The World Trade Organization
at 25

Assessing the Economic Value of the Rules Based Global Trading System

BertelsmannStiftung

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Assessing the Economic Value of the Rules Based Global Trading System

*A Study on Behalf of the **Bertelsmann Stiftung***

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Main Findings of the Study

The creation and expansion of the multilateral trading system has come along with strong growth in trade. After the creation of the General Agreement on Tariffs and Trade (GATT) in 1948, the volume of global trade grew on average by around 8 percent per year. After the crisis of 1974, trade growth slowed down. When the WTO entered into function, growth accelerated again to about 6 percent per year from 1994 to 2008. Between 1995 and 2008, the volume of world trade increased by 125 percent.

These growth rates are impressive. But so is the growth history of the world economy after World War II. However, trade growth outpaced the expansion of GDP. World trade openness (measured as the ratio of world exports over world GDP in current prices) went up from around 5 percent in 1950 to 14 percent in 1994, the year before the creation of the World Trade Organisation (WTO). In the succeeding years, it went up another 8 percentage points to 22 percent in 2008. Since then, the ratio has moved sideways.

Average tariffs in GATT/WTO-member states were significantly reduced over the past decades. Most favoured nation tariffs (MFN tariffs) were reduced on average by about nine percentage points from 1988 to 2016 starting at a level of 17 percent being lowered to about 8 percent in 2016. Similarly, bound tariff rates were reduced by about 8 percentage points from 40 to 32 percent. These figures indicate a successful reduction of customs duties within the rules based trading system in the post World War II decades.

A comparison of how trade volumes in countries emerged before and after accession to the GATT or WTO clearly shows, that for a large majority of the considered countries trade increased significantly and continuously after membership in the GATT and WTO.

Base on a structural gravity model and by accounting for internal- as well as international trade flows, the study quantifies partial, country-specific GATT/WTO effects for the exports of each GATT/WTO member country to its fellow GATT/WTO members to be heterogeneous but positive for the majority of the considered countries. The identified positive trade effects are in contrast to many previous findings and are crucially driven by the inclusion of internal trade flows, as they allow capturing diversion from domestic sales.

Based on the empirically identified estimates (considered period: 1980 -2016), a counterfactual analysis (based on 2016) finds the following welfare and trade effects of the GATT and WTO membership: member countries gained in terms of welfare on average 4.37 percent, with a huge variation from -1.78 percent to 27 percent. Welfare falls on average by -0.96 percent for non-GATT/WTO members.

On average, GATT/WTO members total nominal exports increase about 14 percent, while total nominal exports decrease on average by 5.5 percent for non-members.

1. Introduction

Before World War II was over, politicians of the allied nations came together in the US town of Bretton Woods, New Hampshire, to carve out a new world economic order. The conference was successful in creating international institutions for monetary policy and finance, the International Monetary Fund and the World Bank. In December 1945, the US invited its war-time allies to start negotiations on the creation of a similar international institution to govern international trade.

The logic for binding international rules and for a body of governance was compelling. During the Great Depression, after the US had enacted the so called Smooth-Haley tariffs, the world was drawn into the "Kindleberger Spiral": an accelerating escalation of tariffs and counter-tariffs and a dramatic collapse of world trade from 5.3 bn USD in January 1929 to 1.8 bn USD in January 1933.[1] Average tariffs moved to about 50 percent (Bagwell and Staiger, 2002). Economic historians generally believe that the trade war has not caused the Great Depression but had made it deeper and longer (Irvine, 2011). Moreover, it clearly fostered wide-spread political mistrust and a more general breakdown of international cooperation, ultimately leading to the catastrophe of World War II.

Under the helm of the United Nations and under the intellectual leadership of John Maynard Keynes, work on a charter started and advanced. In March 1948, the Havana Charter was signed by 56 countries. It set out basic rules for international trade and contained provisions against anti-competitive business practices. It designed two new institutions: the International Trade Organization (ITO) and the International Clearing Union (ICU). The latter had the purpose to minimize international trade imbalances by requiring both surplus and deficit countries to "net zero". This was to be accomplished by a system of penalties and an overdraft facility. At the same time, twenty-three countries, including the US, had negotiated a General Agreement on Tariffs and Trade (GATT), and in 1947, eight of those countries (the US, UK, Canada, Australia, France and the BENELUX-countries) sighed the "Protocol of Provisional Application of the GATT".

However, the Havana Charter never entered into force: somewhat paradoxically, it was the US, the initiator of the negotiations, who, in 1950, announced that it would not ratify the text. At the time, the argument was that the ITO would limit national economic sovereignty too much. Quite interestingly, the discussion in the late 1940s bears resemblance to debates today, which also stress legal overreach by international institutions and stress economic sovereignty of nations. A second effort, from 1954 to 1955, to establish an Organization for Trade Cooperation, again hit opposition by the US.

In the meantime, GATT had already held three successful rounds of tariff reductions. Being the only available framework the GATT gradually became a *de facto* international institution despite its provisions character. It turned into the focal point of international governmental cooperation on trade matters. In seven rounds of tariff reductions, and applied to an ever increasing number of members, the GATT became an effective and successful engine for trade liberalization in the "free world", the non-communist allies of the US. When the old systems competition ended with the demise of the Soviet Union, the eighth round, the Uruguay Round, gave birth to the World Trade Organization (WTO).

The WTO, which entered into existence on January 1 of 1995, adopted the GATT and was charged with administering and extending the rules-based international trading system. Its objectives are to foster transparency and predictability, to keep political opportunism at bay, and to enforce the rules.

The WTO fulfills its role with a very small budget and staff: it employs about 650 experts and runs on a budget of about 200 Million Swiss Francs – tiny fractions of the operating budgets of the IMF or the

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[1] Kindleberger (1973).

World Bank. It is a member-driven organization in that new initiatives have to be initiated by members, not the directorate general, and it relies on members to supply it with trade policy information and data. It is a central forum for the negotiation of trade policy, for implementation and surveillance, for the development of capabilities (trade capacity) in poor countries, and – very importantly – for the settlement of trade disputes. It is this last role of the WTO that lifts it above the GATT and which endows it with a modicum of independence; a fact that has attracted criticism, in particular but not only by the US.

GATT/WTO membership should affect trade in various ways. Most obviously, when a negotiation round is successfully concluded or when a new country enters the WTO, tariffs are reduced. This should increase trade. With trade elasticities estimated to lie between 3 and 5 at the aggregate level, a one percentage point decrease in tariffs drives up trade by 3 to 5 percent. More importantly, when a country becomes a member of the multilateral system, it binds its tariffs, that is, it cannot increase them at will above the bound level. This reduces uncertainty and has been shown to matter more for trade than tariffs themselves (Dutt et al., 2011). Through its dispute settlement function, the WTO further reduces trade policy uncertainty which should also stimulate trade flows.

GATT/WTO membership also reduces non-tariff trade barriers (NBS) by disciplining their use, ruling out the most egregious cases and increasing transparency. Over the various rounds, the system reduced quantitative restrictions and replaced them by tariffs, less detrimental tools of trade policy. Moreover, the WTO works with poorer countries to enable them to meet standards and abide by necessary international processes.

By the above mentioned initiatives, GATT/WTO helps bringing down trade costs. However, its prohibition of export subsidies effectively increases the costs of foreign market participation to exporters, thereby adding to the earlier mentioned positive effects a possibly trade-reducing effect. On average, one should not expect this effect to dominate, but it can play a role in highly subsidized sectors or countries.

As we will illustrate in this study, during the years of the GATT, the number of signatory countries multiplied from a mere 23 to 128. Members cut their tariffs on industrial products during the first rounds (1948-62) by an average 36 percent, an average 37 percent in the Kennedy Round (1964-67), an average 33 percent in the Tokyo Round (1973-79), and an average 38 percent in the Uruguay Round (1986-94). According to data from Federico and Teno (2016), the trade openness of the world (measured as the ratio of world exports over world GDP in current prices) increased from a mere 5 percent to 14 percent in 1994, the year before the creation of the WTO. From then, it went up another 8 percentage points to 22 percent in 2008. Since then, the ratio has moved sideways.

Looking at trade volumes (in constant prices), from 1980 to 1994, according to WTO data, world trade went up by 81 percent. With the creation of the WTO, the rules-based system was extended to include services, intellectual property, and dispute settlement. World trade growth accelerated: from 1994 to 2008, the volume of world trade increased by 125 percent.

This is a great success story. However, it begs two important questions. First: To what extent is the expansion of world trade *causally* due to the creation, gradual expansion and deepening of the GATT/WTO-system? The problem, of course, is that, following the Bretton Woods Conference, the world has seen a large number of other developments that were hugely beneficial for trade – the peaceful global environment led by the US, enormous unilateral improvements in economic governance and in all sorts of infrastructure, and important technological improvements such as the containerization of world trade and the collapse of international communication costs through the arrival of the internet.

This study employs state-of-the-art econometrics on a very broad and long panel of trade data to filter out the causal effect of the GATT/WTO. The methodology has to overcome several issues. Amongst other things, it must make sure to account for as many determinants of trade other than GATT/WTO membership as possible. Moreover, it is important to use all possible margins of comparison including between intra- versus international trade flows. The former are not directly impacted by the multilateral system while the latter are. Additionally, taking into account intra-national trade flows allows capturing diversion from domestic sales to international trade. Moreover, the econometric analysis must deal with the fact that countries joining the global system are not randomly selected, and it must be amenable to an analysis that allows calculating the effects of GATT/WTO membership on GDP. Exploiting variation in the data across 37 years and 218 countries, the econometric model finds sizeable positive trade effects: on average, GATT/WTO membership leads to a direct (partial equilibrium) increase in exports by 25 percent.

These direct effects need to be supplemented by indirect (general equilibrium) effects. This overturns some of the negative partial/direct effects found in the econometric analysis. Overall, GATT/WTO membership increases real GDP (welfare) by about 4.37 percent. There is some evidence that, when new countries join, countries remaining outside the system lose slightly due to trade diversion. However, they also benefit from price effects: a more efficient global trade system tends to benefit all countries through lower import prices.

The second question is: if the GATT/WTO-system has causally led to increased trade, how exactly has this beneficial outcome materialize? This is not a trivial question, because the international system has no real means to enforce its rules but relies on continued self-interest of members. Indeed, it is very important to understand the roots of the success of the world trade order from 1948 to, say, 2008, to understand the challenges the system is facing today. Classical trade theory stresses the importance of external effects: when a country unilaterally gives up its tariffs, it is harmed by a deterioration of its terms-of-trade: the relative price of exports to imports goes up as relative demand for the imported good surges. Countries are, therefore, hesitant to give up tariffs unless other countries reciprocate, which approximately restores terms-of-trade.

However, this requires trust, which is hard to sustain. The problem is that countries have unilateral incentives to deviate from free trade: by doing so, they can improve their terms-of-trade as relative demand for imports and, hence, their relative price goes down. Trade partners anticipate this and are therefore reluctant to expose themselves. This is a classical prisoners' dilemma, well-known from game theory, and well-studied in a large literature.

Repeated interaction under a commonly respected protocol can, however, break the deadlock and bring about a stable cooperative equilibrium. Bagwell and Staiger (2002, 2016) have shown that the GATT/WTO system with its core principles of reciprocity and non-discrimination (national treatment, most-favored nation rule) is well-endowed to achieve this objective.[2]

Under these principles, simple tit-for-tat can induce cooperation: when a country deviates from the cooperative equilibrium, the other WTO members are allowed to withdraw concessions (i.e., retaliate) in a proportionate, well-understand way. The credible threat of such action can be enough to keep

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[2] Ossa (2011) extends this view and introduces countries' incentives to induce firm relocation from trade partners by imposing tariffs. This mechanism is very similar to the Bagwell-Staiger one. Other authors have stressed the importance of domestic commitment problems and how external (trade) agreements can solve them (Maggi and Rodriguez-Clare, 1997).

countries cooperating. Ossa (2011) extends this argument to a situation where countries compete for firms.

Currently, the world trade order is under stress. There are number of important points of criticism. The two major ones relate to content and form: (i) Since its creation in 1995, the WTO has not been able to fundamentally modernize its set of rules despite massive changes in the structure of the world economy, in particular the rise of countries (such as China) who many view as non-market economies. Moreover, it has not been able to push through another round of trade liberalization to deal with issues such as data or "unfair" trading practices. (ii) Possibly because of (i), some WTO member countries have increasingly relied on its judicial role to address "creative ambiguity" in legal documents for which the Appellate Body has been criticized and accused of overstepping its mandate. For this reason, the US' has resisted confirming the nomination of judges to the appellate body, paralyzing the arbitration role of the WTO.

Because of (i), essentially all countries have increasingly resorted to preferential trade agreements, which, in principle at least, violate the core tenet of the multilateral order: non-discrimination, as enshrined in Articles I and III of the GATT. By awarding preferences to some partners while denying them to others, bilateral trade agreements undermine the WTO: a larger share of world trade does not rely anymore on multilateral rules, weakening support for the institution. It is well possible that large regional deals may actually invigorate the multilateral system by providing a testing ground for new rules, but this is not automatic. Moreover, bilateralism endangers another implicit principle of the multilateral system: the containment of brute power to the advantage of negotiated outcomes.

The study is structured as follows: Before moving to a descriptive analysis, chapter 2 casts a short history of the multilateral system. Chapter 3 presents a first glance at the data, showing cursory evidence of the GATT/WTO in boosting trade. The core of the study, Chapter 4 presents the results of the econometric analysis. Chapter 5 moves to a general equilibrium perspective, simulating trade and real GDP effects based on the estimates from Chapter 4. Chapter 6 discusses some of the key challenges the multilateral system is currently facing. Chapter 7 concludes.

2. The emergence of the GATT and WTO. A short overview.

The General Agreement on Trade and Tariffs (GATT) entered into force in 1948 with eighteen member states. The agreement was setup alongside the so-called Bretton Woods institutions, the World Bank and the International Monetary Fund. Decades prior to Bretton Woods were characterized by economic conflicts and trade wars ending in a global war. Restrictions on international trade and beggar-thy-neighbour policies had deepened the reach of the Great Depression in the 1930s, imposing huge economic and social costs on societies. Figure 1 illustrates the evolution of average tariffs over a long period covering the years before and after the GATT initiation for France, the United Kingdom, and the US. Average tariffs were steadily declining before the Second World War, however, just within a couple of years politicians were able to raise trade barriers to levels experienced almost hundred years earlier.

A main objective of the GATT was to avert this sort of destructive impediments to international trade that led to a global war in the years before the initiation of the trade accord.

Figure 1: The evolution of average tariffs in the last century
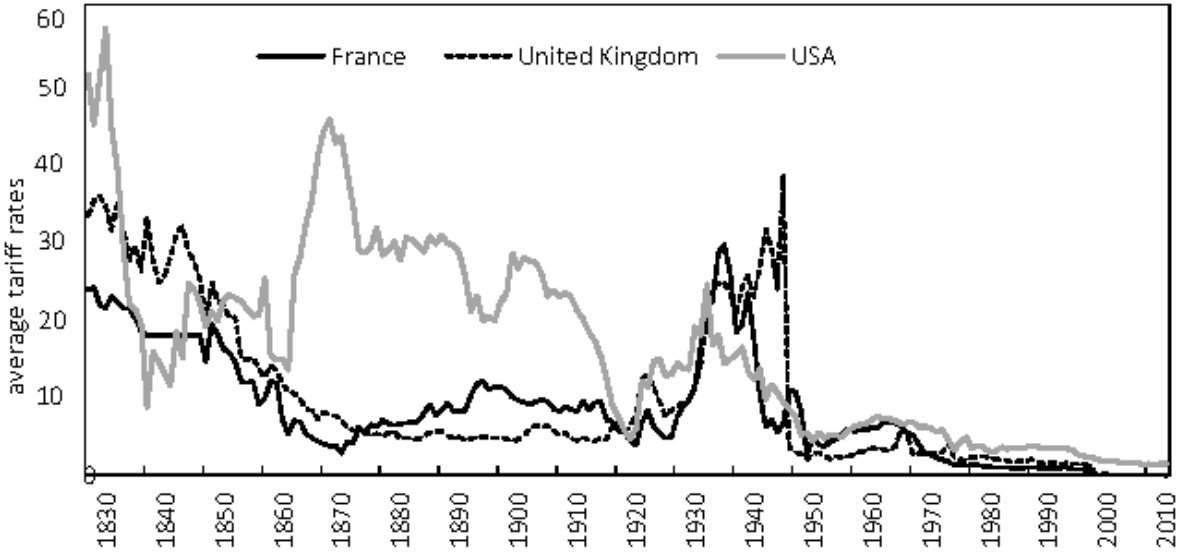
Source: Fouquin et Hugot (2016)

Since then the number of members has greatly expanded. When the GATT was institutionalized in the World Trade Organization (WTO) in 1995, the number had risen to 127 member states. Additionally, while in the early years the GATT represented primarily a club of mostly industrialized countries, over the years members gradually started to reflect the different regions and income levels across the world more broadly. Today, 164 countries are members of the WTO. At the same time as the number of members rises continuously, the nominal trade volume of GATT/WTO members skyrockets while the total trade volume accounted for by non-GATT/WTO members increases only moderately (Figure 2).

Figure 2: Development of GATT/WTO membership and trade volume
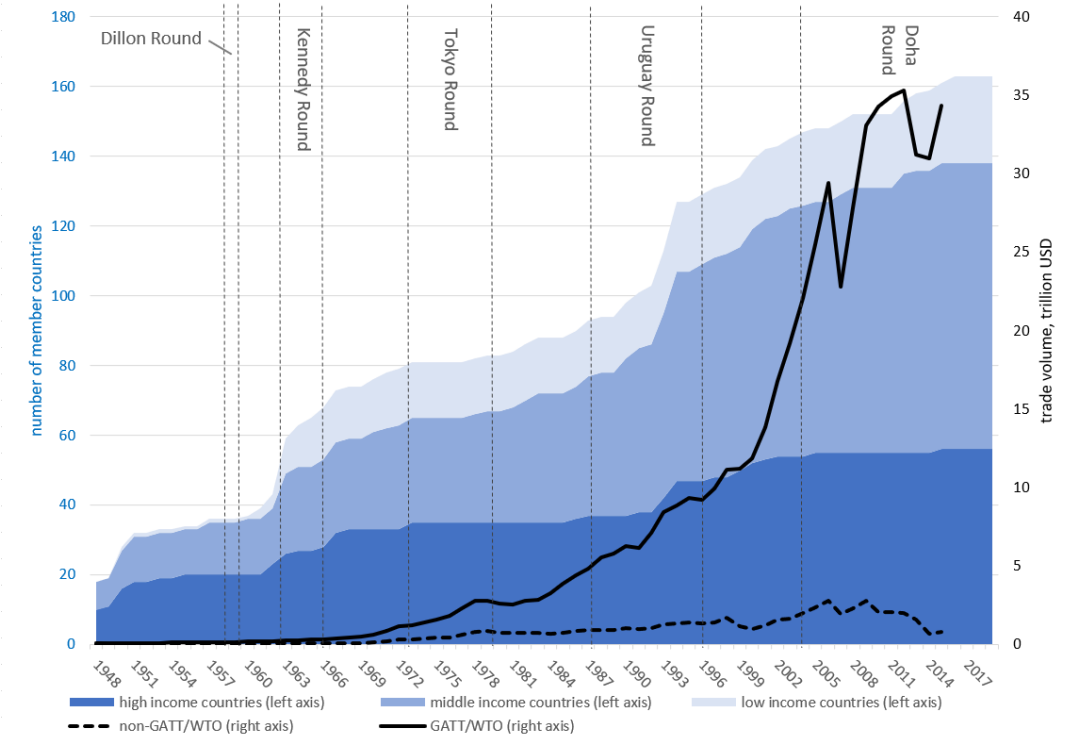
Source: WTO, DOTS, WDI

Since its inception, the GATT expanded not only in its geographic scope but also deepened in its coverage of world trade as well as agreement coverage. In several negotiation rounds, members agreed not only to reduce tariffs and quotas. They also considerably liberalized world trade by agreeing on the reduction of non-tariff barriers to trade in recent decades.

As illustrated in Figure 3, the trade openness of the world (measured as the ratio of world exports over world GDP in current prices) increased from a mere 5 percent to 14 percent in 1994, the year before the creation of the WTO. In the succeeding years, this measure went up by another 8 percentage points to 22 percent in 2008. Since then, the ratio has moved sideways.

Figure 3: World Trade Openness over Time 1950-2014
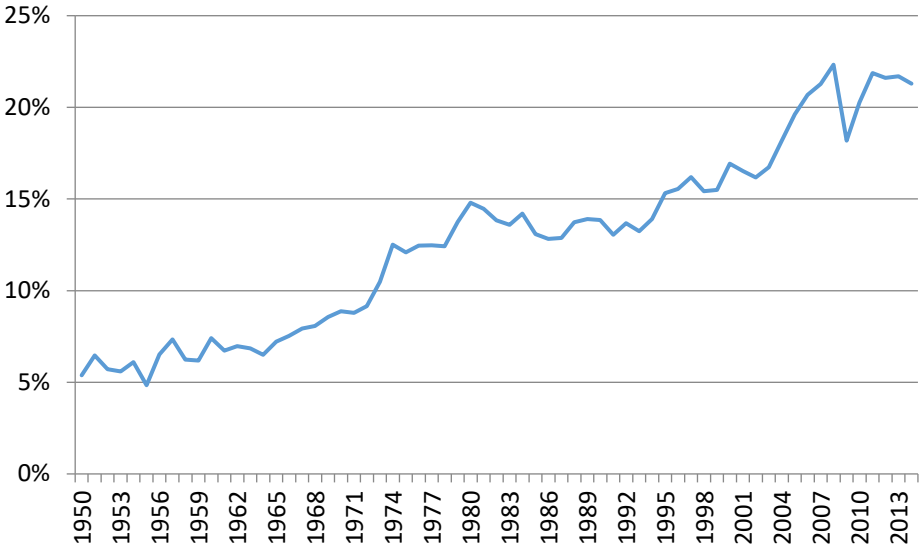
Source: Federico and Tena (2016).
Note: World Trade Openness is defined as the ratio of world exports and world GDP, both measured in current prices.

Figure 4 shows how trade volumes (in constant prices) developed on average over different periods. From 1980 to 1994, according to WTO data, world trade went up by 81 percent[3]. With the creation of the WTO, the rules-based system was extended to include services, intellectual property, and dispute settlement. In this period, world trade growth accelerated: from 1994 to 2008, the volume of world trade increased by 125 percent.[4]

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[3] Calculated as $1.0431^{14} - 1 = 0.805$.
[4] Calculated as $1.0599^{14} - 1 = 1.25$.

Figure 4: Average growth rates of world trade volume, in %
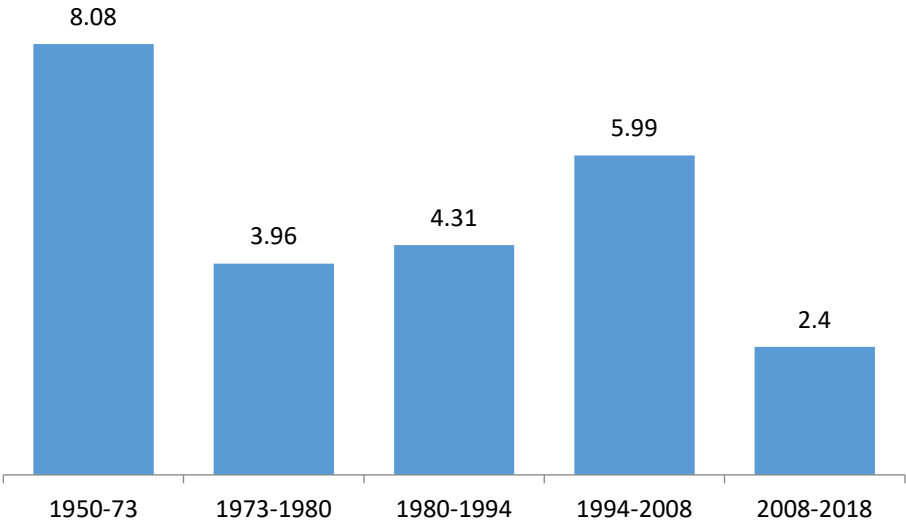
Source: Federico and Tena (2016) and WTO data, own illustration and calculations.
Note: The diagram shows annualized growth rates of deflated global merchandize trade.

Finally, Figure 5 presents an overview of who entered the GATT/WTO in which decade. Clearly, the GATT and later the WTO have expanded much over time. When the GATT was signed in 1948, countries from mostly North America and Europe as well as Australia, Japan, Brazil, India, South Africa and some others were the founding members. Over time, more and more countries joined from Asia (e.g. Indonesia), Africa (e.g. Liberia), and South America (e.g. Peru). In recent decades, China and Russia as well as some Middle Eastern countries (e.g. Jordan) joined the project. To date, few countries remain non-members. They are mostly located in the Middle East and in North and East Africa.

Figure 5: Accession dates of GATT/WTO members
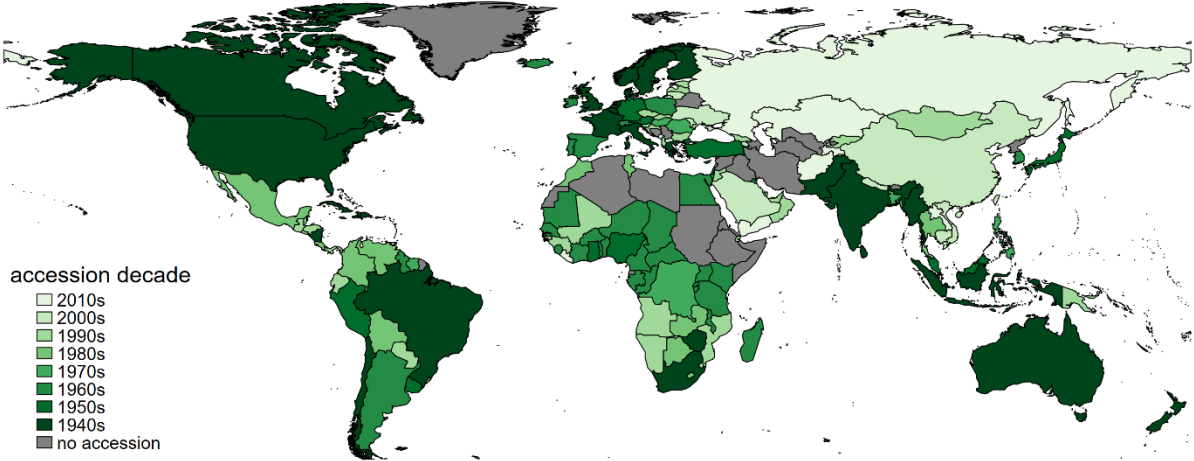
Source: WTO.

3. The evolution of trade across the world between 1950 and 2016.[5]

3.1 Global Trade Patterns in Light of GATT/WTO

Figure 6 compares the emergence of trade for different GATT- and WTO-members with non-member states within the Americas, Europe and Asia (a list of countries for each region can be found in the Appendix). Across all considered regions, clearly, the amount of trade impressively increased over the years among GATT- and WTO-members. A first strong acceleration of trade is observed in the 1970s pushing import and export volumes above 1 trillion US-Dollars. The increasing cross border commerce was slightly slower in Asia during those years in comparison with Europe and the Americas. However, in the following years, particularly after 2001, with China's membership in the WTO, trade in the region reached a level of over 10 trillion USD in only one decade. Equally, European WTO members experience a second strong increase in cross border trade, also reaching a total trade volume significantly above 10 trillion USD after 2001. Similarly, GATT/WTO-members of the Americas experienced an increase in international trade following the year 2000; however, the volume of trade in that region crossed a level of 5 trillion USD that is significantly below the European and Asian trade volumes.

Figure 6: Trade volume over time by region and GATT/WTO membership
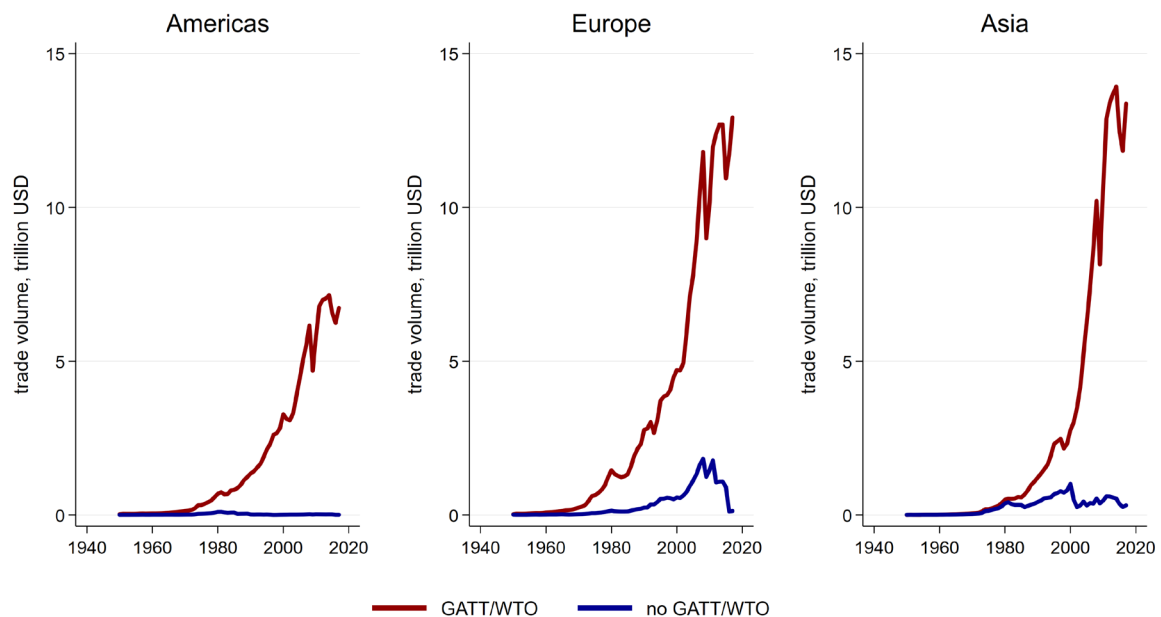
Source: DOTS, WTO.

Figure 7 quantifies for five different regions the share of total trade (imports and exports with the world) that can be traced back to each region's GATT/WTO-member countries for the years 1950 and 2017. Accordingly, in 1950 for example, around 30 percent of Africa's trade with the world resulted from GATT/WTO-members while 70 percent of the continent's trade with the world stemmed from non-GATT/WTO members. Along with the increasing number of countries, joining the GATT and later the WTO, in 2017 more than 80 percent of Africa's trade with the world can be traced back to the continent's GATT/WTO member states. Similar developments are observed for Asia, Latin America and Europe.

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[5] We are grateful to Moritz Goldbeck for excellent research assistance.

Figure 7: Trade share by GATT/WTO membership and regions
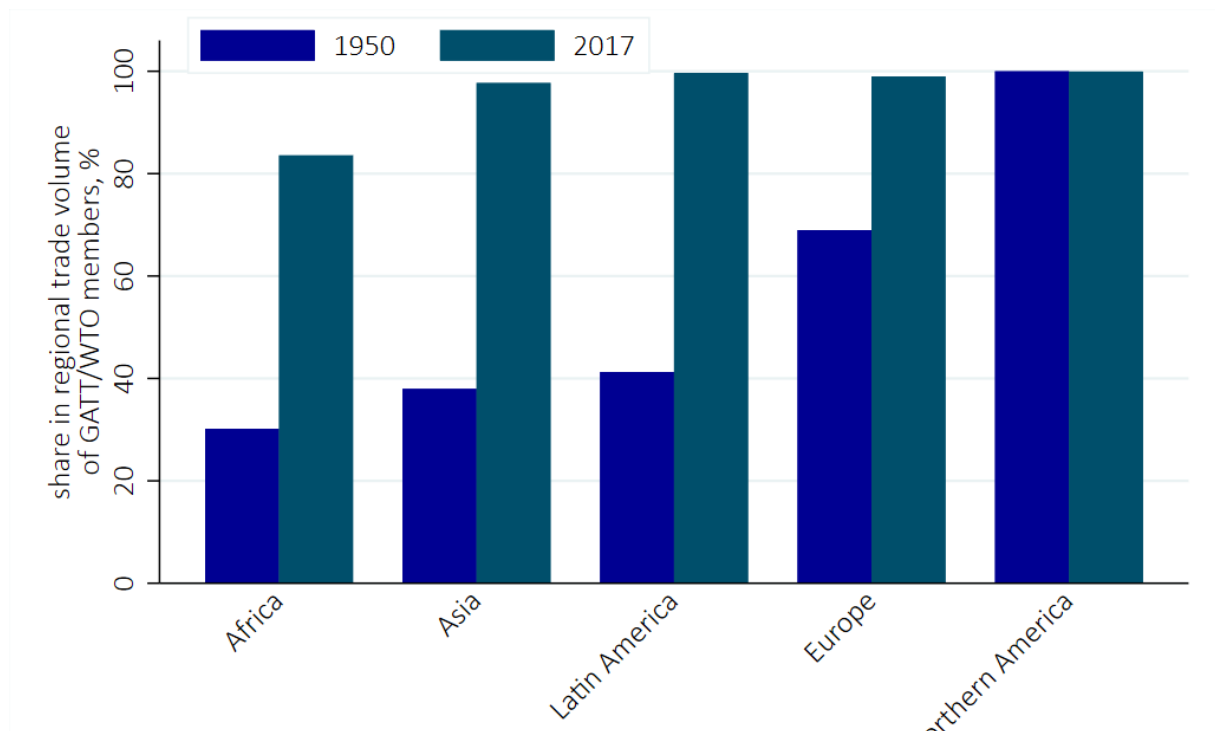
Source: DOTS, WTO.
Note: A list of countries for each presented region is available in the Appendix.

However, in the former three regions, in 2017 nearly all trade with the world is attributable to WTO member states. In case of North America, represented by Canada and the USA, the region's total trade with the world always stemmed from GATT/WTO-member state because Canada and the USA are founding members of GATT.

While Figure 6 visualizes the different dynamics of how the volume of trade among GATT/WTO-member states evolved across different regions, Figure 7 illustrates the growing share of trade across different regions that has increasingly been shaped by GATT- and WTO-members.

Figure 8 goes one step further and shows world maps for the years 1985 and 2017, respectively, depicting the trade volume of countries in these years as well as their membership status in the GATT and WTO. The two maps illustrate how the global rules-based trading system emerged over the years starting with a small number of member states in the 1950, pushed forward by the US as the most active trading nation in those post world war years. Already, in 1985 just a few years before the iron curtain's fall Europe and a large share of the African nations have become members of the GATT. Equally, most of the Southeast-Asian countries have become members of the rules-based world trade order. As the map of 1985 illustrates, among the GATT-members, EU countries, particularly, France, Germany, United Kingdom, and Italy, belonged in that year to the most active trading countries besides the US and Canada. Among the non-GATT-members, China and some oil and gas exporting countries like Saudi Arabia, or Libya showed some higher trade activities than other non-member-states.

Figure 8: Trade volume by country and membership for selected years

1985

2017

trade volume, bn USD
- >100bn, member
- 50-100bn, member
- 10-50bn, member
- 0-10bn, member
- 0-10bn, non-member
- 10-50bn, non-member
- 50-100bn, non-member
- >100bn, non-member
- No data
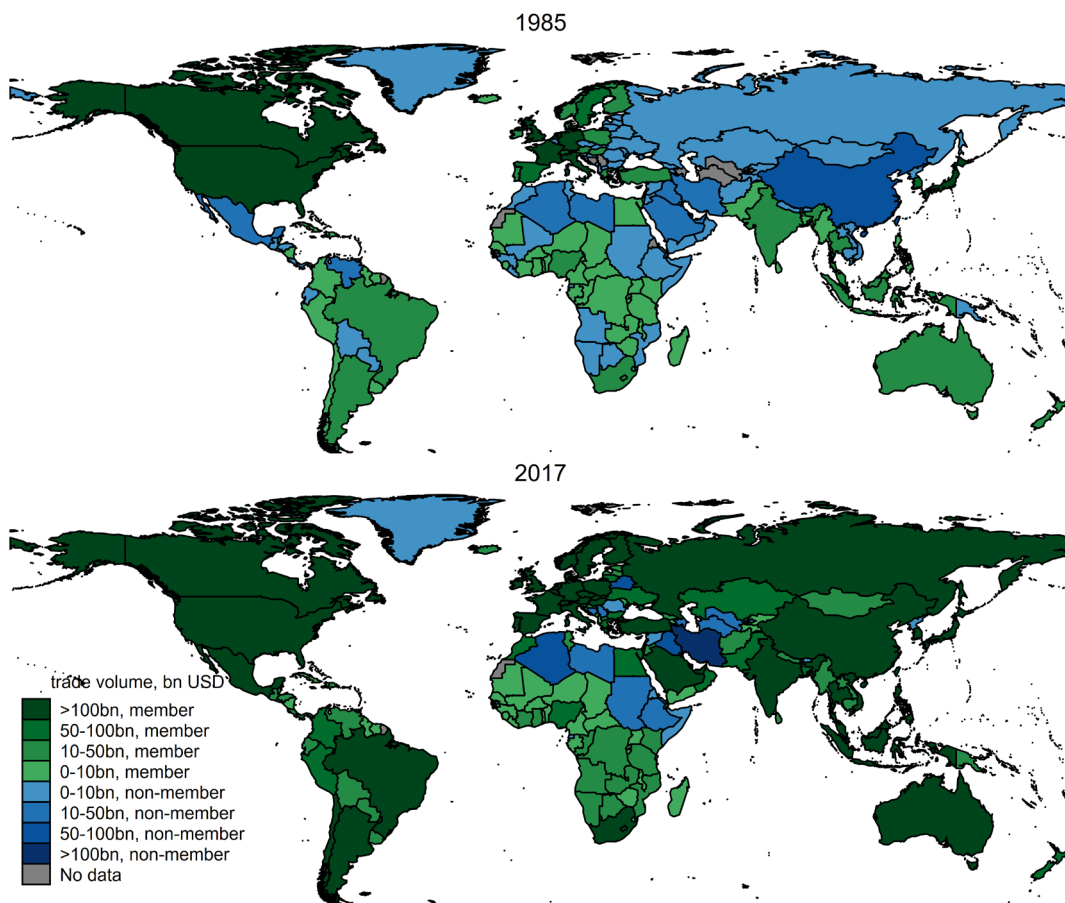
Source: DOTS, WTO.

The pattern of trade across GATT/WTO-members and non-members changes again significantly in 2017. In this most recent year for which data are available, a large share of the countries in the world are part of the WTO. Moreover, it is no longer only a small number of countries that show a high level of trade. In the contrary, for many WTO-members trade reaches a level above 100 billion US-Dollars per year. Two groups of countries stand out in Figure 8. There are still a small number of resource exporting nations such as Algeria, Iran or Libya that are not members of the WTO. Moreover, most of the central African countries show a relatively small annual trade volume in contrast to more advanced economies in the remaining regions of the world.

Figure 9 extends the comparison of cross-border trade between GATT/WTO-members and non-member states, by depicting the evolution of total trade within these two groups. In 1948, when the GATT was initiated, member states already made up around 70 percent of world trade. This share in global trade steadily increased over the following years along the rise in GATT- and WTO-member states. Today, almost 95 percent of merchandise trade is taking place under the umbrella of the WTO rules.
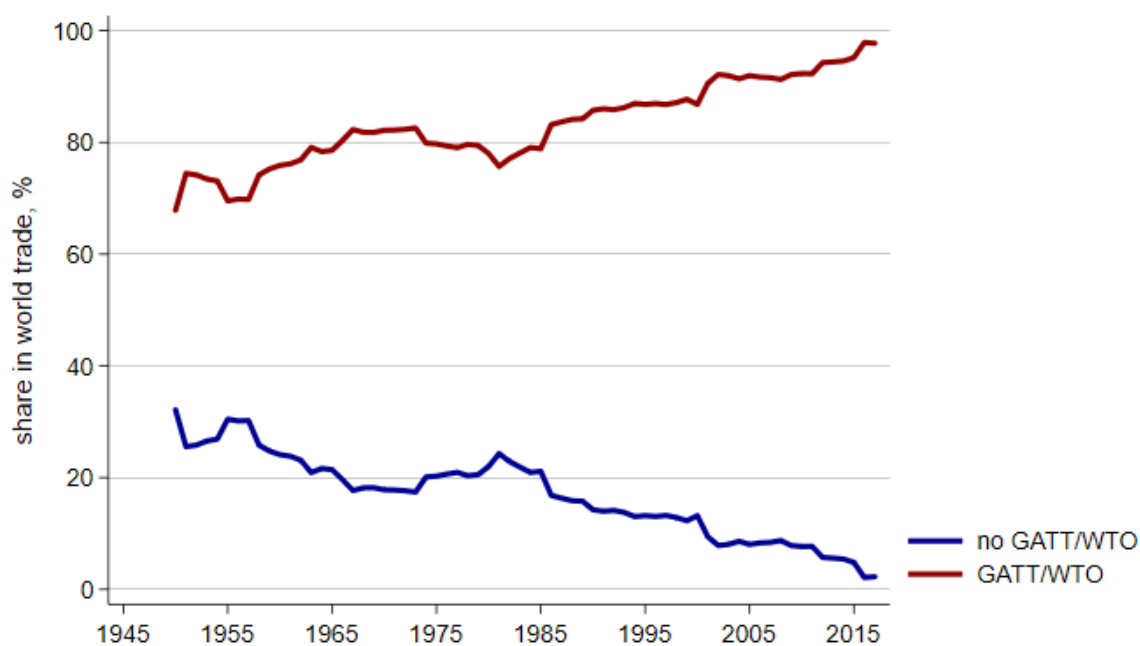
Source: DOTS, WTO.

3.2 Observed trade patterns in light of GATT- and WTO-membership

The previous graphs illustrate a steady increase in cross-border trade along the growing number of GATT- and WTO-members in the world. However, the figures do not indicate in how far a country has benefited from a GATT- or WTO-membership by increasing its cross-border commerce in merchandise trade. This section presents additional descriptive statistics to address the question of whether membership in the GATT or the WTO resulted in larger cross-border trade.

To analyse the development of trade patterns when a country joins the GATT/WTO we compare the average growth in trade before and after accession to the global trading system. Because countries tend to increase trade already before a final ratification of international trade accords (compare Egger et. al 2011) we quantify how trade develops six years before and after a country joint the GATT and WTO. Moreover, we split the pre- and post-accession years into two periods (3-year windows). This allows us to visualize potential dynamics in both the pre- and post-accession period. Moreover, with the chosen 6-year windows before and after a GATT/WTO membership we cover a sufficiently long time window to account for potential anticipation effects that my result in higher trade flows before accession.

The chosen procedure comes with some statistical costs. For several large economies, it is not possible to quantify this GATT/WTO trade-effect due to their early membership in the agreements and the missing availability of trade data for early years.

Figure 10 presents the results of such a simple statistical comparison for several world regions. The first blue bar (t-6 to t-3) measures the average growth in total trade across all countries for a specific region over three years relative to the region's total trade. In case of Europe e.g., in the two pre-accession periods (t-6 to t-3) and (t-3 to t-0) European countries experienced an average annual increase in trade by 17 percent. In contrast to the two pre-accession period, European countries experience on average

significantly higher annual increases in international trade after becoming a GATT- or WTO-member. In the first three years after accession, member states experienced on average a rise in trade by 23 percent. This growth rate turns out to be significantly larger in the second post-accession period, reaching an average annual rate of 40 percent over the three considered years. Overall, compared to the pre-accession period (6 to 0 years before membership), all considered countries experience on average a significantly higher annual increases in international trade after the accession period. Except for Latin America, in all other regions average growth in trade increases significantly stronger in the second post-accession period covering the years 3 to 6 after GATT- or WTO-accession.

Figure 10: Average annual change in trade before and after GATT/WTO accession, by region
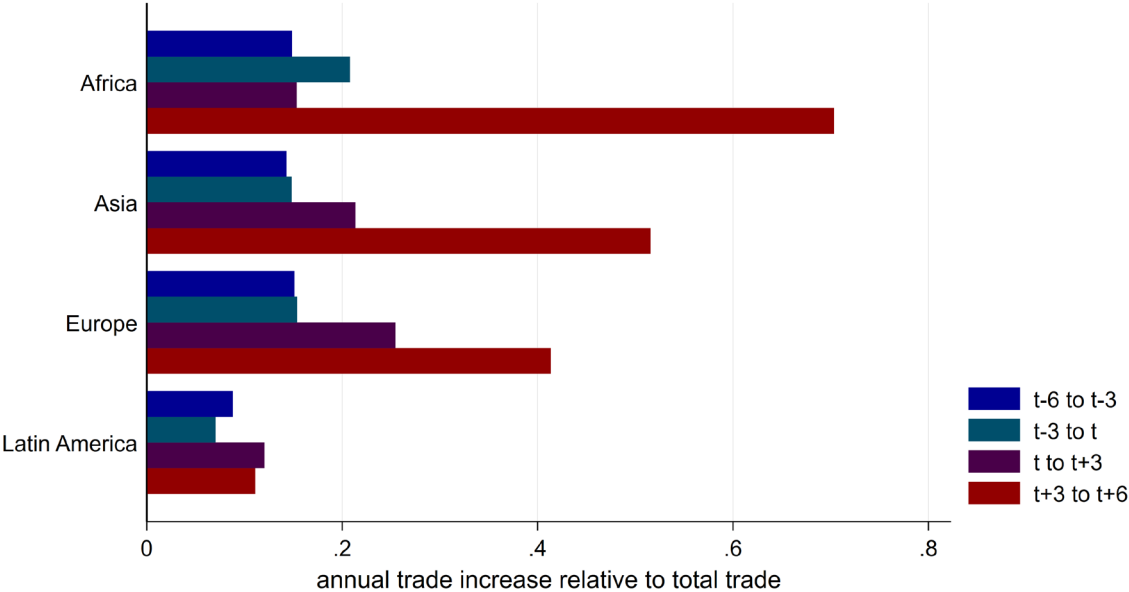
Source: DOTS, WTO.
Note: A list of countries for each presented region is available in the Appendix.

Figure 11 illustrates the same quantitative analysis as in Figure 10, but this time for countries grouped by income levels. Based on the World Bank Group income classification we account for high-income (HIC), middle-income (MIC) and low-income (LIC) countries. As in the previous regional analysis, countries experience on average a significant increase in international trade after becoming a GATT- or WTO-member. This pattern appears across all three income groups, although with some differences. In case of high- and middle-income countries, international trade steadily increases after GATT- and WTO-accession. In case of low-income countries, average annual growth in trade turns out to be smaller in the first post-accession period (t to t+3) than in the pre-accession periods. However, annual trade increases on average very strongly in the second period reaching levels of up to 100 percent. These high average growth rates in trade can be explained by countries such as Burundi exhibiting basically no trade before becoming a GATT-member.

Figure 11: Average annual change in trade before and after GATT/WTO accession, by income-level
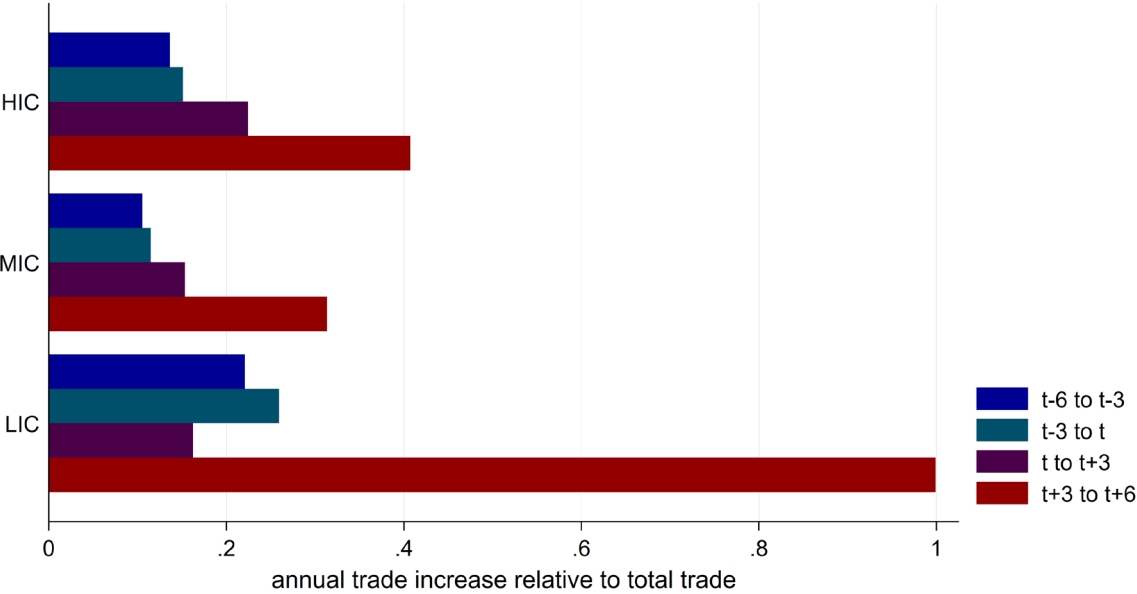
Source: DOTS, WTO.
Note: A list of countries for each presented group is available in the Appendix.

Finally, in Figure 12 we present the evolution of trade in each GATT- and WTO-country for 8 years prior to and 8 years post GATT- and WTO-membership, where the data allows such an analysis. The figure quantifies how trade in each listed year has changed in the pre- and post-accession period relative to the country specific accession year. Therefore, in the accession year (t=0), the observed change in each country is equal to zero indicated by an index value 1. Larger index values indicate a relative higher trade in the specific year relative to a country's accession year amounting to the according index value, while smaller numbers appear if trade in a specific year turns out to be smaller than in the accession year.

Figure 12 visualizes that for the majority of all GATT and WTO member states total trade with the world has increase. The average change of total trade relative to each countries accession year trade volume is positive and increases continuously over the years after GATT- and WTO-membership (black dotted line). At the same time, we highlight some countries with above and below average index values. In case of China, for example, total trade with the world relative to the accession year increased significantly faster than in most other member states. Just within three years after its WTO-membership, China experienced a doubling of total trade. Japan and Germany also experienced a relative strong increase in total trade during the post accession period, although not to the same extent as China. On the other hand, the case of Russia illustrates that GATT- or WTO-members can experience a drop in total trade. Five years after WTO membership Russia was still trading less with the world compared to accession year.[6]

Table A1 in the Appendix lists each GATT/WTO country's specific total trade over the pre- and post-accession years.

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[6] It is worth mentioning that Russia became a WTO member in 2012, just two years before the annexation of Crimea and the succeeding economic sanctions.

Figure 12: Average annual change in trade before and after GATT/WTO accession, by country
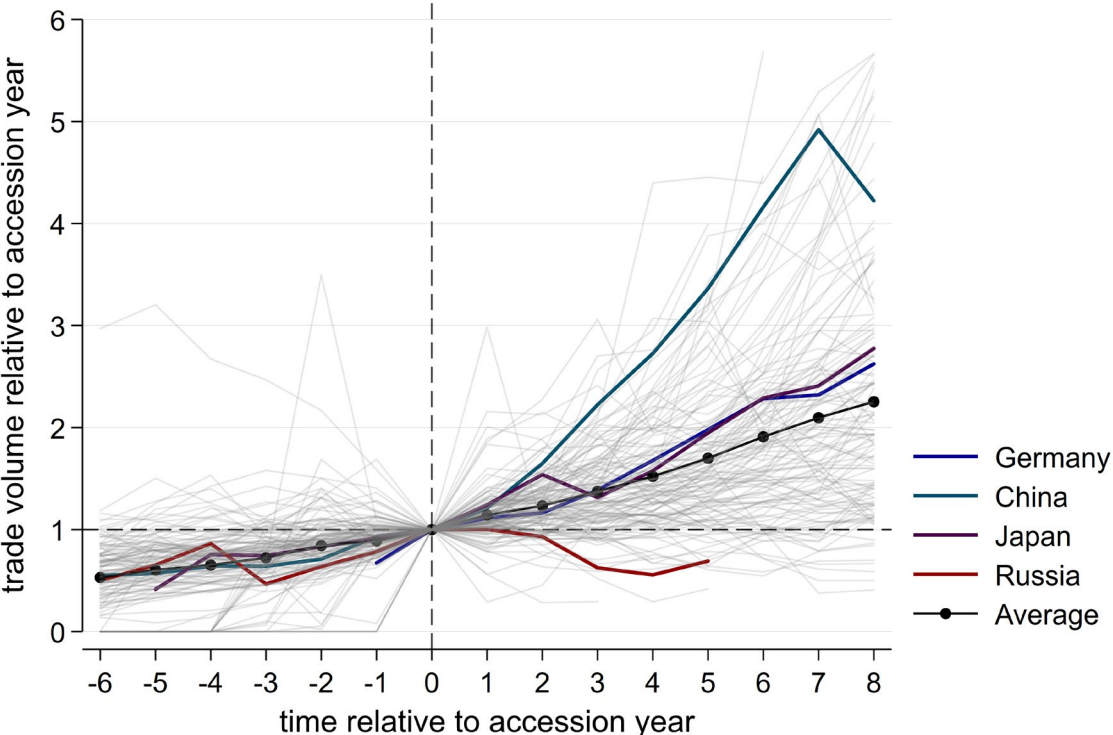
Source: DOTS, WTO.

It is important to emphasize here, that these figures indicate a trade boosting effect once a country becomes a member in the GATT or WTO. However, the descriptive effects cannot be interpreted as a causal relationship because many further aspects such as domestic industrial developments or population growth could drive these patterns. For this reason, we challenge these trade-enhancing effects of a GATT- and WTO-membership by extended the analysis with more advanced empirical methods in chapter 4.

3.3 Tariffs in Light of the GATT and WTO

An important aim of the GATT/WTO has been to allow traded goods to face less trade barriers when crossing borders. Historically, customs duties represented the main source of trade impeding policy instruments, also referred to as tariffs. Unfortunately, a comprehensive analysis of how tariffs evolved over the past decades is only possible for the years starting in 1988, if one intends to account for the whole word.

Within the GATT and the WTO two types of tariffs are of main interest, most favoured nation tariffs (MFN tariffs) and bound tariffs: MFN tariffs are customs duties that countries promise to impose on imports from other WTO-member states, unless the country is part of a preferential trade agreement (e.g. such as a free trade agreement or a customs union). Hence, in practice, MFN rates represent the highest and most restrictive level of tariff that WTO-members charge on one another. In contrast to MFN tariffs, bound tariffs are commitments made by individual WTO-member governments. A bound tariff represents the maximum MFN tariff level for a given commodity line. When countries join the WTO or when WTO members negotiate tariff levels with each other during new trade rounds, they make agreements about bound tariff rates, rather than actually applied MFN tariff rates.

As can be seen in Figure 13, average tariffs in GATT/WTO-member states were reduced significantly over the past decades. MFN tariffs were reduced on average by about nine percentage points from 1988 to 2016 starting at a level of 17 percent being lowered to about 8 percent in 2016. Similarly, bound tariff rates were reduced by about 8 percentage points from 40 to 32 percent. These aggregated tariff measures also illustrate that alongside a continuous decline in applied MFN tariffs, member states in the WTO have maintained on average still relatively high bound tariffs, albeit on a lower level than in the past, which gives the countries a policy space to increase MFN tariffs in the future.

Figure 13: Average tariffs of GATT/WTO-members over time, MFN=most favoured nation tariff rate, bound=bound tariff rate
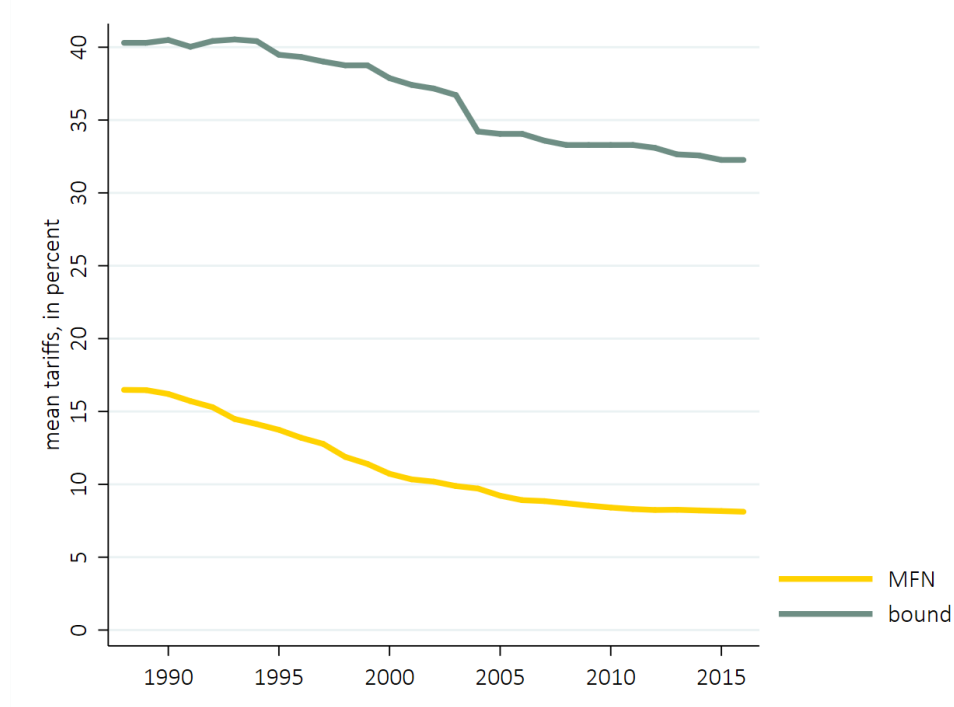
Source: IMF IDB, WTO.

Figure 14 maps the average MFN tariff rates for each country in selected years. Several important developments can be derived from these figures. First, although tariffs have been on the decline over the years, average MFN tariffs turn out to be highly heterogeneous across countries.

Figure 14: Mean most favoured nation tariff rates by country for selected years
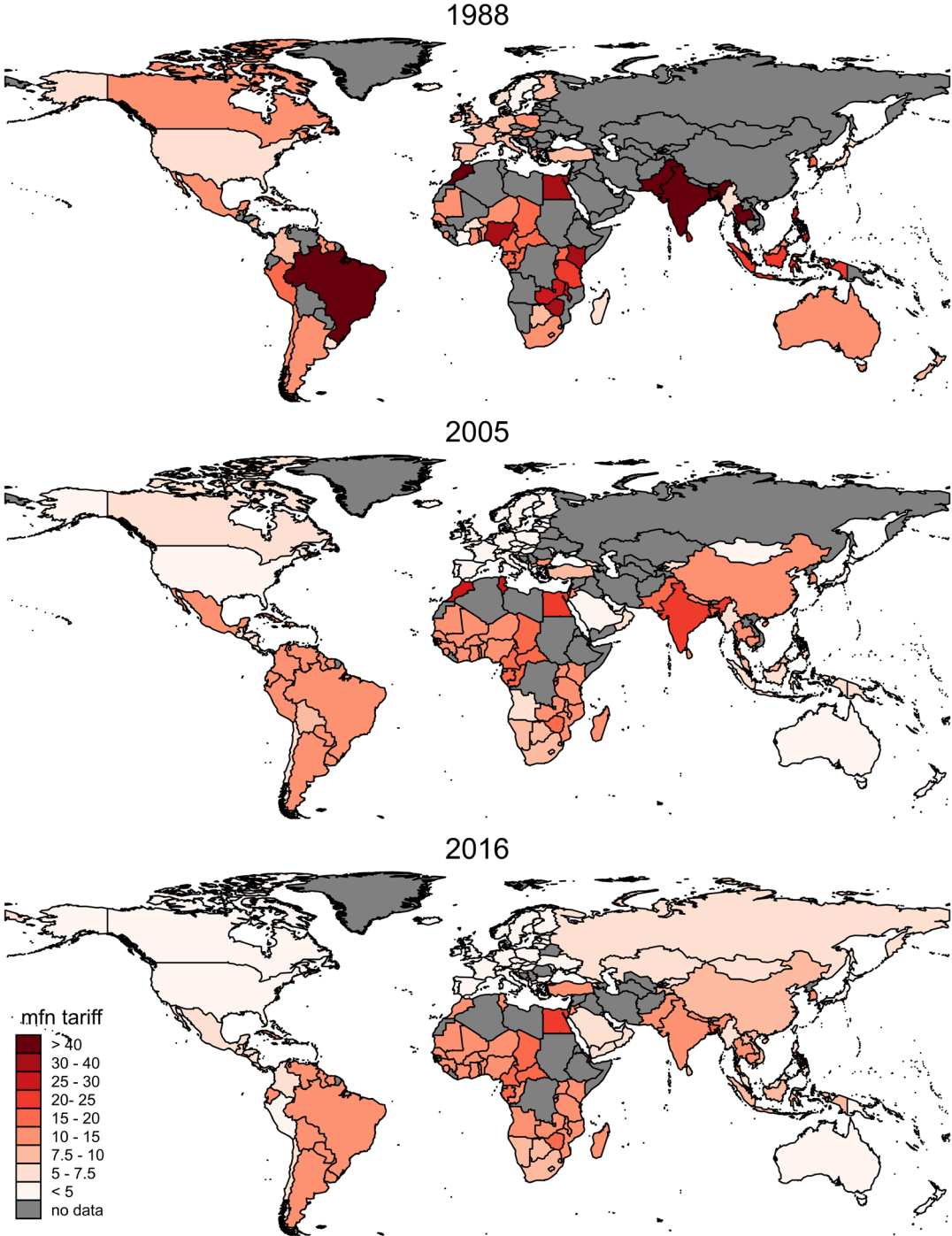
Source: IMF IDB.

While most of the high-income countries as e.g. the USA or the EU exhibit average MFN tariffs below 5 percent, at the same time emerging economies such as Brazil or China still show average applied tariffs reaching 15 percent.

At the same time, tariffs across the fast growing emerging economies e.g. like China, India and Brazil decreased their MFN tariffs significantly over the years. However, the extent of tariff reduction turns out to be slower in some regions, as e.g. in case of South America or India.

Less developed countries, particularly member states in Africa turn out to have the highest average tariffs among WTO members. Moreover, in the past decade African countries did not reduce average MFN tariffs by a significant amount.

Finally, there are some country, e.g. Turkey, which have utilized the tariff policy space resulting from the difference between bound and applied tariffs, to increase MFN tariffs. However, the number of countries increasing average MFN tariff rates within the multilateral trading system remains very small.

Overall, the descriptive analyses in this chapter illustrates that along the growing number of GATT- and WTO-member states, over the years global trade protection in the form of tariffs has been on the decline. At the same time, the evolution of trade across the member countries has been steadily increasing across the world, even though with a strong heterogeneity across countries.

These findings point on a positive and trade supporting effect of the multilateral rules-based trading system that has been continuously established in the post-World-War II period. At the same time, there is a growing academic literature in international economics discussing the trade supporting effect of the GATT and WTO. A review of the contradicting literature reveals that there has been an intense debate on this issue over more than a decade. A recent overview of the relevant publication can be found in Esteve-Perez et al. (2019). A sizeable number of researchers conclude that unlike regional trade agreements or currency unions, membership in the GATT or the WTO has not resulted in positive trade effects. At the same time, other empirical analyses conclude that a GATT or WTO accession leads to a rise in exports for most of the member states.
In turns out that the chosen empirical methodology is crucial for whether GATT and WTO membership is identified as export supporting.

In the next chapter, we extend our analysis by applying advanced empirical methods to analyse in how fare the GATT- and WTO- membership have supported global trade. The chosen empirical methodology accounts for the most recent insights in light of the previously mentioned controversial findings in the relevant literature. Moreover, we continue the analysis by welfare and trade effects resulting from an increasingly liberalized world trade.

4. A causal Analysis of Whether and How much GATT- and WTO- Membership Promote Bilateral Trade

4.1 Estimating the Impact of GATT/WTO

The gravity model of trade has always been the workhorse to estimate the impact of various trade policies and other determinants of trade flows, including the impact of GATT/WTO. While there are several important empirical studies that have analyzed the effects of GATT and WTO in recent years (e.g. Rose, 2004; Helpman et al., 2004; Chang and Lee, 2011; Dutt et al., 2013) using the gravity model, to the best of our knowledge Larch et al. (2019) is the only study that offers a causal analysis by incorporating and extending latest insights in the empirical structural gravity literature, e.g., the use of intra-national trade flows among other improvements which we summarize below. Therefore, to obtain the main estimates in this section we follow the methods of Larch et al. (2019) and we employ their manufacturing dataset. We utilize the original underlying sample of Larch et al. (2019), which covers 218 countries over the period 1980-2016. The focus on total manufacturing and the time limits of the data were determined by the availability of trade and production data, including data on internal trade flows, which will prove important for proper quantification of the effects of GATT/WTO. We offer a description of the data in Appendix A.4., and we refer the reader to Larch et al. (2019) for further details.

Stimulated by the debate in the related literature on whether and how much GATT/WTO promote bilateral trade and because of the inability of existing studies to identify the direct country-specific effects of GATT/WTO membership, we adapt and expand the methods and analysis from Larch et al. (2019) and we implement the latest developments in the empirical structural gravity literature to evaluate the impact of GATT and WTO membership on international trade.[7] The main novelty of our analysis is that we obtain country-specific estimates of the impact of GATT/WTO and we translate these estimates into general equilibrium welfare effects.

Following the related literature, and to perform consistent estimation and general equilibrium analysis, we employ the structural gravity model, as summarized in Appendix A.3. To obtain our main estimates of the GATT/WTO effects, we translate the structural gravity equation into the following econometric specification, which we estimate following the best estimations practices and recommendations proposed by Yotov et al. (2016):

$$X_{ij,t} = \exp\left[\pi_{i,t} + \chi_{j,t} + \mu_{ij} + \boldsymbol{GRAV} \times \boldsymbol{\gamma} + \boldsymbol{INTL} \times \boldsymbol{\delta} + \boldsymbol{GATTWTO} \times \boldsymbol{\beta}\right] + \varepsilon_{ij,t} \qquad (4)$$

The variable $X_{ij,t}$ denotes nominal trade flows, which include *international* and *intra-national* trade, at non-consecutive year *t*. Consistent with theory, intra-national trade flows are domestic sales that are needed to close the market-clearance conditions for each country. Domestic sales in the aggregate manufacturing data used here are constructed as apparent consumption, i.e., as the difference between total production on a gross basis and aggregate exports. In addition to being theory-consistent, the use of internal trade flows has important implications for the estimation of the impact of various trade policies and determinants of trade flows. For example, Yotov (2012) demonstrates the importance of internal trade flows to resolve the distance puzzle in trade. Dai et al. (2014) rely on internal trade flows to identify the trade diversion effects of FTAs. Bergstrand et al. (2015) use internal trade flows to

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[7] See for good overviews of structural gravity models Anderson (2011) and Yotov et al. (2016). The structural gravity model is consistent with a wide range of different theoretical trade model. See for a discussion Costinot and Rodríguez-Clare (2014).

demonstrate that structural gravity equations can capture the impact of globalization. Heid et al. (2018) and Beverelli et al. (2019) show that the theory-consistent internal trade flows allow for the identification of the effects of non-discriminatory trade policies and country-specific policies, respectively. Finally, and more relevant to the current analysis, Baier et al. (2019) and Larch et al. (2019) find that the introduction of internal trade flows has very important implications for quantifying the impact of the effects of FTAs and WTO, respectively. In each case, these studies find that the estimates of the policies in question are significantly larger when internal trade flows are included in the estimation sample. The intuition for this result is that the inclusion of internal trade flows allows to explicitly control for the fact that FTAs and WTO have lead to significant diversion from internal trade. We demonstrate below that this is indeed the case also in our detailed specification with country-specific GATT/WTO effects.

The term $\pi_{i,t}$ denotes the set of time-varying source-country dummies, which control for the outward multilateral resistances, countries' output shares and, potentially any other observable and unobservable exporter-specific factors that may influence bilateral trade.

The term $\chi_{j,t}$ encompasses the set of time-varying destination-country dummy variables that account for the inward multilateral resistances, total expenditure, and any other observable and unobservable importer-specific characteristics that may influence trade.

The term μ_{ij} denotes the set of country-pair fixed effects, which serve two main purposes. First, the pair fixed effects are the most flexible and comprehensive measure of time-invariant bilateral trade costs because they will absorb all time-invariant gravity covariates along with any other time-invariant bilateral determinants of trade costs that are not observable by the researcher and/or the policy maker, c.f., Egger and Nigai (2015) and Agnosteva et al., (2016). Second, the pair fixed effects will absorb most of the linkages between the endogenous trade policy variables and the remainder error term $\varepsilon_{ij,t}$ in order to control for potential endogeneity of the former, c.f., Baier and Bergstrand (2007). In principle, the error term in gravity equations may carry some systematic information about trade costs. However, due to the rich fixed effects structure in equation (4), researchers should be more confident to treat and interpret $\varepsilon_{ij,t}$ as a true measurement error.

The error term $\varepsilon_{ij,t}$ in equation (4) is introduced as additive or multiplicative does not matter for the PPML estimator (Santos Silva and Tenreyro, 2006).

The term $\boldsymbol{GRAV \times \gamma}$ captures the standard gravity variables, such as bilateral distance, sharing a common border (contiguity), sharing a common language, and sharing a colonial history, as well as any time-varying bilateral determinants of trade flows, such as RTAs. As we include not only international but also intra-national trade flows, we also control for crossing the national borders by $\boldsymbol{INTL \times \delta}$, which are also allowed to be time-varying. The inclusion of time-varying international border variables is important for the identification of the GATT/WTO because the estimates on these dummies will capture common globalization effects. Bergstrand et al. (2015) demonstrate the that proper control for globalization effects in structural gravity models leads to smaller estimates of the effects of FTAs. Below, we will demonstrate that this is also the case with the country-specific estimates of the impact of GATT and WTO that we will obtain. Importantly, to the extent that GATT and WTO have had multilateral trade liberalization effects, the implication is that our border/globalization estimates will capture some of the possible trade liberalization effects of GATT and WTO. Decoupling these effects from the impact of globalization is beyond the scope of this study. However, the implication of our country-specific GATT/WTO estimates is that they are conservative, i.e., possibly biased downward.

The most important vector of variable is $\boldsymbol{GATTWTO \times \beta}$. One of the key differences of our quantification of the impact of GATT/WTO membership is to allow for possible trade diversion effects of GATT/WTO members from domestic sales. This adjustment is consistent with gravity theory, as described above, and with the objectives of GATT and WTO. Further, we also estimate country-specific GATT/WTO effects within the same estimation framework. To the best of our knowledge, such country-specific quantification does not exist so far in the related literature. As our identification strategy requires information of domestic sales, we need such data for all countries across the world. This sort of data are available for a sufficiently large set of countries starting in 1980. Therefore, our empirical analysis of GATT and WTO effects will cover a period between 1980 and 2016, and it will focus on manufacturing.

4.2 Partial Equilibrium Estimates of the impact of GATT/WTO

Table 1 presents a series of structural gravity estimates. In order to emphasize the importance of proper account for different estimation challenges, we take a sequential approach to obtaining and presenting our results. Four common features across all columns in Table 1 include: (i) The dependent variable is always nominal bilateral trade in levels; (ii) The estimator is always PPML, c.f., Santos-Silva and Tenreyro (2006, 2011); (iii) All estimates are obtained with panel data; (iv) In each specification we control for the unobservable structural multilateral resistance terms, as well as for all other observable and unobservable characteristics that may affect trade on the importer or on the exporter side, with exporter-time and importer-time fixed effects; (v) Finally, all estimates but those in the first column are obtained with pair fixed effects, which, as noted earlier, will control for all unobservable time-invariant trade costs and will mitigate endogeneity concerns with respect to out RTAs and GATT/WTO estimates. Thus, the main differences between the five columns in Table 1 are across two dimensions: (i) Whether or not intra-national trade flows are added to the estimating sample; and (ii) Whether we control for common globalization trends (i.e., whether we use time-varying border variables). Our results indicate that both of these estimation practices play an important role for proper quantification of the effects of GATT/WTO.

Column (1) of Table 1 estimates the gravity model with the set of standard gravity variables and international trade flows only (i.e., without intra-national trade flows), as has been done in many existing papers. Without going into details, we note that the estimates of the impact of the standard gravity variables are readily comparable to those from the literature, c.f. Head and Mayer (2014). This establishes the representativeness of our sample.

The estimates in column (2) of Table 1 introduce pair fixed effects. As noted earlier, the motivation for the inclusion of pair fixed effects in gravity estimations is twofold. First, they will absorb and will fully control for the impact of all observable and unobservable determinants of bilateral trade, c.f., Egger and Nigai (2015) and Agnosteva et al. (2019). For this reason, we can no longer include in column (2) any of the time-invariant standard gravity covariates, i.e., LN_DIST, CNTG, LANG, and CLNY. In order to allow for asymmetries in the underlying time-invariant trade costs, we employ directional pair fixed effects. Second, on a related note and as demonstrated by Baier and Bergstrand (2007), the use of the pair fixed effects will help mitigate endogeneity concerns related to the trade policy variables in our specification, specifically the RTAs, which are included in column (1), and especially important for our purposes, the GATT/WTO variables, which we introduce next. The main result from column (2), as compared to

column (1) is that comprehensive control of all time-invariant trade costs has significant impact on the estimates of the time-varying policy variables, e.g., RTAs in our specification.

The results in column (3) of Table 1 replicate the estimates from column (2) but also introduce the key variable of interest to our analysis, i.e., the bilateral indicator for GATT/WTO membership (GATTWTO). Two main results stand out from column (2): (i) The estimate on the RTA variable is not statistically significantly affected; and (ii) More importantly, the estimate of the impact of GATT/WTO is economically and statistically insignificant. This result is consistent with the findings from Rose (2004), who concludes that GATT/WTO has not been successful in promoting international trade among members.

The results in column (4) of Table 1 replicate the corresponding specification from column (3) but after introducing internal trade flows to the estimating sample. When the gravity model is estimated with intra-national trade flows and standard gravity variables, along with the additional observations for internal trade, at a minimum, we also have to introduce an additional covariate, INTL_BRDR, which is an indicator border variable that takes a value of one for international trade, and is equal to zero otherwise. The idea behind the introduction of this covariate is that it would capture international border effects that drive a wedge between internal and international trade, and which have not been captured by the other covariates in our estimating model. This said, the explicit inclusion of border dummies is not necessary in our specification because the pair fixed effects absorb all border variables. In fact, the pair fixed effects control for country-specific border effects.

Table 1: Structural Gravity Estimates of the Effects of WTO

	(1) GRAV	(2) PAIR	(3) WTO	(4) INTRA	(5) GLBZN
RTA	0.342 (0.058)**	0.040 (0.048)	0.039 (0.048)	0.443 (0.076)**	0.129 (0.049)**
ln_DIST	-0.820 (0.032)**				
CNTG	0.435 (0.073)**				
LANG	0.161 (0.072)*				
CLNY	0.109 (0.098)				
GATTWTO			0.014 (0.068)	0.519 (0.081)**	0.220 (0.057)**
N	943504	919616	919616	923187	923187

Standard errors in parentheses $^+ p < 0.10$, $^* p < .05$, $^{**} p < .01$

Two main findings stand out from the results in column (4). First, we note that the estimate on RTAs is now positive large and statistically significant. This result is consistent with the results from Dai et al. (2014) and Bergstrand et al. (2015), which are obtained with alternative samples. Second, and most important for our purposes, we see in column (4) that the estimate of the key covariate of interest in our analysis, GATTWTO, is now positive, large and statistically significant. This result confirms the importance of the recommendation of Yotov et al. (2016) that structural gravity estimations should be performed with samples that include internal trade flows, and it is consistent with the main result from Larch et al. (2019), who demonstrate that when, following structural gravity theory, the gravity model

is estimated with intra-national trade flows, the impact of GATTWTO is positive and large. The intuition for this result is that the specification with intra-national trade flows explicitly allows for and accounts for diversion from international trade flows due to WTO membership. Our estimates confirm that this is indeed the case.

Finally, the estimates in the last column (5) of Table 1 replicate the results from column (4) but after also introducing a series of time-varying border variables for each year in the estimating sample, i.e., we introduce fixed effects that correspond to the interaction between INTL_BRDR*YEAR, where YEAR denotes the years in our sample (1980-2016). This specification is motivated by Bergstrand et al. (2015), who demonstrate that (i) the effects of economic integration agreements (EIAs) are significantly larger when common globalization forces are not accounted for; and (ii) that the impact of international borders on trade has fallen over time.

Consistent with the findings and conclusions of Bergstrand et al. (2015), the estimates in column (5) reveal that once globalization forces are accounted for, the estimates of the policy variables (RTA and GATT/WTO) are smaller in magnitude. Specifically, the GATT/WTO is more than twice smaller while the RTA effects is more that three times smaller as compared to the corresponding estimates from column (4). The intuition is that the previously larger effects of GATT/WTO and RTA have been also capturing globalization forces. As noted earlier, this is potentially important for our GATT/WTO estimates because GATT/WTO arguably GATT and WTO have had multilateral globalization effects that are now captured by the estimates of the time-varying border variables in our specification. The implication for the GATT/WTO estimates in column (5) is that they may be biased downward.

Turning to the key variables in our study, we note that despite the decreased magnitude, the impact of GATT/WTO is still positive and economically and statistically significant. In addition, our estimates of the effects of the time-varying international border dummies (which are available by request), reveal that the impact of borders on trade has indeed fallen over time, thus offering evidence against the "missing globalization puzzle" of Coe et al. (2002), who argue that globalization is everywhere but in estimating gravity models.

In our next specification, we go beyond what has been done in the existing literature by obtaining country-specific GATT/WTO effects on the exports of each GATT/WTO member country to its fellow GATT/WTO members. Since this specification delivers a large number of estimates, we present our findings graphically.

Figure 15 reports country-specific estimates of the effects of GATT/WTO. In total, we are able to identify 159 country-specific estimates. Before we analyze the country-specific GATT/WTO results, we note that there are some clear outliers in Figure 15. Visual presentations of the two tails of the distribution of our estimates are presented in the lower panels of Figure 15, and they revel some clear breaks in the estimates on both sides. Specifically, for the negative estimates, apart from the extreme and clear negative outliers, there is a break between the estimates -0.26 and -0.31. On the positive side, there is a break between the estimates of 1.09 and 1.16. Inspection of the number of observations used for identification shows that many of the countries at the two tails of the distribution have only few observations used for identification. Therefore, in combination with the clear breaks, this motivates us to treat these estimates with caution as outliers, especially in the general equilibrium analysis, where, as described below, we approach them in several alternative ways.

Figure 15: Country-specific Structural Gravity Estimates of the Effects of WTO.
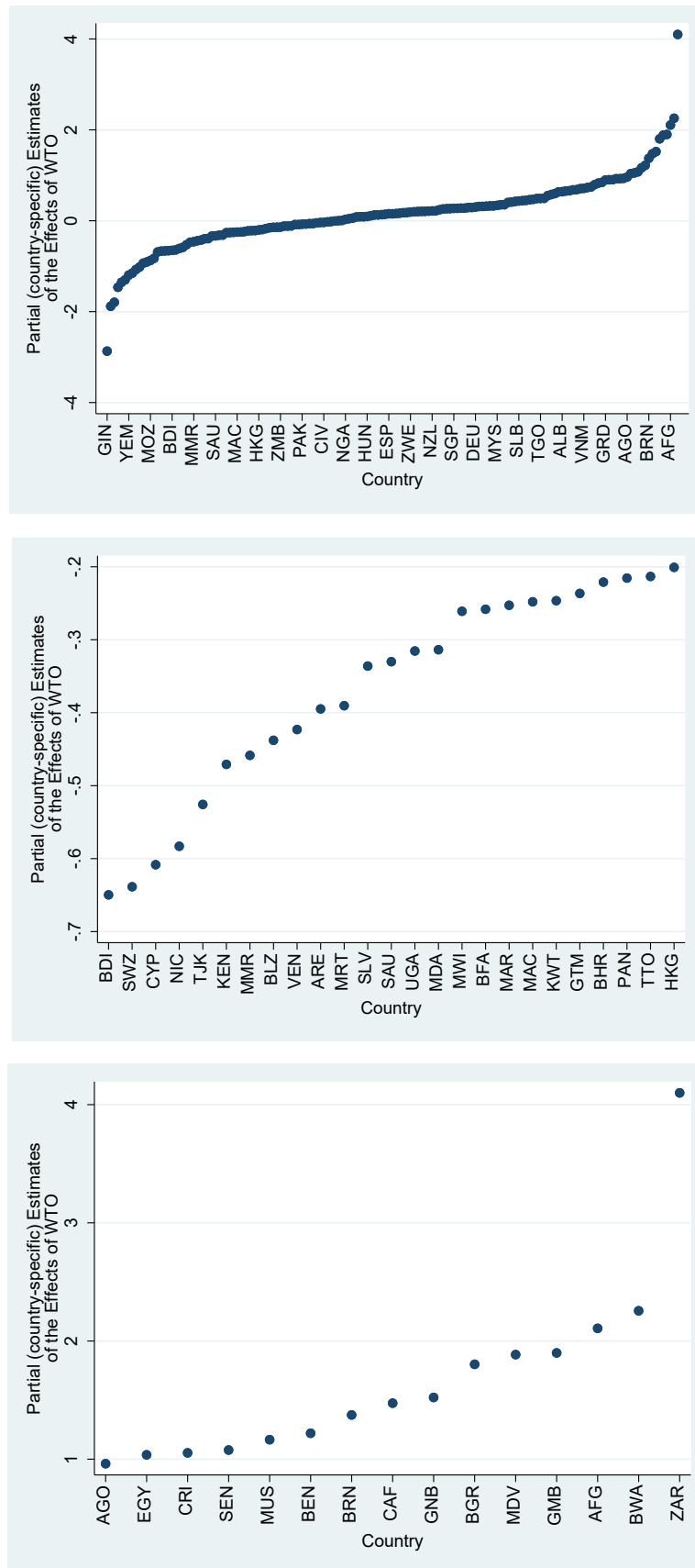
Source: Own calculations.

Figure 16 reports the GATT/WTO estimates without the outliers. In addition to dropping the countries whose estimates fall below or above the previously established breaks, to ease presentation we also drop from the figure some very small islands and countries. The partial equilibrium presentation is affected very little as only two additional countries (i.e. St. Lucia and St. Vincent and the Grenadines), which are members of the WTO not appear in Figure 16. However, we have identified a total of 36 countries and regions (i.e., Andorra, Anguila, Antigua and Barbuda, Aruba, The Bahamas, Bermuda, British Virgin Islands, Cayman Islands, Christmas Island, Cocos (Keeling) Islands, Cook Islands, East Timor, Faeroe Islands, Falkland Island, French Polynesia, Gibraltar, Kiribati, Maldives, Marshall Islands, Micronesia, Fed. Sts., Montserrat, New Caledonia, Niue, Norfolk Island, Northern Mariana Islands, Palau, Pitcairn, Saint Helena, Saint Pierre and Miquelon, San Marino, Sao Tome and Principe, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Tokelau, Wallis and Futura Isl), for which we obtain but do not report general equilibrium effects below. The partial and the GE estimates for these small countries and islands are available by request. The country-specific estimates for the remaining GATT/WTO members (a total of 112) are presented in Figure 16.

Figure 16: Country-specific Structural Gravity Estimates of the Effects of WTO. No outliers
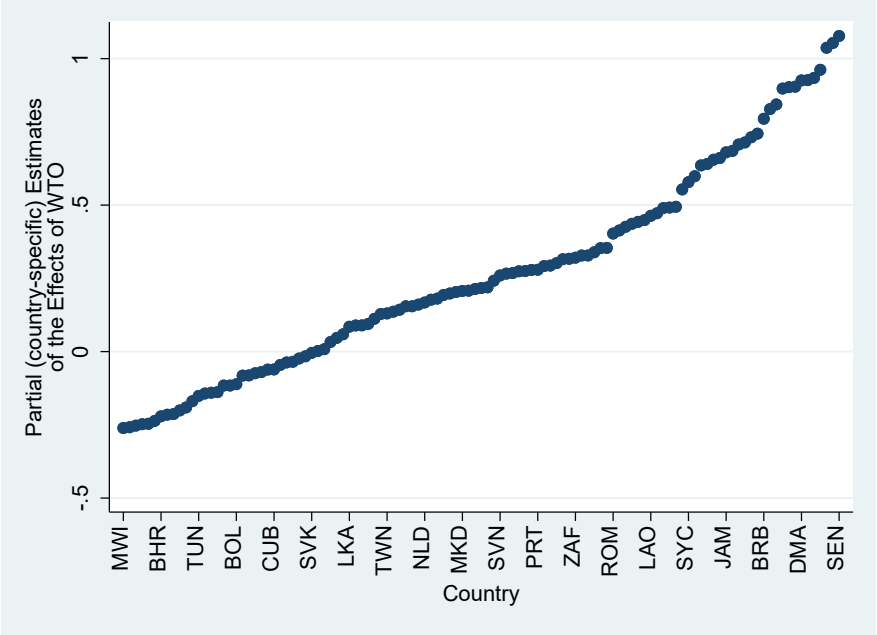
Source: Own calculations.

Three main messages stand out from Figure 16. First, we note that the vast majority of the country-specific GATT/WTO estimates are positive. This result is consistent with the main result from Larch et al. (2019), who use aggregate manufacturing data with intra-national trade flows. Second, we see that the estimates that we obtain are very heterogeneous across the countries in our sample. Third, on a related note, we observe some negative estimates. A possible explanation for these results is that we focus on member exports in manufacturing. As demonstrated in the general equilibrium analysis below, many of the negative partial equilibrium estimates from Figure 16 are accompanied by positive welfare effects. In order to improve exposition and interpretation, the three panels of Figure 17 are designed to map the estimates from Figure 16 to the countries for which they are obtained.

We see from Figure 17 that the GATT/WTO estimates that we obtain are generally larger for poorer and less developed countries. A possible explanation for this result is that these countries joined GATT/WTO more recently and this opened doors for more secure trade with the large GATT/WTO members.

Similarly, a possible explanation for the fact that our estimates of the effect of f GATT/WTO for the richer and more developed countries is that many of those countries were founders of GATT, which formed a long time prior to our sample's coverage. Thus, they may have already exhausted significant part of the potential benefits from trade with other large countries that also joined prior to the period that is covered in our sample. Thus, it is important to emphasize that the large number of positive estimates that we obtained, even for the old and large GATT/WTO members, is driven by their trade with the members that joined during the period of investigation.

Figure 17: Country-specific Structural Gravity Estimates of the Effects of WTO
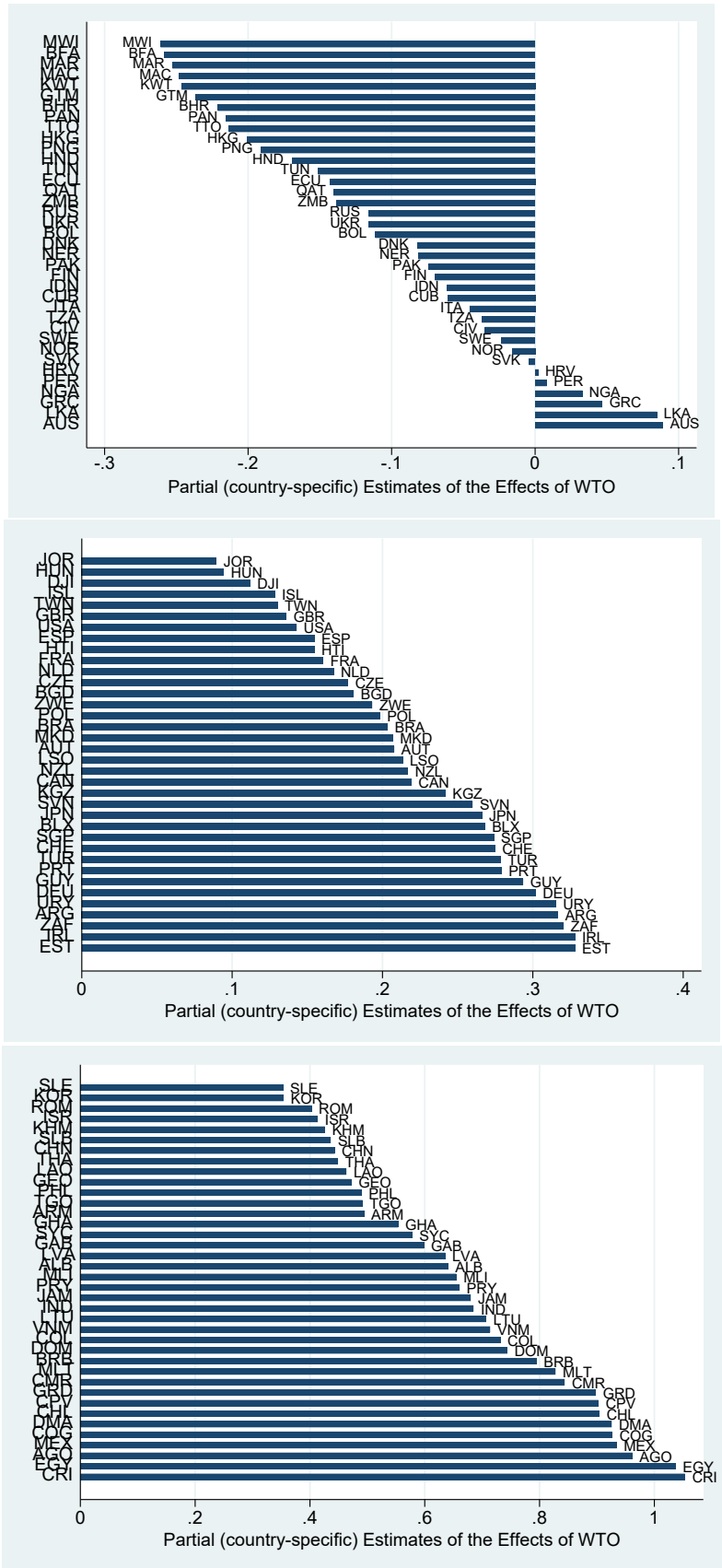
Source: Own calculations.

Note: Country names for ISO codes are listed in the Appendix.

We conclude this section with an investigation of the importance of two adjustments to the econometric gravity model that have potentially important implications for the estimations of trade policy effects with the structural gravity equation. Specifically, these adjustments are: (i) including internal trade flows; and (ii) controlling for common globalization effects.

To facilitate the discussion we visualize our findings in Figure 18. The blue estimates in the figure replicate our results from Figure 17, i.e. they are obtained with intra-national trade flows. The red estimates in Figure 18 are obtained from an econometric model that is identical to our main specification with the only difference being that intra-national trade flows are not included in the estimating sample. The message is clear and consistent with the recommendations for structural gravity estimations of Yotov et al. (2016): The inclusion of intra-national trade flows is important and it leads to larger estimates of the impact of GATT/WTO membership. Figure 18 shows that, with very few exceptions, the GATT/WTO estimates obtained without internal trade flows are always smaller as compared to the corresponding effects that are obtained with internal trade flows in the sample.

The green estimates in Figure 18 are obtained from an econometric model that is identical to our main specification with the only difference being that we do not include the time-varying border dummy variables that are designed to control for common globalization trends. Two main findings stand out. First, most of the GATT/WTO estimates that are obtained without controlling for globalization are larger than the corresponding estimates that do control for common globalization trends. This result is consistent with the findings of Bergstrand et al. (2007). Second, we see that the difference between the green and the blue estimates in Figure 18 is very heterogeneous. Thus, consistent with the conclusion of Bergstrand et al. (2007), the main implication of this analysis is that it is important to account for globalization effects in the structural gravity estimations. In addition, to the extent that GATT and WTO may have had multilateral trade liberalization effects for global trade, an additional and specific implication of this analysis is that our border/globalization estimates may have captured some of the trade liberalization effects of GATT and WTO that have affected trade globally. Decoupling these effects from the impact of globalization is beyond the scope of this study. However, the implication for our country-specific GATT/WTO estimates is that they may possibly be biased downward.

Figure 18: On the importance intra-national trade flows and controlling for globalization
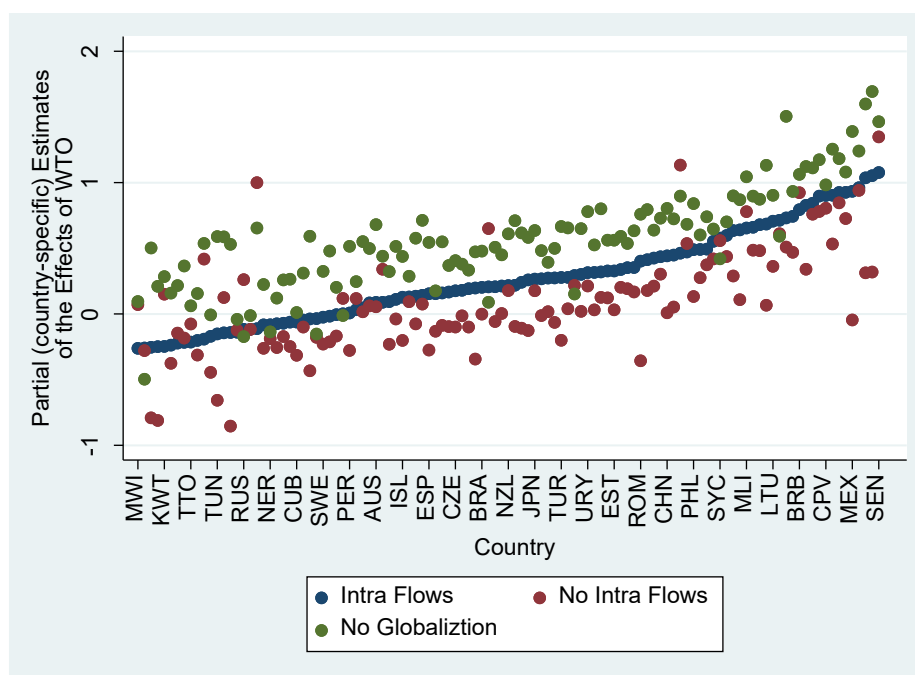
Source: Own calculations.

5. Specific Trade and Welfare Effects for GATT/WTO-Members

Capitalizing on the partial equilibrium estimates in chapter 4, this chapter offers country-specific trade and welfare estimates for all countries in our dataset. In order to be able to perform our counterfactual analysis, we have to prepare appropriate data across three dimensions.

First, we had to construct a square/balanced dataset of exporters and importers for a cross-section. To ensure a maximum number of non-missing observations, we used data from the last five years (2012-2016) and we averaged trade flows for all country pairs in our dataset.[8] For GATT/WTO membership, we took as relevant year the year 2016. Then we kept all countries that appear at least ones as exporters or importers. As a result, we end up with 218 countries. We use all these countries for our counterfactual analysis, but only report results for 182 countries, which are listed in alphabetical order in column (1) of Table 2.[9]

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[8] For Montenegro and Taiwan we use 2006 values, and for Sudan 2011 values, the most recent years with trade data in our dataset.

[9] We do not report results for Aruba, Anguilla, Andorra, Antigua and Barbuda, the Bahamas, Bermuda, Cocos (Keeling) Islands, Cook Islands, Christmas Island, Cayman Islands, Falkland Island, Faeroe Islands, Fed. Sts. Micronesia, Gibraltar, Kiribati, St. Kitts and Nevis, St. Lucia, Maldives, Marshall Islands, Northern Mariana Islands, Montserrat, New Caledonia, Norfolk Island, Niue, Pitcairn, Palau, French Polynesia, Saint Helena, San Marino, Saint Pierre and Miquelon, Sao Tome and Principe, Tokelau, East Timor, St. Vincent and the Grenadines, British Virgin Islands, and Wallis and Futura Isl. These are very small countries with small values in manufacturing trade, our focus of the analysis. Results for these countries may be misleading, as we do not take into account other sectors and foreign direct investments. Having said this, the full set of results is available by request.

Another crucial feature of the data set used in the GE counterfactual analysis is that it had to include production/internal trade flows for all countries in the sample, i.e., the data for the counterfactual analysis has to be balanced. To this end, few options were available, including using GTAP data. Our decision was to rely on and extend the dataset that was used to obtain the partial estimates, which included internal trade flows for 154 countries. Our strategy was to replace missing intra-national trade flows by using the median value of international relative to internal trade for the countries for which we did have internal trade flows data (which is 2.284 in our sample).

Third, we had to decide how to treat the outlier partial GATT/WTO estimates, which we identified in the estimation section. To this end, and in order to offer a comprehensive ad transparent analysis, we experimented with four alternative sets of partial equilibrium estimates, including: (i) A set that consists of all GATT/WTO estimates, including the extreme outliers; (ii) A set, where we have replaced the estimates for the outliers with zeroes; (iii) A set, where we set the estimates for the outliers to be equal to the aggregate estimate from column (5) of Table 1; and (iv) A set where we set the estimates for the negative outliers to be equal to a lower bound that is based on the natural break that we identified in Figure 15, i.e., we set all outlier estimates to -0.26. Similarly, we replace all positive outliers with 1.08, which is the estimate at the break in the upper tail of the distribution. To obtain the main estimates, which we present and discuss below, we rely on set (iv). GE effects based on the three other sets of partial estimates are available by request.

With the resulting square dataset of 218 countries at hand, we used the standard structural gravity framework, as for example described in Yotov et al. (2016), to perform our general equilibrium counterfactual analysis. Specifically, we investigate the effects of GATT/WTO membership for all countries in the dataset by assuming zero effect in the baseline and using our exporter-specific partial estimates for the GATT/WTO members, for which the trade cost counterfactual changes are given by $((\exp(\text{GATT/WTO estimate}))^{1/(1-\sigma)}-1)*100$, where we set σ equal to 5, which is a standard value in the literature. These data and estimates, combined with the underlying theory of structural gravity, delivered the welfare and trade effects of GATT/WTO membership that we report in Table 2. Welfare changes are calculated as change in real manufacturing GDP, given in percent. The translation in absolute effects (in million dollars) are based on using manufacturing expenditures created by summing over all imports and spending domestically for each country. Trade effects are calculated as percentage changes in total nominal manufacturing exports. The percentage changes are translated in absolute values using total exports for each country to the 218 countries in our sample.

The main results from Table 2 are in-line with expectations. Total exports of GATT/WTO members increase welfare on average by 4.37 percent, whereas welfare falls on average by -0.96 percent for non-GATT/WTO members. Behind these average effects is a substantial heterogeneity across the countries in our sample. The welfare effects range from -1.78 percent for Vanuatu to 27 percent for the Gambia.

Table 2: Welfare and Trade Effects

country name	ISO code	welfare (%)	welfare (in m$)	exports (%)	exports (in m$)
(1)	(2)	(3)	(4)	(5)	(6)
Afghanistan*	AFG	19.76	1,200.07	35.42	81.54
Albania*	ALB	8.67	430.70	25.36	349.65
Algeria	DZA	-0.30	-340.64	-7.54	-789.39
Angola*	AGO	9.84	2,530.55	68.94	2,814.95
Argentina*	ARG	7.18	4,839.67	12.60	6,011.64
Armenia*	ARM	5.27	164.16	21.72	212.11
Australia*	AUS	1.40	5,853.88	15.35	10,946.67
Austria*	AUT	4.13	8,224.40	8.33	11,766.61
Azerbaijan	AZE	-0.34	-56.58	-4.65	-103.44
Bahrain*	BHR	-0.88	-158.30	-8.37	-826.77
Bangladesh*	BGD	2.47	1,759.73	13.01	3,538.98
Barbados*	BRB	8.49	163.56	47.23	171.83
Belarus	BLR	-0.00	-269.98	-4.73	-1,452.97
Belgium-Luxembourg*	BLX	7.07	25,612.01	5.73	23,374.39
Belize*	BLZ	-1.42	-15.00	-11.52	-29.30
Benin*	BEN	20.73	1,460.26	44.85	175.80
Bhutan	BTN	-0.66	-3.33	2.23	4.25
Bolivia*	BOL	1.10	121.87	-1.51	-46.40
Bosnia and Herzegovina	BIH	-1.15	-102.31	-2.91	-131.95
Botswana*	BWA	19.08	1,585.81	39.55	2,702.85
Brazil*	BRA	0.80	7,447.96	17.28	22,942.32
Brunei*	BRN	3.96	383.40	155.74	723.89
Bulgaria*	BGR	17.05	5,463.19	38.59	8,619.19
Burkina Faso*	BFA	-0.52	-14.96	-6.22	-110.57
Burundi*	BDI	-0.23	-2.57	-19.54	-18.65
Cambodia*	KHM	10.77	1,607.61	14.67	1,064.57
Cameroon*	CMR	5.82	558.46	70.70	1,031.62
Canada*	CAN	3.42	19,313.26	10.98	31,113.47
Cape Verde*	CPV	5.41	55.38	94.07	67.32
Central African Republic*	CAF	12.83	52.77	84.46	47.58
Chad*	TCD	-0.11	-1.50	-13.53	-30.70
Chile*	CHL	14.80	11,742.87	45.80	19,497.88
China*	CHN	0.65	85,510.10	17.99	376,236.30
Colombia*	COL	3.25	4,088.39	65.52	10,744.60
Comoros	COM	-0.11	-0.42	-6.98	-0.98
Congo, Dem. Rep.*	ZAR	18.23	1,474.05	50.65	2,305.51
Congo, Rep.*	COG	25.11	1,670.19	22.44	585.78
Costa Rica*	CRI	10.15	2,442.96	62.84	5,203.82
Cote d'Ivoire*	CIV	1.59	149.26	-1.18	-67.26
Croatia*	HRV	1.16	282.32	0.76	86.56
Cuba*	CUB	0.45	84.22	2.46	49.04
Cyprus*	CYP	-0.11	-14.78	-7.73	-142.64
Czech Republic*	CZE	3.34	6,290.05	6.69	10,284.22
Denmark*	DNK	0.35	397.44	-2.53	-1,994.32
Djibouti*	DJI	0.96	44.34	13.01	12.61
Dominica*	DMA	9.69	29.22	52.94	37.76
Dominican Republic*	DOM	12.62	2,090.46	29.99	2,261.19

country name	ISO code	welfare (%)	welfare (in m$)	exports (%)	exports (in m$)
(1)	(2)	(3)	(4)	(5)	(6)
Ecuador*	ECU	0.56	223.78	-2.83	-148.26
Egypt, Arab Rep.*	EGY	6.45	6,753.03	73.28	13,726.59
El Salvador*	SLV	-1.72	-167.54	-11.26	-564.30
Equatorial Guinea	GNQ	-1.13	-33.60	-8.45	-50.08
Eritrea	ERI	-2.13	-10.36	-7.26	-14.42
Estonia*	EST	5.97	1,275.55	8.83	1,206.27
Ethiopia (excludes Eritrea)	ETH	-0.24	-35.16	-8.05	-51.54
Fiji*	FJI	-0.93	-21.45	-12.13	-58.53
Finland*	FIN	0.22	249.16	-2.08	-1,256.41
France*	FRA	3.17	24,584.56	6.78	33,002.18
Gabon*	GAB	12.46	441.19	19.82	263.79
Gambia, The*	GMB	27.21	259.37	27.97	9.87
Georgia*	GEO	6.44	559.38	24.75	345.20
Germany*	DEU	4.18	66,113.65	11.11	143,206.00
Ghana*	GHA	12.38	2,035.72	19.58	1,394.74
Greece*	GRC	1.53	1,033.29	4.37	1,182.80
Greenland	GRL	0.04	0.46	-4.41	-7.17
Grenada*	GRD	5.40	16.24	93.60	19.81
Guatemala*	GTM	-0.30	-52.79	-8.84	-592.95
Guinea*	GIN	-0.30	-15.13	-11.20	-118.08
Guinea-Bissau*	GNB	4.63	21.68	176.46	21.64
Guyana*	GUY	3.83	79.21	11.77	104.93
Haiti*	HTI	5.78	194.63	7.45	70.18
Honduras*	HND	-0.20	-22.96	-7.04	-271.03
Hong Kong, China*	HKG	2.44	15,014.32	-0.31	-76.56
Hungary*	HUN	3.66	3,532.66	2.36	2,289.60
Iceland*	ISL	1.70	122.82	5.22	162.23
India*	IND	2.68	26,788.53	37.27	97,594.57
Indonesia*	IDN	0.90	2,819.81	2.37	2,535.76
Iran, Islamic Rep.	IRN	-0.12	-317.18	-2.68	-344.06
Iraq	IRQ	-1.22	-493.56	-14.12	-331.28
Ireland*	IRL	5.75	5,220.03	8.89	10,378.73
Israel*	ISR	5.88	5,333.93	17.65	10,742.26
Italy*	ITA	0.53	4,930.86	0.37	1,686.86
Jamaica*	JAM	9.09	479.11	37.66	472.67
Japan*	JPN	1.36	33,263.66	18.29	118,879.20
Jordan*	JOR	1.36	436.54	9.95	512.35
Kazakhstan*	KAZ	-0.40	-229.52	-7.87	-1,361.53
Kenya*	KEN	0.29	93.42	-11.95	-353.96
Korea, Dem. Rep.	PRK	-1.07	-49.16	-0.66	-8.89
Korea, Rep.*	KOR	2.99	31,487.43	19.78	104,929.80
Kuwait*	KWT	-0.17	-75.60	-6.23	-998.49
Kyrgyz Republic*	KGZ	4.10	389.91	16.36	192.35
Lao PDR*	LAO	16.18	997.91	12.71	224.93
Latvia*	LVA	12.52	3,124.73	18.16	1,798.98
Lebanon	LBN	-1.03	-219.76	-6.59	-216.48
Lesotho*	LSO	5.14	97.14	12.27	106.39
Liberia*	LBR	-1.52	-131.49	-7.21	-46.23
Libya	LBY	-3.25	-482.65	-4.88	-165.01
Lithuania*	LTU	13.70	3,307.21	16.34	4,138.04

country name	ISO code	welfare (%)	welfare (in m$)	exports (%)	exports (in m$)
(1)	(2)	(3)	(4)	(5)	(6)
Macao*	MAC	-0.06	-3.29	-8.97	-55.48
Macedonia, FYR*	MKD	4.94	359.31	8.61	353.53
Madagascar	MDG	-2.84	-76.85	-2.55	-32.53
Malawi*	MWI	-0.32	-7.40	-15.24	-56.81
Malaysia*	MYS	5.67	15,937.26	16.12	29,239.79
Mali*	MLI	10.90	438.70	24.34	655.60
Malta*	MLT	19.51	3,105.43	16.36	675.28
Mauritania*	MRT	-0.19	-8.08	-13.48	-69.67
Mauritius*	MUS	21.46	965.06	39.60	750.92
Mexico*	MEX	12.46	57,766.33	37.58	121,413.00
Moldova*	MDA	-0.85	-44.61	-10.84	-113.80
Mongolia*	MNG	-0.30	-19.05	-10.96	-100.94
Montenegro	MNE	-1.36	-11.53	-6.72	-21.76
Morocco*	MAR	-0.58	-313.85	-9.70	-1,727.09
Mozambique*	MOZ	-0.08	-7.03	-6.50	-198.81
Myanmar*	MMR	1.63	309.46	-3.71	-118.32
Namibia*	NAM	0.86	72.44	-4.17	-125.12
Nauru	NRU	0.27	0.24	0.75	0.06
Nepal*	NPL	1.65	146.79	9.14	63.06
Netherlands*	NLD	5.94	27,825.96	2.90	12,830.46
New Zealand*	NZL	2.50	1,664.94	14.39	4,042.24
Nicaragua*	NIC	-0.32	-23.65	-7.94	-298.93
Niger*	NER	1.16	20.58	-3.27	-30.52
Nigeria*	NGA	0.49	726.35	10.47	977.33
Norway*	NOR	0.70	852.08	0.52	198.84
Oman*	OMN	-0.45	-152.14	-9.68	-862.44
Pakistan*	PAK	0.69	418.87	-0.82	-172.99
Palestine	PSE	-1.34	-60.57	-8.85	-55.19
Panama*	PAN	-0.67	-282.67	-7.16	-898.72
Papua New Guinea*	PNG	-1.11	-52.61	-5.29	-173.83
Paraguay*	PRY	8.03	1,087.62	42.95	1,585.57
Peru*	PER	1.04	975.85	7.69	1,690.34
Philippines*	PHL	6.26	8,717.55	31.23	16,200.25
Poland*	POL	3.08	9,074.98	8.31	15,536.98
Portugal*	PRT	3.82	3,501.65	11.92	6,428.45
Qatar*	QAT	0.32	118.91	-2.95	-366.43
Romania*	ROM	6.40	5,492.70	15.06	8,397.41
Russian Federation*	RUS	0.18	1,133.84	-2.58	-5,168.42
Rwanda*	RWA	-0.85	-10.27	-8.92	-11.46
Samoa*	WSM	-0.41	-1.72	-14.13	-8.00
Saudi Arabia*	SAU	0.01	16.75	-7.32	-4,070.98
Senegal*	SEN	13.44	1,267.14	73.10	1,332.67
Serbia	SER	-1.34	-298.31	-4.19	-486.12
Seychelles*	SYC	7.61	78.51	26.89	115.11
Sierra Leone*	SLE	4.18	84.36	34.24	85.64
Singapore*	SGP	9.82	25,061.84	5.45	18,727.35
Slovak Republic*	SVK	1.81	1,380.55	-0.32	-247.18
Slovenia*	SVN	5.09	1,750.34	7.46	1,960.93
Solomon Islands*	SLB	4.82	23.96	24.47	31.67
Somalia	SOM	-1.44	-23.27	-10.74	-6.97

country name	ISO code	welfare (%)	welfare (in m$)	exports (%)	exports (in m$)
(1)	(2)	(3)	(4)	(5)	(6)
South Africa*	ZAF	2.93	5,463.09	21.57	12,483.79
Spain*	ESP	2.09	10,128.26	7.74	19,680.43
Sri Lanka*	LKA	2.05	639.63	12.07	878.07
Sudan	SDN	-1.63	-157.61	-12.41	-161.65
Suriname*	SUR	-1.44	-40.41	-14.40	-148.93
Swaziland*	SWZ	-0.15	-4.94	-6.27	-120.46
Sweden*	SWE	0.78	1,472.10	-0.72	-1,002.26
Switzerland*	CHE	5.38	18,255.33	9.50	28,907.05
Syrian Arab Republic	SYR	-0.05	-28.67	-9.67	-71.32
Taiwan*	TWN	4.99	10,614.25	6.54	17,486.97
Tajikistan*	TJK	-0.04	-1.69	-10.00	-57.79
Tanzania*	TZA	1.96	312.98	4.95	159.35
Thailand*	THA	6.88	17,819.81	18.45	37,935.71
Togo*	TGO	2.33	329.59	49.80	324.71
Tonga*	TON	0.12	0.17	-15.28	-0.50
Trinidad and Tobago*	TTO	-0.45	-48.93	-5.95	-467.17
Tunisia*	TUN	-0.08	-25.22	-4.73	-625.82
Turkey*	TUR	2.10	8,113.50	14.25	18,906.81
Turkmenistan	TKM	-1.45	-100.33	-3.48	-53.26
Turks and Caicos Isl.	TCA	-0.11	-0.28	-2.99	-1.02
Tuvalu	TUV	-0.86	-0.87	-4.07	-0.73
Uganda*	UGA	0.34	12.90	-5.33	-53.77
Ukraine*	UKR	0.02	16.62	-3.72	-1,434.19
United Arab Emirates*	ARE	0.52	1,246.83	-5.96	-2,558.43
United Kingdom*	GBR	2.46	22,403.55	8.23	33,715.86
United States*	USA	1.45	86,939.38	20.02	211,037.20
Uruguay*	URY	3.21	707.98	25.28	1,546.58
Uzbekistan	UZB	-0.77	-110.14	-3.39	-159.81
Vanuatu*	VUT	-1.78	-13.57	-15.80	-40.31
Venezuela*	VEN	0.12	78.91	-8.43	-1,023.37
Vietnam*	VNM	10.27	22,953.41	34.20	42,861.03
Western Sahara	ESH	-1.17	-0.04	-5.16	-0.07
Yemen, Rep.*	YEM	0.32	60.64	-11.47	-87.15
Zambia*	ZMB	3.11	187.57	-1.56	-137.48
Zimbabwe*	ZWE	4.34	240.81	10.93	204.37

Source: Own calculations. "*" at the end of the country name indicates WTO membership.

To better understand these heterogeneous effects, we plot in Figure 19 the welfare effects against the change in trade costs. There is a strong negative correlation of -0.828, which shows that if there is a substantial drop in trade costs due to GATT/WTO, the welfare effects are also larger. This visualizes the importance of the direct, partial effect. However, the correlation is far from perfect, which shows the general equilibrium channels at work. The general equilibrium effects, which work through price and income changes, are the strongest for the most open countries, i.e., countries that sell a large share of their output abroad. For example, for Laos, Gambia, Myanmar, and Rep. of Congo, which all have a very low share of domestic sales in our data and are all clearly above our regression line, implying larger than average, predicted welfare gains given their trade cost change. On the other hand, countries like China, Syria, Japan, and India, for example, sell a lot domestically and are below our linear best-fit line plotted in red in Figure 19. Column (4) of Table 2 translates the percentage changes in absolute values in million

Dollars using manufacturing expenditures. The absolute values are driven on the one hand side by the size of the percentage changes, and on the other hand side by the size of manufacturing expenditures. Hence, even though in percentage terms USA is not the country with the biggest gains, in absolute values the USA is predicted to have the largest welfare gains from the creation of GATT/WTO. The USA is followed by China, Germany, Mexico, and Japan. Considering the EU countries together, the welfare gains are predicted to be 245,761.8 m$, i.e., substantially larger than the USA gains. The smallest absolute gains are calculated for relatively small countries such as Chad, Tonga, and Uganda.

In Figure 19, we also see quite some countries with negative partial GATT/WTO estimates (note that a positive change in trade cost is associated with a negative point estimate of GATT/WTO membership). As expected, some of these countries see negative welfare effects. However, some of them still see positive welfare effects (as, for example, Zambia, Tanzania, Slovak Republic, Nepal, Sweden, Norway, Denmark, Finland, Venezuela, and Ukraine). The reason for the positive welfare effects despite the negative partial effects are cheaper imports from GATT/WTO trading partners with substantial drops in their trade costs. This implies that GATT/WTO membership has for many countries positive trade cost change effects that we already see in the partial estimates. However, those positive trade cost effects spill over to trading partners due to cheaper imports. Hence, even countries with negatively estimated exporter-specific GATT/WTO effects may see positive welfare effects from trading with GATT/WTO members.

Column (5) of Table 2 reports the change in nominal total exports. The implied trade flow changes are larger (and sometimes substantially so) than the welfare effects for most of the countries (165 out of 182), which is partly driven by price changes, which are also taken into account when calculating nominal trade flows. There is a strong positive correlation between the welfare and the trade effects of 0.691, specifically if one discards some outliers in terms of trade changes (Grenada, Cape Verde, Brunei, Guinea-Bissau, which all are predicted to have over 90 percent increase in total manufacturing exports due to GATT/WTO). On average, GATT/WTO members total nominal exports increase about 14 percent, while total nominal exports decrease on average by 5.5 percent for non-members.

Figure 19: Plot of welfare changes against change in trade costs for main results
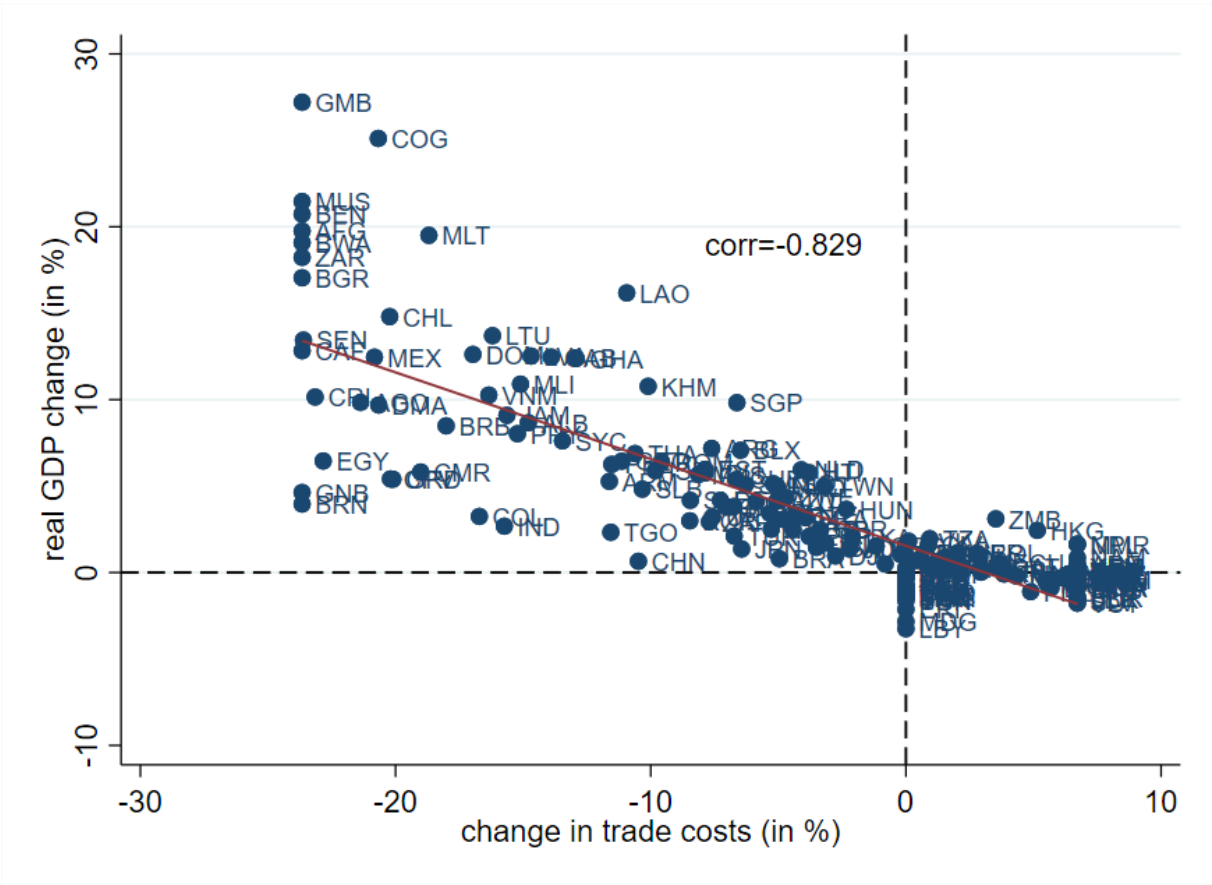
Source: Own calculations.

We summarize our quantification of the GATT/WTO effects as follows. Using internal- as well as international trade flows, we quantify partial, country-specific GATT/WTO effects for the exports of each GATT/WTO member country to its fellow GATT/WTO members to be positive for a vast majority of the members in our sample. Our positive partial estimates are in contrast to many previous findings and are crucially driven by the inclusion of internal trade flows, as they allow capturing diversion from domestic sales. Further, the allowance of country-specific effects shows the huge heterogeneity of the GATT/WTO effects. Using these partial estimates, we perform a counterfactual analysis where we quantify the welfare and trade effects of GATT/WTO for all countries in our data. We find that member countries gained in terms of welfare on average 4.37 percent, with a huge variation from -1.78 percent to 27 percent. Welfare falls on average by -0.96 percent for non-GATT/WTO members. We find as main drives behind these heterogeneous effects heterogeneous partial trade cost estimates and differing trade openness. Interestingly, some countries with negatively estimated exporter-specific GATT/WTO effects have positive welfare effects from trading with GATT/WTO members, emphasizing the importance of taking into account general equilibrium effects.

6. Challenges ahead

In this study we have devoted substantial effort to confirm that the rules based international trade order, epitomized by GATT and WTO, have delivered large gains from trade. In small, open economies such as the Netherlands, about a quarter of welfare (i.e., GDP per capita) depends on the system; in Germany the share still is about 5 percent.

Yet, the multilateral trading order is in a deep, existential crisis. There are various dimensions to this predicament. The most immediate threat is the US blockade of the nomination of members to the WTO Appellate Body. Without a functioning appeal court, the role of the WTO in dispute settlement is strongly diminished.

However, the more fundamental problem that has beset the WTO from its very beginning is its enormous heterogeneity. As of today, the organization encompasses as many as 164 members, ranging from extremely poor to extremely rich, from some of the world's most terrible autocracies to show-case democracies, from illiberal closed economies such as Venezuela to very liberal ones such as Singapore. Even countries with very similar institutional setups can differ widely with respect to their domestic policy imperatives or with respect to their perceived and actual international roles. The WTO being a members-based institutions, each of the countries possesses a veto right. Given this complexity, striving for a uniform body of rules has become a challenge despite the existence of special carve-outs for developing countries and the possibility of plurilateral agreements within the multilateral system.

When, on April 15 1994, GATT members agreed on the Marrakesh Declaration that led to the creation of the WTO, there was a shared vision about the global geopolitical landscape. After the end of Soviet-style communism, it was commonly believed that all countries would gradually converge to a broadly similar model of democratic market economies and that the huge heterogeneity alluded to in the first paragraph would, eventually, be overcome. Francis Fukuyama's book "End of History" (1992) illustrates this thinking. It was taken as granted that the only remaining super power, the US, would guarantee the emerging universal order that itself had promoted from the end of World War II onwards. Under these assumptions, systems competition was assumed a feature of the past and the international economic order would not suffer from fundamental geopolitical disagreements.

The return of power politics and of a new systems competition between democratic, market-based capitalism of the "West" and more autocratic state-capitalism of some emerging markets is, however, proving the "End of History" assumption wrong. This divide correlates with very different economic concepts, for example relating to the legitimacy of direct and indirect subsidies, the approach to market power, or the relationship between economic foreign policy and conventional foreign affairs.

The political non-convergence since 1995 has been accompanied by economic convergence on a massive scale. The relative economic power of the "West" (as proxied by the GDP of G7 countries relative to global GDP) has fallen dramatically since then, from almost 65 percent in the early 1990s to less than 40 percent as of today. As argued by Baldwin (2016), this convergence has been driven by the integration of low-wage countries into the global value added network. The motivation for global trade liberalization always was to spur economic convergence. Indeed, as our quantitative analysis shows, small, often relatively poor countries, belong to the biggest beneficiaries of the multilateral system. However, the founders of the WTO in 1995, first and foremost the US, had surely not planned to be surpassed by a systemic rival in the next quarter of a century. Economic convergence coupled with political non-convergence has now become a potent complicating factor in the rules-based global system. In an era of renewed systems competition, central features of the WTO architecture, such as the enabling clause that grants different and special treatment to poorer countries, has – for very good reasons – attracted massive criticism.

Our quantitative results suggest that countries benefit in very different ways from the GATT/WTO. A better understanding of this heterogeneity is the subject of future work, but differences in countries' underlying economic systems may well explain part of the pattern.

New system competition turns a basic premise of the WTO upside-down. Part of the "End of History" narrative was the assumption that all that really mattered for policy-makers around the world was per capita income of citizens. Indeed, the economic theory of multilateralism as put forward by Bagwell and Staiger (2002) postulates exactly this objective for all relevant players. A universal focus on per capita income enables positive-sum thinking: whenever deeper economic integration leads to higher per capita income, it is welcome, and the fact that all partners gain ensures all countries have interests to participate. If, however, policy makers not only care about per capita income but also (and maybe predominantly) about the size of their own economies relative to their systemic rivals, the world is no longer in a positive-sum game but in zero-sum game, as everything is about the distribution of economic and (derived from relative economic clout) political power. In such a world, the standard theory breaks down: reciprocity and non-discrimination no longer suffice in bringing cooperative outcomes about. The textbook model of the WTO collapses. In return, one sees the "weaponization" of tariffs, of exchange rates, or of international investment. The "End of History" is being supplanted by a "War by Other Means" doctrine (Blackwill and Harris, 2016).

The crucial question, then, is how to bring positive-sum thinking back into the process. The critical prerequisite for this is trust: political non-convergence and economic convergence are not a problem per se, but become a poisonous configuration if central actors do not trust each other and fear opportunistic behavior by trade partners. Indeed, the more trusting actors are, the larger the relative weight of per capita income in the policy objective function can be and the more the world follows a positive-sum logic. The smaller the amount of trust available, the larger the weight on relative economic power will be. Clearly, when China was allowed into the WTO in November 2001, the importance attached to per capita income was still large enough in the most relevant member-states; since then, it has strongly declined. Given the breakdown of trust, at hindsight, it is plausible to assume that the US (and probably European states) would not have allowed China into the WTO. It is, therefore, not overly surprising that the US, the critical facilitator of the global trading system in the 1990s, is walking away from its own creation.

In a world of system competition, mercantilist thinking becomes increasingly relevant as bilateral trade balances determine relative outcomes of trade conflicts. The intellectual godfather of the failed International Trade Organization, John Maynard Keynes, was acutely aware of this problem and, therefore, argued for mechanisms that would foster bilateral balance. The WTO, however, has no rules on bilateral balances at all—this feature is again easily rationalized on the basis of the "End of History" assumption under which implies that bilateral balances are entirely irrelevant.

The return of system competition also rationalizes another recent development: the central role played by the manufacturing sector. Again, under the "End of History" logic, countries should not care at all in which sector they specialize. If structures of comparative advantage imply that trade liberalization implies the loss of industrial production to the advantage of services, countries would not resist this. If, however, countries do not trust the cooperative behavior of trade partners, self-sufficiency in critical sectors becomes important.

An implication of the fundamental challenges faced by the WTO is the rise of bilateralism. It is probably not a pure coincidence that the number of preferential trade agreements increased fastest when, by the turn of the millennium, it became clear that the multilateral system was built on untenable assumptions. While it may be argued that an autonomous preference for bilateralism may have further weakened the multilateral system, it seems apparent that the dysfunctionality of the WTO has strongly

motivated the conclusion of bilateral agreements. These may not per se undermine the WTO; indeed, they can actually serve as stepping stones (Baldwin and Seghezza, 2010). However, in a world of zero-sum thinking, not only does bilateralism become even more attractive, in particular for countries with large domestic markets such as the US, the EU, or China, it may also turn into a stumbling bloc for multilateralism as regional blocs (Limao, 2006).

These considerations suggest that the crisis of the multilateral system is not just a consequence of new economic nationalism as epitomized by politicians such as Donald Trump, Xi Jinping, Wladimir Putin or Narendra Modi. However, it is also clear that aggressive economic nationalism further erodes trust, which weakens the case of positive-sum thinking in the global system. Moreover, paralyzing the WTO will certainly exacerbate the geopolitical challenges as it robs the world of a forum for discussion and dispute settlement.

To get out of the current impasse, it is paramount to acknowledge that the conceptual basis on which the WTO was built reflected a short-lived and historically very unusual episode of universalism in global economics. One has to assume that the tension from political non-convergence coupled with economic convergence will remain.

Nonetheless, as our study shows very clearly, the multilateral system has delivered very sizeable economic benefits to almost all countries in the world. Wrecking the system would impoverish the world and make distributional concerns much more pressing. The challenge, therefore, is on adjusting the rules such that they do justice to the complicated landscape we face today. The following formulates three priorities that are based on the fundamental premises that the economic systems of pivotal players such as China or the US will not converge any time soon, and that the lost trust will not be easily recovered.

Priority number one should be to keep minimum functions of the multilateral system operative. This means that members must find a solution to the impasse regarding the Appellate Body. This could come in two steps: first, many members of the WTO should sign a declaration that they accept first-stage judgements at the WTO as binding. It is not unusual that dispute settlement systems do not provide for an appellate court, see the long-standing practice in international investment dispute settlement between investors and states. Second, countries wishing to have recourse to an appellate mechanism would have to find solutions outside the WTO; the EU has already produced a template panel with Canada; other country-pairs could do the same or sign up to other countries' systems.

Priority number two for core members of the WTO should be to work on a plan B, that is, a legal system that can substitute for the WTO as we know it in case of collapse, for example. Such a plan B, as suggested amongst others by Pascal Lamy,[10] the former WTO Director General and EU trade commissioner, would put pressure on the US in being more constructive and accepting reforms rather than paralyzing the whole system. However, if the issues with the current multilateral systems run deeper, as argued above, such a tactical ploy may not be enough. Arguably, the systemic problems raised by China (and other countries whose economic setup differs from the 1994 assumptions) are one major factor behind the US; so bringing the US back to supporting the multilateral system requires a strategy to deal with systems competition within the global trade order. For this reason, democratic market economies should work on making the WTO more flexible such that it can better deal with countries that differ regarding deep characteristics of their economic systems. This could mean to create a core regime, subscribed to by democratic market economies and aligned value systems, and a peripheral one which regulates trade between countries with incompatible economic systems. In a

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[10] https://www.reuters.com/article/us-usa-wto/wto-should-prepare-for-life-without-u-s-ex-chief-lamy-says-idUSKCN1G326S

sense, the WTO has already been moving towards such a system of clubs as plurilateral agreements within the organization have become more frequent. Clearly, such a two-pronged approach has shortcomings; it is a second best setup for a world in which there is not sufficient trust. But it addresses the risk of a complete system meltdown which could have much higher costs. The European Union should investigate possibilities and take over a leadership role.

The third priority is to move on with regional trade agreements. They cannot substitute for a possible breakdown of the multilateral system but they provide a degree of legal certainty in times where the big reorganization of the global trading order opens many questions that will take time to be solved. A key demand on these agreements must be that they remain open for non-member countries and may even extend to or integrate into a global agreement once a clearer global pattern emerges.

7. Conclusion

The 25th anniversary year of the WTO is shaping up to be a critical one. In light of the institutional and political challenges of the multilateral rules based trading system, this study primarily aimed at elaborating the achievements of the GATT and the WTO over the past decades with a focus on trade and welfare effects that potentially resulted after countries joined the rules based trading system.

The results of the empirical analysis are distinct and insightful. Both the GATT and WTO have lead to a significant increase in global exports and thereby promoted growth in participating member states and the world.

These findings may sound plausible to a post-World-War II society that has experienced an enormous increase in cross-border trade in light of the GATT and the WTO. However, at the same time there has been an increasing and intense debate over the positive effects of the GATT and the WTO on global trade and welfare. As briefly discussed in the study, a large number of empirical studies present findings, concluding that unlike regional trade agreements or currency unions, the GATT and WTO membership has not generated positive trade effects.

Stimulated by this debate in the related literature on whether and how much the GATT and the WTO promote trade and because of the inability of existing studies to identify the direct country-specific effects of GATT/WTO membership, the study adapts and expands the methods and analysis from Larch et al. (2019) and implements the latest developments in the empirical structural gravity literature to evaluate the impact of GATT and WTO membership on international trade. Specifically, we obtain country-specific estimates of the impact of GATT and WTO on the manufacturing exports of member countries, and we find that, while heterogeneous, the majority of our estimates are positive and sizeable.

Based on the empirically identified estimates, our counterfactual analysis finds the following welfare and trade effects for a GATT- and WTO- membership: countries joining the rules based trading system gained in terms of welfare on average 4.37 percent. In contrast, welfare falls on average by -0.96 percent for non-GATT/WTO members. Accordingly, manufacturing exports of the USA, for example, would be lower by around 20 percent without a WTO-membership, and hence welfare based on real manufacturing output would also be lower, by around 1.5 percent. USA turns out to be the biggest loser in terms of absolute values. These effects turn out to be significantly larger in case of developing countries, as for example, in case of Laos or Gambia. Without a WTO-membership, trade and welfare would be lower by about 30 percent.

Overall, the empirical findings of this study show strong positive trade and welfare effects resulting from a GATT- and WTO-membership. In light of these findings, it is no exaggeration to consider the rules based system under the shelter of the WTO as a crucial pillar for the experienced economic prosperity over the past decades.

While the achievements of the GATT and WTO are clear and instructive, the future of the rules based system remains less obvious. In light of growing international protectionism, the study also discusses briefly new challenges for the WTO and provides several recommendations, how the world can maintain a multilateral rules based trading system until systemic policy conflicts related to cross-border business have been settled between the biggest actors in the west and east.

The findings of this study unrestrictedly underline the necessity for a global rules based trading system in the future.

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Appendix

A.1. REGIONAL CLASSIFICATION

Africa: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Cote d'Ivoire, Democratic Republic of the Congo, Djibouti, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libyan Arab Jamahiriya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mayotte, Morocco, Mozambique, Namibia, Niger, Nigeria, Reunion, Rwanda, Saint Helena, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Togo, Tunisia, Uganda, United Republic of Tanzania, Western Sahara, Zambia, Zimbabwe

Asia: Afghanistan, Armenia, Azerbaijan, Bahrain, Bangladesh, Bhutan, Brunei Darussalam, Burma, Cambodia, China, Cyprus, Georgia, Hong Kong, India, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Japan, Jordan, Kazakhstan, Korea, Democratic People's Republic of, Korea, Republic of, Kuwait, Kyrgyzstan, Lao People's Democratic Republic, Lebanon, Macau, Malaysia, Maldives, Mongolia, Nepal, Oman, Pakistan, Palestine, Philippines, Qatar, Saudi Arabia, Singapore, Sri Lanka, Syrian Arab Republic, Taiwan, Tajikistan, Thailand, Timor-Leste, Turkey, Turkmenistan, United Arab Emirates, Uzbekistan, Viet Nam, Yemen

Europe: Albania, Andorra, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Faroe Islands, Finland, France, Germany, Gibraltar, Greece, Holy See (Vatican City), Hungary, Iceland, Ireland, Isle of Man, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Republic of Moldova, Romania, Russia, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, The former Yugoslav Republic of Macedonia, Ukraine, United Kingdom

Latin America (and the Caribbean): Anguilla, Antigua and Barbuda, Argentina, Aruba, Bahamas, Barbados, Belize, Bolivia, Brazil, British Virgin Islands, Cayman Islands, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Falkland Islands (Malvinas), French Guiana, Grenada, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Jamaica, Martinique, Mexico, Montserrat, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Turks and Caicos Islands, United States Virgin Islands, Uruguay, Venezuela

Northern America: Bermuda, Canada, Greenland, Saint Pierre and Miquelon, United States

Oceania: American Samoa, Australia, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Micronesia, Federated States of, Nauru, New Caledonia, New Zealand, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, Wallis and Futuna Islands

A.2. INCOME CLASSIFICATION

High income countries (HIC): Andorra, Antigua and Barbuda, Aruba, Australia, Austria, Bahamas, Bahrain, Barbados, Belgium, Bermuda, British Virgin Islands, Brunei Darussalam, Canada, Cayman Islands, Chile, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Faroe Islands, Finland, France, French Polynesia, Germany, Gibraltar, Greece, Greenland, Guam, Hong Kong, Hungary, Iceland, Ireland, Isle of Man, Israel, Italy, Japan, Republic of Korea, Kuwait, Latvia, Liechtenstein, Lithuania, Luxembourg, Macau, Malta, Monaco, Netherlands, New Caledonia, New Zealand, Northern Mariana Islands, Norway, Oman, Palau, Panama, Poland, Portugal, Puerto Rico, Qatar, Saint Kitts and Nevis, Saint Martin, San Marino, Saudi Arabia, Seychelles, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, Taiwan, Trinidad and Tobago, Turks and Caicos Islands, United Arab Emirates, United Kingdom, United States, United States Virgin Islands, Uruguay

Middle income countries (MIC): Albania, Algeria, American Samoa, Angola, Argentina, Armenia, Azerbaijan, Bangladesh, Belarus, Belize, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burma, Cambodia, Cameroon, Cape Verde, China, Colombia, Comoros, Congo, Costa Rica, Cote d'Ivoire, Cuba, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Fiji, Gabon, Georgia, Ghana, Grenada, Guatemala, Guyana, Honduras, India, Indonesia, Iran (Islamic Republic of), Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Kyrgyzstan, Lao People's Democratic Republic, Lebanon, Lesotho, Libyan Arab Jamahiriya, Malaysia, Maldives, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia, Federated States of, Mongolia, Montenegro, Morocco, Namibia, Nauru, Nicaragua, Nigeria, Pakistan, Palestine, Papua New Guinea, Paraguay, Peru, Philippines, Republic of Moldova, Romania, Russia, Saint Lucia, Saint Vincent and the Grenadines, Samoa, Sao Tome and Principe, Senegal, Serbia, Solomon Islands, South Africa, Sri Lanka, Sudan, Suriname, Swaziland, Thailand, The former Yugoslav Republic of Macedonia, Timor-Leste, Tonga, Tunisia, Turkey, Turkmenistan, Tuvalu, Ukraine, Uzbekistan, Vanuatu, Venezuela, Viet Nam, Zambia, Zimbabwe

Low income countries (LIC): Afghanistan, Benin, Burkina Faso, Burundi, Central African Republic, Chad, Democratic Republic of the Congo, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Korea, Democratic People's Republic of, Liberia, Madagascar, Malawi, Mali, Mozambique, Nepal, Niger, Rwanda, Sierra Leone, Somalia, Syrian Arab Republic, Tajikistan, Togo, Uganda, United Republic of Tanzania, Yemen

A.3. THE STRUCTURAL GRAVITY MODEL

Following the related literature, and to perform consistent estimation and general equilibrium analysis, we employ the structural gravity system, which is summarized as follows:

$$X_{ij,t} = \frac{Y_{i,t}E_{j,t}}{Y_t}\left(\frac{t_{ij,t}}{\Pi_{i,t}P_{j,t}}\right)^{1-\sigma} \qquad (1)$$

$$\Pi_{i,t}^{1-\sigma} = \sum_j \left(\frac{t_{ij,t}}{P_{j,t}}\right)^{1-\sigma}\frac{E_{j,t}}{Y_t} \qquad (2)$$

$$P_{j,t}^{1-\sigma} = \sum_i \left(\frac{t_{ij,t}}{P_{i,t}}\right)^{1-\sigma}\frac{Y_{i,t}}{Y_t} \qquad (3)$$

Equation (1), which represents the theoretical gravity equation that governs bilateral trade flows, can be conveniently decomposed into two terms: a *size* term, $Y_{i,t}E_{j,t}/Y_t$, and a *trade cost* term, $\left(t_{ij,t}/(\Pi_{i,t}P_{j,t})\right)^{1-\sigma}$.

- The size term consists of the nominal income in country i in year *t*, $Y_{i,t}$, country *j*'s aggregate expenditure in year *t*, $E_{j,t}$, and world output in year *t*, Y_t, which is the sum over i of $Y_{i,t}$ (and due to world trade balance, also the sum over j of $E_{j,t}$). The intuitive interpretation of the *size term*, $Y_{i,t}E_{j,t}/Y_t$, is as the hypothetical level of frictionless trade between partners *i* and *j* if there were no trade costs. The size term implies that large producers will export more to all destinations; big/rich markets will import more from all sources; and trade flows between countries *i* and *j* will be larger the more similar in size the trading partners are.

- The trade cost term consists of three components: (i) bilateral trade cost between partners *i* and *j in year t*, $t_{ij,t}$, (ii) the structural term $P_{j,t}$, coined by Anderson and van Wincoop (2003) as inward multilateral resistances, represents importer *j*'s ease of market access in year *t*, (iii) the structural term $\Pi_{i,t}$, defined as outward multilateral resistances by Anderson and van Wincoop (2003), measures exporter *i*'s ease of market access in year *t*. The natural interpretation of the *trade cost* term, $\left(t_{ij,t}/(\Pi_{i,t}P_{j,t})\right)^{1-\sigma}$, corresponds to the total effects of trade costs that drive a wedge between realized and frictionless trade. The multilateral resistances are the vehicles that translate the initial, partial equilibrium effects of trade policy at the bilateral level to country-specific effects on consumer and producer prices. The direct effects do give the initial impact effects of trade costs on trade flows, while the general equilibrium trade costs also take into account the changes in prices, incomes and expenditures induced by trade cost changes.

In Section 4 we rely on the empirical version of Equation (1) in order to obtain our direct/partial equilibrium estimates of the impact of GATT/WTO. Then, we combine these estimates with the complete structural gravity system (1)-(3) together with the market clearance conditions to obtain the general equilibrium trade and welfare indexes that we report and discuss in Section 5.

A.4. DESCRIPTION OF DATA USED FOR ESTIMATIONS AND FOR THE GE ANALYSIS

The data used to obtain the estimation results and the general equilibrium trade and welfare analysis in this report was constructed by Larch et al. (2019) with the goal of using these data to implement the latest techniques in structural gravity estimations to evaluate the impact of GATT/WTO at the aggregate manufacturing level. Therefore, here we reproduce the description of the dataset from the original paper, and we refer the reader for further details on the data, its construction and usage to Larch et al. (2019).

Following the recommendations of Glick and Rose (2016), Larch et al. (2019) construct a new database that includes a very large number of countries. In addition, given their goal to quantify the impact of GATT and WTO, the authors also aimed at a long time-period coverage. As a result, in order to perform their analysis, Larch et al. (2019) construct and employ an intra-national and international manufacturing trade dataset for 218 trading partners over the period 1980-2016. Please see Larch et al. (2019) for a complete list of the countries in the original sample.

Intra-national trade flows, which are crucial for the implementation of our methods, are computed as the difference between gross output and exports. Gross manufacturing output is constructed using data from UN UNIDO INDSTAT 2 2017 and 2018 editions at the 2-digit level of International Standard Industrial Classification (ISIC) Revision 3, CEPII Trade, Production and Bilateral Protection Database (TradeProd) at the 3-digit level of ISIC Revision 2, World Bank's Trade, Production and Protection (TPP) database at the 3-digit level of ISIC Revision 2, and COMTRADE bilateral trade at the 3- and 2-digit level of ISIC Revision 2. The UN UNIDO INDSTAT 2 is derived from INDSTAT3 ISIC Revision 2 and INDSTAT4 ISIC Revision 3. INDSTAT2 combines historical time series data starting 1963. The CEPII TradeProd and World Bank's TPP databases were used to provide production data for earlier years for some countries. Given that the different databases are reported in different ISIC industry classifications, UNIDO INDSTAT data had to be translated from ISIC Revision 3 to ISIC Revision 2 using a correspondence table. However, ISIC Rev. 2 industry codes do not map one-to-one to the Rev. 3 industry codes. That is why Larch et al. (2019) constructed country-specific concordance between ISIC Revision 3 to ISIC Revision 2 based on an iteration process for the matching years for which UNIDO INDSTAT data were available in both ISIC Revision 2 and ISIC Revision 3. The correlation between the original ISIC Revision 2 production values and the mapped values is larger than 0.99 for many countries.

Larch et al. (2019) note that gross output data were available for 157 countries. However, due to data availability, the time coverage of gross output differs substantially across countries. Finally, Larch et al. (2019) obtain the data on bilateral trade from UN COMTRADE. Export flows, expressed in free on board (FOB), were complemented by mirrored import data flows after adjusting for cost, insurance and freight (CIF) costs. Estimates of bilateral CIF-FOB costs were obtained from OECD. In order to be able to draw sound inference in the presence of many fixed effects, Larch et al. (2019) eliminate countries with very few bilateral trade observations.

In addition to international and intra-national trade flows, we also employ data on WTO membership, RTAs, as well as a series of gravity variables, which are used standardly in the literature. Data on RTAs and GATT/WTO membership come from the WTO website. Data on bilateral distance, contiguous borders, colonial ties and common language were taken from CEPII. Further description on the variables, the data sources, and the dataset itself are available upon request from Larch et al. (2019).

Table A 1: Average annual change in trade before and after GATT/WTO accession, by country (Source: DOTS, WTO)

trade volume in pre- (t<0) and post (t>0) GATT/WTO accession years (current mn USD)

Income Group	Country Name	t=-6	t=-5	t=-4	t=-3	t=-2	t=-1	t=0	t=1	t=2	t=3	t=4	t=5	t=6
LIC	Benin	0.0	0.0	0.0	2.8	38.7	28.5	43.9	43.2	45.8	41.7	55.7	68.6	78.2
LIC	Burkina Faso	0.0	0.0	0.0	8.2	8.6	40.2	45.4	13.2	20.6	51.2	51.8	52.3	66.6
LIC	Burundi	0.0	0.0	0.0	0.0	2.1	37.2	39.0	30.8	38.0	39.3	26.0	32.4	38.3
LIC	Central African Republic	0.0	0.0	0.0	31.1	8.5	3.8	47.5	56.6	52.3	64.7	71.1	72.5	67.6
LIC	Chad	0.0	0.0	0.0	36.6	44.7	42.3	48.7	57.9	54.2	53.7	61.6	61.7	88.1
LIC	Democratic Republic of the Congo	348.9	394.7	337.8	362.8	728.3	817.0	599.3	1113.7	1363.5	1833.9	1170.9	1235.6	1433.3
LIC	Gambia	8.8	10.2	15.0	16.1	20.0	21.0	30.7	36.2	34.7	39.1	32.1	33.8	38.9
LIC	Guinea	819.8	974.3	1078.3	1226.2	1300.4	1223.2	1183.6	1317.8	1137.4	1207.4	1225.7	1027.8	1149.0
LIC	Guinea-Bissau	100.5	129.2	153.9	144.0	123.4	156.8	216.8	224.6	162.8	130.8	163.4	139.9	209.0
LIC	Madagascar	222.0	207.5	185.9	177.1	160.7	192.8	191.4	207.0	218.5	223.4	218.8	246.5	252.0
LIC	Malawi	0.0	0.0	0.0	0.0	0.0	0.0	77.7	94.3	101.3	117.5	98.0	105.0	119.6
LIC	Mali	495.0	578.5	605.3	784.3	718.2	720.2	723.9	591.5	910.8	1053.1	1078.5	1143.9	1102.8
LIC	Mozambique	593.6	938.9	1094.0	965.8	1274.5	797.1	970.5	1135.2	1312.3	849.6	929.4	1292.8	995.0
LIC	Niger	0.0	0.0	0.0	26.0	2.9	32.8	42.0	52.9	60.9	77.2	70.2	65.1	66.7
LIC	Rwanda	0.0	0.0	0.0	0.0	7.7	11.2	13.9	15.9	20.7	29.7	42.7	42.2	35.2
LIC	Sierra Leone	55.7	66.2	114.3	107.2	103.7	143.4	158.3	128.7	151.2	183.6	180.4	169.7	150.9
LIC	Togo	0.0	0.0	11.5	19.3	42.1	44.6	67.9	68.4	79.1	73.1	80.5	98.5	109.9
LIC	Uganda	149.4	168.4	160.7	144.2	146.3	145.9	145.4	190.6	261.4	264.3	294.9	286.1	368.9
LIC	United Republic of Tanzania	201.7	195.0	189.0	181.3	191.9	220.5	211.2	217.8	245.7	301.6	300.5	393.9	383.2
MIC	Angola	3652.5	4053.7	5100.8	4770.1	5787.4	4287.0	4223.3	5096.4	6326.4	6863.3	5707.6	6632.5	9515.6
MIC	Botswana	321.6	227.9	282.1	284.0	229.5	247.4	319.5	451.4	497.2	627.6	637.2	568.3	536.7
MIC	Cameroon	169.4	189.5	170.8	164.8	175.1	166.0	221.6	224.9	243.9	251.9	289.2	354.4	417.0
MIC	Cape Verde	279.6	358.2	439.3	449.8	554.6	759.1	853.8	736.9	781.3	1119.7	862.3	928.0	976.4
MIC	Congo	0.0	0.0	0.0	7.5	91.9	83.3	89.1	102.5	106.0	105.6	125.6	96.8	93.4
MIC	Cote d'Ivoire	0.0	0.0	0.0	262.5	318.3	328.9	379.6	525.1	495.1	551.5	560.8	681.6	730.9
MIC	Djibouti	228.6	220.1	238.7	295.4	546.6	560.8	499.0	513.9	501.6	485.0	669.5	745.9	740.6
MIC	Egypt	1253.8	1250.3	1403.2	1010.1	994.9	1030.7	1137.9	1249.5	1277.7	1548.2	3089.8	4415.1	4547.5
MIC	Gabon	0.0	0.0	0.0	75.9	86.3	91.7	113.7	142.1	157.4	160.4	178.6	167.8	217.5

MIC	Ghana	400.0	394.3	429.2	476.2	492.2	468.5	494.0	493.2	582.9	639.0	688.5	627.1	628.5
MIC	Kenya	276.7	296.5	332.3	327.7	348.3	372.1	330.4	354.1	445.4	419.5	563.1	587.4	696.8
MIC	Lesotho	34.8	31.0	40.6	32.7	33.8	56.6	69.9	93.1	87.3	144.3	164.8	139.2	150.3
MIC	Mauritania	0.0	0.0	0.0	4.4	1.0	34.6	43.9	60.2	45.2	83.8	97.0	93.5	107.4
MIC	Mauritius	135.4	136.3	136.2	134.4	129.7	128.2	138.6	145.4	219.7	290.7	609.6	617.4	609.5
MIC	Morocco	6172.0	5813.0	5131.1	5651.8	5597.9	5806.0	6634.2	7761.5	8225.7	10495.1	10996.4	11275.8	10337.7
MIC	Namibia	62.3	38.4	61.4	179.6	750.2	560.7	444.5	430.3	719.6	655.5	612.4	609.7	747.0
MIC	Nigeria	0.0	0.0	0.0	0.0	0.0	0.0	964.6	993.5	1005.2	1073.4	1266.4	1452.2	1447.5
MIC	Senegal	0.0	0.0	0.0	276.4	265.9	268.2	268.5	289.9	285.1	273.6	284.5	326.3	273.9
MIC	Swaziland	255.6	358.4	322.9	424.7	444.6	523.9	407.4	423.7	401.0	365.4	378.8	297.2	383.7
MIC	Tunisia	4601.7	4177.5	4240.7	4589.6	5623.5	6922.7	8707.9	8326.5	9729.2	9218.0	10283.8	12478.3	12322.7
MIC	Zambia	1655.2	1515.7	1386.7	2078.2	2360.3	1474.3	1914.6	1510.3	1217.8	1130.5	1172.9	1335.7	1700.9
HIC	Bahrain	4519.6	3068.0	3523.6	4001.3	5690.0	5952.7	6060.6	5045.3	5177.6	5436.7	6931.1	5966.5	5798.3
HIC	Brunei Darussalam	2537.4	2445.7	2658.4	3117.0	3441.6	6290.9	6624.9	6013.6	6308.0	7127.4	7067.4	4254.0	3873.6
HIC	Cyprus	175.2	146.0	162.1	157.3	153.9	173.8	183.2	156.2	199.4	217.3	228.7	242.6	287.9
HIC	Hong Kong	41310.8	45912.9	43623.1	45338.3	56226.4	59154.1	69897.5	95685.9	125482.0	143483.9	162553.8	196155.0	240389.0
HIC	Israel	404.1	488.9	489.9	532.3	627.3	734.1	816.6	907.0	1052.3	1116.8	1179.5	1150.3	1507.5
HIC	Korea, Republic of	325.7	447.8	609.7	496.6	594.3	933.9	1272.3	1897.4	2409.6	2772.1	3393.2	4017.5	7230.5
HIC	Kuwait	0.0	1256.6	1328.3	1408.1	1415.2	1493.7	1578.2	1616.7	1565.1	1706.9	1948.9	2270.6	2338.3
HIC	Macau	1671.3	1897.0	2489.6	2756.0	3086.6	3203.6	3495.8	3697.8	3734.9	3924.9	4009.3	4110.6	4288.2
HIC	Oman	9309.6	10159.9	11757.7	12509.5	11056.9	11768.6	15706.3	16792.2	17073.8	18077.0	21828.3	27281.4	32350.4
HIC	Qatar	3134.7	3635.8	4847.5	4817.4	5491.3	5050.6	4918.9	5415.6	7577.3	8168.0	8056.9	8541.2	13668.0
HIC	Saudi Arabia	76850.1	104947.1	99135.8	97413.2	121879.1	155130.1	213499.4	264478.7	298090.0	416222.6	264183.9	338551.3	461981.9
HIC	Singapore	1397.6	2995.2	3651.9	4113.1	4682.9	5667.6	9027.2	14446.1	14027.3	16378.6	19764.3	24310.0	33546.5
HIC	Taiwan	221584.2	236139.3	223441.2	241834.8	297203.9	251851.7	269880.5	304159.1	384500.7	416351.5	470463.1	511207.3	537553.1
HIC	United Arab Emirates	18668.5	23200.6	29689.8	33707.4	36399.0	36433.3	38665.6	40904.7	45833.5	49641.9	45726.8	58958.5	60676.6
LIC	Nepal	1848.7	1744.9	2170.9	2274.4	1897.3	2210.8	2463.7	2769.2	2941.0	3902.8	4398.9	3336.5	4401.9
MIC	Armenia	1123.4	1101.7	1042.6	1107.2	1199.6	1488.1	1954.1	2067.5	2770.1	3172.4	4411.6	5475.0	3990.9
MIC	Bangladesh	0.0	0.0	0.0	0.0	0.0	0.0	556.2	1200.2	1183.2	1340.8	1098.7	1343.9	1680.8
MIC	Cambodia	2008	2014	2780	2947	3518.2	3765.6	4825.5	5564.1	6546.3	7075.2	8771.7	8881.2	10469.6
MIC	China	276442	285564	322145	321064	356487	466742	501480	605931	825874	1115220	1366902	1686568	2087170.9
MIC	Georgia	492.7	541.2	877.7	1158.8	1566.5	1217.1	1040.3	1068.2	1135.4	1600.9	2488.8	3339.1	4639.6

MIC	Jordan	4215.4	4775.7	5462.6	5321.3	4897.9	4786.3	5717.2	6640.9	7538.6	8474.4	11488.8	14404.3	16288.0
MIC	Kyrgyzstan	730.3	804.2	655.3	871.7	1289.3	1318.9	1350.3	1054.0	1054.5	947.6	1072.7	1297.7	1646.3
MIC	Malaysia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53.4	62.4	28.0
MIC	Maldives	13.0	15.5	16.3	23.1	47.3	79.0	79.3	83.5	92.8	101.9	128.8	162.2	187.7
MIC	Mongolia	228.8	801.0	754.6	611.6	885.4	870.4	919.8	848.4	871.4	1150.3	1233.8	1214.3	1406.3
MIC	Philippines	3639.6	6063.3	5926.8	6386.7	7198.0	8464.3	11047.1	13790.3	13953.6	12963.7	12540.5	11314.0	9803.8
MIC	Thailand	6430.1	7961.2	9261.9	12192.2	15266.0	16324.3	15062.2	16279.6	17473.7	16033.7	17658.8	24055.0	34998.9
MIC	Viet Nam	30609.8	36044.2	45004.8	57972.3	68371.5	83619.3	109979.3	141135.1	123111.7	153242.1	197450.5	222509.6	255738.8
HIC	Croatia	9356.0	12010.5	12089.1	13175.5	12156.4	11506.6	12312.3	13702.0	15624.9	20387.4	24520.7	27328.5	30969.3
HIC	Czech Republic	0.0	0.0	0.0	0.0	0.0	0.0	24811.9	29070.6	38548.2	50348.6	48743.1	57523.8	56693.7
HIC	Estonia	1684.2	2935.4	4318.5	5211.4	7367.3	8028.3	7055.0	9161.4	9102.1	10090.3	13560.1	14227.3	17867.8
HIC	Hungary	812.2	1608.8	2066.5	2602.2	2826.0	3089.2	4294.6	5631.5	6005.4	7050.2	8312.3	9623.0	11178.3
HIC	Iceland	150.0	177.7	217.8	243.6	273.3	231.5	195.2	209.3	278.7	327.8	389.5	586.2	762.8
HIC	Ireland	1139.8	1149.8	1304.4	1496.2	1576.0	1644.6	1775.9	1884.9	2221.7	2511.8	2972.2	3492.3	4708.2
HIC	Latvia	1862.5	2230.8	3056.9	3676.6	4387.4	5000.6	4665.6	5030.6	5510.1	6311.4	8105.5	10714.3	13800.4
HIC	Lithuania	6264.0	7554.1	9466.2	9419.2	7756.1	9178.3	10834.7	13051.1	16826.6	21667.2	27244.5	33532.2	41599.9
HIC	Malta	74.2	71.5	84.3	83.0	76.7	83.3	105.4	113.3	127.8	129.6	142.5	171.7	186.3
HIC	Portugal	662.5	709.6	699.9	699.8	800.3	900.0	891.3	1014.8	1223.6	1439.4	1570.6	1647.6	1718.6
HIC	Slovakia	0.0	0.0	0.0	0.0	0.0	0.0	12289.5	13750.3	17959.8	20526.1	22416.8	24853.9	22559.2
HIC	Slovenia	0.0	0.0	0.0	0.0	0.0	12422.5	13958.7	17558.2	17363.9	17568.1	19095.2	18377.3	18789.7
HIC	Spain	1239.8	1267.0	1206.0	1348.3	1720.1	2192.2	2567.4	3100.2	3806.0	4697.0	4643.6	4905.8	5912.1
HIC	Switzerland	3923.9	4526.5	5010.9	5412.2	6008.1	6403.0	6953.1	7353.1	8220.0	9567.6	11206.3	12513.7	14801.0
MIC	Albania	292.5	828.8	1083.0	759.3	1000.0	1174.2	1349.4	1632.9	1839.7	2298.9	2897.5	3246.9	3756.1
MIC	Bulgaria	5413.5	4681.2	6629.9	6682.1	7947.4	10425.9	9335.5	7972.9	8861.9	8597.3	10569.9	11641.2	12595.9
MIC	Republic of Moldova	1576.2	1863.4	2039.1	1595.9	1049.8	1247.9	1457.4	1681.0	2191.9	2753.1	3378.8	3719.1	5010.9
MIC	f Macedonia	2509.0	2739.1	2545.3	3400.3	2840.4	3106.7	3671.9	4606.3	5181.9	5319.6	8678.5	10829.3	7456.8
MIC	Ukraine	34582.0	45824.1	61328.3	69800.0	82587.5	108292	150907	84687.4	111646	150654.0	152956.1	139747.7	108078.1
HIC	Antigua and Barbuda	30.5	43.9	38.4	44.6	58.3	80.8	98.3	185.9	211.5	185.3	207.5	180.2	176.2
HIC	Barbados	69.9	65.2	79.7	85.8	88.6	103.8	103.0	105.3	99.3	170.3	160.3	170.4	206.8
HIC	Panama	1698.2	2288.3	2365.5	2564.8	4165.7	5356.8	3172.2	3617.4	3669.9	3692.5	3346.8	3308.0	3435.0
HIC	Saint Kitts and Nevis	116.9	149.7	131.1	121.8	614.8	191.8	175.9	524.9	179.9	221.2	229.5	180.5	226.3
HIC	Trinidad and Tobago	309.0	366.9	413.8	440.4	481.9	586.0	620.7	666.4	740.3	789.5	792.4	756.0	789.3

MIC	Argentina	2282.6	2466.8	2247.5	2381.3	2505.6	2543.9	2449.3	2439.3	3080.8	3338.5	3488.5	3720.6	5295.5
MIC	Belize	128.9	205.7	218.1	243.9	223.6	201.9	171.3	222.3	217.9	214.1	241.4	286.0	338.3
MIC	Bolivia	1141.5	1327.9	1267.7	1296.8	1145.4	1371.3	1548.4	1570.3	1740.8	1924.9	2209.1	2491.0	2816.9
MIC	Colombia	2917.7	3399.4	4385.1	5773.2	6467.6	8500.9	8085.0	8479.7	7881.1	7789.4	7515.2	8840.8	9065.6
MIC	Costa Rica	2050.4	1992.8	2193.8	2445.9	2612.0	3091.2	3376.9	3333.8	4507.0	5818.1	5047.5	5684.9	6155.2
MIC	Dominica	111.0	139.4	146.9	165.1	154.5	146.7	130.0	141.0	159.9	179.2	173.5	188.9	192.2
MIC	Ecuador	4027.7	4752.8	4970.2	5442.5	7158.9	8201.0	8376.8	9485.4	9710.5	8327.1	8039.8	9336.8	10649.2
MIC	El Salvador	1601.5	1562.2	1517.3	1562.7	1597.8	1782.0	1897.6	2224.2	2586.9	3588.5	3459.3	3598.3	4234.9
MIC	Grenada	120.5	125.5	130.0	142.2	157.7	148.1	142.1	151.4	175.2	198.1	229.1	258.0	303.6
MIC	Guatemala	2181.4	1982.3	2360.8	2459.9	2645.6	2784.7	3026.1	3750.9	3808.3	4053.8	5106.7	5073.4	7174.9
MIC	Guyana	157.2	169.0	143.1	161.3	170.9	188.5	211.0	224.6	206.6	230.8	227.5	271.0	263.1
MIC	Honduras	1445.2	1558.5	1399.3	1422.0	1705.0	1778.5	2223.0	2418.5	2622.6	3047.6	3321.5	7358.1	4133.2
MIC	Jamaica	317.8	304.2	310.2	365.9	372.7	390.7	416.2	482.9	493.1	527.2	550.1	579.5	670.9
MIC	Mexico	33148.5	42060.9	35139.9	29821.5	33899.9	35776.7	27992.3	33970.0	41228.4	46701.4	58741.6	96045.4	113143.2
MIC	Paraguay	1028.2	1691.4	2246.3	2124.5	1999.3	2330.8	3148.4	3967.9	4164.9	5320.4	5454.0	3824.7	3099.7
MIC	Saint Lucia	155.3	326.2	316.1	343.1	336.6	428.7	416.0	395.6	413.2	380.7	381.0	396.9	409.7
MIC	Saint Vincent and the Grenadines	148.5	203.5	200.8	217.5	204.2	206.5	196.5	182.2	182.6	196.2	217.3	242.3	248.9
MIC	Suriname	302.1	321.7	458.0	482.5	544.7	685.4	753.9	806.0	913.0	981.8	897.3	755.5	724.7
MIC	Venezuela	20468.1	20987.1	15103.9	17549.6	20939.2	19353.5	22067.4	24699.3	25180.5	25104.0	23381.5	28333.0	30081.7
MIC	Fiji	674.3	796.9	981.7	1079.0	944.3	1004.4	1050.2	1279.6	1459.0	1672.6	1497.4	1360.7	1626.3
MIC	Papua New Guinea	2862.8	3028.0	2568.0	2858.5	2806.8	3714.7	4125.4	4056.4	4379.1	3989.0	2941.6	3243.0	3116.2
MIC	Solomon Islands	178.4	191.2	161.7	187.8	300.0	281.5	278.8	337.1	389.2	370.0	325.3	319.5	199.8
MIC	Tonga	97.6	114.7	132.4	145.2	146.9	160.9	175.4	185.1	163.5	215.7	218.9	238.6	255.1

Table A 2: ISO-codes of Countries

Country	ISO code	Country	ISO code	Country	ISO code	Country	ISO code
Afghanistan	AFG	Bulgaria	BGR	Egypt	EGY	Honduras	HND
Åland Islands	ALA	Burkina Faso	BFA	El Salvador	SLV	Hungary	HUN
Albania	ALB	Burundi	BDI	Equatorial Guinea	GNQ	Iceland	ISL
Algeria	DZA	Cambodia	KHM	Eritrea	ERI	India	IND
American Samoa	ASM	Cameroon	CMR	Estonia	EST	Indonesia	IDN
Andorra	AND	Canada	CAN	Ethiopia	ETH	Iran, Islamic Republic of	IRN
Angola	AGO	Cape Verde	CPV	Faeroe Islands	FRO	Iraq	IRQ
Anguilla	AIA	Cayman Islands	CYM	Falkland Islands (Malvinas)	FLK	Ireland	IRL
Antigua and Barbuda	ATG	Central African Republic	CAF	Fiji	FJI	Isle of Man	IMN
Argentina	ARG	Chad	TCD	Finland	FIN	Israel	ISR
Armenia	ARM	Chile	CHL	France	FRA	Italy	ITA
Aruba	ABW	China	CHN	French Guiana	GUF	Jamaica	JAM
Australia	AUS	Hong Kong Special Administrative Region of China	HKG	French Polynesia	PYF	Japan	JPN
Austria	AUT	Macao Special Administrative Region of China	MAC	Gabon	GAB	Jersey	JEY
Azerbaijan	AZE	Colombia	COL	Gambia	GMB	Jordan	JOR
Bahamas	BHS	Comoros	COM	Georgia	GEO	Kazakhstan	KAZ
Bahrain	BHR	Congo	COG	Germany	DEU	Kenya	KEN
Bangladesh	BGD	Cook Islands	COK	Ghana	GHA	Kiribati	KIR
Barbados	BRB	Costa Rica	CRI	Gibraltar	GIB	Kuwait	KWT
Belarus	BLR	Côte d'Ivoire	CIV	Greece	GRC	Kyrgyzstan	KGZ
Belgium	BEL	Croatia	HRV	Greenland	GRL	Lao People's Democratic Republic	LAO
Belize	BLZ	Cuba	CUB	Grenada	GRD	Latvia	LVA
Benin	BEN	Cyprus	CYP	Guadeloupe	GLP	Lebanon	LBN
Bermuda	BMU	Czech Republic	CZE	Guam	GUM	Lesotho	LSO
Bhutan	BTN	Democratic People's Republic of Korea	PRK	Guatemala	GTM	Liberia	LBR
Bolivia	BOL	Democratic Republic of the Congo	COD	Guernsey	GGY	Libyan Arab Jamahiriya	LBY
Bosnia and Herzegovina	BIH	Denmark	DNK	Guinea	GIN	Liechtenstein	LIE
Botswana	BWA	Djibouti	DJI	Guinea-Bissau	GNB	Lithuania	LTU
Brazil	BRA	Dominica	DMA	Guyana	GUY	Luxembourg	LUX
British Virgin Islands	VGB	Dominican Republic	DOM	Haiti	HTI	Madagascar	MDG
Brunei Darussalam	BRN	Ecuador	ECU	Holy See	VAT	Malawi	MWI
Malaysia	MYS	Northern Mariana Islands	MNP	Saudi Arabia	SAU	Turks and Caicos Islands	TCA
Maldives	MDV	Norway	NOR	Senegal	SEN	Tuvalu	TUV
Mali	MLI	Occupied Palestinian Territory	PSE	Serbia	SRB	Uganda	UGA
Malta	MLT	Oman	OMN	Seychelles	SYC	Ukraine	UKR
Marshall Islands	MHL	Pakistan	PAK	Sierra Leone	SLE	United Arab Emirates	ARE
Martinique	MTQ	Palau	PLW	Singapore	SGP	United Kingdom of Great Britain and Northern Ireland	GBR
Mauritania	MRT	Panama	PAN	Slovakia	SVK	United Republic of Tanzania	TZA
Mauritius	MUS	Papua New Guinea	PNG	Slovenia	SVN	United States of America	USA
Mayotte	MYT	Paraguay	PRY	Solomon Islands	SLB	United States Virgin Islands	VIR
Mexico	MEX	Peru	PER	Somalia	SOM	Uruguay	URY
Micronesia, Federated States of	FSM	Philippines	PHL	South Africa	ZAF	Uzbekistan	UZB
Moldova	MDA	Pitcairn	PCN	Spain	ESP	Vanuatu	VUT
Monaco	MCO	Poland	POL	Sri Lanka	LKA	Venezuela (Bolivarian Republic of)	VEN

Mongolia	MNG	Portugal	PRT	Sudan	SDN	Viet Nam	VNM
Montenegro	MNE	Puerto Rico	PRI	Suriname	SUR	Wallis and Futuna Islands	WLF
Montserrat	MSR	Qatar	QAT	Svalbard and Jan Mayen Islands	SJM	Western Sahara	ESH
Morocco	MAR	Republic of Korea	KOR	Swaziland	SWZ	Yemen	YEM
Mozambique	MOZ	R_union	REU	Sweden	SWE	Zambia	ZMB
Myanmar	MMR	Romania	ROU	Switzerland	CHE	Zimbabwe	ZWE
Namibia	NAM	Russian Federation	RUS	Syrian Arab Republic	SYR		
Nauru	NRU	Rwanda	RWA	Tajikistan	TJK		
Nepal	NPL	Saint-Barthélemy	BLM	Thailand	THA		
Netherlands	NLD	Saint Helena	SHN	The former Yugoslav Republic of Macedonia	MKD		
Netherlands Antilles	ANT	Saint Kitts and Nevis	KNA	Timor-Leste	TLS		
New Caledonia	NCL	Saint Lucia	LCA	Togo	TGO		
New Zealand	NZL	Saint-Martin (French part)	MAF	Tokelau	TKL		
Nicaragua	NIC	Saint Pierre and Miquelon	SPM	Tonga	TON		
Niger	NER	Saint Vincent and the Grenadines	VCT	Trinidad and Tobago	TTO		
Nigeria	NGA	Samoa	WSM	Tunisia	TUN		
Niue	NIU	San Marino	SMR	Turkey	TUR		
Norfolk Island	NFK	Sao Tome and Principe	STP	Turkmenistan	TKM		

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