



# How Differing Trade Policies May Impact U.S. Agriculture: The Potential Economic Impacts of TPP, USMCA, and NAFTA

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## Executive Summary

In the last two years, the United States has reversed the post-World War II trend toward the lowering of trade barriers and a commitment towards multilateral free trade. Citing a need to "level the playing field" and hold trading partners accountable to their commitments, the current Administration has moved towards a more protectionist and perhaps mercantilist position vis-à-vis trade policy. One of the Administration's first actions in this regard was the decision to leave the Trans-Pacific Partnership (TPP) agreement, followed thereafter by raising tariffs on steel and aluminum imports. The Administration's actions on trade are likely to have significant implications for U.S. farmers as these actions target three of the largest markets for U.S. agricultural exports – Canada, China and Mexico – accounting for some 44%, and representing an average of $63 billion, of U.S. agricultural exports 2013 to 2015.

Though the yet-to-be-ratified renegotiation of the North American Free Trade Agreement (NAFTA), known as the United States-Mexico-Canada Agreement (USMCA or NAFTA 2.0), consolidates the gains from the original agreement and provides some additional modest market access for U.S. agricultural exports (an estimated $454 million), U.S. farmers still are facing strong headwinds and the possibility of a significant loss of export revenues. According to these estimates, the United States' withdrawal from the TPP reduces agricultural and food exports by $1.8 billion a year ($1.4 billion, with the offsetting $454 million of USMCA export gains). Following trade liberalization between the 11 remaining TPP members, there is an increase in

[1] This paper is an extension of an analysis commissioned by Farm Foundation in October 2018. The Purdue economists have expanded their original work to examine potential scenarios that may develop as events continue to evolve in the trade arena.

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trade within those countries, which substitutes away from U.S.-based imports and causes a corresponding loss in U.S. export markets. However, if the United States were to rejoin the TPP, the agreement would significantly benefit U.S. farmers—the loss of $1.4 billion would turn into a gain of $2.9 billion in additional agricultural exports.

If the current U.S. trade policy were to continue towards protectionism (i.e., with the U.S. withdrawal from TPP, with the global retaliatory tariffs and if the United States were to entirely withdraw from NAFTA), U.S. agricultural exports would drop by $21.8 billion. These negative trade impacts would be reflected in lower incomes for U.S. farmers, reduced agricultural land returns and farm labor displacement. On average, such an export reduction is equivalent to $4,000 per person employed in the agricultural and food sectors. This scenario would also result in an aggregate welfare loss of $42.5 billion to the U.S. economy, or $340 per U.S. household.

What does all this mean? It suggests that U.S. agriculture is entering a volatile period in international trade. The data suggests the sector currently risks losing much of the trade gains achieved over the past three decades. The analysis predicts that if the USMCA is approved, if the trade war ends and if the United States rejoins TPP, U.S. agriculture could see not only the gains of the past decades reinforced but could also realize the potential for additional trade gains. Needless to say, the outcome strongly impacts the future of the U.S. food and agriculture sector.

## Introduction

The purpose of this study is to estimate the impacts on U.S. agriculture of the set of recently agreed and potential trade policies. First, this paper provide a review of the previous assessment of the recently negotiated United States-Mexico-Canada Agreement (USMCA, sometimes referred to as NAFTA 2.0).[3] This analysis was originally completed in October 2018 and is done from two different perspectives – estimating the impacts of changes introduced in the USMCA related to the U.S. agricultural sector, assuming no other changes to trade policy, and then estimating the impacts of other tariff changes (e.g., steel and aluminum tariffs and the retaliation against those U.S.-imposed tariffs), including the agricultural tariffs imposed by Canada and Mexico and the agricultural tariffs imposed by other countries, such as China and the European Union (EU).

Then, the analysis is extended to explore the recently implemented Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP or TPP11).[4] Despite U.S. withdrawal from the original Trans-Pacific Partnership (TPP), implementation of this new agreement will impact U.S. agriculture as the TPP11 countries substitute away from U.S. products.

While the USMCA, TPP11 and other trade policies correspond to ongoing economic adjustments in the U.S. agricultural sector in the near term, alternative policies could be introduced – either towards further protectionism or trade liberalization. One of the possible protectionist measures includes dissolution of NAFTA, which has been recently discussed by the Trump

[3] The trade agreement was signed on November 30, 2018, though it requires ratification by all three member states.
[4] The agreement has been signed by 11 partners: Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore and Vietnam. The start data of the agreement was on December 30, 2018—with an initial six countries having ratified the agreement. To date, 7 of the 11 countries have ratified.

Administration. This analysis includes estimated economic impacts on the U.S. agricultural sector of withdrawing from NAFTA. Alternatively, one of the possible trade liberalization measures would be for the United States to rejoin the original TPP, in addition to the USMCA. This analysis includes estimated economic impacts on the U.S. agricultural sector of joining and implementing the original TPP.

This paper contains the sections examining the following trade policy scenarios, as described in Table 1:

- An overview of the U.S. historical performance of agricultural trade;
- A review of the USMCA and impacts of this agreement on U.S. agriculture as a stand-alone policy, as well as in a context of broader trade policies, such as retaliatory tariffs;
- A review of key policy changes in the TPP11 and the impacts of this agreement on U.S. agriculture without U.S. participation;
- The impact on U.S. agriculture if the United States were to withdraw from NAFTA; and
- The impact on U.S. agriculture if the United States were to rejoin the original TPP.

The paper ends with some overall conclusions.

**Table 1. Policy scenarios**

| Reference | Policy scenario | Description |
|---|---|---|
| ***Reference:*** GTAP 10p2 2014 database + NTBs | USMCA | Impacts of USMCA implementation (increase in market access of U.S. agricultural exports to Canada). |
| | USMCA + retaliation by Canada and Mexico | Adds U.S. aluminum and steel import tariffs and retaliatory agricultural tariffs by Canada and Mexico. |
| | USMCA + all retaliation | Adds retaliatory trade measures by other U.S. trading partners, including China and the European Union (EU). |
| | USMCA + all retaliation + TPP11 | Adds reduction of tariff (MAcMap, 2018) and non-tariff (Kee et al., 2009; Jafari and Tarr, 2015) barriers among TPP11 signatory countries. |
| | NAFTA termination | NAFTA termination scenario. 'Most-favored nation' (MFN) tariffs for all intra-NAFTA trade are imposed (Ciuriak et al., 2017). Non-tariff barriers (NTBs) for trade in services within NAFTA countries increase (Ciuriak et al., 2017). |
| | USMCA + TPP12 | USMCA implementation and United States rejoins TPP. Reductions in tariff (MAcMap, 2018) and non-tariff (Kee et al., 2009; Jafari and Tarr, 2015) barriers among 12 TPP members. |

Source: Authors.

## U.S. agricultural trade: An historical perspective

To put the analysis in this paper in context, it is useful to examine the historical trends of U.S. agricultural trade. Figure 1 shows that since 1961, U.S. agricultural exports and imports have increased significantly, growing at a pace comparable with GDP (3.0% to 3.3% annually). Following NAFTA implementation in 1995, U.S. agricultural imports have been outpacing agricultural exports and GDP, by growing on average 4.2% per year (Figure 1). Over one third (36.6%) of the increase in U.S. agricultural and food imports between 1995 and 2017 was associated with Canada and Mexico.

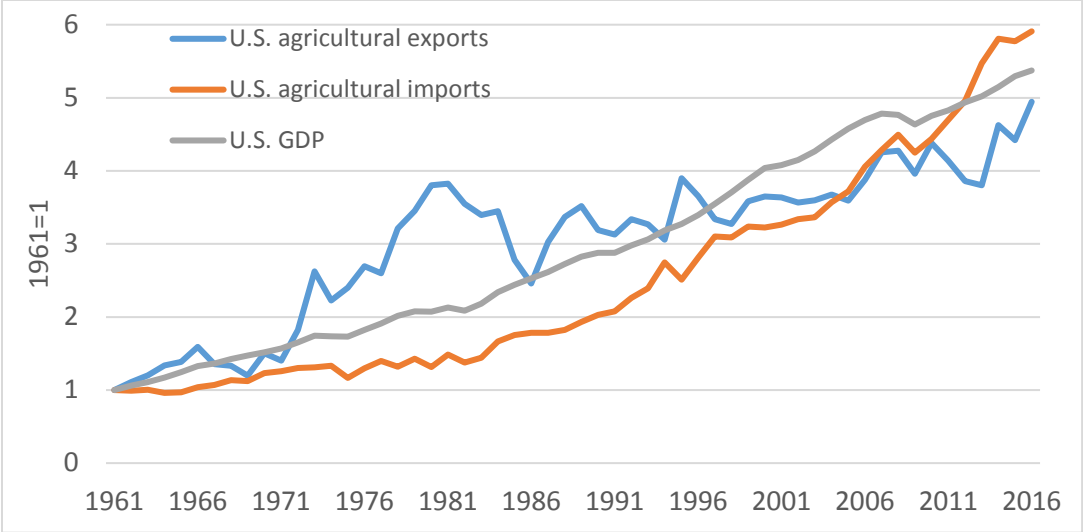


**Figure 1. U.S. agricultural trade and GDP since 1961**
*Source:* WB (2018), FAO (2018).

Such growth has been accompanied by a major shift in U.S. agricultural trade destinations and sources. Figure 2 shows the shares of major agricultural export destinations in 1995 and 2017. Over that time period, the shares of U.S. agricultural exports destined for Canada and Mexico more than doubled, moving from 14.2% to 29.8%. Other notable changes include Japan falling from the top export market, at 24% in 1995 to 8.5% in 2017, and China moving up significantly on the list, from 4.7% to 13.7%, roughly tripling in share.

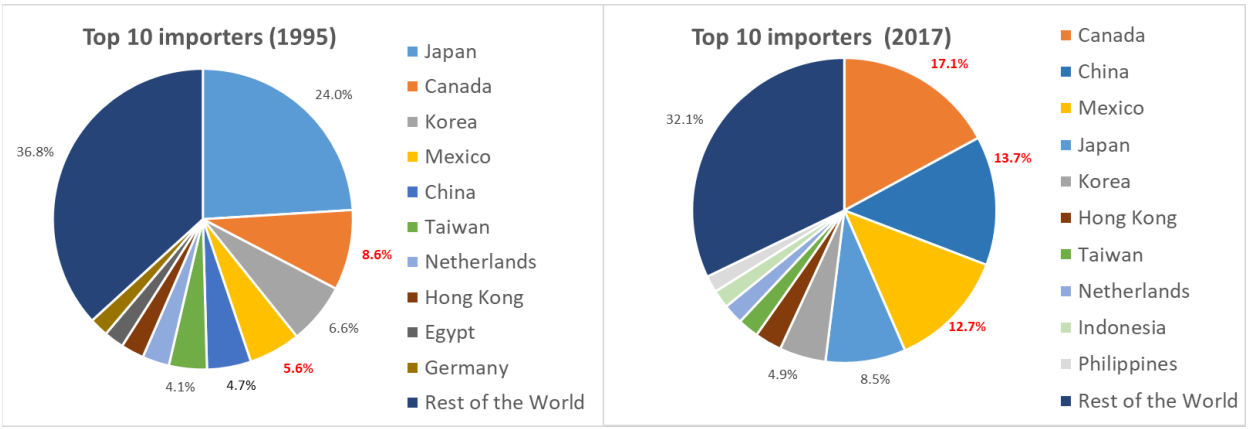


**Figure 2. Destination shares for U.S. agricultural exports**
*Source:* UN (2018), Aguiar et al. (2016).

Figure 3 shows the sources of U.S. agricultural imports. Canada and Mexico were already the largest sources of U.S. agricultural imports in 1995, due largely to their proximity to the U.S. market. Their combined shares grew a bit from 30% to 35% from 1995 to 2017. China was not an important agricultural exporter in 1995, but ranked third in 2017, now accounting for 5% of U.S. agricultural imports. The relative importance of Canada, Mexico and China in U.S. agricultural trade provides valuable context for the analysis of the impacts of trade policy changes that follows.

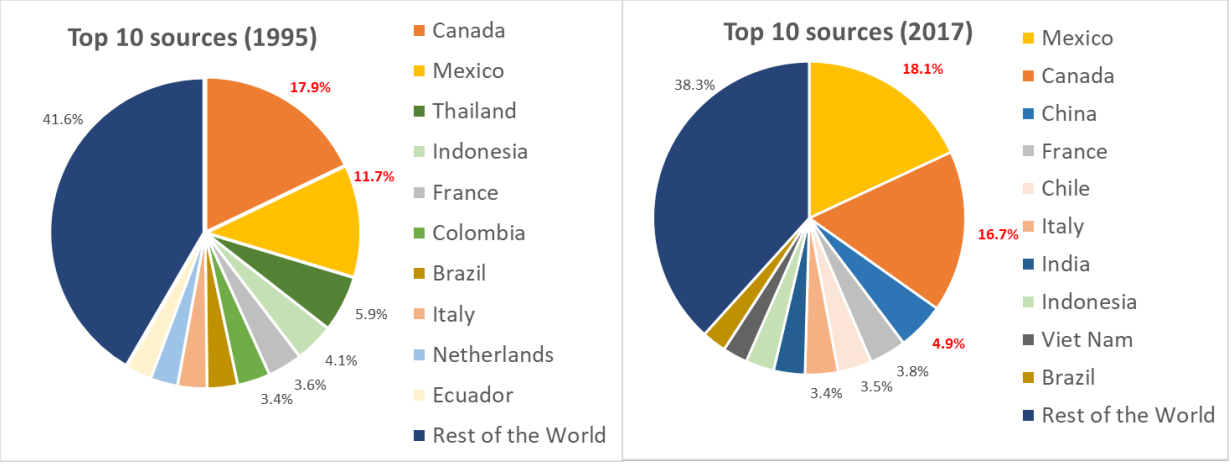


**Figure 3. Source shares for U.S. agricultural imports**

*Source:* UN (2018), Aguiar et al. (2016).

## A review of the USMCA and retaliatory tariffs impacts on U.S. agriculture

In an October 2018 Farm Foundation/Purdue University analysis, a quantitative assessment estimated the possible impacts from different trade policy regimes in a volatile trade policy context. That analysis concluded that the U.S. agriculture sector has benefitted significantly from increasing market access in Canada and Mexico as a result of the formation of NAFTA some 25 years ago. The share of U.S. agricultural exports to these two countries has increased from 14.2% when the agreement was first signed to almost 30% currently.

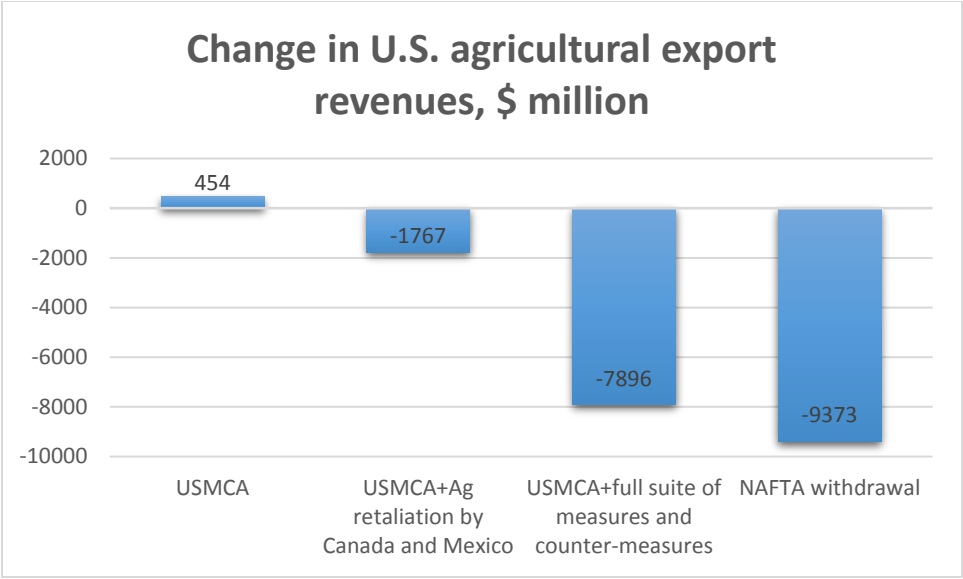


**Figure 4. Export revenues under various scenarios**

*Source*: GTAP model simulations and Ciuriak et al. 2017 for NAFTA withdrawal.

The USMCA does have some benefits for the U.S. food and agriculture sector in that it consolidates the agricultural market access gains from NAFTA 1.0 and, in some sectors, leads to an improvement in market access, most notably in dairy and poultry exports to Canada. U.S.

agricultural exports would increase by an estimated **$454 million** per year under the USMCA, with export gains largely concentrated in dairy and poultry.

However, U.S. trade policies are in a state of considerable flux as the Trump Administration reverses the decades-long commitment towards freer trade. One of the first salvos was the imposition of 25% and 10% tariffs on steel and aluminum imports, respectively. U.S. trading partners reacted to these tariffs by targeting U.S. exports for higher tariffs, particularly focusing on sensitive sectors such as agriculture. The previous study estimated that the retaliatory tariffs implemented by Canada and Mexico on U.S. agricultural exports will reverse the modest export gains from USMCA – to a decline of **$1.8 billion**, rather than a gain of $454 million. In the broadest possible context, when examining the impacts of *all* measures and counter measures, including the retaliatory tariffs from China, the EU, and other export destinations, U.S. agricultural exports will decline by **$7.9 billion**. These negative trade impacts will be reflected in lower incomes for U.S. farmers, reduced farm land returns and agricultural labor displacement.

The previous analysis also reviewed literature on a U.S. withdrawal from NAFTA. According to one separate study, if Canadian and Mexican tariffs were to revert to their former most favored nation (MFN) levels, this would create a decline in U.S. agricultural exports of over $9 billion, and a loss of export revenue of $9 billion with the two NAFTA partners.

## U.S. withdrawal from TPP/Implementation of TPP11

Aside from the new USMCA, the other trade agreement with the potential to have the largest impact on the U.S. agriculture sector is the Trans-Pacific-Partnership (TPP), now called the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP or TPP11). Initially a trade agreement between 12 countries – Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, Vietnam, and the United States – the TPP was signed by the Obama Administration on February 4, 2016.

TPP was an ambitious and progressive regional trade agreement. At the time is was negotiated, the Office of the U.S. Trade Representative (USTR) claimed that TPP would "open foreign markets to U.S. food and agriculture, providing new and commercially meaningful market access and advancing regulations that are transparent and based on science." The agreement included some important provisions – some common to U.S. trade agreements and some new to this one – including:

- Eliminating tariffs on the majority of U.S. agricultural exports. For example, agricultural tariff rates average 19% in Japan and 16% in Vietnam, according to USTR.
- Providing additional market access through further tariff reductions or expansion of tariff rate quotas (TRQs) for the remaining products.
- Requiring TPP countries to eliminate all agricultural export subsidies.
- Ensuring sanitary and phytosanitary (SPS) measures – especially those impacting food safety, animal health and plant health – are developed and implemented transparently and in a science-based manner.
- Committing to provide transparency on government measures on trade in agricultural products derived from biotechnology and providing for information sharing, including on when the low-level presence of biotechnology material is detected in a shipment of agricultural commodities or food products.

One of the first trade actions of the Trump Administration upon taking office in 2017 was to withdraw the United States from this trade pact.[5] However, the remaining 11 countries decided to move forward without the United States and negotiated a new agreement – the TPP11.[6] With six signatories (Australia, Canada, Japan, Mexico, New Zealand and Singapore), the agreement came into force for those countries on Dec. 30, 2018. (Vietnam started on Jan. 14, 2019, and the remaining countries will follow with their domestic ratifications.)

Within the TPP11 scenario, this analysis implements import tariff changes for all 11 signatory countries following the Market Access Map (MAcMap) (2018). MAcMap is an online database of customs tariffs and market requirements made available by the International Trade Centre (ITC), a joint agency of the United Nations (UN) and the World Trade Organization (WTO). This analysis also assumes some adjustments to non-tariff barriers (NTBs) among the TPP11 member countries.[7]

The analysis finds that implementation of the TPP11 leads to a reduction in the U.S. agricultural and food exports, as trade within TPP11 countries increases and substitutes away from U.S. based imports. U.S. agricultural and food exports fall by **$1.8 billion** per year. While 'oil seeds', 'other food products' and 'pigs, chicken, etc.' exports are not significantly impacted by the TPP11, pork and poultry products get the most sizeable hit (-4.4%), followed by dairy products (-2.9%) and all other food products (-2.1%) (Figure 5).

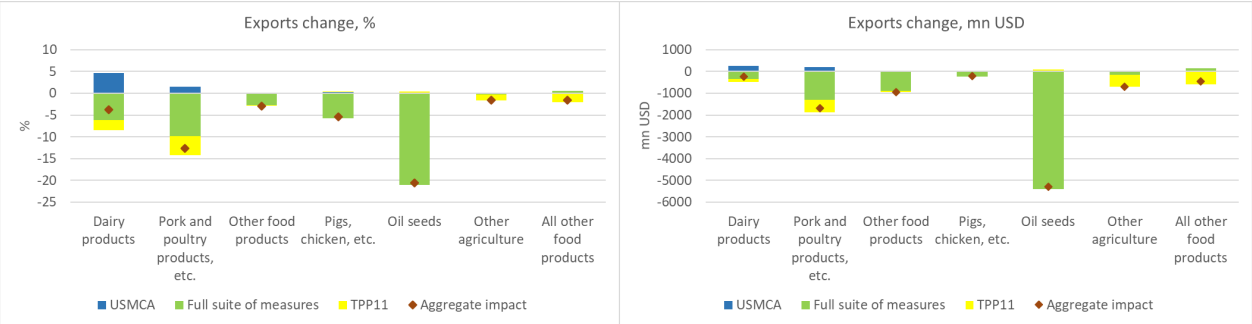


**Figure 5. Estimated changes in the U.S. agricultural exports under the USMCA, Full suite of measures and counter-measures and TPP11**

*Source*: GTAP model simulations.

[5] Withdrawal of the United States from the Trans-Pacific Partnership Negotiations and Agreement. Memorandum of January 23, 2017. https://www.whitehouse.gov/presidential-actions/presidential-memorandum-regarding-withdrawal-united-states-trans-pacific-partnership-negotiations-agreement/

[6] Comprehensive and Progressive Agreement for Trans-Pacific Partnership. https://www.mfat.govt.nz/assets/CPTPP/Comprehensive-and-Progressive-Agreement-for-Trans-Pacific-Partnership-CPTPP-English.pdf

[7] In the reference database, the analysis also represents ad valorem equivalents (AVE) of the NTBs for goods and services. Kee et al. (2009) is the source for the AVE estimates for goods, while AVEs on services are sourced from Jafari and Tarr (2015). AVEs of the NTBs mapped to the regional and sectoral aggregation are provided in Appendix C. While the tariff change schedule under TPP11 is well documented (MAcMap, 2018), different assumptions could be made regarding the reduction of the NTBs and possible spillover effects. In many cases, reductions in NTBs apply to all imports as they are not primarily designed by country of origin. This study follows Petri and Plummer (2016) and assume that the actionable portion of the estimated NTBs (Appendix E) is 56.3% for goods and 37.5% for services. To represent the TPP11 policy implementation, the analysis assumes full reduction in the actionable portion of the NTBs. The analysis does not assume any reductions in NTBs for the non-TPP11 members.

On aggregate, USMCA implementation, global retaliatory tariffs and TPP11 implementation results in an almost **$9.8 billion** reduction in agricultural exports, with half of it associated with the oil seeds and another 19% with pork and poultry products (Figure 5). The positive impacts of the USMCA implementation on U.S. agricultural and food exports are more than outweighed by the negative impacts of TPP11 implementation – a $454 million increase in agricultural exports versus a $1.8 billion reduction.

The decrease in U.S. agricultural exports within the TPP11 scenario also generates reductions in output. TPP11-related output reductions are 0.6% in the case of 'pork and poultry products, etc.' and around 0.3% in 'pigs, chicken, etc.' and 'other agriculture'.

Falling exports and output reduce land and labor demand in the U.S. agricultural and food sector, as well. On the labor side, the TPP11 scenario brings additional reallocation of the 6,200 workers away from the U.S. food and agriculture sector. Most of this reallocation is coming from the 'other agriculture' (-0.3%) and 'pork and poultry products, etc.' (-0.6%), which together contribute over 60% of this change (Figure 6). This brings the aggregate number of workers reallocated from the agricultural sector to 47,800.

Under the TPP11 scenario, land prices are estimated to fall further by around 1.0% to 1.1% in most agricultural sectors, with a smaller reduction in the 'oil seeds' sector (-0.5%) (Figure 6).

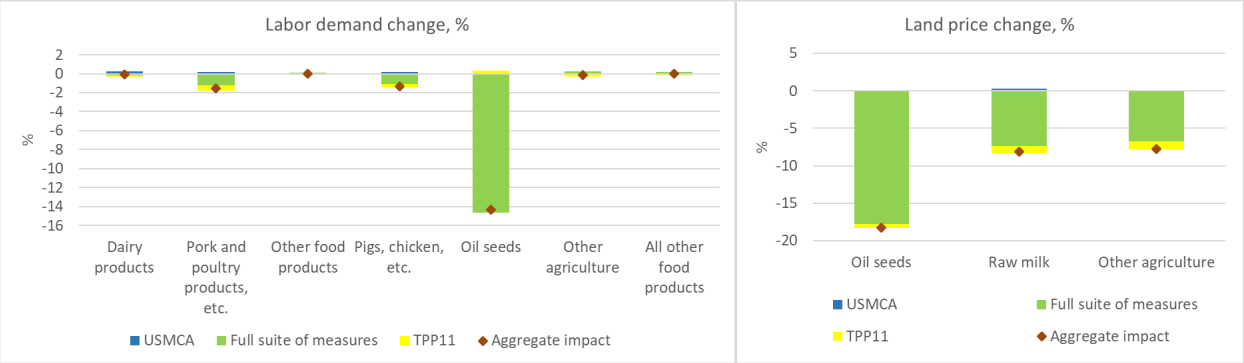


**Figure 6. Estimated changes in the U.S. agricultural labor demand and land prices under the USMCA, Full suite of measures and counter-measures and TPP11**

*Source*: GTAP model simulations.

On the macro level, implementation of the TPP11 further reduces welfare (or general economic well-being) by $2.3 billion, bringing the aggregate welfare loss from the USMCA implementation, the imposition of retaliatory tariffs, and TPP11 implementation to almost $31.8 billion. The TPP11 scenario does not significantly impact GDP (an additional reduction by 0.001%) or per capita income (-0.015%).

## U.S. withdrawal from NAFTA

This analysis also estimates the impacts on the U.S. food and agriculture sector from the possible termination of NAFTA, following recent discussions by the Trump Administration. In this case,

the analysis assumes that all three NAFTA members exit the agreement and MFN tariffs[8] for all intra-NAFTA trade are imposed (Ciuriak et al., 2017). Following Ciuriak et al. (2017), the analysis assumes no change to the current dairy regime between Canada and Mexico, as well as dairy imports to Canada from the United States. The analysis also assumes no change in the current sugar regime for all bilateral flows, except imports to Canada from the United States.[9]

Figures F.1 to F.4 (found in Appendix F) highlight the potential tariff increases for Canada, Mexico and the United States for the 20 highest MFN rates within each of the countries. In the case of the United States there are two charts (one each for Canada and Mexico) showing the MFN tariff levels for U.S. exports compared to the existing preferential tariffs agreed upon as part of NAFTA (Figures F.1 and F.2). Based on the 2014 data, under the existing NAFTA, U.S. exports to Canada face significant tariffs in only the dairy sector. If Canada were to move to MFN rates with a termination of NAFTA, U.S. exporters would see some substantial increases in tariffs, with the exception of dairy products that are governed by the quota regime that would likely not be impacted by elimination of NAFTA.[10] Looking at all U.S. exports to Canada, of the 20 goods with the greatest change from NAFTA to MFN rates, eight are in agriculture and food. For example, beef products would go from a tariff rate of zero under NAFTA to more than 24%. In isolation, this could generate a reduction in U.S. beef product exports to Canada by some 50% to 100%.

U.S. exports to Mexico currently face very little headwinds under NAFTA. According to the 2014 data, all agricultural tariffs are zero. However, Mexico's MFN tariffs are much higher than those of Canada. Of the 20 commodities with the highest MFN rates, 13 are agricultural or food products. A number of the MFN rates are likely prohibitive, virtually halting all exports from the United States. These include pork and poultry products with an MFN tariff of 71.1%, other food products at 35.6%, dairy products at 31.4% and vegetables and fruits at 28.5%.

The United States allows virtually free access to Canadian and Mexican agricultural exports, with a few key exceptions (Figures F.3 and F.4). Imports from Canada face tariffs on sugar of around 9.1% and smaller tariffs on dairy and other food products. In the case of Mexican exports, the only significant tariff is on 'other food' products. MFN tariffs would raise tariffs on a broad range of goods from Canada, with tariff rates increasing from around 1% up to 12% for textiles and wearing apparel. Many agricultural goods would see higher tariffs, including beef products (8.5%), vegetable oils (4.2%) and fruits and vegetables (3.7%). In the case of Mexican exports, the highest tariff increases would include dairy products (17.3%), beef (9.8%), vegetable oils (4.9%) and vegetables and fruits (3.9%).

The quantitative assessment shows that the termination of NAFTA would result in an aggregate U.S. agricultural and food exports drop by over **$12 billion**. In the most affected agricultural segments, U.S. withdrawal from NAFTA leads to a decline in exports of 'pork and poultry'

[8] MFN tariffs are those tariff rates that WTO-member countries have agreed to impose on imports from other WTO-member countries as part of their WTO obligations.

[9] As this study uses 2014 as the reference year with the corresponding import tariffs, these tariff change shocks are different from those used by Ciuriak et al. (2017), as the latter paper uses 2011 as the reference year. In the case when aggregate sector comprises of two or more individual commodities with differentiated tariff rates (e.g. vegetables, fruits and nuts), changes in the composition of trade over time may change levels of the actual applied tariff rates at the aggregate sectoral level even under constant commodity-level tariff rates.

[10] According to the Ciuriak et al. (2017) interpretation.

products by 35.1% ($4.6 billion), dairy products by 16.4% ($950 million) and 'other food products' by 15.1% ($4.9 billion) (Figure 7). 'Pigs, chicken, etc.' and 'all other food products' also get a sizeable hit, as their exports decline by 6.4% and 4.7% respectively. Mixed changes are observed in the exports of oil seeds and other agricultural commodities, but on aggregate, outweigh each other (Figure 7). In terms of output changes, 'pork and poultry products, etc.' and 'other animal' (products) are the most impacted sectors, with output falling in these sectors by 4.6% and 3.4% respectively.

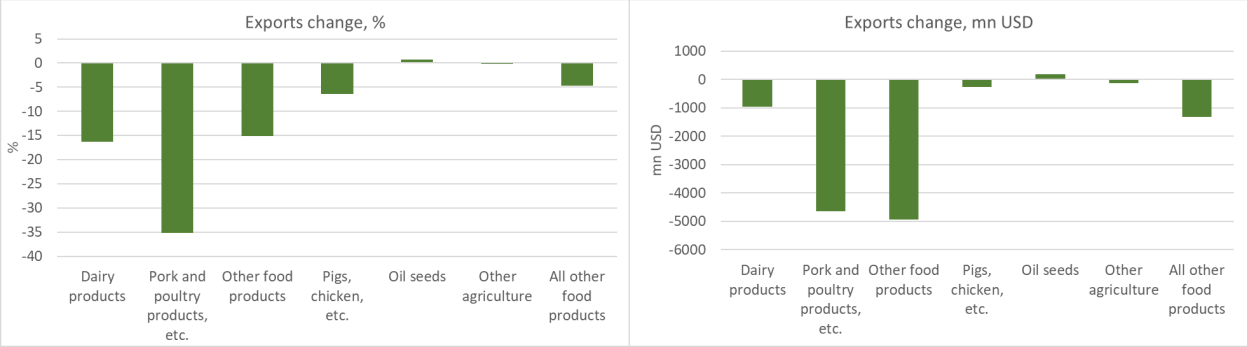


**Figure 7. Estimated changes in the U.S. agricultural exports under the NAFTA termination scenario**

*Source*: GTAP model simulations.

The dissolution of NAFTA also leads to the significant regressive impacts on the U.S. agricultural labor demand. Assumption that all three NAFTA members would return to the MFN rates, U.S. withdrawal from NAFTA would result in the reallocation of 48,200 workers away from the U.S. agricultural and food sector. In relative terms, the largest reduction in labor demand are observed in 'pork and poultry products, etc.' (-4.6%), 'pigs, chicken, etc.' (-3.4%) and 'other food products' (-1.2%) (Figure 8). These activities also experience the largest labor reallocation in the absolute terms – between 13,000 and 13,500 workers for each sector.

U.S. withdrawal from NAFTA would also impact U.S. agricultural land prices. With falling output and decreasing demand for land, land prices decline by 1.6% in the 'raw milk' sector and by around 1% in the 'other agriculture' (Figure 8). More modest land price reduction is observed in the 'oil seeds' sector (-0.5%).

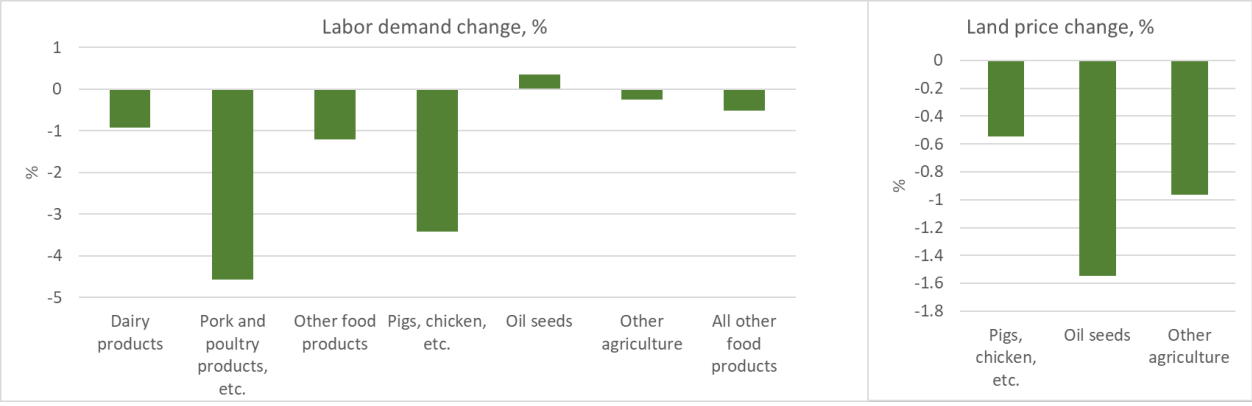


**Figure 8. Estimated changes in the U.S. agricultural land prices and labor demand under the NAFTA termination scenario**

*Source*: GTAP model simulations.

On the macro level the NAFTA termination scenario results in a welfare reduction of $10.5 billion and per capital income reduction of 0.07%. GDP declines by 0.02%.

## U.S. rejoining of the TPP

Though the United States withdrew from TPP on January 23, 2017, and the initial agreement has been transformed into TPP11, already ratified by seven countries, this analysis also explores a scenario where United States joins the TPP under conditions outlined in the original TPP agreement – in a new TPP12 scenario.[11] To be precise, the analysis compares TPP12 with our original reference data, and not with the TPP11 scenario, which could lead to (typically) modest interaction effects.

The analysis indicates that United States joining of the new TPP12 would have a sizable positive impact on U.S. food and agriculture exports with an increase of around **$2.9 billion**. 'Dairy products' experience the largest relative increase in exports – at 17.5%, which is equivalent to $1 billion (Figure 9). Similar increase in export values – around $1.1 billion – is observed in 'other food products' sector, while exports of 'other agriculture' and 'all other food products' grow between $600 million and $700 million.

U.S. 'oil seeds' and 'pork and poultry products, etc.' experience moderate reduction in exports – by $150 million and $370 million respectively. In the case of oil seed, as key U.S. exports destinations (China, the EU and the rest of East Asia) are not members of the TPP12, corresponding export activities are becoming less attractive and there is a shift in U.S. agricultural and food exports towards alternative sectors and destinations. In particular, the analysis shows this shift toward 'other agriculture' and 'all other food products' exports to Japan and 'dairy products' exports to Japan and Canada, as well as an increase in manufacturing and services exports to the key TPP12 partners.

Likewise, the analysis estimates moderate reductions in some livestock markets. A key driver in falling U.S. exports of 'pork and poultry' products is the partial loss of the Japanese market. Under the TPP12 tariff schedule, there is a significant reduction in tariff on 'pork and poultry products, etc.' imports to Japan from Chile, which allows Japanese imports of 'pork and poultry products, etc.' from other sources, not just the United States. The TPP12 policy shock offsets the benefits of the increasing 'pork and poultry' products exports under the USMCA (Figure 9).

The aggregate increase in agricultural exports also generates growth in sectoral output, with the largest positive changes in the 'dairy products' (+0.8%) and 'other agriculture' (+0.4%). Output in 'pork and poultry products, etc.' and 'oil seeds' sectors declines by around 0.4%.

[11] The analysis assumes that policy shocks include reductions in the import tariffs between the twelve TPP members following MAcMap (2018), as well as reductions in the NTBs for goods and services. Following Petri and Plummer (2016), the analysis assumes that the actionable portion of the estimated NTBs (Appendix E) is 56.3% for goods and 37.5% for services. In this policy simulation, actionable portion of the NTBs between 12 TPP countries is fully reduced.

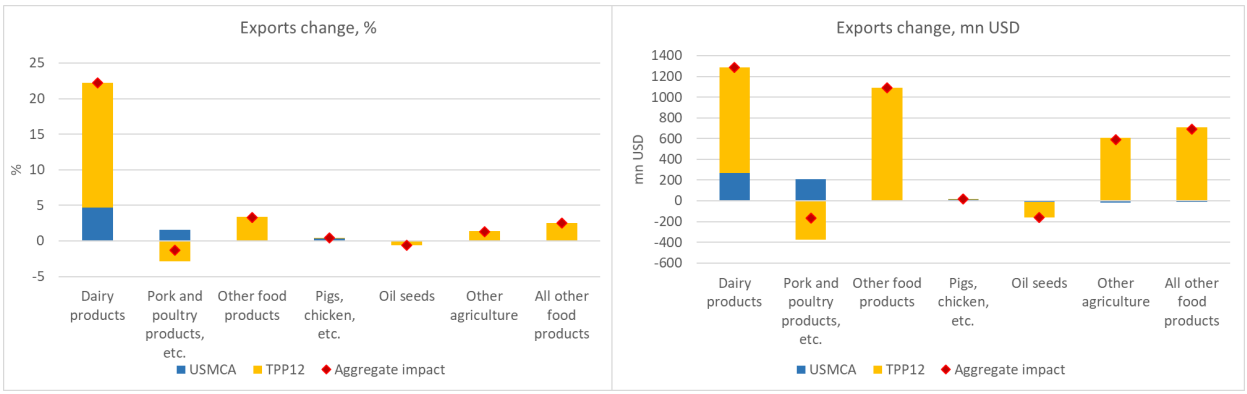


**Figure 9. Estimated changes in the U.S. agricultural exports under the TPP12 and USMCA**

*Source*: GTAP model simulations.

Increasing exports under the TPP12 scenario impact labor demand, with the largest relative increases in 'dairy products' (0.8% or 1,770 workers) and 'other agriculture' (0.4% or 10,710 workers) (Figure 10). Labor demand decreases by 0.4% in 'oil seeds' sector, by 0.2% in 'pigs, chicken, etc.' and by 0.4% in 'pork and poultry products, etc.' On aggregate, this is equivalent to 3,130 workers. It is offset by growing labor demand in 'other food products' (0.2% or 1,890 workers) and 'all other food products' (0.1% or 840 workers). Aggregate food and agricultural labor demand within the TPP12 scenario increase by around 12,100 workers.

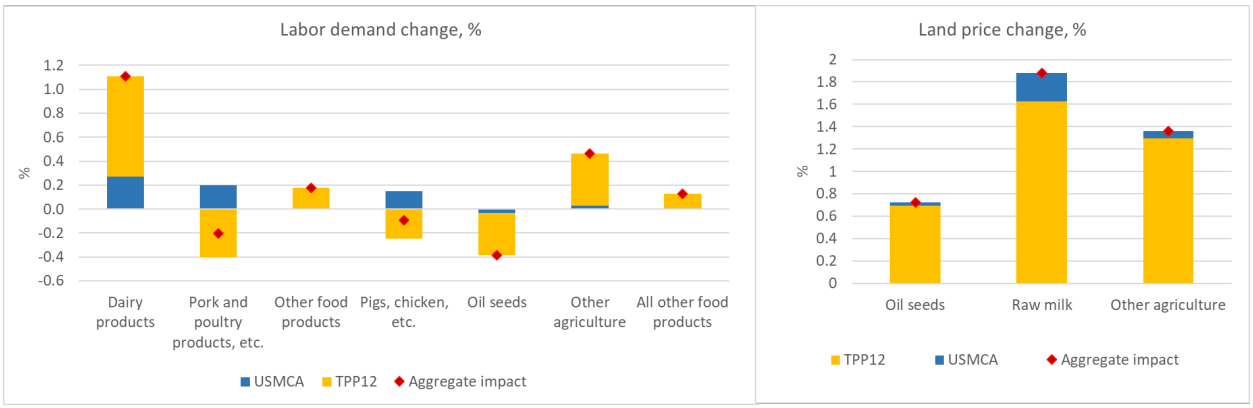


**Figure 10. Estimated changes in the U.S. agricultural labor demand and land prices under the TPP12 and USMCA, %**

*Source*: GTAP model simulations.

With growing output and increasing demand for land, U.S. agricultural land prices grow by 1.6% in the 'raw milk' sector, 1.3% in 'other agriculture' and 0.7% in the 'oil seeds' sector (Figure 10).

On the macro level, TPP12 scenario results in a moderate increase in U.S. per capita income – by 0.01%, while aggregate welfare increases by around $1.7 billion. There is sizeable impact on GDP (+0.007%).

## Conclusions

U.S. agriculture has benefitted significantly from increasing market access in Canada and Mexico as a result of the formation of NAFTA some 25 years ago. The share of U.S. agricultural exports to these two countries has increased from 14.2% when the agreement was first signed to almost 30% currently.

The new NAFTA agreement, the USMCA, consolidates the agricultural market access gains from the original NAFTA and in some sectors leads to an improvement in market access, most notably in dairy and poultry exports to Canada. U.S. agricultural exports would increase by an estimated $454 million, largely concentrated in dairy and poultry (Figure 11).

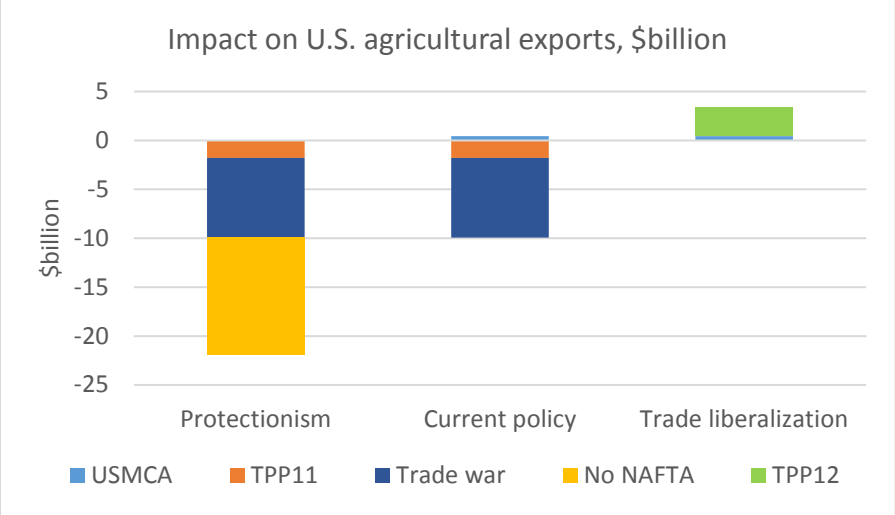


**Figure 11. Agricultural export revenues under various scenarios**

*Source:* GTAP model simulations.

Nonetheless, the international trade regime is in a state of considerable flux as the Trump Administration reverses the decades-long U.S. commitment towards freer trade. One of the first salvos was the imposition of 25% and 10% tariffs on steel and aluminum imports, respectively. U.S. trading partners immediately reacted to these tariffs by targeting U.S. exports, particularly in sensitive sectors such as agriculture. The retaliatory tariffs implemented by Canada and Mexico on U.S. agricultural exports will reverse the modest export gains from USMCA – a decline of $1.8 billion rather than a gain of $454 million. In a broader trade context, with all measures and counter-measures (including tariff retaliation by China and the European Union), U.S. agricultural exports will decline by around $8.4 billion (Figure 11).

According to this analysis, implementation of the TPP11 (and the U.S. withdrawal from the original TPP) reduces U.S. food and agriculture exports by $1.8 billion. Following trade liberalization between the eleven member-countries, there is an increase in trade among the members, which substitutes imports away from the United States.

In addition to these existing trade policies, this analysis looked at some additional potential trade policies that could impact the U.S. agricultural sector. According to our estimates, a complete withdrawal from NAFTA, with tariffs reverting to MFN levels, would create a decline in U.S.

agricultural exports of more than $12 billion (Figure 11). Under this more pessimistic outcome, the negative trade impacts would be reflected in lower incomes for U.S. farmers, reduced land returns and labor displacement. On average, such an export reduction is equivalent to $3,990 per person employed in the agricultural and food sector. This scenario would also result in an aggregate loss of economic well-being of $42.5 billion or $340 per U.S. household. Alternatively, the United States rejoining the TPP (as the new TPP12) would significantly benefit U.S. farmers, as exports are estimated to increase by around $2.9 billion.

In summary, for the U.S. food and agriculture sector, the current shape of trade policies, including steel and aluminum tariffs and the corresponding retaliatory tariffs, is leading towards an export loss of $9.8 billion, with slight gains from the USMCA notwithstanding. Dissolution of NAFTA (and failure to implement the USMCA), would lead to an additional loss in export revenues of some $12 billion. In addition, the trade war could intensify after the current temporary lull.[12] Even if the trade liberalization situation transpires, there may be a lasting impact to U.S. agriculture export markets, as newcomers solidify their newly acquired market access.

This analysis provides a quantitative assessment of the possible impacts on U.S. agriculture from different trade policy regimes in a volatile trade policy context. The assessment is based on the GTAP model, a standard tool in the arsenal of available tools in quantifying economics impacts of changes in trade policies. The direction of change and the overall magnitudes are likely to be robust under a number of possible specifications to the model. For example, the model assumes full employment and flexible labor markets—a perhaps not unreasonable assumption given the labor market conditions in the United States today. It also ignores other possible adjustment costs and thus reflects to a large extent a long-run outcome. Other factors that could influence the results include: (1) a re-allocation of investment across countries as firms reassess the profitability of their global supply chains and (2) a decline in investment due to the uncertainties inherently linked to the volatility in trade policies. Though not possible in the context of the GTAP model, which is national in scope, it would also be interesting to assess the winners and losers at a regional or state level, particularly for those states that are highly reliant on agricultural exports.

[12] This analysis does not include any estimation of the economic impact of an intensification of the trade war in our assessment.

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# Appendix A. Model assumptions and policy scenarios

The quantitative findings discussed in this report are based on the GTAP v7 Model (Corong et al., 2017) calibrated to the GTAP global database (Aguiar et al., 2016). The analysis uses a standard closure and default elasticity values. Additional information on the model and use of the database are available from the authors.

The GTAP database used for this report is Version 10p2 with a 2014 reference year. The specific regional and sectoral aggregations are provided in Appendix A and Appendix B.

## Appendix B. Regional concordance

| No. | Code | Description | GTAP concordance |
|---|---|---|---|
| 1 | aus | Australia | Australia |
| 2 | chn | China | China |
| 3 | kor | Korea | Korea |
| 4 | jpn | Japan | Japan |
| 5 | brn | Brunei Darussalam | Brunei Darussalam |
| 6 | mys | Malaysia | Malaysia |
| 7 | sgp | Singapore | Singapore |
| 8 | vnm | Viet Nam | Viet Nam |
| 9 | xea | Rest of East Asia | Hong Kong; Mongolia; Taiwan; Rest of East Asia; Cambodia; Indonesia; Lao People's Democratic Republ; Philippines; Thailand; Rest of Southeast Asia |
| 10 | ind | India | India |
| 11 | usa | USA | United States of America |
| 12 | can | Canada | Canada |
| 13 | mex | Mexico | Mexico |
| 14 | arg | Argentina | Argentina |
| 15 | bra | Brazil | Brazil |
| 16 | eur | EU28 | Austria; Belgium; Cyprus; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Latvia; Lithuania; Luxembourg; Malta; Netherlands; Poland; Portugal; Slovakia; Slovenia; Spain; Sweden; United Kingdom; Bulgaria; Croatia; Romania |
| 17 | tur | Turkey | Turkey |
| 18 | rus | Russian Federation | Russian Federation |
| 19 | nzl | New Zealand | New Zealand |
| 20 | chl | Chile | Chile |
| 21 | per | Peru | Peru |
| 22 | row | Rest of the World | Rest of Oceania; Bangladesh; Nepal; Pakistan; Sri Lanka; Rest of South Asia; Rest of North America; Bolivia; Colombia; Ecuador; Paraguay; Uruguay; Venezuela; Rest of South America; Costa Rica; Guatemala; Honduras; Nicaragua; Panama; El Salvador; Rest of Central America; Dominican Republic; Jamaica; Puerto Rico; Trinidad and Tobago; Caribbean; Switzerland; Norway; Rest of EFTA; Albania; Belarus; Ukraine; Rest of Eastern Europe; Rest of Europe; Kazakhstan; Kyrgyzstan; Tajikistan; Rest of Former Soviet Union; Armenia; Azerbaijan; Georgia; Bahrain; Iran Islamic Republic of; Israel; Jordan; Kuwait; Oman; Qatar; Saudi Arabia; United Arab Emirates; Rest of Western Asia; Egypt; Morocco; Tunisia; Rest of North Africa; Benin; Burkina Faso; Cameroon; Cote d'Ivoire; Ghana; Guinea; Nigeria; Senegal; Togo; Rest of Western Africa; Central Africa; South Central Africa; Ethiopia; Kenya; Madagascar; Malawi; Mauritius; Mozambique; Rwanda; Tanzania; Uganda; Zambia; Zimbabwe; Rest of Eastern Africa; Botswana; Namibia; South Africa; Rest of South African Customs ; Rest of the World |

Source: Authors.

## Appendix C. Sectoral concordance

| No. | Code | Description | GTAP concordance |
|---|---|---|---|
| 1 | pdr | Paddy rice | Paddy rice |
| 2 | wht | Wheat | Wheat |
| 3 | gro | Cereal grains n.e.s. | Cereal grains n.e.s. |
| 4 | v_f | Vegetables, fruit, nuts | Vegetables, fruit, nuts |
| 5 | osd | Oil seeds | Oil seeds |
| 6 | c_b | Sugar cane, sugar beet | Sugar cane, sugar beet |
| 7 | pfb | Plant-based fibers | Plant-based fibers |
| 8 | ocr | Crops n.e.s. | Crops n.e.s. |
| 9 | ctl | Cattle, sheep, goats, horses | Cattle, sheep, goats, horses |
| 10 | oap | Animal products n.e.s. | Animal products n.e.s. |
| 11 | rmk | Raw milk | Raw milk |
| 12 | wol | Wool, silk-worm cocoons | Wool, silk-worm cocoons |
| 13 | frs | Forestry | Forestry |
| 14 | fsh | Fishing | Fishing |
| 15 | coa | Coal | Coal |
| 16 | oil | Oil | Oil |
| 17 | gas | Gas | Gas |
| 18 | omn | Minerals n.e.s. | Minerals n.e.s. |
| 19 | cmt | Meat: cattle, sheep, goats, horse | Meat: cattle, sheep, goats, horse |
| 20 | omt | Meat products n.e.s. | Meat products n.e.s. |
| 21 | vol | Vegetable oils and fats | Vegetable oils and fats |
| 22 | mil | Dairy products | Dairy products |
| 23 | pcr | Processed rice | Processed rice |
| 24 | sgr | Sugar | Sugar |
| 25 | ofd | Food products n.e.s. | Food products n.e.s. |
| 26 | b_t | Beverages and tobacco products | Beverages and tobacco products |
| 27 | tex | Textiles | Textiles |
| 28 | wap | Wearing apparel | Wearing apparel |
| 29 | lea | Leather products | Leather products |
| 30 | lum | Wood products | Wood products |
| 31 | ppp | Paper products, publishing | Paper products, publishing |
| 32 | p_c | Petroleum, coal products | Petroleum, coal products |
| 33 | crp | Chemical, rubber, plastic products | Chemical, rubber and plastic products |
| 34 | nmm | Mineral products n.e.s. | Mineral products n.e.s. |
| 35 | i_s | Ferrous metals | Ferrous metals |
| 36 | nfm | Metals n.e.s. | Metals n.e.s. |
| 37 | fmp | Metal products | Metal products |
| 38 | mvh | Motor vehicles and parts | Motor vehicles and parts |
| 39 | otn | Transport equipment n.e.s. | Transport equipment n.e.s. |
| 40 | ele | Electronic equipment | Electronic equipment |
| 41 | ome | Machinery and equipment n.e.s. | Machinery and equipment n.e.s. |
| 42 | omf | Manufactures n.e.s. | Manufactures n.e.s. |
| 43 | utl | Utilities | Electricity; Gas manufacture, distribution; Water |
| 44 | cns | Construction | Construction |
| 45 | trd | Trade | Trade |
| 46 | cmn | Communications | Communication |
| 47 | ofi | Financial services n.e.s. | Financial services n.e.s. |
| 48 | isr | Insurance | Insurance |
| 49 | otp | Other transportation | Transport n.e.s. |
| 50 | wtp | Water transportation | Sea transport |
| 51 | atp | Air transportation | Air transport |

| No. | Code | Description | GTAP concordance |
|---|---|---|---|
| 52 | obs | Business services n.e.s. | Business services n.e.s. |
| 53 | osv | Other services | Recreation and other services; Public Administration; Defence; Health; Education; Dwellings |

Source: Authors.

# Appendix D. Agricultural and food sectors aggregation used for reporting

| Aggregated sector | | GTAP concordance | |
|---|---|---|---|
| **Code** | **Description** | **Code** | **Description** |
| mil | Dairy products | mil | Dairy products |
| omt | Pork and poultry products, etc. | omt | Meat products n.e.s. |
| ofd | Other food products | ofd | Food products n.e.s. |
| oap | Pigs, chicken, etc. | oap | Animal products n.e.s. |
| osd | Oil seeds | osd | Oil seeds |
| oag | Other agriculture | pdr | Paddy rice |
| | | wht | Wheat |
| | | gro | Cereal grains n.e.s. |
| | | v_f | Vegetables, fruit, nuts |
| | | c_b | Sugar cane, sugar beet |
| | | pfb | Plant-based fibers |
| | | ocr | Crops n.e.s. |
| | | ctl | Cattle, sheep, goats, horses |
| | | rmk | Raw milk* |
| | | wol | Wool, silk-worm cocoons |
| otf | All other food products | cmt | Meat: cattle, sheep, goats, horse |
| | | vol | Vegetable oils and fats |
| | | pcr | Processed rice |
| | | sgr | Sugar |
| | | b_t | Beverages and tobacco products |

*When raw milk is reported as a separate sector, it is excluded from other agriculture.

## Appendix E. Non-tariff barriers, %

| **Region\sector** | Paddy rice | Wheat | Cereal grains n.e.s. | Vegetables, fruit, nuts | Oil seeds | Sugar cane, sugar beet | Plant-based fibers | Crops n.e.s. | Cattle, sheep, goats, horses | Animal products n.e.s. | Raw milk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | 0 | 0.2 | 0.3 | 0.4 | 1 | 0.4 | 0 | 0.4 | 0.2 | 0.1 | 0.4 |
| China | 0.1 | 0 | 0.2 | 0 | 0 | 0 | 0 | 0.2 | 0 | 0.6 | 0 |
| Korea | 0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| Japan | 0 | 0.2 | 0.6 | 0.6 | 0.5 | 0.7 | 0 | 0.6 | 0 | 0.4 | 0 |
| Brunei Darussalam | 1.4 | 1.3 | 0.3 | 0.6 | 0.5 | 1.2 | 0 | 0.5 | 0.5 | 0.6 | 0 |
| Malaysia | 0 | 0 | 0.8 | 0.6 | 0.4 | 1.5 | 0.9 | 0.7 | 0.7 | 0.5 | 0.6 |
| Singapore | 0 | 0.3 | 0.3 | 0.6 | 0.9 | 0.7 | 1.1 | 0.6 | 0 | 0.8 | 0.9 |
| Viet Nam | 0.2 | 0.1 | 0.6 | 0.6 | 0.3 | 0.9 | 0.6 | 0.4 | 0.4 | 0.8 | 0.6 |
| Rest of East Asia | 0.3 | 0.1 | 0.4 | 0.3 | 0.1 | 0.4 | 0.2 | 0.2 | 0.5 | 0.8 | 0.6 |
| India | 0 | 0 | 0.3 | 0.6 | 0.4 | 0.8 | 0 | 0.2 | 1 | 1.4 | 0 |
| USA | 0 | 0.3 | 0.6 | 0.5 | 0.3 | 0 | 0 | 0.2 | 0.6 | 0.2 | 0.5 |
| Canada | 0 | 0.1 | 0.1 | 0.6 | 0.3 | 0 | 0 | 0.5 | 0.4 | 0 | 0.5 |
| Mexico | 0.1 | 0 | 1 | 0.6 | 0 | 0 | 0 | 0.1 | 0.7 | 0 | 0.9 |
| Argentina | 0 | 0 | 1.8 | 0.3 | 0.1 | 0 | 0 | 0.5 | 0.4 | 0.1 | 0.6 |
| Brazil | 0 | 0 | 0.3 | 0.6 | 0.1 | 1.1 | 0 | 0.2 | 0.6 | 0.1 | 0.8 |
| EU28 | 0.2 | 0.2 | 0.7 | 0.5 | 0.2 | 0.6 | 0.1 | 0.6 | 0.6 | 0.7 | 0.8 |
| Turkey | 0 | 0.3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Russian Federation | 0 | 0 | 1.7 | 0.6 | 0 | 0 | 0 | 0.6 | 0 | 0.3 | 0.8 |
| New Zealand | 0 | 0.2 | 0.4 | 0.4 | 0.7 | 1 | 0 | 0.5 | 0.2 | 0.1 | 0.4 |
| Chile | 0.1 | 0 | 0.7 | 0.3 | 0.6 | 1.6 | 0.5 | 0.5 | 0.3 | 0 | 0.3 |
| Peru | 0 | 0.1 | 1.1 | 1.4 | 0.1 | 1.6 | 0 | 0.3 | 0.8 | 0.1 | 0.5 |
| Rest of the World | 0.1 | 0.1 | 0.5 | 0.4 | 0.6 | 0.3 | 0.1 | 0.4 | 0.6 | 0.5 | 0.3 |

Source: Authors' estimates based on Kee et al. (2009) and Jafari and Tarr (2015).

## Appendix E. Non-tariff barriers, % (continued)

| **Region\sector** | Wool, silk-worm cocoons | Forestry | Fishing | Coal | Oil | Gas | Minerals n.e.s. | Meat: cattle, sheep, goats, horse | Meat products n.e.s. | Vegetable oils and fats | Dairy products |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | 0 | 0.4 | 1 | 0 | 0 | 0.8 | 0 | 0.8 | 0.4 | 1.1 | 0.8 |
| China | 0 | 0.1 | 0 | 0.2 | 0 | 1.4 | 0 | 0 | 0.8 | 0.8 | 0.6 |
| Korea | 0 | 0 | 0 | 0.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Japan | 0 | 0.1 | 0.3 | 0 | 0 | 1.6 | 1.9 | 0.2 | 0.7 | 0.2 | 1 |
| Brunei Darussalam | 0 | 0 | 0.1 | 0 | 0 | 0.6 | 1.3 | 0.2 | 0.4 | 0.1 | 1.2 |
| Malaysia | 0 | 0.3 | 0.6 | 1.3 | 0 | 1.4 | 0.4 | 0.7 | 0.7 | 0.6 | 0.9 |
| Singapore | 0 | 0.6 | 0.7 | 1.4 | 0 | 1.4 | 0.8 | 0.5 | 0.8 | 0.8 | 0.9 |
| Viet Nam | 0 | 0.4 | 0.6 | 0.6 | 0 | 0.9 | 0.4 | 0.6 | 0.5 | 0.5 | 0.8 |
| Rest of East Asia | 0 | 0.1 | 0.4 | 0.1 | 0 | 0.3 | 0.5 | 0.4 | 0.6 | 0.4 | 0.8 |
| India | 0 | 0 | 0.3 | 0 | 0 | 1.3 | 1.3 | 0.8 | 0.5 | 0.8 | 0.4 |
| USA | 1.3 | 0.2 | 0.7 | 0 | 0 | 1.5 | 0 | 0.5 | 0.4 | 0.1 | 0.8 |
| Canada | 0.1 | 0.1 | 0.6 | 0 | 0 | 1.5 | 0 | 0.4 | 0.5 | 0 | 0.8 |
| Mexico | 0 | 0.1 | 0.2 | 0 | 0 | 1.5 | 0 | 0.4 | 0.8 | 1.1 | 0.8 |
| Argentina | 0 | 0.9 | 0.9 | 0 | 0 | 0 | 0.1 | 0 | 0.1 | 0.7 | 0.7 |
| Brazil | 0 | 0.6 | 0.8 | 0 | 0 | 1.4 | 0.2 | 0.3 | 0.2 | 0.2 | 0.9 |
| EU28 | 0.2 | 0.4 | 0.5 | 0 | 0 | 0.1 | 0.1 | 0.5 | 0.7 | 0.7 | 0.9 |
| Turkey | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Russian Federation | 0 | 0 | 0.4 | 0 | 0 | 1.6 | 1.6 | 0.5 | 0.4 | 0.1 | 0.7 |
| New Zealand | 0 | 0.2 | 1.1 | 0 | 0 | 0 | 0 | 0.7 | 0.2 | 1.9 | 0.6 |
| Chile | 0 | 0.2 | 0.9 | 0 | 0 | 0 | 1.2 | 1.5 | 0.3 | 0.7 | 0.8 |
| Peru | 0 | 1.2 | 0.1 | 0 | 0 | 1.6 | 0 | 0.9 | 0.2 | 0.9 | 0.9 |
| Rest of the World | 0 | 0.3 | 0.4 | 0.1 | 0 | 0.6 | 0.2 | 0.6 | 0.3 | 0.5 | 0.5 |

Source: Authors' estimates based on Kee et al. (2009) and Jafari and Tarr (2015).

## Appendix E. Non-tariff barriers, % (continued)

| **Region\sector** | Processed rice | Sugar | Food products n.e.s. | Beverages and tobacco products | Textiles | Wearing apparel | Leather products | Wood products | Paper products, publishing | Petroleum, coal products | Chemical, rubber, plastic products |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | 4 | 1 | 0.8 | 0.3 | 0.1 | 0.3 | 0.1 | 0.1 | 0.2 | 0.8 | 0.1 |
| China | 1.9 | 0 | 0.1 | 0.6 | 0.5 | 0.5 | 0 | 0.2 | 0.5 | 1.5 | 0.3 |
| Korea | 0.2 | 0 | 0.2 | 2.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Japan | 2.5 | 1.2 | 0.7 | 0.4 | 0.5 | 0.4 | 0 | 0.4 | 0.5 | 0 | 0.2 |
| Brunei Darussalam | 0 | 0 | 0.5 | 0.1 | 0 | 0 | 0 | 0.7 | 0.5 | 1.5 | 0.1 |
| Malaysia | 0 | 0.9 | 0.8 | 0.4 | 0.5 | 0.8 | 0.4 | 0.8 | 0.3 | 0.2 | 0.4 |
| Singapore | 2.2 | 0 | 0.8 | 0.7 | 0.5 | 0.7 | 0.6 | 0.7 | 0.5 | 0.1 | 0.3 |
| Viet Nam | 1.5 | 0.2 | 0.8 | 0.4 | 0.3 | 0.4 | 0.7 | 0.5 | 0.3 | 0.1 | 0.4 |
| Rest of East Asia | 1.5 | 0.1 | 0.6 | 0.4 | 0.1 | 0.1 | 0.5 | 0.3 | 0.2 | 0.2 | 0.3 |
| India | 2.2 | 2 | 0.4 | 0.1 | 0.3 | 0.3 | 0.7 | 1.1 | 0.6 | 0.3 | 0.6 |
| USA | 3.9 | 0 | 0.6 | 0.1 | 0.7 | 0.4 | 0.8 | 0.7 | 0 | 0 | 0.1 |
| Canada | 2.1 | 0 | 0.3 | 1 | 0 | 0 | 0.1 | 0.3 | 0 | 0.2 | 0.3 |
| Mexico | 4.3 | 0 | 0.6 | 0.3 | 0.5 | 0.4 | 0.3 | 0.6 | 0.4 | 0.8 | 0.4 |
| Argentina | 0 | 1.4 | 0.6 | 0.1 | 0.6 | 0.4 | 0.7 | 0.4 | 0.2 | 0 | 0.3 |
| Brazil | 8.8 | 0.2 | 0.6 | 0.8 | 0.4 | 0.5 | 1 | 0.9 | 0.5 | 1 | 0.5 |
| EU28 | 2.3 | 0.4 | 0.8 | 0.4 | 0.5 | 0.4 | 0.6 | 0 | 0.5 | 0 | 1 |
| Turkey | 1.1 | 0.1 | 0 | 0 | 1.8 | 0 | 0 | 0.9 | 0.2 | 0 | 0.4 |
| Russian Federation | 2.2 | 0.6 | 0.7 | 0.2 | 0.2 | 0.3 | 0.5 | 1.2 | 0.9 | 0.6 | 0.3 |
| New Zealand | 2 | 1.1 | 0.7 | 0.3 | 0.2 | 0.4 | 0.2 | 0.2 | 0.5 | 0 | 0.3 |
| Chile | 0.7 | 1.4 | 0.6 | 0.6 | 0.1 | 0 | 0 | 0.5 | 0.4 | 0.1 | 0.3 |
| Peru | 3.8 | 0.1 | 0.6 | 0.4 | 0.2 | 0.4 | 0 | 1.1 | 0.3 | 0.1 | 0.3 |
| Rest of the World | 1 | 0.5 | 0.6 | 0.3 | 0.3 | 0.3 | 0.2 | 0.3 | 0.2 | 0.4 | 0.3 |

Source: Authors' estimates based on Kee et al. (2009) and Jafari and Tarr (2015).

## Appendix E. Non-tariff barriers, % (continued)

| **Region\sector** | Mineral products n.e.s. | Ferrous metals | Metals n.e.s. | Metal products | Motor vehicles and parts | Transport equipment n.e.s. | Electronic equipment | Machinery and equipment n.e.s. | Manufactures n.e.s. | Utilities | Construction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | 0.8 | 0 | 0 | 0.1 | 0 | 0 | 0.2 | 0.5 | 0.1 | 0 | 0 |
| China | 0.1 | 0.3 | 0.8 | 0.4 | 0 | 0.2 | 0.3 | 0.4 | 0 | 0 | 0 |
| Korea | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Japan | 0.1 | 0 | 0.8 | 0.5 | 0.2 | 0.4 | 0.4 | 0.4 | 0.5 | 0 | 0 |
| Brunei Darussalam | 1 | 0 | 0 | 0 | 0.2 | 0.5 | 0.8 | 0.5 | 0.9 | 0 | 0 |
| Malaysia | 0.3 | 0.3 | 0.4 | 0.5 | 0.1 | 0.1 | 0.2 | 0.4 | 0.5 | 0.1 | 0 |
| Singapore | 0.3 | 0.4 | 0.4 | 0.3 | 0.1 | 0.1 | 0.2 | 0.3 | 0.6 | 0.1 | 0 |
| Viet Nam | 0.3 | 0.2 | 0.2 | 0.3 | 0.1 | 0.1 | 0.1 | 0.5 | 0.5 | 0 | 0 |
| Rest of East Asia | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.4 | 0.2 | 0 | 0 |
| India | 0.4 | 0.1 | 0.1 | 0.7 | 0.3 | 0.6 | 0.6 | 0.7 | 0.5 | 0 | 0 |
| USA | 0.2 | 0 | 0 | 0.3 | 0.1 | 0.6 | 0 | 0.5 | 0.2 | 0 | 0 |
| Canada | 0 | 0.3 | 0 | 0.3 | 0.2 | 0.4 | 0 | 0.4 | 0.1 | 0 | 0 |
| Mexico | 0.6 | 0.3 | 1.1 | 0.5 | 0.2 | 0.5 | 0.2 | 0.5 | 0.5 | 0 | 0 |
| Argentina | 1 | 0.9 | 0.1 | 0.7 | 0.7 | 0.4 | 0.1 | 0.5 | 0.6 | 0 | 0 |
| Brazil | 0.8 | 0.6 | 0.4 | 0.9 | 0.3 | 0.7 | 0.5 | 0.6 | 0.8 | 0 | 0 |
| EU28 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.8 | 0 | 0 |
| Turkey | 0.6 | 0.4 | 0.1 | 0.6 | 0.1 | 0.4 | 0.3 | 0.5 | 1.2 | 0 | 0 |
| Russian Federation | 0.8 | 0.5 | 0 | 0.8 | 0.2 | 0 | 0.4 | 0.6 | 0.3 | 0 | 0 |
| New Zealand | 0.3 | 0 | 0 | 0.2 | 0 | 0.1 | 0.3 | 0.6 | 0.2 | 0 | 0 |
| Chile | 0.1 | 0.1 | 0 | 0 | 0.1 | 0.6 | 0.1 | 0.6 | 0.5 | 0 | 0 |
| Peru | 0.4 | 0 | 0 | 0.8 | 0.1 | 0.1 | 0.2 | 0.5 | 0 | 0 | 0 |
| Rest of the World | 0.4 | 0.1 | 0.1 | 0.3 | 0.2 | 0.2 | 0.2 | 0.4 | 0.5 | 0 | 0 |

Source: Authors' estimates based on Kee et al. (2009) and Jafari and Tarr (2015).

## Appendix E. Non-tariff barriers, % (continued)

| **Region\sector** | Trade | Communications | Financial services n.e.s. | Insurance | Other transportation | Water transportation | Air transportation | Business services n.e.s. | Other services |
|---|---|---|---|---|---|---|---|---|---|
| Australia | 1.3 | 0.7 | 1.5 | 18.4 | 0.1 | 14.3 | 0 | 25.4 | 0 |
| China | 6.5 | 2.9 | 22.3 | 21 | 0 | 53.4 | 68.4 | 53.7 | 0 |
| Korea | 2.6 | 1.1 | 1.5 | 36.9 | 0.4 | 15.1 | 19.1 | 71.4 | 0 |
| Japan | 0 | 0.6 | 1.5 | 11.8 | 5.6 | 12.3 | 20.1 | 21.8 | 0 |
| Brunei Darussalam | 2.6 | 1.7 | 7.5 | 20.6 | 5.4 | 20.2 | 26.9 | 38 | 0 |
| Malaysia | 6.9 | 1.9 | 32 | 39.1 | 75.3 | 62.6 | 65.1 | 48.5 | 0 |
| Singapore | 5 | 37.3 | 21.7 | 26.3 | 60.6 | 50.2 | 57.8 | 59.1 | 0 |
| Viet Nam | 6.9 | 11.4 | 4.5 | 27.8 | 77.4 | 50.7 | 71.8 | 47.7 | 0 |
| Rest of East Asia | 2.9 | 3.4 | 12.1 | 24.3 | 29.4 | 30.9 | 45.9 | 50.4 | 0 |
| India | 7.7 | 15.9 | 14.2 | 37.6 | 84.2 | 63.4 | 84.2 | 64.7 | 0 |
| USA | 1.8 | 0.7 | 2.2 | 11.9 | 0 | 16.6 | 20.6 | 40.8 | 0 |
| Canada | 2.7 | 3.2 | 3.2 | 13.6 | 0.2 | 11.5 | 21.5 | 33.2 | 0 |
| Mexico | 1.7 | 0.6 | 1.5 | 42.9 | 34.8 | 10.5 | 16.4 | 27.1 | 0 |
| Argentina | 0.8 | 0.3 | 1.5 | 13.3 | 0 | 0 | 74.2 | 19.3 | 0 |
| Brazil | 1.5 | 1 | 18.3 | 16.8 | 0 | 54.8 | 70.8 | 56 | 0 |
| EU28 | 1.4 | 0.7 | 2 | 11 | 27.3 | 9.3 | 17.6 | 31.6 | 0 |
| Turkey | 1 | 1.1 | 1.5 | 13.5 | 8.7 | 9.3 | 22.1 | 72.7 | 0 |
| Russian Federation | 4.5 | 0 | 19.2 | 44.1 | 0 | 63.4 | 66.2 | 46.1 | 0 |
| New Zealand | 0 | 2.7 | 1.5 | 11.8 | 0 | 11.2 | 0 | 22.8 | 0 |
| Chile | 1.6 | 69.9 | 0.7 | 15.2 | 0 | 0 | 0 | 23.5 | 0 |
| Peru | 1.3 | 0.3 | 12.7 | 22.5 | 0 | 10.6 | 60.7 | 22.2 | 0 |
| Rest of the World | 4.2 | 9.4 | 21.1 | 33.1 | 41.9 | 29.5 | 40.5 | 41.3 | 0 |

Source: Authors' estimates based on Kee et al. (2009) and Jafari and Tarr (2015).

## Appendix F. Potential tariff increases for Canada, Mexico and the United States under NAFTA termination scenario (20 highest MFN rates), %

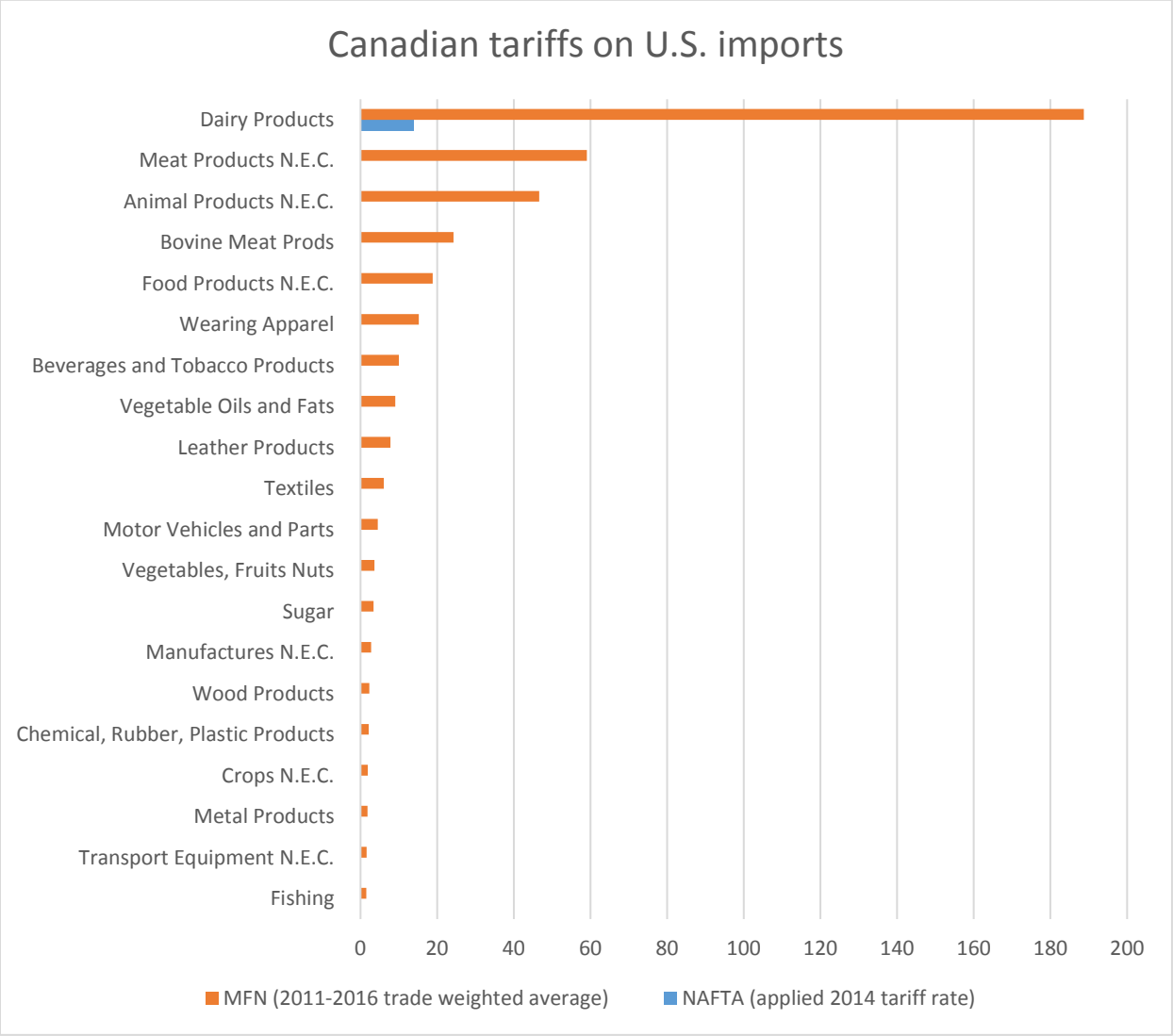


**Figure F.1. Canadian tariffs on U.S. imports**

*Source*: GTAP 10p2 database, Ciuriak et al. (2017).

*Note:* We assume no change in Canadian tariffs on U.S. imports of dairy following Ciuriak et al. (2017).

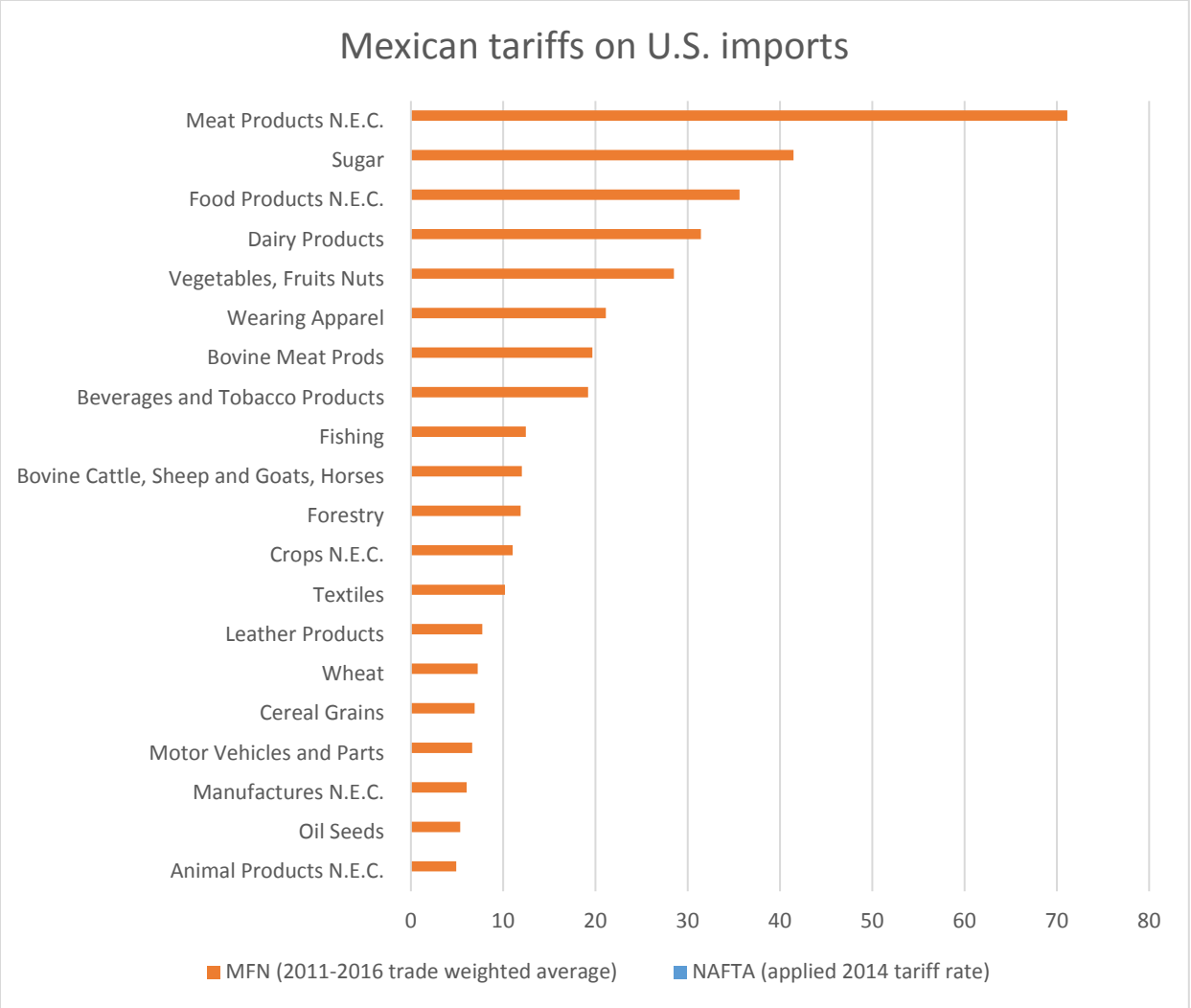


**Figure F.2. Mexican tariffs on U.S. imports**

*Source*: GTAP 10p2 database, Ciuriak et al. (2017).

*Note:* We assume no change in Mexican tariffs on U.S. imports of sugar following Ciuriak et al. (2017).

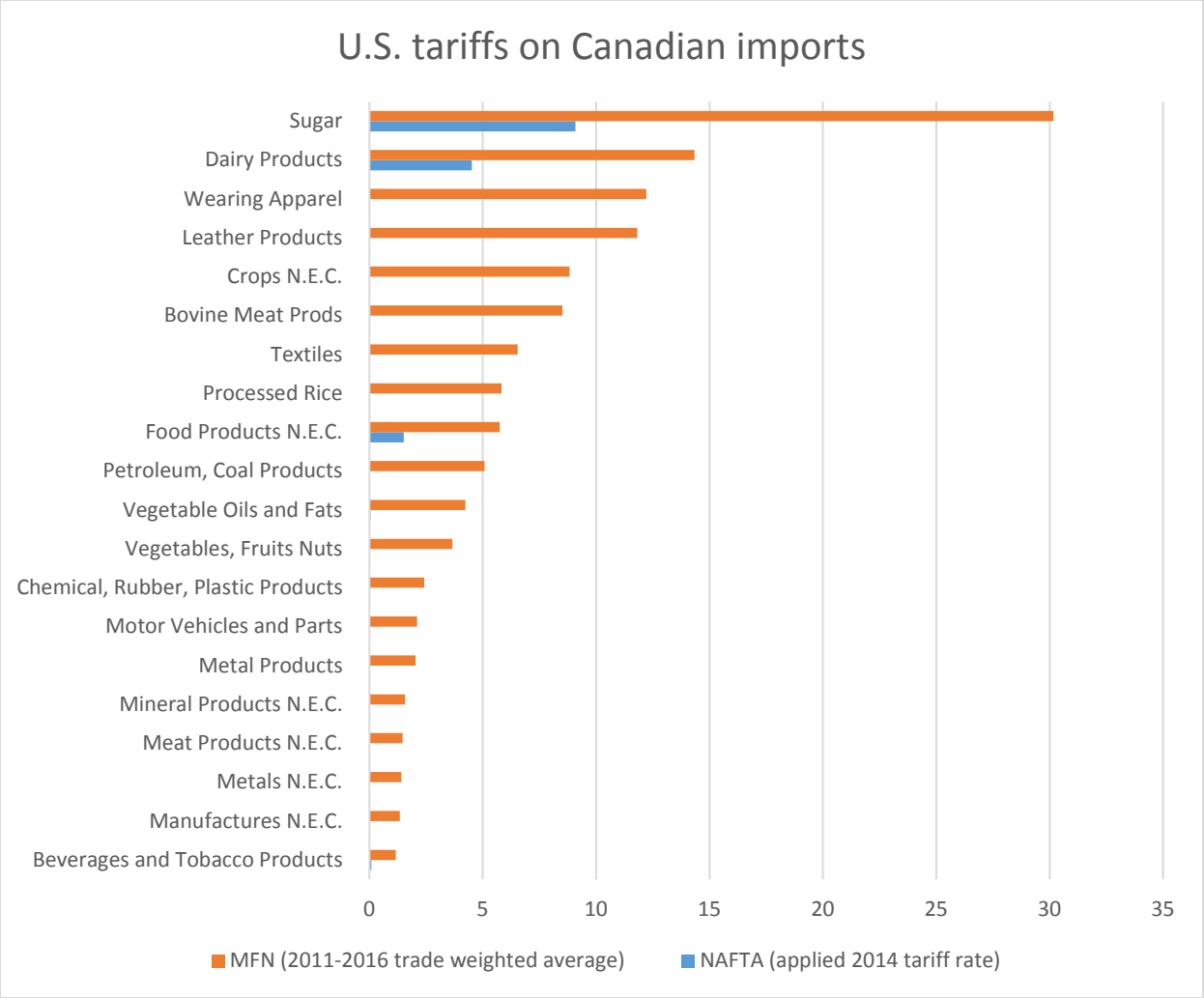


**Figure F.3. U.S. tariffs on Canadian imports**

*Source*: GTAP 10p2 database, Ciuriak et al. (2017).

*Note:* We assume no change in U.S. tariffs on Canadian imports following Ciuriak et al. (2017).

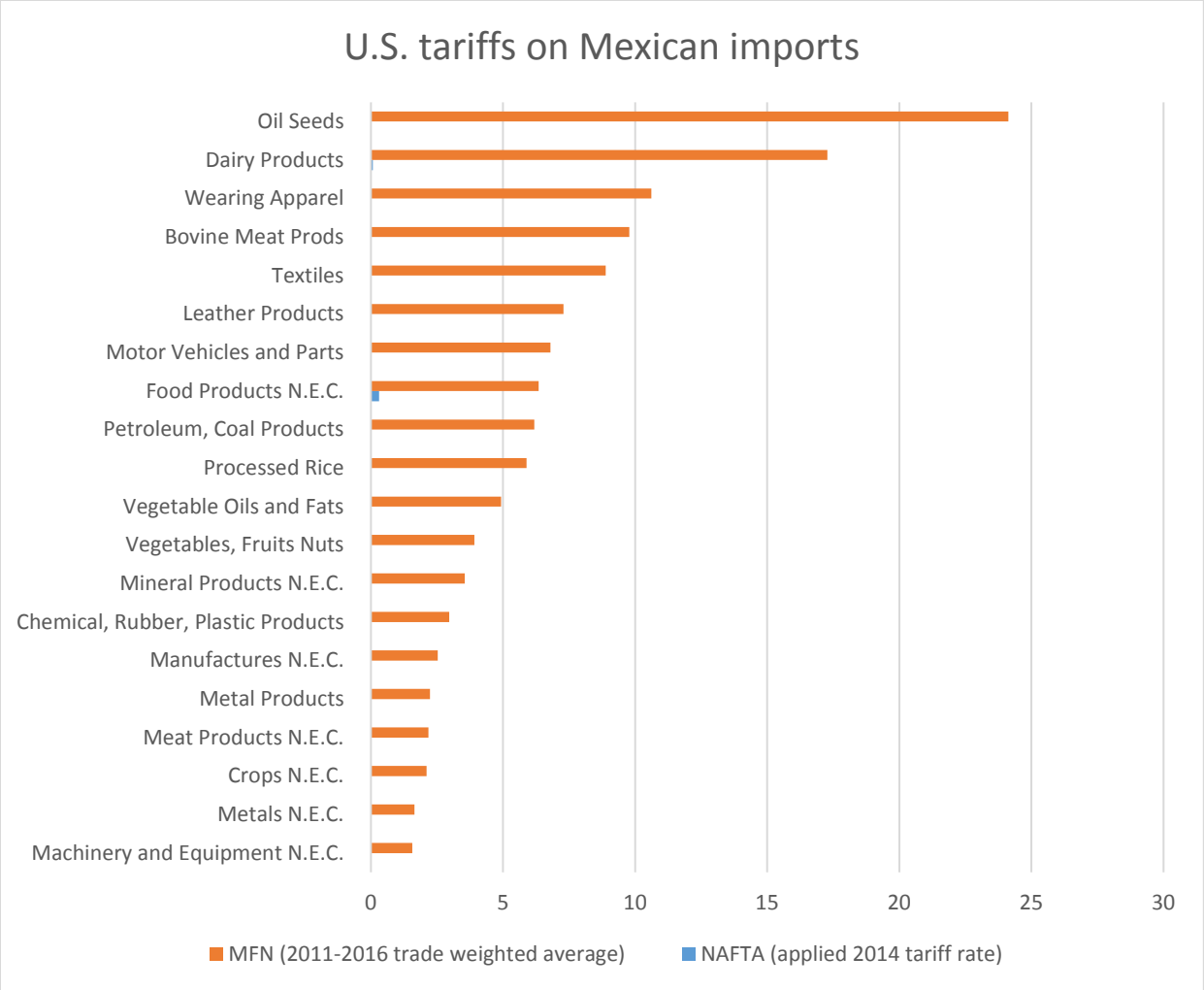


**Figure F.4. U.S. tariffs on Mexican imports**
*Source*: GTAP 10p2 database, Ciuriak et al. (2017).