue-oriented retaliatory strategy, it leads to a very significant drop of 82 percent on the large trade flows from the US to China. The main reason for such a significant decline is that China would have to respond to a 60 percent tariff increase by the US with an 82 percent increase in order to balance its revenues through

a tariff revenue-oriented approach. This scenario would lead to a new trade route for US exports to Canada, Mexico and CAFTA countries.

Under the Nash equilibrium scenario, in the US-Mexico scenario, the tariff increases were more moderate and the resulting trade disruption, as well as trade diversion, was significantly smaller. In this case, when Nash equilibrium conditions are met, a 29 percent reduction in China-US trade flows and an 18 percent reduction in US-China trade flows are projected (Bouet and Laborde, 2017).

4.6.3. Macroeconomic Consequences

In assessing the macroeconomic effects of the US-China trade war, it should be emphasized that both belligerent countries have suffered significant losses in this trade war, albeit more serious losses on the Chinese side. However, compared to the first example, China's losses are less significant than Mexico's losses in the US-Mexico trade war. Due to the relative proximity of the parties in terms of size, the US losses in such a trade war are somewhat more pronounced in its trade war with China. As alternative import markets for the US and due to their geographical location, Mexico gains from this trade war scenario, assuming, as in the first example, that the CAFTA region and the US only engage in a trade war with China.

Many sectors in China are expected to be affected by the 35 percent increase in import tariffs imposed by the US. As mentioned in the introduction of the section analyzing the bilateral trade between countries by sectoral weights, sectors such as automotive and related industries, electronic equipment sector, apparel and leather products, wood and paper products, which have a significant share in total value added, are the sectors that will be affected by this trade war in the first place. Adopting a trade war policy, the US should also increase its activities in these sectors by finding solutions such as market diversification, but compared to China, these sectors are less important in terms of limited comparative advantages in the US economy.

An income-oriented, i.e. relatively severe, Chinese retaliation would also have a negative impact on the US forestry and agricultural products sector. In this area, US producers, who are among China's major industrial suppliers, are likely to be adversely affected by the trade war. In a Nash equilibrium with a more moderate retaliation, all of the above-mentioned sectors suffer losses that are repairable, moderate and can be replaced through alternative export markets.

The inflationary effects in the domestic economy that would be expected to follow a government's adoption of a protectionist approach to trade lead to a fall in domestic purchasing power under conditions of constant nominal remuneration of productive factors. This increase in domestic prices may affect the price of final consumption goods, leading to direct losses for consumers. Such a price increase, which affects the price of intermediate goods, can have a negative impact on economic activity and can be transmitted along sectoral value chains, affecting the competitiveness of the relevant local sectors. When a sector's economic activity is adversely affected by protectionist policies, the demand for productive factors in that sector is also adversely affected.

However, in some US industries, such as the apparel and leather goods sectors, trade wars can be expected to have a positive impact as production increases and the demand for the productive factors used in these sectors increases.

When an economy is adversely affected by trade protectionism, as in the case of unilateral tariffs imposed on China by the US, this has a negative shock effect on domestic output. For example, as in the unilateral scenario, production prices and the real wage level in China can be expected to fall as a result of lower demand for factors of production that are heavily used in export sectors.

While some sectors may benefit from China's retaliatory scenarios and protectionist stance in response, the protectionist shock may accelerate the rise in the overall price level in the country, especially in areas where China has opened up production areas for export sectors and where there is no demand for this production in the domestic market.

From the US perspective, all factors of production will suffer from protectionist measures and trade wars, and those who hold factors of production, including skilled labor, will feel the impact most closely. In this case, it can be assumed that low-skilled labor will be positively affected by this situation as the only exception. This is because a significant portion of imports from China are production-related products that require low-skilled labor, such as electronic goods, apparel and leather goods, wood and paper products.

5. Conclusion

Various scenarios have been evaluated depending on whether the US would initiate an actual trade war against Mexico or China, as it has been

frequently stated recently, and whether or how the relevant trading partners would retaliate.

Three different scenarios were considered in the trade war assessment. To briefly recall these three scenarios, in the scenario in which unilateral US tariffs are imposed, tariffs are bilaterally increased by 35 percent on trade with China and Mexico by the US alone. In the second scenario, China and Mexico retaliate by increasing their tariff revenues in order to bring their tariff revenues to the same level as before the US increase. Finally, the third scenario is a Nash equilibrium scenario that maximizes the welfare of each trading partner based on optimal equilibrium.

The results from the various protectionist policy scenarios evaluated in this study show that there is no scenario in which the US benefits significantly from protectionism against these two trading partners or from engaging in a trade war with them.

The scenarios presented above were selected because they offer contrasting outcomes of a trade war, including unilateral protectionism, a large and bilateral increase in US protectionism, violent retaliation against US protectionist policies, and a relatively moderate spread of protectionism between the parties. What these scenarios and all other unselected scenarios have in common in terms of outcome is that they have no positive or negative effects on US welfare.

While it is true that some US sectors such as textiles, apparel and leather goods, electronics, etc. could benefit from these scenarios in terms of value added, these gains could come at the expense of losses faced by other sectors such as chemicals, rubber, plastics, agricultural crops, meat and dairy products, motor vehicles and parts, and transportation equipment. In addition, workers, both skilled and unskilled, and in both agricultural and non-agricultural activities, also suffer as a result of these policies. Again, all of these scenarios have a negative impact on the real wages of unskilled and skilled workers in the US, especially unskilled workers in the sectors primarily affected, and similarly, in all cases, capital is also negatively affected by these policies.

As a second important policy implication, comparing the outcomes of the scenario in which the US imposes a 35 percent increase in tariffs and the other trading partner makes a similar increase with the Nash equilibrium option in which both partners increase their protectionist trade rates less, we find that in the Nash scenario, countries' welfare losses are significantly lower.

The third important policy implication from the results of the scenarios is that, although China suffers significant losses in trade wars, these losses are lower than the losses that Mexico would face in a trade war with the US. In other words, Mexico faces huge welfare losses, macroeconomic losses and trade losses in every scenario of a trade war with the US.

In addition, some sectors, such as the motor vehicles and parts sector and transportation equipment, which have developed and grown dependent on demand from the United States, in particular due to Mexico's long-standing foreign trade structure with the United States, are significantly undervalued. For example, these sectors, which represent 3.3 percent of the total value added generated in the Mexican economy, lose about 16 percent of their value added in a unilateral scenario imposed by the United States alone, and 22 percent in a coordinated trade retaliation.

It is important to emphasize that for Mexico, whose economic size is significantly smaller than that of the United States and which views the United States as an important export destination, trade wars would potentially result in high losses. Along the same lines, it follows that the manner in which trade retaliation is implemented is also important for the outcomes.

In a trade war between Mexico and the United States based on retaliatory retaliation to raise the terms of trade and hence tariff revenues, it is found that Mexico experiences a systematically higher welfare loss, but retaliation with a welfare-enhancing approach would reduce losses for Mexico. In this context, the bilateral trade war between China and the US yields similar results.

As a fourth policy implication, it is important to highlight an economic mechanism that mitigates the negative effects of US protectionism on China and Mexico. Since the current account as a percentage of GDP needs to remain at a certain level, real exchange rates at domestic prices need to adjust in response to the changed situation as a result of a trade war. In the case of Mexico, the significant depreciation of the real exchange rate that would result from the loss of exports to its northern neighbor would lead the country to export more, especially to other trading partners, and to import less compared to the previous equilibrium situation, thus leading to a redefinition of the current account as a percentage of GDP. In this case, the trade and macroeconomic losses that the country would face could be transformed into a head start that could lead to significant gains in the long run through the development and diversification of substitute export markets.

From a similar perspective, if the US voluntarily turns a long-standing geographically and culturally compatible partner into a supplier in new

markets, this could lead to losses for the US in terms of both diversification and cost advantage in the long run.

In conclusion, it is important to reiterate that trade wars are potentially very harmful for the global economy. Practice shows that protectionism is not the right way to reduce current account deficits in the private and public sectors, as it is often the result of insufficient net savings.

Remembering the positive role that multilateral trading systems, which provide for the mediation of trade disputes between countries, can play in resolving such disputes can help to avoid significant losses. If the current U.S. government believes that the ongoing trade conflicts, which have been examined in detail in this study, involve unfair trade practices that impose costs on U.S. producers, the option of filing complaints or seeking changes to these practices through the WTO should be seen as one of the best approaches to take in this area.

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