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Global Impact of a Protectionist U.S. Trade Policy

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Leibniz Institute for Economic Research
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International Economics

Global Impact of a Protectionist U.S. Trade Policy

Study on Behalf of the Bertelsmann Foundation

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Abbreviations

BTA	Border Tax Adjustment
GDP	gross domestic product
GL	Grubel Lloyd
GTAP	Global Trade Analysis Project
HS	Harmonized Commodity Description and Coding Systems
IDB	Integrated Datenbase of the World Trade Organization
ISIC	International Standard Industrial Classification of All Economic Activities
MFN	Most Favoured Nation
NAFTA	North American Free Trade Agreement
NTB	Non-Tariff Barriers
OECD	Organisation for Economic Co-operation and Development
ROW	Rest of World
SVA	Sectoral Value Added
TTIP	Transatlantic Trade and Investment Partnership
TPP	Trans-Pacific Partnership
VA	Value Added
WIOD	World Input Output Tables
WITS-TRAINS	Database: World Integrated Trade Solutions
WTO	World Trade Organization

1 Introduction

Following the global financial crisis in 2008/2009 and the resulting economic stagnation in the Post-Doha round within the World Trade Organization (WTO), leading trading nations were striving to conclude new regional trade agreements (RTA) to advance progress in global trade liberalization in individual regions. In particular, these included the Transatlantic Trade and Investment Partnership (TTIP), which aimed at improving economic relations between the EU and the US, and the transpacific trade agreement between the US and a multitude of Pacific-Pacific countries (TPP, Trans-Pacific Partnership). The core objective of these trade policies was to counter a possible increase in national protectionist policies in international trade. Until today, the aftermath of the recent financial crisis is felt in many countries in the form of higher unemployment rates and stagnation of economic growth. In this economically challenging environment, political decision-makers are confronted with the challenge to convince their voters that isolating national markets by implementing protectionist policies will not lead to sustainable solutions to their domestic economic problems. In many countries these efforts are increasingly confronted by political actors, who propagate protectionist economic policies.

With the appointment of Donald Trump as the new US president, this "Our nation's first" attitude reached new dimensions. The US has put the already very advanced negotiated trade agreements with both the EU and the trans-pacific countries on hold: TTIP and TPP are not implemented for the time being. In addition, the US has announced a renegotiation of the North American Free Trade Agreement (NAFTA).
The US administration is currently examining trade relations with all foreign countries and is evaluating whether the trade practices are "fair" from a US perspective. If trade practices by foreign countries are classified as non-competitive or unfair, the US-administration wants to restrict their access to US market. Specifically, the taxation of goods in America is to be reformed to the disadvantage of imported foreign value-added. This is to be achieved by, among other things, a so-called "Border Tax Adjustment" (BTA).

The fact that especially the United States is showing an increasingly reserved attitude towards international trade weighs particularly heavy. The US is the architect of the global rule-based multilateral trading system. In the past, the US has consistently initiated its development with the three pillars of the international economic system – the World Bank, the International Monetary Fund and the World Trade Organization. In addition, integration into the Western economic system enables especially developing and newly industrialized countries to not only evolve their economies but also to advance their national democracies and liberal values. Insofar, the consequences of a changing US trade policy are not limited to economic dimensions, but may have important political and social implications. Therefore, an in-depth analysis of possible protectionist measures by the US government, which presently, mainly communicated as possible trade policies, is of particular international interest.

The ongoing public and academic debates have not yet fully quantified the possible economic consequences of various protectionist US trade policies. Assuming market access restrictions are being imitated all over the world, a worldwide increase in trade protection is likely to take place. In the worst case, worldwide knock-on effects of protectionist measures eventually could lead to a collapse of the multilateral trading system towards all WTO members.

In view of this worrying development, this study aims to quantify the economic consequences of a US protectionist trade policy. The study focuses on trade policy scenarios, which have so far been communicated by the current US administration as potential new trade policies. In the first simulation, a partial retraction from the North American Free Trade Agreement (NAFTA) is considered. The study then illustrates possible consequences of a Border Tax Adjustment policy by increasing the price of US imports and at the same time subsidizing US exports. Finally, further protectionist measures of the US market are simulated by presuming an increase in American duties.

The study presents robust quantitative results to be expected in the case of implementation of an increasingly protectionist US trade policy. The results are intended to contribute to decision-makers' and stakeholders' ability to critically assess evolved risks of such policies.

The main findings of the study are summarized in the next section. Section 3 presents a descriptive analysis of the structure and developments in US foreign trade relations. Finally, section 5 outlines and discusses the results of three simulated protectionist US trade policies. The study ends with a political conclusion.

2 Main Findings of the Study

1. With USD 16.6 trillion, the United States of America is currently the world's largest single market, in which the US citizens attain one of the highest worldwide per capita incomes of USD 58,000. Due to its economic size, economic policy measures, in particular trade policies, have far reaching consequences on global economic developments.

2. With entry into force of the North American Free Trade Agreement (NAFTA) the two neighboring countries, Canada and Mexico, have evolved into the most important trading partners for United States. For both countries the US market constitutes their largest export market. Besides, a substantial share of US imports is attributed to Canadian and Mexican origin. Only since China became a member of the WTO in 2001 the US imports more goods from China than from its NAFTA partners.

3. Due to geographical proximity and the existence of NAFTA, Canada and Mexico are now highly integrated into the US value chains. Canada accounts for about 1.2 percent of total US value added while Mexico contributes about 0.9 percent. An above-average share of Canadian value added is found in the US automotive industry.

4. Since the ratification of the NAFTA, the US has had a significant trade deficit with its neighboring countries. With Mexico the trade deficit has steadily increased from the beginning of NAFTA until stagnating since the financial crisis 2008 at around USD 60 billion. With its other partner, Canada, a persistent US trade deficit exists, which has remained at USD 20 billion since 2009. However, the US' total trade balance with Canada (goods and services) has turned positive in 2015.

5. A development that has not been widely acknowledged in the public debate affects the US trade balance in the services sector. Here, the USA regularly has a surplus with both Canada and Mexico. In the case of Canada, for example, surpluses in services trade exceed the trade deficits in goods trade. A similar pattern is found for Mexico, but with the United States continuing to show a trade deficit in the aggregate.

6. In recent years, China has played a particularly important role in US trade relations with the rest of world. Especially after China joining the WTO 2001, US trade with China surged dramatically. The steadily growing US trade deficit with China mainly drove this development. The US import value from China now exceeds 3.5 times the value of US exports to China.

7. Over the years a persistent US trade deficit has not only existed with China. With eight out of the ten most important trading partners, the US shows a significant trade deficit. These include Japan and Germany, which export twice as much to the US as they import. Within the EU, trade relations with the USA are predominantly characterized by trade surpluses.

8. The US has reduced its tariffs both within the NAFTA and within the WTO to a relatively low level compared to the respective trading partners. Considering global tariff rates, the US can be distinguished as a very open economy due to its relatively low tariffs.

9. Examining non-tariff trade protection, however, the US proves to be an increasingly protec-

tionist country - especially in recent years. In the last two years, the number of regulatory trade barriers on the US import side have increased considerably.

10. The revocation of the North American Free Trade Agreement (NAFTA) would result in considerable economic damage to its member countries the USA, Mexico and Canada. With a declining gross household income of 1.54 percent, Canada would experience the strongest loss within the NAFTA members. Mexico would lose 0.96 percent and the US 0.22 percent of gross household income. Resulting trade diversion effcts induce an increase in US imports from non NAFTA members, mainly from China, Japan and Germany.

11. Contrary to what the US government intends, the introduction of a "Border Tax Adjustment" would lead to a fall in gross household income of 0.67 percent. Moreover, this trade policy causes a long-run decline in global trade volumes.

12. Given a unilateral implementation of protectionist policies of the US against all WTO members in the form of higher tariffs and non-tariff barriers, the NAFTA members Mexico (-2.51 percent) and Canada (-2.73 percent) would suffer severe losses in gross household income. Within the EU, Ireland and Luxembourg would be harmed strongest with declines in gross household income of 3.48 percent and 2.84 percent, respectively. EU members would consistently suffer losses through unilateral US protectionist policies. Germany's current gross household income would plunge by 0.68 percent while US gross household income were to drop by 1.30 percent due to the implementation of its own protectionist policies.

13. If the US does not comply with the WTO agreements, a global trade war with retaliation against America would be very likely. In such a scenario, the respective economic losses would be even greater. The US economy would shrink by 2.32 percent. For some countries, a trade war aimed at the US would to some extent compensate for the economic losses in the case of a unilateral US protectionist policies. For example in Germany, this would imply loosing 0.40 percent of GDP, as China's GDP would only drop by 0.34 percent.

14. All of the protectionist trade policies threatened by the current US administration would lead to negative economic consequences not only for US trading partners, but importantly these measures harm the US economy itself.

3 America's Economy and Trade

3.1 Economic Development of the US Over the Past 25 Years

With a gross domestic product (GDP) of USD 16.6 trillion, the USA is the largest single market in the world. With a real per capita income of USD 58,000 (2016), a US citizen earns the eighth-highest income in a world-wide comparison, well above the German per capita income (USD 48,000). Apart from the dot-com bubble around the turn of the century and the global economic crisis in 2008 and 2009, US economic growth fluctuated between one and 3.5 percent per year. Especially in the period of 1995 to 2000, and one year after the entry into force of the NAFTA, the USA was able to achieve record economic growth rates. Moreover, with a annual growth rate in per capita income of around two percent in the years after the economic crisis, the US recovered much faster than the EU. The population of the US reached just over 320 million in 2015.

Figure 1: Key characteristics of the US (2015)
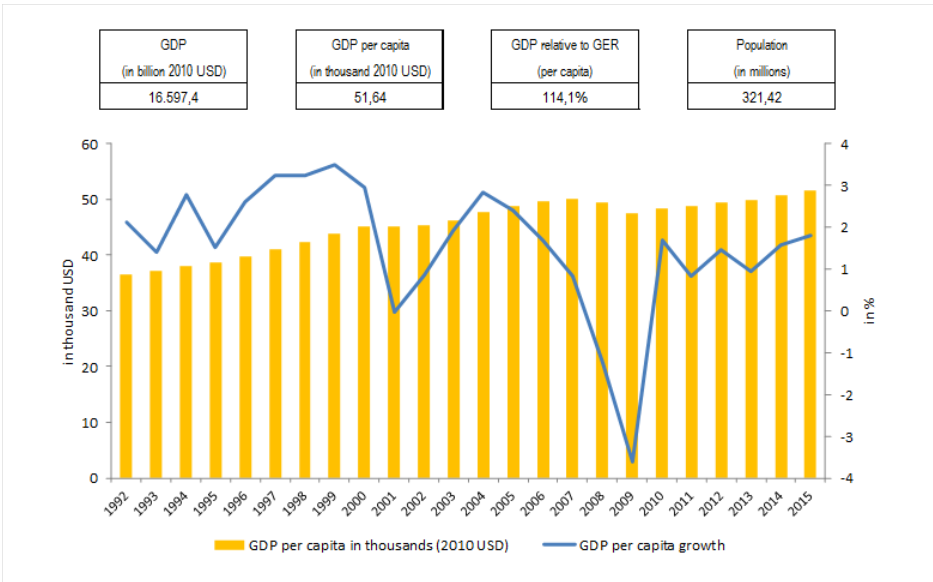
Source: World Development Indicators -World Bank

The two neighboring countries, Canada and Mexico, evolved especially since the signing of the NAFTA agreement into the most important trading partners of the United States. Canada and Mexico receive most export revenue from the US; both countries are also of equal importance for US imports. Except from China the US imports more than from Canada and Mexico. The next section describes the economic development of Canada and Mexico in more detail.

3.2 Development of US Trading Partners – Canada and Mexico

With a GDP of USD 1.79 trillion, Canada's economy is by far smaller than the US economy. Looking at the past 25 years, however, Canada shows a similar strong economic development as the US.

After the NAFTA ratification and up to the year 2000, Canada achieved relatively high income per capita growth rates. During this period, Canada was able to temporarily exceed an annual income per capita growth rate of four percent. In contrast, economic growth in the years preceeding the financial crisis in 2008/2009 was slightly slower than that of the US, ranging only from one to two percent per year. Like the US economy Canada recovered similarly fast from the global economic crisis.

Figure 2: Key characteristics of Canada (2015)
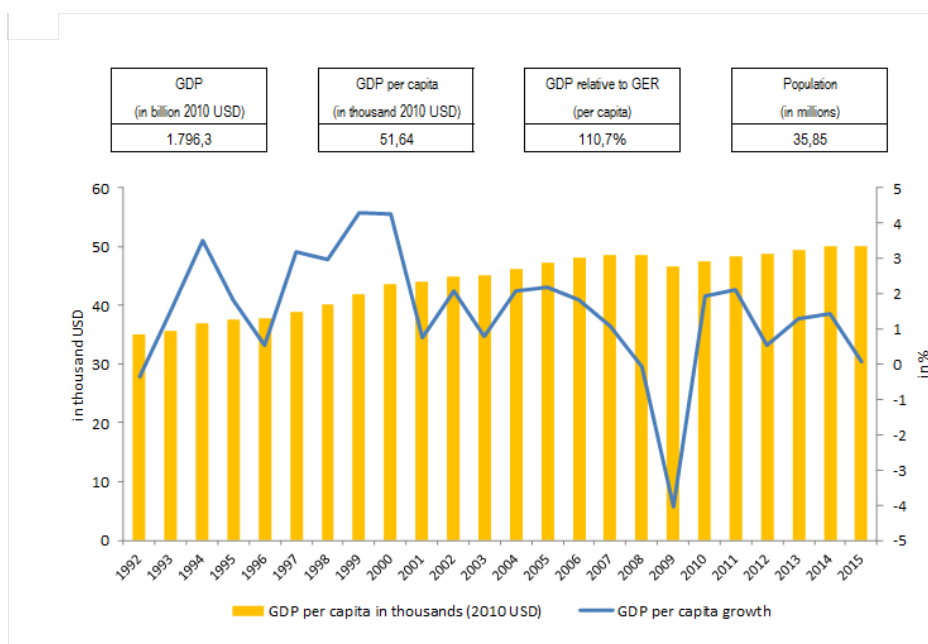
Source: World Development Indicators – World Bank

Important to note is that, according to the World Bank, Canada's economic output fell below one percent of global value added in 2015. A major cause for this development plays the low crude oil price, which fell sharply in 2014. As primary commodities and, in particular, crude oil are among Canada's main exporting goods, the drop in the price was mirrored in lower growth. In 2015, the per capita income was USD 50,110; below the US' and above Germany's. Canada has 35.85 million inhabitants and since 1990 has seen a varying population growth between 0.8 and 1.2 percent. Mexico's national value added is with USD 1.208 trillion slightly lower than Canadian value added. However, as the country has significantly more inhabitants (127 million) than Canada, per capita income is by far lower than in the USA and Canada. GDP per capita of USD 9,510 it is slightly less than one-fifth of its northern neighbors and is around 80 percent lower than Germany's GDP per capita. In 1995, Mexico experienced a severe currency crisis where its fixed exchange rate regime with the US Dollar broke down. In consequence, the Mexican Peso depreciated sharply and GDP per capita plunged by 7.5 percent. With the ratification of the NAFTA agreement, Mexico experienced a positive economic development until the year 2000. On average, the annual per capita income growth was three percent. Between the turn of the century and the outbreak of financial crisis in 2008/2009, Mexico's economy underperformed compared to the USA and Canada. The financial crisis itself also had a stronger impact on Mexico than on the remaining NAFTA partner countries, as income per capita fell by six percent. With a GDP per capita growth of 3.5 percent in 2010, Mexico succeeded in recovering the positive pre-crisis growth rates. Since then per capita income growth slowed down, while stagnating at around one percent in recent years.

Figure 3: Key characteristics of Mexico (2015)

GDP (in billion 2010 USD)	GDP per capita (in thousand 2010 USD)	GDP relative to GER (per capita)	Population (in millions)
1.208,0	9,51	21,0%	127,02
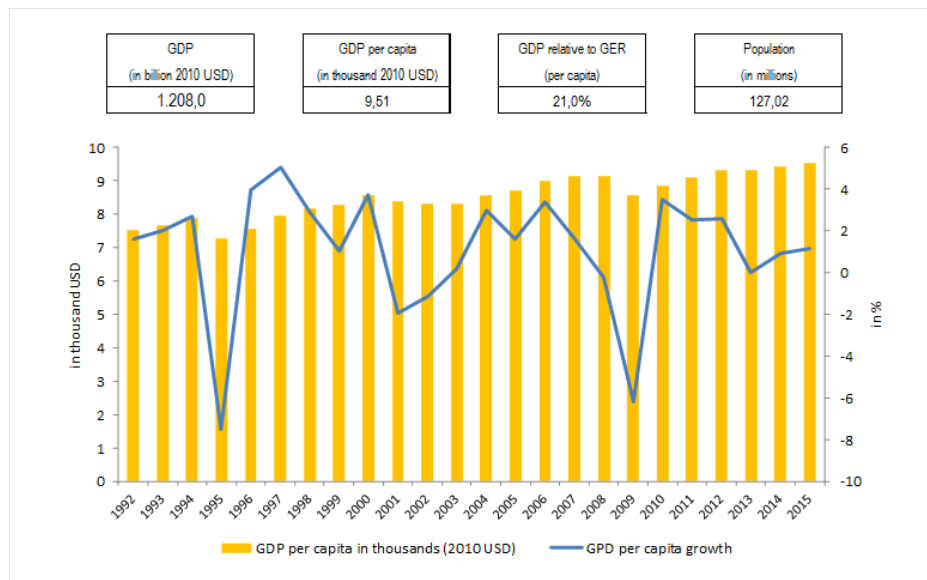
Source: World Development Indicators – World Bank

In the 1990s population grew in a range of 1.5 to 2 percent, before falling onto a lower level of 1.2 percent in 2002. A brief increase in the rate of growth until 2008 was followed by an annualy decreasing population size, reaching negative 1.3 percent in 2015.

3.3 NAFTA and Trade Development

Due to the geographical proximity of the NAFTA members and the free trade agreement per se, economic relations between the US, Canada and Mexico are highly integrated compared to outside countries. In particular, cross-border trade between the three members boomed following the ratification of free-trade agreement.

Figure 4 illustrates US trade with Mexico and Canada over the past 20 years and exemplifies the steady increase in aggregate bilateral trade volumes. Both US exports to Mexico and Canada as well as imports from both countries grew rapidly until the turn of the century. As mentioned in the previous section, the Mexican currency crisis beginning in December 1994 displays an exception. Its impact on the real economy is reflected in a slight decline in US exports to Mexico in 1995. Thereafter, the at the time relatively balanced US trade with Mexico deteriorated into a continuing trade deficit. These descriptive statistics reveal a remarkable observation that after the implementation of the NAFTA agreement neither a direct increase nor a decrease in exports or imports can be observed. There do exist serval explanations for this. Canada and the USA were already since 1989 contracting partners in a free-trade agreement. Additionally, free-trade agreements are negotiated over several year; giving rise to possible anticipation effects. In anticipation of an implemented free-trade agreement firms already increase their present cross-border activities so that steadily increasing trade volumes can be observed even before the agreement has been ratified. For NAFTA, the negotiations began three years before the entry into force in January 1994. Furthermore, the NAFTA agreement itself poses an explanation. The agreed reduction of trade duties will be successively implemented

Figure 4: US trade in goods with Canada and Mexico
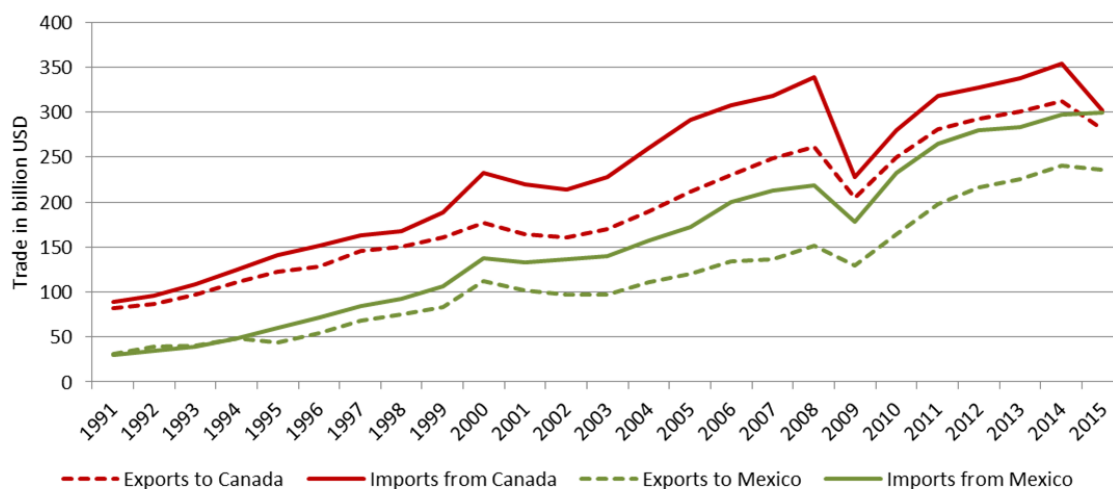
Source: UN Comtrade

depending on the type of goods traded over a period of five to ten years. In consequence, the agreed trade liberalizing measures were only fully implemented ten years after the entry into force of NAFTA.

Figure 4 also indicates that after China joining the WTO in 2001 the volume of US trade with Mexico and Canada fell for the first time since NAFTA was ratified. However, the strong global economy allowed goods trade to bounce back quickly thereafter in 2002. Steady growth continued until the financial crisis hit the real economy in 2009, where goods trade declined sharply. Following the crisis year 2009, trade recovered fast and even exceeded its pre-crisis level. In 2015, US imports from Mexico reached the level of US imports from Canada for the first time in history. The US trade balance with the NAFTA partners represents one of the economic topics attaining the highest public attention; especially gaining momentum through candidate and current president Donald Trump. Indeed, US goods trade with both Mexico and Canada is characterized by significant trade deficits. With Mexico, the US goods trade deficit was relatively stable in 2013 and 2014, while rising to USD 63 billion in 2015. Nevertheless, since 2009 the deficit is far below its pre-crisis level. With Canada the US deficit is currently trending upwards and reached a level of USD 21 billion in 2015.

The public debate, however, pays little attention to the structure of US trade with its NAFTA partners. In addition to goods trade, service trade becomes an increasingly important building block for US trade structure and should not be neglected. Figures 5 and 6 explore the US trade balance with Canada in goods and services sector separately. Two charts are required as in 2012 the definition of the time series data altered. The current time series of the OECD for services only dates back to 1999. However, since years prior to the ratification of the NAFTA are relevant for the analysis, a differently defined trade data time series from the OECD is employed in addition. One draw back of this procedure this is that the two time series partially differ in levels; but are consistent within the displayed time series.

The debate mostly focuses on the US trade deficit in the goods sector and the associated job destructions in manufacturing. Figures 5 and 6 exhibit that the USA has a trade balance surplus in the service sector with Canada. The narrative during the US election campaign and the current

Figure 5: US trade balance with Canada
by goods and services sector; 1991-2012 in billion USD
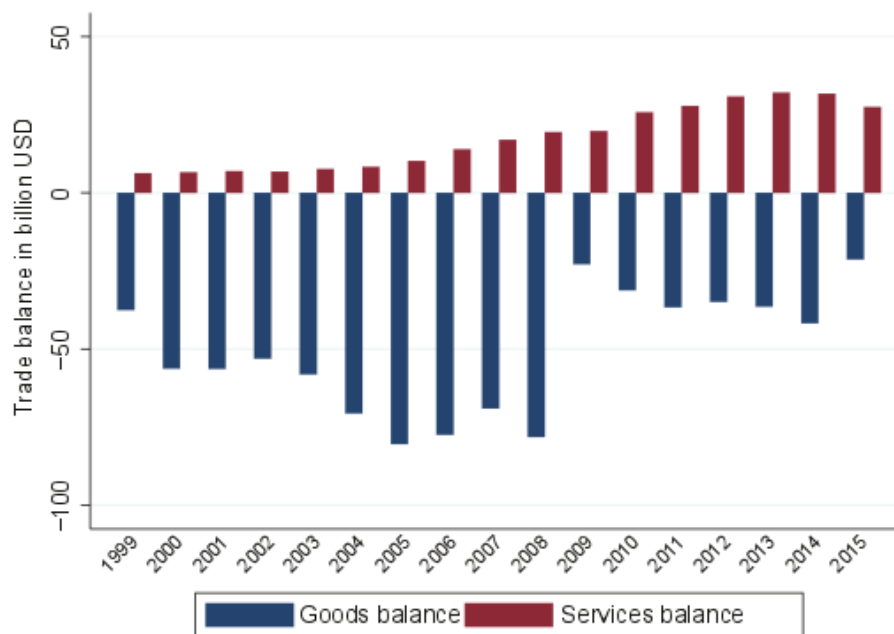
Source: Comtrade Trade in Goods and OECD Stat Trade in Services

president Donald Trump disregard the gains trade agreements have for the US economy. For a more complete picture, this narrative needs to be supplemented by the mostly neglected positive effects of NAFTA on the service sector.

In the goods sector these simple descriptive statistics show a noticeable effect through the implementation of NAFTA only from 1999 onwards. Since 1999, the deficit in the goods trade continues to grow and leads to a negative trade balance for the USA.

However, the decline in the trade deficit in the course of the financial crisis is remarkable. The deficit in goods trade is being reduced from about USD 78 billion in 2008 to about USD 23 billion in 2009 (Figure **??**), while Figure 6 appends that this deficit has not reached the pre-crisis level ever since.

A different pattern of the trade balance development emerges for the service sector. Since the end of the 1990s, a positive trend in the development of the trade surplus in the service sector stands out. An important observation to capture is the sensitivity of how the goods and service trade balances adjusted to financial crisis in 2008/2009 and the subsequent downturn in the global economy. Evidently the service trade balance reacted to the economic shock less sensitive in absolute value than the goods trade balance. Examining US service exports and imports more closely allows the conclusion that the low sensitivity is not explained by a sharp simultaneous decline in exports and imports but rather by a weak decline of both. Thus, in the event of an economic crisis service exports might support the US economy and absorb the schock partly.

The US trade balance with Mexico classified by goods and service sectors is depicted in Figures

Figure 6: US trade balance with Canada
by goods and services sector; 1999-2015 in billion USD
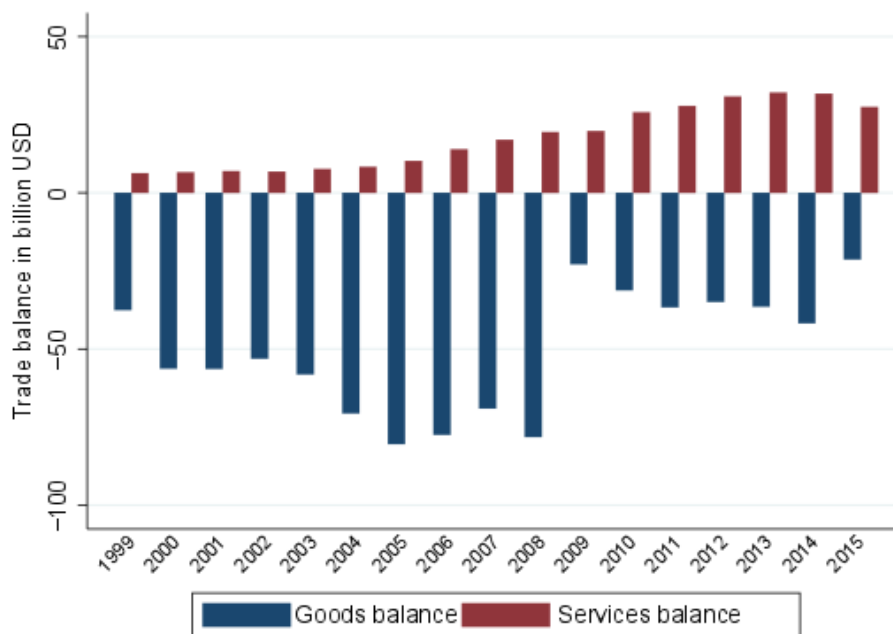
Source: Comtrade Trade in Goods and OECD Stat Trade in Services

7 and 8. As before, due to varying data availability and definitions, two different time series are utilized (Figure 7 for 1991 to 2012 and Figure 8 for 1999 to 2015).

Already in 1995 the US goods trade with Mexico suddenly deteriorated in a substantial trade balance deficit. The cause for this development can not necessarily be traced back to the ratification of the NAFTA as the Mexican currency crisis in late 1994 lead to a severe depreciation of the Mexican Peso. Both events might have jointly determined the emergence of the sustained US trade deficit with Mexico. A more detailed analysis of service exports and imports in 1995 reveals that the change in the service balance is solely explained by the reduction in service exports. This change, in turn, is plausibly rooted in the depreciation of the Peso against the USD.

Until 1998, the trade deficit in the goods trade remained relatively constant. Between 1998 and 2007, however, a dramatic expansion of the deficit from USD 17 billion to USD 76 billion can be observed. During the course of the financial crisis (2008-2009), the deficit in the goods trade began to fall. Already in 2010, however, the defect reached its pre-crisis level. The following years are characterized by minor declines in the goods trade balance deficit.

After a decline in 1995, the service trade balance surplus continuously improved even through the global economic crisis until 2013. This trend thus mirrors the developments with Canada only on a lower level. The change in the US trade surplus with Mexico is also smaller during the financial crisis, as service trade is less affected than the deficit in goods trade. As a result, the US experienced a growing trade surplus with both Mexico and Canada in the services sector. In its magnitude, this observation is of particular interest to the US trade with Canada. Following this recent development, US trade with Canada even showed an overall surplus in 2015.

Figure 7: US trade balance with Mexico
by goods and service sector; 1999-2015 in billion USD
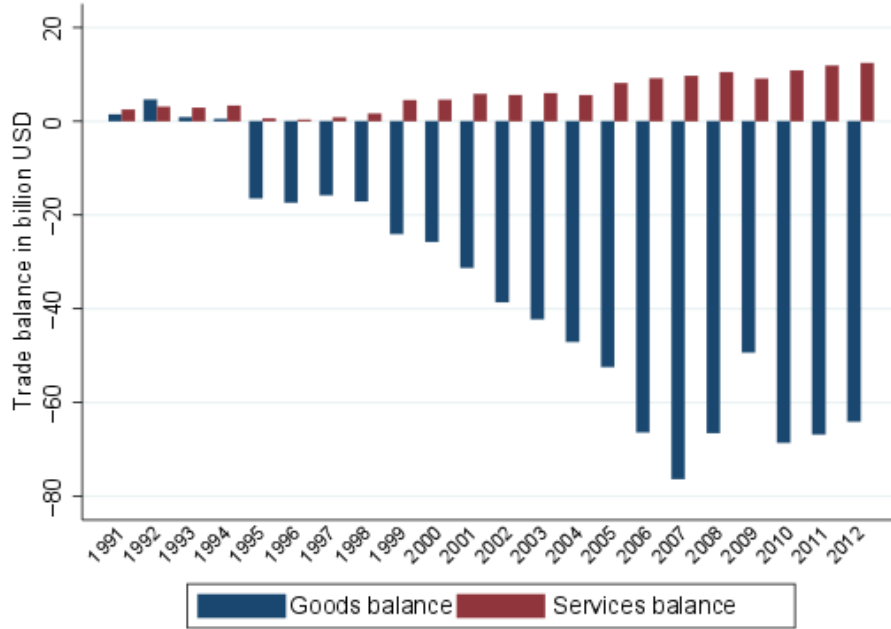
Source: Comtrade Trade in Goods and OECD Stat Trade in Services

Figure 8: US trade balance with Mexico
by goods and services sector; 1991-2012 in billion USD
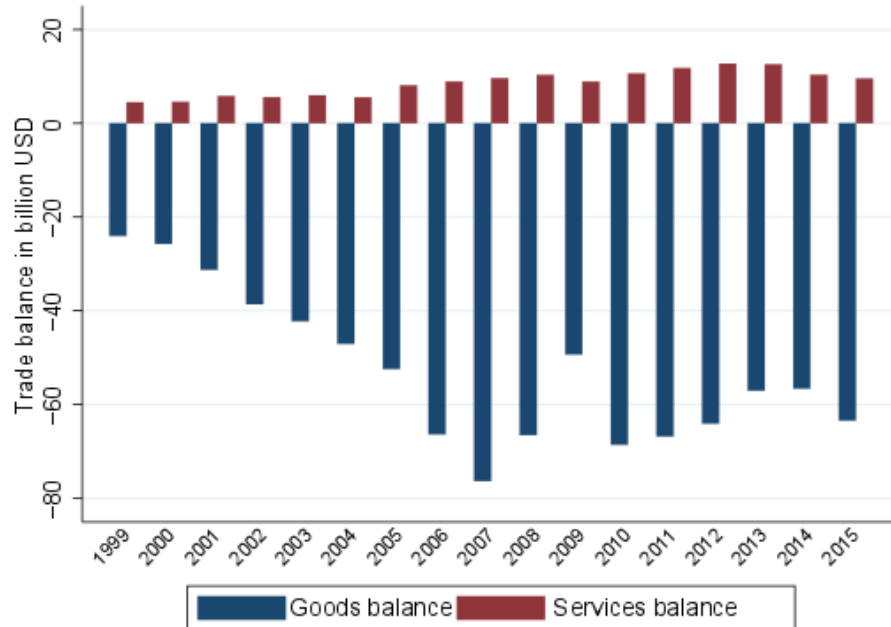
Source: Comtrade Trade in Goods and OECD Stat Trade in Services

3.4 Shares of Mexico and Canada in US Total Trade

Figure 9 presents the development of aggregated US trade shares in the US total goods exports and imports with Canada and Mexico since 1991, while Figure 10 describes Mexico's and Canada's trade shares of exports and imports with the US over the same time period.

Figure 9: Trade shares of Mexico and Canada in US total improts
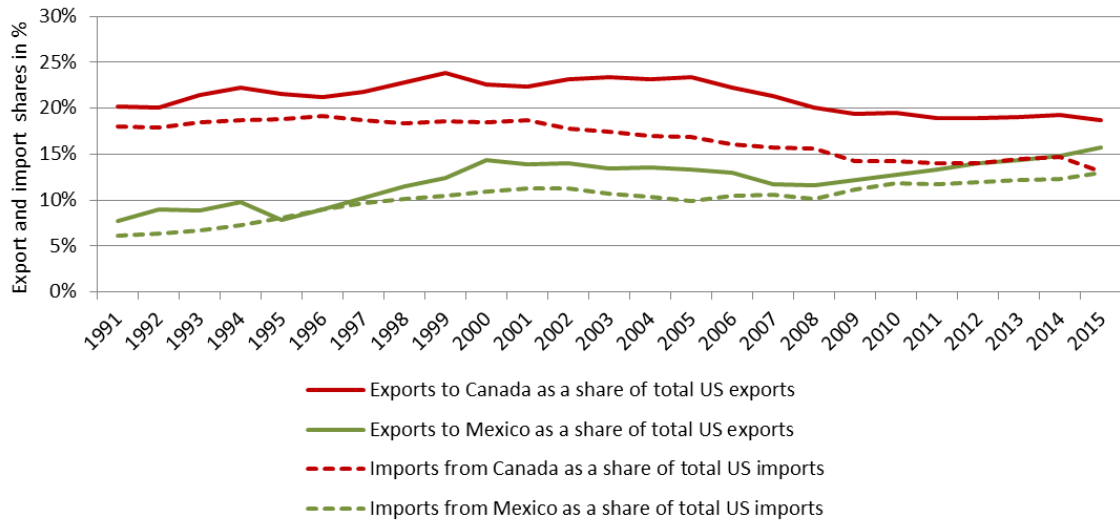
Source: UN Comtrade

Figure 10: Mexico and Canada: Share of imports from US in total imports and share of exports in the US in total exports
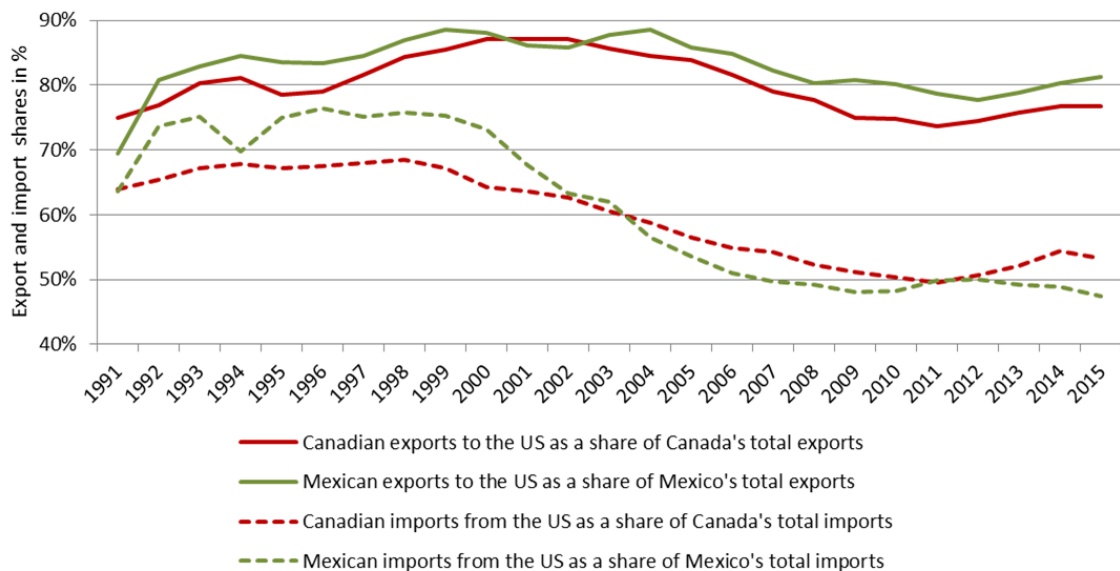
Source: UN Comtrade

Especially in the period after the ratification of the NAFTA, the share of Mexico's goods trade in the US total trade grew at constantly until 2000, remained relatively constant in the following years until 2007, before showing again a steady increase in the aftermath of the financial crisis. For Canada, a

similar pattern can be observed initially until to 1999 (and for exports to 2006). The following years, however, are dominated by a constant decline the Canadian share of imports and exports. Despite the downward trend with Canada, Mexico and Canada still remain the two most important export markets for US firms. On the US import side, only China ranks in front of Canada and Mexico. Figure 10 shows that the US is by far the most important trading partner for Canada and Mexico. Even though the share of exports to the US in total trade has declined slightly for both Canada and Mexico in 2003 and 2004, still far more than 70 percent of exports from these two countries are directed to the US market. A similar pattern can be observed on the import side. From 2000 onwards there is, however, a stronger decrease in import shares. Despite this negative trend, currently about 50 percent of Canadian and Mexican total imports still originate in the USA.

3.5 Sectoral Trade Linkages

The descriptive statistics examined in the previous section underline the economic integration NAFTA members experienced since the initiation of the free-trade agreement. For a more thorough understanding of the ongoing economic integration, the sectoral trade flows between the countries is briefly described in the following. Not only is the volume of trade in the individual sectors of general importance. Moreover, the intra-industrial trade within the sectors between the countries indicates sectoral interdependencies of trading partners. For this purpose, the Grubel-Lloyd Index (GL Index) is commonly utilized to quantify the extent of similarity in bilateral trade between two countries in a given sector. The GL index (Grubel and Lloyd 1971) is calculated as follows:

$$GL_i = \frac{(X_i + M_i) - |X_i - M_i|}{X_i + M_i} = 1 - \frac{|X_i - M_i|}{X_i + M_i} \; ; \; 0 \leqslant GL_i \leqslant 1, \tag{1}$$

where X_i and M_i denote bilateral exports and imports in sector i, respectivly.

Table 1: US trade flows with Canada by the top 5 ISIC4 sectors, 2011–2015

(a) US exports to Canada by the top 5 ISIC4 sectors, 2011–2015

ISIC4	Sector	Exports in million USD	Export share in total exports	Grubel-Lloyd Index	Intermediate goods exports	Intermediate goods share
29	Vehicles and vehicle parts	53939.2	18 %	0.97	24530.38	45 %
28	Mechanical engineering	33772.24	12 %	0.58	12982.68	38 %
20	Chemical products	26382.11	9 %	0.90	21637.26	82 %
26	Data processing equipment	25089.67	9 %	0.44	6230.625	25 %
10	Food and animal feed products	15134.95	5 %	0.97	2658.043	18 %
sum		154318.17	53 %			

(b) US imports to Canada by the top 5 ISIC4 sectors, 2011–2015

ISIC4	Sector	Imports in million USD	Import share in total imports	Grubel-Lloyd Index	Intermediate goods imports	Intermediate goods share
6	Extraction of mineral oil and gas	82137.67	25 %	0.20	82137.67	100 %
29	Vehicles and vehicle parts	57827.18	18 %	0.97	13090.67	23 %
24	Metal production and processing	22279.29	7 %	0.76	21686.46	97 %
20	Chemical products	21774.35	7 %	0.90	20108.42	92 %
19	Coking and mineral oil processing	18583.72	6 %	0.81	6621.786	36 %
sum		202602.21	62 %			

Source: OECD STAN

If there is a very similar volume of exports and imports in a given sector, the GL index approaches 1. A high index value can be driven by either heterogeneous products, or by intermediate goods that are part of bilateral production networks within the NAFTA member countries. Tables 1 und 2 summarize the US trade with Canada and Mexico, respectively, in the five sectors to which the United States exports or imports the most. Trade volume in these five sectors represent more than 50 percent in total exports or imports. For imports from Canada and exports to Canada the data reveals hardly any specialization of the trading countries in any specific sectors. As an exception, the US specializes in the sector of data processing equipment, while Canada's only specialization is – little surprising – in the sector of extraction of mineral oil and gas. Imports from Canada, in particular, are characterized by a large share of intermediaries. These descriptive statistics allow the deduction that US firms, especially in the metal production, mineral oil extraction and processing industries, import Canadadian intermediates for processing in the US. This, in retrospect, implies a high degree of intra-industrial trade and thus a high level of economic integration between the USA and Canada.

Table 2: US trade flows with Mexico by the top 5 ISIC4 sectors, 2011–2015

(a) US exports to Mexico

ISIC4	Sector	Exports in million USD	Export share in total exports	Grubel-Lloyd Index	Intermediate goods exports	Intermediate goods share
26	Data processing equipment	36758.14	16 %	0.84	20600.63	56 %
29	Vehicles and vehicle parts	26671.78	12 %	0.53	21940.15	82 %
20	Chemical products	22140.61	10 %	0.35	21285.5	96 %
19	Coking and mineral oil processing	19751.92	9 %	0.24	5470.301	28 %
28	Mechanical engineering	19293.47	9 %	1.00	9252.418	48 %
sum		124615.92	56%			

(b) US imports from Mexico

ISIC4	Sector	Imports in million USD	Import share in total imports	Grubel-Lloyd Index	Intermediate goods imports	Intermediate goods share
29	Vehicles and vehicle parts	73988.28	26 %	0.53	31671.24	43 %
26	Data processing equipment	50993.96	18 %	0.84	5337.745	10 %
6	Extraction of mineral oil and gas	30200.03	11 %	0.13	30200.03	100 %
27	Electrical equipment	25389.36	9 %	0.77	14826.92	58 %
28	Mechanical engineering	19127.14	7 %	1.00	8774.112	46 %
sum		199698.77	70 %			

Source: OECD STAN

Examining US sectoral trade with Mexico, it is noticeable that the share of intermediates in four of the top 5 sectors reaches almost 50 percent or more. Additionally, the share of intermediate goods is higher for US exports to Mexico than for US imports from Mexico. Mexican firms import a large proportion of their (intermediate) goods from the US for further processing and assembly. For the top 2 importing sectors, vehicles and vehicle parts and data processing equipment, the share of intermediate goods is significantly lower than the of exports to Mexico in the same sectors. This gives some indication that intermediate goods (from the US) are being assembled into final goods in Mexico and are then being exported back to the US. Trade with Mexico is somewhat higher specialized in the individual sectors compared to trade with Canada. The GL index for vehicles and vehicle parts is, for example, 0.53.

3.6 Contribution of Canada and Mexico to US Output

Figure 11 quantifies the value added share of the NAFTA countries in US output. It amounts to 1.2 percent for Canada and 0.83 percent for Mexico. In an international comparison of the foreign value added share in US-American output Canada and Mexico place 2nd and 3rd behind China, respectively. Table 3 describes the value added share of Mexico and Canada in US output in the top 5 sectors in 2011 (measured by trade volume). Table 4 presents the value added share in the same year for the US in Mexican and Canadian output in the top 5 sectors. Notably, the value added share of the US in output of the other two countries is clearly higher than vice versa. On the sectoral level (Table 4), one finds that these are related to either agriculture or textile industries.

For US imports from Mexico, these sectors play a subordinate role in magnitude (see Table 2). Remarkably, the US contributes a significant value added share to Canada's vehicle sector. A somewhat different picture is drawn by Table 3. Even though the shares are lower in level, it transpires that more secondary sectors are represented here (only sugar and oils are components of the primary sector, air transport is part of the service sector).

Figure 11: NAFTA members' value added share in US output, 2011
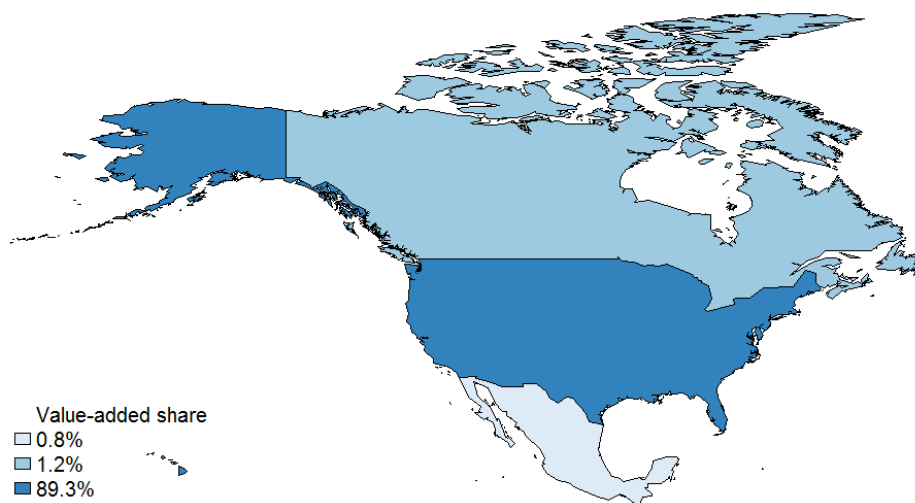
Source: Global Trade Analysis Project (GTAP)

Table 3: Mexico's and Canada's value added share in US output by top 5 GTAP secotors

	Mexico			Canada	
	GTAP Sector	**Share**		**GTAP Sector**	**Share**
32	Petroleum, coal products	4.1 %	32	Petroleum, coal products	8.1 %
24	Sugar	4.0 %	21	Vegetable oils and greases	4.1 %
40	Electronic equipment	3.1 %	36	Ferrous metals	3.9 %
36	Metals	2.9 %	50	Air transport	3.7 %
38	Vehicles and vehicle parts	2.8 %	38	Vehicles and vehicle parts	2.8 %

Source: Global Trade Analysis Project (GTAP)

Table 4: US' value added share in Canadian and Mexican output by the top 5 GTAP sectors

	USA in Mexican output			USA in Canadian output	
	GTAP Sector	**Share**		**GTAP Sector**	**Share**
21	Vegetable oils and greases	50.3 %	23	Processed rice	30.4 %
2	Wheat	17.4 %	12	Wool and silk	30.4 %
12	Wool and silk	17.3 %	38	Vehicles and vehicle parts	22.3 %
27	Textiles	15.6 %	1	Raw rice	16.0 %
31	Paper and publishing	15.3 %	39	Transport equipment	15.4 %

Source: Global Trade Analysis Project (GTAP)

3.7 US Trade Development Globally

The following subsection briefly summarizes the development of US trade beyond the NAFTA members over the past 20 years. Figures 12 and 13 show US goods trade with the top 5 export destinations and import countries (except Canada and Mexico) from 1995 onwards. Striking is a relatively constant trading volume over time (in contrast to the US trade with Canada and Mexico) with other major industrialized countries like Japan, Germany, South Korea and Great Britain. Consequently since 1995 the share of bilateral US trade with these countries stagnated (in the case of Germany) or even halved.

From the top 5 trading partners, China is of paramount importance. Both exports to China and, even more pronounced, imports from China have risen rapidly over the last 20 years. Especially after China joining the WTO in 2001, US trade with China boomed massively. Figure 14 summarizes the top 10 trading partners for 2015. Tables 15 and 16 supplement this picture by using a world map to indicate the trade shares of the US by country in 2015. Reviewing the EU-28 trade with the US instead of individual European countries, Europe plays a very important role in US exports and imports. Leaving NAFTA partner countries aside, the EU constitutes the leading export market for US firms, and ranks second after China on the US import side. As already discussed, Canada and Mexico are placed 2nd and 3rd on the main US export destinations.

By far the highest value of imports comes from China. Further examining the aggregate US trade balance with its major trading partners, one observes a trade deficit with eight out of its top ten export partners. Outstanding is the deficit with China where the import value amounts to 3.5 times its export value. Further, Japan and Germany export approximately twice as much to the US as they import from the US. It is, above all, this ongoing trade balance deficits, which increasingly reserved US attitude against international trade; especially with China, Germany and Japan. Based on this narrative, Figure 17 depicts a world map showing the countries with which the US has on average unbalanced trade, either in form of a trade deficit or a trade surplus, between 2013 and 2015. Over this period, with almost all European countries the US shows a trade balance deficit. A closer look at the most developed nations worldwide,a minority, for example Australia, do not confirm this trading pattern. Unsurprisingly, less developed countries from South America and Africa import more from the US than they export to US, thus having a trade balance deficit.

Figure 12: Top 5 US-american export destinations outside of the NAFTA, 2015
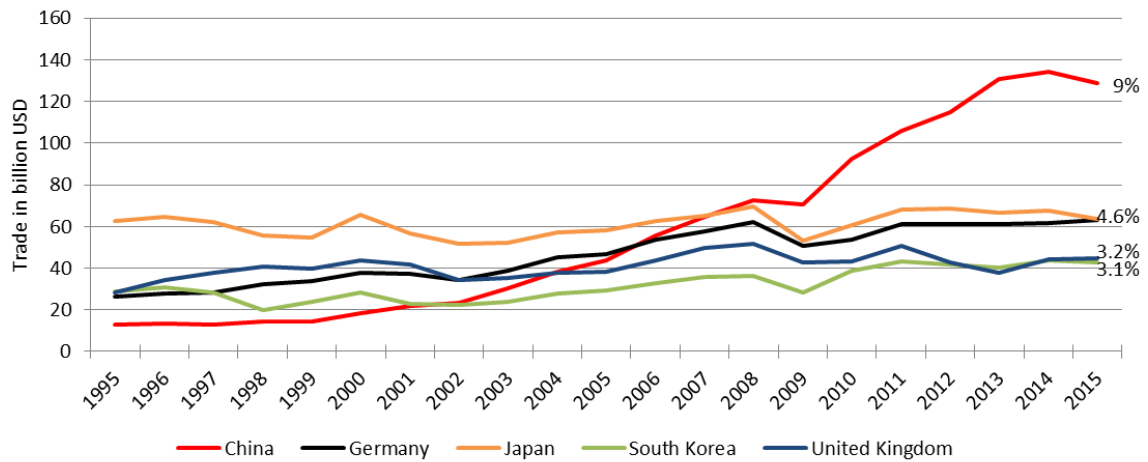
Source: Baci World Trade Database

Figure 13: Top 5 US-american import countries outside of the NAFTA, 2015
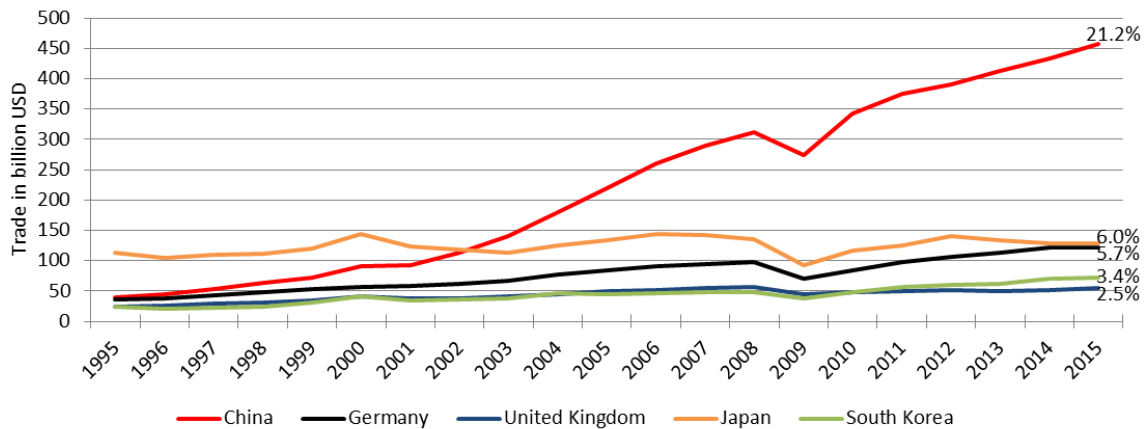
Source: Baci World Trade Database

Global Value Added Shares   Figure 18 provides information on the contributions of value added by country to US output. Canada and Mexico place with 1.2 and 0.8 percent second and third, respectively. With 1.3 percent only China contributes more to value added of US output. Due to US oil imports Saudi Arabia ranks remarkably fifth, followed by Japan and Germany that account for roughly 0.4 percent of US output.

Figure 19 provides insights on US value added in the output of foreign countries. Central American countries, like Honduras, rank first with seven to ten percent. Ireland closely follows as the first European country with just below seven percent. The US contributes over six percent to Canadian and Mexican output. Still, the US adds 1.7 percent to German output (ranking 53th).

Figure 14: US trade balance with its Top 10 trading partners, 2015
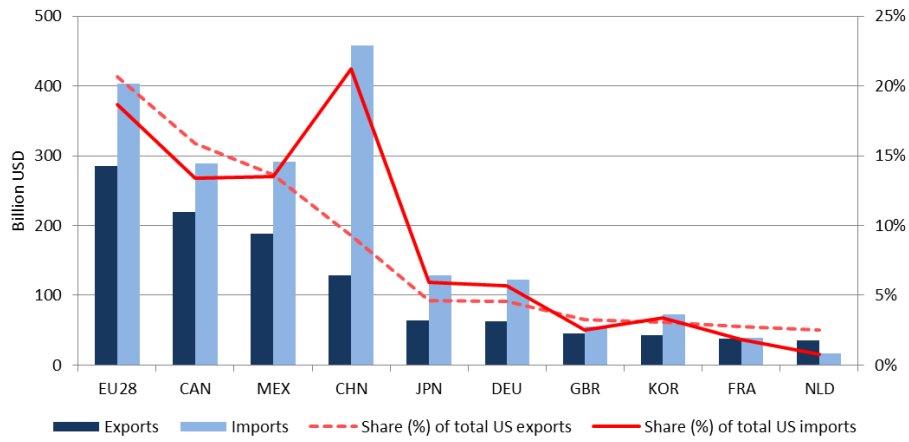
Source: Baci World Trade Database

Figure 15: Export share in US total exports, 2015
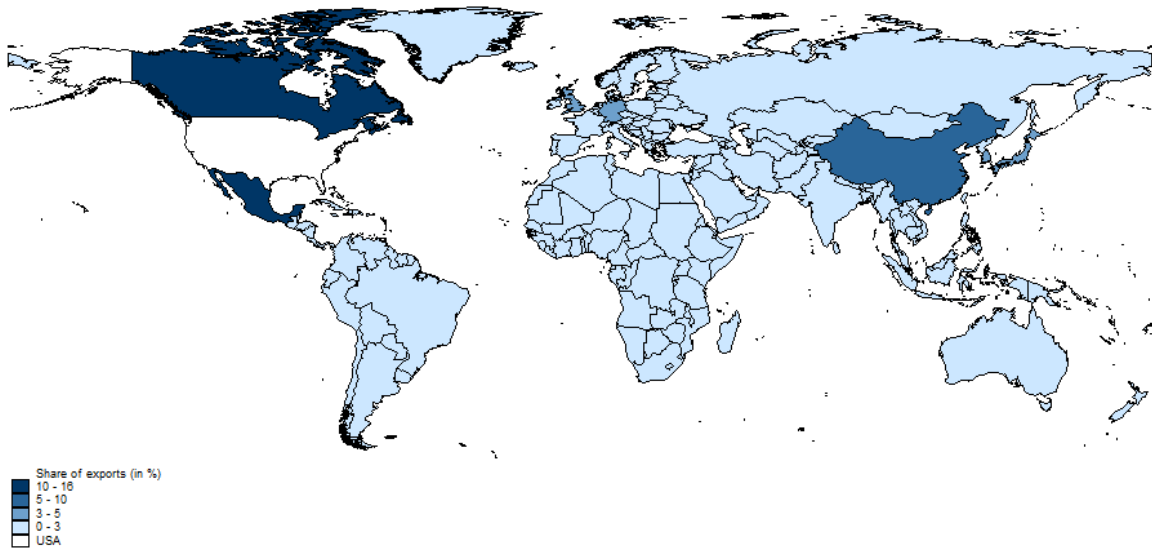
Source: Baci World Trade Database

Figure 16: Import share in US total imports, 2015
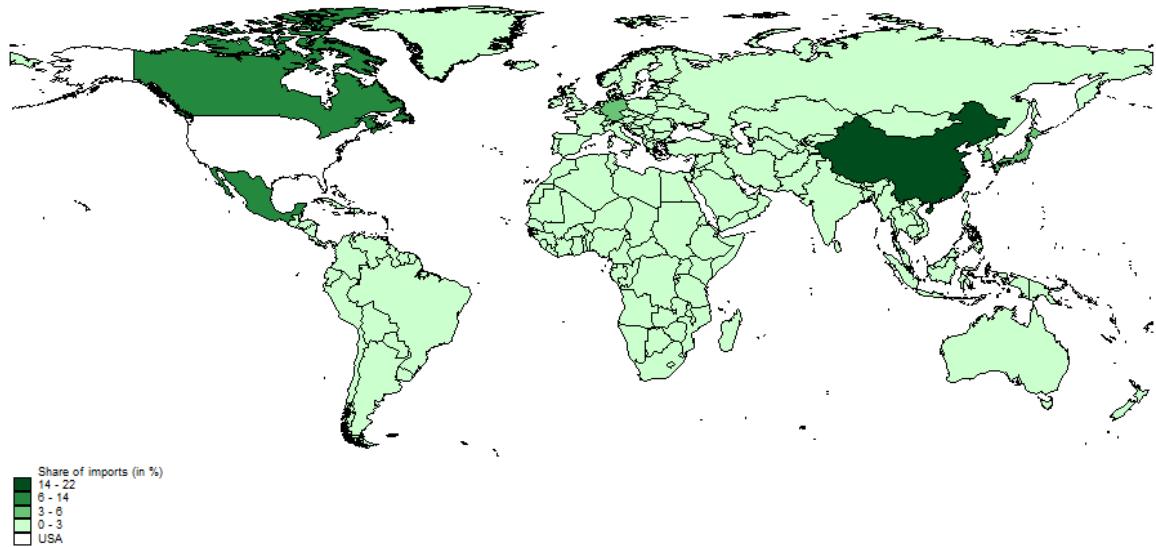
Source: Baci World Trade Database

Figure 17: Global US trade surpluses and deficits, 2013-2015
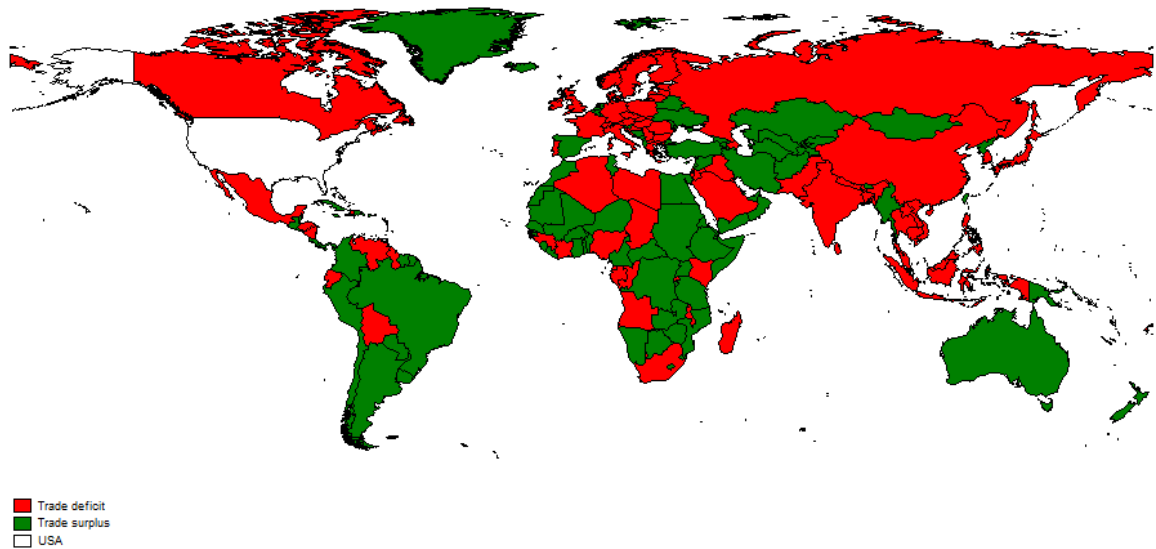
Source: Baci World Trade Database

Figure 18: Percentage value added to US total output by other countries, 2011
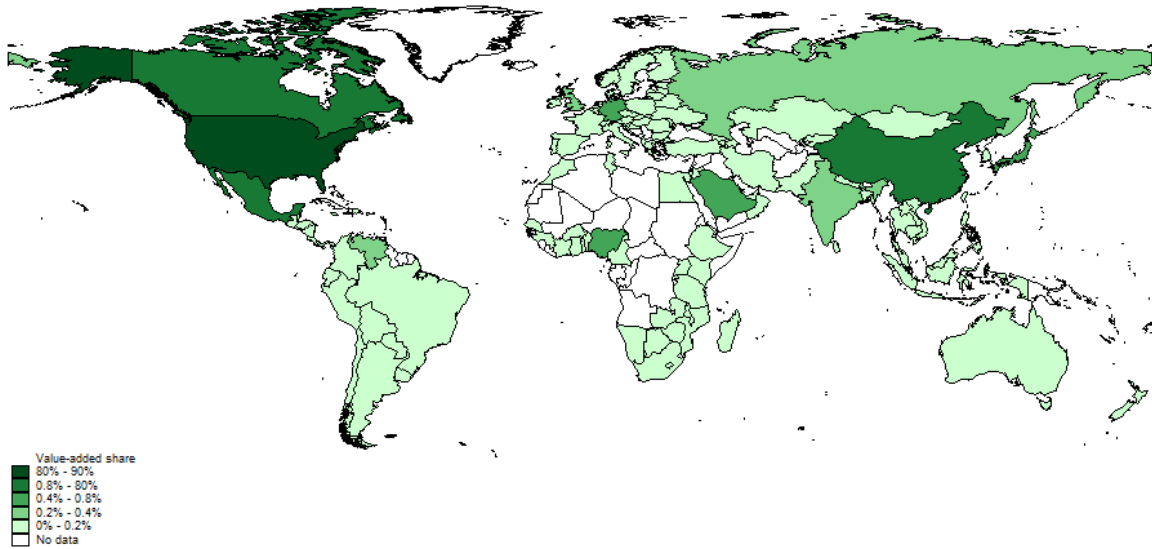
Source: Global Trade Analysis Project (GTAP)

Figure 19: Percentage value added to other countries by the US, 2011
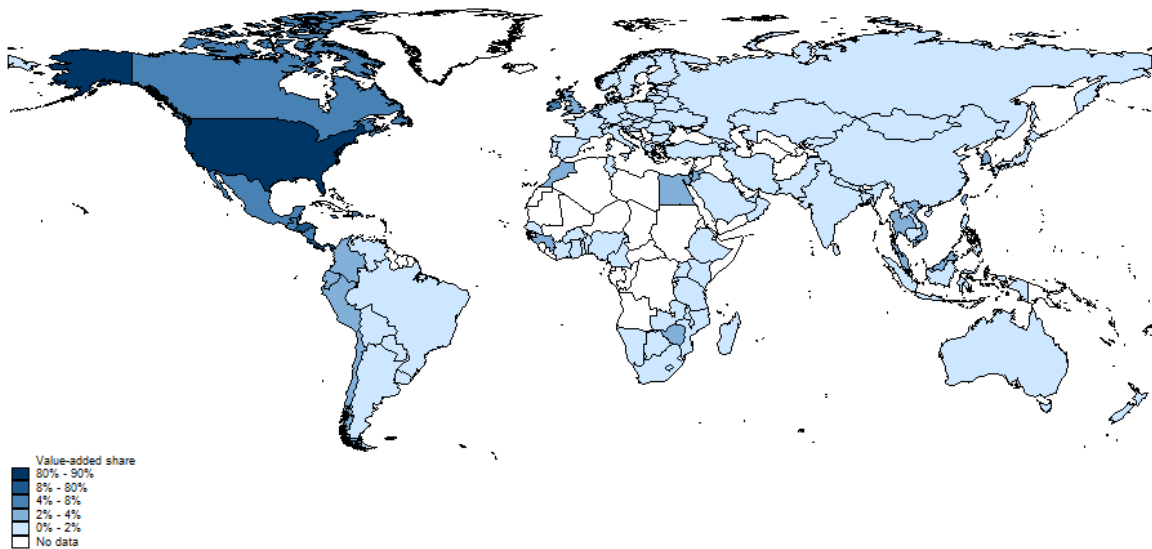
Source: Global Trade Analysis Project (GTAP)

4 US Tariff and Trade Barriers

4.1 US Trade Barriers to Mexico and Canada

Tariffs on aggregated level.   A key objective of the NAFTA trade agreement was the reduction of tariffs in goods trade. The agreement designed a continuous reduction of tariffs over several years. For a large part of the goods, the final preferential tariff rate was met after five or ten years. Figure 20 plots the development of the average tariff of the NAFTA countries between 1990 and 2016. The former mentioned country levies the respective tariff against the latter country. In the case of Mexico, the representation of tariffs is only possible from the year 2000 onwards. In general, the graph clearly shows the development of steadily reduced tariffs within the NAFTA members over the considered period. On average, the USA levied the lowest tariffs on both Canada and Mexico. Conversely, with an average tariff of about six percent, Mexico imposed the highest tariffs in the free trade area. Canada has a similar average tariff against the USA as against Mexico.

Figure 20: Tariffs of NAFTA coutries against member countries (unweighted average)
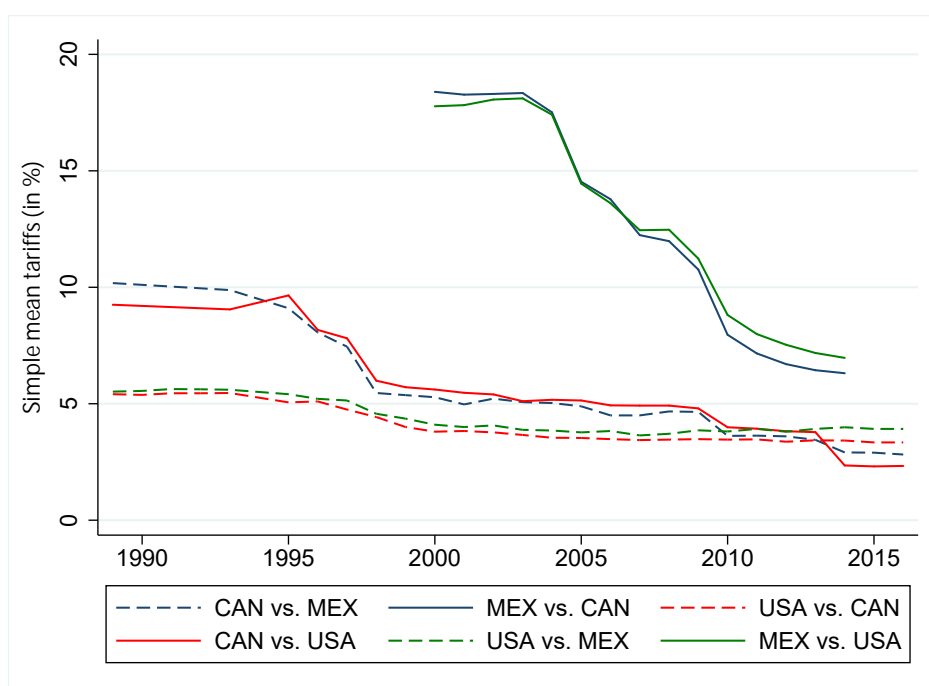
Source: WITS-TRAINS Tariff Data

Sectoral Tariff Development.   A sectoral illustration of the US trade tariffs shows a reduction in tariffs for a considerable part US industries. Table 5 lists the average tariff rates in each sector five years before and after the ratification of NAFTA. This confirms the development in figure 20. Tariffs are virtually driven down to zero in every US sector. For Canada, this holds true alike. There are, however, exceptions. Canadian tariffs against Mexico in 1999 exceeded the 1989 rate in the meat and milk products sectors. For Mexico, the pattern is less consistent. Similar to Canada, Mexico levied higher tariffs in agricultural and food sectors than in 1989. Generally, tariff reductions tend to be slower as time passes until the agreed tariff rate is reached.

Table 5: Applied bilateral tariffs between the NAFTA member countries, 1989 und 1999

	GTAP-Sector	USA from CAN		USA from MEX	
		1989	1999	1989	1999
1	Raw rice	3.73	0.00	6.85	2.75
2	Wheat	4.29	0.00	5.07	0.67
3	Cereals	1.03	0.00	1.78	0.00
4	Vegetables, fruits, nuts	5.38	0.00	6.39	0.43
5	Oilseeds	1.45	6.34	1.70	0.00
6	Sugar cane, sugar beet	1.13	0.00	1.17	0.00
7	Vegetable fibers	0.00	0.00	0.00	0.00
8	Agricultural crops	1.49	0.00	2.03	0.00
9	Cattle, sheep, goats, horses	0.61	0.00	1.19	0.00
10	Animal products	0.45	0.00	1.11	0.00
12	Wool, silk	0.84	0.00	0.94	0.00
13	Forestry	0.44	0.00	0.66	0.00
14	Fishery	0.58	0.00	0.89	0.00
15	Coal	0.00	0.00	0.00	0.00
16	Oil	0.16	0.00	0.20	0.11
17	Gas	0.00	0.00	0.00	0.00
18	Minerals	0.42	0.00	1.33	0.00
19	Meat: cattle, sheep, goats, horses	1.39	1.12	2.36	0.00
20	Meat products	3.09	0.00	4.93	0.00
21	Vegetable oils and greases	4.46	0.00	5.60	0.00
22	Milk products	9.02	0.25	10.05	3.76
23	Processed rice	8.63	0.00	9.82	0.38
24	Sugar	33.44	0.41	33.58	0.53
25	Food products	4.62	0.29	5.44	0.73
26	Beverages and tabacco	7.22	0.00	8.10	1.15
27	Textiles	9.73	0.00	11.09	0.26
28	Garments	12.53	0.00	13.97	1.61
29	Leather	8.23	0.00	10.42	3.01
30	Wood	2.60	0.00	3.54	0.07
31	Paper and publishing	1.47	0.00	1.94	0.00
32	Petroleum, coal products	0.34	0.00	0.63	0.06
33	Chemicals, rubber, plastic	3.91	0.00	5.06	0.20
34	Mineral products	3.62	0.00	5.51	0.73
35	Ferrous metals	4.08	0.03	4.98	1.33
36	Metals	2.64	0.00	3.53	0.01
37	Metal products	2.94	0.01	4.70	0.16
38	Vehicles and vehicle parts	0.50	0.00	3.01	0.66
39	Transport equipment	3.17	0.00	4.80	0.19
40	Electronic equipment	0.79	0.00	4.48	0.04
41	Machinery and equipment	2.64	0.00	4.15	0.03
42	Manufacture	3.92	0.00	5.20	0.03
43	Electricity	0.00	0.00	0.00	0.00
44	Gas distribution	0.00	0.00	0.00	0.00

Note: The listed tariffs are unweighted tariffs.

4.2 Differences between Maximum WTO and NAFTA Tariff Level

One of the several trade policies the new US administration announced is either a renegotiation of the NAFTA terms or even a premature dismissal of the free-trade agreement. If the NAFTA were to be dissolved, the partner countries would no longer be compelled to maintain preferential tariffs against each other. Yet, the scope for tariff increases is limited by WTO statutes. According to WTO rules, there exists a negotiated maximum tariff level, called the bound tariff, for each individual product group, WTO members can impose. The potential for possible increases in tariffs can thus be easily calculated by subtracting the currently applied NAFTA tariff from the bound tariff for each product.

For Canada, the US has 9,700 product lines on which tariffs are registered. However, there is a difference between the bound tariff and the tariff level agreed in NAFTA for only about 1,900 products. In the case of Mexico, there are be about 3,300 tariffs of 9,600 products with a difference in WTO and NAFTA tariffs. Figure 21 groups the 2015 US tariffs according to the difference of applied tariff and the WTO bound. Nearly ten percent of all US importing goods were levied with a nearly ten percent lower tariff rate than the WTO bound tariff. About 15 percent of US importing goods have a tariff rate that is currently five to ten percent below the WTO bound.

Figure 21: "Water in the tariff": WTO-Bound tariff – applied NAFTA tariff in the USA, 2015
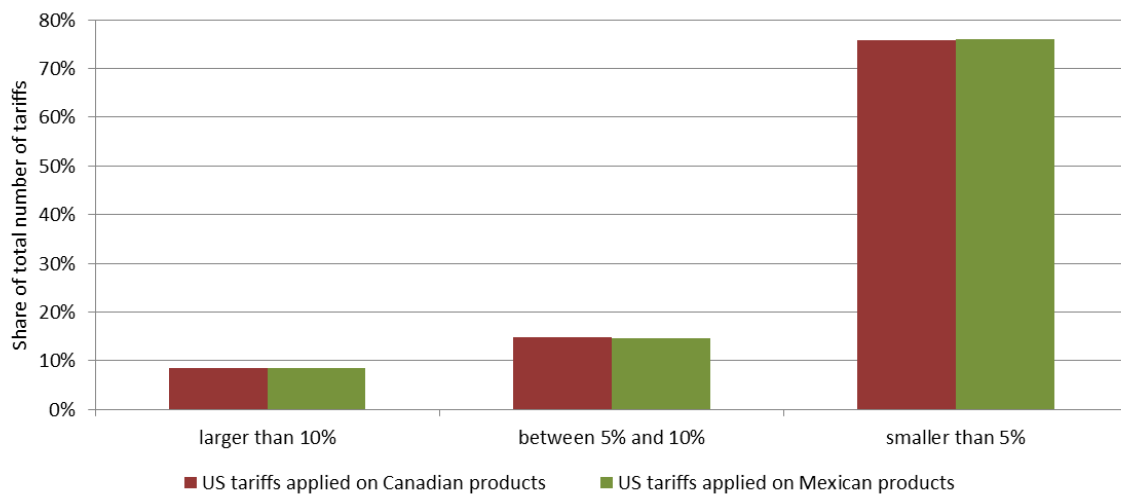
Source: WITS-TRAINS Tariff Data

Table 6 goes descriptively into further detail by looking at individual sectors. As in Figure 21, the duties are grouped according to the difference between the Bound-WTO and the NAFTA tariff (2015). These categories are labeled as "difference categories". The individual products (HS92 6-digits) are now assigned to their respective sectors. Thus, the difference categories allows to isolate the two most frequently represented sectors. Thereby, the absolute number of products in the respective difference category as well as the relative frequency of that sector in the difference category is presented. This can be used to provide a more detailed description of the sectors with the most pronounced potential tariff impacts. The tariff differences between NAFTA and WTO tariff for the US are relatively similar for goods from Canada and Mexico. Sectors belonging to the clothing and textiles sectors show the highest tariff difference. Importantly, these two sectors do not correspond to main components of US imports from Canada and Mexico. Shedding light onto the structure and

trade volume of products with current tariffs below five and ten percent of the WTO bound, the chemical products sector stand out. This sector, however, is one of the sectors with a high volume US imports from Canada. In the "less than five percent "category, 22 percent of goods are associated with the machinery and equipment sector. There, seven percent of total US imports come from Canada whereas 23 percent originate in Mexico. From this simple descriptive tariff analysis it can be concluded that revoking the NAFTA by the US has the potential to significantly harm trade relations between the current NAFTA partner countries.

Table 6: "Water in the tariff": USA – Canada and Mexico, 2015

	US tariffs against Canada			US tariffs against Mexico		
Difference between Bound and NAFTA tariff	**Number of tariffs in GTAP sector**	**GTAP sector**		**Frequency of GTAP products (HS92 6 digits)**	**Number of tariffs in GTAP sector**	**GTAP sector**		**Frequency of GTAP products (HS92 6 digits)**

Difference between Bound and NAFTA tariff	**Number of tariffs in GTAP sector**	**GTAP sector**		**Frequency of GTAP products (HS92 6 digits)**	**Number of tariffs in GTAP sector**	**GTAP sector**		**Frequency of GTAP products (HS92 6 digits)**
Above 10 %	407	28	Garments	26 %	402	28	Garments	26 %
		27	Textiles	46 %		27	Textiles	47 %
Between 5% and 10 %	700	28	Garments	11%	695	28	Garments	11 %
		33	Chemicals, plastic	24%		33	Chemicals, plastic	24 %
		27	Textiles	32 %		27	Textiles	32%
Below 5 %	3584	33	Chemicals, plastic	22 %	3584	33	Chemicals, plastic	22 %
		41	Machinery and equipment	22 %		41	Machinery and equipment	22%

Source: WITS -TRAINS Tariff Data

Table 7: US top 10 import sectors and their tariffs

GTAP		Imports (in million USD)	Weighted		unweighted	
			Bound	MFN	Bound	MFN
41	Machinery and equipment	40333	1.31	1.30	1.47	1.67
40	Electrical equipment	29673	0.36	0.34	1.02	1.12
38	Vehicles and vehicle parts	29571	3.72	3.69	3.84	3.82
33	Chemicals, rubber, plastic	27412	1.72	1.64	2.63	2.66
16	Oil	12006	0.00	0.00	0.00	0.00
42	Manufactures	7784	1.55	1.55	2.57	2.59
39	Transport equipment	7435	0.93	0.93	2.26	2.28
28	Garments	6892	12.02	12.10	10.45	10.54
30	Wood	6214	0.50	0.56	1.28	1.41
27	Textiles	5487	9.35	9.53	8.07	8.13

Source: WITS -TRAINS Tariff Data; BACI World Trade Database

4.3 US Tariffs Worldwide

Given the threatened protectionist US policies, tariffs – and the potential to raise them – play an important role. The following reviews the currently worldwide applied US tariffs and descriptively shows potentials for tariff raises. Table 7 displays the top ten US importing sectors in 2015. Besides the sectoral volume of US imports, average sectoral duties are shown in percentage points. Average duties are further distinguished into WTO bound and applied MFN tariff. Whereas the Bound Tariff describes the maximum tariff rate allowed within the WTO, the MFN tariff is the currently applied tariff consistent with WTO regulations.

If the US is not part of a free-trade agreement with some foreign country, this trading partner is not to be discriminated against by imposing higher tariffs on this countries exports to the US. The MFN tariff is them the highest possible tariff applied. To avoid that very high tariffs weigh disproportionately, a further distinction between the weighted and unweighed tariffs is made in Table 7. To rule out any biases, tariffs are weighted by the sectoral import volume. With a maximum MFN tariff of just below four percent (vehicles and vehicle parts) the tariff rates in the top five US import sectors (of the top 10 US import sectors) are relatively low. By considering the Bound tariff rates of the respective sectors, it is evident that there are hardly any differences in Bound and MFN tariffs at the sectoral level. This pattern does not only apply to the US, but is rather common for economically highly integrated economies.

Figure 22 corroborates this result. The figure ranks the sectors (x-Axis) in their import value. Furthermore, Bound and MFN tariffs are indicated for each sector. Comparing import value with the applied tariff, it is confirmed that sectors with higher import value also enjoy below average tariff rates. Figure 23 represents the difference between the currently applied tariff and the maximum tariff allowed by the WTO. With 0.4 percent, there is only a very small number of tariffs where the difference between Bound and MFN tariff is greater than ten percent. Likewise, this applies to the remaining two difference categories. Thus, Figure 23 supports the pattern revealed by Table 7 and Figure 22. Since the share of applied tariffs that correspond to the maximum WTO tariffs is quite high, there is, with the exception of individual products, little room for increasing US tariff rates within the WTO. As long as the US does not breach contractual obligations within the WTO, there exits therefore only a small margin to lower US imports from the rest of the world by official policy

intervention in the form of higher permitted US tariff rates.

Figure 22: Bound-MFN tariff and imports by GTAP sectors
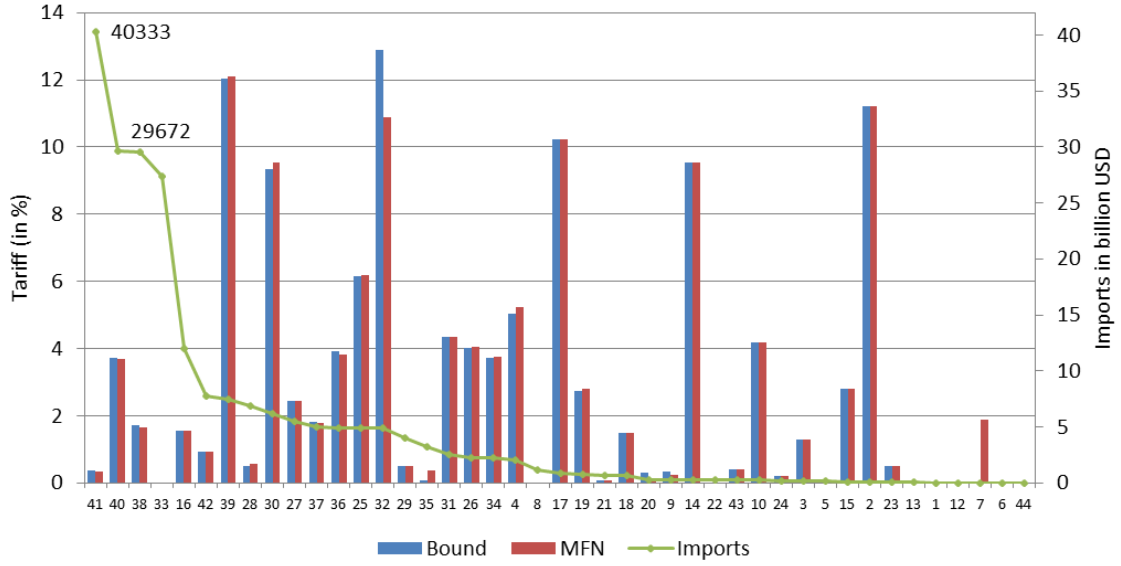
Source: WITS-TRAINS Tariff Data; BACI World Trade Database

Figure 23: Difference between Bound and MFN tariff, 2014
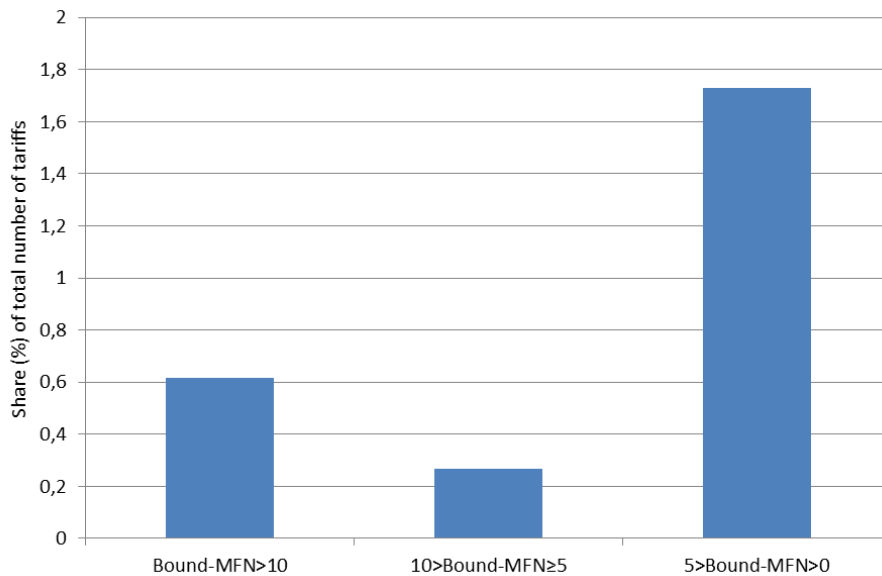
Source: WITS -TRAINS Tariff Data

4.4 US Non-tariff Trade Barriers

From a US tariff perspective only, the American economy can be categorized as an open economy. However, this assessment neglects non-tariff impediments that restrict trade flows. Figure 24 hints at substantial evidence to an increasing protectionist attitude by US in the recent past. Figure 25 underlines that the US is the most protectionist country within the group of G20 nations as it implements by far the highest number of non-tariff barriers.

Figure 24: Number of US discriminatory measures since 2009
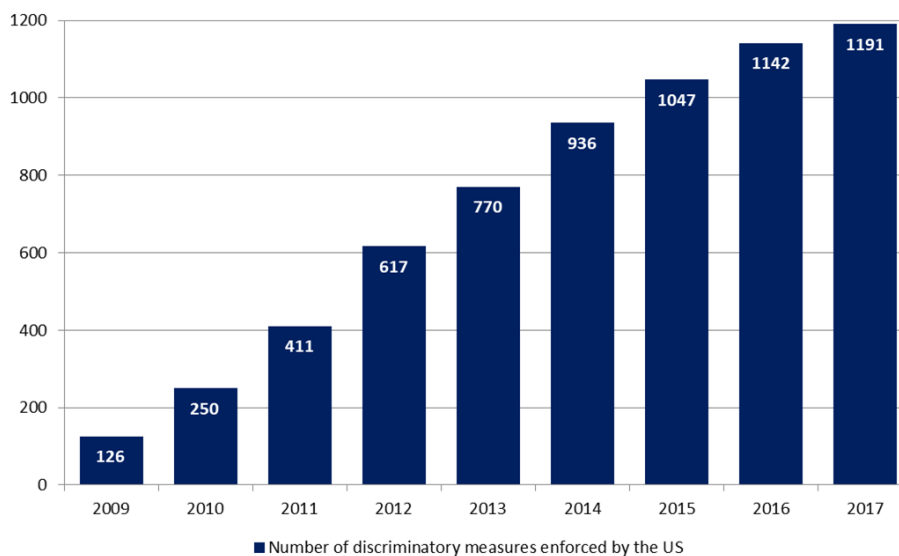
Source: Global Trade Alert Data

Figure 25: Number of G20 discriminatory measures

■ Number of discriminatory measures (implemented in Nov. 2008 - Jun. 2017)
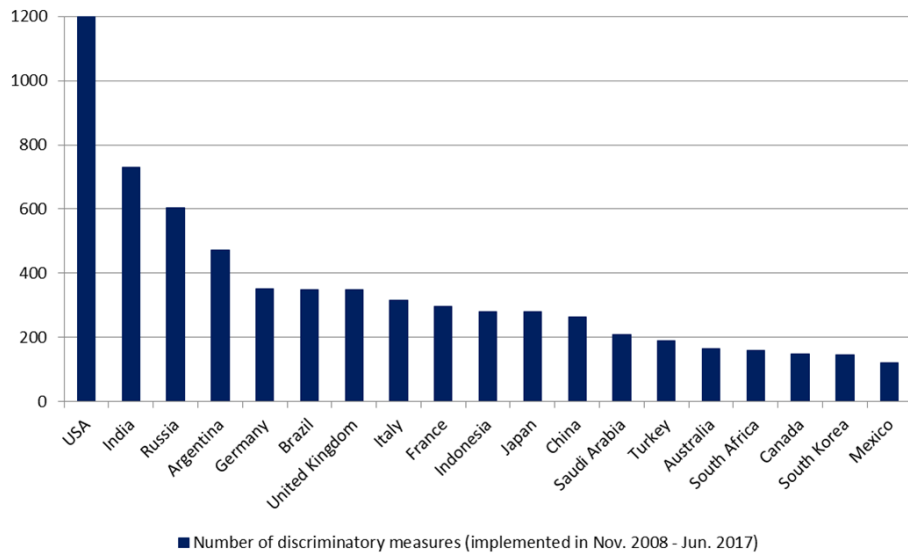
Source: Global Trade Alert Data

The figures 26 and 27 further illustrate that the US, when taking into account non-tariff barriers in addition to tariffs, belongs to the increasingly protectionist states.

Figure 26: Number of US protectionist measures per country (in force)

□ 0
□ 1 - 19
■ 20 - 39
■ 40 - 59
■ 60 or more
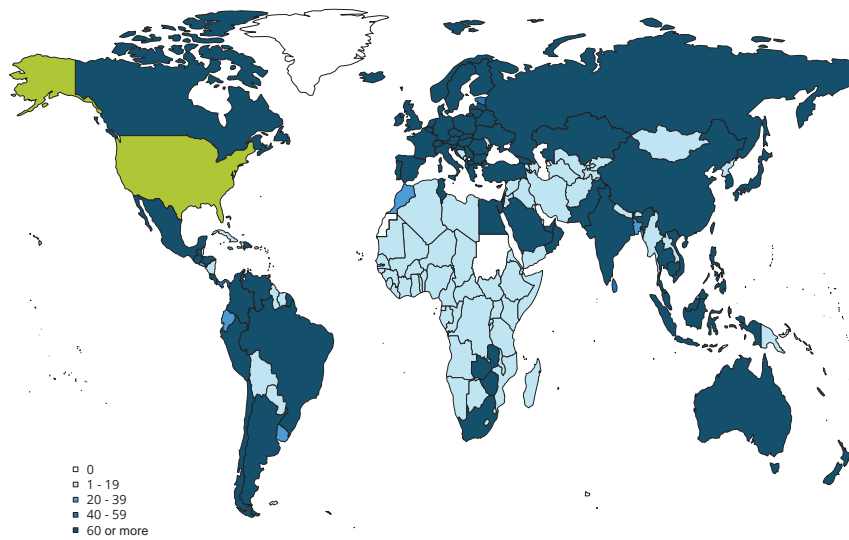
Source: Global Trade Alert Report 2017

Figure 27: Number of protectionist measures against the USA (in force)

0
1 - 19
20 - 39
40 - 59
60 or more
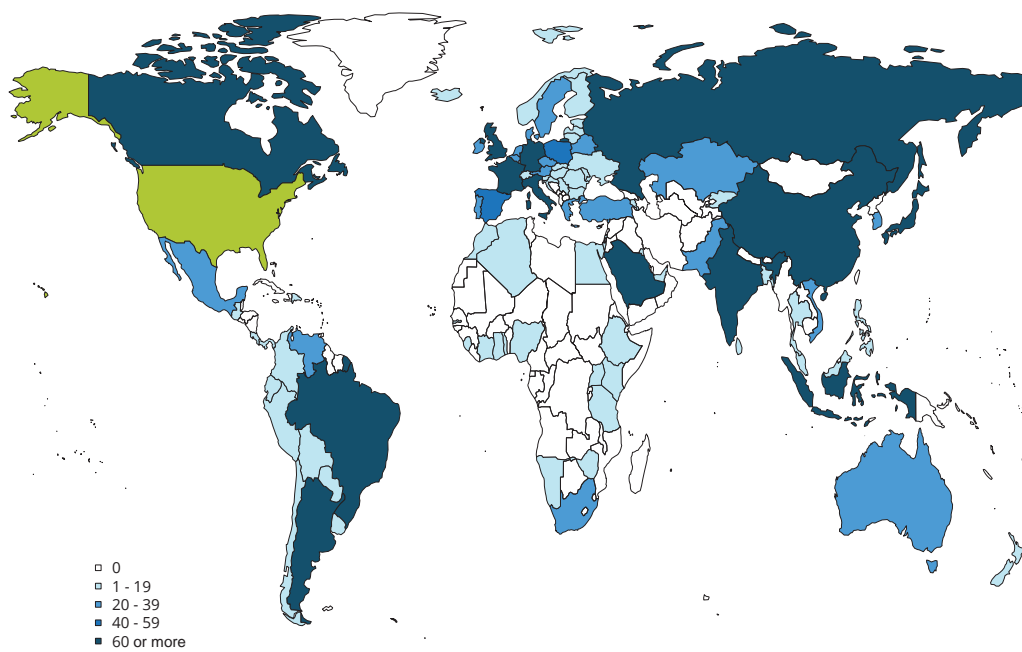
Source: Global Trade Alert Report 2017

5 Quantitative Analysis

The descriptive analysis illustrated that, on the one hand, the US is an relatively open economy with regard to tariffs, both within the NAFTA and with the rest of the world, while, other hand, the US is highly protectionist in form of non-tariff barriers. The reduction of trade barriers in the US, especially with industrialized economies, was accompanied by a deterioration in the trade balances. Albeit the US service sector is increasingly moving into trade surpluses, the political dissatisfaction with long-run adjustments is understandable. High trade deficits in goods trade, coupled with high import volumes from China and Europe, raise the question of how these developments are compatible with the low level of job creation in traditional industries in the Mid-Western US. The call for a correction of these imbalances by a protectionist trade policy is initially understandable. Thus, the descriptive analysis in the previous sections may explain motivations for the increasingly protectionist rhetoric of the US administration. Nevertheless, the identified economic imbalances are most likely not solved by a protectionist trade policy. On the contrary, the threat of worldwide counteractive protectionist measures will not only harm main US trading partners, but will predominantly threaten the stability of global economy.

The aim of the quantitative analysis is to quantify the possible triggered economic effects that the three new most likely US trade policies have. The essential objective in the analysis is a quantification of all trade effects that take place. First, the direct response of trade flows to an increase in tariffs and secondly, general equilibrium effects, such as price adjustments for consumers and the indirect increase in production costs. Trade protectionism can certainly benefit individual stakeholders, yet being at disadvantage for a majority of economic agents. It is, therefore, the quantification of general equilibrium welfare effects that is particular interest to avoid any political misguidance.

5.1 Methodology of a General Equilibrium Model and Data

The underlying ifo Trade Model, described in detail in Aichele et al. (2014) and Aichele et al. (2016) is a static, general equilibrium model of international trade and is used to analyze different political scenarios. It encompasses 43 countries as well as the rest of the world (ROW) and a detailed structure for 50 goods sectors. Trade flows are impeded by tariffs and non-tariff barriers. The model covers more than 90 percent of global value added. Data for the value-added linkages are derived from a global input-output database (WIOD 2017). The trade-policy scenarios – which are described in detail in the following subsections – are based on the following thought experiment: If the USA introduces a protectionist trade policy in the world observed today by reintroducing tariffs and establishing non-tariff trade barriers, how would gross household income, trade flows, and sectoral production structures look like in this alternative world?

Our base year for the simulations is the year 2014, for which we have a complete dataset with the technological conditions for 43 countries as well as the rest of the world (ROW) at detailed level for 50 sectors. It should be emphasized that the ifo Trade Model allows for a real economic analysis with a very deep sectoral heterogeneity. Further keep in mind that , in contrast to macroeconomic models, this does not take into account any dynamic effects, such as capital accumulation, savings and investment behavior over time. Similarly, no monetary aspects or exchange rate policies are simulated here. The potential dynamic effects of trade, such as innovation activities of firms or

diffusion of technologies, remain outside the scope of this analysis. Instead, the contribution of the ifo Trade Model is the quantification of structural adjustments; in other words, how production structures within sectors and across trading parterns respond to shocks in the long run. The nature of the static model provides lower bounds for the long-run equilibrium effects on trade flows, gross household income etc.

Our most important data source comes from Timmer's et al. (2015) World Input-Output Database (WIOD). The database provides sectoral production values, sectoral value-added information, and bilateral intermediate and final goods trade flows with producer and consumer prices (incl. services). Thus, bilateral input-output tables and value-added levels can be constructed. WIOD distinguishes industries into 56 different sectors. To implement the simulations, we aggregate the 56 sectors from the WIOD into 50 sectors while still maintaining the sectoral level of detail in agricultural and manufacturing. The current WIOD database provides the latest available data in harmonized form for goods and services transactions, and is compatible with the input-output tables of different countries. Data on bilateral tariffs is retrieved from the World Integrated Trade Solutions (WITS TRAINS), as well as the integrated database (IDB) of the WTO. The estimated demand elasticities are based on the obtained results by Felbermayr et al. (2017).

Figure 30 shows how the results of the simulation model are to be interpreted correctly. The figure depicts the time path of GDP per capita that would emerge with and without US protectionism. The simulated long-term effect then is the vertical distance between GDP per capita's time path without US protectionism and the time path of GDP per capita with US protectionism. Besides, note that the static nature of the model does not affect the equilibrium growth rate. However, the level of GDP per capita (the time path) is shifted vertically downwards by the policy intervention. The adjustment of variables takes place continuously over a period of several years. How long the adjustment process takes is conditional on the specific regulations within the protectionist policies. It is within the realms of possibility that an isolationist US trade policy might not trigger an immediate recession, but rather only cause an extended phase of slower growth.

Figure 28: Stylized GDP adjustment path
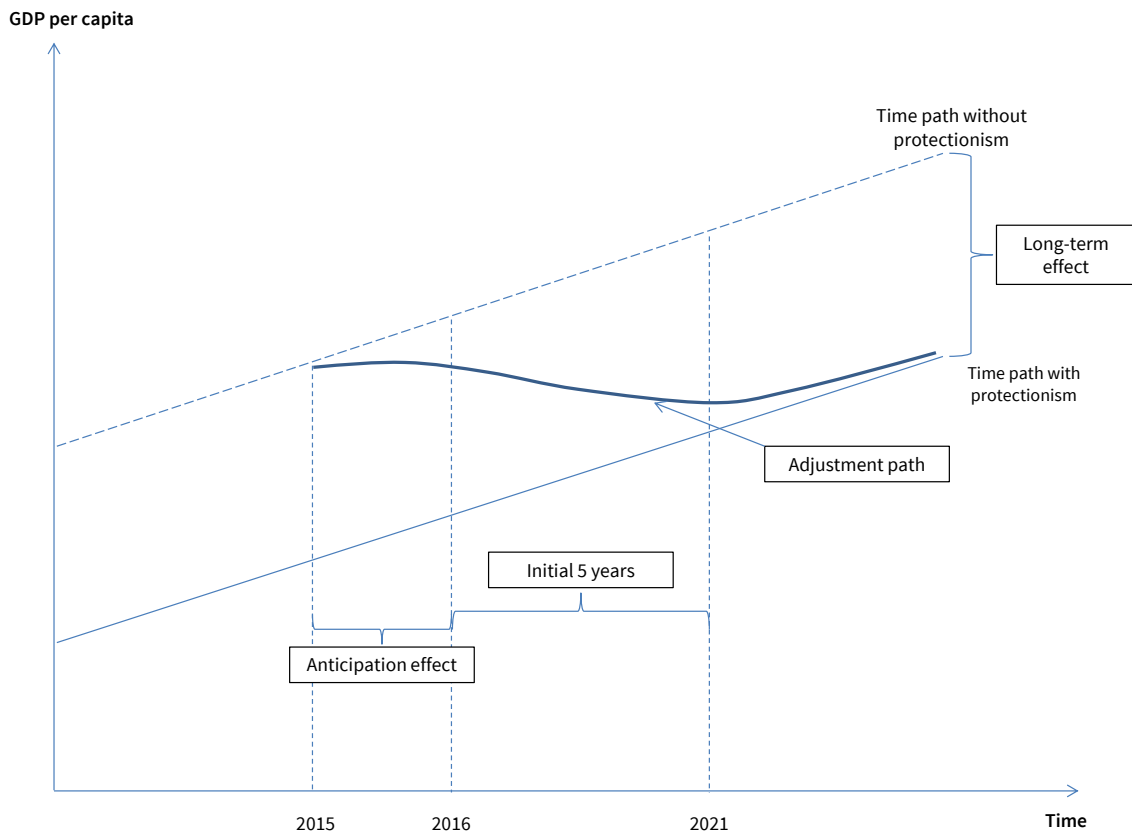
Source: ifo Trade Model

5.2 Scenarios

This subsection presents the actively communicated trade US policies that are possibly imple-
mented by the current US administration in more detail. Additionally, an isolation of the US market –
as far as possible under the WTO agreement – is simulated. Due to the uncertainties in the potential
design of a US protectionist policy, it is necessary to quantifying different scenarios. All these
scenarios are based on data where the experience with existing trade agreements is the starting
point for the expectations of a future regime between the EU, the USA and third parties. The analysis
presents changes in gross household income – often referred to as welfare in the literature – and
the change in the real wages of all countries. Furthermore, changes in trade flows are presented at
sectoral and country level.

Szenarien:

  I: USA – NAFTA

  II: Border Tax Adjustment

  III: USA – WTO

I: Withdrawal from NAFTA.   The first scenario considers the expected economic consequences of a reintroduction of US trade barriers with NAFTA countries. In doing so, possible tariff adjustments and non-tariff barriers between the NAFTA countries are taken into account. The simulations first quantifies direct trade effects between the three trading partners and secondly, quantifies welfare effects within each country. In addition, trade diversion effects that do have an impact on the rest of the world are identified. A more detailed explanation of the exact measures and results of the first simulation are found in the corresponding subsection.

II: Introduction of a Border Tax Adjustment.   As part of a tax reform the US adminstration has announced plans to discriminate against foreign suppliers and favor national suppliers. This discrimination against foreign suppliers is to be achieved by introducing a so-called "Border Tax Adjustment" in combination with a cash flow tax. Implicitly, such a tax policy means that US imports are subject to a protective tariff. The introduction of such a trade policy could not only affect the foreign suppliers, but also the US citizens. It is, therefore, of general interest that such a tax policy to be evaluated quantitatively. In our scenario, we assume a 20 percent import tax and a percentage-equivalent export subsidy for American producers. Scenario II shows the effects of the increased import tax and simultaneously introduced export subsidies. The current US government is expecting an increase in domestic production and thus an increase in jobs after implementing such tax policies. Their rationale is based on more expensive imports by taxation and cheaper exports due to the subsidy. Our quantitative analysis will show which countries will gain by this trade policy and who loose out.

III: Protectionist US Trade Policy with Respect to the Rest of the World.   In principle, it is possible for the US to introduce an even stronger protectionist trade policy by systematically raising tariffs on all traded goods. In this last scenario, the following thought experiments are simulated: The US increases tariffs across all product lines. The first sub-scenario assumes a one-sided US tariff increase of 20 percent (scenario IIIa). The second sub-scenario (scenario IIIb) further introduces an increase in tariffs by US trading partners against the US, thus simulating tariff retaliation in response to the increased US import duties. The third scenario (scenario IIIc) includes the tariff increase from sub-scenario IIIa and also models a simultaneous 20 percent increase in non-tariff barriers against all US trading partners. Sub-scenario IIId goes further and include all tariff and non-tariff measures from the previous three sub-scenarios, but also introduces a retaliating 20 percent raise in non-tariff barriers by all countries against the US. In last scenario, the trade tariffs for all imported goods are increased to "Bound Tariff Level" under the WTO rules. The detailed explanation for these scenarios are found in the corresponding subsection.

5.3 USA – NAFTA

Canada's, Mexico's and the US' economic development has been strongly influenced by the North American Free Trade Agreement since 1994. The plans of the new US administration could therefore have serious consequences for firms and employees in NAFTA member countries, and even affect

outside countries. The US-NAFTA scenario (scenario I) considers the expected economic conse-
quences from a reintroduction of US trade barriers in the NAFTA area. In doing so, possible tariff
adjustments and non-tariff barriers between the participating countries are taken into account. The
tariffs are raised by the USA to the trade-weighted MFN tariff level against Canada and Mexico. The
Figures 29 and 30 depict the percentage point increase in tariffs for this thought experiment. For
Canada, the largest tariff changes are to be found in the agricultural sector, food and beverages
(sector 5). Similarly, Mexico will face significant tariff increases in the textile, food and wood prod-
ucts sectors. Traditional production sectors of mechanical engineering, electronics, or furniture
manufacturing will see only small tariff increases, while the Mexican vehicle industry (sector 20) will
be hit relatively hard by higher protectionist tariffs. For illustrative purposes of the effects, Scenario
Ia only depicts the increase in US tariffs against Mexico and Canada. Scenario Ib shows the effects
of the NTB increase, and scenario Ic – the overall scenario – takes into account both effects.

Figure 29: Scenario I – Change in US tariffs against Canada, in %-points
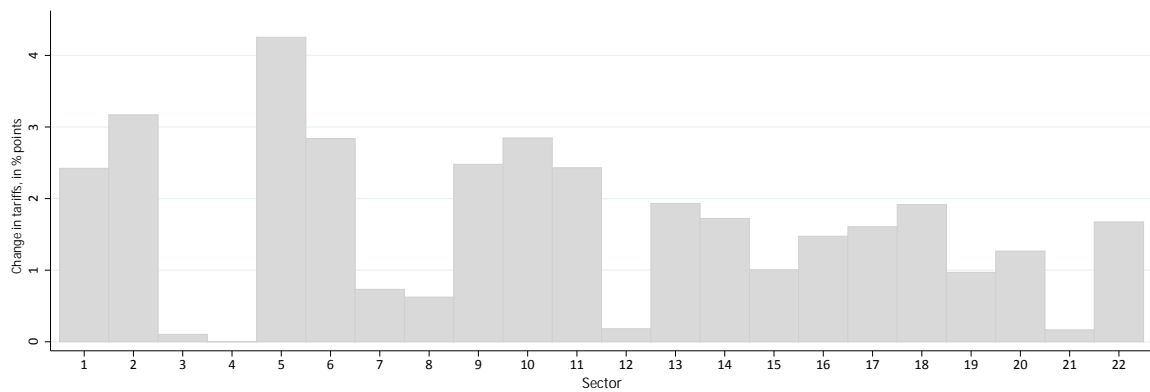
Source: ifo Trade Model

Figure 30: Scenario I – Change in US tariffs against Mexico, in %-points
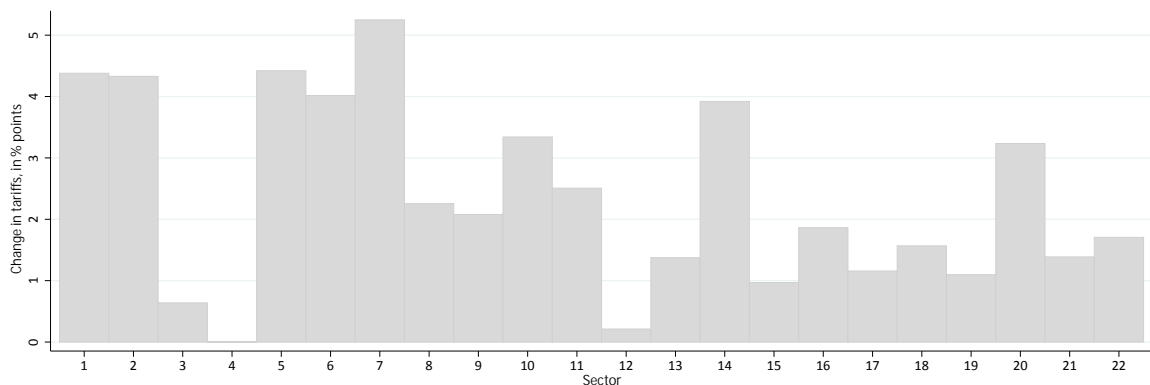
Source: ifo Trade Model

The non-tariff trade barriers are estimated in analogy to Felbermayr et al. (2017) by a standard
gravity model. By modeling the trade-influencing factors between different trading partners, the
causal effect of regional trade agreements on trade flows can be estimated. The change in non-tariff
barriers is shown in Figure 31 for all 50 sectors. The non-tariff barriers between the US, Mexico and
Canada is reintroduced in our simulation.

Figure 31: Scenario I – Change in NTBs in percent
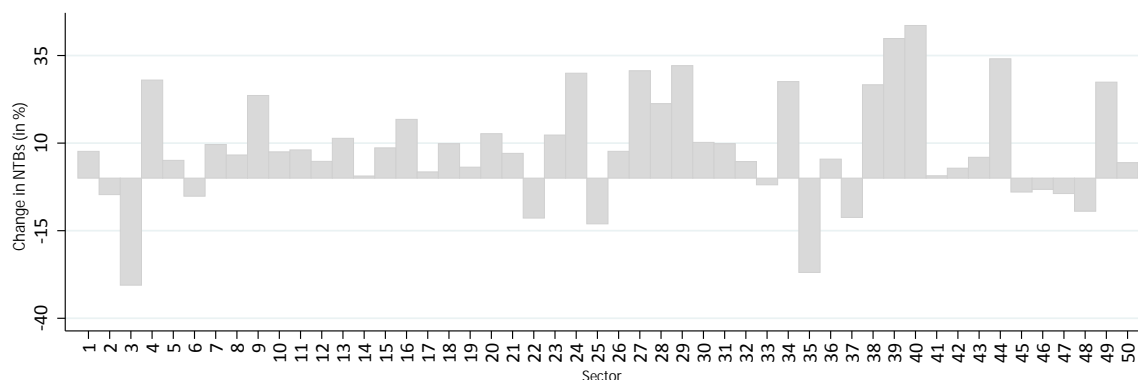
Source: ifo Trade Model

At first, the simulation quantifies direct trade effects between the three trading partners and secondly, quantifies welfare effects within each country. In addition, predicted trade effects with the rest of the world that are likely based on expected trade diversion effects are reported. Recall and keep in mind that the simulated predictions are of conservative nature and can be interpreted as a lower bound.

Change in the Gross Household Income (USA – NAFTA).   Table 8 shows the predicted change in gross household income for all 43 countries (inlc. ROW) considered in the model. Revoking NAFTA will result in gross household income losses for all NAFTA members. Canada will suffer a gross household income loss of 1.54 percent, Mexico's gross household income drops by 0.96 percent, and the US is losing 0.22 percent of its gross household income. The effects in all three countries are primarily driven by the increase in non-tariff barriers (NTBs). As Mexico and Canada are among the largest US trading partners, it is not surprising that the relatively conservative simulation suggests substantial effects. Our simulation onyl incorporates a unilateral increase in US barriers to Mexico and Canada. Theoretically, these two states could introduce retaliation measures that would be more detrimental to the US than in the considered model. Hence, the results are – especially for the US – relatively conservative.

There will be heterogeneity within the US on how US-American states are affectd individually. For example, 87 percent of North Dakota's exports are directed to Canada and Mexico while 60 percent of its imports come from the other two NAFTA members. In particular, the automotive industry in Michigan where main manufacturing plants of General Motors, Ford and Chrysler are located will feel the effects of protectionist policies as the industry in highly dependent on intermediate goods from NAFTA countries. 65 percent of exports and 72 percentage of imports in Michigan are to and from NAFTA countries. Trade barriers will undoubtedly change production and employment structures. At this point, it is important to note that pure tariff and exclusive NTB adjustments are not additive. Due to composition effects, the scenario simulating both tariffs and NTB adjustments may differ from the summing over the two individual scenarios. For all countries outside of NAFTA, the dissolution of the agreement would only have minor effects on gross household income. Changes in gross household income for non-NAFTA members range between -0.02 percent and 0.09 percent. These minor effects are unsurprising since changing trade structure between NAFTA members

only indirectly affects outside countries. An indirect channel might have the following structure: Lower demand in Mexico resulting from lower gross household income caused by revoking NAFTA might lead reduce demand for products from outside trading partners like the EU. Therefore, some countries lose out in the "Tariffs and NTBs" scenario (e.g. Latvia, Greece and Portugal) whereas other countries, such as Germany, Spain and France, benefit to a small extent from trade diversion effects.

Table 8: Scenario I – Change in real gross household income, in %

	Tariffs only	Change in % NTBs only	Tariffs and NTBs		Tariffs only	Change in % NTBs only	tariffs and NTBs
Australia	-0.0003	0.0098	0.0089	Ireland	0.0025	-0.0004	0.0011
Austria	-0.0042	0.0079	0.0053	Italy	0.0007	0.0095	0.0118
Belgium	-0.0008	0.0244	0.0250	Japan	0.0041	0.0115	0.0137
Bulgaria	0.0022	-0.0038	-0.0035	South Korea	0.0063	0.0407	0.0481
Brazil	0.0036	-0.0012	-0.0011	Lithuania	-0.0003	0.0474	0.0426
Canada	-0.1886	-1.3750	-1.5436	Luxembourg	-0.0019	0.0659	0.0641
Switzerland	0.0034	0.0169	0.0171	Latvia	-0.0003	-0.0102	-0.0082
China	-0.0026	0.0132	0.0132	Mexico	0.0140	-0.9619	-0.9607
Cyprus	0.0043	-0.0147	-0.0151	Malta	0.0082	0.0014	0.0101
Czech Republic	0.0013	0.0231	0.0231	Netherlands	0.0001	0.0341	0.0353
Germany	0.0025	0.0280	0.0291	Norway	-0.0014	0.0848	0.0850
Denmark	0.0030	0.0147	0.0170	Poland	0.0026	0.0040	0.0054
Spain	0.0066	0.0159	0.0210	Portugal	0.0039	-0.0017	-0.0037
Estonia	0.0036	0.0040	0.0071	Romania	0.0041	0.0021	0.0064
Finland	0.0037	0.0037	0.0011	ROW	-0.0000	0.0279	0.0376
France	0.0030	-0.0039	-0.0019	Russia	0.0004	0.0400	0.0406
United Kingdom	0.0032	0.0069	0.0044	Slovakia	-0.0004	0.0169	0.0218
Greece	0.0039	-0.0058	-0.0079	Slovenia	-0.0006	0.0064	0.0054
Croatia	0.0028	-0.0049	-0.0029	Sweden	0.0027	0.0143	0.0142
Hungary	-0.0009	0.0276	0.0285	Turkey	0.0021	0.0065	0.0037
Indonesia	0.0042	0.0067	0.0082	Taiwan	0.0006	0.0248	0.0274
India	0.0003	0.0120	0.0129	USA	0.0111	-0.2309	-0.2225

Source: ifo Trade Model

Change in Real Wages (USA–NAFTA).   In Table 9 we present the change in real wages in all 43 countries (incl. ROW). The calculated real wage is an average gross wage. As stated before, the predicted changes in variables are relative to the base year 2014. A termination of the free trade agreement induces a fall in real wages for all three NAFTA member states by 0.23 percent (USA), 0.90 percent (Mexico) and 1.44 percent (Canada). Canada is hardest hit, the least hit is the United States. Again, the result is of a conservative nature, since in our simulation only US is introducing higher barriers in the form of tariffs and non-tariff barriers. Vengeance by Canada and Mexico is ruled out by assumption in this simulation, yet doing so could aggravate the drop in the US real wage. The decline in real wage is mainly caused by the higher non-tariff barriers in Mexico and Canada. In the case of only higher levied tariffs, the real wages in Mexico and Canada declines only slightly. Changes in the real wage for outside countries even in overall scenario (tariffs and NTBs) are insignificant.

Table 9: Scenario I – Change in the real wage, in %

	Change in %				Change in %		
	Tariffs only	NTBs only	Tariffs and NTBs		Tariffs only	NTBs only	Tariffs and NTBs
Australia	-0.0003	0.0016	0.0006	Ireland	-0.0030	-0.0261	-0.0302
Austria	0.0006	0.0004	0.0026	Italy	0.0004	-0.0003	0.0016
Belgium	0.0029	0.0174	0.0138	Japan	0.0088	0.0156	0.0147
Bulgaria	-0.0014	0.0013	0.0079	South Korea	0.0001	0.0137	0.0148
Brazil	-0.0007	0.0046	0.0003	Lithuania	-0.0003	0.0340	0.0292
Canada	-0.1684	-1.2894	-1.4423	Luxembourg	-0.0019	0.0037	0.0019
Switzerland	-0.0016	-0.0021	-0.0051	Latvia	-0.0003	-0.0019	-0.0032
China	0.0001	-0.0026	0.0012	Mexico	0.0063	-0.9031	-0.8987
Cyprus	0.0000	-0.0018	-0.0022	Malta	0.0012	0.0034	0.0022
Czech Republic	0.0001	0.0031	0.0075	Netherlands	-0.0056	0.0039	0.0008
Germany	0.0003	0.0130	0.0048	Norway	0.0002	0.0326	0.0328
Denmark	-0.0005	0.0014	0.0003	Poland	-0.0014	0.0010	-0.0017
Spain	-0.0011	0.0087	0.0160	Portugal	-0.0006	-0.0005	0.0031
Estonia	-0.0006	0.0017	0.0006	Romania	-0.0013	-0.0002	-0.0013
Finland	-0.0004	-0.0063	0.0011	ROW	-0.0000	0.0363	0.0369
France	-0.0008	-0.0007	-0.0025	Russia	-0.0006	0.0194	0.0199
United Kingdom	-0.0004	0.0104	0.0079	Slovakia	0.0010	0.0059	0.0133
Greece	-0.0003	0.0025	0.0103	Slovenia	0.0025	-0.0025	0.0019
Croatia	-0.0011	0.0017	-0.0002	Sweden	-0.0013	0.0067	0.0026
Hungary	0.0004	0.0078	0.0100	Turkey	-0.0007	-0.0017	0.0027
Indonesia	0.0095	0.0048	0.0015	Taiwan	0.0019	-0.0001	0.0037
India	0.0055	0.0016	0.0076	USA	-0.0102	-0.2241	-0.2314

Source: ifo Trade Model

Change in US Trade (USA–NAFTA).   From the macroeconomic perspective presented so far, it is evident that Mexico, Canada and the US would experience a negative wealth shock by dissolving NAFTA. This results is anything but surprising as trade between the three member countries integrated their economies. In a next step we examine the changes in trade structures between the NAFTA countries in response to the different US trade policies. Further, it is analyzed whether trade between the US and outside countries is shifting, and if potential negative effects could be compensated. Table 10 shows the change in bilateral US exports with all countries available in the employed dataset. Additionally, we report the export value (in millions USD) to the respective country, in order relate the predicted percentage changes to absolute export values. The strongest US export reductions are to Mexico (-9.82 percent) and Canada (-11.43 percent). Accordingly, goods and services exports to Canada plunge by USD 33 billion and to Mexico by USD 17 billion. The extreme reduction in exports in the double-digit range can hardly be compensated for by increasing exports to Europe and the rest of the world. Thus, the loss of exports to Mexico and Canada, two countries that are among the most important US export destinations, can not be compensated for by trade diversion effects.

Evidently, imports from Canada and Mexico would fall sharply. The relative import rate with America's most important import partners would even drop by more than 20 percent, or USD 74 billion. Imports from Mexico would go down by 14 percent (USD 36 billion). Trade diversion can only compensate to a small extent for the reduction of imports from NAFTA countries. Additional imports of

Table 10: Scenario I – Change in bilateral US exports, in %

	Exports in million USD	Change in % Tariffs only	Change in % NTBs only	Tariffs and NTBs		Exports in million USD	Change in % Tariffs only	Change in % NTBs only	Tariffs and NTBs
Australia	26758	-0.14	-1.1	-1.22	India	15846	-0.09	-1.03	-1.12
Austria	4562	-0.12	-0.96	-1.07	Ireland	60924	-0.03	-0.11	-0.14
Belgium	29823	-0.06	-0.78	-0.84	Italy	19612	-0.1	-1.44	-1.54
Bulgaria	545	-0.08	-1.13	-1.2	Japan	63598	-0.09	-1.06	-1.15
Brazil	40168	-0.09	-2.64	-2.74	South Korea	43853	-0.09	-0.98	-1.07
Canada	289808	-1.94	-9.82	-11.43	Lithuania	429	-0.15	-1.27	-1.4
Switzerland	13245	-0.13	-1.23	-1.35	Luxembourg	20852	-0.03	0.03	0.01
China	110369	-0.13	-1.06	-1.18	Latvia	232	-0.1	-0.63	-0.72
Cyprus	140	-0.08	-0.98	-1.05	Mexico	176284	0.01	-9.8	-9.82
Czech Republic	2739	-0.09	-0.63	-0.72	Malta	354	-0.05	-2.58	-2.65
Germany	79446	-0.09	-0.7	-0.79	Netherlands	47883	-0.06	-1.21	-1.28
Denmark	6802	-0.06	-0.49	-0.54	Norway	6367	-0.11	-1.39	-1.5
Spain	10933	-0.13	-2.18	-2.32	Poland	4572	-0.11	-0.79	-0.9
Estonia	242	-0.11	-0.74	-0.85	Portugal	1563	-0.07	-1.36	-1.43
Finland	6185	-0.07	-0.73	-0.8	Romania	1219	-0.06	-2.9	-2.98
France	57650	-0.08	-1.88	-1.97	Russia	7039	-0.21	-1.27	-1.46
United Kingdom	73643	-0.12	-1.19	-1.31	Slovakia	760	-0.09	-0.8	-0.89
Greece	2270	-0.05	-0.62	-0.66	Slovenia	306	-0.07	-1.28	-1.35
Croatia	480	-0.08	-0.62	-0.7	Sweden	13539	-0.06	-0.35	-0.41
Hungary	3397	-0.07	-0.44	-0.51	Turkey	8283	-0.12	-2.24	-2.37
Indonesia	5848	-0.12	-0.95	-1.07	Taiwan	16352	-0.1	-1.76	-1.86

Source: ifo Trade Model

USD 29 billion come from other countries, such as Germany. In absolute terms the import trade with China, Japan and Germany is increasing the most. It is, however, clear that the close and long-term trade relations with the NAFTA countries are very difficult to replace for the US.

Table 11: Scenario I – Change in bilateral US imports, in %

	Imports in million USD	Change in % Tariffs only	Change in % NTBs only	Tariffs and NTBs		Imports in million USD	Change in % Tariffs only	Change in % NTBs only	Tariffs and NTBs
Australia	10136	0.19	1.07	1.25	India	36474	0.2	1.99	2.2
Austria	9966	0.35	2.45	2.76	Ireland	31924	0.15	0.86	1
Belgium	23695	0.14	2.46	2.6	Italy	44966	0.3	1.74	2.02
Bulgaria	623	0.16	1.27	1.42	Japan	120174	0.52	3.7	4.14
Brazil	29088	0.17	2.57	2.74	South Korea	77881	0.38	3.17	3.49
Canada	348576	-3.35	-18.17	-21.17	Lithuania	1546	0.08	9.34	9.49
Switzerland	32898	0.15	1.06	1.21	Luxembourg	257	0.07	1.48	1.55
China	344939	0.23	1.31	1.54	Latvia	208	0.2	0.51	0.71
Cyprus	114	0.09	0.57	0.65	Mexico	265531	0.3	-13.92	-13.68
Czech Republik	3764	0.24	1.99	2.21	Malta	105	0.19	1.67	1.86
Germany	134374	0.43	2.87	3.24	Netherlands	26568	0.13	1.41	1.54
Denmark	7687	0.19	1.35	1.53	Norway	6681	0.12	3.37	3.51
Spain	16954	0.24	5.09	5.33	Poland	5251	0.21	1.62	1.82
Estonia	427	0.17	1.19	1.36	Portugal	3113	0.17	3.64	3.83
Finland	7135	0.18	2.37	2.55	Romania	1932	0.21	1.44	1.63
France	49168	0.2	1.44	1.64	Russia	14743	0.06	5.88	5.98
United Kingdom	85289	0.22	1.87	2.08	Slovakia	1579	0.65	4.24	4.79
Greece	904	0.1	2.95	3.06	Slovenia	514	0.22	1.99	2.2
Croatia	603	0.17	1.34	1.5	Sweden	12610	0.24	2.19	2.41
Hungary	4910	0.46	2.96	3.35	Turkey	10128	0.2	1.48	1.67
Indonesia	19475	0.23	0.4	0.63	Taiwan	33812	0.24	1.6	1.82

Source: ifo Trade Model

Next to predicting possible changes in bilateral trade structures, the ifo Trade Model is able to esti-

mate changes in exports and imports at the sector level. A detailed list of predictions for each sector is given in Tables 12 and 13 where only the overall scenario is presented for illustrative purposes. Recall that the overall scenario includes the increase in both tariffs and non-tariff trade barriers. For US industries, exports in each sector plunge by at least 1.25 percent (fishery) and at maximum of 13.98 percent (coal and petroleum). Exports in the critical automotive sector fall sharply by 9.86 percent. The change in Canadian exports is heterogeneously distributed across sectors. The effects tend to be larger in magnitude than in the US. Notably, exports in the fishery sector expand strongly (66 percent), while export volume in the automotive industry, as in the US, contracts by more than 35 percent. In Mexico, the automotive industry is also clearly worse off as exports decline by 20.36 percent. More detailed effects are to be found in Tables 12 and 13. Exports in the European countries are affected marginally. In Germany, the changes in exports across all goods sectors lie strictly within an interval of -1 percent to +1 percent. Export contractions in the range of only 2.5 percent and 0 percent in the US services sectors, support the claim from before that US services react relatively intensive to economic shocks. Remarkably, the Canadian service providers largely increase their exports. 80 percent of the Canadian service sectors expand their export sales. Only the wholesale and retail trade suffers severely from the revocation of NAFTA. In Mexico, the decline in exports in the service sector is of minor importance. However, this is the general observed pattern for the service sector.

Table 12: Scenario I – Change in the sectoral exports and imports of goods, in %, for the USA, Canada, Mexico and Germany

| | Change in trade in % | | | | | | | |
| | Exports | | | | Imports | | | |
	USA	Canada	Mexico	Germany	USA	Canada	Mexico	Germany
Other means of transport	-2.36	-1.08	-8.48	-0.02	-4.30	-6.27	-6.78	0.19
Mining	-6.57	-33.36	-22.36	0.36	-20.02	-10.92	-8.16	0.34
Chemical produces	-2.80	-12.11	-3.28	0.17	-1.04	-6.75	-6.97	0.18
Computer etc.	-2.31	12.42	0.54	-0.06	0.54	-5.80	-3.06	0.21
Print and reproduction	-5.47	-18.86	4.11	0.03	-28.84	-11.36	-6.75	0.55
Electrical machinery etc.	-5.21	-11.85	-22.07	0.23	-4.11	-7.91	-5.90	0.31
Vehicles	-9.86	-35.51	-20.36	0.87	-7.13	-13.34	-12.82	0.41
Fishery	-1.25	66.49	31.15	0.04	17.90	-3.94	-9.30	0.20
Forestry	-8.40	15.92	19.15	-0.21	2.38	-10.64	-5.38	0.22
Basic metals	-6.37	-0.75	-4.93	-0.07	-1.51	-9.60	-10.45	0.24
Wood and wood products	-5.11	-7.37	-9.00	-0.09	-8.71	-10.86	-5.56	0.21
Rubber and plastic	-5.67	-15.58	-7.74	0.00	-5.80	-8.44	-7.53	0.28
Coal and refined mineral oil	-13.98	-11.11	-0.58	0.88	6.37	-23.23	-18.72	0.05
Mechanical engineering	-5.72	10.02	4.34	0.03	1.96	-12.73	-5.93	0.34
Furniture etc.	-3.41	26.23	28.89	-0.32	6.39	-10.61	-5.49	0.26
Food, beverages and tabacco	-5.05	-6.02	2.71	0.02	-1.68	-10.53	-10.61	0.24
Agricultural crops etc.	-2.90	3.10	-5.50	0.02	-3.61	-10.22	-8.80	0.21
Paper	-4.21	-3.00	-4.26	0.07	-2.35	-7.51	-6.81	0.17
Pharmaceutical products	-5.24	12.37	26.55	-0.48	1.60	-11.38	-18.69	0.30
Textiles and leather	-3.27	7.38	17.92	0.03	0.63	-4.96	-5.73	0.20
Processed metals	-3.74	-8.73	-8.72	0.04	-2.62	-7.43	-6.26	0.24
Non-metal minerals	-4.03	1.85	2.88	0.05	1.00	-7.94	-6.70	0.21

Source: ifo Trade Model

The changes in US imports are heterogenous across the goods sectors. While, on the one hand, American imports in the printing sector fall by 28.84 percent, the fishery sector, on the other hand, experiences an export boom of 17.90 percent. Unlike US imports, Canadian and Mexican imports are contracting in all goods and agricultural sectors. The largest reduction in imports is identified in the Canadian (-23.23 percent) and Mexican (-18.72 percent) coal industry. In Germany, imports increase between 0.05 percent and 0.55 percent across all goods and agricultural sectors.

Table 13: Scenario I – Change in the sectoral exports and imports of services, in %, for the USA, Canada, Mexico and Germany

| | Change in trade in % | | | | | | | |
| | Exports | | | | Imports | | | |
	USA	Canada	Mexico	Germany	USA	Canada	Mexico	Germany
Wastewater etc.	-0.91	12.45	n.a.	0.14	1.96	-6.93	-7.33	0.16
Other services	-1.82	3.33	n.a.	-0.10	0.54	-9.50	-5.94	0.29
Architecture etc.	-0.43	-13.04	-0.68	0.05	-1.73	-9.18	-4.90	0.18
Construction business	-0.42	1.37	-2.03	0.05	-0.37	-9.38	-6.77	0.23
Computer programming etc.	-0.31	3.66	n.a.	0.00	0.06	-9.44	-7.03	0.22
Retail industry	-2.42	-14.42	-19.09	0.01	-10.53	-9.06	-7.51	0.25
Energy supply	-0.86	3.91	0.32	0.11	0.25	-9.70	-6.87	0.27
Education and schooling	-0.41	7.56	n.a.	0.17	2.93	-10.23	-7.36	0.30
Movies, videos and television	-1.00	11.35	4.70	0.10	2.16	-8.66	-6.86	0.15
Financial services	-0.50	-0.74	1.11	0.10	-6.55	-9.89	-7.51	0.23
Hotel and restaurant business	-0.56	17.39	n.a.	0.07	29.84	-8.14	-3.91	0.27
Health and social services	-0.31	-8.75	n.a.	0.17	-5.09	-10.03	-5.41	0.61
Wholesale	-0.89	-17.31	-18.18	0.05	-17.27	-7.65	-6.80	0.34
Wholesale excl. vehicles	-0.07	4.26	-11.50	-0.01	-1.97	-9.18	-7.49	0.22
Real estate etc.	-0.23	5.23	n.a.	0.13	0.45	-9.92	-4.06	0.24
Warehousing	-0.18	5.24	4.28	0.11	3.60	-8.00	-6.40	0.19
Overland transport etc.	-0.60	4.21	-3.65	0.09	-1.21	-7.44	-7.05	0.21
Air transport	-1.36	2.61	-0.13	0.02	0.66	-6.86	-5.66	0.14
Postal and courier services	-0.57	4.52	n.a.	0.09	-0.26	-8.57	-7.05	0.00
Legal consulting	-0.54	2.52	n.a.	0.13	0.31	-9.26	-6.79	0.22
Telecommunication	-0.70	-1.97	1.90	0.10	-7.99	-9.22	-6.60	0.16
Publishing industry	0.00	2.08	n.a.	0.17	0.38	-7.84	-5.42	0.22
Insurance services	-0.22	4.89	3.40	0.05	0.41	-9.28	-5.67	0.23
Administration	-0.76	5.87	5.09	-0.02	0.66	-8.63	-7.53	0.25
Water transport	-0.36	3.90	-3.08	0.18	-0.46	-5.30	-7.09	0.17
Water supply	-0.36	n.a.	n.a.	0.20	0.72	-3.98	-6.42	0.22
Academic research	-0.10	5.04	4.63	0.16	0.88	-9.65	-4.31	0.22
Public administration	-0.99	6.63	n.a.	0.18	2.89	-9.86	-7.31	0.23

Source: ifo Trade Model

US service imports decline in specific sectors only. Retailers and wholesalers import 10.53 percent and 17.27 percent less than in the base year. Besides, imports in the financial services sector would fall by 6.55 percent. Yet, some US services sectors see their imports increasing relative to the base year, whereas Mexican and Canadian service imports decline in every sector. These effects are negligible small for Germany.

Changes in the Sectoral Value-added Structure (USA–NAFTA). In a next step, we consider the changes sectoral value-added. Table 14 shows the effects for the USA (equivalent for Mexico and Canada is given in Tables 30 and 31 in the Appendix). The US mining industry (5.3 percent), wood and wood products (0.9 percent), print and reproductive media (1 percent), rubber and plastic (0.5 percent), processed metals (0.1 percent), and electrical machinery (1.7 percent) are able to increase their sectoral value added after revoking the NAFTA. These increases, nonetheless, do not compensate for the losses in the remaining sectors. All US agricultural sectors suffer from a potential termination of the NAFTA. These include, for example, crops (-0.1 percent), food and beverages (-0.2 percent) and the fishery sector (-5.9 percent); classical production sectors tend to lose out substantially. Most US service providers gain homogeneously between 0.1 percent and 0.8 percent in value added. Only individual sectors, such as air transport (-0.3 percent), contract in value added. Again, it has to be emphasized that the scenario is merely based on a unilateral increase in tariffs and non-tariff barriers. In the case of political retaliation by Mexico and Canada in the form of higher tariffs and NTBs against the US the effects on the service sectors could be significantly worse. By dividing the overall scenario into a pure tariff and NTB scenario, it can be concluded that the reintroduction of non-tariff barriers rather than tariffs drives the sharp decline in value added in most sectors. The increase in tariffs only leads to small sectoral losses. Once more, it can be verified by Tables 30 and 31 (Appendix) that Mexico and Canada feel the strong negative effects of a NAFTA resolution.

Table 14: Scenario I – Change in sectoral value added in the USA

	share in nat. SVA	VA Bench in million USD	Change in % Tariffs only	Change in % NTBs only	Change in % Total
Agricultural crops etc.	1.0	177154.9	0.1	-0.2	-0.1
Forestry	0.1	23752.4	-0.1	-1.7	-1.9
Fishery	0.1	14505.3	0.2	-6.2	-5.9
Mining	2.6	455587.9	-0.2	5.5	5.3
Food, beverages and tabacco	1.4	243252.8	0.1	-0.3	-0.2
Textile and leather	0.2	27698.3	0.0	-1.3	-1.3
Wood and wood products	0.2	28804.7	0.3	0.6	0.9
Paper	0.3	55730.2	0.0	-0.3	-0.2
Print and reproduction	0.2	38300.7	0.1	0.9	1.0
Coal and refined mineral oil	1.1	182719.1	0.0	-2.8	-2.8
Chemical produces	1.5	267111.0	0.0	-0.3	-0.3
Pharmaceutical products	0.5	95466.8	-0.2	-1.2	-1.4
Rubber and plastic	0.4	75501.3	0.1	0.4	0.5
Non-metal minerals	0.3	46790.6	0.0	-0.4	-0.4
Basic metals	0.4	60860.5	-0.1	-0.1	-0.2
Processed metals	0.8	147060.3	0.0	0.1	0.1
Computer etc.	1.5	269400.2	-0.1	-0.7	-0.8
Electrical machinery, etc.	0.3	54138.5	-0.1	1.8	1.7
Mechanical engineering	1.0	175011.7	-0.1	-1.6	-1.7
Vehicles	0.8	141160.4	0.2	1.8	2.0
Other means of transport	0.7	127798.2	0.1	-0.3	-0.2
Furniture etc.	0.6	105838.9	0.1	-2.9	-2.8
Energy supply	1.6	272719.3	0.1	0.2	0.2
Water supply	0.1	9317.5	0.1	0.1	0.2
Wastewater etc.	0.2	43149.8	0.0	-0.1	-0.1
Construction business	3.8	665784.7	0.1	0.2	0.3
Wholesale	1.5	254915.8	0.1	0.8	0.8
Wholesale excl. vehicles	6.0	1044654.6	0.0	0.2	0.2
Retail industry	4.7	815873.8	0.1	0.3	0.4
Overland transport, etc.	1.4	240382.3	0.0	0.1	0.1
Water transport	0.1	18593.4	0.0	0.0	0.1
Air transport	0.5	84343.9	0.0	-0.3	-0.3
Warehousing	0.6	106151.1	0.0	0.1	0.1
Postal and courier services	0.3	57439.3	0.0	0.0	0.1
Hotel and restaurant industry	2.8	487443.1	0.1	-0.0	0.0
Publishing industry	1.2	210656.4	0.0	0.2	0.2
Movies, videos and television	1.2	200183.2	0.0	0.1	0.1
Telecommunication	1.9	326912.4	0.1	0.2	0.2
Computer programming etc.	1.9	338228.6	0.0	0.2	0.2
Financial services	2.8	488091.5	0.0	0.2	0.2
Insurance services	4.2	734910.1	0.0	0.2	0.2
Real estate etc.	11.8	2059167.8	0.1	0.2	0.3
Legal consulting	4.0	693747.3	0.0	0.1	0.2
Architecture etc.	2.6	448149.7	0.0	0.3	0.3
Academic research	0.8	140414.4	0.0	0.2	0.2
Administration	3.9	672084.6	0.0	0.1	0.1
Public administration	13.1	2277284.5	0.1	0.2	0.3
Education and schooling	1.1	192772.7	0.1	0.2	0.2
Health and social services	7.1	1227401.6	0.1	0.2	0.3
Other services	2.6	458561.2	0.1	0.2	0.2

Source: ifo Trade Model

5.4 Border Tax Adjustment

The current US government has announced that it will impose a so-called cash flow tax on foreign input suppliers as part of a general tax reform. In addition to the intended discrimination against foreign suppliers, this tax will be suspended for US exporting firms to foster aggregate exports. Technically, this tax policy is equivalent to a subsidy of domestic value added. In our simulation framework, this export subsidy is introduced at a rate of 20 percent for all US exporting products. A cash flow tax is also implemented by the same amount for all US imported products.

The current US government expects an increase in domestic output and additional demand for domestic workers. This expectation is based on the notion that imports are becoming more expensive by taxation and exports are becoming cheaper due to the subsidy. This is intended to stimulate domestic production and dampen imports. The general "BTA" literature is of the opinion that long-run (e.g. ten years) exchange rate effects neutralize the BTA mechanisms and thus leaving the trade balance unchanged in the long term.

The BTA could strengthen the USD, thereby making US imports relatively cheaper and US exports relatively more expensive for the rest of the world. A study by the Peterson Institute finds that exchange rate effects completely neutralize the BTA intentions through higher prices of domestic and imported goods. No significant changes in the current account are identified by Freund (2017). On the basis of these generally accepted macroeconomic relationships, this study also assumes that the exchange rate neutralizes tax policy and the trade balance does not change in the long-run.

Macroeconomic Consequences of a „Border Tax Adjustment".   The results of the ifo Trade Model for a US BTA are presented below. Table 15 shows the change in gross household income for all countries available in the dataset. Contrary to what the US government intends, the model predicts that the US gross household income drops by 0.67 percent. Taiwan (-1.45 percent), Luxembourg (-1.3 percent), Norway (-1.1 percent), Germany (-0.86 percent), the Netherlands (-0.74 percent) and South Korea (-0, 73 percent) would suffer even more from the BTA than the US itself. Countries (e.g. Germany and China) that are highly integrated in the US value chains and internal market loose out disproportionately.

Change in Real Wages.   Changes in the real wages for all countries available in the dataset are depicted in Table 16. The impact for the US real wage is marginally positive with 0.04 percent. In Europe, the effects on the real wage are highly heterogeneous. While Austria (0.03 percent), Belgium (0.52 percent), France (0.46 percent), or the United Kingdom (0.75 percent) are able to increase their real wage, Germany (-0.22 percent) and Denmark (-0.05 percent) lose out from the US protectionist measures.

Change in US Trade (BTA).   As Table 16 indicates that the BTA leads to winners and losers across countries, it vital to grasp some understanding on the mechanisms at work. To answer this, trade relations between the US as an exporting and importing country with the rest of the world are considered first. Subsequently, potential trade diversion effects are examined. The aim of this

Table 15: Scenario II – Change in real gross household income, in %

| | Change in gross household income | | | | | | |
	in %		in %		in %		in %
Australia	0.22	Spain	0.27	Japan	0.26	ROW	1.3
Austria	-0.15	Estonia	0.24	South Korea	-0.73	Russia	-0.34
Belgium	0.34	Finland	0.31	Lithuania	-0.43	Slovakia	-0.38
Bulgaria	0.78	France	0.48	Luxembourg	-1.36	Slovenia	-0.39
Brazil	0.36	United Kingdom	0.76	Latvia	0.61	Sweden	-0.02
Canada	0.7	Greece	0.88	Mexico	0.3	Turkey	0.14
Switzerland	-0.56	Croatia	0.4	Malta	0.71	Taiwan	-1.45
China	-0.6	Hungary	-0.4	Netherlands	-0.74	USA	-0.67
Cyprus	1.02	Indonesia	0.01	Norway	-1.1		
Czech Republic	-0.67	India	0.24	Poland	-0.11		
Germany	-0.86	Ireland	-0.46	Portugal	0.57		
Denmark	-0.5	Italy	-0.1	Romania	0.36		

Source: ifo Trade Model

Table 16: Scenario II – Change in real wages, in %

| | Change in real wages | | | | | | |
	in %		in %		in %		in %
Australia	0.22	Spain	0.29	Japan	0.22	ROW	1.1
Austria	0.03	Estland	0.31	South Korea	-0.18	Russia	-0.03
Belgium	0.52	Finland	0.35	Lithuania	0.02	Slovakia	-0.05
Bulgaria	0.67	France	0.46	Luxembourg	0.1	Slovenia	-0.02
Brazil	0.32	United Kingdom	0.75	Latvia	0.54	Sweden	0.22
Canada	0.75	Greece	0.84	Mexico	0.34	Turkey	0.22
Switzerland	0.04	Croatia	0.41	Malta	0.66	Taiwan	-0.5
China	-0.25	Hungary	0.02	Netherlands	0.05	USA	0.04
Cyprus	0.95	Indonesia	0.04	Norway	-0.25		
Czech Republic	-0.16	India	0.24	Poland	0.05		
Germany	-0.22	Ireland	0.7	Portugal	0.52		
Denmark	-0.05	Italy	0.03	Romania	0.37		

Source: ifo Trade Model

exercise is to see whether countries generate their gross wage increase by substituting their trade relations towards new trading partners, or whether other mechanisms drive the adjustment. Table 17 shows the change in bilateral US trade flows (exports and imports) with third countries. The columns "Exports in millions USD" presents the value of US exports to the respective partner country in the initial scenario. Similarly, import values are listed in million USD. The "Change in percent" column gives the percentage change in respective US trade flow with the partner country. The taxation policy leads to a overall decline in US exports and imports across all partner countries. The relative magnitude in the reduction of bilateral exports is concentrated in the range of 5 to 7 percent while on the import side the relative decline is slightly lower and pooled between 3 to 5 percent.

Table 17: Scenario II – Change in US exports and imports to third countries, in %

	Exports		Imports			Exports		Imports	
	in million USD	Change in %	in million USD	Change in %		in million USD	Change in %	in million USD	Change in %
Australia	26758	-5.75	10136	-2.52	India	15846	-4.92	36474	-5.04
Austria	4562	-6.82	9966	-5.06	Ireland	60924	-6.18	31924	-2.52
Belgium	29823	-6.04	23695	-1.48	Italy	19612	-6.48	44966	-5.07
Bulgaria	545	-5.41	623	-1.83	Japan	63598	-5.42	120174	-6.07
Brazil	40168	-4.65	29088	-5.16	South Korea	43853	-7.13	77881	-5.42
Canada	289808	-6.05	348576	-5.75	Lithuania	429	-6.3	1546	-6.24
Switzerland	13245	-6.62	32898	-1.81	Luxembourg	20852	-6.63	257	-3.36
China	110369	-7.48	344939	-6.67	Latvia	232	-5.65	208	-3.85
Cyprus	140	-4.57	114	4.28	Mexico	176284	-6.94	265531	-6.66
Czech Republik	2739	-7.16	3764	-4.42	Malta	354	-5.91	105	-0.85
Germany	79446	-7.54	134374	-4.98	Netherlands	47883	-6.99	26568	-0.6
Denmark	6802	-7.08	7687	-3.46	Norway	6367	-7.94	6681	-4.04
Spain	10933	-5.03	16954	-4.75	Poland	4572	-6.6	5251	-2.36
Estonia	242	-6.07	427	-2.76	Portugal	1563	-5.12	3113	-3.44
Finland	6185	-6.36	7135	-4.18	Romania	1219	-5.68	1932	-1.33
France	57650	-5.31	49168	-1.64	Russia	7039	-6.42	14743	-5.86
United Kingdom	73643	-4.1	85289	-0.47	Slovakia	760	-6.64	1579	-5.98
Greece	2270	-4.61	904	-1.55	Slovenia	306	-6.85	514	-5.12
Croatia	480	-5.54	603	-4.58	Sweden	13539	-6.94	12610	-3.2
Hungary	3397	-7.07	4910	-4.03	Turkey	8283	-5.14	10128	-5.55
Indonesia	5848	-5.91	19475	-6.57	Taiwan	16352	-7.35		

Source: ifo Trade Model

Like on the macroeconomic level, Table 18 identifies a very similar pattern for US exports at sectoral level. On a relative scale, sectoral US exports decline homogeneously across all sectors between 4.5 and 7.5 percent. In contrast to what the US Gouvernement intended, the export subsidy in combination with the import tariff induces a reduction in aggregate bilateral exports across all countries and decline in US exports across all sectors.

Table 18: Scenario II – Change in US exports at sectoral level, in %

	Exports			Exports	
	In million USD	Change in %		In million USD	Change in %
Wastewater, etc.	19.9	-6.8	Wood and wood products	6.5	-6.0
Other means of transport	126.2	-4.6	Rubber ans plastic	30.7	-6.1
Other services	3.3	-6.9	Coal and refined mineral oil	126.8	-4.9
Architecture, etc.	53.6	-6.8	Warehousing	14.0	-6.7
Construction business	0.1	-7.0	Overland transport, etc.	47.4	-6.6
Mining	44.2	-5.8	Air transport	48.1	-6.9
Chemical produces	118.1	-5.7	Mechanical engineering	106.8	-5.6
Computer, etc.	111.1	-5.7	Furniture, etc.	35.1	-5.6
Computer programming, etc.	21.8	-6.5	Food, beverages and tabacco	75.4	-5.8
Print and reproduction	4.7	-5.8	Agricultural crops, etc.	48.7	-6.1
Retail industry	2.4	-7.5	Paper	24.8	-5.8
Electrical machinery, etc.	31.7	-5.7	Pharmaceutical products	42.3	-5.4
Energy supply	1.5	-7.0	Postal and courier services	10.6	-6.4
Education and schooling	4.4	-7.0	Legal consulting	33.0	-7.5
Vehicles	101.6	-6.0	Telecommunication	17.8	-7.4
Movies, videos and television	23.3	-6.6	Textiles and leather	12.9	-6.1
Financial services	55.1	-6.4	Processed metals	43.0	-5.8
Fishery	2.2	-5.4	Publishing industry	40.7	-4.6
Forestry	3.7	-6.2	Insurance services	64.4	-5.4
Hotel and restaurant industry	1.6	-6.7	Administration	61.4	-6.6
Health and social services	2.0	-6.8	Water transport	16.8	-6.0
Wholesale excl. vehicles	198.6	-6.0	Water supply	0.1	-6.4
Wholesale	0.7	-6.7	Academic research	16.8	-7.0
Basic metals	31.0	-5.9	Non-metal minerals	10.7	-6.0
Real estate, etc.	3.0	-6.8	Public administration	17.1	-7.3

Note: Exports in million USD show the value of US exports for respective sectors in the base year 2014. The percentage change shows by how much percent the exports in the respective sector changed in response to simulated scenario. Both goods and services are shown.

Source: ifo Trade Model.

For Germany a similar picture across all sectors emerges. Exports in all sectors contract relative to the baseline year 2014 by 1.2 to 4.3 percent.

Table 19: Scenario II – Change in German exports at sectoral level, in %

| | Exports | | | Exports | |
	In million USD	Change in %		In million USD	Change in %
Wastewater, etc.	17.2	-2.5	Wood and wood products	8.4	-3.9
Other means of transport	47.2	-3.0	Rubber and plastic	53.9	-3.8
Other services	1.7	-4.3	Coal and refined mineral oil	33.8	-3.8
Architecture, etc.	25.9	-2.1	Warehousing	10.5	-3.5
Construction business	2.9	-3.8	Overland transport, etc.	5.4	-3.4
Mining	10.7	-3.7	Air transport	7.7	-2.5
Chemical produces	138.2	-3.9	Mechanical engineering	213.7	-4.1
Computer, etc.	82.8	-3.8	Furniture, etc.	40.1	-3.9
Computer programming, etc.	29.0	-3.0	Food, beverages and tabacco	76.0	-3.8
Print and reproduction	2.9	-4.0	Agricultural crops, etc.	12.8	-4.0
Retail industry	2.8	-3.8	Paper	25.1	-3.7
Electrical machinery, etc.	89.3	-3.9	Pharmaceutical products	46.9	-3.7
Energy supply	7.5	-3.7	Postal and courier services	1.4	-3.3
Education and schooling	2.3	-3.4	Legal consulting	25.8	-4.2
Vehicles	286.3	-4.2	Telecommunication	3.6	-3.7
Movies, videos and television	5.9	-2.7	Textile and leather	27.7	-4.0
Financial services	23.8	-3.3	Processed metals	52.6	-4.0
Fishery	0.3	-3.7	Publishing industry	7.2	-1.5
Foretry	0.8	-4.3	Insurance services	8.3	-1.2
Hotel and restaurant industry	10.2	-3.7	Administration	12.4	-2.9
Health and social services	0.9	-3.4	Water transport	30.7	-2.7
Wholesale excl. vehicles	79.3	-3.5	Water supply	0.9	-3.1
Wholesale	6.4	-3.6	Academic research	6.3	-2.9
Basic metals	62.3	-3.8	Non-metal minerals	18.1	-4.1
Real estate, etc.	2.6	-3.5	Public administration	1.6	-3.0

Note: Exports in million USD show the value of German exports for respective sectors in the base year 2014. The percentage change shows by how much percent the exports in the respective sector changed in response to the simulated scenario. Both goods and services are shown.

Source: ifo Trade Model.

5.5 USA – WTO

In principle, a even stronger US protectionist policy is within the realms of possibility. The US government could systematically raise tariffs on all traded goods. In the first sub-scenario (IIIa), the US increases its tariffs on all product lines by 20 percent relative to the prevailing tariff level. If the original tariff of a product is five percent, a 20 percent increase in the tariff level is equivalent to a new tariff of six percent. In the simulation it is assumed that the levied duties will be increased unilaterally by the US. In Sub-scenario IIIb, the WTO countries in turn raise their tariffs against the US by 20 percent relative to their currently imposed tariff level. The tariff increase in sub-scenario IIIc corresponds to scenario IIIa, but adds an increase US non-tariff barriers by 20 percent against its trading partners. Sub-scenario IIId combines sub-scenarios IIIa, IIIb and IIIc into one integrated scenario. US tariffs are increased by 20 percent against the WTO countries; retaliation of US trading partners causes tariffs against the US to be increased by 20 percent; and the US raises its non-tariff barriers by 20 percent. Furthermore, WTO countries are equivalently introducing non-tariff barriers as retaliation measures against the US in scenario IIId. In an additional scenario, tariffs on all US imported goods are increased to the so-called "Bound Tariff Level", the maximum possible duty within the WTO regulations. For industrialized economies only small effects on the respective variable are to expected since the differences between applied and bound tariff levels are quite small.

Change in Real Gross Household Income (USA–WTO). In a next step, we examine the possible implications of a comprehensive US isolation from the rest of the world. [1] Table 20 lists the change in gross household income for scenarios IIIa-d. The effects are presented for all 43 countries (incl. ROW). Scenario IIIa indicates the change in gross household income for a unilateral increase in US tariffs (20 percent) of against WTO member countries. In such a scenario, the US would even experience a positive gross household income effect of 0.26 percent by the means of additional tax revenues. This result is in line with the optimal tariff theorem. Systemically relevant countries considered in isolation (such as the US) have an incentive to set positive tariffs because by doing so these countries are able to improve their terms-of-trade and at the same time generate government revenue.

This positive gross household income gain, however, vanishes completely (-0.30 percent) as soon as WTO countries equivalently increase their tariffs against the US by 20 percent (IIIb). Retaliation measures against the US cause a reduction in gross household income of 0.56 percent relative to sub-scenario IIIa, while the loss in gross household income for third countries can be reduced as their governments generate additional tax revenue. Germany, for example, is able to reduce its loss in gross household income by 15 percentage points from 0.29 percent to 0.14 percent. Only Bulgaria, Cyprus, the United Kingdom, Greece, Croatia, Romania, Portugal, Malta and Latvia would be slightly worse off by retaliating against the US. Unilateral US protectionist measures against all WTO members in the form of higher tariffs and non-tariff barriers (Sub-scenario IIIc), makes almost every country worse off.

Relative to the unilateral tariff increase (IIIa) the introduction of non-tariff barriers does not generate additional revenue (such as tariffs), but rather wastes resources and increases inefficiencies. The

[1]   Again, all the countries available in the data are listed, but no detailed description of the results is provided for each country. Emphasis is put on the analysis of the US and Germany.

NAFTA members Mexico (-2.51 percent) and Canada (-2.73 percent) suffer heavy losses in gross household income. Within the EU, Ireland (-3.48 percent) and Luxembourg (2.84 percent) loose out the most. The majority of EU members (23 countries) would experience declines in gross household income from the unilateral, protectionist US policy. Germany would lose 0.68 percent of the prevailing gross household income. Gains in gross household income are only observed in Cyprus (0.29 percent), Greece (0.21 percent), Bulgaria (0.11 percent), Latvia (0.06 percent) and Portugal (0.5 percent). Interdependencies in value chains and the dependence of countries on the US market do not allow for any positive gains in gross household income in the rest of the world economies. Taiwan (-1.17 percent), Norway (-0.95 percent) and South Korea (-0.88 percent) are affected most; Brazil (-0.13 percent), Japan (-0.15 percent) and Australia (-0.16 percent) only experience minor declines in their gross household income. Retaliation measures in tariffs and non-tariff barriers against the US (IIId) only exacerbate the plunge in gross household income across nearly all countries. Non-tariff barriers are recommended neither unilaterally by the US (IIIc) nor as revenge measures by WTO countries (IIId). Since the US is one of the most important trading partners for the majority of WTO countries, it is anything but surprising that US protectionism will heavily impact trading relations and the respective partner countries themselves. From a pure theoretical point of view, the effects of trade protectionism are ambiguous; they could be even positive income effects. Positive income effect are possible if the structure of a countries comparative advantage largely coincides with that of the US, and other countries structures are complementary to the US. The first very important conclusion of the simulation exercise is that this does not apply to the overall majority of countries in the model.

Table 20: Scenario III – Change in real gross household income, in %

	Change in %					Change in %			
	Tariffs		Tariffs and NTBs			Tariffs		Tariffs and NTBs	
	USA only	WTO and USA	USA only	WTO and USA		USA only	WTO and USA	USA only	WTO and USA
	IIIa	IIIb	IIIc	IIId		IIIa	IIIb	IIIc	IIId
Australia	-0.08	-0.05	-0.16	-0.25	Ireland	-1.31	-0.78	-3.48	-3.60
Austria	-0.14	-0.09	-0.31	-0.20	Italy	-0.12	-0.07	-0.26	-0.19
Belgium	-0.18	-0.09	-0.65	-0.72	Japan	-0.12	-0.11	-0.15	-0.29
Bulgaria	0.05	-0.04	0.11	-0.12	South Korea	-0.42	-0.16	-0.88	-0.61
Brazil	-0.09	-0.06	-0.13	-0.24	Lithuania	-0.16	-0.13	-0.29	-0.17
Canada	-1.45	-1.20	-2.73	-3.85	Luxembourg	-1.18	-0.47	-2.84	-2.31
Switzerland	-0.20	-0.11	-0.77	-0.50	Latvia	0.03	-0.04	0.06	-0.08
China	-0.30	-0.17	-0.55	-0.34	Mexico	-1.43	-1.10	-2.51	-3.42
Cyprus	0.14	-0.02	0.29	0.00	Malta	-0.03	-0.09	-0.14	-0.46
Czech Republic	-0.20	-0.03	-0.50	-0.13	Netherlands	-0.25	-0.05	-0.98	-0.60
Germany	-0.29	-0.14	-0.68	-0.40	Norway	-0.38	-0.10	-0.95	-0.24
Denmark	-0.22	-0.11	-0.54	-0.28	Poland	-0.06	0.00	-0.21	-0.09
Spain	-0.03	-0.01	-0.07	-0.06	Portugal	0.01	-0.04	0.05	-0.10
Estonia	-0.04	-0.04	-0.17	-0.14	Romania	-0.01	-0.02	-0.07	-0.07
Finland	-0.14	-0.09	-0.29	-0.32	ROW	-0.24	-0.20	-0.53	-0.92
France	-0.05	-0.04	-0.16	-0.25	Russia	-0.17	-0.08	-0.36	-0.12
United Kingdom	-0.04	-0.10	-0.24	-0.43	Slovakia	-0.12	-0.05	-0.28	-0.13
Greece	0.07	-0.01	0.21	-0.08	Slovenia	-0.08	-0.03	-0.20	-0.04
Croatia	-0.05	-0.06	-0.08	-0.15	Sweden	-0.15	-0.07	-0.40	-0.27
Hungary	-0.19	-0.06	-0.57	-0.32	Turkey	-0.14	-0.08	-0.27	-0.24
Indonesia	-0.17	-0.11	-0.26	-0.23	Taiwan	-0.55	-0.25	-1.17	-0.74
India	-0.09	-0.06	-0.18	-0.14	USA	0.26	-0.30	-1.39	-2.32

Source: ifo Trade Model

Change in Real Wages (USA–WTO). The next subsection we present the change in real wages in all 43 countries (incl. ROW). In Table 21, the effects for the previously defined scenarios are listed in the

same way for the changes in gross household income (see Table 20). The unilateral tariff increase in the US market against the WTO countries (IIIa) causes a slump in the real wage for all countries where the NAFTA member states (US, Mexico and Canada) are particularly affected. Retaliation measures in the form of a tariff increase against the US (scenario IIIb) further reduces the real wage in most countries, as well as the introduction of non-tariff barriers worsens the picture for most countries. As for gross household income, retaliatory NTB measures of WTO countries have no effect in improving the level of real wages. In scenario IIIc the strongest real wage declines are to be found in Mexico (-2.42 percent), Canada (-2.70 percent) and the USA (-2.09 percent), closely followed by European countries like Ireland (-2.09 percent) and Luxembourg (-1.31 percent). Besides, Germany and the Netherlands are within the EU-28 amongst the largest losers in real wages with respective changes of -0.31 and -0.44 percent. There do, however, exist two countries, Greece and Cyprus, that experience a slight increase their real wages by 0.02 and 0.13 percent. Nevertheless, the remaining EU-28 countries as well as non-EU countries have to expect lower real wages in the future.

Table 21: Scenario III – Change in real wages, in %

	Change in %					Change in %			
	Tariffs		Tariffs and NTBs			Tariffs		Tariffs and NTBs	
	USA only IIIa	WTO and USA IIIb	USA only IIIc	WTO and USA IIId		USA only IIIa	WTO and USA IIIb	USA only IIIc	WTO and USA IIId
Australia	-0.08	-0.17	-0.18	-0.33	Ireland	-0.86	-0.76	-2.09	-3.00
Austria	-0.09	-0.12	-0.16	-0.22	Italy	-0.09	-0.10	-0.15	-0.20
Belgium	-0.13	-0.28	-0.47	-0.80	Japan	-0.15	-0.21	-0.21	-0.34
Bulgaria	0.01	-0.07	-0.02	-0.12	South Korea	-0.24	-0.33	-0.46	-0.66
Brazil	-0.10	-0.18	-0.17	-0.29	Lithuania	-0.10	-0.16	-0.14	-0.18
Canada	-1.42	-2.73	-2.70	-4.73	Luxembourg	-0.63	-0.41	-1.31	-1.79
Switzerland	-0.06	-0.16	-0.28	-0.47	Latvia	0.00	-0.08	-0.01	-0.09
China	-0.15	-0.19	-0.22	-0.31	Mexico	-1.37	-2.31	-2.42	-4.00
Cyprus	0.10	-0.05	0.13	0.02	Malta	-0.08	-0.17	-0.29	-0.50
Czech Republic	-0.08	-0.09	-0.16	-0.19	Netherlands	-0.11	-0.25	-0.44	-0.70
Germany	-0.16	-0.21	-0.31	-0.43	Norway	-0.12	-0.13	-0.23	-0.29
Denmark	-0.11	-0.13	-0.23	-0.30	Poland	-0.01	-0.04	-0.08	-0.12
Spain	-0.03	-0.07	-0.06	-0.09	Portugal	-0.02	-0.07	-0.03	-0.10
Estonia	-0.01	-0.09	-0.08	-0.17	Romania	0.00	-0.05	-0.04	-0.10
Finland	-0.12	-0.14	-0.23	-0.35	ROW	-0.22	-0.40	-0.56	-1.04
France	-0.05	-0.12	-0.16	-0.29	Russia	-0.07	-0.10	-0.11	-0.14
United Kingdom	-0.04	-0.24	-0.24	-0.50	Slovakia	-0.06	-0.11	-0.12	-0.17
Greece	0.01	-0.02	0.02	-0.04	Slovenia	-0.04	-0.05	-0.06	-0.07
Croatia	-0.05	-0.11	-0.09	-0.19	Sweden	-0.09	-0.11	-0.21	-0.31
Hungary	-0.08	-0.12	-0.24	-0.36	Turkey	-0.10	-0.16	-0.17	-0.28
Indonesia	-0.11	-0.14	-0.16	-0.24	Taiwan	-0.26	-0.39	-0.49	-0.70
India	-0.06	-0.10	-0.10	-0.16	USA	-0.97	-1.43	-2.09	-2.93

Source: ifo Trade Model

The overall majority countries suffers from the protectionist trade policy. Evidently, the simulation points out that WTO countries' retaliatory measures do not improve their loss in real wages. This can mainly be attributed to the strong dependency of most of the WTO member countries on the US market. In summary, countries may counteract their potential loss by countermeasures (only tariff retaliation), yet no country can fully compensate reduction in real wages and generate any positive effect. Retaliation should therefore not be the overriding response to threatened US polices. Rather, a prior containment of protectionist policies is strongly recommended.

Change in US Trade (USA–WTO).   The following part of the analysis is devoted to examining how trade flows between WTO members and WTO adjust to the various policy scenarios. Recall the

content of the four simulated policies. IIIa introduces a unilateral 20 percent increase in US duties against all WTO members, while IIIb builds on IIIa and allows for retaliation in form of 20 percent higher duties against the US by TWO members. Based on IIIa, in scenario IIIc the US additionally increases its non-tariff barriers to trade by 20 percent. Scenario IIId integrates IIIa-c and also allows WTO members to revenge the increase in US non-tariff barriers. Table 22 then reports the change in US bilateral exports to all countries available in the dataset. For the reader to proper classify the dimensions of the percentage changes, the value of US bilateral exports (in USD million) are given additionally. The unilateral tariff increase by the US against all WTO countries (scenario IIIa) reduces bilateral US exports across all trading partners evenly by 19 to 27 percent. Counter-measures (scenario IIIb) by foreign governments let US exports to contract further across all countries. The drop in US bilateral exports is even more pronounced by the unilateral introduction of higher US non-tariff barriers (scenario IIIc). With one of the most important US trading partners, Germany, the implementation of higher non-tariff barriers reduces US exports by additional 15.09 percentage points from 34.71 percent (IIIb) to 49.8 percent (IIIc) of the initial export value. If WTO member countries would take vengeance for the increased non-tariff barriers US exports to Germany would drop by 73.81 percent, i.e. additional 24.01 percentage points.

Table 22: Scenario III – Change in bilateral US exports, in %

	Exports in million USD	Tariffs USA only IIIa	Tariffs WTO and USA IIIb	Tariffs and NTBs USA only IIIc	Tariffs and NTBs WTO and USA IIId		Exports in million USD	Tariffs USA only IIIa	Tariffs WTO and USA IIIb	Tariffs and NTBs USA only IIIc	Tariffs and NTBs WTO and USA IIId
Australia	26758	-23.58	-43.91	-47.2	-75.31	India	15846	-22.29	-42.02	-44.77	-73.24
Austria	4562	-26.9	-26.9	-52.96	-76.75	Ireland	60924	-20.59	-12.48	-44.9	-61.87
Belgium	29823	-22.9	-29.19	-48.3	-71.49	Italy	19612	-26.25	-41.45	-51.56	-76.59
Bulgaria	545	-24.95	-24.95	-50.66	-73.87	Japan	63598	-23.36	-48.66	-44.93	-75.28
Brazil	40168	-24.73	-52.48	-48.04	-78.96	South Korea	43853	-24.14	-45.02	-46.91	-74.96
Canada	289808	-21.82	-48.59	-41.61	-73.71	Lithuania	429	-23.53	-23.54	-47.01	-76.5
Switzerland	13245	-26.65	-42.6	-52.68	-77.27	Luxembourg	20852	-20.5	-8.1	-46.52	-63.12
China	110369	-25.24	-47.95	-48.3	-76.94	Latvia	232	-22.96	-22.964	-46.89	-72.23
Cyprus	140	-22.17	-22.174	-46.22	-69.38	Mexico	176284	-25.89	-55.56	-46.14	-77.8
Czech Republic	2739	-24.73	-24.73	-49.74	-74.41	Malta	354	-25.3	-25.3	-52.26	-74.31
Germany	79446	-24.78	-34.71	-49.8	-73.81	Netherlands	47883	-23.39	-30.37	-49.09	-72.13
Denmark	6802	-24.82	-24.82	-51.07	-70.26	Norway	6367	-25.77	-25.77	-51.6	-75.61
Spain	10933	-26.02	-55.52	-50.57	-80.29	Poland	4572	-24.2	-24.2	-48.93	-74.95
Estonia	242	-23.93	-23.93	-48.32	-74.41	Portugal	1563	-23.3	-23.31	-47.9	-71.97
Finland	6185	-24.43	-24.43	-49.95	-70.92	Romania	1219	-26.08	-26.09	-51.74	-77.64
France	57650	-24.967	-38.41	-50.88	-76.36	Russia	7039	-25.31	-56.33	-48.69	-79.76
United Kingdom	73643	-21.68	-41.55	-45.99	-75.97	Slovakia	760	-19.51	-19.51	-40.34	-70.88
Greece	2270	-23.81	-23.81	-49.49	-69.22	Slovenia	306	-24.42	-24.43	-49.06	-73.02
Croatia	480	-19.61	-19.61	-40.94	-70.02	Sweden	13539	-24.43	-20.66	-50.78	-69.99
Hungary	3397	-24.89	-24.9	-50.78	-72.24	Turkey	8283	-21.59	-56.87	-43.19	-77.86
Indonesia	5848	-21.98	-21.97	-42.78	-74.07	Taiwan	16352	-24.04	-52.08	-46.53	-77.29

Source: ifo Trade Model

Equivalently, Table 23 illustrates the change in bilateral US imports for the same policy scenarios. The results are very similar to those for bilateral US exports (see Table 22). As before, the unilateral tariff increase in the US does the least harm to the US import structure. An additional introduction of non-tariff trade barriers triggers a strong reduction of US imports across all partner countries. If the WTO countries in turn respond to the US policy with own protectionist policies like increasing their tariffs and non-tariff barrier (scenario IIId), this merely leads to further reductions in bilateral US imports. Compared to the percentage changes in bilateral US exports, however, the magnitude of the relative import reductions are significantly lower. Clearly, a fall in the import rate from main import markets like Canada, China, Mexico or Germany will have a much stronger impact on the nominal import volumes than for small trading partner countries, such as Malta or Cyprus. Imports from Germany – fourth largest import market in the US – would drop by over 70 percent. In nominal terms, this is equivalent to a loss of USD 83 billion. Trade with Canada, America's most important

import source, could collapse by 56 percent, or nearly USD 200 billion.

Table 23: Scenario III – Change in bilateral US imports, in %

	Imports in million USD	Change in %					Imports in million USD	Change in %			
		Tariffs		Tariffs and NTBs				Tariffs		Tariffs and NTBs	
		USA only III a	WTO and USA III b	USA only III c	WTO and USA III d			USA only III a	WTO and USA III b	USA only III c	WTO and USA III d
Australia	10136	-4.96	-20.29	-31.49	-56.9	India	36474	-22.68	-32.05	-36.82	-55
Austria	9966	-22.36	-33.24	-40.23	-60.4	Ireland	31924	-13.17	-26.63	-42.54	-66.88
Belgium	23695	-3.98	-19.89	-35.31	-62.56	Italy	44966	-22.83	-33.44	-39.96	-59.43
Bulgaria	623	-3.75	-18.45	-30.73	-56.51	Japan	120174	-29.63	-38.52	-42.99	-60.82
Brazil	29088	-26.96	-37.07	-40.68	-58.62	South Korea	77881	-22.81	-33.96	-40.56	-61.26
Canada	348576	-21.36	-34.03	-36.79	-56.98	Lithuania	1546	-42.45	-51.39	-59.74	-76.02
Switzerland	32898	-7.04	-23.14	-38.93	-65.73	Luxembourg	257	-8.13	-20.95	-28.04	-50.9
China	344939	-28.36	-37.26	-41.41	-59.32	Latvia	208	-13.59	-24.88	-32.81	-54.52
Cyprus	114	33.07	10.76	-14.1	-52.97	Mexico	265531	-23.99	-37.38	-38.68	-58.56
Czech Republic	3764	-17.54	-29.76	-37.8	-59.57	Malta	105	3.49	-14.14	-32.64	-62.03
Germany	134374	-20.89	-32.38	-40.62	-61.98	Netherlands	26568	4.94	-12.62	-29.8	-60.25
Denmark	7687	-19.73	-33.63	-46.14	-68.92	Norway	6681	-15.95	-28.9	-37.68	-60.64
Spain	16954	-26.25	-37.08	-44.72	-64.09	Poland	5251	-3.68	-19.37	-32.25	-58.95
Estonia	427	-8.55	-22.33	-33.99	-59.33	Portugal	3113	-18.58	-29.4	-37.92	-58.89
Finland	7135	-21.73	-33.39	-42.36	-63.53	Romania	1932	0.11	-15.94	-29.79	-57.57
France	49168	-6.17	-21.49	-34.88	-61.14	Russia	14743	-32.6	-42.54	-47.58	-65.3
United Kingdom	85289	-0.92	-17.16	-33.17	-61.35	Slovakia	1579	-25.87	-34.6	-39.71	-58.43
Greece	904	-10	-22.6	-33.23	-57.08	Slovenia	514	-25.42	-36.06	-42.55	-61.45
Croatia	603	-23.74	-34.32	-39.97	-57.94	Sweden	12610	-13.67	-27.24	-39.38	-63.4
Hungary	4910	-14.52	-26.69	-36.5	-59.76	Turkey	10128	-23.13	-32.47	-34.77	-52.27
Indonesia	19475	-24.5	-31.56	-32.24	-47.91	Taiwan	33812	-20.08	-31.43	-37.57	-58.53

Source: ifo Trade Model

Change in US Sectoral Value-added (USA–WTO).   After analyzing how gross household income, real wages and trading relations alter in response to the various policy scenarios, we now turn to the adjustments in sectoral value added. For illustrative purposes we restrict ourselves to the US and Germany. Tables 24 (for the US) and 25 (for Germany) show the changes in sectoral value added in all simulated scenarios for the considered countries. Similarly to the previous analysis, we report nominal sectoral value added (in USD million) and its share in national value added for the baseline year.

For most US sectors the strongest contraction (or expansion) is incurred in the integrated scenario where US protectionist policies are fully retaliated by other WTO member countries. It is therefore no surprise that the sectoral value added losses (gains) are an increasing function in the depth of the protectionist scenarios (IIIa to IIId). For this reason, we only go into further detail for the most protectionist sub-scenario IIId. The vehicles sector "Other means of transport" experiences with -27.1 percent (IIId) the most severe relative contraction, followed by the "Water transport" sectors which reduces its value added by 20.5 percent. In nominal terms, however, this plays only a minor role in the US. In the wholesale sector (excluding vehicles), the sectoral value added only drops by 8.86 percent; yet this decline amounts nominally to 93 billion USD which represents the greatest absolute sectoral contraction in the US. Surprisingly, there do exits some sectors like the computer and electronical machinery sectors that even expand their value added. The sectoral value added in the computer sector as well as in the electrical machinery sector is different. Interestingly, the sectoral value added can be increased by 21.3, 24 and 10.2 percent. However, if one groups the vehicle categories into one category, it can be seen that the sectoral value added has declined.

Table 24: Scenario III – Change in sectoral value added in the USA

	Share in GDP	VA Bench in million USD	Change in % Tariffs IIIa USA only	Change in % Tariffs IIIb WTO and USA	Change in % Tariffs and NTBs IIIc USA only	Change in % Tariffs and NTBs IIId WTO and USA
Agricultural crops etc.	1	177154.9	-0.5	-5.6	-3.2	-7.3
Forestry	0.1	23752.4	4.1	-0.1	5.3	4.1
Fishery	0.1	14505.3	4	-0.4	5	3.5
Mining	2.6	455587.9	4	0.6	5.7	5.5
Food, beverages and tabacco	1.4	243252.8	0.2	-2.5	-1.6	-3.9
Textiles and leather	0.2	27698.3	11.3	11.5	21.2	31.8
Wood and wood products	0.2	28804.7	1.6	-0.6	1.6	1
Paper	0.3	55730.2	-0.1	-4.7	-1.7	-4.9
Print and reproduction	0.2	38300.7	-1.7	-2.9	-3.6	-5.2
Coal and refined mineral oil	1.1	182719.1	-2	-6.9	-5.2	-8.8
Chemical produces	1.5	267111	1.5	-4.9	0.6	-3.2
Pharmaceutical products	0.5	95466.8	5.7	-2.3	4.9	1.9
Rubber and plastic	0.4	75501.3	0.9	-2.8	0.5	-1.2
Non-metal minerals	0.3	46790.6	0.6	-2	-0.2	-1.4
Basic metals	0.4	60860.5	5	-0.8	7.9	8.2
Processed metals	0.8	147060.3	0.4	-3.8	-0.7	-2.8
Computer etc.	1.5	269400.2	10.7	5.3	18.3	21.3
Electrical machinery, etc.	0.3	54138.5	11	6.8	19.3	24
Mechanical engineering	1	175011.7	3.7	-3.5	3.5	1
Vehicles	0.8	141160.4	5.2	2.5	8.5	10.2
Other means of transport	0.7	127798.2	-6.7	-20.4	-15.6	-27.1
Furniture etc.	0.6	105838.9	3.7	0.8	4.7	4.6
Energy supply	1.6	272719.3	-0.4	-1.1	-1.4	-2.1
Water supply	0.1	9317.5	-1.2	-1.4	-0.8	-0.8
Wastewater etc.	0.2	43149.8	-7	-4.4	-3.5	-9.2
Construction business	3.8	665784.7	0.1	-0.5	-1.4	-2.3
Wholesale	1.5	254915.8	-1.2	-0.8	-1	-0.9
Wholesale excl. vehicles	6	1044654.6	-4.3	-2.7	-7.4	-8.9
Retail industry	4.7	815873.8	-0.3	-0.6	-1.4	-2
Overland transport etc.	1.4	240382.3	-3.8	-3.1	-6.2	-7.5
Water transport	0.1	18593.4	-8.6	-4.9	-16.9	-20.5
Air transport	0.5	84343.9	-12.8	-5.9	-13.1	-11.2
Warehousing	0.6	106151.1	-5.3	-3.1	-8.5	-9.8
Postal and courier services	0.3	57439.3	-6.5	-3.5	-11.1	-12.9
Hotel and restaurant industry	2.8	487443.1	-0.6	-0.8	-1.7	-2.3
Publishing industry	1.2	210656.4	-3.7	-1.8	-7.5	-9.1
Movies, videos and television	1.2	200183.2	-3.3	-1.8	-6	-7.1
Telecommunication	1.9	326912.4	-1.6	-1.2	-3.7	-4.8
Computer programming etc.	1.9	338228.6	-3.1	-1.9	-3.1	-3
Financial services	2.8	488091.5	-3.4	-2	-6.6	-8.1
Insurance services	4.2	734910.1	-3	-1.6	-3.8	-3.9
Real estate etc.	11.8	2059167.8	-0.2	-0.6	-1.8	-2.7
Legal consulting	4	693747.3	-2	-2.1	-3	-3.7
Architecture etc.	2.6	448149.7	-4.7	-2.5	-4.9	-4.6
Academic research	0.8	140414.4	-3.9	-2.2	-5.1	-5.4
Administration	3.9	672084.6	-5.8	-3.1	-3.4	-1.6
Public administration	13.1	2277284.5	-0.1	-0.5	-1.8	-2.7
Education and schooling	1.1	192772.7	-0.8	-0.8	-2	-2.7
Health and social services	7.1	1227401.6	0.1	-0.4	-1.4	-2.3
Other services	2.6	458561.2	-0.6	-0.8	-1.9	-2.6

Source: ifo Trade Model

As Table 24 did for the US, Table 25 presents the change in sectoral value added across all sectors for the four sub-scenarios IIIa-d. In contrast to the US, for Germany it makes a difference in its change of sectoral value added whether counter-measures of the WTO countries are carried out, or whether the protectionist trade policy is merely implemented by the US. Retaliative measures in the form of higher tariffs and higher non-tariff barriers (IIIb and/or IIId) against the US seem to benefit some German industries. Third countries that have highly integrated value chains with US and use the US as their import market now shift their imports towards the German market. In some German sectors this might give rise to increasing sectoral value added relative to the baseline year. It is especially the automotive and "Other means of transport" sector that are likely to generate some gains (16 percent), while the equivalent US sectors US suffer heavy losses in value added from the US protectionism.

Table 25: Scenario III – Change in sectoral value added in Germany

	Share in nat. SVA	VA Bench in million USD	Change in % — Tariffs		Change in % — Tariffs and NTBs	
			USA only IIIa	WTO and USA IIIb	USA only IIIc	WTO and USA IIId
Agricultural crops, etc.	0.6	22966.5	-0.1	0.2	0	-0.1
Forestry	0.1	2969.5	-0.8	-0.8	-1.1	-1.5
Fishery	0	263.4	0	0.3	0.1	0
Mining	0.2	6785.4	-0.7	-0.2	-0.5	-1.1
Food, beverages and tabacco	1.7	59688.1	-0.3	-0.2	-0.4	-0.5
Textiles and leather	0.3	10552.4	-1	-0.9	-1	-1.8
Wood and wood products	0.2	9029.5	-0.6	-0.2	-0.8	-0.6
Paper	0.4	15246.2	-1	-0.8	-1	-1
Print and reproduction	0.3	11360.2	0.5	0.4	1	1.5
Coal and refined mineral oil	0.4	13263.8	0.3	1.3	1	1.2
Chemical produces	1.7	60498.5	-2.3	-1.4	-2.2	-2.4
Pharmaceutical products	0.9	31789.6	-2.6	-0.3	-2.5	-1.2
Rubber and plastic	1.1	38049.7	-1.3	-0.9	-1.4	-1.8
Non-metal minerals	0.6	22718.7	-0.8	-0.6	-1	-1.1
Basic metals	0.9	31678	-2.1	-1.7	-2.1	-3
Processed metals	2	72686.4	-1.4	-1	-1.4	-1.7
Computer, etc.	1.3	47262.3	-2.5	-1	-2.4	-2.7
Electrical machinery, etc.	1.7	59834.9	-1.9	-1.1	-1.9	-2.6
Mechanical engineering	4.1	149590.2	-2.2	-1.2	-2.2	-2.7
Vehicles	4	146263.3	-3.2	-3	-3.8	-5.2
Other means of transport	0.5	17951.5	1.9	10.8	6.5	16
Furniture, etc.	0.9	31631	-1.2	-0.7	-1	-1.4
Energy supply	1.9	68764.1	-0.3	-0.3	-0.6	-0.8
Water supply	0.2	7512.9	0.3	0	-0.6	-1.1
Wastewater, etc.	0.8	30479.4	3.7	1.5	3.1	2.2
Construction business	4.6	164523.2	-0.2	-0.1	-0.5	-0.3
Wholesale	1.5	54076.7	-0.4	-0.4	-0.9	-1.5
Wholesale excl. vehicles	4.5	161246.2	0.9	0.1	0	-1.2
Retail industry	3.2	114235.8	-0.3	-0.2	-0.6	-0.5
Overland trasport, etc.	1.9	67410.9	0.4	0.1	0.8	0.8
Water transport	0.3	10620.8	1	0.5	2.8	2.6
Air transport	0.2	8878.4	1.9	0.7	1.7	1.1
Warehousing	1.8	65821.5	0.7	0.1	1.2	0.9
Postal and courier services	0.5	19410.2	1	0.3	2	2.6
Hotel and restaurant industry	1.5	54402	-0.1	-0.1	-0.4	-0.5
Publishing industry	0.6	20271.1	2.9	0.8	5.8	8
Movies, videos and television	0.7	23897.5	4.5	1.5	6.2	7.1
Telecommunication	1	34998.7	1.3	0.4	2.3	3
Computer programming, etc.	2.5	91130.9	1.3	0.2	2	1.8
Financial services	2.7	96960.5	0.4	-0.1	0.4	0.2
Insurance services	1.6	59037.1	1	0.2	0.8	0.6
Real estate, etc.	10.9	392928.1	-0.2	-0.1	-0.5	-0.4
Legal consulting	2.9	103701.8	1.2	0.3	1.3	0.9
Architecture, etc.	2.4	85803.8	2.7	0.8	1.7	0.2
Academic research	0.8	27456.2	2.3	0.8	2.1	2
Administration	4.7	171191.3	0.3	0	0	-0.3
Public administration	6.3	229160.3	0	0	-0.3	0
Education and schooling	4.5	163340.3	-0.2	-0.1	-0.6	-0.4
Health and social services	7.6	275878.8	-0.3	-0.1	-0.7	-0.4
Other services	4.1	146724.2	-0.1	-0.1	-0.4	-0.2

Source: ifo Trade Model

Change in US Tariffs to Bound Level.   In addition to the previously described scenarios of political trade interventions by the US and WTO, we now will consider the impact of a US tariff increase to the WTO Bound Level. The so-called Bound Levels are the tariff levels defined by the individual WTO members that represent the maximum MFN tariffs on a specific product line that can be charged. For example, in negotiations on the specific regulations in free-trade agreements, political leaders do not only discuss the level of applied tariffs but rather focus on the maximum tariff level possible. WTO members are free to change their tariffs flexibly (e.g. in a regional trade agreements), but only up to the Bound Level. If a member country violates this agreed upon upper bound, the remaining members are allowed to demand compensation in the form of higher counter-tariffs against the violating country. As already noted before, the difference between applied and Bound Level is marginally for industrialized economies (see section 4.2 and 4.3). Yet, this difference appears to be larger between developed and developing countries. This is more or less the reason why an increase of US tariff levels up to the Bound Level against all trading partners has merely a little effect on the trade volumes of WTO countries with the US. As the trade volume effects are of very small magnitude macroeconomic consequences are negligible. Table 26 summarizes the changes in gross household income and real wages for this scenario. In the US gross household income might fall by 0.0046 percent, while the real wages decline by 0.01 percent. For Germany the consequences are even of smaller size. Gross household income is predicted to drop by 0.0007 percent and real wages remain roughly constant with a marginal increase of 0.0001 percent.

Table 26: Scenario III – Bound Level Tariffs: macroeconomic effects, in %

	Change			Change	
	Gross HH income	Real wage		Gross HH income	Real wage
	in %			in %	
Australia	-0.0027	0.0001	Ireland	0.0114	0.0104
Austria	-0.0021	0.0001	Italy	0.0054	-0.0001
Belgium	-0.0028	0.0009	Japan	-0.0022	-0.0011
Bulgaria	-0.0010	0.0000	South Korea	-0.0014	-0.0014
Brazil	0.0013	0.0021	Lithuania	0.0013	0.0001
Canada	-0.0103	-0.0056	Luxembourg	0.0139	0.0094
Switzerland	-0.0003	-0.0019	Latvia	0.0001	0
China	0.0032	0.0020	Mexico	0.0106	0.0077
Cyprus	-0.0015	0.0000	Malta	-0.0002	0.0001
Czech Republic	0.0014	0.0002	Netherlands	-0.0017	0.0012
Germany	-0.0007	0.0001	Norway	-0.0019	0.0004
Denmark	-0.0030	0.0001	Poland	0.0021	-0.0001
Spain	0.0054	0.0000	Portugal	-0.0009	0.0001
Estonia	-0.0018	-0.0001	Romania	0.0008	0
Finland	-0.0036	-0.0077	ROW	0.0075	0.0093
France	0.0034	0.0084	Russia	0.0019	-0.0005
United Kingdom	0.0013	0.0007	Slovakia	-0.0003	0
Greece	-0.0014	0.0001	Slovenia	-0.0008	0
Croatia	-0.0022	0.0000	Sweden	-0.0016	0.0005
Hungary	-0.0010	0.0003	Turkey	0.0005	0.0028
Indonesia	0.0067	0.0105	Taiwan	-0.0014	-0.0036
India	0.0109	0.0025	USA	-0.0046	0.0104

Source: ifo Trade Model

5.6 Summary of Quantitative Simulation Findings

Withdrawal from NAFTA: The revocation of the North American Free Trade Agreement would damage the its member countries USA, Canada and Mexico the most. Canada will be most affected as gross household income declines by 1.54 percent over the long-run. Mexico and the US might loose 0.96 percent and 0.22 percent of gross household income respectively. US Exports of goods and services to Canada are predicted to contract by USD 33 billion, and to Mexico by USD 17 billion. Slightly increasing US export volumes to Europe and the rest of the world do not compensate for these losses. In consequence to the implemented protectionist US policies imports from Canada and Mexico will fall sharply. On aggregate, the import reductions from NAFTA countries will amount to USD 110 billion; trade diversion effects can only compensate to a small extent for this reduction. Additional imports worth of USD 29 billion are obtained from other countries, such as Germany. In nominal terms, imports from China, Japan and Germany is increasing the most. It is, however, obvious that the integrated and long-term trading relations with NAFTA countries, Mexico and Canada, are very difficult to be replaced by third countries for the US. According to the ifo Trade Model, the reintroduction of tariffs and non-tariff barriers will only have a very little impact on the outside countries. With the of exception of Luxembourg and Norway, gross household income changes merely change.

Border Tax Adjustment: Unlike the US government intends, the introduction of the "Border Tax Adjustment" (BTA) causes US gross household income to contract by 0.67 percent. Taiwan (-1.45 percent), Luxembourg (-1.3 percent), Norway (-1.1 percent), Germany (-0.86 percent), the Netherlands (-0.74 percent) and South Korea (-0, 73 percent) suffer even greater losses from the BTA than the US itself. On average, Europe experiences an increase its gross household income by 0.04 percent as the BTA positively affects the gross household income for the majority of EU-28 countries. The US real wage is hardly affected by its implemented BTA. Though, the picture is very different for Europe. There are countries like Austria (0.03 percent), Belgium (0.52 percent), France (0.46 percent) and the United Kingdom (0.75 percent) that gain in real wage. Germany (-0.22 percent) and Denmark (-0.05 percent), on the other hand, suffer from the US protectionist policy. The aggregate effect of the cash flow tax causes a decline in total US exports and imports. In relative terms, US trade declines homogeneously across all partner countries, where the relative magnitude in export contracting is on average slightly higher than on the import side. At the sectoral level we can identify an overall decline in exports and imports across nearly all sectors. On a lower relative scale the same picture can be found for Germany. Contrary to the expectations of the US government, such a trade policy only leads to diminishing global exports and imports.

US-Protectionism against the WTO: Gross household income and real wages in WTO member countries incur losses from increasing tariffs and non-tariff barriers. In particular, Mexico and Canada experience disproportionate declines. Evidently, retaliative trade policy measures by WTO members against the US do not improve the situation in any country. In general this can be attributed to the strong dependency of domestic economies on the US market. Individual countries nevertheless are able to reduce the potential loss through countervailing measures (e.g. tariff increase), yet not a single country can fully compensate the incurred contracting in gross household income and real wages. Vengeance should therefore not the be a main response to threatened, discriminatory US policies. Rather, a prior containment of protectionist policies is strongly recommended.

In summary, the US protectionist trade policies do not generate any benefits neither for the US itself nor for the rest of the world. The consequences of a withdrawal of NAFTA are mainly carried by its current members Mexico, Canada and the US. Outside country are hardly affected. The introduction of a BTA, however, touches all US partner countries to different extents. The impact on macroeconomic variables is still lower than in the case of US protectionist measures against WTO countries in combination with retaliative responses.

6 Conclusions

With the inauguration of Donald Trump the new US administration initiated a detailed analysis of US trading relations with the rest of the world. Its aim is to identify supposedly increasing "unfair trade practices" by other nations that threaten or destroy "well-paid American jobs." The heated political debate over fair trade focuses on the US' most important regional trading partners Mexico and Canada, but large US trade balance deficits with major partner countries like China and Germany have also come under fire.

In the case of China, the US administration sees subsidies and discrimination against US companies as an unfair trade policy. In the case of Germany, it criticizes domestic consumers' weak appetite for US products. The new US administration has presented three protectionist trade policy measures as possible strategies for correcting what it perceives to be unfair trade, and for establishing a so-called "level playing field."

This study simulates US protectionist trade policies using historical data. Based on the results available, the study offers a comprehensive assessment of the political debate; and in particular its meaningfulness. It reveals that the US actually levies relatively low tariffs compared to its trading partners. At the same time, it is clear that in parallel to this liberal tariff policy, the USA has run a high trade deficit for many years, especially in goods trade. This macroeconomic imbalance can be observed with eight of the ten top US trading partners.

Considering these two phenomena – low tariffs and high trade deficits – it initially seems understandable that US political stakeholders regard the present trade structure as unfair. Moreover, US jobs are particularly concentrated in industries that suffer from America's open stance. These interest groups unsurprisingly see isolating the US market as an effective cure.

However, the US administration's promise to create more jobs and investment in the US through the trade policies presented is a fallacy. This study clarifies that, in all of the scenarios presented, an isolation of the US market would primarily have a negative impact on the US economy itself in the long term. It is also clear that a protectionist trade policy would most likely lead to a worldwide policy of retaliation against the USA. In such a scenario, the threat of economic damage is again particularly pronounced for the USA.

Overall, the US is indeed confronted with economic imbalances, and especially high trade deficits, which are increasingly causing conflict among different domestic industries. At the same time, however, the study also shows that a protectionist trade policy will not solve these economic challenges. On the contrary, such a policy would only exacerbate long-term problems.

The economic inequalities outlined above, whether in trade or income distribution, should be addressed by the US administration with political instruments that do not distort trade. Instead, it needs to support for workers forced to reorient themselves as a result of intensified competition due to trade and other labour-market-promoting measures.

At the same time, countries like China and Germany have to ask themselves whether their present trade surpluses are sustainable in the long term. While, in the case of Germany, this criticism is to be relativized, since the surpluses are not induced by politics, but can be explained, for example, by

demographic ageing and the high saving rate that goes with it, the case of China is different. The relatively high level of isolation of the Chinese market and the simultaneous increase in overcapacity in individual industries like the steel sector, for example, are indeed leading to unfair trade with the US and are encouraging a rash political response in the US. Finally, it should also be pointed out that in the service industries – in which the US still have a high competitive advantage – America generally runs a trade surplus.

To sum up, the study clearly discourages t the US from pursuing the protectionist trade policy announced by its new administration for its own sake. Seeking new forms of cooperation between the US and its main trading partners like China, Germany and the NAFTA partners would be a far more sensible strategy. First steps in this direction are to be found, for example, in the "Global Forum" for the global reduction of steel overcapacity and dumping. Such new co-ordination platforms are becoming increasingly necessary and help to identify new issues that can subsequently be tackled by existing international institutions like the WTO on a larger scale.

The US is the architect of the global, rule-based, multilateral trading system. The country has consistently pushed ahead with the three pillars of the international economic system – the World Bank, the Monetary Fund and the World Trade Organization. It is time for leading industrial countries to support the US in this endeavor in order to avoid a throwback in free trade. Here, beneficiaries of the US post-war policy like Germany, Europe and Japan, need to recognize that they bear a special responsibility and step up to this challenge.

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Appendix

Figure 32: USA Bound und MFN Tariffs 2015 by HS4 6-digit product level
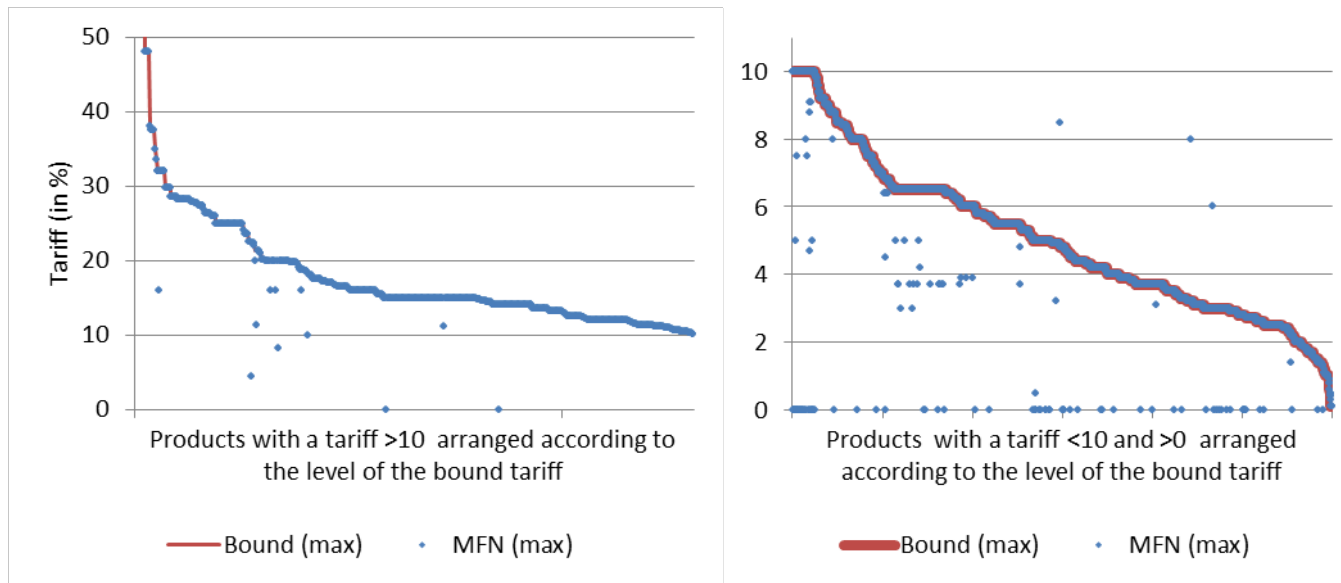
Source: WITS TRAINS Tariff Data

Table 27: (per capita) income, baseline year 2014

	Income in millions USD	Inhabitants	Per capita income in thousands USD
Australia	1390300	23464086	59.25
Austria	387960	8541575	45.42
Belgium	477170	11231213	42.49
Bulgaia	55501	7223938	7.68
Brasil	2296500	206100000	11.14
Canada	1678900	35543658	47.23
Switzerland	610070	8188649	74.50
China	9628100	1364000000	7.06
Cyprus	23603	1153658	20.46
Czech Republic	178950	10525347	17.00
Germany	3266900	80982500	40.34
Denmark	288580	5643475	51.14
Spain	1297700	46480882	27.92
Estonia	24031	1314545	18.28
Finland	243720	5461512	44.63
France	2656800	66495940	39.95
United Kingdom	2810700	64613160	43.50
Greece	234990	10892413	21.57
Croatia	51489	4238389	12.15
Hungary	115110	9866468	11.67
Indonesia	858060	254500000	3.37
India	2053700	1295000000	1.59
Ireland	182830	4617225	39.60
Italy	1938700	60789140	31.89
Japan	4593600	127100000	36.13
South Korea	1233000	50423955	24.45
Lithuania	44587	2932367	15.21
Luxemburg	44998	556319	80.89
Latvia	29656	1993782	14.87
Mexico	1214700	125400000	9.69
Malta	10299	427364	24.10
Netherlands	708620	16865008	42.02
Norway	390660	5137232	76.04
Poland	490750	38011735	12.91
Portugal	221870	10401062	21.33
Rumania	184870	19908979	9.29
Rest of World	11014000	2717000000	4.05
Russia	1611100	143800000	11.20
Slovakia	93183	5418649	17.20
Slovenia	43425	2061980	21.06
Sweden	500950	9696110	51.67
Turkey	732890	77523788	9.45
Taiwan	457080		
United States	17925000	318900000	56.21

Source: WIOD (2014)

Table 28: List of WIOD goods

Sector ID	Sector Name	ISIC Rev. 4
1	Agricultural crops, animal products	A01
2	Forestry	A02
3	Fishery	A03
4	Mining	B
5	Food, beverages and tobacco	C10-C12
6	Textiles and leather	C13-C15
7	Wood and wood products	C16
8	Paper	C17
9	Print and reproduction media	C18
10	Coal and refined mineral oil	C19
11	Chemical products	C20
12	Chemical products	C21
13	Rubber and plastic	C22
14	Other non-metal minerals	C23
15	Metals	C24
16	Processed metals	C25
17	Computer, electric and optic goods	C26
18	Electric machinery and devices	C27
19	Mechanical engineering	C28,C33
20	Vehicles	C29
21	Other means of transport	C30
22	Furniture and other manufactures	C31, C32

Source: WIOD (2014)

Table 29: List of WIOD services

Sector ID	Sector Name	ISIC Rev. 4
23	Energy supply	D35
24	Water supply	E36
25	Waste water, waste collection and disposal	E37-E39
26	Construction industry	F
27	Wholesale	G45
28	Wholesale excl. vehicles	G46
29	Retail industry excl. vehicles	G47
30	Ground travel and transport	H49
31	Water transport	H50
32	Air transport	H51
33	Storage	H52
34	Postal and courier services	H53
35	Hotel and restaurant industry	I
36	Publishing industry	J58
37	Movies, videos and television	J59J60
38	Telecommunication	J61
39	Computer programming	J62J63
40	Financial services	K64
41	Insurance services	K65K66
42	Real estate	L68
43	Legal consulting and accounting	M69M70
44	Architecture and engineering	M71,M73-M75
45	Research and development	M72
46	Administration and service support	N
47	Public administration	O84
48	Education and tuition	P85
49	Health and social services	Q
50	Other services	R-U

Source: WIOD (2014)

Table 30: Scenario I – Change in sectoral value added in Mexico

	Share in nat. SVA	VA Bench in million USD	Change in % Tariffs only	Change in % NTBs only	Change in % Total
Agricultural crops etc.	3.1	38188.0	0.1	-1.9	-1.8
Forestry	0.1	1206.8	0.0	1.2	1.2
Fishery	0.1	911.3	-2.1	7.1	3.2
Mining	7.2	87502.8	-0.1	-9.2	-9.3
Food, beverages and tabacco	5.2	63128.2	0.2	-2.5	-2.3
Textiles and leather	0.8	10038.8	0.0	8.1	8.2
Wood and wood products	0.2	2108.4	0.1	1.6	1.6
Paper	0.4	4399.8	0.1	-0.3	-0.2
Print and reproduction	0.1	1596.6	-0.1	-2.0	-2.1
Coal and refined mineral oil	0.8	10307.8	-0.1	4.7	4.7
Chemical produces	1.3	15496.4	0.0	0.4	0.4
Pharmaceutical products	0.5	6319.4	-0.1	10.4	10.2
Rubber and plastic	0.5	6640.6	0.1	-4.6	-4.5
Non-metal minerals	0.8	9929.0	0.0	-2.3	-2.3
Basic metals	1.0	12672.3	-0.1	-3.5	-3.6
Processed metals	0.6	6947.0	0.0	-6.1	-6.1
Computer etc.	0.9	10789.5	-0.0	0.8	0.8
Electrical machinery, etc.	0.6	7030.8	-0.0	-21.7	-21.8
Mechanical engineering	0.8	10360.3	0.0	5.4	5.4
Vehicles	3.2	39531.5	0.3	-12.1	-12.0
Other means of transport	0.2	2922.0	0.0	-7.6	-7.6
Furniture etc.	0.7	8200.6	0.0	16.0	16.1
Energy supply	1.4	17643.2	0.1	-3.8	-3.8
Water supply	0.4	5058.4	0.1	-3.2	-3.2
Wastewater etc.	0.0	349.4	0.0	-4.0	-4.0
Construction business	7.6	92644.4	0.1	-4.2	-4.2
Wholesale	1.0	12663.2	0.1	-4.8	-4.8
Wholesale excl. vehicles	8.3	101504.9	0.1	-4.4	-4.3
Retail industry	7.4	91126.5	0.1	-4.9	-4.8
Overland transport, etc.	4.9	59681.4	0.1	-4.1	-4.0
Water transport	0.1	1059.6	0.1	-4.0	-4.0
Air transport	0.1	745.5	0.0	-2.4	-2.4
Warehousing	0.6	6890.8	0.1	-3.4	-3.4
Postal and courier services	0.1	1349.9	0.0	-3.7	-3.7
Hotel and restaurant industry	2.2	27361.4	0.0	-4.2	-4.1
Publishing industry	0.1	1270.4	0.1	-3.6	-3.6
Movies, videos and television	0.2	2340.1	0.0	-3.7	-3.7
Telecommunication	1.9	23070.5	0.0	-3.9	-3.8
Computer programming, etc.	0.1	675.5	0.1	-3.5	-3.4
Financial services	3.0	36469.3	0.1	-4.1	-4.0
Insurance services	0.5	6373.5	0.0	-2.0	-1.9
Real estate etc.	0.0	0.0	.	.	.
Legal consulting	1.6	19230.8	0.0	-4.0	-3.9
Architecture etc.	0.4	4902.0	0.0	-1.6	-1.6
Academic research	0.5	5907.9	0.0	-3.9	-3.8
Administration	15.4	188139.6	0.1	-4.0	-4.0
Public administration	4.4	53895.1	0.1	-4.1	-4.1
Eduction and schooling	4.3	52926.8	0.1	-4.2	-4.1
Health and social services	2.3	28085.0	0.1	-4.2	-4.1
Other services	2.1	25790.0	0.1	-4.2	-4.1

Source: ifo Trade Model

Table 31: Scenario I– Change in sectoral value added in Canada

	Share in nat. SVA	VA Bench in million USD	Change in %		
			Tariffs only	NTBs only	Total
Agricultural crops etc.	1.2	20709.9	-0.6	1.1	0.4
Forestry	0.3	4565.1	-0.7	3.2	2.6
Fishery	0.1	2192.9	-1.0	27.1	25.5
Mining	8.4	141633.6	0.8	-20.8	-20.3
Food, beverages and tabacco	1.6	26368.7	-2.0	-0.1	-2.1
Textile and leather	0.1	2299.4	-5.9	13.6	6.4
Wood and wood products	0.4	6996.8	-2.0	-2.9	-4.7
Paper	0.4	6729.7	-1.0	1.0	0.0
Print and reproduction	0.4	6882.1	-1.2	-5.0	-5.9
Coal and refined mineral oil	0.6	10838.0	-0.6	-0.2	-0.7
Chemical produces	0.5	9020.4	-2.8	-2.5	-5.0
Pharmaceutical products	0.3	5701.7	3.5	13.9	17.6
Rubber and plastic	0.5	8978.6	-4.8	-8.1	-12.3
Non-metal minerals	0.4	7074.9	-0.9	-2.1	-2.9
Basic metals	1.6	27141.8	0.5	-0.7	-0.2
Processed metals	0.8	13148.5	-1.2	-4.6	-5.6
Computer etc.	0.6	9511.6	-0.1	12.7	12.6
Electrical machinery, etc.	0.2	3774.3	-0.8	-4.7	-4.9
Mechanical engineering	0.8	14258.0	-0.2	11.6	11.4
Vehicles	0.9	15709.1	-10.1	-17.1	-24.6
Other means of trasport	0.6	9598.8	-3.0	3.3	1.0
Furniture etc.	0.6	10757.9	-1.1	7.3	5.8
Energy supply	2.1	35136.5	-0.7	-4.1	-4.7
Water supply	0.0	0.0	.	.	.
Wastewater etc.	0.3	5009.0	-0.1	0.9	0.8

	Share in nat. SVA	VA Bench in million USD	Change in %		
			Tariffs only	NTBs only	Total
Construction business	7.6	129265.2	-0.6	-4.8	-5.4
Wholesale	1.7	28654.3	-0.8	-5.1	-5.8
Wholesale excl. vehicles	5.1	86170.1	-0.7	-2.7	-3.3
Retail industry	3.8	63634.8	-0.7	-4.4	-5.0
Overland trasport, etc.	2.3	38170.3	-0.6	-1.7	-2.2
Water trasport	0.1	1307.0	-0.2	0.1	-0.0
Air transport	0.4	6309.6	-0.3	-1.7	-1.9
Warehousing	0.8	13034.3	-0.6	-1.5	-2.0
Postal and courier services	0.4	7355.8	-0.6	-3.0	-3.5
Hotel and restaurant industry	2.1	35485.7	-0.5	0.8	0.4
Publishing industry	0.1	2330.9	-0.5	-2.5	-3.0
Movies, videos and television	0.4	5972.5	-0.4	-3.0	-3.4
Telecommunication	1.9	32773.3	-0.6	-4.2	-4.7
Computer programming, etc.	1.7	28377.0	-0.4	-3.3	-3.6
Financial services	3.9	66641.0	-0.6	-4.6	-5.1
Insurance services	1.6	27463.4	-0.5	-3.9	-4.4
Real estate etc.	11.8	199092.2	-0.7	-4.7	-5.3
Legal consulting	1.6	27687.8	-0.6	-3.5	-4.0
Architecture etc.	2.4	40218.8	-0.5	-5.1	-5.6
Academic research	0.8	13756.6	-0.5	-4.0	-4.5
Administration	2.9	49691.1	-0.5	-2.8	-3.3
Public administration	9.0	152095.6	-0.6	-4.7	-5.2
Education and schooling	5.4	91381.6	-0.6	-4.6	-5.1
Health and social services	6.3	106343.2	-0.6	-4.9	-5.5
Other services	2.1	35609.8	-0.6	-4.3	-4.9

Source: ifo Trade Model