Analysis

Valuing the impact of the World Trade Organization (WTO)

Research Report

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Main findings of the report

At the end of 2020, only 14 countries in the world were not engaged in some way in the World Trade Organization (WTO). The WTO is made up of 163 countries, the European Union members, and an additional 25 observer states in the process of joining. Consequently, in 2020 more than 98% of world merchandise trade was made up by WTO member states.

A comparison of trade volumes before and after joining the General Agreement on Tariffs and Trade (GATT) or WTO shows that almost all countries experienced a steady increase in trade following membership.

A causal empirical analysis confirms a positive WTO effect on international trade. From 2000 to 2016, the overwhelming majority (79%) of WTO members experienced a significant decrease in trade (export and import) costs as a result of WTO membership. Many of the largest positive impacts were observed in developing countries.

The minority (21%), who did not experience a decrease in trade costs as a result of WTO membership, were largely former communist countries and very small nations. When converting these changes into tariff equivalent measures (ad-valorem tariff equivalent (AVE)), the average WTO member saw a 15% decrease in AVE as a result of WTO membership. The greatest fall in AVEs as for developing countries (average 21 % fall in AVEs), followed by fuel exporting countries (17% fall), and developed countries (7 % fall). The trade cost reduction across economies in transition is very heterogeneous. The corresponding simple average AVE measure indicates an increase in trade costs for economies in transition by about 16%.

For a sample of 43 WTO members all these countries saw increases in both relative (compared to the rest of the world) aggregate exports and aggregate welfare as a result of WTO membership. The average increase in exports for this sample as a result of membership was 35%, from a high of 129% (Mexico) to a lower bound with 4% (Lithuania).

The estimated impact of WTO membership was found to be highly variable across sectors and across countries. Across all countries, the highest positive export changes due to a WTO membership appear in the Agricultural sector (28.5%), followed by Manufacturing (28.4%), Services (27.4%), and Mining (18.3%).

Across all of the sample countries, the average aggregate welfare increase resulting from WTO membership was 4%, ranging from a high of 19% (Ireland) to a low 0.7% (China).

A quarter of the sample experienced an increase in relative[1] producer prices and at the same time a decrease in relative consumer prices as a result of WTO membership. This group of countries included WTO member states with the largest observed aggregate welfare gains.

The largest group of the sample (59%) experienced a decrease in relative consumer prices and a decrease in relative producer prices, because of WTO membership. On average, welfare effects for this group of countries were less pronounced compared to countries in which average relative producer prices increased.

No country saw a decrease in relative producer prices and at the same time an increase in relative consumer prices because of WTO membership. However, 14% of the sample did see an increase in both relative producer prices and an increase in relative consumer prices.

[1] Compared to the rest of the world (ROW)

1. Introduction

The multilateral rules-based trading system first under the shelter of the General Agreement on Tariffs and Trade (GATT) and later within the World Trade Organization (WTO) is in crisis, with the functioning of the WTO disputes settlement system undermined, lack of progress in negotiations, and trade wars breaking out between the US, China and Europe. There is also considerable scepticism in the public about the role of the WTO in the future. A major political question in light of the observed crisis within the WTO is in how far liberalized international trade has resulted in benefits for households and companies.

In face of the multilateral rules-based trading system's crisis, in 2020, the WTO has been celebrating its 25th birthday. This is a special anniversary of a remarkable international institution, which has significantly shaped the developments in international trade by continuously supporting the reduction of global trade barriers.

There has been an increasing number of empirical studies trying to quantify the effects of WTO membership. In a seminal empirical contribution, Rose (2004) came to the finding that countries becoming members or belonging to the WTO did not have significantly different trade patterns than non-members. Succeeding studies extended the empirical analysis of Rose and illustrated that the WTO has had a trade promoting effect in line with the aforementioned consensus view. To name some, Tomz et al. (2007), Liu (2009), Chang and Lee (2011), Herz and Wagner (2011), Dutt et al. (2013), Larch et al. (2019), Felbermayr et al. (2020c). However, the estimated effects vary substantially between the studies.

The gravity model of trade has always been the workhorse framework to estimate the impact of various trade policies and other determinants of trade flows, including the impact of GATT/WTO. This study builds on the latest developments in the related literature to contribute to the debate about the value and importance of the WTO and accompanying multilateral trading system. To this end, we provide partial (sectoral and aggregate) estimates of the impact of the WTO on trade of its members, as well as general equilibrium export and welfare effects of the WTO.

The key objectives of the study are to deliver evidence on:

- the estimated impact of WTO membership on aggregate trade (percent change) across the Agriculture, Mining, Manufacture, and Services sectors by country and
- the estimated impact of WTO membership on aggregate exports and economic welfare gains (percent change) by country

The study is structured as follows: Section 2 provides a short historical overview of the multilateral rules-based trading system. Section 3 presents various statistics visualizing the evolution of trade protection in light of the WTO before important structural changes in international trade are discussed. Section 4 motivates and sets the econometric specification. Moreover, it describes the data that are used for the analysis. The core of the study is presented in section 5, which first presents the estimates of WTO effects on trade (export and import) costs, and then offers general equilibrium analysis of the WTO effects on exports and welfare. Section 6 concludes.

2. A short historical overview of the GATT/WTO

The WTO came into existence in 1995 and replaced the GATT which represented the rules-based framework for international trade policy between 1948 and 1994.[2]

After an era of trade protection starting in the 1930s - often exemplified by the U.S. imposition of the Smoot-Hawley tariffs and the international retaliatory response[3] - global trade virtually came to halt. As a result, the world plunged into one of its biggest recessions in history followed by World War II. With these negative experiences in mind, leading policy makers intended to establish a multilateral rules-based trading system that could reverse the protectionist trade policies of the previous decades.

Initially, policy makers attempted to establish the International Trade Organization (ITO) which was discussed at the United Nations Conference on Trade and Employment in Havana (Cuba) in 1947. The ITO was planned to complement the World Bank and International Monetary Fund (IMF) within the Bretton Woods system in fostering international economic cooperation. Parallel to the negotiation of the ITO, preparatory sessions were held regarding the GATT which was initially seen as a *provisional agreement* that would be replaced with the founding of the ITO. However, after the announcement of the US government that it will not seek Congressional approval of the ITO Charter, the GATT became the legal framework for international trade. It came into effect on 1 January 1948 and for almost half a century, its principles remained basically as they were defined in 1948. These legal principles were supplemented and amended in a series of multilateral negotiations known as trade-negotiation rounds.

The GATT only dealt with trade in goods and its purpose was defined as reducing tariffs and quantitative restrictions (quotas) in international trade. Therefore, most of the GATT trade rounds were primarily devoted to continuing the process of reducing tariffs and quotas. It is worth mentioning that the enlargement of the member states (referred to as contracting parties) was also an important achievement contributing to a less restrictive international trade environment over the past decades.

The average level of most favoured nation (MFN) rates during the GATT period has been controversially discussed in recent years, due to a lack of appropriate data. Bown and Irvin (2015), derive an average tariff rate ranging between 20 and 30% for 1947, based on US customs data. Alternative sources estimate average MFN tariffs before the GATT at around 40% (cf. WTO, 2007).

There is clear evidence that the rules-based trading system under GATT lead to a significant reduction in global tariffs for goods until the 1970s supporting trade among participating parties (cf. Bown and Irvin, 2015). However, in the succeeding years, due to the GATT's provisional framework international trade liberalization noticeable slowed down.

Reasons for this slowdown are multifaceted: International trade became more complex and accelerated by the 1980s, and along with the changing face of globalization, new challenges in international commerce revealed the weaknesses of the GATT. Trade in services, which

[2] The GATT still exists as the WTO's umbrella treaty for trade in goods.
[3] The official name of the law is "Tariff Act of 1930", commonly referred to as Smoot-Hawley Tariff after the sponsoring Senator Reed Smoot and Representative Willis C. Hawley.

was not covered by the GATT rules in those years, continuously increased, and required international standards. Attempts to liberalize agricultural trade were not successful.[4]

The Uruguay Round officially started in 1986 and was meant to comprehensively address the increasing challenges in international trade. At the end of the negotiation round, the WTO was established as an administrative institution. While the GATT was formally concluded in 1994, with the WTO taking effect on 1 January 1995, the GATT remained the WTO's umbrella treaty on trade in goods.

The WTO has five important functions which represent the backbone of the multilateral trading system (cf. Anderson, 2014):

i) Establish and further develop rules for international trade in goods and services

ii) Negotiate reductions in international trade distortions that are provoked by protectionist trade policies

iii) Settle trade-related disputes between member states (dispute settlement mechanism)

iv) Monitor, record notifications and disseminate information on trade and trade-related policies of members, which is of particular interest for developing and least developed member states, and

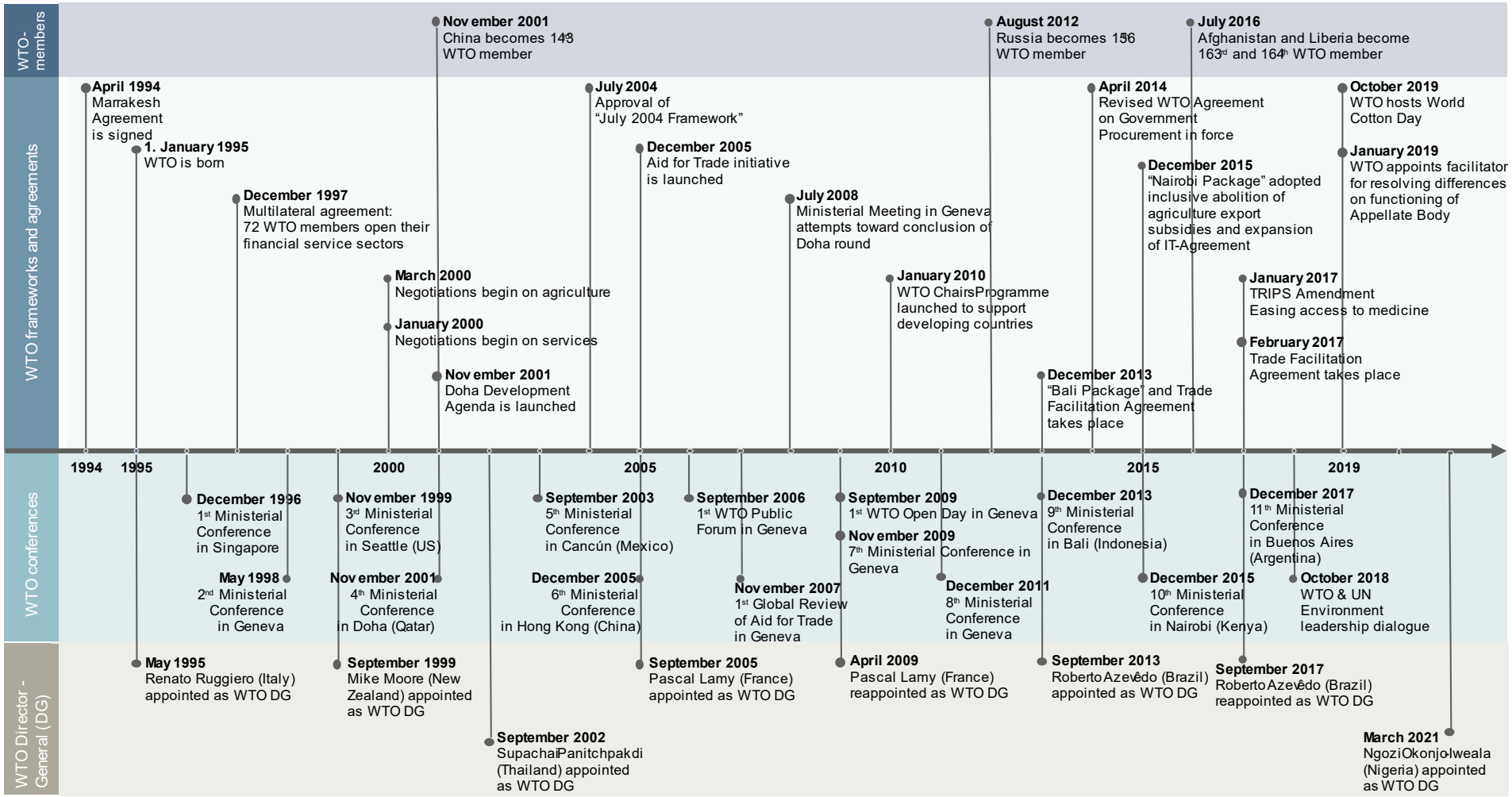
v) Coordinate with other international organizations on trade-related issues, including aid for trade

The WTO has been particularly important in reinforcing the international trading system by extending international rules to new areas. Trade in agriculture became subject to multilateral trade disciplines. Existing rules and enforcement procedures were strengthened, including the agreements on subsidies and countervailing measures, and on safeguards. A dispute settlement system was established. In addition to the continuing reduction of tariffs and elimination of non-tariff barriers, three new agreements were achieved: i) the *General Agreement on Trade in Services (GATS)*, ii) the *Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)*, and iii) the *Agreement on the Application of Sanitary and Phytosanitary Measures (SPS)*. Figure 1 summarizes important milestones in the years following the WTO founding.[5]

[4] For a comprehensive discussion of strength and weaknesses of the GATT we refer to (Narlikar et al., 2012).

[5] More detailed information of the listed WTO milestones in figure 1 can be found on the following WTO webpage: https://www.wto.org/english/thewto_e/25y_e/25ytimeline_e.htm

Figure 1: 25 years of WTO – milestones and historical events in a timeline

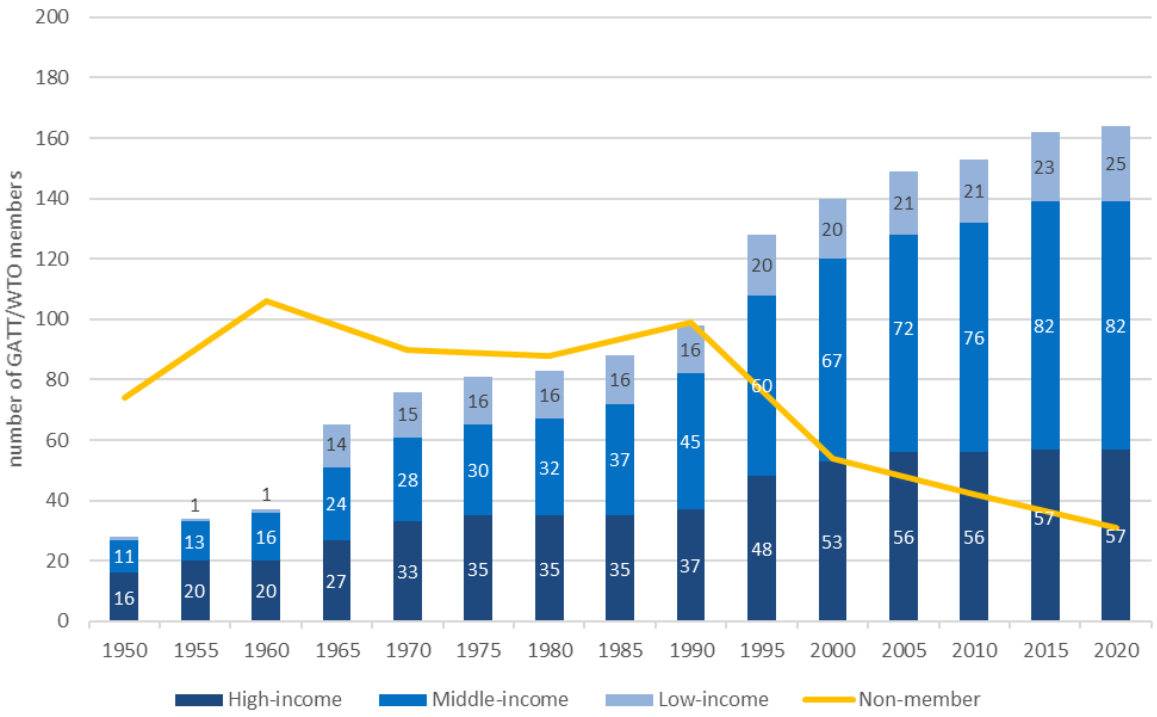


Source: World Trade Organization, own illustration.

Evolution of GATT/WTO membership

Countries wishing to become members of the WTO must first accede and complete negotiations to become a contracting member to GATT. Figure 2 below shows how the number of GATT and WTO members has increased over time between 1950 and 2020. As of December 2020, 163 countries and the European Union (EU) were members of the WTO and 25 nations were observer states (in the process of joining the organization). Turkmenistan became the 25th observer in 2020. Only 14 countries in the world are not currently engaged in the WTO[6].

Figure 2: Number of GATT/WTO members in comparison to non-members (1948 to 2020)



Source: World Trade Organization, own illustration.

A full list of the WTO members, observer states, and non-members is provided in the Appendix A.

[6] This group of countries compromise the State of Eritrea, Aruba, Kiribati, Kosovo, Marshall Islands, Micronesia, Monaco, Nauru, Democratic People's Republic of Korea, Palau, the Palestinian Territories, San Marino, Saint Maarten, and Tuvalu.

3. GATT/WTO and global trade patterns

The GATT and the WTO have been successful in continuously increasing the number of member states over the past decades. Parallel to this progressive international cooperation in trade policy, both the GATT and the WTO have contributed to a globalizing world by reducing and eliminating trade barriers and modernizing the rules for international commerce.

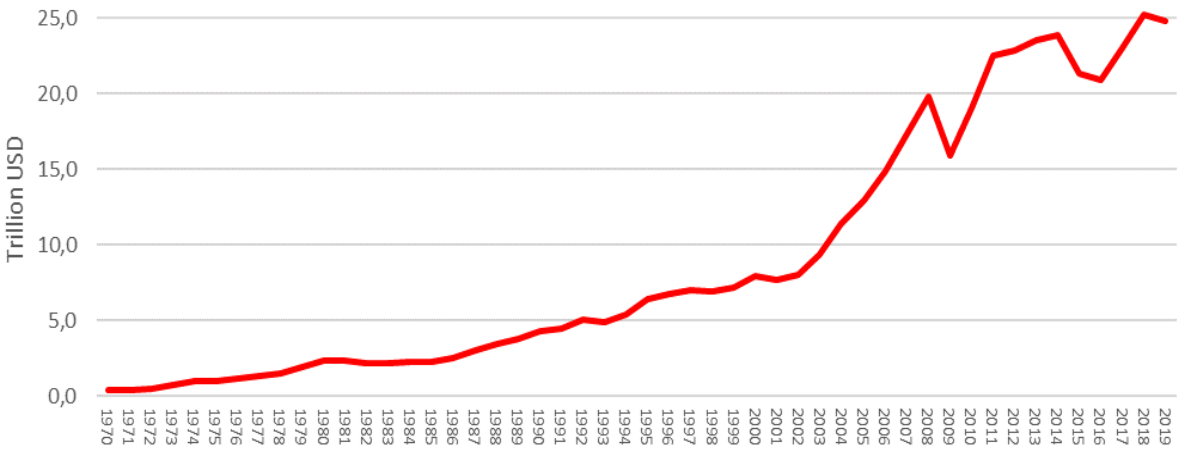
General trade patterns

In 2019 worldwide exports in goods and services (total exports) reached 24.8 trillion USD, after a historical record of 25.2 trillion USD the year before. Around three quarters (76%) of this world trade in 2019 was made up of goods merchandise exports (or 18.9 trillion USD), with the remaining 24% made up of exports in services (reaching their highest value with 6.1 trillion USD).

Figure 3 below shows how total trade continuously increased over the past decades until the global financial crises in 2008. The last 10 years are characterized by a significantly lower average growth in trade compared to earlier periods. Because of the global pandemic, international trade is expected to fall by a significant amount, at least in the short term.

Figure 3 below also illustrates that global trade in goods and services accelerated after the mid-1990s. Two important aspects supported this positive trend: i) with the founding of the WTO, international trade rules have been extended to include services, intellectual property, and dispute settlement, and ii) in 2001 China became a member of the WTO and contributed significantly to the acceleration of cross-border commerce.

Figure 3: World exports of goods and services – in trillion USD

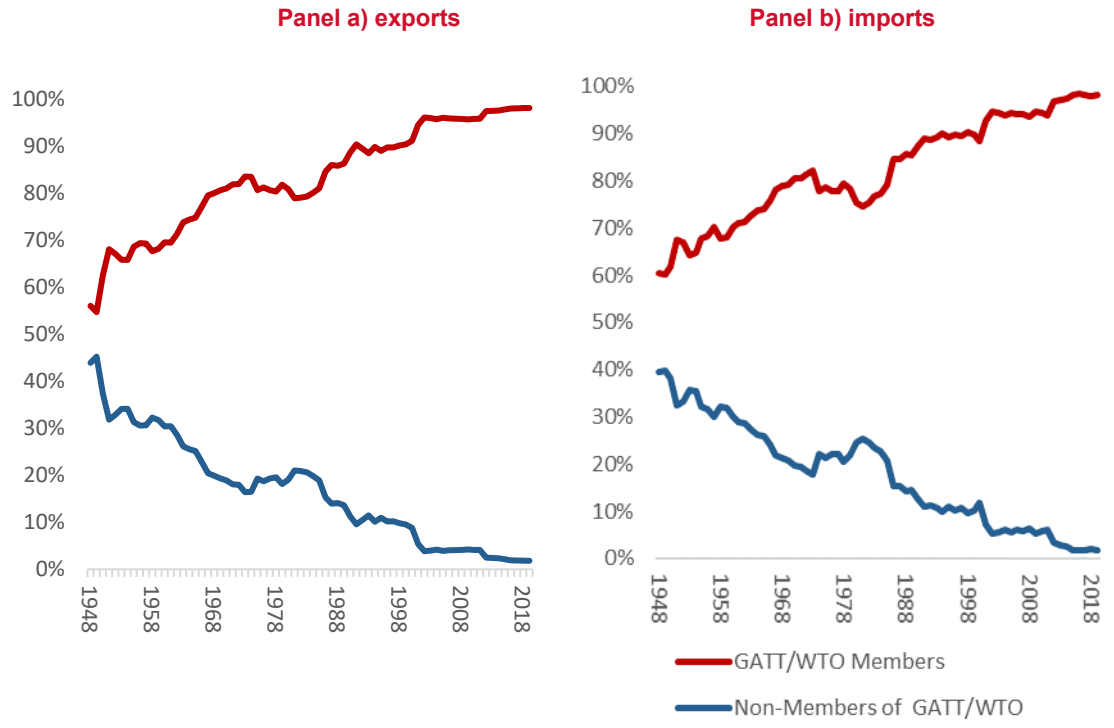


Note: Comprehensive data for service trade is available starting in 1970. Merchandise trade is well document since 1948.
Source: WTO, UNCTAD, IMF, own illustration.

According to the latest statistics, in 2019 WTO member states were responsible for 98% of all world merchandise exports (18.6 trillion USD), while non-members accounted for just 2% (around 300 billion USD).

Figure 4 below shows how exports and imports of the GATT/WTO-countries developed in comparison to non-member states, expressed as a share of total world exports and imports. Panel a) illustrates that already in 1948 more than 60% of merchandise exports in the world originated in GATT-member states. With the rising number of members, this share has been growing over the past years. However, due to the changing structure of global trade, in the 1970s the share of GATT/WTO-members stagnated or temporarily declined. With the initiation of the Uruguay round and the founding of the WTO in 1995, WTO members' share in world merchandise exports steadily increased. Panel b) illustrates a similar pattern for world merchandise imports. In 2020 more than 98% of world merchandise exports were made up by WTO member states. The same share of world merchandise imports goes to WTO countries.

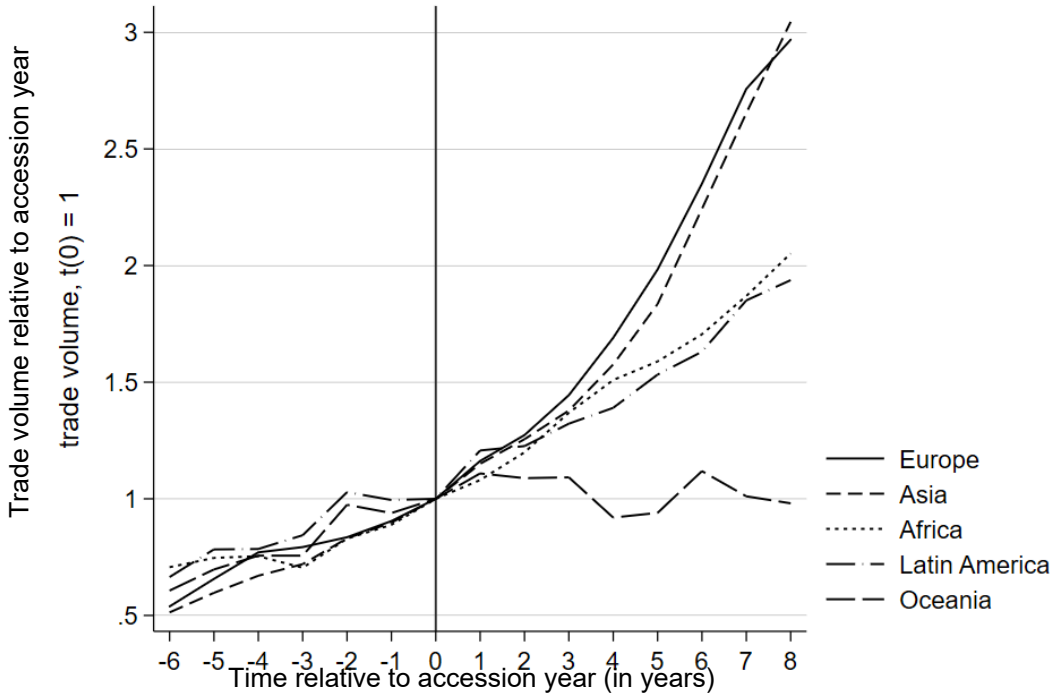
Figure 4: The GATT/WTO countries' share in world exports and imports – merchandise trade (1948 to 2019)



Note: Panel a) depicts the GATT/WTO members' and non-members' share in merchandise world exports for each year between 1948 and 2019. Panel b) shows the shares of both groups for merchandise world imports. Over the considered period the number of GATT/WTO members changes.
Source: WTO, UNCTAD, IMF, own illustration.

Finally, Figure 5 below quantifies the average change in exports with the world before and after a country joined the GATT or the WTO. Except for countries in the group of Oceania, countries were seen to have experienced a steady increase in international trade.

Figure 5: Average annual change in countries' international trade before and after accession to the GATT/WTO



Note: A list of countries for each presented region is available in the Appendix B.
Source: WTO and DOTs, own illustration.

So far, the presented descriptive findings point to a trade enhancing effect of the multilateral rules-based trading system that has been continuously established since 1948 and with the founding of the WTO. However, there is a growing academic literature in international economics questioning the trade supporting effect of the WTO. Not less important are recent political developments such as the increasing protectionist policies in the USA but also in other countries (see Evenett and Fritz, 2020) endangering the maintenance of the global trade rules successfully established by the WTO.

A review of the related academic literature reveals that there has been an intense debate on this issue over the last years. Interestingly, a considerable number of researchers present empirical results according to which a membership in the GATT or the WTO has not resulted in a significant increase in international trade. However, other empirical analyses conclude that a WTO accession leads to a significant rise in international trade for most of the member states and hence, increases the welfare of participating countries. It turns out that accounting for intra-national trade is crucial for a consistent quantification GATT/WTO effects.

If countries liberalize international trade by reducing, for example import tariffs, exporters are able to access larger markets at lower trade costs. From the importer and consumer perspective goods can become cheaper, while exporters have opportunities to sell goods at higher prices and / or higher profit. Price adjustments resulting from reductions in trade barriers certainly have implications for national firms' production structure and the rearrangement of

national production and resources. Successfully exporting firms can increase output and become more productive which can help enable them to, for example, pay higher wages to their workers. As a consequence, production factors and the number of firms within a country will be affected by WTO membership. Most importantly, by liberalizing international trade, sales may be diverted from the home market to exports to foreign markets. In addition, with bilateral liberalization, some consumption of domestic goods will be substituted by imports. Hence, it is crucial, and also consistent with theory, to quantify potential trade and welfare effects after a WTO membership by not only accounting for changes in exports and imports, but also changes in domestic production and sales.

Finally, it is important to emphasize, that the partial estimates of the effects of the WTO on trade may be a misleading indicator about the true WTO impact. Instead, one should also take into account potential trade diversion effects as well as possibly conflicting effects on the consumers and producers in the respective country. This study offers a comprehensive approach to obtain partial equilibrium estimates of the effects of the WTO on the export costs of its members and to translate them into general equilibrium effects on trade and welfare/real GDP per capita.

4. Methodology and data

This section offers a brief description of the methods and data used to quantify the partial and the general equilibrium (PE and GE) effects of WTO membership on trade and welfare. To obtain both the PE estimates of the WTO and the GE effects on consumers and producers as well as the welfare effects, we rely on the structural gravity model of trade. Because the gravity equation has solid theoretical foundations, it not only guides our estimation approach but also enables us -- due to the theoretical sectoral separability of the model -- see Anderson and van Wincoop (2004) and Costinot et al., (2012) -- to perform individual analysis for each sector, as well as to translate our partial estimates into GE effects within the same theoretical framework.

To obtain the direct/PE estimates of the effects of WTO on the trade of its members, we follow Yotov et al. (2016) to implement the latest developments in the empirical gravity literature. The econometric model delivers country-specific estimates of the WTO effects on the aggregate exports of each member state, as well as member-specific effects on sectoral exports in Agriculture, Mining, Manufacturing, and Services. For example, we are able to identify the direct/PE impacts of WTO membership on the UK's total exports, and the UK's exports in Agriculture, Mining, Manufacturing, and Services. To ease interpretation, we capitalize on the theoretical properties of the model, and we convert our PE estimates into tariff equivalent effects. Appendix C.1 motivates and describes in detail the econometric specification used to obtain our PE estimates.

To obtain the PE estimates, for our trade data we relied on the International Trade and Production Database for Estimation (ITPD-E). ITPD-E covers international trade data as well as consistently constructed domestic sales for the period 2000 to 2016 for 243 countries and 170 industries.[7] We selected the ITPD-E for our analysis for the following reasons: (i) ITPD-E is not constructed with statistical methods, thus it is appropriate for estimations; (ii) Consistent with theory, ITPD-E includes domestic trade flows; (iii) ITPD-E covers all sectors; and (iv)

[7] ITPD-E is developed by Borchert et al. (2020b) and hosted by the US International Trade Commission (US ITC) at https://www.usitc.gov/data/gravity/itpde.htm.

ITPD-E covers a large number of countries. To obtain the main results from the current project we aggregate the 170 ITPD-E sectors into four broad categories of Agriculture, Mining, Manufacturing, and Services[8] whilst also obtaining aggregate WTO estimates overall.[9]

In addition to the key data on trade flows, we also employ a number of variables that are standardly used in the gravity literature, including the logarithm of bilateral distance (DIST) and indicator variables for colonial relationships (CLNY), common language (LANG), common borders (CNTG), membership in the WTO, participation in regional trade agreements (RTAs), and sanctions. The data on RTAs come from the Regional Trade Agreements Database, which is developed by Egger and Larch (2008).[10] The data on sanctions come from the Global Sanctions Data Base (GSDB), which was created by Felbermayr et al. (2020a).[11] Data on all other standard gravity variables are from the Dynamic Gravity Database of the US ITC, see. Gurevich and Herman, 2018.[12]

The estimating gravity equation that we employ to identify the PE WTO effects on the aggregate and the sectoral exports of its members belongs to a structural GE gravity system that can be used to translate the PE estimates obtained here into GE effects on consumer and producer prices. We capitalize on this property, see Arkolakis et al., (2012), Costinot et al. (2014) and Yotov et al. (2016), to quantify the GE effects of the WTO on total exports and welfare, and to calculate and decompose the WTO impact on consumer and producer prices. Appendix C.2 describes how we translate the partial equilibrium estimates of the effects of the WTO into GE indexes.

To perform the GE analysis and simulations we rely on the World Input-Output Database (WIOD) for the years 2000 to 2014.[13] We have selected WIOD for the GE analysis since, while suited for estimations, the ITPD-E dataset is not fully balanced and it includes some missing domestic trade flows, which are crucial for sound GE analysis. WIOD provides such fully balanced data based on world input-output tables covering 28 EU countries, 15 other major countries in the world and a “Rest of the World” (ROW) aggregate. The most recent year is 2014, which we use for our GE analysis. WIOD contains 56 sectors. Consistent with the estimates obtained for the 4 broad sectors Agriculture, Mining, Manufacturing, and Services, we aggregate WIOD exports of these 4 broad sectors, whilst also constructing total aggregate estimates.

[8] We also obtain results for the four broad sectors with disaggregated data and proper set of fixed effects. The aggregated and disaggregated results are highly correlated.
[9] For further details on the ITPD-E data and its use for gravity estimations we refer the reader to Borchert et al. (2020a, b).
[10] The dataset is available at https://www.ewf.uni-bayreuth.de/de/forschung/RTA- daten/index.html.
[11] The GSDB is hosted at https://www. globalsanctionsdatabase.com.
[12] The data is downloadable at https://catalog.data.gov/dataset/dynamic- gravity-dataset-1948-2016.
[13] WIOD is available for download at http://www.wiod.org/database/wiots16

5. Partial & general equilibrium results and analysis

This section presents and describes the PE and GE results that we obtained based on the methods explained in Section 4 and the Appendix C.

Section 5.1 presents the country-specific effects that we obtain for aggregate trade, while the corresponding country-specific sectoral estimates for each of the 4 main sectors in our sample appear in the Appendix D. Section 5.2 presents our GE findings.[14] We describe the main findings and the intuition for obtaining them from a model/methodological perspective.

5.1 The direct effect of a WTO membership on trade and trade costs

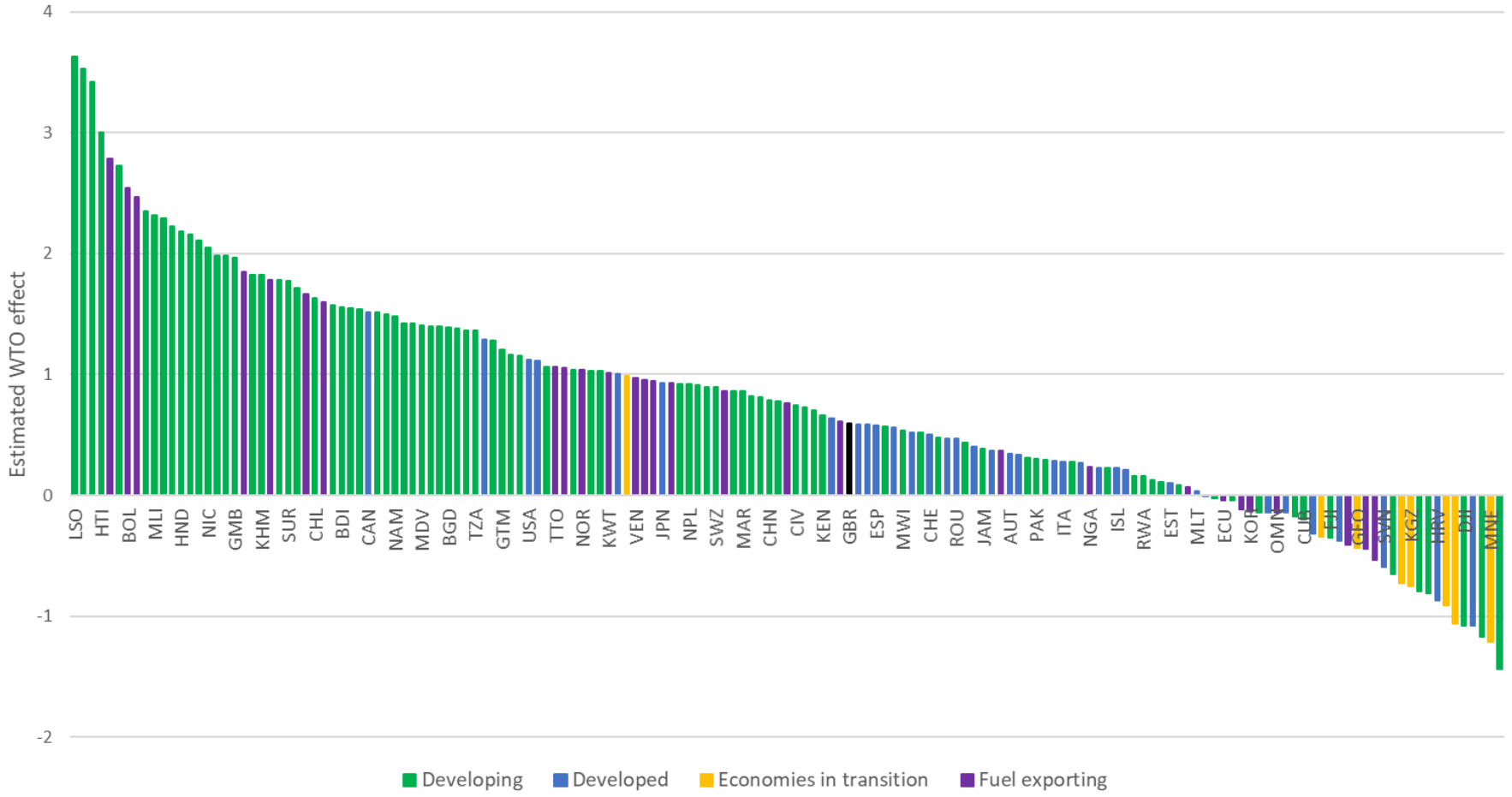
Figure 6 below, presents the PE estimates of the impact of WTO membership on the aggregate exports for each member state. The corresponding table of estimates is Table D2.1 in Appendix D. A positive coefficient implies that the corresponding country experienced a positive effect on its exports through a WTO membership. It is possible to translate the gravity estimates from Figure 6 into export volume effects and into ad-valorem tariff equivalent (AVE) changes that result from a WTO membership.[15] The AVE values corresponding to the numbers in Figure 6 are reported in Figure 7, and they should be interpreted as the equivalent reductions in ad-valorem tariffs that correspond to our estimates of the WTO effects.

Several results stand out from Figures 6 and 7. First, for an overwhelming majority of the considered countries' (79%) WTO membership resulted in improved trade conditions. The countries with the largest positive WTO effects turn out to be relatively small economies (in terms of GDP). Following the World Economic Situation and Prospects (WESP) classification Figures 6 and 7 categorises all countries into one of four broad groups: developed economies, economies in transition, developing economies, and fuel exporting countries. Inspection of the WTO effects reveals that many of the largest export enhancing WTO effects are observed in developing economies such as Lesotho, Congo or Costa Rica. In addition, many of the countries with large aggregate trade effects are from Africa. Most of these countries have a younger WTO history. A possible explanation for this result is that membership in the WTO allows developing countries to access significantly larger markets at lower trade costs that can result in a large rise in average aggregate exports. Figures 6 and 7 also show some negative estimates. Many of the negative estimates are for former communist countries, for example, Armenia, Kyrgyzstan, Moldova, Russia, Tajikistan, Ukraine, Bulgaria, Slovenia, Cuba, etc. For many of these countries, the period of WTO membership coincided with their transition period toward competitive markets, which was also accompanied by significant structural changes. Thus, we would not attribute the negative effects to the WTO.

[14] The GE analysis does not account for dynamic effects.

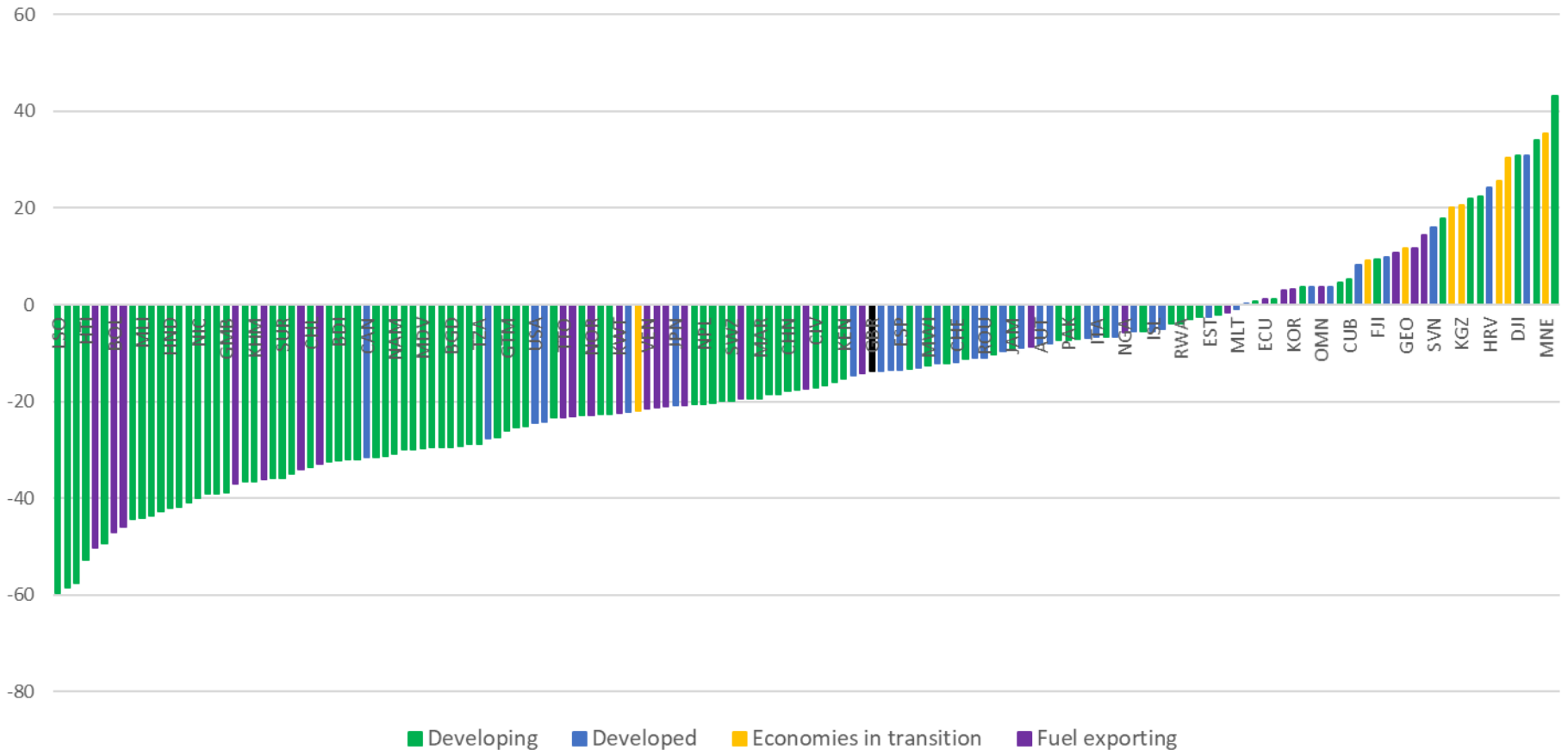
[15] Export volume effects can be calculated as follows (exp(WTO estimate)-1)*100, while the formula for ad-valorem tariff equivalents is ((exp(WTO estimate))^(1/(1-σ))-1)*100, where we set σ equal to 5, which is a standard value in the literature. Table D2.2 in Appendix D lists the country specific AVEs.

Figure 6: Estimated impact on aggregate trade resulting from WTO membership, by country



Source: Own calculation and illustration.

Figure 7: Ad-valorem tariff equivalent changes after WTO membership – %



Source: Own calculation and illustration.

In reference to Figure 7 above, the average WTO member saw a 15% decrease in AVE as a result of WTO membership. The greatest fall in AVEs is observed for developing countries who saw an average 21% fall, followed by 17% fall for fuel exporting countries and a 7% fall for developed countries. The trade cost reduction – derived based on AVE tariff changes - across economies in transitions is very heterogeneous. The corresponding simple average AVE measure indicates an increase in trade costs for economies in transition by about 16%.

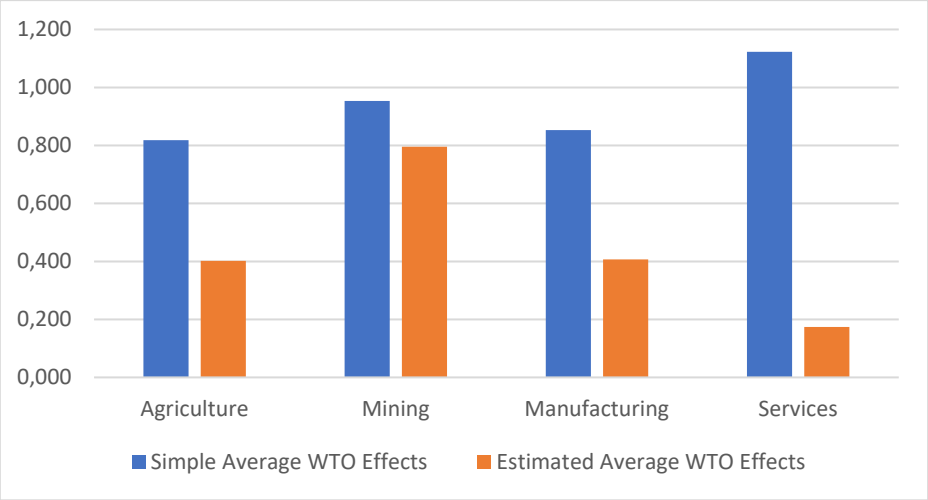
For most of the developed economies, WTO estimates in Figure 6 range between a value of 0.2 and 1, implying an average ad-valorem tariff equivalent reduction of about 22%. Finally, we note that there are some outlier observations on each tail of the distribution of our estimates. Many of the outlier observations are for very small countries. A possible explanation for this result is that international trade of such small countries may be dominated by trade with large partner economies. Hence, outliers may drive the respective WTO estimates. Another explanation for the very large or very small results could be the number of observations which are used to obtain the estimates.[16] Overall Figure 6 and 7 illustrate that the WTO effects on the exports of member states have been positive and sizable on average, but they vary significantly across countries.

Figure 8 below presents two sets of average WTO effects for the four analysed sectors (Agriculture, Mining, Manufacturing, and Services). First, in blue colour, we report simple average effects that are obtained from the full set of estimates for the WTO effects on the exports of each member for the corresponding sector. Figure D1 and Table D3 in the Appendix present the corresponding distributions of estimated WTO effects for all member countries in each sector. In addition to the simple averages, we also report estimated average coefficients for each sector, which are obtained from regressions that impose a common WTO effect on the exports across all members.

The common message from the simple and the estimated average coefficients is that, on average, the WTO has had a positive effect on the exports of its members in each sector. However, we also see some important differences between the two sets of estimates. For example, we note that the estimated averages are relatively smaller. The explanation for this result is in the weighting, that is the PPML estimator assigns larger weights to the larger trade flows. We find this to be reasonable.

[16] For example, our procedure to control for outliers eliminated Afghanistan from our estimating sample, since this country joined the WTO in 2016. (Technically, Afghanistan became a WTO member in December of 2015, but for estimation purposes, it was coded as a member in 2016 for the first time.)

Figure 8: Average WTO effects across sectors



Source: Own calculation and illustration.

The difference between the simple and estimated averages is most pronounced in Services. A closer inspection of the effects for Services, for example, illustrates that within the service sector, the large and positive average WTO effect is driven by a small number of countries reaching estimates of up to 9.1 (Central African Republic) or 8.0 (Guyana). These rather economically small countries experienced on average large trade increases in the service sector that can be traced back to a WTO membership. In addition, we note that the Services data is, in principle, less reliable and patchier as compared to goods trade data.

Two other results from Figure 8 are that the impact of the WTO on exports in Manufacturing and Agriculture has been similar, even though the estimated average effects are significantly smaller as compared to the corresponding simple averages. In addition, we also see that the impact of the WTO on Mining exports has been similarly strong both based on the simple and on the estimated average effects.

5.2 General equilibrium WTO effects

This section reports and describes our GE results. These results are based on the PE estimates from the previous section but are obtained using the WIOD database, because, as described in the data section, the WIOD database is balanced and properly designed for GE simulations. Simulations are based on the latest available WIOD data release 2016 that includes a balanced data for the year 2014.

To obtain the GE results, we followed the methods that we describe in the section 4 and in Appendix C. We obtain results based on two sets of derived trade costs (counterfactual trade costs): (i) unconstrained, i.e., based on the estimates shown in Figure 6 and Figure 7, (ii) constrained, i.e., based on the same estimates but after censoring each tail of the distribution. Specifically, to obtain the set of constrained GE estimates: (i) we have set all negative estimates to zero. The motivation for this is that even if the WTO were not successful in decreasing bilateral trade costs, we have no reason to believe that it leads to an increase in the trade costs for the exporters in member countries; and (ii) we have set all estimates (aggregate and for each sector) that are greater than 1.1 to be equal to 1.1. The motivation for

this (admittedly arbitrary choice) is that this bound appears as a natural structural break in our aggregate estimates from Figure 6. The results in Table 1 below provide the estimates for the 'constrained' scenario, while the estimates from the 'unconstrained' scenario are included in Appendix D.

We focus our interpretation on the aggregate trade and welfare estimates from the constrained scenario.[17] We obtained the following results: (i) Aggregate trade and welfare effects for each country. These are the results that we report and discuss in the main report; (ii) Sectoral aggregate trade and output effects for each of the four broad sectors. The sectoral results are delegated to the Appendix; (iii) A decomposition of the effects on consumer and producer prices (and accompanying impact on welfare) in each industry.

Table 1: Aggregate welfare and trade indexes: Constrained scenario

Country / ISO code	welfare (%)	total exports (%)
Australia (AUS)	2.71	56.56
Austria (AUT)	3.58	25.12
Belgium (BEL)	7.46	37.10
Bulgaria (BGR)	1.52	7.22
Brazil (BRA)	1.18	33.35
Canada (CAN)	9.09	106.00
Switzerland (CHE)	3.45	33.37
China (CHN)	0.74	50.31
Cyprus (CYP)	1.52	5.69
Czech Republic (CZE)	4.26	28.47
Germany (DEU)	3.60	35.64
Denmark (DNK)	3.84	25.60
Spain (ESP)	2.44	43.43
Estonia (EST)	2.98	12.14
Finland (FIN)	3.20	31.45
France (FRA)	2.96	45.14
United Kingdom (GBR)	2.90	45.38
Greece (GRC)	1.10	8.90
Croatia (HRV)	1.49	8.00
Hungary (HUN)	8.18	33.76
Indonesia (IDN)	3.11	57.22
India (IND)	1.10	29.82
Ireland (IRL)	18.85	48.34
Italy (ITA)	1.55	27.90
Japan (JPN)	2.36	71.35

[17] The corresponding decomposition results for the effects on consumer and producer prices appear in Appendix D, where we also offer sectoral estimates. We remind the reader that the estimates that we obtain for exports, consumer prices, and producer prices are all relative to the impact of WTO on producer prices in the ROW region, which we have selected as the numéraire/reference region for our counterfactuals. The welfare/real expenditure numbers are independent of the choice of the numéraire/reference region.

Korea, Rep (KOR)	1.79	19.74
Lithuania (LTU)	1.70	3.77
Luxembourg (LUX)	15.08	39.73
Latvia (LVA)	1).10	6.88
Mexico (MEX)	10.66	128.56
Malta (MLT)	5.27	12.88
Netherlands (NLD)	6.98	32.81
Norway (NOR)	6.38	47.78
Poland (POL)	2.17	20.07
Portugal (PRT)	5.30	64.50
Romania (ROU)	2.46	27.79
Russian Federation (RUS)	0.80	8.77
Slovak Republic (SVK)	3.11	16.49
Slovenia (SVN)	1.80	6.39
Sweden (SWE)	4.78	43.21
Turkey (TUR)	1.15	13.42
Taiwan (TWN)	6.76	42.56
United States (USA)	2.38	93.92
The Rest of the World (ROW)	-0.19	-3.04

Note: This table reports GE estimates of the effects of the WTO on welfare and total exports. Country names for ISO codes are listed in the Appendix. See text for further details.

These results also appear in the Appendix. The list of countries in the WIOD sample appear in the first column of Table 1 which presents the main findings that we discuss in the following in detail, starting with aggregate trade effects.

WTO effects on total exports

Before we discuss the indexes for the percentage change in exports, we emphasize that these indexes are dependent on the reference region – which is the Rest of the World (ROW) in the following - and, therefore, they should be interpreted with caution.[18] Specifically, relative comparisons between the effects on the different countries in our sample are valid, however, conversions to nominal values (for example US-Dollar or GBP) require proper transformation that needs data on producer prices in the ROW.

As expected, the main driving force underlying the differences across countries in terms of the changes in total relative exports are the corresponding partial effects. Thus, larger PE estimates are naturally associated with larger GE effects on exports. However, also changes in import demand, which are captured by the GE channels in our model play a substantial role. Thus, the correlation between our PE WTO estimates and the corresponding GE effects on total exports is high but not perfect (−0.87). The only country with negative trade flow changes

[18] The Rest of the Word (ROW) is an aggregate of countries accounting for all other (170) countries in the World.

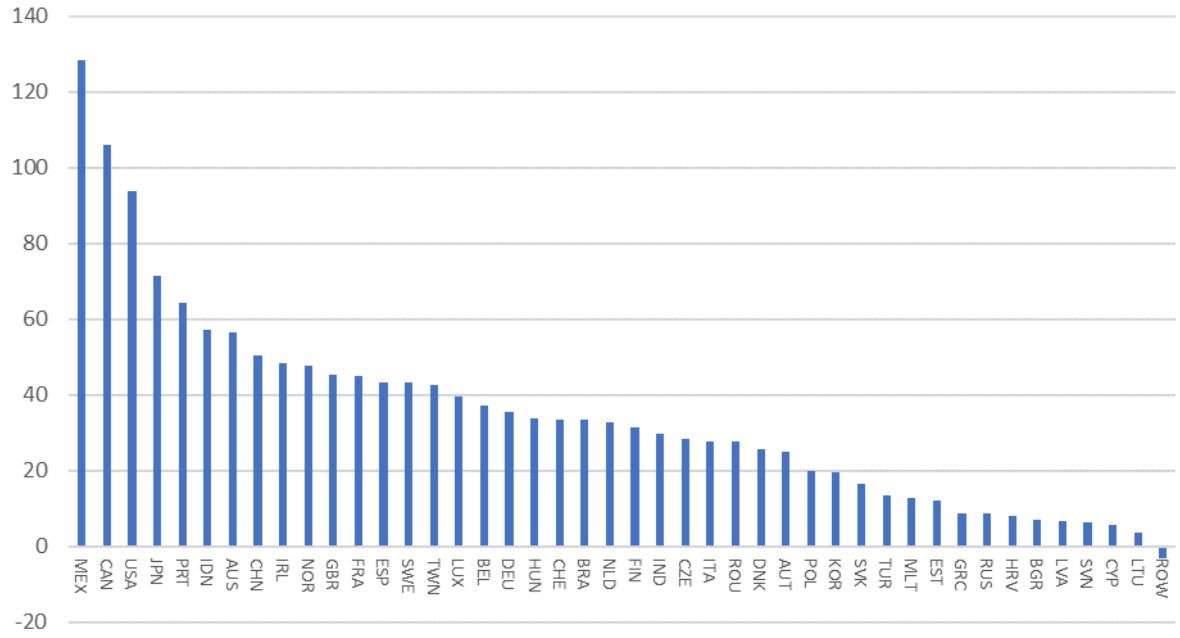
is the ROW, as it is not affected directly by the WTO. For all other countries, we observed relative increases in total exports.

Importantly, relative exports increased also for the countries where we did not find any positive effects of WTO membership on trade costs. Relative exports of these countries increased because demand for their products in other countries increased due to increased incomes. Specifically, relatively bigger countries where trade costs substantially decreased due to WTO membership may spend part of their increased income on imports from countries with no direct trade cost reduction due to WTO membership.

Figure 9 below illustrates the scale and distribution of the estimated relative impact on exports for the sample countries as a result of WTO membership. Several interesting results are illustrated. First, over the considered period, all considered countries experienced a significant increase in exports due to WTO membership, but effects vary considerably across countries. The average estimated relative increase in exports was 35%, ranging from a high of 129% (Mexico) to a lower bound of 4% (Lithuania).

The largest export increases that can be traced to WTO membership are observed in Mexico (129%), Canada (106%), and the USA (94%). In comparison to the average export supporting effect (35%) these three countries are experiencing a significantly larger trade supporting WTO effect.

Figure 9: Estimated impact of WTO membership on relative exports



Source: Own calculation and illustration.

Interestingly this pattern is weaker in the EU. Export supporting effects of the WTO in the European Union are at a lower level and differ across member states. The highest export supporting effect of WTO membership are observed in Portugal, Ireland, the UK[19], and France, ranging between 65 and 45%. Highly export oriented countries like Germany or Belgium experienced additional exports of 36 and 37%, respectively. EU member states with a former

[19] The UK was still an EU member in the considered period of this analysis.

communist history, such as Latvia or Bulgaria, experienced still 7% higher exports due to WTO membership, however at a significantly lower level than the average.

Large emerging economies such as China and Indonesia are experiencing significantly larger export supporting effects resulting from WTO membership than most of the considered countries. In the case of Indonesia, exports turn out to be higher by 57%, whilst China achieved 50% more exports due to WTO membership.

As shown in Appendix D, sectoral average export effects also vary across the analysed sectors. The highest positive export changes due to WTO membership appear in the Agricultural sector (28.5%), followed by Manufacturing (28.4%), Services (27.4%) and Mining (18.3%). The quantified sectoral total export effects differ in the ranking compared to the estimated sectoral ad-valorem tariff equivalent reductions in Figure 8, because the GE analysis takes further income and price aspects into account that are caused by WTO membership.

Export effects were also found to be heterogeneous across sectors within countries. Our sectoral analysis (Appendix D) illustrates that the impact of WTO membership, for example on the UK's sectoral exports, has been positive but heterogeneous across sectors. The largest WTO effects were observed in Manufacturing, where exports increased by around 40%) and in Mining (an increase of 35%). Effects in the Services and Agricultural sectors are smaller but still positive, around 14 and 12% higher exports, respectively.

WTO welfare effects

The overall aggregate welfare effects that we report in Table 1 above are measured as real GDP per capita changes. These indexes do not depend on the choice of reference region (ROW) and therefore they can be used for relative as well as for absolute comparisons. From a theoretical point of view, an increase of producer prices and a decrease of consumer prices work in the same direction and both lead to an increase of welfare. However, in principle, these effects may operate in opposite directions and each of them could dominate the other. Therefore, a final assessment of the welfare effect should be based on the GDP per capita effect which includes both the consumer and producer price adjustments.

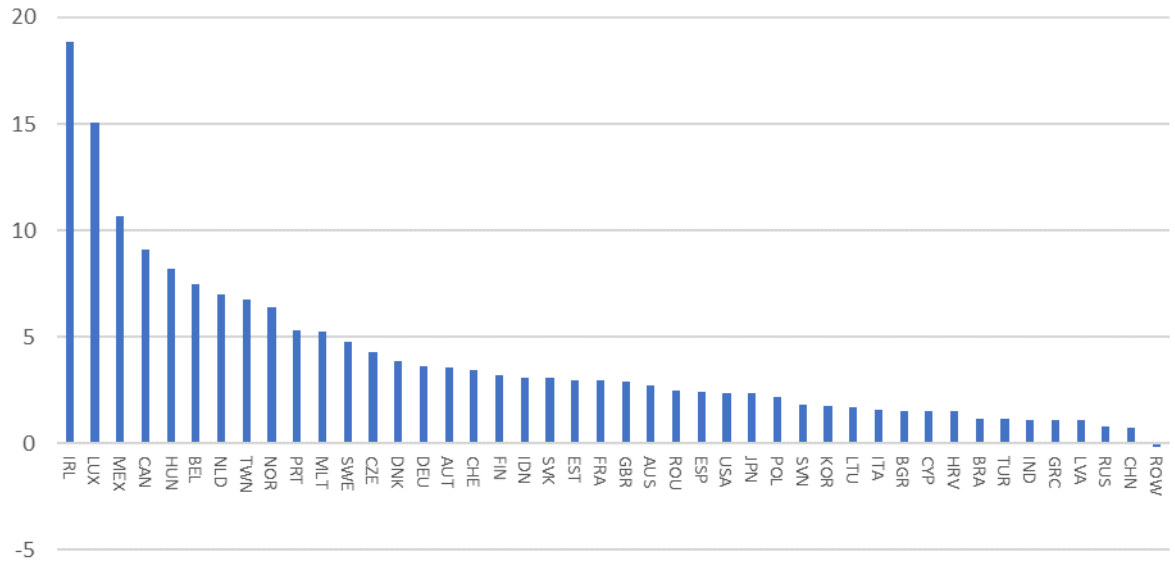
The estimates in Table 1 reveal noteworthy findings: (i) For all WTO members we see positive aggregate welfare effects. Part of this result is driven by the fact that we constrained some of the negative partial estimates to zero. However, as can be seen from the estimates that we provide in the Appendix D, even with the unconstrained estimates, the instances with negative welfare effects for the WTO are very few (4 in total) and the effects are small in magnitude; (ii) The correlation of the aggregate welfare effects with the trade cost change based on our PE WTO estimates is high but not perfect (0.61), highlighting the importance of the PE estimates but also of the GE forces. Hence, a comprehensive assessment of WTO effects should be based on the GE analysis. In this sense the quantified per capita effects capture the overall WTO effects.

(iii) As expected, some of the countries with the largest WTO gains are those for which we obtained the largest PE estimates shown in Figure 6. (iv) However, another important factor from the gains from WTO membership is initial trade openness. This may explain the large estimates that we obtain for countries such as Ireland, Luxembourg and Belgium; (v) Finally, we also obtained positive aggregate welfare effects for the countries where the WTO did not directly reduce trade costs, i.e., for the countries with PE estimates equal to zero. The explanation for this result is that, even though these countries did not experience lower export costs, they gained due to lower costs of importing from their WTO partners. This highlights the importance to take not only own trade costs for exports into account, but also the changes of

trade costs of other countries due to their effect on the imports. Hence, WTO membership for one country may also benefit non-member countries.

Figure 10 below illustrates the scale and distribution of the estimated relative impact on aggregate welfare on the sample of considered countries because of WTO membership.

Figure 10: Estimated impact of WTO membership on aggregate welfare – %



Source: Own calculation and illustration.

The quantified average welfare increased for the sample countries resulting from WTO membership was 4%, ranging from a high of 19% (Ireland) to a low 0.7% (China). The biggest winners in terms of welfare gains were Ireland, Luxembourg, Mexico and Canada. Mexico and Canada both benefited from WTO membership disproportionally with larger relative export and welfare gains than the quantified average effects across all countries. In contrast, for China relative aggregate welfare gains at 0.7% turn out to be moderate. Similarly, the USA shows welfare gains from WTO membership of 2.4%, less than the quantified average welfare gains across all considered countries, despite showing large relative export gains in Figure 9.

As mentioned above the overall welfare gains that can result from a WTO membership are complex. They include parallel adjustments driven by changes in consumer and producer prices that may affect the consumption and production sector in various ways. Even though these interdependencies are complex, it is still possible to assess the WTO effects on welfare by considering changes in consumer and producer prices.[20]

Figure 11 below presents the country-specific average price changes for consumers and producers relative to the ROW price levels resulting from WTO membership. The vertical axis measures consumer price changes as a result of WTO membership, while the horizontal axis shows producer price adjustments. With this graph, it is possible to assess price changes for both consumers and producers simultaneously for each considered country. Several interesting results can be identified.

[20] As can be seen in equations (17) and (18) in the Appendix C, the nominator is the change in producer prices, and the denominator the change in consumer prices. Hence, increasing producer prices, ceteris paribus, will increase welfare, and decreasing consumer prices, ceteris paribus, will increase welfare, and vice versa.

First, none of the considered countries experienced both a decrease in producer prices (ceteris paribus, drop in welfare) and an increase consumer prices (ceteris paribus, drop in welfare) because of WTO membership (see upper left quadrant).

A quarter (25%) of all considered countries experienced an increase in average producer prices (ceteris paribus, rise in welfare) and at the same time a decrease in consumer prices (ceteris paribus, rise in welfare) because of WTO membership. This group of countries included those with the largest observed aggregate welfare gains (see lower right quadrant). The observed average price effects after WTO membership in these countries are beneficial for both consumers and producers. As a result of WTO membership, producers can earn more and implicitly, for example, pay higher wages due to higher average final goods prices. At the same time, consumers can afford to purchase more goods due to lower average consumer prices (or higher welfare). In this sense, it is not surprising that countries in the lower right quadrant in Figure 11 such as Canada, Mexico or Ireland show also the highest total aggregate welfare gains listed in Figure 10.

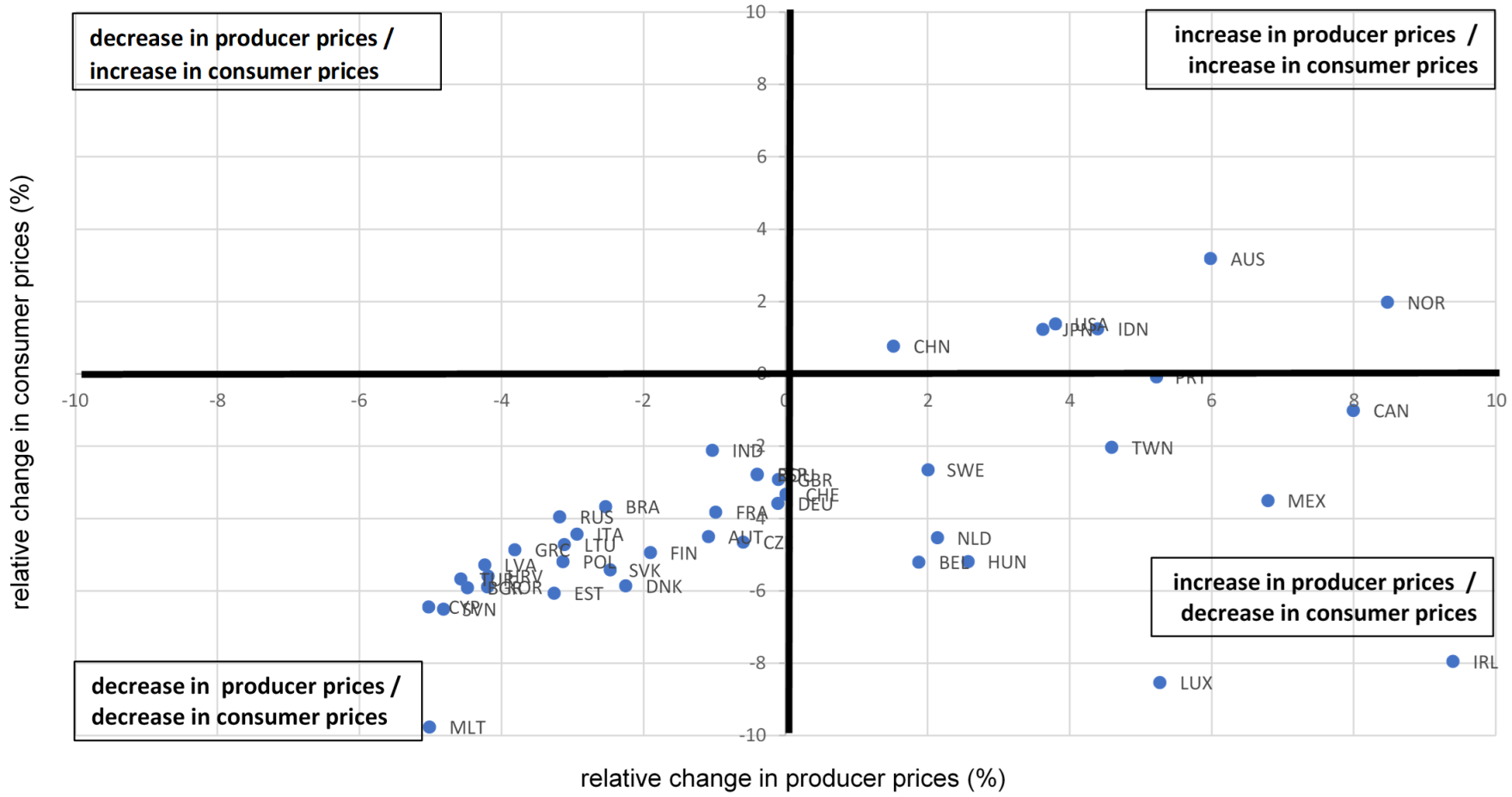
The upper right quadrant in Figure 11 shows countries with both higher average consumer prices (ceteris paribus, drop in welfare) and higher producer prices (ceteris paribus, rise in welfare). 14% of all analysed countries show these types of price changes due to WTO membership. Hence, part of the gains on the producer side in these countries are earned by higher prices paid from domestic consumers. The overall aggregate welfare effects for these countries are still positive but, in most cases, significantly lower than in the latter group (lower right quadrant). Among these countries are the USA and China. Both countries' exports increased due to WTO membership - as shown earlier - turn out to be moderate, at least in comparison to the average welfare effects. Part of this pattern can be explained by increasing consumer prices.

The largest group of countries (59%) in the analysis experienced a decrease in both, average consumer prices (ceteris paribus, rise in welfare) and a decrease in producer prices (ceteris paribus, drop in welfare). Whether this translated into overall aggregate welfare increases or decreases depends on the relative magnitude of producer and consumer price changes for the respective country. Overall, WTO membership is associated with larger welfare gains when average consumer costs fall more (welfare rises more). This group includes countries like Brazil with falling average consumer and producer prices. Even so, producers experienced a drop in average producer prices it is not straightforward how these price changes affect the producer gains. Particularly in countries like Brazil, the observed decrease in producer prices can be accompanied by increasing production. It is very likely that companies can still increase profits due to increasing returns to scale. Such cost savings are particularly likely for example in the agricultural sector. In this sense, the observed consumer and producer price changes are indicated as changes in welfare, assuming all else equal (ceteris paribus).

Hence, the presented changes in average prices can give some interesting and important insights into how consumers and producers are affected. An assessment of the overall welfare changes that appear with WTO membership should be based on the total aggregate welfare measure.

Overall, the results from our counterfactual analysis reveal that the WTO has been effective in promoting trade among its members. We find that most WTO members experienced heterogeneous but positive welfare effects, while the negative welfare effects that we obtain are few and small in magnitude.

Figure 11: Quantified impact of WTO membership on relative consumer and producer prices



Source: Own calculation and illustration.

Conclusion

The creation of the WTO in 1995 was one of the biggest advances in multilateralism following World War II. The WTO, along with the GATT, was intended to provide an institutional structure to effectively organise cross-border trade based on transparent and fair rules. In establishing a rules-based trading system, the WTO created a level-playing field accompanied by more security and predictability of market access for exporting and importing enterprises.

However, a quarter of a century after its creation and amid a global health crisis, the WTO appears to be struggling to be the international institution where urgent problems in international trade can be solved. Today, an increasing number of policy makers and stakeholders question the need for and benefits of the rules-based multilateral trading system. In this sense, it is no exaggeration to claim that the WTO is in an existential crisis, with both the functioning of the WTO's disputes settlement system undermined, lack of progress in negotiations, and trade wars breaking out between leading members such as the US, China, and the EU.

In light of these increasing political challenges the question whether the WTO has been successful in promoting international trade and thereby whether it led to welfare gains for its members may be crucial for the future of the institution. Surprisingly, the related empirical literature has provided conflicting answers to the latter question.

The main purpose of this study is to generate new insights about the expected trade and welfare effects associated with a WTO membership based on recent empirical methods and new data permitting a quantification of the GATT/WTO effects that are consistent with the latest developments in the academic literature. The study offers a large set of partial and general equilibrium indexes that can be used to shed light on the impact and effectiveness of the WTO in promoting trade and welfare.

The quantitative analysis illustrates that 79% of the WTO members experienced a drop in country-specific ad-valorem tariff equivalents. The empirical results suggest that WTO membership has been beneficial for the large majority of the member countries. This finding is confirmed for each of the four considered sectors (Agriculture, Mining, Manufacture, and Services). Moreover, the trade supporting effect of the WTO turns out to vary widely across the considered countries. At the same time, there are countries for which a WTO membership has not materialised in lower trade costs. Most of the countries without a trade enhancing WTO effect were seen to be former communist states.

More specifically, the report illustrates that aggregate trade increases across all considered countries on average by 35%, ranging from a high of 129% to a lower bound with 4%. The estimated impact of a WTO membership varies highly across the considered for sectors (Agriculture, Mining, Manufacturing, Services). Across all analysed countries, the highest positive export changes due to a WTO membership appear in the Agricultural sector (28.5%), followed by Manufacturing (28.4%), Services (27.4%), and Mining (18.3%).

Across all considered countries, the quantified average welfare increase resulting from a WTO membership is 4%, ranging from a high of 19% (Ireland) to a low 0.7% (China).

25% of all considered countries experienced an increase in average producer prices (ceteris paribus a rise in welfare) and at the same time a drop in consumer prices (ceteris paribus a rise in welfare) because of a WTO membership. This group of countries includes WTO member states with the largest observed welfare gains. The largest group of countries (59%) in the

analysis experience a drop in both, average consumer and producer prices, due to a WTO membership. On average welfare effects for these countries are less pronounced, compared to countries in which average producer prices increase.

There was not a single country where relative producer prices decreased, and relative consumer prices increased due to WTO membership. However, 14% of the analysed countries did see an increase in both relative producer and consumer prices.

Overall, our results and analysis suggest that the WTO has been effective in promoting international trade among its members, leading to significant (but heterogeneous) gains in terms of trade and welfare.

Bibliography

Adam, Hanna, Michael Nower, and Yoto V. Yotov, “Asymmetric Trade Costs and Cross-country Income Inequality,” Work in progress, 2020.

Agnosteva, Delina E., James E. Anderson, and Yoto V. Yotov, “Intra-national Trade Costs: Assaying Regional Frictions,” European Economic Review, 2019, 112 (C), 32–50.

Anderson, James E., “A Theoretical Foundation for the Gravity Equation,” American Economic Review, 1979, 69 (1), 106–116.

__, “The Gravity Model,” Annual Review of Economics, 2011, 3, 133–160.

__, and Eric van Wincoop, “Gravity with Gravitas: A Solution to the Border Puzzle,” American Economic Review, 2003, 93 (1), 170–192.

__ and __, “Trade Costs,” Journal of Economic Literature, 2004, 42 (3), 691–751.

__ and Yoto V. Yotov, “The Changing Incidence of Geography,” American Economic Review, 2010, 100 (5), 2157–2186.

__ and Yoto V. Yotov, “Short Run Gravity,” Journal of International Economics, 2020, 126, 103–341.

__, Mario Larch, and Yoto V. Yotov, “Transitional Growth and Trade with Frictions: A Structural Estimation Framework,” The Economic Journal, 2020, 130 (630), 1583–1607.

Arkolakis, Costas, Arnaud Costinot, and Andrés Rodríguez-Clare, “New Trade Models, Same Old Gains?,” American Economic Review, 2012, 102 (1), 94–130.

Armington, Paul S., “A Theory of Demand for Products Distinguished by Place of Pro- duction,” IMF Staff Papers, 1969, 16, 159–176.

Baier, Scott L. and Jeffrey H. Bergstrand, “Do Free Trade Agreements Actually In- crease Members’ International Trade?,” Journal of International Economics, 2007, 71 (1), 72–95.

Baldwin, Richard E. and Daria Taglioni, “Gravity for Dummies and Dummies for Gravity Equations,” NBER Working Paper No. 12516, 2006.

Bergstrand, Jeffrey H., “The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence,” Review of Economics and Statistics, 1985, 67 (3), 474–481.

__, Mario Larch, and Yoto V. Yotov, “Economic Integration Agreements, Border Effects, and Distance Elasticities in the Gravity Equation,” European Economic Review, 2015, 78, 307–327.

Beverelli, Cosimo, Alexander Keck, Mario Larch, and Yoto Yotov, “Institutions, Trade and Development: A Quantitative Analysis,” CESifo Working Paper No. 6920 and School of Economics Working Paper Series, https://ideas.repec.org/p/ris/drxlwp/2018_003.html, 2018-3, LeBow College of Business, Drexel University February 2018.

Borchert, Ingo, Mario Larch, Serge Shikher, and Yoto V. Yotov, “Disaggregated Gravity: Benchmark Estimates and Stylized Facts from a New Database,” Working Paper, School of Economics Working Paper Series, LeBow College of Business, Drexel University 2020-8, Revise-and-resubmit at the Review of International Economics, June 2020a.

__, __, __, and __, “The International Trade and Production Database for Estimation (ITPD-E),” International Economics, forthcoming., 2020.

Bown, Chad P. and Douglas A. Irwin, “The GATT’s Starting Point: Tariff Levels circa 1947,” CEPR Discussion Paper 10979, 2015.

Caliendo, Lorenzo and Fernando Parro, “Estimates of the Trade and Welfare Effects of NAFTA,” Review of Economic Studies, 2015, 82 (1), 1–44.

Chaney, Thomas, “Distorted Gravity: The Intensive and Extensive Margins of International Trade,” American Economic Review, 2008, 98 (4), 1707–1721.

Chang, P.-L. & Lee, M.-J. The WTO trade effect. Journal of International Economics, 2011, 85, 53 – 71.

Cheng, I-Hui and Howard J. Wall, “Controlling for Heterogeneity in Gravity Models of Trade and Integration,” Federal Reserve Bank of St. Louis Review, 2005, 87 (1), 49–63.

Correia, Sergio, Paulo Guimarães, and Tom Zylkin, “Fast Poisson Estimation with High-dimensional Fixed Effects,” Stata Journal, 2020, 20 (1), 95–115.

Costinot, Arnaud and Andrés Rodríguez-Clare, “Trade Theory with Numbers: Quantifying the Consequences of Globalization,” Chapter 4 in the Handbook of International Economics Vol. 4, eds. Gita Gopinath, Elhanan Helpman, and Kenneth S. Rogoff, Elsevier Ltd., Oxford, 2014, pp. 197–261.

__, Dave Donaldson, and Ivana Komunjer, “What Goods Do Countries Trade? A Quantitative Exploration of Ricardo’s Ideas,” Review of Economic Studies, 2012, 79 (2), 581–608.

Dai, Mian, Yoto V. Yotov, and Thomas Zylkin, “On the Trade-Diversion Effects of Free Trade Agreements,” Economics Letters, 2014, 122 (2), 321–325.

Dekle, Robert, Jonathan Eaton, and Samuel Kortum, “Unbalanced Trade,” American Economic Review: Papers and Proceedings, 2007, 97 (2), 351–355.

__, __, and __, “Global Rebalancing with Gravity: Measuring the Burden of Adjustment,” IMF Staff Papers, June 2008, 55 (3), 511–540.

Dutt, Pushan & Mihov, Ilian & Van Zandt, Timothy, "The effect of WTO on the extensive and the intensive margins of trade," Journal of International Economics, 2013, 91 (2), 204-219.

Eaton, Jonathan and Samuel Kortum, “Technology, Geography and Trade,” Econometrica, 2002, 70 (5), 1741–1779.

Egger, Peter and Mario Larch, “Interdependent Preferential Trade Agreement Member- ships: An Empirical Analysis,” Journal of International Economics, 2008, 76 (2), 384–399.

Egger, Peter H. and Sergey Nigai, “Structural Gravity with Dummies Only: Constrained ANOVA-Type Estimation of Gravity Models,” Journal of International Economics, 2015, 97, 86–99.

__, Mario Larch, and Yoto V. Yotov, “Structural Gravity with Interval Data: Revisiting the Impact of Free Trade Agreements,” Revise and resubmit, Economica, WP, CESifo Working Paper No. 8553 and School of Economics Working Paper Series, LeBow College of Business, Drexel University, https://ideas.repec.org/p/ris/drxlwp/2020_011.html, 2020.

Evenett, S J and J Fritz, Collateral Damage: Cross-Border Fallout from Pandemic Policy Overdrive, The 26th Global Trade Alert report, CEPR Press, 2020.

Felbermayr, Gabriel, Aleksandra Kirilakha, Constantinos Syropoulos, Erdal Yalcin, and Yoto V. Yotov, "The Global Sanctions Data Base," School of Economics Working Paper Series 2020-2, LeBow College of Business, Drexel University, 2020.

__, Constantinos Syropoulos, Erdal Yalcin, and Yoto Yotov, "On the Heterogeneous Effects of Sanctions on Trade and Welfare: Evidence from the Sanctions on Iran and a New Database," CESifo Working Paper No. 7728, School of Economics Working Paper Series 2020-4, LeBow College of Business, Drexel University, 2020.

__, Mario Larch, Erdal Yalcin, and Yoto V. Yotov, "On the Heterogeneous Trade and Welfare Effects of GATT/WTO Membership," CESifo Working Paper No. 8555, School of Economics Working Paper Series 2020-12, LeBow College of Business, Drexel University, 2020.

Grant, Jason, Mario Larch, and Yoto V. Yotov, "Economic Sanctions and Agricultural Trade," Manuscript, 2020.

Gurevich, Tamara and Peter Herman, "The Dynamic Gravity Dataset: 1948-2016," 2018. USITC Working Paper 2018-02-A.

Head, Keith and Thierry Mayer, "Gravity Equations: Workhorse, Toolkit, and Cook- book," Chapter 3 in the Handbook of International Economics Vol. 4, eds. Gita Gopinath, Elhanan Helpman, and Kenneth S. Rogoff, Elsevier Ltd., Oxford, 2014, pp. 131–195.

Heid, Benedikt, Mario Larch, and Yoto V. Yotov, "Estimating the Effects of Non- discriminatory Trade Policies within Structural Gravity Models," Canadian Journal of Economics, forthcoming.

Herz, Bernhard and Wagner, Marco, The 'Real' Impact of GATT/WTO – A Generalised Approach. The World Economy, 2011, Vol. 34, Issue 6, pp. 1014-1041.

Krugman, Paul R., "Increasing Returns, Monopolistic Competition and International Trade," Journal of International Economics, 1979, 9 (4), 469–479.

Mario Larch, Serge Shikher, Constantinos Syropoulos, and Yoto V. Yotov, "On the Impact of Economic Sanctions on International Trade in Mining," unpublised manuscript, 2020a.

__, José-Antonio Monteiro, Roberta Piermartini, and Yoto V. Yotov, "On the Effects of GATT/WTO Membership on Trade: They are Positive and Large After All," WTO Staff Working Papers ERSD-2019-09, World Trade Organization (WTO), Economic Research and Statistics Division 2019.

__, Serge Shikher, Jose Signoret, and Yoto V. Yotov, "Subsidized Trade," 2020a.

Liu, X., GATT/WTO Promotes Trade Strongly: Sample Selection and Model Specification. Review of International Economics, 2011, 17: 428-446.

Narlikar, Amrita, Daunton, Martin, and Robert Stern (eds.), The Oxford Handbook on the World Trade Organization, Oxford: Oxford University Press, 2012.

Olivero, María Pía and Yoto V. Yotov, "Dynamic Gravity: Endogenous Country Size and Asset Accumulation," Canadian Journal of Economics, 2012, 45 (1), 64–92.

Ramondo, Natalia, Andres Rodriguez-Clare, and Milagro Saborio-Rodriguez, "Trade, Domestic Frictions, and Scale Effects," American Economic Review, 2016, 106 (10), 3159–3184.

Redding, Stephen J. and David E. Weinstein, “Aggregation and the Gravity Equation,” AEA Papers and Proceedings, May 2019, 109, 450–455.

Rose, Andrew K., “Do We Really Know That the WTO Increases Trade?,” American Economic Review, 2004, 94 (1), 98–114.

Sala, Davide, and Erdal Yalcin, Market Access Through Bound Tariffs, Scottish Journal of Political Economy, 2010, 57 (3), 272-289.

Santos Silva, João M.C. and Silvana Tenreyro, “The Log of Gravity,” Review of Economics and Statistics, 2006, 88 (4), 641–658.

__, and __, “Further Simulation Evidence on the Performance of the Poisson Pseudo-Maximum Likelihood Estimator,” Economics Letters, 2011, 112 (2), 220–222.

Tomz, Michael, Judith L. Goldstein, and Douglas Rivers. 2007. "Do We Really Know That the WTO Increases Trade? Comment." American Economic Review, 97 (5): 2005-2018.

Trefler, Daniel, “The Long and Short of the Canada-U.S. Free Trade Agreement,” American Economic Review, 2004, 94 (4), 870–895.

Yotov, Yoto V., “A Simple Solution to the Distance Puzzle in International Trade,” Eco- nomics Letters, 2012, 117 (3), 794–798.

__, Roberta Piermartini, Jose-Antonio Monteiro, and Mario Larch, An Advanced Guide to Trade Policy Analysis: The Structural Gravity Model, Geneva: UNCTAD and WTO, 2016.

World Trade Organization, World Trade Report: Six Decades of Multilateral Cooperation, What Have we Learnt? Geneva: WTO, 2007.

Appendix

Appendix A

List of WTO members (As at December 2020)

1	Afghanistan	**34**	Croatia	**67**	Iceland	**100**	Montenegro	**133**	Sierra Leone
2	Albania	**35**	Cuba	**68**	India	**101**	Morocco	**134**	Singapore
3	Angola	**36**	Cyprus	**69**	Indonesia	**102**	Mozambique	**135**	Slovak Republic
4	Antigua and Barbuda	**37**	Czech Republic	**70**	Ireland	**103**	Myanmar	**136**	Slovenia
5	Argentina	**38**	DR of the Congo	**71**	Israel	**104**	Namibia	**137**	Solomon Islands
6	Armenia	**39**	Denmark	**72**	Italy	**105**	Nepal	**138**	South Africa
7	Australia	**40**	Djibouti	**73**	Jamaica	**106**	Netherlands	**139**	Spain
8	Austria	**41**	Dominica	**74**	Japan	**107**	New Zealand	**140**	Sri Lanka
9	Bahrain, Kingdom of	**42**	Dominican Republic	**75**	Jordan	**108**	Nicaragua	**141**	Suriname
10	Bangladesh	**43**	Ecuador	**76**	Kazakhstan	**109**	Niger	**142**	Sweden
11	Barbados	**44**	Egypt	**77**	Kenya	**110**	Nigeria	**143**	Switzerland
12	Belgium	**45**	El Salvador	**78**	Korea, Republic of	**111**	North Macedonia	**144**	Chinese Taipei
13	Belize	**46**	Estonia	**79**	Kuwait, the State of	**112**	Norway	**145**	Tajikistan
14	Benin	**47**	Eswatini	**80**	Kyrgyz Republic	**113**	Oman	**146**	Tanzania
15	Bolivia, Plurinational State of	**48**	European Union	**81**	Lao People's DR	**114**	Pakistan	**147**	Thailand
16	Botswana	**49**	Fiji	**82**	Latvia	**115**	Panama	**148**	Togo
17	Brazil	**50**	Finland	**83**	Lesotho	**116**	Papua New Guinea	**149**	Tonga
18	Brunei Darussalam	**51**	France	**84**	Liberia	**117**	Paraguay	**150**	Trinidad and Tobago
19	Bulgaria	**52**	Gabon	**85**	Liechtenstein	**118**	Peru	**151**	Tunisia
20	Burkina Faso	**53**	Gambia	**86**	Lithuania	**119**	Philippines	**152**	Turkey
21	Burundi	**54**	Georgia	**87**	Luxembourg	**120**	Poland	**153**	Uganda
22	Cabo Verde	**55**	Germany	**88**	Macao, China	**121**	Portugal	**154**	Ukraine
23	Cambodia	**56**	Ghana	**89**	Madagascar	**122**	Qatar	**155**	United Arab Emirates
24	Cameroon	**57**	Greece	**90**	Malawi	**123**	Romania	**156**	United Kingdom
25	Canada	**58**	Grenada	**91**	Malaysia	**124**	Russian Federation	**157**	United States
26	Central African Republic	**59**	Guatemala	**92**	Maldives	**125**	Rwanda	**158**	Uruguay
27	Chad	**60**	Guinea	**93**	Mali	**126**	Saint Kitts and Nevis	**159**	Vanuatu
28	Chile	**61**	Guinea-Bissau	**94**	Malta	**127**	Saint Lucia	**160**	Venezuela, Bolivarian Republic of
29	China	**62**	Guyana	**95**	Mauritania	**128**	Saint Vincent, Grenadines	**161**	Viet Nam
30	Colombia	**63**	Haiti	**96**	Mauritius	**129**	Samoa	**162**	Yemen
31	Republic of Congo	**64**	Honduras	**97**	Mexico	**130**	Saudi Arabia	**163**	Zambia
32	Costa Rica	**65**	Hong Kong, China	**98**	Moldova, Republic of	**131**	Senegal	**164**	Zimbabwe
33	Côte d'Ivoire	**66**	Hungary	**99**	Mongolia	**132**	Seychelles		

Source: World Trade Organization

List of countries with observer status in the WTO (As of December 2020)

1	Algeria	**11**	Ethiopia	**21**	Sudan
2	Andorra	**12**	Holy See	**22**	Syrian Arab Republic
3	Azerbaijan	**13**	Iran	**23**	Timor-Leste
4	Bahamas	**14**	Iraq	**24**	Turkmenistan
5	Belarus	**15**	Lebanese Republic	**25**	Uzbekistan
6	Bhutan	**16**	Libya		
7	Bosnia and Herzegovina	**17**	Sao Tomé and Principe		
8	Comoros	**18**	Serbia		
9	Curaçao	**19**	Somalia		
10	Equatorial Guinea	**20**	South Sudan		

Source: World Trade Organization

List of WTO non-members (As at December 2020)

1	Aruba
2	Eritrea
3	Democratic People's Republic of Korea
4	Federated States of Micronesia
5	Greenland
6	Kiribati
7	Kosovo
8	Marshall Islands
9	Monaco
10	Nauru
11	Palau
12	Palestine
13	San Marino
14	Tuvalu

Source: World Trade Organization

Appendix B

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

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

Appendix C

This appendix offers details on the methods that we used to obtain the partial and the general equilibrium effects of the WTO.

C.1 Estimating the Impact of WTO membership on trade

This appendix offers details on the econometric specification used to obtain the partial equilibrium (PE) estimates that are presented in discussed in the main text of the report. Broadly, we follow the summary of recommendations for structural gravity estimations from Yotov et al. (2016), but we also extend the analysis by capitalizing on a number of recent papers.[21] We start by setting up our estimating equation. We then proceed to describe its components and key traits, and to explain the motivation behind each of them:[22]

$$X_{ij,t}^{k} = \exp[\pi_{i,t}^{k} + \chi_{j,t}^{k} + \sum_{t} \alpha_{t}^{k} BRDR_{ij,t} + \mu_{ii}^{k} + \mu_{ii}^{k} \times LTT_{t} + GRAV_{ij,t}\beta^{k} + \sum_{i} WTO_{ij,t}\gamma_{i}^{k}] \times \varepsilon_{ij,t}^{k}. \quad (1)$$

$X_{ij,t}^{k}$ denotes nominal trade flows in industry *k* from source *i* to importer *j* at time *t*. The sectoral superscript in our setting is used to denote each of the four sectors (e.g., Agriculture, Mining, Manufacturing, and Services) for which we estimate the model.[23] In addition, we will also obtain aggregate WTO effects for total trade by pooling the four main sectors together in a single gravity specification. In principle, there are three approaches that we could follow to obtain country-specific WTO estimates with aggregate trade. First, we could simply aggregate all individual 170 ITPD-E sectors (see data section for a description of ITPD-E) into a single aggregate category. The advantage of this approach is computational, while the disadvantage is that we will be aggregating very different categories, for example, services vs. agriculture, which may lead to aggregation biases, see Redding and Weinstein (2019). Second, we could pool the raw data for each of the underlying 170 ITPD-E sectors. This procedure relies on the raw ITPD-E data and avoids aggregation biases, however, it is very computationally intensive due to the very large number of theory-consistent fixed effects combined with the country-specific WTO effects that we are after. The third option is a hybrid of the first two, where for

[21] Borchert et al. (2020a), who employ the ITPD-E (see data section for a description of ITPD-E data) to obtain sectoral gravity estimates and to test some stylized facts from the related literature. Larch et al. (2020a), who use similar methods to assess the impact of sanctions on trade flows in order to estimate the impact of economic sanctions on international trade in mining. Grant et al. (2020), who capitalise on recent developments in the gravity literature and the new ITPD-E to obtain estimates of the impact of the WTO on agricultural trade. Larch et al. (2019), who rely on theory-consistent gravity estimations with domestic trade flows to resolve the puzzling finding from the related literature, c.f. Rose (2004), that GATT/WTO have not been effective in promoting trade. Felbermayr et al. (2020c), who extend on the analysis of Larch et al. (2019) to obtain country- specific estimates of the effects of WTO membership for aggregate manufacturing trade. Finally, Agnosteva et al. (2019), who propose flexible methods to model internal and international trade costs, which we extend on to obtain our estimates.

[22] We refer the reader to Baldwin and Taglioni (2006), Head and Mayer (2014) and Yotov et al. (2016) for surveys of the empirical gravity literature, and to Felbermayr et al. (2020a;b) for recent applications of the gravity model to study the effects of sanctions on trade.

[23] Due to the separability property of the structural gravity model, equation (1) can be estimated separately at any desired level of aggregation (e.g., at the product, industry, sector, and/or aggregate/total levels). See Anderson and van Wincoop (2004) for a derivation of a sectoral gravity model from a demand-side perspective; Costinot et al. (2012) for a derivation of sectoral gravity model from a supply-side perspective; and Yotov et al. (2016) for a demonstration that the demand-side and supply-side sectoral gravity models are identical from an estimation point of view and for a discussion on the challenges and best practices for estimating sectoral/disaggregated gravity models.

our estimation we pool together the data across the four major sectors but do not aggregate it to the total. This procedure allows for underlying sectoral differences across the four major sectors (that is, Agriculture, Mining, Manufacturing, and Services), while it is computationally feasible.

Following the recommendations of Yotov et al. (2016) for theory-consistent gravity estimations and taking advantage of one of the key dimensions of the ITPD-E, $X_{ij,t}^{k}$ includes internal trade flows (that is, domestic sales). The inclusion of domestic trade flows in gravity estimation is consistent with any theoretical gravity model. Additionally, it generates important benefits for the estimation of the effects of various policies. For example, Dai et al. (2014) demonstrate that the effects of FTAs are biased downward when gravity is estimated without domestic trade flows. The explanation for this result is that much of the additional trade between FTA members is actually due to domestic trade diversion. More recently, and more relevant for the current purposes, Larch et al. (2019) rely on this intuition and on the use of domestic trade flows to resolve the puzzling finding from the related literature, see Rose (2004), that GATT/WTO have not been effective in promoting trade.[24]

$X_{ij,t}^{k}$ enters equation (1) in levels because we estimate our specifications with the multiplicative Poisson Pseudo Maximum Likelihood (PPML) estimator. As famously argued by Santos Silva and Tenreyro (2006; 2011), the traditional OLS gravity estimates are biased due to the presence of heteroskedasticity in the data on trade flows. These authors also offer robust evidence for the ability of the PPML estimator to address the heteroskedasticity issue effectively. In addition to handling heteroskedasticity, the PPML estimator takes into account the information contained in the zero trade flows, because the corresponding estimation equation is multiplicative. This is potentially important in our case because our disaggregated sectoral sample contains a significant number of zeros.[25]

Equation (1) includes four sets of fixed effects. The first two sets are the exporter-industry-time $(\pi_{i,t}^{k})$ and the importer-industry-time $(\chi_{j,t}^{k})$fixed effects to control for the structural multilateral resistances of Anderson and van Wincoop (2003), which are of dimension exporter-industry-time and importer-industry-time, respectively. Naturally, these fixed effects also control for any other exporter-industry-time and importer-industry-time determinants of trade flows (e.g., country-industry-specific productivity, size, etc.) which also can vary over time. These fixed

[24] Borchert et al. (2020a) summarize the literature that relies on domestic trade flows as follows: "The importance of proper account of internal trade costs is demonstrated in a series of papers including: Anderson and Yotov (2010), who study the impact of Canada's Agreement on Internal Trade (AIT), Yotov (2012), who argues that the use of intra-national trade flows ensures proper measurement of the evolving impact of distance and, thus, resolves the 'distance puzzle' in international trade; Dai et al. (2014) who use internal trade flows to capture trade-diversion effects of free trade agreements (FTAs); Bergstrand et al. (2015) who rely on internal trade flows to resolve the 'missing globalization puzzle' and improve on the estimation of FTA effects; Ramondo et al. (2016), who demonstrate that the introduction of internal trade frictions removes the counterfactual prediction that larger countries should be much richer than smaller ones; Agnosteva et al. (2019) who demonstrate that internal trade costs are quite heterogeneous, even among Canada's provinces; and, finally, the inclusion of intra-national trade flows allows for identification of the effects of country-specific determinants of trade flows, see, Beverelli et al. (2018), as well as non-discriminatory effects of trade policies, see, Heid et al. (forthcoming)." (Footnote 12, p. 21).

[25] We perform our estimations in Stata, where we utilize the command *ppmlhdfe*, due to Correia et al. (2020), which is specifically designed to handle PPML estimations with high-dimensional fixed effects.

effects also control for any global trends that, for example, may affect sectoral and aggregate production and consumption.[26]

Next, following Bergstrand et al. (2015), $BRDR_{ij,t}$ denotes a set of time-varying bilateral border fixed effects, which take a value of one for international trade and are equal to zero for domestic trade for each year *t.* This is the third set of fixed effects in our econometric model. The border dummies are used to control for sector-specific globalization trends. For example, these dummy variables control for improvements in technology, communication, transportation, etc. trends that affect the international (relative to internal) trade of all countries in a given sector. Also note that, by construction, the sum of the sectoral border dummies will be a common border dummy across all sectors, which will control for any common globalization trends. In other words, for each year, the sector-specific border dummies will absorb and be perfectly collinear with a common border dummy. Finally, we remind the reader that the exporter-sector-time and the importer-sector-time fixed effects will absorb and control for any country-specific characteristics and trends.

Before we proceed, we note that most modern panel gravity studies usually include a set of country-pair fixed effects, which also can/should vary per sector. As argued by Baier and Bergstrand (2007), the pair fixed effects would mitigate endogeneity concerns with respect to trade agreements (and possibly other bilateral policy variables). On a related note, as demonstrated by Egger and Nigai (2015) and Agnosteva et al. (2019) by fully controlling for all time-invariant bilateral trade costs, the pair-fixed effects often outperform gravity regressions with standard covariates (e.g., distance, contiguity, etc., which we discuss in more detail below). We see the benefits, and, in principle, we advocate the use of pair fixed effects in panel gravity regressions. Unfortunately, our current goals to obtain estimates of the impact of the WTO cannot be achieved in the presence of pair fixed effects since our sample covers the period 2000 to 2016 only. This means that, if estimated with pair fixed effects, our estimates would capture only the impact of the WTO membership due to trade with members that joined WTO during the period of investigation (that is, between 2000 and 2016).[27]

In order to be able to identify the effects of interest to us, while staying close to the flexible specification with pair-fixed effects, we propose a hybrid (between fixed effects and trade cost proxies) modelling of bilateral trade costs, which builds and extends on the approach from Agnosteva et al. (2019). Similar to Agnosteva et al. (2019) we use country-specific fixed effects, μ_{ii}^{k}, to completely capture all time-invariant domestic trade costs. In addition, we follow Larch et al. (2020c) to improve the treatment of internal trade costs by also interacting the country-specific internal trade cost fixed effects with a linear time trend, LTT_t. An alternative interpretation of this approach is that we allow for country-specific time-invariant border effects, each of which we allow to also vary linearly over time.

We complement the existing literature by introducing some improvements to the set of standardly used gravity covariates, which are included in vector $GRAV_{ij,t}$ in equation (1). In particular, we employ the logarithm of bilateral distance ($DIST_{ij}$), and indicator variables for colonial relationships ($CLNY_{ij}$), common official language ($LANG_{ij}$), and common/contiguous

[26] To see this point note that if we were to include time or industry-time fixed effects, then these effects would have been perfectly collinear with and absorbed by the more detailed exporter-industry-time and importer-industry-time that are present in all of our specifications.

[27] In addition to the ITPD-E, we have experimented with an alternative sample, which was recently constructed by the WTO (https://www.wto.org/english/res_e/reser_e/structural_gravity_e.htm), and which covers aggregate manufacturing over the period 1980-2016. The ITPD-E and the WTO samples deliver very similar estimates for 2000-2016 and even the longer-span WTO data do not cover the period when the largest members joined GATT.

borders ($CNTG_{ij}$). In addition, we follow Larch et al. (2020b) to allow for the impact of distance to vary depending on development by constructing four distance variables including: distance between rich and poor countries (i.e., corresponding to exports from rich to poor countries), distance between poor and rich countries (i.e., corresponding to exports from poor to rich countries),, distance between rich countries, and distance between poor countries. [28]

We also add to our model several time-varying policy covariates. First, we include a number of dummy variables to account for the presence of regional trade agreements that were implemented among the countries in our sample and which distinguish the trade agreements by type. Specifically, we include indicator variables for free trade agreements ($FTA_{ij,t}$), customs unions ($CU_{ij,t}$), economic integration agreements ($EIA_{ij,t}$), and agreements that combine customs unions and economic integration agreements ($CU\_EIA_{ij,t}$), and free trade agreements and economic integration agreements ($FTA\_EIA_{ij,t}$). We also include an indicator variable for the presence of trade sanctions between *i* and *j* at time *t,* ($TRADE\_COMPL_{ij,t}$).

Finally, and most important for our purposes, $WTO_{ij,t}$ is a vector of dummy variables for WTO membership that are of central importance to the analysis. Specifically, we follow Felbermayr et al. (2020c) to obtain country-specific estimates of the effects of WTO on the exports of each member in each of the broad sectors in our sample. We also obtain country-specific estimates of the WTO effects on the exports of each member for aggregate trade. Due to perfect collinearity, we cannot obtain separate WTO estimates for the exports and for the imports of each WTO member. Therefore, we will focus on the country-specific sectoral effects of the WTO on the exports of each WTO member in our sample. In sum, the estimation analysis will deliver an estimate of the impact of WTO on the aggregate exports of each member country as well as on the exports of each member in Agriculture, Mining, Manufacturing, and Services.

To obtain our main estimates we use consecutive-year data. Cheng and Wall (2005) note that econometric specifications with fixed effects, such as the gravity model employed here, are *"sometimes criticized when applied to data pooled over consecutive years on the grounds that dependent and independent variables cannot fully adjust in a single year's time."* (Footnote 8, p. 52, Cheng and Wall, 2005). Therefore, they recommend the use of interval data instead of data over consecutive years for gravity estimations. Many papers follow this recommendation and, to avoid the Cheng-and-Wall critique, they estimate gravity with interval data.[29] More recently, however, Egger et al. (2020) argue that, in addition to improving estimation efficiency and avoiding arbitrary dropping of observations, the use of pooled/consecutive-year data in fact improves our ability to capture the adjustment of trade flows in response to trade policy changes. Finally, we note that, given the rich structure of fixed effects in each of our specifications, we believe it is safe to assume that the error term $\varepsilon_{ij,t}$ is just noise. The standard errors in all specifications will be clustered by country-pair.

In order to eliminate outliers (for example, in terms of observations that are used to identify the key WTO effects of interest to us), we implement a two-step estimation procedure. At step one,

[28] The approach of Larch et al. (2020b) has three advantages. First, it addresses the criticisms of Egger and Nigai (2015) and Agnosteva et al. (2019) that standard gravity variables do not match the level of bilateral trade costs well by allowing for a more flexible and intuitive impact of the effects of distance, as the most widely used proxy for bilateral trade costs. Second, it complements the approach of Eaton and Kortum (2002) to split the effects of distance in intervals, i.e., close, medium, etc., by allowing for distance to vary depending on development status. Third, it allows for directional asymmetries in bilateral trade costs.

[29] For example, Trefler (2004) also criticizes trade estimations with samples that are pooled over consecutive years and he uses 3-year intervals. Cheng and Wall (2005) and Baier and Bergstrand (2007) use 5-year intervals, while Olivero and Yotov (2012) experiment with 3- and 5-year interval data.

we estimate the model by replacing all time-invariant bilateral trade costs with directional pair fixed effects and we allow for directional WTO estimates. This procedure drops certain number of observations. Then, we produce our main estimates without taking these observations into account. Most notably, this procedure eliminates Afghanistan from our estimating sample. The reason is that this country joined the WTO in 2016.[30] Other than that, the WTO estimates that are obtained from the full sample and from the sample that eliminates outliers are very close to each other.

Finally, we note that when we pool the sectoral data to obtain our aggregate estimates, we follow theory to preserve the sectoral dimension for the exporter and the importer fixed effects, i.e., we use $\pi_{i,t}^{k}$ and $\chi_{j,t}^{k}$ fixed effects, , where *k* denotes each of the four main sectors in our estimating sample. In addition, we also allow for the effects of the general globalization trends, $\alpha_t^k BRDR_{ij,t}$ the country-specific borders μ_{ii}^k, and their interaction with the time trends $\mu_{ii}^k \times LTT_t$ to be heterogeneous across sectors. Thus, in effect, we only constrain the estimates of the standard gravity proxies, including the key country-specific WTO effects, to be common across sectors. The goal is to obtain aggregate country-specific WTO estimates, while capitalising on the variation in the data across sectors.

C.2 On the general equilibrium effects of WTO membership

This section describes how we translate our partial equilibrium estimates of the effects of the WTO into general equilibrium WTO effects on trade and welfare, and decomposes their incidence on consumers and producers. To this end, we rely on a very general and widely accepted model structure known as a "new quantitative trade model", which is consistent with a broad class of microeconomic foundations, see, Arkolakis et al. (2012), Costinot and Rodríguez-Clare (2014) and Yotov et al. (2016), and which is consistent with and, in fact, nests the same estimating structural gravity model, which we use to obtain our partial estimates of the effects of the WTO. For our analysis, we follow Anderson and van Wincoop (2003; 2004), and we assume a standard endowment economy with CES preferences.[31] The solution for volumes of exports shipped from country *i* to country *j* obtained from the consumer's optimization problem in this framework is given by:

$$X_{ij} = \left(\frac{\alpha_i p_i t_{ij}}{P_j} \right)^{1-\sigma} E_j, \qquad (2)$$

where α_i is a CES preference parameter, p_i denotes the producer price in country *i,* t_{ij} denotes overall trade costs for exchanging goods and services from country i to country j. E_j denote the expenditure in country j, which equal the sum across all bilateral imports for each country,

[30] Technically, Afghanistan became a WTO member in December of 2015, but for estimation purposes it was coded as a member in 2016 for the first time.

[31] Thus, our general equilibrium estimates, both the aggregate and the sectoral, do not take into account inter-sectoral (IO) linkages, neither they account for dynamic effects through country-specific factor/asset accumulation. Such effects are controlled for in our estimations, so our partial estimates are sound, however we do not model them in the GE analysis. Based on evidence from the existing literature, e.g., Caliendo and Parro (2015) and Anderson et al. (2020), respectively, introducing IO linkages and country-specific asset accumulation effects would magnify the impact of trade liberalization and, in our case, WTO membership. From that perspective, the GE effects that we obtain may be interpreted as conservative.

including spending on domestic goods and services in country *j*, $E_j = \sum_i X_{ij}$. σ is the elasticity of substitution. Finally, P_j denotes the CES price aggregator for consumer prices:

$$P_j^{1-\sigma} = \sum_l (\alpha_l p_l t_{lj})^{1-\sigma}. \tag{3}$$

Note that, for expositional simplicity, we did not add any sector subscripts. However, equation (2) applies to each sector as well as to the aggregate.

Following Dekle et al. (2007; 2008) we define country *i*'s share in country *j's* spending as $\pi_{ij} = X_{ij} / E_j$. Using (2), the change of π_{ij} between the baseline (denoted with superscript b) and the counterfactual (denoted with superscript c) is given by:

$$\hat{\pi}_{ij} = \frac{\pi_{ij}^c}{\pi_{ij}^b} = \frac{\left(\hat{p}_i \hat{t}_{ij}\right)^{1-\sigma}}{\sum_l \pi_{lj}^b \left(\hat{p}_l \hat{t}_{lj}\right)^{1-\sigma}}. \tag{4}$$

Note that in our case the baseline is assumed to be a world without WTO, whereas the counterfactual is a situation with WTO. Technically, we use our partial equilibrium effects to define $\hat{t}_{ij}$.

Y_i denote the total value of production of country i, which we calculate as the sum of sales at home and abroad:

$$Y_i = \sum_j X_{ij} = \sum_j \pi_{ij} E_j. \tag{5}$$

As we assume an endowment economy, it holds that

$$E_i = Y_i + TI_i = p_i Q_i + TI_i, \tag{6}$$

Where Q_i denotes the initial endowments in *i* and TI_i are exogenous trade imbalances, which are assumed to be constant between baseline and counterfactual.

The change of total value of production from the baseline to the counterfactual is therefore given by:

$$\hat{Y}_j = \hat{p}_j. \tag{7}$$

The change in total expenditure can be expressed as:

$$\hat{E}_i = \frac{E_i^c}{E_i^b} = \frac{\hat{Y}_i Y_i^b + TI_i}{E_i^b}. \tag{8}$$

Combining equations (4), (7) and (8), we end up with the following equation:

$$Y_i^b \hat{Y}_i = \sum_j \frac{\pi_{ij}^b (\hat{Y}_i \hat{t}_{ij})^{1-\sigma}}{\sum_l \pi_{lj}^b (\hat{Y}_l \hat{t}_{lj})^{1-\sigma}} (\hat{Y}_j Y_j^b + TI_j). \quad (9)$$

Setting up a system of equations using equation (9) for each country, this system can be solved using baseline values for trade flows and setting a value for σ, which we set to be equal to (5). This is a standard value in the literature and aligns well with the median value of −3.78 of the price elasticities (1 − σ) for structural gravity estimates reported in Table 3.5 in Head and Mayer (2014). The changes in $t_{ij}, \hat{t}_{ij}$ are given by the partial equilibrium estimate of the WTO effects.

In order to calculate output and expenditures, we use the following relationships:

$$Y_i = \sum_j X_{ij}, \quad (10)$$

$$E_j = \sum_i X_{ij}, \quad (11)$$

$$TI_i = E_i - Y_i, \quad (12)$$

$$\pi_{ij} = \frac{X_{ij}}{E_j}. \quad (13)$$

As we are working with a real-sided model that is homogeneous in degree zero of prices, we have to set a numéraire. This also implies that all nominal values, such as producer and consumer prices as well as volume of trade flows, have to be interpreted in relative terms. This also applies to the changes. As discussed in Yotov et al. (2016), one consideration for the choice of the numéraire is reliability of the data of the numéraire. A second consideration is that potential changes in the considered counterfactual for the chosen numéraire is relatively small. Specifically, for the latter reason we choose the producer price in the “Rest of the World” as the numéraire, as we do not change trade costs in the counterfactual for the “Rest of the World”.

Having solved $\hat{Y}_i$ from equation (9), we can calculate the remaining changes:

$$\hat{E}_j = \frac{\hat{Y}_j Y_j^b + TI_j}{E_j^b}, \quad (14)$$

$$\hat{p}_j = \hat{Y}_j, \quad (15)$$

$$\widehat{P_j} = \left(\sum_l \pi_{lj}^b (\hat{p}_l \hat{t}_{lj})^{1-\sigma} \right)^{\frac{1}{1-\sigma}}, \quad (16)$$

$$\hat{\pi}_{ij} = \frac{\left(\hat{p}_i \hat{t}_{ij}\right)^{1-\sigma}}{\sum_l \pi^b_{lj} \left(\hat{p}_l \hat{t}_{lj}\right)^{1-\sigma}}. \tag{17}$$

Our measure of welfare are real GDP changes which are given by:

$$W_i = (\hat{\pi}_{ii})^{\frac{1}{1-\sigma}}. \tag{18}$$

Note that the welfare effects are overall real GDP changes in the case where we calculate the counterfactuals using aggregate data. This is what is typically used as welfare measure. When we use only data for some sectors, the effects are real output changes of the subsectors and do not give overall welfare. Finally, we note that while our estimates on the effects of welfare/real GDP/real expenditure are unaffected by the normalization/numeraire choice, the estimates that we report, for example., exports, consumer prices, and producer prices are all relative to the normalization/numeraire choice. Thus, one has to be very careful with the conversion and interpretation of these estimates into nominal values.

Appendix D

In the following we present tables which list additional country-specific sectoral results of WTO effects. Moreover, country-specific sectoral welfare effects (general equilibrium results) are also presented. Finally, the tables include country-specific sectoral importer and exporter price effects.

List of additional tables with country- and sector-specific indexes

Table D 1: Partial equilibrium sectoral estimates

Table D 2.1: Country specific WTO estimates for aggregate trade

Table D 2.2: Country specific WTO effects: Ad-valorem equivalents (%)

Table D 3: Country- and sector-specific WTO estimates for trade

Figure D 1: Estimated impact on aggregate trade resulting from WTO membership, by country and sector

Table D 4: Aggregate effects on consumer and producer prices: Constrained scenario

Table D 5: Aggregate indexes: Unconstrained scenario

Table D 6: Sectoral indexes – Agriculture

Table D 7: Sectoral indexes – Mining

Table D 8: Sectoral indexes – Manufacturing

Table D 9: Sectoral indexes – Services

Table D 1: Partial equilibrium sectoral estimates

Panel a): Agriculture

Variables	Estimates	Std. Error	z	p	min95	max95
LN_DIST_R_R	-0.714	0.068	-10.468	0.000	-0.848	-0.581
LN_DIST_P_R	-0.788	0.062	-12.705	0.000	-0.910	-0.667
LN_DIST_R_P	-0.886	0.070	-12.611	0.000	-1.024	-0.748
LN_DIST_P_P	-0.976	0.052	-18.839	0.000	-1.077	-0.874
CNTG	0.398	0.094	4.247	0.000	0.214	0.582
LANG	0.148	0.087	1.698	0.090	-0.023	0.319
CLNY	0.991	0.168	5.900	0.000	0.662	1.320
CU	0.422	0.129	3.278	0.001	0.170	0.674
FTA	0.428	0.101	4.222	0.000	0.229	0.627
EIA	0.908	0.230	3.952	0.000	0.458	1.359
CU_EIA	0.641	0.181	3.543	0.000	0.287	0.996
FTA_EIA	0.244	0.096	2.541	0.011	0.056	0.432
TRADE_COMPL	-1.372	0.316	-4.343	0.000	-1.991	-0.753

Panel b): Mining

Variables	Estimates	Std. Error	z	p	min95	max95
LN_DIST_R_R	-1.696	0.155	-10.965	0.000	-1.999	-1.393
LN_DIST_P_R	-1.102	0.109	-10.136	0.000	-1.315	-0.889
LN_DIST_R_P	-1.782	0.150	-11.845	0.000	-2.076	-1.487
LN_DIST_P_P	-1.211	0.095	-12.699	0.000	-1.398	-1.024
CNTG	0.284	0.219	1.293	0.196	-0.146	0.714
LANG	0.130	0.143	0.903	0.366	-0.152	0.411
CLNY	0.621	0.265	2.345	0.019	0.102	1.139
CU	0.077	0.359	0.214	0.831	-0.628	0.781
FTA	0.327	0.155	2.114	0.035	0.024	0.630
EIA	1.393	0.466	2.989	0.003	0.480	2.307
CU_EIA	-1.745	0.525	-3.325	0.001	-2.773	-0.716
FTA_EIA	0.099	0.153	0.642	0.521	-0.202	0.399
TRADE_COMPL	-2.399	0.505	-4.750	0.000	-3.389	-1.409

Panel c) Manufacturing

Variables	Estimates	Std. Error	z	p	min95	max95
LN_DIST_R_R	-0.661	0.035	-19.020	0.000	-0.729	-0.593
LN_DIST_P_R	-0.731	0.039	-18.818	0.000	-0.807	-0.654
LN_DIST_R_P	-0.810	0.038	-21.291	0.000	-0.884	-0.735
LN_DIST_P_P	-0.876	0.032	-27.299	0.000	-0.939	-0.813
CNTG	0.266	0.057	4.632	0.000	0.153	0.378
LANG	0.224	0.055	4.082	0.000	0.116	0.331
CLNY	0.524	0.126	4.159	0.000	0.277	0.771
CU	0.802	0.109	7.340	0.000	0.588	1.017
FTA	0.285	0.069	4.117	0.000	0.150	0.421
EIA	-0.063	0.184	-0.342	0.733	-0.423	0.297
CU_EIA	0.694	0.185	3.751	0.000	0.331	1.056
FTA_EIA	0.175	0.054	3.256	0.001	0.070	0.281
TRADE_COMPL	-2.096	0.408	-5.143	0.000	-2.895	-1.297

Panel d) Services

Variables	Estimates	Std. Error	z	p	min95	max95
LN_DIST_R_R	-0.620	0.050	-12.365	0.000	-0.718	-0.522
LN_DIST_P_R	-0.730	0.062	-11.840	0.000	-0.851	-0.609
LN_DIST_R_P	-0.677	0.054	-12.489	0.000	-0.784	-0.571
LN_DIST_P_P	-0.785	0.046	-16.923	0.000	-0.876	-0.694
CNTG	0.176	0.081	2.184	0.029	0.018	0.334
LANG	0.199	0.077	2.579	0.010	0.048	0.350
CLNY	0.563	0.132	4.281	0.000	0.305	0.821
CU	1.289	0.300	4.301	0.000	0.702	1.877
FTA	0.470	0.152	3.084	0.002	0.171	0.768
EIA	0.041	0.292	0.142	0.887	-0.531	0.613
CU_EIA	0.101	0.284	0.355	0.723	-0.456	0.658
FTA_EIA	0.347	0.101	3.445	0.001	0.149	0.544
TRADE_COMPL	0.431	0.448	0.962	0.336	-0.447	1.308

Note: Each panel of this table offers gravity estimates for one of the four main sectors in our estimating sample, based on equation (1). Column “Estimates” of each panel reports the point estimates. Column “Std. Error” lists the corresponding standard errors. “z” stands for the z-statistics, “p” for the corresponding p-value. The last two columns show the upper and lower margins of the 95% confidence interval. Listed variables with source country i and importer j: the log of bilateral distance between rich countries (LN_DIST_R_R), the log of bilateral distance between poor and rich countries (LN_DIST_P_R), the log of bilateral distance between rich and poor countries (LN_DIST_R_P), the log of bilateral distance between poor countries, an indicator variables for common/contiguous borders (CNTG), common official language (LANG), colonial relationships (CLNY), and indicator variables for customs unions (CU), free trade agreements (FTA), economic integration agreements (EIA), agreements that combine customs unions and economic integration agreements (CU_EIA), free trade agreements and economic integration agreements (FTA_EIA), and for complete trade sanctions (TRADE_COMPL). See text for further details.

Table D 2.1: Country specific WTO estimates for aggregate trade

ISO3 Code	WTO Estimate	Std. Error	z	p	min95	max95
AGO	0.947	0.524	1.808	0.071	-0.080	1.973
ALB	0.985	0.568	1.735	0.083	-0.128	2.098
ARE	-0.538	0.375	-1.433	0.152	-1.274	0.198
ARG	0.105	0.283	0.372	0.710	-0.449	0.659
ARM	-0.346	0.332	-1.043	0.297	-0.997	0.304
ATG	1.383	0.961	1.439	0.150	-0.501	3.268
AUS	0.864	0.224	3.858	0.000	0.425	1.303
AUT	0.346	0.167	2.074	0.038	0.019	0.672
BDI	1.558	0.545	2.859	0.004	0.490	2.626
BEL	0.583	0.164	3.550	0.000	0.261	0.904
BEN	0.778	0.894	0.870	0.384	-0.975	2.531
BFA	2.723	0.522	5.215	0.000	1.699	3.746
BGD	1.392	0.370	3.762	0.000	0.667	2.117
BGR	-0.146	0.227	-0.640	0.522	-0.591	0.300
BHR	0.760	0.316	2.409	0.016	0.142	1.379
BLZ	1.028	0.624	1.648	0.099	-0.195	2.251
BOL	2.546	0.330	7.710	0.000	1.898	3.193
BRA	0.294	0.203	1.447	0.148	-0.104	0.693
BRB	0.519	0.586	0.885	0.376	-0.630	1.667
BRN	2.785	0.651	4.276	0.000	1.508	4.062
BWA	3.525	0.565	6.240	0.000	2.418	4.632
CAF	0.728	0.591	1.231	0.218	-0.431	1.886
CAN	1.517	0.196	7.756	0.000	1.133	1.900
CHE	0.501	0.199	2.523	0.012	0.112	0.890
CHL	1.633	0.270	6.043	0.000	1.103	2.162
CHN	0.790	0.146	5.409	0.000	0.504	1.076
CIV	0.747	0.323	2.312	0.021	0.114	1.379
CMR	1.053	0.463	2.273	0.023	0.145	1.960
COD	3.421	0.608	5.627	0.000	2.229	4.612
COG	0.364	0.692	0.527	0.599	-0.991	1.720
COL	0.609	0.340	1.789	0.074	-0.058	1.275
CPV	2.109	0.626	3.368	0.001	0.882	3.336
CRI	2.220	0.268	8.296	0.000	1.696	2.745
CUB	-0.201	0.586	-0.343	0.731	-1.350	0.948
CYP	-1.078	0.557	-1.935	0.053	-2.170	0.014
CZE	0.401	0.272	1.473	0.141	-0.132	0.933
DEU	0.468	0.179	2.610	0.009	0.116	0.819
DJI	-1.078	0.566	-1.905	0.057	-2.186	0.031
DMA	-0.029	0.660	-0.043	0.965	-1.322	1.265
DNK	0.270	0.235	1.147	0.251	-0.191	0.731
DOM	2.157	0.290	7.429	0.000	1.588	2.727

ISO3 Code	WTO Estimate	Std. Error	z	p	min95	max95
ECU	-0.043	0.449	-0.095	0.924	-0.922	0.837
EGY	-0.046	0.249	-0.183	0.855	-0.534	0.443
ESP	0.574	0.211	2.727	0.006	0.162	0.987
EST	0.103	0.313	0.330	0.742	-0.510	0.716
FIN	0.331	0.222	1.492	0.136	-0.104	0.765
FJI	-0.354	0.494	-0.716	0.474	-1.323	0.615
FRA	0.520	0.127	4.077	0.000	0.270	0.769
GAB	1.665	0.687	2.422	0.015	0.318	3.012
GBR	0.592	0.177	3.342	0.001	0.245	0.939
GEO	-0.438	0.272	-1.610	0.107	-0.972	0.095
GHA	1.277	0.387	3.301	0.001	0.519	2.035
GIN	-1.173	0.747	-1.572	0.116	-2.636	0.290
GMB	1.967	0.552	3.564	0.000	0.885	3.049
GNB	1.166	1.369	0.852	0.394	-1.516	3.848
GRC	-0.011	0.270	-0.040	0.968	-0.539	0.518
GRD	1.546	0.390	3.963	0.000	0.781	2.310
GTM	1.207	0.280	4.305	0.000	0.657	1.756
GUY	1.400	0.513	2.731	0.006	0.395	2.405
HKG	1.153	0.294	3.919	0.000	0.577	1.730
HND	2.183	0.371	5.887	0.000	1.456	2.909
HRV	-0.867	0.461	-1.881	0.060	-1.770	0.037
HTI	3.005	0.739	4.064	0.000	1.555	4.454
HUN	0.585	0.295	1.984	0.047	0.007	1.164
IDN	0.927	0.163	5.685	0.000	0.607	1.246
IND	0.480	0.207	2.316	0.021	0.074	0.886
IRL	1.289	0.354	3.642	0.000	0.595	1.983
ISL	0.226	0.370	0.611	0.541	-0.499	0.952
ISR	0.863	0.559	1.543	0.123	-0.233	1.958
ITA	0.275	0.117	2.344	0.019	0.045	0.505
JAM	0.387	0.522	0.743	0.458	-0.635	1.410
JOR	-0.808	0.437	-1.851	0.064	-1.663	0.048
JPN	0.931	0.150	6.195	0.000	0.637	1.226
KAZ	-0.441	0.325	-1.358	0.174	-1.078	0.196
KEN	0.663	0.335	1.981	0.048	0.007	1.319
KGZ	-0.750	0.461	-1.626	0.104	-1.655	0.154
KHM	1.823	0.432	4.220	0.000	0.976	2.670
KNA	0.911	0.400	2.277	0.023	0.127	1.694
KOR	-0.130	0.235	-0.554	0.579	-0.590	0.330
KWT	1.015	0.469	2.163	0.031	0.095	1.935
LAO	0.821	0.444	1.850	0.064	-0.049	1.691
LCA	1.980	0.430	4.604	0.000	1.137	2.823
LIE	0.280	0.542	0.518	0.605	-0.781	1.342

ISO3 Code	WTO Estimate	Std. Error	z	p	min95	max95
LKA	0.158	0.306	0.515	0.606	-0.442	0.757
LSO	3.627	0.644	5.629	0.000	2.364	4.890
LTU	-0.375	0.292	-1.283	0.200	-0.948	0.198
LUX	1.004	0.184	5.466	0.000	0.644	1.364
LVA	-0.146	0.245	-0.595	0.552	-0.626	0.334
MAC	1.571	0.663	2.371	0.018	0.273	2.870
MAR	0.860	0.294	2.923	0.003	0.283	1.437
MDA	-0.914	0.332	-2.751	0.006	-1.565	-0.263
MDG	2.348	0.368	6.379	0.000	1.626	3.069
MDV	1.403	0.603	2.327	0.020	0.221	2.585
MEX	1.780	0.363	4.897	0.000	1.068	2.493
MKD	-0.318	0.361	-0.880	0.379	-1.027	0.390
MLI	2.317	0.623	3.722	0.000	1.097	3.537
MLT	0.033	0.471	0.069	0.945	-0.890	0.956
MMR	1.398	0.631	2.216	0.027	0.161	2.635
MNE	-1.211	0.421	-2.873	0.004	-2.037	-0.385
MNG	0.067	0.415	0.161	0.872	-0.747	0.881
MOZ	1.784	0.466	3.830	0.000	0.871	2.696
MRT	0.228	0.592	0.385	0.701	-0.933	1.388
MUS	1.539	0.570	2.699	0.007	0.421	2.656
MWI	0.533	0.388	1.374	0.169	-0.227	1.293
MYS	1.026	0.175	5.863	0.000	0.683	1.369
NAM	1.481	0.391	3.792	0.000	0.715	2.246
NER	1.066	0.681	1.565	0.118	-0.269	2.401
NGA	0.232	0.383	0.606	0.544	-0.518	0.982
NIC	2.048	0.541	3.785	0.000	0.987	3.109
NLD	0.559	0.166	3.378	0.001	0.235	0.884
NOR	1.033	0.258	3.997	0.000	0.526	1.539
NPL	0.917	0.430	2.133	0.033	0.074	1.759
NZL	0.370	0.295	1.251	0.211	-0.209	0.949
OMN	-0.146	0.314	-0.465	0.642	-0.761	0.469
PAK	0.304	0.512	0.593	0.553	-0.700	1.307
PAN	-0.795	0.868	-0.915	0.360	-2.496	0.907
PER	1.717	0.262	6.540	0.000	1.202	2.231
PHL	1.361	0.378	3.599	0.000	0.620	2.102
PNG	1.844	0.621	2.968	0.003	0.626	3.062
POL	0.209	0.211	0.992	0.321	-0.204	0.623
PRT	1.114	0.265	4.204	0.000	0.595	1.633
PRY	-0.142	0.404	-0.351	0.726	-0.933	0.650
QAT	1.594	0.397	4.015	0.000	0.816	2.373
ROU	0.465	0.196	2.374	0.018	0.081	0.849
RUS	-0.410	0.123	-3.334	0.001	-0.652	-0.169

ISO3 Code	WTO Estimate	Std. Error	z	p	min95	max95
RWA	0.155	0.602	0.257	0.797	-1.024	1.334
SAU	0.954	0.363	2.626	0.009	0.242	1.666
SEN	1.423	0.475	2.999	0.003	0.493	2.353
SGP	0.923	0.299	3.088	0.002	0.337	1.508
SLB	1.500	0.593	2.530	0.011	0.338	2.663
SLE	1.419	0.562	2.525	0.012	0.317	2.521
SLV	1.826	0.414	4.415	0.000	1.015	2.636
SUR	1.771	0.532	3.327	0.001	0.728	2.814
SVK	0.228	0.395	0.577	0.564	-0.547	1.002
SVN	-0.594	0.262	-2.262	0.024	-1.108	-0.079
SWE	0.632	0.149	4.253	0.000	0.341	0.924
SWZ	0.891	0.467	1.907	0.057	-0.025	1.807
SYC	2.288	0.591	3.871	0.000	1.130	3.447
TCD	2.464	0.654	3.769	0.000	1.183	3.744
TGO	0.272	0.872	0.311	0.756	-1.438	1.981
THA	0.891	0.187	4.774	0.000	0.525	1.257
TJK	-1.061	0.462	-2.298	0.022	-1.966	-0.156
TON	0.815	0.744	1.095	0.274	-0.644	2.274
TTO	1.059	0.432	2.451	0.014	0.212	1.906
TUN	0.308	0.448	0.688	0.491	-0.570	1.187
TUR	-0.654	0.211	-3.098	0.002	-1.067	-0.240
TWN	0.700	0.236	2.965	0.003	0.237	1.163
TZA	1.359	0.370	3.674	0.000	0.634	2.083
UGA	0.084	0.503	0.167	0.868	-0.903	1.071
UKR	-0.729	0.173	-4.222	0.000	-1.068	-0.391
URY	0.123	0.322	0.382	0.703	-0.508	0.754
USA	1.123	0.154	7.298	0.000	0.821	1.425
VCT	-0.180	0.813	-0.221	0.825	-1.774	1.415
VEN	0.968	0.455	2.128	0.033	0.077	1.859
VNM	0.432	0.220	1.963	0.050	0.001	0.863
VUT	0.564	0.701	0.805	0.421	-0.809	1.937
WSM	-1.434	0.805	-1.781	0.075	-3.013	0.144
YEM	-0.121	0.339	-0.357	0.721	-0.786	0.544
ZAF	1.512	0.225	6.716	0.000	1.071	1.953
ZMB	1.985	0.657	3.022	0.003	0.698	3.273
ZWE	1.038	0.239	4.346	0.000	0.570	1.506

Note: This table offers gravity estimates based on equation (1). Column “Estimates” reports the point estimates. Column “Std. Error” lists the corresponding standard errors. “z” stands for the z-statistics. “p” for the corresponding p-value. The last two columns show the upper and lower margins of the 95% confidence interval. See text for further details.

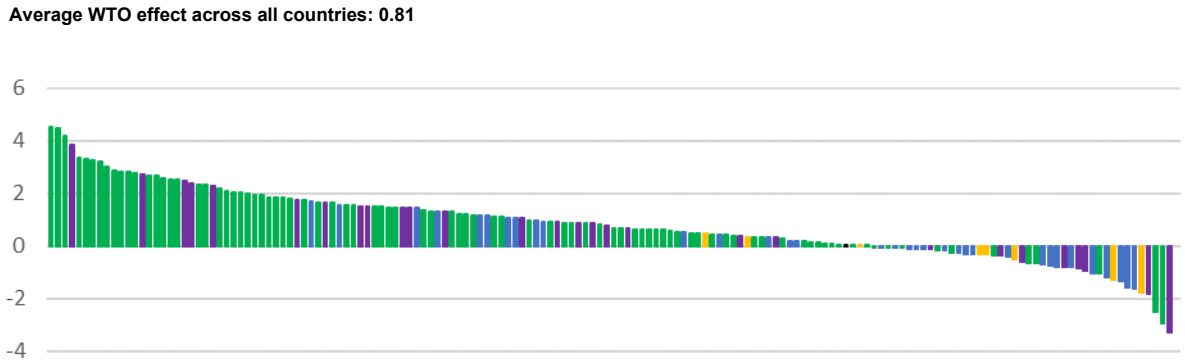
Table D 2.2: Country specific WTO effects: Ad-valorem equivalents (%)

ISO3 Code	AVE	ISO3 Code	AVE	ISO3 Code	AVE	ISO3 Code	AVE
LSO	-59.62	MMR	-29.50	CAF	-16.64	EST	-2.55
BWA	-58.57	BGD	-29.38	TWN	-16.06	UGA	-2.08
COD	-57.48	ATG	-29.24	KEN	-15.27	MNG	-1.66
HTI	-52.82	PHL	-28.84	SWE	-14.62	MLT	-0.81
BRN	-50.16	TZA	-28.80	COL	-14.11	GRC	0.27
BFA	-49.37	IRL	-27.56	GBR	-13.75	DMA	0.72
BOL	-47.08	GHA	-27.33	HUN	-13.62	ECU	1.07
TCD	-45.98	GTM	-26.04	BEL	-13.55	EGY	1.15
MDG	-44.40	GNB	-25.29	ESP	-13.38	YEM	3.07
MLI	-43.97	HKG	-25.05	VUT	-13.16	KOR	3.30
SYC	-43.57	USA	-24.48	NLD	-13.05	PRY	3.60
CRI	-42.60	PRT	-24.31	MWI	-12.48	BGR	3.71
HND	-42.05	NER	-23.39	FRA	-12.18	OMN	3.71
DOM	-41.69	TTO	-23.26	BRB	-12.17	LVA	3.71
CPV	-40.98	CMR	-23.14	CHE	-11.77	VCT	4.59
NIC	-40.07	ZWE	-22.85	IND	-11.31	CUB	5.16
ZMB	-39.12	NOR	-22.76	DEU	-11.03	MKD	8.28
LCA	-39.04	BLZ	-22.66	ROU	-10.98	ARM	9.04
GMB	-38.84	MYS	-22.62	VNM	-10.23	FJI	9.26
PNG	-36.93	KWT	-22.42	CZE	-9.53	LTU	9.83
SLV	-36.65	LUX	-22.19	JAM	-9.23	RUS	10.81
KHM	-36.60	ALB	-21.83	NZL	-8.83	GEO	11.58
MOZ	-35.98	VEN	-21.49	COG	-8.70	KAZ	11.66
MEX	-35.92	SAU	-21.21	AUT	-8.28	ARE	14.40
SUR	-35.77	AGO	-21.08	FIN	-7.94	SVN	16.00
PER	-34.89	JPN	-20.77	TUN	-7.42	TUR	17.75
GAB	-34.05	IDN	-20.68	PAK	-7.31	UKR	20.01
CHL	-33.52	SGP	-20.60	BRA	-7.09	KGZ	20.63
QAT	-32.88	NPL	-20.48	LIE	-6.77	PAN	21.97
MAC	-32.49	KNA	-20.36	ITA	-6.65	JOR	22.38
BDI	-32.26	THA	-19.98	TGO	-6.56	HRV	24.19
GRD	-32.05	SWZ	-19.97	DNK	-6.53	MDA	25.66
MUS	-31.93	AUS	-19.43	NGA	-5.63	TJK	30.37
CAN	-31.56	ISR	-19.40	SVK	-5.54	DJI	30.92
ZAF	-31.48	MAR	-19.34	MRT	-5.53	CYP	30.93
SLB	-31.28	LAO	-18.56	ISL	-5.50	GIN	34.09
NAM	-30.94	TON	-18.43	POL	-5.10	MNE	35.35
SEN	-29.94	CHN	-17.92	LKA	-3.86	WSM	43.13
SLE	-29.87	BEN	-17.68	RWA	-3.80		
MDV	-29.59	BHR	-17.31	URY	-3.03		
GUY	-29.53	CIV	-17.03	ARG	-2.59		

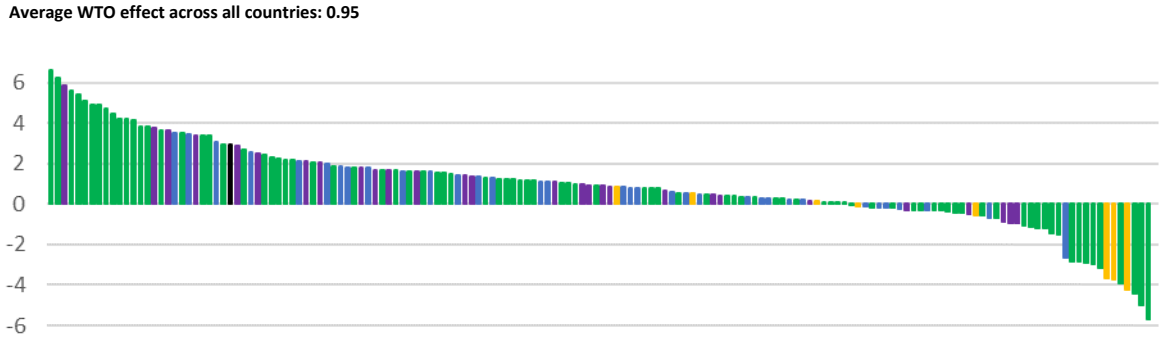
Note: The table offers ad-valorem equivalent (trade costs) reductions. The formula for ad-valorem tariff equivalents is ((exp(WTO estimate))^(1/(1-σ))-1)*100, where we set σ equal to 5, which is a standard value in the literature.

Figure D 1: Estimated impact on aggregate trade resulting from WTO membership, by country and sector

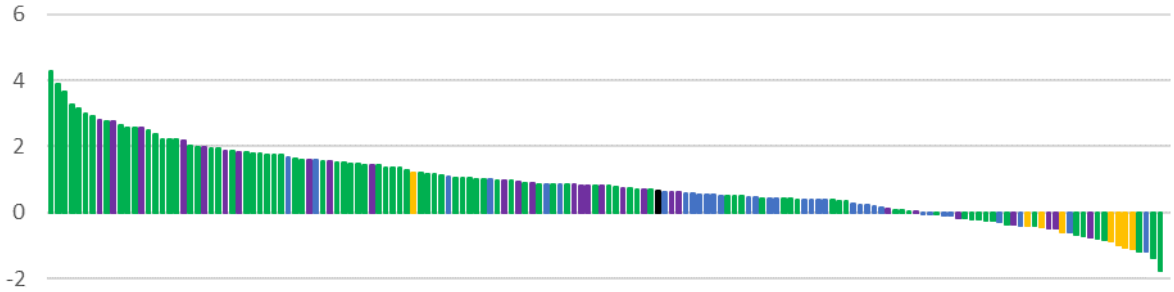
Panel a) Agriculture



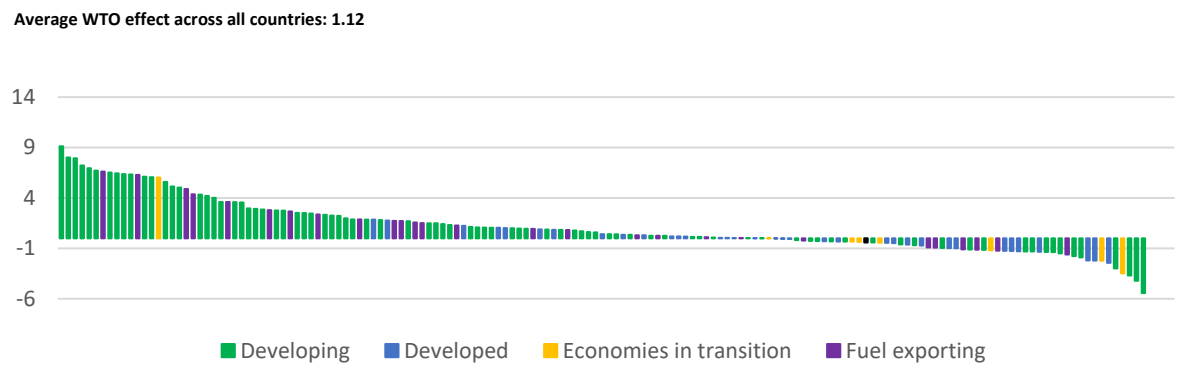
Panel b) Mining



Panel c) Manufacturing



Panel d) Services



Source: Own calculation and illustration.

Table D 3: Country and sector specific WTO estimates for trade

ISO3 Code	Agriculture	Mining	Manufacturing	Services
AGO	-3.288	0.959	0.945	-1.602
ALB	0.358	0.525	1.193	-0.440
ARE	-0.821	1.358	-0.737	-0.914
ARG	0.159	1.663	0.008	2.222
ARM	-0.303	-0.564	-0.393	0.003
ATG	-0.021	6.630	1.419	1.410
AUS	0.370	1.083	0.900	1.870
AUT	-0.031	2.011	0.411	-0.487
BDI	2.353	-0.149	1.173	
BEL	-0.247	1.860	0.516	0.177
BEN	2.043	4.201	0.368	1.982
BFA	3.024	2.203	2.566	0.614
BGD	1.200	-2.828	1.374	2.331
BGR	-0.075	-0.191	-0.083	-1.334
BHR	0.772	-0.928	0.816	-1.100
BLZ	1.824	3.811	0.970	0.397
BOL	2.397	2.505	2.816	-0.227
BRA	0.861	1.229	0.079	0.692
BRB	1.504	4.212	0.508	-0.176
BRN	1.641	2.867	2.755	3.607
BWA	2.657	5.599	3.280	2.507
CAF	0.072	2.676	1.052	9.131
CAN	0.414	3.414	1.585	1.759
CHE	-1.304	2.142	0.633	-0.616
CHL	1.760	0.385	1.804	2.759
CHN	0.700	-1.024	0.768	1.067
CIV	0.839	2.961	0.717	0.966
CMR	2.458	0.426	0.818	0.935
COD	2.796	2.180	4.271	0.130
COG	2.704	-0.263	1.555	1.570
COL	1.435	0.867	0.699	1.504
CPV	-0.618	5.112	2.203	4.207
CRI	1.787	3.484	2.482	0.405
CUB	1.944	3.818	-0.197	-1.112
CYP	1.167	-0.196	0.271	-2.440
CZE	0.330	0.819	0.520	-1.285
DEU	-0.374	1.626	0.413	-0.050
DJI	0.050	-5.713	-1.361	4.332
DMA	2.172	0.778	-0.217	0.243
DNK	-0.171	3.530	0.154	0.191
DOM	4.501	1.517	2.195	-4.215

ISO3 Code	Agriculture	Mining	Manufacturing	Services
ECU	-0.790	1.439	1.425	2.664
EGY	0.478	1.201	-0.255	0.874
ESP	1.079	1.101	0.389	0.840
EST	-1.166	1.338	0.378	-1.253
FIN	-0.280	0.812	0.390	-0.978
FJI	0.345	-4.967	-0.798	7.930
FRA	-0.086	0.604	0.450	0.193
GAB	3.857	1.600	1.870	0.113
GBR	0.046	2.955	0.642	-0.418
GEO	0.015	0.834	-0.578	-0.352
GHA	1.333	-1.194	1.754	1.120
GIN	0.337	-1.528	-1.174	0.138
GMB	3.297	1.133	1.753	
GNB	1.128	5.401	2.927	2.457
GRC	0.202	-0.107	-0.392	0.348
GRD	2.880	4.884	1.340	-3.695
GTM	1.296	0.769	1.267	0.588
GUY	0.043	1.138	1.939	8.019
HKG	0.613	1.593	1.033	1.849
HND	1.838	-2.810	2.778	-0.316
HRV	-1.554	0.293	-1.193	0.023
HTI	0.565	-3.174	3.873	
HUN	-0.102	0.321	0.572	-0.007
IDN	1.524	0.899	0.828	1.728
IND	0.642	0.553	0.403	1.490
IRL	0.955	1.118	1.658	-0.316
ISL	-0.735	-2.659	0.381	-0.068
ISR	0.411	-0.264	0.792	0.941
ITA	0.533	0.286	0.173	0.042
JAM	1.846	1.615	0.402	6.948
JOR	-0.339	0.458	-0.846	-2.995
JPN	1.711	-0.301	0.858	1.239
KAZ	-1.807	-0.498	-0.475	0.022
KEN	0.884	0.209	0.487	1.486
KGZ	-1.747	-4.217	-0.438	-1.203
KHM	0.130	1.173	1.943	0.344
KNA	-0.625	-0.321	1.012	-0.424
KOR	1.298	0.175	-0.170	0.304
KWT	-0.933	1.685	0.963	2.365
LAO	-0.067	0.376	3.010	6.104
LCA	4.545	4.693	1.858	2.854
LIE				-0.287

ISO3 Code	Agriculture	Mining	Manufacturing	Services
LKA	-1.033	-0.324	0.848	3.579
LSO	1.216	4.130	3.656	1.083
LTU	-1.633	1.770	-0.022	-2.191
LUX	1.080	0.186	0.845	0.890
LVA	-1.029	2.558	-0.019	-1.249
MAC	1.446	0.104	1.565	3.607
MAR	0.633	0.310	0.957	2.914
MDA	-0.311	-3.712	-1.049	-0.327
MDG	2.822	0.252	2.219	1.696
MDV	-2.928	-2.936	1.458	-0.282
MEX	1.093	0.057	2.369	-0.257
MKD	-0.679	0.530	-0.277	0.018
MLI	1.567	3.393	3.144	0.021
MLT	0.926	0.493	-0.103	0.407
MMR	2.826	2.450	1.149	-1.350
MNE	-1.283	0.152	-1.114	-3.482
MNG	1.441	-0.914	0.744	-0.932
MOZ	0.659	2.069	2.191	2.797
MRT	1.976	-0.369	0.425	-1.371
MUS	2.595	-0.045	1.530	-0.690
MWI	0.687	3.397	0.392	6.520
MYS	0.549	0.912	1.026	1.003
NAM	2.101	1.239	1.509	0.778
NER	3.284	6.266	0.902	0.242
NGA	1.515	0.438	0.001	1.717
NIC	2.336	0.340	2.021	-1.760
NLD	0.177	3.096	0.550	-0.447
NOR	0.861	1.784	0.833	1.268
NPL	0.422	3.666	1.019	-1.308
NZL	1.571	1.281	0.221	1.037
OMN	0.852	0.688	-0.459	-1.234
PAK	-0.227	-1.180	0.333	1.805
PAN	1.454	4.448	0.701	-5.430
PER	2.520	1.560	1.739	-0.602
PHL	0.647	0.763	1.374	2.970
PNG	1.771	0.912	1.963	6.610
POL	-0.795	1.440	0.219	-0.712
PRT	1.433	1.591	0.988	1.847
PRY	0.292	4.888	-0.709	5.035
QAT	0.897	2.087	1.600	-1.139
ROU	-0.298	-0.685	0.468	0.047
RUS	-0.346	-0.865	-0.351	0.243

ISO3 Code	Agriculture	Mining	Manufacturing	Services
RWA	3.194	-1.132	-0.347	5.145
SAU	0.310	5.843	0.631	4.363
SEN	2.529	-0.453	1.465	-1.150
SGP	-0.078	-1.405	0.864	1.872
SLB	1.929	-2.879	1.434	0.014
SLE	0.486	1.687	1.646	2.738
SLV	3.337	1.037	1.782	-1.494
SUR	2.672	1.811	1.803	-0.299
SVK	1.168	-0.256	0.548	-2.213
SVN	-0.779	0.234	-0.606	-0.995
SWE	-0.092	0.782	0.560	0.290
SWZ	0.869	1.879	0.817	4.007
SYC	0.172	2.272	2.653	6.441
TCD	2.294	3.411	2.546	4.884
TGO	1.366	-0.271	0.059	5.591
THA	1.494	-0.198	0.837	2.257
TJK	-0.513	-3.625	-1.003	6.035
TON	0.086	-3.923	-0.043	6.708
TTO	1.065	3.606	0.596	6.289
TUN	0.405	1.302	0.349	-0.962
TUR	0.007	0.285	-0.689	-1.900
TWN	1.641	-0.392	0.698	3.553
TZA	1.653	2.075	1.182	1.048
UGA	0.645	-0.567	-0.403	0.068
UKR	0.476	-0.074	-0.866	-2.236
URY	0.899	0.062	-0.174	2.517
USA	1.306	1.815	1.083	1.016
VCT	1.571	-0.699	-0.234	0.832
VEN	-0.115	1.687	1.831	0.828
VNM	-0.130	0.088	0.513	-1.309
VUT	-2.477	2.292	2.561	6.359
WSM	4.212	-4.433	-1.775	6.330
YEM	-0.586	3.785	0.093	
ZAF	1.175	0.998	1.608	1.306
ZMB	2.055	1.462	1.976	6.065
ZWE	0.956	1.030	1.139	7.226

Note: This table offers estimates of the effects of the WTO for each main sector in our sample, based on equation (1). See text for further details.

Table D 4: Aggregate effects on consumer and producer prices: Constrained scenario

country	producer price (%)	consumer price (%)	country	producer price (%)	consumer price (%)
AUS	5.99	3.19	IRL	9.40	-7.95
AUT	-1.09	-4.50	ITA	-2.94	-4.43
BEL	1.88	-5.20	JPN	3.62	1.23
BGR	-4.48	-5.91	KOR	-4.20	-5.89
BRA	-2.53	-3.67	LTU	-3.11	-4.72
CAN	7.99	-1.01	LUX	5.27	-8.53
CHE	0.01	-3.33	LVA	-4.24	-5.28
CHN	1.52	0.77	MEX	6.79	-3.50
CYP	-5.02	-6.44	MLT	-5.01	-9.76
CZE	-0.59	-4.65	NLD	2.14	-4.53
DEU	-0.11	-3.58	NOR	8.48	1.98
DNK	-2.25	-5.86	POL	-3.13	-5.19
ESP	-0.40	-2.77	PRT	5.22	-0.08
EST	-3.26	-6.06	ROU	-0.40	-2.79
FIN	-1.90	-4.94	RUS	-3.18	-3.95
FRA	-0.98	-3.82	SVK	-2.48	-5.42
GBR	-0.10	-2.92	SVN	-4.82	-6.50
GRC	-3.81	-4.86	SWE	2.00	-2.65
HRV	-4.19	-5.59	TUR	-4.58	-5.67
HUN	2.57	-5.19	TWN	4.59	-2.03
IDN	4.40	1.25	USA	3.79	1.38
IND	-1.03	-2.11	ROW	0.00	0.19

Note: This table reports GE estimates of the effects of the WTO on consumer and producer prices. Country names for ISO codes are listed in the Appendix. See main text for further details.

Table D 5: Aggregate indexes: Unconstrained scenario

country	welfare (%)	producer price (%)	consumer price (%)	total exports (%)
AUS	2.71	6.05	3.24	56.78
AUT	3.45	-0.87	-4.17	24.52
BEL	7.45	1.97	-5.10	37.17
BGR	0.81	-5.46	-6.22	0.78
BRA	1.20	-2.49	-3.64	34.12
CAN	12.24	14.23	1.77	144.57
CHE	3.45	0.15	-3.19	33.50
CHN	0.74	1.68	0.94	50.48
CYP	-0.79	-10.93	-10.22	-15.02
CZE	4.14	-0.37	-4.33	27.99
DEU	3.54	0.06	-3.36	35.33
DNK	3.79	-2.12	-5.70	25.49
ESP	2.48	-0.36	-2.77	44.06
EST	2.64	-3.07	-5.56	10.72
FIN	3.10	-1.71	-4.66	30.75
FRA	2.96	-0.88	-3.73	45.31
GBR	2.94	0.01	-2.85	46.14
GRC	0.93	-3.81	-4.70	6.94
HRV	-0.28	-8.40	-8.14	-10.39
HUN	8.06	2.77	-4.90	33.63
IDN	3.08	4.50	1.38	56.89
IND	1.10	-1.01	-2.09	29.90
IRL	21.71	12.56	-7.52	56.29
ITA	1.51	-2.76	-4.21	27.34
JPN	2.37	3.76	1.35	71.89
KOR	1.51	-5.20	-6.61	14.85
LTU	-0.32	-5.95	-5.65	-6.64
LUX	15.22	5.36	-8.56	40.08
LVA	0.44	-5.05	-5.46	-0.32
MEX	16.99	17.44	0.38	205.33
MLT	4.74	-4.67	-8.98	11.65
NLD	7.01	2.27	-4.43	33.08
NOR	6.41	8.58	2.04	48.07
POL	2.00	-2.77	-4.68	18.79
PRT	5.35	5.50	0.14	65.42
ROU	2.28	-0.08	-2.31	26.25
RUS	0.40	-5.87	-6.25	2.53
SVK	2.94	-2.30	-5.09	15.76
SVN	-0.60	-10.02	-9.48	-12.93
SWE	4.72	2.17	-2.43	42.99
TUR	0.31	-7.55	-7.84	-3.66
TWN	6.80	4.77	-1.90	42.97
USA	2.84	4.08	1.20	110.99
ROW	-0.15	0.00	0.15	-2.51

Note: This table reports GE estimates of the effects of the WTO on welfare, total exports, consumer and producer prices based on the unconstrained partial estimates of the impact of WTO on country-specific export costs for member countries. Country names for ISO codes are listed in the Appendix. See main text for further details.

Table D 6: Sectoral indexes - Agriculture

	A. unconstrained				B. constrained = 0/1.1			
country	welfare (%)	producer price (%)	consumer price (%)	total exports (%)	welfare (%)	producer price (%)	consumer price (%)	total exports (%)
AUS	1.41	-2.80	-4.15	42.72	1.16	-2.26	-3.38	35.41
AUT	0.03	-4.03	-4.05	-3.01	0.78	-3.94	-4.68	3.33
BEL	0.24	-6.48	-6.71	-3.41	1.79	-3.35	-5.05	2.69
BGR	0.44	-4.04	-4.46	1.15	0.82	-3.97	-4.75	5.72
BRA	3.42	2.22	-1.16	63.89	3.20	2.57	-0.62	60.83
CAN	4.89	-1.82	-6.39	74.83	4.10	-1.66	-5.53	63.91
CHE	-0.80	-10.35	-9.63	-8.02	1.14	-2.21	-3.31	4.53
CHN	0.60	-3.18	-3.76	62.98	0.51	-2.32	-2.82	54.29
CYP	3.07	3.83	0.74	41.50	3.30	3.11	-0.18	42.80
CZE	1.15	-0.51	-1.64	13.12	1.87	-0.94	-2.76	20.85
DEU	-0.06	-8.13	-8.07	-4.89	1.22	-3.76	-4.91	5.14
DNK	0.29	-3.94	-4.21	-1.31	1.13	-3.21	-4.29	7.03
ESP	2.70	8.04	5.20	55.16	2.68	7.82	5.00	54.70
EST	-2.06	-7.85	-5.90	-31.38	0.81	-3.25	-4.03	4.26
FIN	-0.08	-6.27	-6.19	-7.14	0.80	-4.16	-4.92	6.35
FRA	0.74	-4.88	-5.57	8.35	1.01	-4.49	-5.44	14.01
GBR	1.25	-3.21	-4.41	10.98	1.33	-3.27	-4.54	11.84
GRC	1.11	-2.78	-3.85	12.54	1.31	-3.26	-4.51	14.65
HRV	-0.83	-8.62	-7.86	-19.78	0.72	-3.65	-4.34	6.20
HUN	0.14	-4.66	-4.79	-3.63	0.88	-4.30	-5.14	5.36
IDN	4.60	11.15	6.27	75.31	3.06	6.44	3.29	48.96
IND	0.73	0.69	-0.05	36.41	0.64	1.07	0.43	32.41
IRL	14.31	7.35	-6.09	50.94	13.56	7.40	-5.42	49.43
ITA	1.54	0.86	-0.67	28.49	1.74	0.77	-0.95	31.82
JPN	4.53	10.48	5.69	119.86	2.71	4.14	1.39	68.77
KOR	6.05	11.76	5.39	65.22	4.59	9.44	4.64	50.16
LTU	-3.23	-10.36	-7.36	-25.37	1.21	-2.88	-4.03	2.82
LUX	7.28	8.49	1.13	8.42	9.62	9.09	-0.48	9.63
LVA	-1.90	-2.54	-0.64	-34.77	0.60	-2.95	-3.53	3.95
MEX	7.69	3.43	-3.96	173.13	6.69	3.74	-2.77	155.49
MLT	5.79	7.03	1.18	35.72	5.90	7.05	1.08	36.27
NLD	1.97	-2.85	-4.73	10.52	2.30	-2.56	-4.75	12.98
NOR	2.90	5.88	2.90	33.23	3.36	5.87	2.42	37.42
POL	-0.75	-8.75	-8.06	-26.87	0.50	-4.30	-4.78	5.15
PRT	5.38	5.33	-0.04	86.78	4.35	2.08	-2.17	67.09
ROU	0.11	-4.65	-4.75	-2.22	0.48	-3.81	-4.26	7.45
RUS	0.54	-5.33	-5.83	6.25	0.81	-4.01	-4.78	13.10
SVK	5.41	9.63	4.00	59.88	5.97	8.32	2.21	62.18
SVN	-1.06	-9.88	-8.91	-16.50	1.97	-4.59	-6.43	6.94
SWE	0.42	-3.85	-4.25	0.68	1.04	-3.25	-4.25	5.94
TUR	1.02	-4.91	-5.87	17.38	1.03	-4.88	-5.86	17.91
TWN	10.97	16.17	4.69	71.58	6.77	8.72	1.82	43.85
USA	2.65	8.64	5.84	76.50	2.17	6.52	4.26	61.63
ROW	0.00	0.00	0.00	0.14	-0.06	0.00	0.06	-2.07

Note: This table reports GE estimates of the effects of the WTO on welfare, total exports, consumer and producer prices for Agriculture based on the corresponding constrained and the unconstrained partial estimates of the impact of WTO on country-specific export costs for member countries. The term “welfare” is used loosely to denote the ratio between producer and consumer prices in the sector. An imperfect alternative could be “Terms of Trade”. Country names for ISO codes are listed in the Appendix. See main text for further details.

Table D 7: Sectoral indexes - Mining

country	A. unconstrained				B. constrained = 0/1.1			
	welfare (%)	producer price (%)	consumer price (%)	total exports (%)	welfare (%)	producer price (%)	consumer price (%)	total exports (%)
AUS	3.14	2.06	-1.05	45.72	2.59	4.94	2.28	41.89
AUT	23.47	25.75	1.84	49.94	10.64	11.10	0.42	22.81
BEL	36.98	23.90	-9.55	25.91	15.05	11.16	-3.38	10.80
BGR	1.94	-2.99	-4.83	5.88	1.46	-1.62	-3.04	4.86
BRA	3.53	-0.03	-3.43	43.47	2.26	1.52	-0.72	30.31
CAN	45.79	44.17	-1.11	348.70	9.15	5.66	-3.19	90.17
CHE	21.11	23.45	1.93	28.64	7.40	7.77	0.35	8.89
CHN	0.42	-6.65	-7.04	15.98	0.36	-3.84	-4.19	17.42
CYP	4.40	-1.70	-5.85	2.72	2.73	-0.78	-3.41	1.96
CZE	10.75	2.37	-7.56	49.74	8.12	4.30	-3.53	42.65
DEU	26.71	17.83	-7.01	33.54	12.13	11.05	-0.96	18.10
DNK	53.11	54.94	1.20	72.20	10.69	8.43	-2.05	11.51
ESP	6.53	4.05	-2.32	18.39	4.52	5.39	0.84	14.44
EST	18.42	10.56	-6.64	42.91	12.44	9.05	-3.02	32.79
FIN	12.82	4.23	-7.62	30.60	8.56	5.96	-2.39	24.48
FRA	11.21	2.76	-7.59	12.52	6.71	3.48	-3.03	9.01
GBR	27.52	24.67	-2.23	129.58	6.93	2.37	-4.27	35.34
GRC	5.42	-1.50	-6.56	4.73	2.63	-0.79	-3.33	2.53
HRV	5.10	-3.97	-8.63	22.24	3.41	-2.78	-5.98	15.58
HUN	13.61	1.20	-10.92	9.22	7.93	1.74	-5.74	6.66
IDN	1.29	0.71	-0.57	15.10	1.24	1.58	0.34	15.26
IND	2.27	-0.12	-2.33	10.11	1.49	0.87	-0.61	7.15
IRL	32.06	7.03	-18.95	19.70	17.41	6.89	-8.96	15.22
ITA	5.85	-0.60	-6.10	11.48	3.49	0.84	-2.56	7.89
JPN	2.95	-3.60	-6.36	3.27	3.02	-1.81	-4.68	5.42
KOR	2.03	-0.40	-2.39	1.03	1.31	0.72	-0.58	0.86
LTU	28.94	19.63	-7.22	24.26	15.04	9.74	-4.61	12.13
LUX	17.78	1.49	-13.83	1.54	9.56	0.64	-8.15	0.68
LVA	33.50	30.15	-2.51	69.54	11.13	7.55	-3.22	23.56
MEX	6.51	-9.39	-14.93	47.01	3.67	-5.76	-9.10	29.63
MLT	21.02	5.39	-12.91	10.39	11.36	4.19	-6.44	7.14
NLD	48.03	55.16	4.82	100.25	10.91	12.57	1.49	23.63
NOR	18.85	9.45	-7.92	91.52	6.81	2.46	-4.07	38.19
POL	9.48	6.09	-3.10	91.79	5.92	4.26	-1.57	61.22
PRT	10.92	7.85	-2.77	18.45	6.54	4.61	-1.81	11.27
ROU	1.73	-5.65	-7.25	10.06	1.46	-2.54	-3.95	10.45
RUS	1.47	-4.65	-6.03	9.36	0.98	-1.99	-2.94	6.89
SVK	5.57	-4.65	-9.68	1.87	4.85	-1.54	-6.09	3.53
SVN	8.14	-0.87	-8.33	9.22	5.36	-0.10	-5.18	6.83
SWE	15.68	3.86	-10.21	25.74	9.30	5.53	-3.45	19.30
TUR	3.41	-2.11	-5.34	14.37	2.32	-1.11	-3.35	10.39
TWN	2.89	-3.76	-6.46	-0.88	2.64	-0.82	-3.37	0.16
USA	11.32	6.54	-4.30	168.95	3.35	2.39	-0.94	57.67
ROW	-0.33	0.00	0.33	-17.32	-0.20	0.00	0.20	-10.23

Note: This table reports GE estimates of the effects of the WTO on welfare, total exports, consumer and producer prices for Mining, based on the corresponding constrained and the unconstrained partial estimates of the impact of WTO on country-specific export costs for member countries. The term “welfare” is used loosely to denote the ratio between producer and consumer prices in the sector. An imperfect alternative could be “Terms of Trade”. Country names for ISO codes are listed in the Appendix. See main text for further details.

Table D 8: Sectoral indexes – Manufacturing

	A. unconstrained				B. constrained = 0/1.1			
country	welfare (%)	producer price (%)	consumer price (%)	total exports (%)	welfare (%)	producer price (%)	consumer price (%)	total exports (%)
AUS	6.16	12.71	6.17	35.84	6.15	12.59	6.06	35.70
AUT	5.79	1.35	-4.20	21.36	6.00	1.12	-4.60	21.71
BEL	9.79	3.15	-6.04	24.69	9.81	3.02	-6.18	24.57
BGR	0.59	-4.26	-4.82	-1.84	1.49	-3.66	-5.07	2.78
BRA	1.16	-3.53	-4.63	22.06	1.12	-3.61	-4.67	21.24
CAN	23.16	22.75	-0.34	103.55	16.74	13.81	-2.51	74.98
CHE	5.19	1.91	-3.12	37.12	5.06	1.85	-3.06	36.27
CHN	0.69	1.59	0.89	52.32	0.70	1.34	0.64	52.16
CYP	1.93	-0.77	-2.65	7.79	2.48	-0.96	-3.36	9.88
CZE	7.04	2.48	-4.26	28.91	7.17	2.22	-4.62	28.97
DEU	4.41	0.28	-3.96	29.21	4.51	0.05	-4.26	29.44
DNK	4.26	-1.96	-5.96	13.83	4.27	-2.11	-6.12	13.71
ESP	2.84	-1.41	-4.14	32.68	2.69	-1.36	-3.94	30.98
EST	6.42	1.12	-4.98	19.94	6.64	0.93	-5.36	20.24
FIN	4.09	0.17	-3.76	27.93	4.25	-0.06	-4.13	28.60
FRA	4.27	0.30	-3.81	30.55	4.29	0.16	-3.96	30.48
GBR	5.43	2.64	-2.64	41.15	5.33	2.50	-2.68	40.35
GRC	-0.26	-3.94	-3.69	-7.12	0.51	-2.29	-2.79	1.91
HRV	-1.59	-11.24	-9.81	-16.98	1.71	-3.90	-5.52	4.78
HUN	10.39	4.02	-5.77	27.23	10.50	3.76	-6.10	27.08
IDN	3.61	5.63	1.95	46.70	3.66	5.49	1.76	47.11
IND	1.00	-1.39	-2.37	30.03	0.99	-1.38	-2.35	29.53
IRL	37.92	25.28	-9.16	56.60	26.46	13.82	-9.99	37.77
ITA	1.61	-3.01	-4.55	17.80	1.68	-3.22	-4.81	18.33
JPN	3.00	4.58	1.53	62.82	3.00	4.36	1.33	62.36
KOR	1.40	-5.29	-6.60	11.44	1.82	-4.01	-5.73	18.33
LTU	0.81	-2.62	-3.40	-0.53	1.59	-2.76	-4.28	1.56
LUX	17.27	8.50	-7.48	12.24	17.42	8.30	-7.76	12.07
LVA	1.29	-3.47	-4.70	2.18	1.69	-3.48	-5.08	3.67
MEX	27.32	30.01	2.12	258.08	12.36	7.74	-4.11	121.20
MLT	2.86	-4.47	-7.12	1.52	4.00	-3.47	-7.17	4.57
NLD	10.31	4.44	-5.32	21.97	10.28	4.23	-5.49	21.71
NOR	6.86	9.35	2.33	26.21	6.75	9.19	2.29	25.78
POL	2.47	-1.96	-4.32	15.95	2.67	-2.37	-4.91	16.80
PRT	7.04	5.89	-1.08	53.56	7.08	5.76	-1.23	53.56
ROU	2.74	1.17	-1.53	21.73	2.99	0.81	-2.11	23.07
RUS	0.36	-5.86	-6.20	0.53	0.91	-2.72	-3.60	5.89
SVK	7.02	2.70	-4.04	28.39	7.28	2.49	-4.47	28.86
SVN	-1.73	-10.58	-9.01	-16.09	2.22	-4.39	-6.46	3.12
SWE	5.73	2.83	-2.74	32.65	5.84	2.59	-3.07	32.85
TUR	-0.01	-7.49	-7.48	-9.03	1.25	-4.02	-5.21	10.14
TWN	7.31	5.37	-1.81	45.40	7.30	5.08	-2.06	44.94
USA	5.15	5.18	0.03	119.16	3.91	4.87	0.92	93.86
ROW	-0.26	0.00	0.26	-2.72	-0.30	0.00	0.30	-3.20

Note: This table reports GE estimates of the effects of the WTO on welfare, total exports, consumer and producer prices for Manufacturing, based on the corresponding constrained and the unconstrained partial estimates of the impact of WTO on country-specific export costs for member countries. The term “welfare” is used loosely to denote the ratio between producer and consumer prices in the sector. An imperfect alternative could be “Terms of Trade”. Country names for ISO codes are listed in the Appendix. See main text for further details.

Table D 9: Sectoral indexes – Services

	A. unconstrained				B. constrained = 0/1.1			
country	welfare (%)	producer price (%)	consumer price (%)	total exports (%)	welfare (%)	producer price (%)	consumer price (%)	total exports (%)
AUS	4.02	11.74	7.42	202.66	2.06	3.71	1.62	98.24
AUT	-0.70	-8.39	-7.74	-17.31	0.53	-4.53	-5.03	2.91
BEL	1.77	-3.55	-5.24	10.90	2.22	-3.46	-5.56	14.44
BGR	-1.24	-11.43	-10.31	-25.24	0.85	-4.66	-5.46	5.39
BRA	1.19	-0.75	-1.92	60.39	1.05	-0.01	-1.05	54.50
CAN	8.07	11.27	2.96	196.11	5.12	3.82	-1.24	120.46
CHE	-0.30	-8.81	-8.53	-10.44	0.82	-4.10	-4.88	6.90
CHN	1.17	4.02	2.82	68.26	0.90	5.36	4.42	54.83
CYP	-2.25	-15.09	-13.14	-30.23	1.24	-5.06	-6.22	4.52
CZE	-2.15	-16.57	-14.74	-39.73	0.55	-5.14	-5.66	2.12
DEU	0.44	-5.70	-6.11	2.79	0.80	-5.00	-5.76	8.78
DNK	1.81	-2.94	-4.66	16.72	2.08	-3.06	-5.03	19.51
ESP	1.68	3.09	1.39	46.92	1.60	2.89	1.27	44.63
EST	-2.99	-14.22	-11.58	-32.06	1.08	-4.17	-5.19	4.01
FIN	-0.55	-12.93	-12.45	-20.55	1.15	-5.39	-6.47	12.30
FRA	1.01	-4.26	-5.21	21.26	1.10	-4.12	-5.17	23.84
GBR	0.38	-8.24	-8.59	0.11	0.86	-5.25	-6.06	13.54
GRC	0.99	-2.84	-3.79	12.09	1.37	-2.64	-3.96	17.78
HRV	0.12	-3.11	-3.22	-1.71	0.66	-3.56	-4.19	3.90
HUN	0.03	-4.97	-5.00	-4.18	0.98	-4.84	-5.76	1.88
IDN	5.93	10.14	3.97	172.66	3.13	3.53	0.39	89.16
IND	2.49	7.30	4.69	68.26	1.70	4.12	2.39	45.42
IRL	2.81	-6.82	-9.37	1.94	4.75	-4.36	-8.70	10.37
ITA	0.35	-4.61	-4.93	6.25	0.47	-4.67	-5.11	9.84
JPN	2.66	4.18	1.49	130.42	1.87	3.56	1.66	93.53
KOR	2.65	-1.57	-4.11	41.89	2.13	-1.10	-3.16	34.42
LTU	-2.89	-16.88	-14.41	-21.83	0.83	-3.24	-4.04	2.15
LUX	7.96	2.82	-4.76	31.92	9.29	2.79	-5.94	35.67
LVA	-1.65	-10.07	-8.57	-34.08	0.54	-4.31	-4.82	3.70
MEX	2.32	-9.71	-11.75	24.22	2.86	-6.35	-8.96	37.28
MLT	3.91	-1.33	-5.04	15.41	6.11	-1.48	-7.16	23.53
NLD	0.32	-9.82	-10.11	-5.78	1.68	-5.64	-7.19	9.20
NOR	4.43	8.60	3.99	60.34	4.16	6.75	2.48	55.06
POL	-0.86	-11.99	-11.22	-22.87	0.54	-5.24	-5.74	3.76
PRT	5.35	14.32	8.51	103.27	3.14	5.20	2.00	56.27
ROU	0.26	-3.76	-4.01	-0.11	0.63	-4.07	-4.66	4.96
RUS	0.49	-1.94	-2.41	9.71	0.67	-1.87	-2.52	13.67
SVK	-2.84	-20.43	-18.11	-40.50	0.36	-4.76	-5.10	0.05
SVN	-1.49	-11.59	-10.25	-25.30	0.60	-4.58	-5.15	2.02
SWE	1.88	-2.16	-3.96	21.60	2.10	-2.21	-4.23	24.22
TUR	-0.07	-10.80	-10.74	-12.81	0.78	-4.92	-5.66	13.28
TWN	36.05	56.66	15.15	252.70	7.34	9.55	2.06	56.36
USA	1.54	1.92	0.38	83.87	1.26	2.74	1.45	71.04
ROW	0.12	0.00	-0.12	2.67	-0.03	0.00	0.03	-0.58

Note: This table reports GE estimates of the effects of the WTO on welfare, total exports, consumer and producer prices for Services, based on the corresponding constrained and the unconstrained partial estimates of the impact of WTO on country-specific export costs for member countries. The term “welfare” is used loosely to denote the ratio between producer and consumer prices in the sector. An imperfect alternative could be “Terms of Trade”. Country names for ISO codes are listed in the Appendix. See main text for further details.

Appendix E

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	Reunion	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-Barthelemy	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		

Source: World Bank Group

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