“Trade wars are good, and easy to win”

A study of Trump’s steel tariffs and international trade

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**Abstract**

For a long time, free trade has been considered the optimal trade pattern for a country to increase its welfare. This idea has however been put to the test by the ongoing steel tariff implementations by the United States. President Donald Trump has argued that foreign production and export is hurting the American steel industry. This paper will examine the effects and consequences of these tariffs from a trade theory point of view and analyze the potential risk of a trade war. Further, it will discuss whether this trade policy is an optimal way for the United States to improve its economy which will be related to data on the United States’ history of trade and its membership in the World Trade Organization, WTO.

The main findings of this paper are that if the country that imposes the tariffs are considered as being a large country and the tariffs are optimal, it can increase the country’s welfare. Another finding is that the negotiating of quotas instead of tariffs might have a similar effect for the implementing country depending on if they receive the quota rents, and a combination of tariffs and quotas might not diminish US role as a large country which means that the US can gain a positive welfare effect of the trade barriers. Actions like these might however be considered as violations of the WTO agreements and retaliation from other countries are likely. Furthermore, the historical data on the United States indicates that tariffs in general can have a positive effect on its GDP.
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1. Introduction

“When a country (USA) is losing many billions of dollars on trade with virtually every country it does business with, trade wars are good, and easy to win. Example, when we are down $100 billion with a certain country and they get cute, don’t trade anymore—we win big. It’s easy!” (Trump, 2018)

In April 2017, the United States’ President Donald Trump directed the Department of Commerce to examine if steel imports from China and other countries could damage the United States’ national security (Iyengar 2018). According to the Department of Commerce the US imported 34.6 million metric tons of steel in 2017. This makes them the world’s largest steel importer with a growth of 134% of their steel imports since 2009. Based on available data, the imports of steel to the US in 2017 represented about 8% of all steel imported globally and this imported volume was more than 15% larger than Germany’s imported volume who was the second largest importer that year. In 2017 the US imported steel from 85 countries and territories with the top ten countries representing 77% of all American steel imports, Canada (17%), Brazil (14%) and South Korea (10%) being the three largest (Department of Commerce 2018, 1, 3). Following the Department of Commerce investigation, President Trump decided to impose a 25 percent ad valorem tariff on imported steel articles (Iyengar 2018) as a first step to make sure that the United States’ steel industry is economic viable for national security reasons (Trump, 2018b). China, who is the world’s largest exporter of steel and represents 2% of American steel imports (Department of Commerce 2018, 3), criticized the tariff as an attack on global trade and said it would take actions if Chinese businesses were negatively impacted, pointing out it would defend its rights if tariffs were to be put in place (Iyengar 2018)

1.2 Purpose

The current trade conflict between the United States and China is one of the most discussed topics at the time of this thesis and a subject well worth studying. It has a high level of topicality and a worldwide impact on trade and trading relations. We have therefore chosen to write about trade theory focusing on tariffs and quotas related to Trump’s latest tariffs on steel as a starting point. We will begin by studying consequences and effects of tariffs and quotas on importing and exporting countries as well as for the producing industries and for the consumers. Further,
we will examine the potential risk of a trade war to break out and finally we will discuss whether or not tariffs will have a positive impact for the US based on trade theory and historical data. This study will hence contribute to the analysis of the current tariff situation by relating theory and historical patterns to ongoing events.

2. Background

2.1 Timeline
As presidential candidate, one of Donald Trump’s campaign promises was to protect the US steel producers from foreign price-dumping. One of the first things he did when he later came into office was therefore to order the Department of Commerce to investigate under a rarely used provision that permit the executive branch to limit imports considered to be a threat to the readiness of the military (Bonney 2018, 7). On March 8 2018, the White House published President Donald J. Trump’s Presidential Proclamation on “Adjusting Imports of Steel into the United States” which stated that the Secretary of Commerce had found that the current quantities and circumstances of steel articles being imported into the United States were threatening to hurt the country’s national security. National security was threatened through the weakening of the internal economy which causes a continuous threat of more steel production plants to close, reducing the United States’ ability to produce enough steel for national defense (Trump, 2018b).

In the reaching of this conclusion, the Secretary of Commerce considered previous actions on steel imports and excess capacity by the United States government (Trump, 2018b). The recommended actions by the Secretary of Commerce was therefore, among others, to enhance national security by a global import tariff of 24 percent on steel articles in order to reduce import quantities and increase production to attain long-term economic viability. The Secretary also wanted, and was among the ones granted, the authorization to exclude steel articles which does not have adequate domestic production capacity upon request from affected domestic actors and for national security reasons (Trump, 2018b).

From these recommendations President Trump decided to impose a 25 percent ad valorem tariff on imported steel articles, excepting Canada and Mexico. Trump stated that the tariffs was necessary and relevant in light of the Secretary of Commerce’s report, the 2017’s import and
production numbers, the lack of success in reducing global excess capacity and the high levels of imports in 2018, among other things. US steelmakers were supportive of the measures but much of Corporate America were worried it would fail and that it could start a trade war (Iyengar 2018). The goal of the steel tariffs is to be a first step to make sure that the United States’ steel industry is economic viable. The President stated his believes that without the tariffs, the US will become at risk of being dependent on foreign steel production to meet the national security needs as the domestic industry would continue to decline (Trump, 2018b).

Due to United States significant security relationships with some of the countries from which it imports steel articles, President Trump recognized that the US is open to deal with the national security threat in alternative ways, in which case he would remove or amend the steel articles’ import restriction for that country (Trump, 2018b). The exclusion of Canada and Mexico from the tariffs is an example of alternative cases which were explained by Trump due to their support for each other’s national security concerns, shared dedication to address excess capacity of steel, the physical closeness of their industries, the economic integration between the countries and the United States’ export of steel to Mexico and Canada. Trump also stated his expectations on Mexico and Canada to take measures to prevent transshipment to the US through their respective countries (Trump, 2018b). On March 22, President Trump added Australia, Argentina, South Korea, Brazil and the EU to the countries exempt from the tariffs. (Trump, 2018a).

China who is the world’s biggest exporter of steel, criticized the tariff as an attack on global trade and said it would take actions if Chinese businesses were negatively impacted, pointing out it would defend its rights if tariffs were to be put in place (Iyengar 2018). Accordingly, China retaliated on April 2, 2018, with tariffs on 3 billion dollars’ worth of US imports including fruits, nuts and pork, stating that the tariffs were in response to the US tariffs. The US responded the next day with a threat of targeting 50 billion dollars’ worth of Chinese goods, focusing on goods in the aerospace, machinery and medical industries (Iyengar 2018). 24 hours later, China threatened to retaliate and impose tariffs on another 50 billion dollars’ worth of US goods. The threat included 106 products ranging from cars and aircrafts to soybeans and chemicals. China’s announcement hit the global markets hard as well as the companies making the products that were threatened to be tariffed (Iyengar 2018). At the end of April 5th, just as the stock market had improved as investors believed the back-and-forth between US and China were just talk, Trump made a statement calling for new tariffs on 100 billion dollars’ worth of
Chinese goods. The US Trade Representative was put in charge of assessing which products would be targeted. China, having allegedly already prepared countermeasures, warned that it would retaliate to any new tariffs which rattled the American stock markets (Iyengar 2018).

On April 30th, 2018, the White House released a statement saying that it had reached an agreement with South Korea regarding steel imports and non-finalized agreements with Australia, Argentina and Brazil. The proclamation also stated that the exemption of Canada, Mexico and the EU had been extended until the first of June 2018 under which time negotiations would continue. The Administration is focusing on quotas that will restrict imports in all negotiations (White House 2018). The EU expressed its disappointment with the exemption only being prolonged and not permanent in its press release. The release pointed out that the EU is not responsible for overcapacity in the steel market and expressed its willingness to negotiate but not under threat (European Commission 2018).

2.2 Similar Cases
Similar protective actions were carried out in 2002 by President George W. Bush who announced the unilateral imposition of a combination of up to 30 percent tariffs and some tariff quotas on steel as emergency safeguard measures. Different from the now ongoing Trump case, the margin of protection by Bush were set to be reduced annually over the three-year span of which the measures were going to be imposed (Read, 2005, 1120-1121). The underlying reasons for those actions where a combination of a declining international competitiveness of the US steel industry since the 1970s, a substantial expansion of low-cost steel production in many industrializing countries such as China and Korea resulting in an over-capacity and increasing import penetration, an appreciation of the dollar leading to cheaper imports and a promise by Bush in his election campaign to help the steel industries in Ohio and West Virginia. There were exclusions made for the countries with whom the US had free trading agreements, that being the members of NAFTA together with Israel, Jordan, Australia and South Korea and with “generous” tariff quotas for Russia and Brazil. The main countries affected by these tariffs were China, Japan and the EU (Read, 2005, 1122-1127). This was met shortly after with complaints by the EU, Japan, China, Korea, Switzerland and Norway to the WTO on the grounds that the US measures broke its obligations under several Articles of the GATT 1994 and the Agreement on Safeguards. The EU answered by setting their own steel safeguards in March 2002 which were planned to last as long as those of the US as a legitimate response to the surge in its steel imports (Read, 2005, 1131-1132). The EU also argued that it was entitled
to compensation of around €2.4 billion per annum for the lost value of trade concessions and decided on retaliatory measures against US products produced in key marginal states in the 2004 US Presidential Election. In December 2003 it was announced that the US steel safeguards were to be removed on the grounds that it had been successful in improving the domestic situation but that its cost now outweighed its benefits. By the decision to remove the tariffs the US avoided a major potential trade war and the possible electoral consequences of the EU retaliation (Read, 2005, 1132-1133).

This case with Bush was however not the first-time that measures were used to protect steel. Between 1985 and 1989 most of the steel exporting countries to the US were included in steel restraints which included finished and semi-finished steel quotas (Crandall 187, 274). Between 1978 and 1982, trigger prices were used to protect American steel. The prices were set to be the projected cost of Japanese production plus the cost of importation. The trigger prices were enacted between 1978 and 1980, and then occasionally between 1981 and 1982. The trigger prices were implemented as the US dollar was depreciating which decreased the effect on the domestic price in the early years, American producer prices increase approximately 1 percent in 1979. When the US dollar appreciated in 1980, American producers got the trigger prices reinstated, but eventually the trigger price system was terminated. This back and forth caused nervousness among steel exporters and in 1982 European producers consented to limit their exports to the US (Crandall 1987, 273-274). Between 1969 and 1974, steel exports were limited to the US and quotas were negotiated with Japanese and European producers. According to Crandall, the limitations on exports were only binding between 1971 and 1972, which caused US steel prices to increase between 1.2 to 3.5 percent in those years (Crandall 1987, 273).

3. World Trade Organization

United States is part of the World Trade Organization, WTO, which is an organization supporting free trade and creating a forum for negotiating trade agreements and resolving trade disputes between its 164-member countries (World Trade Organization, 2018f). The main negotiation under which the WTO works is the Uruguay Round (1986-1994) together with earlier negotiations under the GATT, or formally General Agreement on Tariffs and Trade (World Trade Organization, 2018d). In 1995, the WTO replaced GATT which was established in 1948 as a way to boost trade liberalization after the ending of the second world war (World Trade Organization, 2018c).
The WTO is governed by its member countries and all important decisions are made by the members. The ever-changing agreements of the WTO include goods, services and intellectual property and the agreements explains the concept of free trade and its allowed exceptions. The agreements require member governments to inform the WTO of their laws and measures concerning trade and the WTO makes sure that the requirements are fulfilled and that the agreements are implemented. The member countries undergo regular inspections of their trade practices and policies (World Trade Organization, 2018e).

One of the result of the Uruguay Round was the countries’ commitment to reduce and bind tariffs on goods. A bound tariff means that it is committed in the WTO and it is difficult to increase. To increase a tariff beyond the bound rate requires negotiation with affected and concerned countries and it could entail compensation for the affected countries’ loss of trade (World Trade Organization, 2018g).

An important principle known as the most-favored-nation (MFN) treatment states that countries under the WTO agreements cannot normally discriminate between their trading partners but have to treat every country the same. If a country for example lowers a trade barrier or open up a market it must treat all goods and services from all trading partners equally no matter how rich, poor, weak or strong a country is. The MFN rule being a part of the WTO system is constructed to secure open, fair and undistorted competition and therefore it sometimes does allow for tariffs and other forms of protection in limited circumstances (World Trade Organization, 2018a). One of these allowed exceptions is safeguard measures (World Trade Organization, 2018b).

Safeguard measures are defined as temporary restrictions of imports of a good for which domestic industry is injured or threatened with injury from a surge in imports and the injury is considered serious. An import surge that would justify safeguard actions by the WTO could be a real increase in imports which would mean an absolute increase. Another justifiable reason is if there is an increase in the imports share of a shrinking market, although the quantity imported has not increased, which would mean a relative increase. If there is a request for safeguard actions by an industry or a company in a country, the WTO agreement has requirements that an investigation must be performed by the national authorities. This investigation should consider transparency and that the following established rules and practices do not enable arbitrary
methods. The investigators should announce publicly when the hearings are being held making it possible for interested parties to present evidence including arguments on whether the measure is in the public interest. If a safeguard measure is being imposed, it should only be applied to the extent necessary to prevent or remedy the serious injury to the concerned industry and help it to adjust. The imposed measure should not last longer than four years unless there is evidence that it is still needed and then can be extended up to eight years, although safeguard measures implemented for more than one year must be progressively liberalized.

One of the foundations of the global trading system is dispute settlement and the WTO contributes to world trade and economic stability since it enforces the rules. For dispute settlements, the basis of the WTO system and procedure are the rule of law through clearly defined rules with timetables and possibility for appeals. The goal of the WTO is not to reach judgment, instead the organization wants disputes to be settled through consultations. A dispute settlement should normally take a total of 12 months to run its full course to a first ruling and a total of 15 months if appealed, as speedy settlements are crucial for WTO’s ability to operate effectively. However, the timetable is flexible and if a case is considered pressing, for example involving perishable goods, the process is accelerated. A newly founded agreement removed the possibility for a losing country to block the ruling of the case, a ruling can only be blocked if there is a consensus to reject it among all WTO members (World Trade Organization, 2018h).

As mentioned, disputes are settled by the WTO and hence its members have agreed to use its multilateral system instead of taking unilateral actions when disputes arise among the members. Disputes occur when a WTO country enforces policy measures or act in a way that other WTO countries deem to be in disagreement with the WTO agreements, or when a country does not live up to its commitments (World Trade Organization, 2018h). If the country which is being accused of breaking WTO agreements loses, it must follow the verdict. The country is given an appropriate timetable for complying with the order. If the country fails to do so within the time period, it has to negotiate with the complaining country or countries to decide on a compensation that is acceptable for all, for example a reduction of tariffs. If no acceptable compensation can be reached in a timely matter, the complaining countries can request authorization to retaliate. The retaliation is intended to be short-term, as an incentive for the other country to comply with the verdict (World Trade Organization, 2018h).
For a country that imposes restrictions on their imports to help its domestic producers must in principle give something in return for these safeguards and the exporting country or countries can try to get compensation through consultation. However, as mentioned, if no agreement is reached the exporting country can retaliate by taking similar actions, for example raising tariffs on the country imposing the safeguards. These retaliations might though have to wait for three years after the implementation of the safeguards in some circumstances (World Trade Organization, 2018b).

4. Method
Our method consists of literature studies which are complemented with a regression analysis with an empirical model. The literature study is focusing on trade theory, the World Trade Organization and similar cases from earlier periods in the US. We have mainly used scientific articles, economic textbooks, relevant organizations’ websites and news articles. The regression analysis is based on historical data on the United States’ production factors and trade conditions from 1928-2010 and it examines whether dutiable imports of consumption has a positive or negative effect on its GDP.

An alternative method to analyze this situation would have been to use data on the 2018 tariffs. This would have shown the actual effect of the tariffs in question. However, since this study was performed as these tariffs were implemented, there were no such data available. An analysis like this is therefore a suggestion for future studies.

5. Theory

5.1 Basic Trade Theory
The incentive to trade is explained by the differences in market prices and costs of self-sufficiency between countries due to international differences in supply and demand. The theories of international trade and production specialization mainly consider the differences in supply. The trade patterns are mainly explained by international differences in production costs, such as availability and costs of production factors, differences in production technology and efficiency, as well as comparative costs (Lundberg, 1995, 37). In other words, since countries are different from each other they will benefit from doing what they do relatively well. If each country can focus their production on this good or service, they are able to produce it in a larger
scale and be more efficient than they would have been trying to produce everything (Krugman and Obstfeld 2009, 27).

The proponents of free trade tend to emphasize the profits of international specialization and division of labor in terms of better resource utilization and higher real incomes for the society as a whole. The proponents of protectionism, or other import limiting interventions, tend to point out the beneficial effects on employment and income in individual industries, the need to particularly support certain industries and the risk of being too dependent on other countries (Lundberg, 1995, 123).

5.2 Absolute and Comparative Advantage

The idea of absolute advantages origins from Adam Smith who in his book *The Wealth of Nations Book 4* from 1776 stated that “If a foreign country can supply us with a commodity cheaper than we ourselves can make it, better buy it of them with some part of the produce of our own industry employed in a way which we have some advantage” (Smith, 2000, 595). This implies that a country has absolute advantages if it can produce a unit of good with less labor than any other country can produce the same good (Krugman and Obstfeld 2009, 32). A question that might arise from this view though is “what if a country does not have anything that it produces more efficiently than any other country, does that mean it cannot export?” This “problem” points to the reason why the pattern of trade cannot be determined by absolute advantages alone. This view was therefore developed later on to show that a country having an absolute advantage in productivity of a good is neither a necessary nor a sufficient condition for a country to have a comparative advantage in that good (Krugman and Obstfeld 2009, 32, 40).

The concept of comparative advantages was first developed by the economist David Ricardo in his book *The Principles of Political Economy and Taxation* from 1817 (Krugman and Obstfeld 2009, 29). In his book, Ricardo gives a simple example of comparative advantages; two men are both making shoes and hats, one of them are better than the other in producing both goods. The superior one is 20 percent better in producing hats, and 33 percent better in producing shoes. Therefore, it is in the interest of both men that the superior man only produces shoes while the inferior man produces hats (Ricardo 2001, 128) This idea of comparative advantages is based on the differences in opportunity costs and the possibility for rearrangements of the world production to reach a more beneficial and increased worldwide production as well as
higher standard of livings. The opportunity cost for a country producing a good that it has comparative advantages in producing is, in terms of other goods, lower in that country than it is in other countries (Krugman and Obstfeld 2009, 28, 29).

The comparative advantages in the Ricardian model focuses on labor as the only production factor and that production of different products would arise due to differences in the labor productivity. However, this view excludes that differences in countries resources also could be an explanation for trade. The Ricardian model was therefore further developed by economists Eli Heckscher and Bertil Ohlin who constructed the Heckscher-Ohlin theory, also referred to as the factor-proportions theory (Krugman and Obstfeld 2009, 54). The Heckscher-Ohlin theory says that a country will specialize its production and export on a good which production requires relatively much of the production factors that the country has plenty of and will import the goods which are intensive in the use of the country’s scarce factors (Lundberg, 1995, 54).

As an example of the Heckscher-Ohlin theory with two countries: country A having more capital relative to country B which has more labor relative country A, are both producing the two goods Y and X. Good Y has a more capital-intensive production and good X a more labor-intensive production, country A is therefore considered to have a comparative advantage in the production of good Y and country B a comparative advantage in the production of good X. This will result in the price of good X being higher than good Y in country A and the price of good Y being higher than good X in country B. In the Heckscher-Ohlin model, if trade occurs between the two countries both will gain due to the price differences which can create profit opportunities for both producers as well as consumers. The country with the higher level of capital will then export the capital intensive good to the other country which in turn will export the labor intensive good due to its own higher level of labor. This will increase the production of the good for which each country is having a comparative advantage in the production (Suranovic 2012, 180).
Figure 1: Heckscher-Ohlin (Suranovic 2012, 222).

Without trade, country A is producing good Y and X at point $A_a$. After trade country A will shift its production to point $Q_a$, where it is producing more of the good Y for which it has a comparative advantage. Country B will start with producing at point $A_b$ when there is no trade and will shift its production to point $Q_b$ when trade is introduced, producing more of good X in which it has a comparative advantage. When there is trade between the two, Country A will consume at point $C_a$ and Country B at point $C_b$. The countries indifference curves under free trade, $I_a^{FT}$ and $I_b^{FT}$ are hence higher than the indifference curves under autarky, $I_a^{AUT}$ and $I_b^{AUT}$. The Heckscher-Ohlin model shows that trade is beneficial for both countries increasing the production efficiency as well as the consumption efficiency which can lead to an increase in the welfare for both countries (Suranovic 2012, 219, 222).

The theory of comparative advantage was even furthered developed by Paul Krugman who published “Intraindustry Specialization and the Gains from Trade” in 1981 where he writes about interindustry and intraindustry trade and their different applications. Interindustry specialization reflects the standard of comparative advantage, while intraindustry specialization reflects economies of scale and consumers’ demand for different products (Krugman 1981, 959) and not comparative advantage. Countries will produce goods that are differentiated when they have the same production factors and customers’ demand will generate intraindustry trade. The scale economies prevent the countries from producing the full range of goods itself, and intraindustry trade is therefore its own cause of global trade (Krugman and Obstfeld 2009, 131). One of Krugman’s finding is that the type of trade depends on countries similarities in their production factors. The more similar the countries are, the more the trade will be intraindustrial.
(Krugman 1981, 959), and the more they differ, the more the trade will be interindustrial, Heckscher-Ohlin trade (Krugman 1981, 964).

5.3 Tariffs

Economic politics can affect trade and production in individual industries in different ways. Trade policy actions such as tariffs and import quotas are directed towards trade, usually imports, while industrial policy actions such as subsidies and taxes are directed towards the production of an individual industry (Lundberg, 1995, 102-108). In this paper, we will focus on tariffs and quotas.

![Figure 2: World Market Equilibrium (Lundberg 1995, 103)](image)

On the market for a good produced and consumed in two countries the equilibrium price is decided on the world market from the condition that the export supply ($ES_B$) and the import demand ($ID_A$) should meet, in figure 2 it is in point E which creates the equilibrium price $P_0$. This condition also decides the production and consumption in the two countries and their trade of the good between each other. In point A, no import is needed and therefore corresponds with point C on the world market. Point B reflects that country B does not have any goods to export as all of it is being consumed on the domestic market, which corresponds to point D on the world market (Lundberg, 1995, 102-104).
If the country that implements the tariff is relatively small in relation to the world market, the price of the imported good can be considered as given, it is still the world market price, as the country’s variation in import demand cannot affect the world market price (Lundberg, 1995, 104). The domestic price of the import will now be the world market price of the good plus the tariff. As seen in figure 3, when a small country implements a tariff the world price is unaffected but the price on the domestic market rises from $P_0$ to $P_A$ and the quantity imported is reduced from $Q_0 - C_0$ to $Q_1 - C_1$ (Krugman and Obstfeld 2009, 186).

Figure 3: A tariff in a small country (Krugman and Obstfeld 2009, 186).

Figure 4: Welfare effect on a small country (Krugman and Obstfeld 2009, 190).
The welfare effect of a tariff for a small country is seen in figure 4. As the price on the domestic market rises from $P_0$ to $P_A$, the consumer surplus reduces with the area $P_0PADB$ while producer surplus increases with the area $P_0PACA$. The area CDFE are the government’s revenue of the tariff. The net effect of the tariff are the two grey triangles which represent the efficiency loss. The larger the tariff, the bigger the efficiency loss (Krugman and Obstfeld 2009, 190-192).

### 5.3.1 Optimal Tariff

Free trade can benefit the world overall (Scitovszky 1942, 89) and economist often argue that national welfare is reduced when one diverges from free trade. However, there is some theoretical arguments implying that deviation from free trade can occasionally increase a nation’s welfare. This is where the theory of the optimal tariff becomes relevant (Krugman and Obstfeld 2009, 217-218).

A country that is sufficiently large can affect the world market price, and thereby foreign exporters’ prices, which can generate a terms of trade benefit by the tariff’s ability to lower the price of imports. Terms of trade is defined by Krugman and Obstfeld as the price of a country’s exports divided by the price of the country’s imports (2009, 89). There is a cost-benefit analysis, where the benefit of the improved terms of trade must be weighed against the cost of the tariff, namely the distortion of production and consumption incentives. The benefits might outweigh the costs which creates an argument for a tariff on a good; there is an optimal tariff where the marginal gain from the improved terms of trade is equal to the marginal efficiency loss from distortion of consumption and production, and national welfare is maximized (Krugman and Obstfeld 2009, 218). However, this argument has some key limitations. For small countries, the argument has no relevance as they cannot affect world prices individually as shown in figure 3. For large countries, the argument becomes a reason to use its advantage to benefit on other countries expense, which would likely lead to retaliation from other countries. According to Krugman and Obstfeld, the argument for optimal tariff is more theoretical than practical useful and it is rarely used by governments as a reason for trade policy (2009, 218-219).
Figure 5: Optimal tariff (Lundberg 1995, 103)

Figure 5 shows a simplified version by Lundberg of how the optimal tariff theory works when the actions only applies on one or a few goods and other effects on the economy can be disregarded. One good is being produced and consumed in two countries, A and B, and there is no difference between the good in the countries. $D_A$ and $D_B$ are the demand curves and $S_A$ and $S_B$ are the supply curves in each country. $ID_A$ is the import demand-curve for country A and $ES_B$ is the export supply-curve for country B. $P_0$ is the equilibrium price, which is decided on the world market where import demand and export supply correspond. Production and consumption in both countries, as well as the size of the trade, are decided on the world market (Lundberg, 1995, 102-104). In country A, the imported good will have the same price as the domestically produced good and assuming there are no transport costs and tariffs, the market price in country A will be the same as in country B. Assume now that the importing country (A) enacts an ad valorem tariff of size $t$ percent on the good. After the tariff has been introduced, the imported good will cost the same, including the tariff, as the domestically produced good. However, the market price in A and B will differ with the size of the tariff (Lundberg, 1995, 102-104). The price that the importer in country A now pays is equal to the price the exporter in B gets, plus the tariff. A new export supply-curve is created, $ES_B(t)$, by pushing $ES_B$ upwards with $(t)$. The new equilibrium is where $ES_B(t)$ and $ID_A$ intersect and it shows the price, including the tariff, where export supply and import demand corresponds on the world market again. In figure 5, the effects of the tariffs on the world market price, production, consumption and trade are visible. In country A, the market price, including the tariff, increases from $P_0$ to $P_A$ which generates increased domestic production from $Q_0$ to $Q_1$ while consumption decreases...
from $C_0$ to $C_1$ resulting in decreased trade (from $E_0$ to $E_1$). The producers’ revenue increases (from $P_0Q_0$ to $P_AQ_1$), the import price, excluding the tariff, falls from $P_0$ to $P_B$ and the value of the import decreases (from $P_0E_0$ to $P_BE_1$) since both the price and trade is lower. For country A, the government’s revenue increases with the tariff ($E_it$). For country B, the effects of the tariffs are decreased export price (from $P_0$ to $P_B$), which causes production, export and producer revenue all to decrease while consumption increases (Lundberg, 1995, 102-104).

Figure 6: Optimal tariff and welfare for importing country (Krugman and Obstfeld 2009, 248).

Krugman and Obstfeld state in their textbook that a big country always improves their terms of trade with a tariff, but the tariff also causes production and consumption distortions. However, if the tariff is of the right size, it can create bigger gains than losses and the terms of trade benefits would then outweigh the losses from the distortion (2009, 247). This is shown in figure 6 for country A (from figure 5) where $Q_0$ and $C_0$ are the levels of production and consumption before the tariff and $Q_1$ and $C_1$ are the levels after the tariff. The tariff increases the domestic price to $P_A$ and lowers the world price to $P_B$. $P_0$ is what the price would have been with no tariff. Consumer surplus reduces with the area of $P_0PA\, DB$, while producer surplus increases with the area $P_0PA\, CA$. Country A also receives area $CDFE$ as tariff revenues. The net benefit is therefore the striped rectangle minus the two grey triangles. In this figure, the gain is bigger than the loss; the net benefit is positive (Krugman and Obstfeld 2009, 248-249).
The welfare for the exporting country from figure 5 is shown in figure 7. As the world market price decreases from $P_0$ to $P_B$, the consumer surplus increases with the area of $P_BP_0AC$ while producer surplus decreases with the area $P_BP_0BD$. The net loss is therefore the striped area ABDC.

In summary, according to the theory and the size of the tariff, the importing country (Country A here) increases its welfare through an optimal tariff while it creates a net loss in welfare for the exporting country (Country B). This assuming there is no retaliation to the original tariff from Country A.

5.4 Quotas
Import quotas means a restriction of import quantity and it is usually enforced through a license system where individuals or firms are exposed to a maximum quantity of which they can import a good. Usually, exporting governments are given the right to sell on the domestic market (Krugman and Obstfeld 2009, 195).

An import quota always increases the domestic price of the imported good. As imports are limited, the instant result is that the demand for the good exceeds the domestic and import supply at the initial price. The price will then increase until demand and all supply are equal. The government does not get a given revenue with a quota, as it does with a tariff, instead the money which would have been government revenue will go to the one who has the license to
import. The license holders will be able to buy imports at a lower price than the price at which they will sell on the domestic market, and the profits are called quota rents. If the right to sell on the domestic market goes to the exporting government, the quota rents goes to them and the cost of a quota is then much higher compared to a tariff that limits import to the same level (Krugman and Obstfeld 2009, 195).

Figure 8: Effects of a quota in a small country (Krugman and Obstfeld 2009, 196).

In figure 8, the effects of a quota in a small country is seen. As import is restricted from $Q_0 - C_0$ to $Q_1 - C_1$ by import quotas, the domestic price increases from $P_0$ to $P_A$. This decreases consumer surplus with area $P_0P_ADB$ and producer surplus increases with the area $P_0P_ACA$. For a tariff, the striped area CDFE would have been government revenue and cancelled some of the consumer surplus decrease, but with a quota it is instead the quota rents, which can be collected by firms, the domestic government or foreign exporting governments (Krugman and Obstfeld 2009, 196).

5.4.1 Quota Large Country

When a large country imposes a quota, it will have some of the same effects as if it imposes a tariff, mainly that the export price decreases (Suranovic 2012, 347). An import quota instituted by a large country will increase the domestic price and reduce the export price. This creates an opening for those who have license to purchase or produce the good at the lower export price and resell it at the higher domestic price (Suranovic 2012, 350).
Figure 9: Large country quota (Suranovic 2012, 352)

The same example for the optimal tariff is here used for quotas, with country A and B where country A is large and $P_0$ is the equilibrium world price if there is free trade. If country A imposes quota restriction, represented by the bold line, the domestic price will increase until the demand for import is equal to the bold line at price $P_A$. In country B, the price will fall until the supply of exports are equal to the bold line at price $P_B$. In country A, the quota will lead to an increase in production and a decrease in consumption. In country B, consumption increases while production decreases (Suranovic 2012, 352-353). For country A, consumer surplus decreases by the areas ABCD while producer surplus increases with the area A. For country B, the producer surplus decreases by the areas FGHI and consumer surplus increases with F. The quota rents are the areas CE which will go to whoever has the license to sell the good and can be received by the country A’s government, domestic individuals or firms, foreign individuals or firms, or country B’s government. For both countries, the net effects consist of three elements: production distortions (area B for country A, area I for country B), consumption distortion (area D for country A, area G for country B) and effect on terms of trade (area E for country A, area H for country B) (Suranovic 2012, 352-355).
Figure 10: Welfare effects on a large country enforcing quotas (Suranovic 2012, 352).

Hence, the large country (A) can reach a positive welfare effect if it gains the quota rents, and if the positive effect of the rents exceeds the negative distortions on production and consumption (Suranovic 2012, 352-355). That would be if the black striped area is larger than the two grey triangles. Since one country in this two-country example will receive a positive terms of trade effect while the other will receive a negative effect, the net world welfare effect will be the two countries’ producer and consumer distortions ($B + I + D + G$), which will be negative (Suranovic 2012, 353, 355).

5.5 Trade War

The ability for large countries to affect the world market price is not without risk and the possibility to trigger a trade war could be one. John A. C. Conybeare defines a trade war as “a category of intense international conflict where states interact, bargain, and retaliate primarily over economic objectives directly related to the traded goods or service sectors of their economies, and where the means used are restrictions on the free flow of goods or services” (1987, 3). Conybeare continues to explain that trade wars are, different from what the definition might suggest, not only economic means used for economic ends but can be political attempts to influence the behavior of others (1987, 3). A trade war is distinguished from lesser degrees of trade conflicts and more normal and routine forms of disagreements by its high level of conflict in terms of intensity and duration. Intensity is referring to the extent of which the conflict reaches the highest or executive levels and does not stay at the bureaucratic level of
government. Duration is referred to interaction and it means that at least one round of retaliation by the actor that did not initiate the conflict is necessary for a trade war to exist (Conybeare 1987, 5-6). An example of intensity is when an industry’s demand for tariff protection reaches the executive level of government. An example of duration is when there is a retaliation from a country affected by an antidumping duty. Trade wars are usually the result of trade conflicts where the intensity gradually increases, and the degree of interactive retaliation escalates (Conybeare 1987, 6).

Harry G Johnson (1965) shows how to predict gains and losses from a tariff war from relative price elasticities of demand and supply for traded goods. Conybeare presents Johnson’s findings as “a country’s gain is a positive function of its own price elasticity of demand for imports, relative to the other country, and a negative function of its price elasticity of supply of import, relative to the other country” (Conybeare 1987, 24). If this would hold, it would imply that a country might gain from imposing an optimal tariff even if it would lead to retaliation. The general criterion for this to hold is relative national income. It is much more likely that a large country facing a small country will improve its income with an optimal tariff, even if the small country retaliates (Conybeare 1987, 24).

Price elasticity shows how the demand or supply of a good changes as the price of the good changes (see for example Axelsson, chapter 5.2). From Harry G Johnson then, a country will gain from a trade war if its price elasticity of demand for a good exposed to a tariff is elastic, meaning that it can substitute its demand to another good due to the price increase in the first good. On the other hand, a country will lose from a trade war if its price elasticity of supply for the good exposed to the tariff is inelastic, meaning that it cannot substitute its supply to another good due to the price increase of the first good (Conybeare 1987, 24).

6. Empirical Application
To complement the literature study, we have chosen to do a regression analysis based on historical data on the United States’ production factors and trade conditions examining whether dutiable imports of consumption has a positive or negative effect on its GDP.
6.1 Data

The regression is based on time series data which stretches from 1928 to 2010. The data is retrieved from governmental websites such as the United States Census Bureau, the Department of Education, U. S. International Trade Commission, the Bureau of Economic Analysis, and the U.S. Bureau of Labor Statistics.

6.2 Variables

Table 1: Explanation of the variables included in the empirical model.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Variable Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>Annual GDP</td>
</tr>
<tr>
<td>Labor</td>
<td>Annual number of people employed in the US</td>
</tr>
<tr>
<td>Capital</td>
<td>Industrial equipment</td>
</tr>
<tr>
<td>Human Capital</td>
<td>Number of awarded bachelor’s degrees as a percentage of the population 25 years and older</td>
</tr>
<tr>
<td>Tariffs</td>
<td>Dutiable percentage of total imports for consumption in customs value</td>
</tr>
<tr>
<td>WWII</td>
<td>Dummy variable for WWII, years 1941-1945</td>
</tr>
<tr>
<td>Korea</td>
<td>Dummy variable for the Korean war, years 1950-1953</td>
</tr>
<tr>
<td>Terror</td>
<td>Dummy variable for the War Against Terror, years 2001-2010</td>
</tr>
</tbody>
</table>

As our dependent variable we use annual GDP in the US since it is a measure of how well the economy is working. Our constant term will represent technology and for labor we use the annual number of people employed in the US. For human capital we use the number of awarded bachelor’s degrees as a percentage of the population 25 years and older. The effect of tariffs on this production function is shown by the dutiable percentage of total imports for consumption in customs value.

For the variable capital we found several different measures that can be used to represent the US capital stock, as capital can be a difficult variable to calculate. We choose the measure industrial equipment, such as machinery, because it has the highest correlation to all the other measures we have found. Human capital is another problematic variable to evaluate but we choose to use a measure of education as an indication of human capital. Finding a variable for tariffs from as early as 1930 also has its difficulties. We use the dutiable percentage of total
imports for consumption in customs value to represent a measurement of tariffs in this paper, however there might be other measurements that capture this effect better.

We choose to lag the variable for human capital with two years since we assume that they will not affect GDP directly. This variable is edited since the even years between 1930 and 1948 did not have data, for those years we use the weighted average of the year before and after.

6.3 Empirical Model

To examine whether tariffs have a positive or negative effect on the United States’ GDP we have chosen the production function

\[ Y = A(t) \times K^{a_1}(t) \times L^{a_2}(t) \times H^{a_3}(t) + \lambda \times T(t) \]

where:
Y = Output, A = Technology, K = Capital, L = Labor, H = Human capital and T = Dutiable percentage of total imports for consumption in customs value. To facilitate the reading, we will exclude the time notation (t) from now on and assume it for all variables.

Three dummy-variables were added to control for World War II, The Korean War and The War on Terror. This since we assume that these conflicts had an effect on GDP differing it from what would have been considered as normal otherwise (Institute for economics and peace, 2011). Excluding them might therefore give a misleading result. \( D_1 = 1 \) for World War II, \( D_2 = 1 \) for the Korean war and \( D_3 = 1 \) for the War on Terror. \( D_i = 0 \) if no war.

\[ Y = A \times K^{a_1} \times L^{a_2} \times H^{a_3} + \lambda \times T + \beta_1 \times D_1 + \beta_2 \times D_2 + \beta_3 \times D_3 \]

The reason for the chosen model is that we believe that without any of the variables A, K, L and H there will be no production and that these variables therefore should be multiplied with each other. The variable for the dutiable percentage of total imports for consumption in customs value is however added to the function since we believe that the US will have some level of production no matter the level of this.

We logged the function, except for the dummy variables, to make it additive and possible to express changes in percent. We will focus on the variable T in the results.
\( \ln Y = \ln A + \alpha_1 \times \ln K + \alpha_2 \times \ln L + \alpha_3 \times \ln H + \lambda \times \ln T + \beta_1 \times D_1 + \beta_2 \times D_2 + \beta_3 \times D_3 \)

**7. Results**

We have divided the results into two sections. In the first one we analyze the situation based on the theories and in the other section we interpret the regression analysis.

**7.1 Results: Theory**

Our question about the consequences and effects of the imposed tariffs and whether they will have a positive or negative effect on the US can now be interpreted from our data on the US being the largest steel importer in the world. Due to this volume of imports we will begin by consider the US as a large country having the ability to affect the world market price of steel by imposing tariffs. Furthermore, we assume the tariffs suggested by the national authority as being optimal having the effect of increasing the production of the domestic steel industry according to the optimal tariff theory, resulting in a positive net welfare effect. However, since the decision to exempt certain countries from the tariffs, the effect of the US tariffs might no longer be considered as having as large effect on the world market price of steel as it only affects a smaller part of their total imports. This since the exemption included five of the ten largest countries from which the US import steel, representing 54% of all its steel imports. Therefore, the use of the optimal tariff theory is no longer as certain and instead might be replaced by the theory of a small country-tariff which then would conclude that there will be no positive net welfare effects of the tariff, see figure 4 in the theory chapter.

If the effect of the imposed tariffs results is an increase in the domestic price, as according to the small country tariff theory, it will have a negative effect on US industries depending on steel in their production as well as the consumers within the country which both are facing higher prices. The US steel producers will on the other hand experience a positive effect due to the higher prices and the decrease in imports from the countries affected by the tariffs. How the cost of the tariffs will be divided depends on the elasticities. However, the US net benefit will now be negative.

As the US is trying to negotiate quotas with the exempt countries and has successfully done so with South Korea, the theory of quotas for a large country can become applicable. The negotiated quotas might lead to similar effects as the tariffs with increased domestic prices and
decreased export price. If the quota rents are received domestically, it creates a positive net welfare effect for the US. If US is not characterized as a large country, the effects of the quota will be similar to a tariff by a small country with the addition of the quota rents. Even if the quota rents are received domestically, there still is a negative welfare effect. If the US negotiate quotas with all the exempt countries and it generates a positive net welfare effect, the combination of tariffs and quotas might not diminish US role as a large country. The effects of the combination of tariffs and quotas could then create a net positive welfare effect for the US.

The potential risk for a trade war to break out can be considered out of the upset that arose from the tariffs and the retaliation and the threats of retaliation that took place especially from China, since other upset countries like the EU were exempted. This shows that the tariffs might have an impact on the world steel market and can be an indication that the US have some market power enabling them to affect the world market price of steel. The exporting countries will then receive a net loss and the risk of retaliation and hence the risk of a trade war is increased. If a country like US is large and can affect the world market price through an optimal tariff, retaliation must be included in the calculations. The theory states that one might still benefit if a small country retaliates but if a country like China, a large trading partner to the US, retaliates there is less chance that US will benefit from imposing an optimal tariff. The retaliation from China with tariffs on 3 billion dollars’ worth of US exports fulfills the criteria of duration necessary for a trade war and the benefits of a tariff, even if it is optimal, decreases. The cost of the tariff therefor runs the risk of being larger than the benefits if a trade war ensues.

By its actions it might be seen as if the US broke the WTO agreement rule on safeguard measures since the tariffs were imposed without any time limit and with no planned progressive liberalization. The exemption of some countries might also be viewed as a violation against the principle of the most-favored-nation treatment. The US also violated WTO rules when they increased tariffs without negotiating with affected and concerned countries. China’s retaliation was also not in accordance to WTO rules on the dispute settlement as they acted unilateral.
### 7.2 Results: Regression analysis

*Table 2: Result of regression analysis*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std Error</th>
<th>Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln(Labor)</td>
<td>3.866***</td>
<td>0.256</td>
<td>3.356</td>
</tr>
<tr>
<td>ln(Human Capital)</td>
<td>0.0861</td>
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<td>ln(Capital)</td>
<td>-0.0330</td>
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<td>-0.1393</td>
</tr>
<tr>
<td>ln(Tariffs)</td>
<td>0.1622**</td>
<td>0.0716</td>
<td>0.0196</td>
</tr>
<tr>
<td>WWII</td>
<td>0.0019</td>
<td>0.0443</td>
<td>-0.0864</td>
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<tr>
<td>Korea</td>
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<tr>
<td>Terror</td>
<td>0.1501***</td>
<td>0.0517</td>
<td>0.0471</td>
</tr>
</tbody>
</table>

Adj. R-squared = 0.9977

Note: *** one percent significance level, ** five percent significance level, * ten percent significance level

For this study, we wanted to examine the effect of the variable Tariffs on GDP. The regression model in Table 1 shows that the variable tariff has a positive effect on GDP and that it is significant on a five percent significance level. This means that a one percentage increase in dutiable import for consumption increases GDP with 0.1622 percent. If this increase in the dutiable percentage of total imports for consumption in customs value is due to an increase in the number of tariffs, imposing tariffs might be considered to have a positive effect on GDP. This would then support Trump’s reasons for imposing tariffs, as it increases GDP, and it shows that tariffs do not necessarily always have to have negative effects. If this variable of dutiable imports for consumption really contains steel is not certain and therefore this result might not be able to apply specifically to the steel tariffs. However, it might be seen as a general effect of tariffs on the American GDP and its trading pattern. Also, this regression does not take into account retaliation from exporters who are faced with the tariffs and the consequences of retaliations.
An F-test shows that all coefficients in the regression analysis are jointly significant, we can therefore reject the hypothesis that all of them are equal to zero. We have a high R-square adjusted meaning that our explanatory variables are describing the dependent variable well. Our residuals seem random however there might be risk of multicollinearity which can make the coefficients less precise (Moore et al. 2010, 610). For a complete view of the regression analysis, residuals and correlation between independent variables, see appendix.

8. Concluding Remarks and Discussion

The purpose of this study is to examine the effects and consequences of tariffs and quotas based on trade theory, the potential risk of a trade war and whether the imposed steel tariffs in the US will have a positive or negative effect on the country. To answer this a literature study is performed and complemented with a regression on historical data related to the United States’ economy and its history of trade.

Earlier periods where the United States has imposed trade restricting measures, for example in the Bush case and in periods before that, has shown that actions like these have created tension and upset on the market without having done permanent wonders for its domestic steel industry as it needs rescuing again. For the US to once again try and use this way to protect its steel production is therefore an interesting decision and the results of the tariffs are to be interesting to follow.

Regardless of US being a large or a small country, the domestic prices of steel will increase with tariffs and quotas. Since steel is used in production to produce other goods, the higher price of steel might weaken the competitiveness of American producers depending on steel. The tariffs could consequently cause American domestic production to move out of the country. We therefore suggest future studies to analyze the actual effects of these tariffs at the time they were imposed as well as the following effects that might arise years after, since the regression part of this study does not use data from 2018 and hence the tariffs in question.

The effect of the tariffs and its use can be viewed as an economic and political tool for the US to reach agreements through negotiations and create new trade deals. This is something that has already been seen in the case with South Korea and the successful agreement on quotas. The
European Commission expressed in its press release regarding its exemption extension that it will not negotiate under threat. Negotiating under threat might result in positive outcomes involving some countries, but not involving others. It might lead to worsened relationship between US and its trading partners.

The breaking of the WTO rules by the US and China might cause concerns about the future of WTO. Questions might arise of whether its existence is depending on necessary changes of its system or maybe even if it will be able to continue to exist in the future. If the WTO is considered as an important part in the maintenance of world trade, it might be a desirable organization to preserve. A suggestion for a system change might be to give the WTO a penalizing power in situations where a country breaks its rules. This would increase their power further which now is limited to a legislative level and dispute settlements. The current dispute settlements also need to be done faster to avoid affected countries to retaliate on their own. When large countries like the US and China are able to bypass the WTO rules, as they have done now, this might also weaken the WTO’s credibility. This could result in other countries losing their faith in the organization. However, further possible changes of the WTO and its effects is a subject for future studies together with how the world market would look like without the WTO or a similar organization.

In summary, the effects of steel tariffs and import restriction in general can have positive effects on US welfare as seen by the optimal tariff, large country quotas and the regression analysis, but it can also create negative ripple effects such as trade wars. Much depends on the involved countries leaders and their actions as well as WTO’s power and role. Since the historical data indicates that tariffs can have a positive effect on the GDP while trade theory in general suggest otherwise, it shows that this is a difficult situation to assess. In conclusion, a careful examination of possible effects and consequences of the trade policy should therefore be performed, discussed and taken into account before any actions are taken since after all, trade wars are not always good and easy to win.
9. References


Trump, Donald J. 2018. *When a country (USA) is losing many billions of dollars on trade with virtually every country it does business with, trade wars are good, and easy to win. Example, when we are down $100 billion with a certain country and they get cute, don’t trade anymore-we win big. It’s easy!* [Twitter]. 2 Mars. https://twitter.com/realDonaldTrump/status/969525362580484098 (Accessed 2018-04-09).


10. Appendix

Table 3: Complete Regression Analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std Error</th>
<th>t</th>
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<th>t</th>
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Figure 11: Residuals

Table 4: Correlation independent variables

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