The United States Trade Policies in the Twenty First Century and Impacts for Domestic Agriculture

by

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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 **$440 million**), American farmers still are facing strong headwinds and the possibility of a significant loss of export revenues. According to these estimates, U.S. withdrawal from the TPP reduces agricultural and food exports by **$1.8 billion** a year ($1.4 billion, with the offsetting $440 million of USMCA export gains). Following trade liberalization between the eleven remaining TPP members, there is an increase in trade within those countries, which substitutes agricultural exports away imports from the United States. However, if the United States were to rejoin the TPP, the agreement would significantly benefit American 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 over $500 per U.S. household.

What does all this mean? It suggests that U.S. agriculture is entering a very risky environment with respect to international trade. On the down side, the sector risks losing much of the trade gains achieved over the past three decades. That would result in significant economic damage to American agriculture. On the up-side, 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 is critical for the future and for the success of the U.S. food and agriculture sector.

1. 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).[1] 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).[2] 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 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.

[1] The trade agreement was signed on November 30, 2018, though it requires ratification by all three member states.

[2] 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.

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.

2. 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.

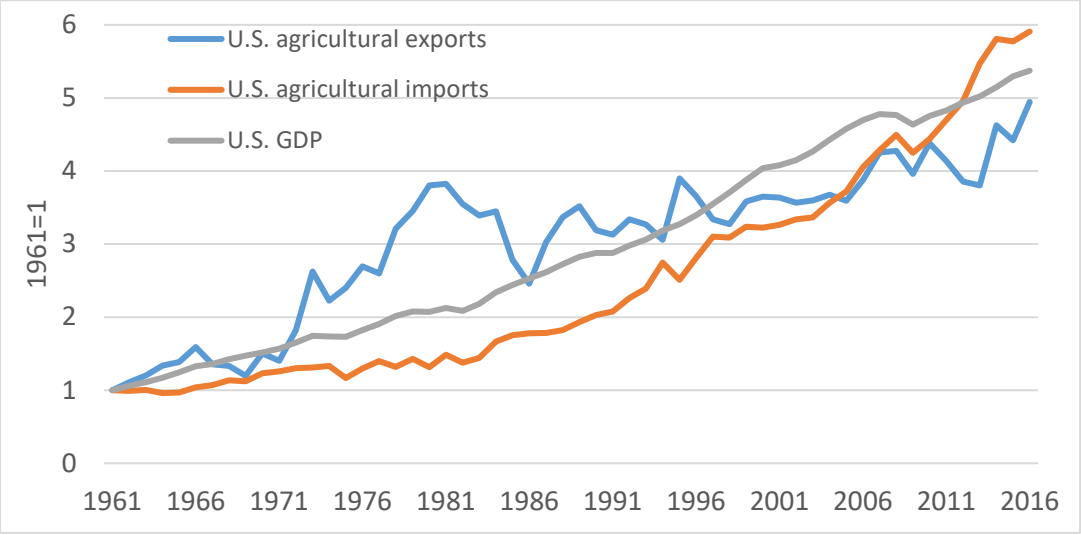

Figure 1. U.S. agricultural trade and GDP since 1961
Source: WB (2018), FAO (2018).

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.

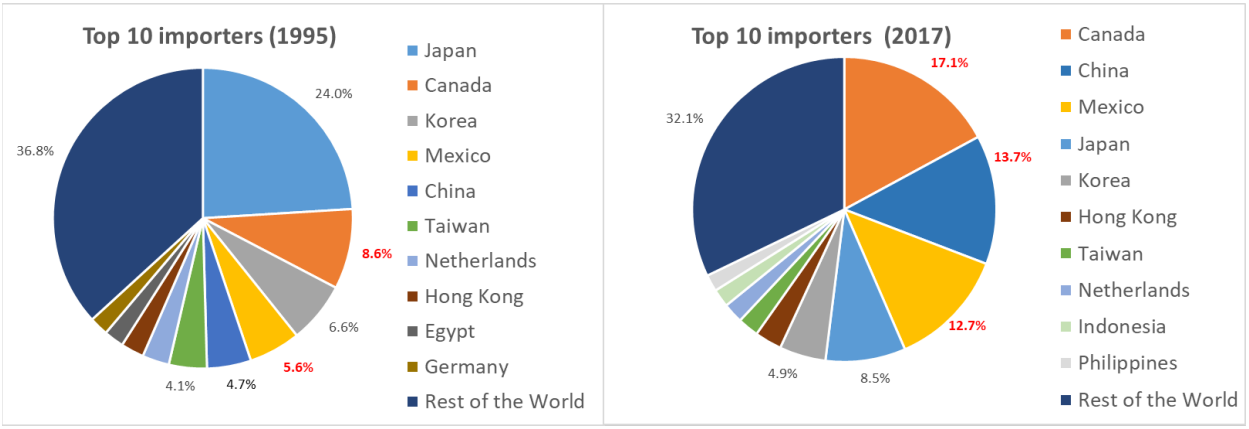

Figure 2. Destination shares for U.S. agricultural exports

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.

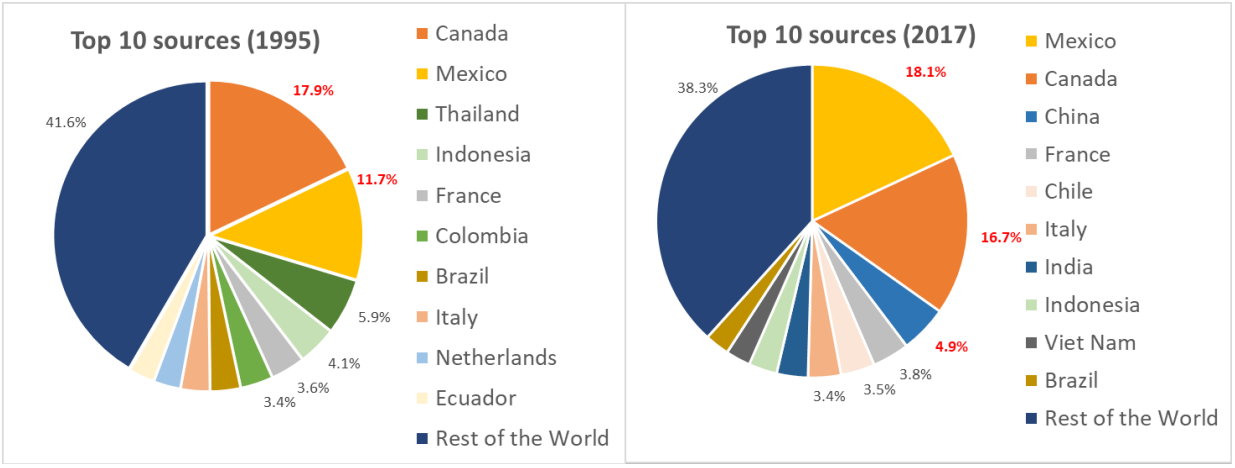

Figure 3. Source shares for U.S. agricultural imports

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

3. The USMCA in a broad trade context and impacts for U.S. agriculture

3.1. Key policy changes in the USMCA

The most significant impacts of the USMCA related to market access are concentrated in the automobile sector and a few agricultural sectors:

- Auto content for duty free access is raised to 75 percent (from the existing 62.5 percent under NAFTA's auto rule of origin).
- 45 percent of the auto content must be produced in factories where workers are paid at least $16/hour.
- Expanded import quotas in Canada for dairy and poultry products.

Many of the other new provisions relative to the initial NAFTA accord deal with so-called 'deeper' integration issues such as reducing the impacts of non-tariff barriers, such as transparency in import and export licensing. There are also additional provisions that deal with intellectual property and the digital economy—only nascent when the initial NAFTA agreement was signed. The accord extends copyrights to 70 years (up from 50) and the period that a pharmaceutical drug can be protected from generic competition. In terms of the digital economy, it prohibits duties on music and e-books, and protections for internet companies exempting them from liability for content their users produce. The new agreement maintains the dispute settlement mechanism of the existing NAFTA accord. There is a new sunset clause. The agreement expires in 16 years unless there is an agreement to extend it. The accord will be reviewed every 6 years for a decision on whether to extend or not, beginning six years after initial signing. The review process provides an opportunity to 'refresh' the agreement on a regular basis.

3.2. Implementation of the USMCA and Impacts on U.S. Agriculture

After a transition period at the beginning of the implementation of NAFTA, agricultural trade across the three NAFTA countries was largely liberalized and increased substantially. A few key exceptions included protection of Canada's heavily regulated dairy sector and to a lesser extent poultry. The dairy and poultry sectors were subject to tariff rate quotas (TRQs), which provided minimal access, i.e. an export quota, at a low tariff level. Higher exports, so-called out-of-quota exports, faced much higher and typically prohibitive tariffs. In particular, in 2017 TRQs were applied to chicken and turkey products, eggs and egg products, milk, butter, cream, cheese, ice cream, etc. Some of the specified Canadian quotas were reserved for selected regions (e.g. cheese of all types other than imitation cheese – 66 percent allocated to EU; powdered buttermilk – reserved for New Zealand; concentrated/condensed milk/cream – reserved for Australia).

The new agreement expands the quotas in these sectors. This analysis estimates that the dairy quota expands by more than 100 percent (see Table 1) from an initial low level, and the 'pork and poultry products, etc.' sector by some 11.5 percent.[3] There are smaller expansions in two other sectors – 'other food products' and 'pigs, chicken, etc.' – which includes live chickens and eggs. Our interpretation of the changes to agricultural protection under the USMCA is limited to these four sectors and only affect U.S. exports to Canada.

[3] Poultry meat is a sub-sector in the 'pork and poultry products, etc.' sector that also includes pork meat.

Table 1. Estimated increase in market access of U.S. agricultural exports to Canada under the USMCA

Sector code	Sector description	Increase in U.S. exports to Canada, %
MIL	Dairy products	105.59
OFD	Other food products	0.04
OAP	Pigs, chicken, etc.	2.69
OMT	Pork and poultry products, etc.	11.50

Source: authors' estimates based on USTR (2018a; 2018b).

The impact on total U.S. agricultural exports is relatively modest at around **$440 million**.[4] Focusing on the target sectors, dairy exports increase by 4.6 percent and 'other meat' exports increase by 1.6 percent; to some extent this reflects the low share of U.S. exports in these sectors towards Canada (Figure 3). Export increases in the other two target sectors are much lower 0.35 percent and essentially 0 percent for 'pigs, chicken, etc.' and 'other food products' respectively. In value terms, the largest export increases are also associated with dairy ($269 million) and 'other meat' ($206 million) sectors (Figure 4).

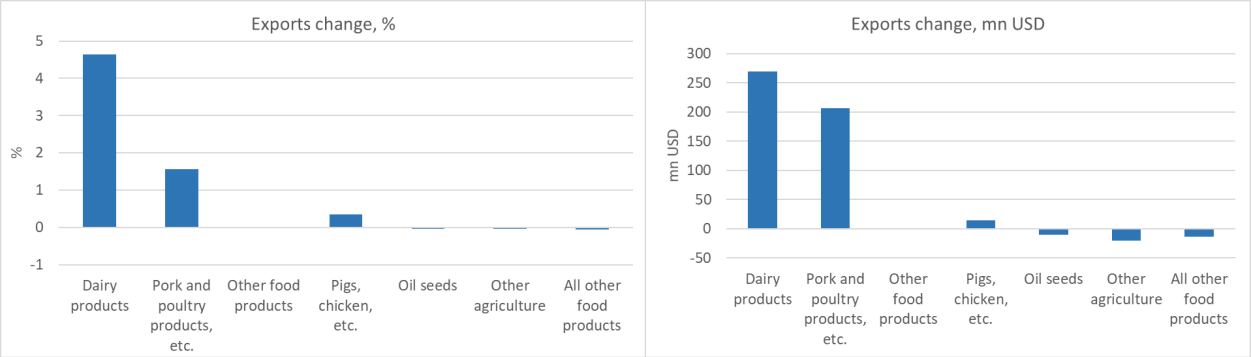

Figure 4. Estimated changes in the U.S. agricultural exports under the USMCA relative to NAFTA[5]

Source: GTAP model simulations.

The increase in U.S. exports in these sectors also generates increases in output, 0.3 percent in dairy (products) and 0.2 percent in raw milk production; 0.2 percent in 'pork and poultry products, etc.', 0.2 percent in 'pigs, chicken, etc.'[6] and virtually no change in 'other food' output.

Implementation of the USMCA would also impact agricultural land prices. With increasing exports and growing demand for land, land prices grow by 0.25 percent in the 'raw milk' sector. In other agricultural sectors, the land price increase is a more modest 0.06 percent, while in 'oil seeds' sector the land prices grow by less than 0.03 percent (Figure 5). In the case of 'dairy

[4] Due to the differences in regional aggregation and implementation of the NTBs to the reference year, results reported in this paper are different from numbers reported in Chepeliev et al. (2018).

[5] For the mapping between reported aggregate sectors and GTAP sectors see Appendix D.

[6] Due to both upstream linkages and improved market access.

products', labor demand grows by 0.27 percent, which is equivalent to 570 workers.[7] The same absolute increase in employment is observed in the 'other meat' sector, where labor demand grows by 0.2 percent, while in 'pigs, chicken, etc.' employment increases by 580 workers (+0.15 percent) (Figure 5).

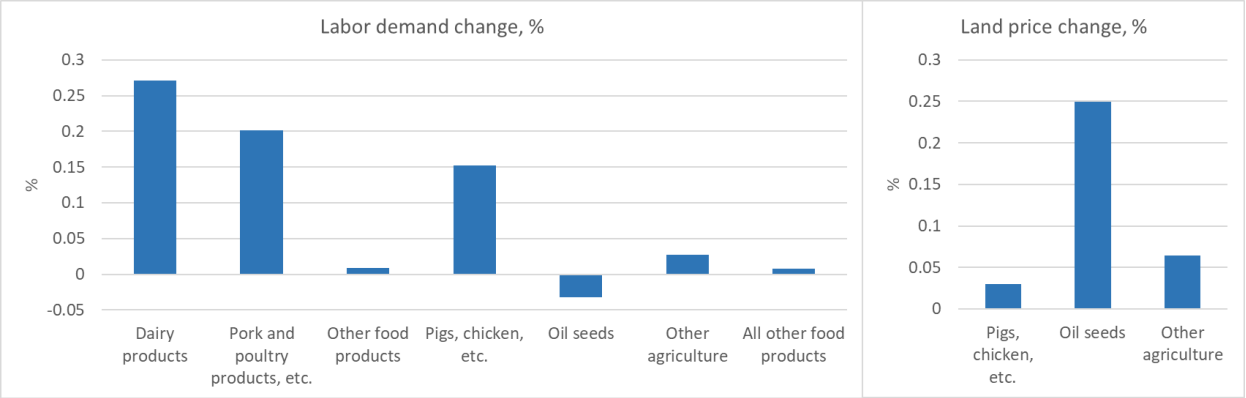

Figure 5. Estimated changes in U.S. agricultural land prices and labor demand under the USMCA

Source: GTAP model simulations.

On the macro level, implementation of the USMCA results in a slight welfare improvement in the United States of $202 million, while per capita income remains unchanged (+0.001 percent). There is no negligible impact on aggregate U.S. GDP. In summary, from the point of view of agricultural interests, the new USMCA has measurable impacts on the exports of dairy and poultry towards Canada, with very modest impacts on farm income and labor demand.

3.3. Retaliatory agricultural tariffs by Canada and Mexico

A hallmark of the Trump Administration has been sharp changes in U.S. trade policy—largely a reversal of the steady movement towards free trade since the end of World War II. The first of these trade policy actions targeted the steel and aluminum sectors in March 2018, justified on national security considerations, by imposing tariffs of 25 percent on steel and 10 percent on aluminum imports from most countries.[8] These trade actions were largely implemented uniformly across all trading partners—including Canada and Mexico. Along with many of the other U.S. trading partners, both NAFTA partners initiated retaliatory tariffs—targeting a broad set of traded goods, not only steel and aluminum. Table 2 summarizes the retaliatory tariffs imposed by Canada and Mexico on U.S. agricultural exports. They include 9.6 percent on 'other meat' products—largely poultry and pork meat, 6.7 percent on dairy products and 3.8 percent on vegetables and fruits by Mexico; 3.4 percent on sugar, 2.8 percent on 'other food products' and 1.65 percent on 'other meat' products by Canada.[9]

[7] Labor demand changes represent reallocation of workers between sectors (as aggregate labor demand at the national level is fixed). It is estimated by multiplying 2014 sectoral employment levels by percentage changes in labor demand.
[8] Through the invocation of Section 232 of the Trade Expansion Act of 1962.
[9] Retaliatory agricultural import tariffs are based on the aggregation of the HS 2012 6-digit tariffs using trade weights. In most cases, food and agricultural sectors reported in this study include more than one commodity at the HS 6-digit level of classification. Not all HS 6-digit level commodities within one sector face retaliatory tariffs, therefore the change in import tariffs at the sectoral level are lower than retaliatory tariffs for specific commodities. For example,

Table 2. Retaliatory agricultural import tariffs by Canada and Mexico, %

Sector code	Sector description	Canada	Mexico
V_F	Vegetables, fruit, nuts	0.00	3.76
OMT	Pork and poultry products, etc.	1.65	9.59
MIL	Dairy products	0.09	6.68
SGR	Sugar	3.38	0.00
OFD	Other food products	2.82	3.08
B_T	Beverages and tobacco products	0.72	0.9

Source: Based on data provided in Li (2018).

Simulations in this analysis show that the retaliatory tariffs enacted by Canada and Mexico on their imports of U.S. agricultural and food products would reverse any potential gains that emerge from implementation of the USMCA, with exports losses for the sector at roughly **$1.74 billion**. In the most affected sectors, these retaliatory tariffs lead to a decline in U.S. exports of 'other meat' products by 7 percent, dairy products by 1.2 percent and 'other food products' by 2.5 percent (Figure 6). There is only a minor drop in the exports of fruits and vegetables. In value terms, the largest decreases in exports are observed in 'other meat' ($918 million) and 'other food products' ($824 million). Exports in other sectors increase marginally as U.S. agriculture adjusts its production and exports towards the non-targeted sectors.

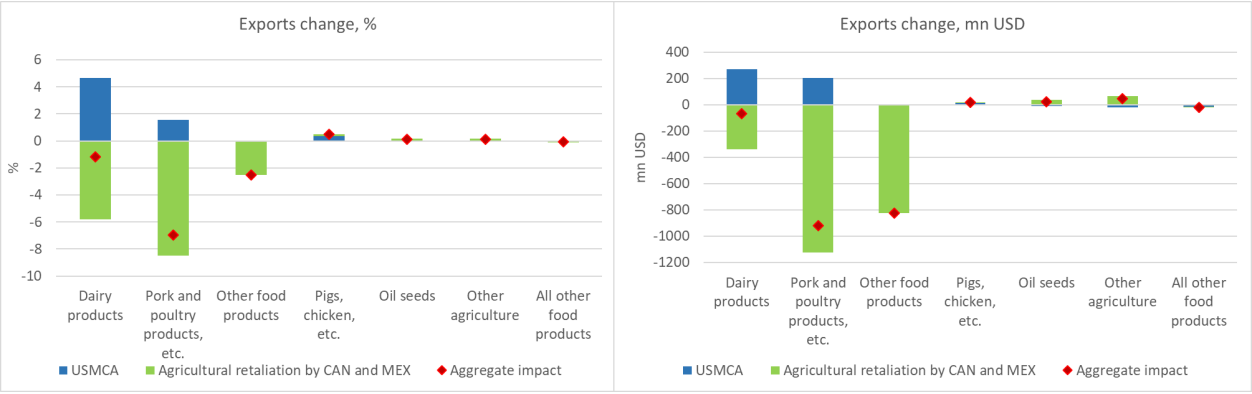

Figure 6. Estimated changes in the U.S. agricultural exports under the USMCA and retaliatory agricultural import tariffs by Canada and Mexico

Source: GTAP model simulations.

The decrease in U.S. agricultural exports also generates a reduction in output – 0.1 percent in dairy products and 0.1 percent in raw milk production—the upstream activity. More significant reductions in output are observed in 'pork and poultry products, etc.' (0.9 percent) and pigs, chicken, etc.' (0.5 percent). Reductions in agricultural exports also result in weakening land demand, which would lower land prices—up to 0.15 percent in the case of 'raw milk' (Figure 7).

Mexico has imposed a 20 percent tariff on U.S. exports of apples and cranberries. But these two goods are part of a large basket of goods denominated as 'vegetables and fruits' in the database and model and thus the average tariff increase on the broader basket is estimated to be 3.76 percent.

In relative terms, the biggest reductions in labor demand are also observed in 'other meat' and 'other animal' (products)—0.9 percent and 0.5 percent respectively (Figure 7).

On aggregate, implementation of the USMCA together with the retaliatory tariffs imposed by Canada and Mexico results in the reallocation of 8,500 workers away from the agricultural and food sector, with the largest negative changes in the 'pork and poultry products, etc.' and 'other food products' (2,600 workers within each sector) and 'pigs, chicken, etc.' (2,100 workers).
At the macro level, implementation of the USMCA together with the retaliatory measures imposed by Canada and Mexico results in a reduction in U.S. economic well-being of $827 million, with per capita income reduction by 0.01 percent. There is almost no impact on U.S. GDP (-0.0002 percent).

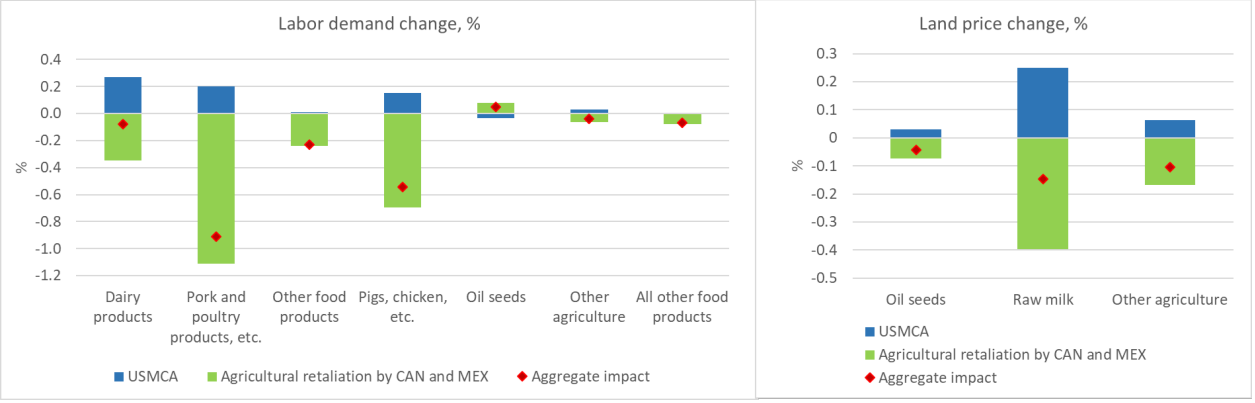

Figure 7. Estimated changes in the U.S. agricultural land prices and labor demand under the USMCA and retaliatory agricultural import tariffs by Canada and Mexico
Source: GTAP model simulations.

3.4. USMCA in the context of broader trade retaliation

Implementation of the USMCA is taking place in the context of a much broader set of trade policies. In particular, as mentioned before, steel and aluminum import tariffs, implemented by the United States in March 2018 (earlier, in January 2018, United States also imposed import tariffs on the solar panels, most of which are manufactured in China). These actions launched a chain reaction of retaliatory trade measures by U.S. trading partners, including China and EU. This includes multi-round tariff increases between China and United States. (Li, 2018). Relative to the positive impacts of the USMCA implementation on the U.S. agricultural sector, the aforementioned trade frictions could have a dramatic negative effect on the U.S. agricultural industry. These tariff increases begin with the steel and aluminum tariffs implemented by the United States on March 23, 2018 and include all the tariff changes up to the first round of US-China tariff increases (Li, 2018).

Tariff increases implemented in this scenario do not include the second round of the United States-China import tariff increases (initially scheduled for 01/01/2019). Following G20 discussions, the United States and China agreed to refrain from increasing tariffs or imposing new tariffs for 90 days (until March 1, 2019) (China Briefing, 2018). In this scenario, we also do not include the recent announcement by China's Ministry of Finance to temporarily suspend the additional 25 percent tariff on U.S. autos and five percent tariff on certain U.S. auto parts for three months, beginning on January 1, 2019 (China Briefing, 2018).

The quantitative assessment shows that under this more dramatic scenario of bilateral tariff increases the U.S. agricultural sector takes a much more sizeable hit, as aggregate U.S. agricultural and food exports drop by around **$7.7 billion**. While 'oil seed' exports suffer the most (a 21 percent decline) following implementation of the retaliatory policies by China, exports in other agricultural and food sectors also decline (Figure 8). 'pork and poultry products, etc.' exports drop by 8.3 percent, 'pigs, chicken, etc.' by 5.4 percent, 'other food products' by 2.7 percent and 'dairy products' by 1.5 percent. Mixed changes are observed in the exports of other food and agricultural commodities, but on aggregate, they outweigh each other (Figure 8).

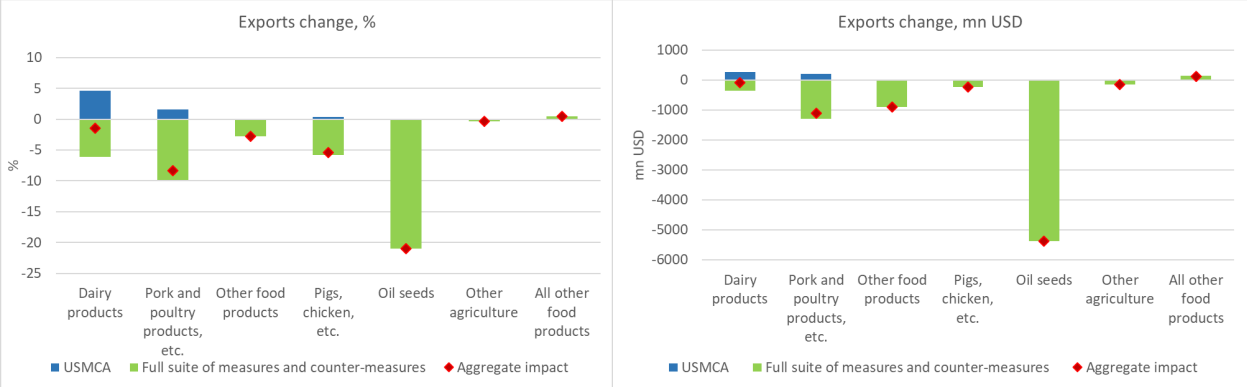

Figure 8. Estimated changes in U.S. agricultural exports in the context of broader trade retaliation

Source: GTAP model simulations.

The decrease in U.S. agricultural exports also generates reductions in output. Output decreases by around 1 percent in the case of 'pork and poultry products, etc.' and 'pigs, chicken, etc.', while the 'oil seeds' sector experiences a much larger drop of 13.5 percent.[10]

Falling exports and output reduces land and labor demand in the agricultural and food sector. Land prices decrease by 6.7 percent to 7.1 percent in most agricultural sectors, declining by 17.8 percent in the case of 'oil seeds' (Figure 9). Other agriculture sectors with large land price reductions include 'plant-based fibers' (11.1 percent). On the labor side, implemented policies result in the reallocation of 41,200 workers away from the agricultural and food sector, most of this reallocation is coming from the 'oil seeds' sector, where labor demand falls by 14.6 percent. Smaller labor reallocation comes from 'pork and poultry products, etc.' and 'pigs, chicken, etc.', at 2,800 and 3,600 workers, respectively.

At the macro level, implementation of the USMCA together with the recent broad set of retaliatory measures results in a welfare reduction of $29.5 billion and per capita income reduction of 0.19 percent as U.S. GDP declines by 0.08 percent.

[10] For a detailed analysis of the impacts of Chinese protectionist measures on U.S. soybeans, see Taheripour and Tyner (2018).

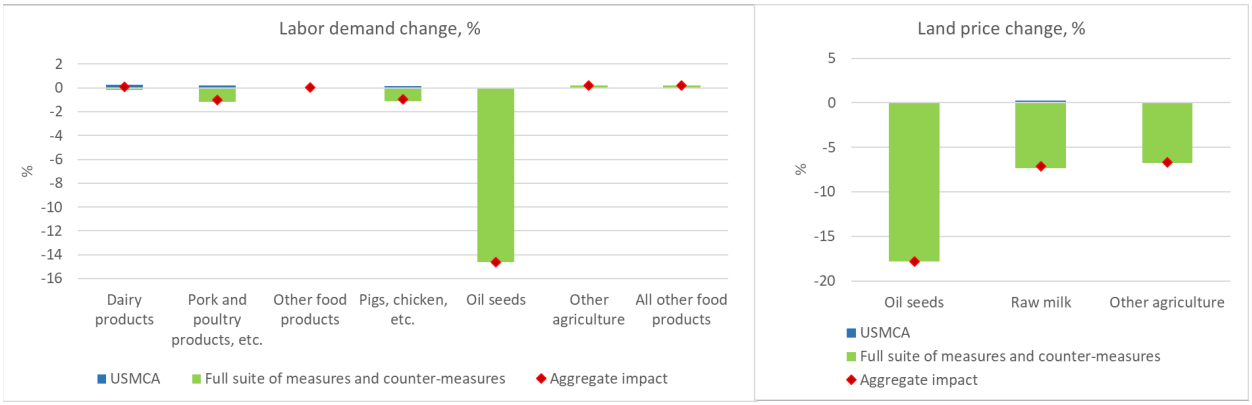

Figure 9. Estimated changes in the U.S. agricultural land prices and labor demand in the context of broader trade retaliations

Source: GTAP model simulations.

Though slightly different in terms of sectoral aggregation and reference data year, our results are in line with other studies that estimated potential impacts of China's retaliatory tariffs on U.S. agriculture. Zheng et al. (2018) and Taheripour and Tyner (2018) estimated that U.S soybeans exports to China would fall by 34.2% and 47.7% (under the standard GTAP trade elasticities) respectively. Our results suggest reduction in U.S. "oil seeds" exports to China by 44.8%. Zheng et al. (2018) predict a reduction in U.S. pork exports to China by 83.3%, while our estimates show a 93.4% reduction in 'pork and poultry products, etc.' exports to China.

4. 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 American 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.[11] However, the remaining 11 countries decided to move forward without the United States and negotiated a new agreement – the TPP11.[12] With six signatories (Australia, Canada, Japan, New Zealand, Singapore and Mexico), the agreement came into force for those countries on December 30, 2018. (Vietnam started on January 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.[13]

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 10).

[11] 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/

[12] 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

[13] 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.

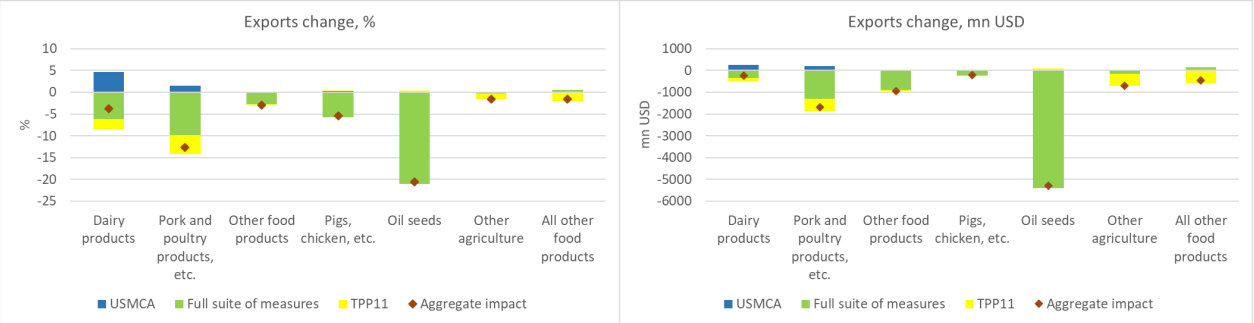

Figure 10. Estimated changes in the U.S. agricultural exports under the USMCA, Full suite of measures and counter-measures and TPP11

Source: GTAP model simulations.

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 10). 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 $440 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 11). 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 11).

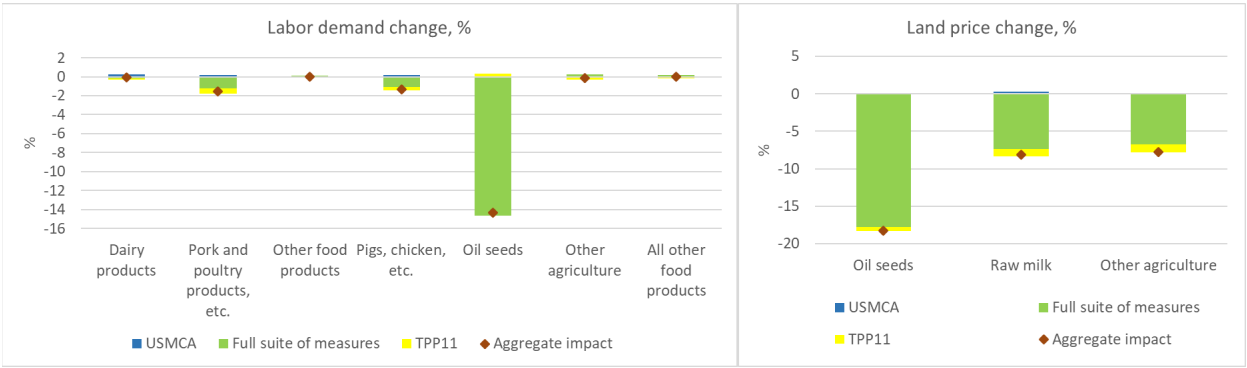

Figure 11. Estimated changes in the U.S. agricultural labor demand and land prices under the USMCA, Full suite of measures and counter-measures and TPP11

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%).

5. 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[14] 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.[15]

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.[16] 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

[14] 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.

[15] 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.

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

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' 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 12). '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 12). 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.

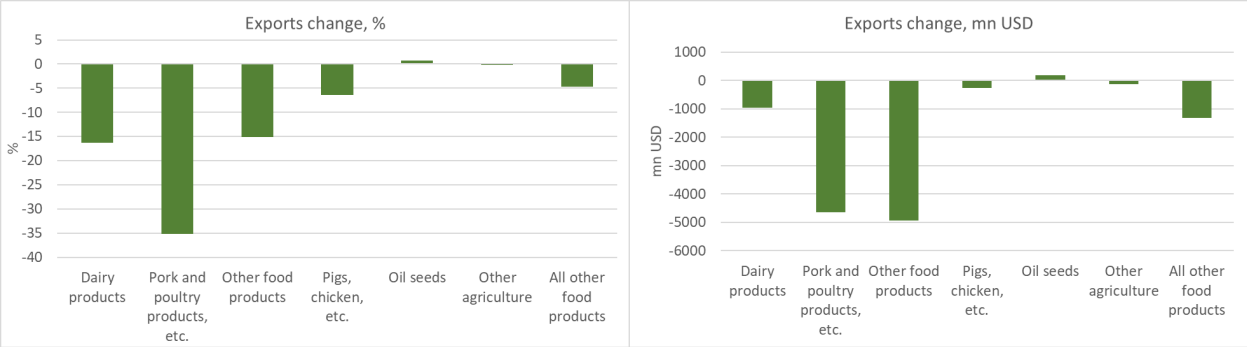

Figure 12. Estimated changes in the U.S. agricultural exports under the NAFTA termination scenario

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 13). 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 13). More modest land price reduction is observed in the 'oil seeds' sector (-0.5%).

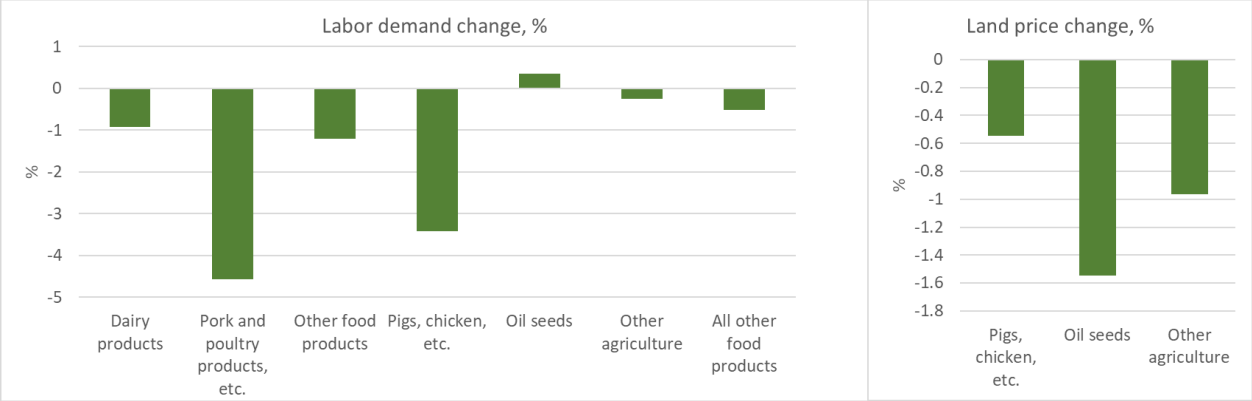

Figure 13. Estimated changes in the U.S. agricultural land prices and labor demand under the NAFTA termination scenario

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%.

6. 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.[17] 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 14). 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.

[17] 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.

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 14).

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%.

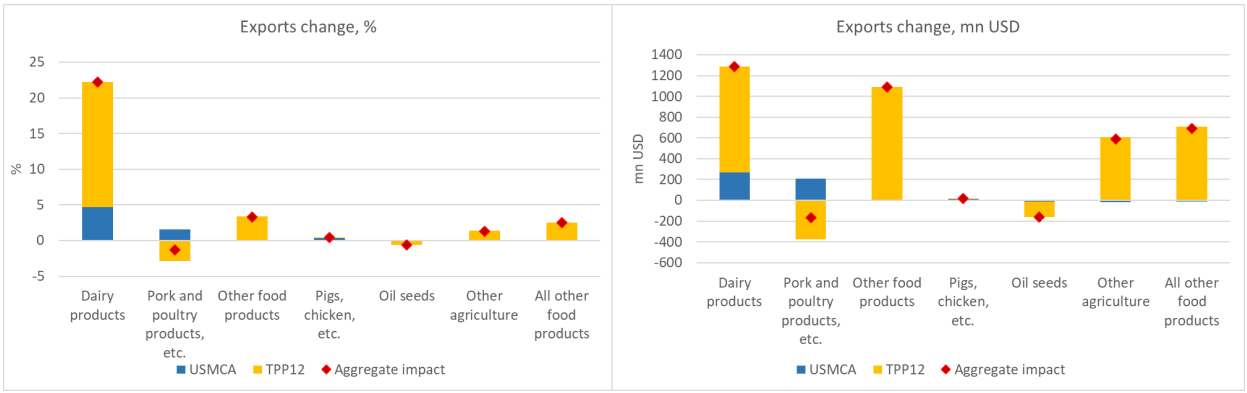

Figure 14. Estimated changes in the U.S. agricultural exports under the TPP12 and USMCA

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 15). 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.

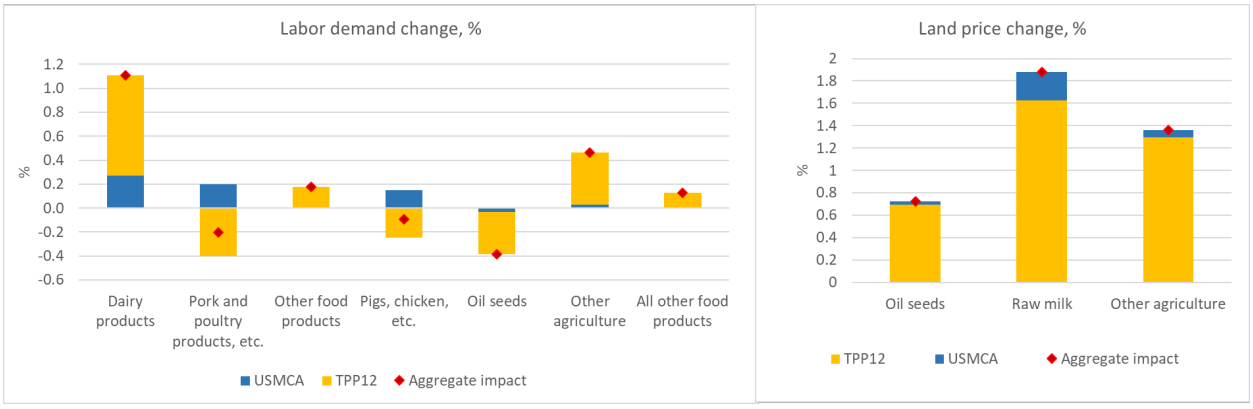

Figure 15. Estimated changes in the U.S. agricultural labor demand and land prices under the TPP12 and USMCA, %

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 15).

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%).

7. 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 **$440 million**, largely concentrated in dairy and poultry (Figure 16).

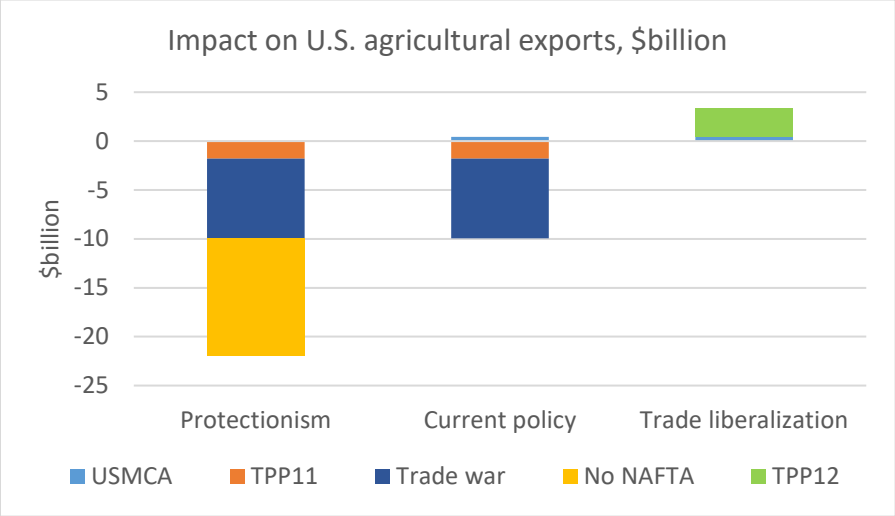

Figure 16. Agricultural export revenues under various scenarios

Source: GTAP model simulations.

*'Current policy trajectory' scenario corresponds to the combination of USMCA + TPP11 + Trade war + NAFTA termination scenarios.

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 $440 million. In a broader trade context of USMCA implementation, with all measures and counter-measures (including tariff retaliation by China and the European Union), U.S. agricultural exports will decline by around **$7.7 billion** (Figure 16).

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 American 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 over **$12 billion** (Figure 16). 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 over $500 per U.S. household. Alternatively, the United States rejoining the TPP (as the new TPP12) would significantly benefit American 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 **$9.5 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.[18] However, there is an opportunity for a better economic situation for U.S. farmers and ranchers – an end to the trade war, ratification of the USMCA and a U.S. decision to rejoin the TPP. 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.

[18] 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), %

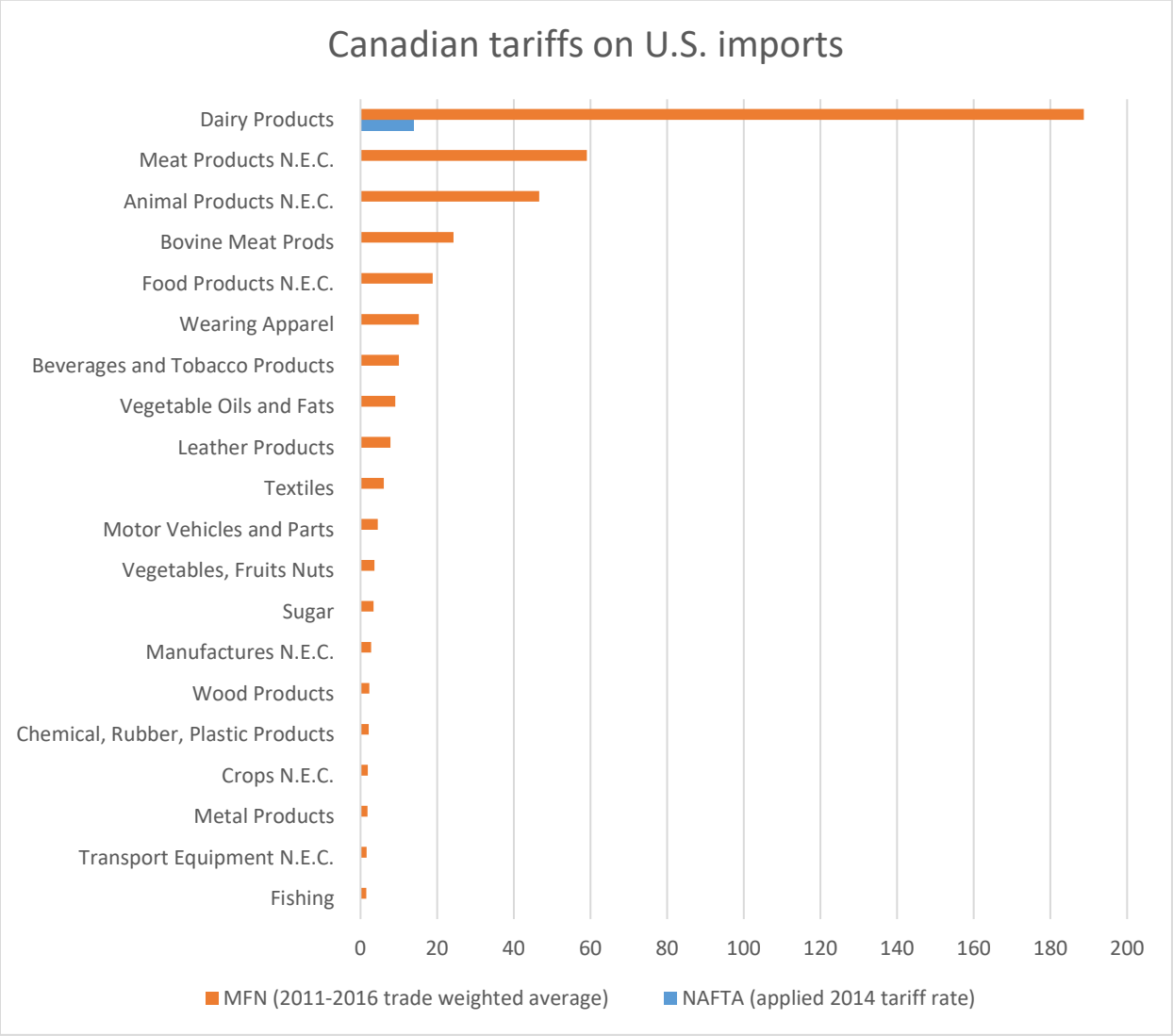

Figure F.1. Canadian tariffs on U.S. imports

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).

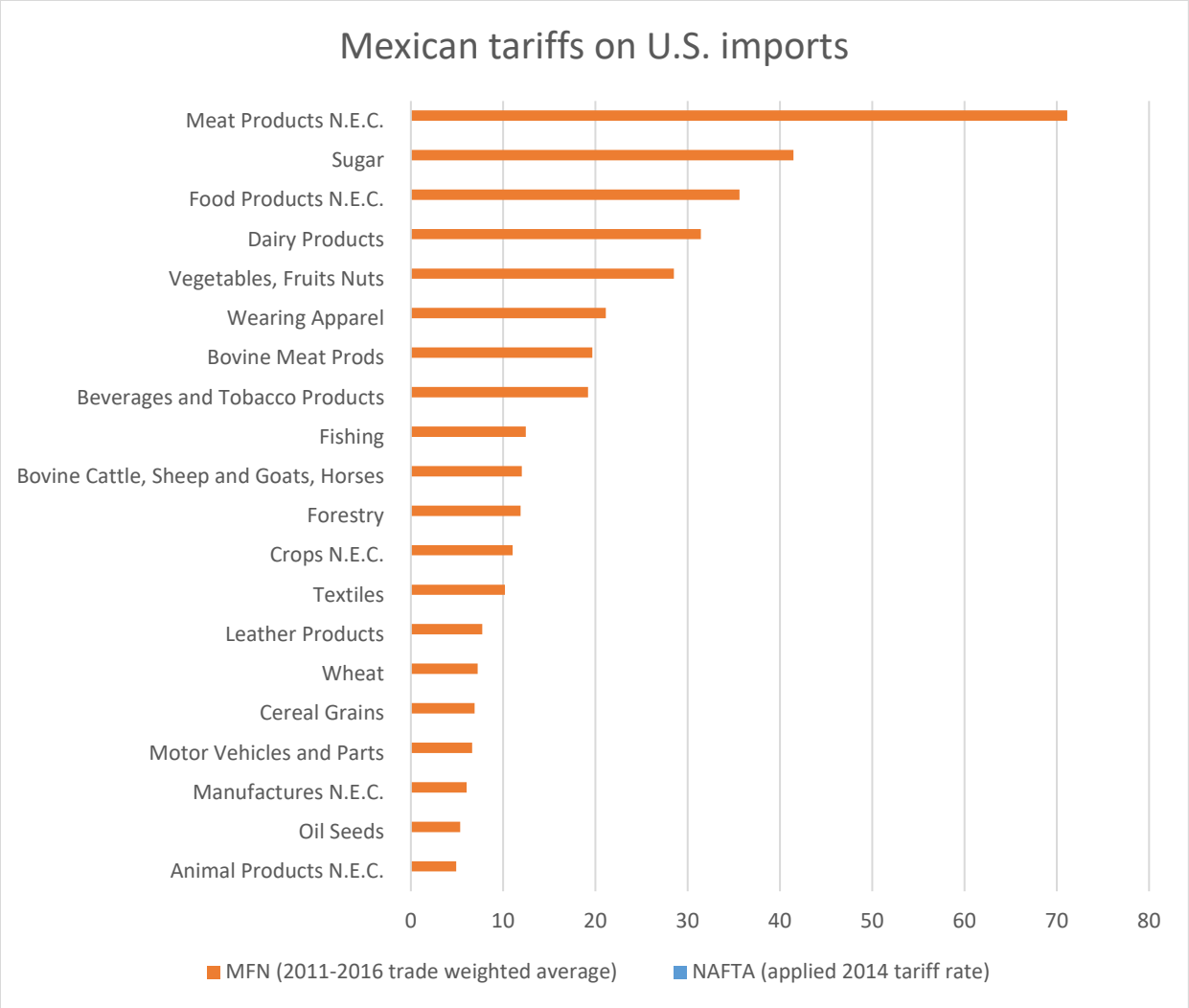

Figure F.2. Mexican tariffs on U.S. imports

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).

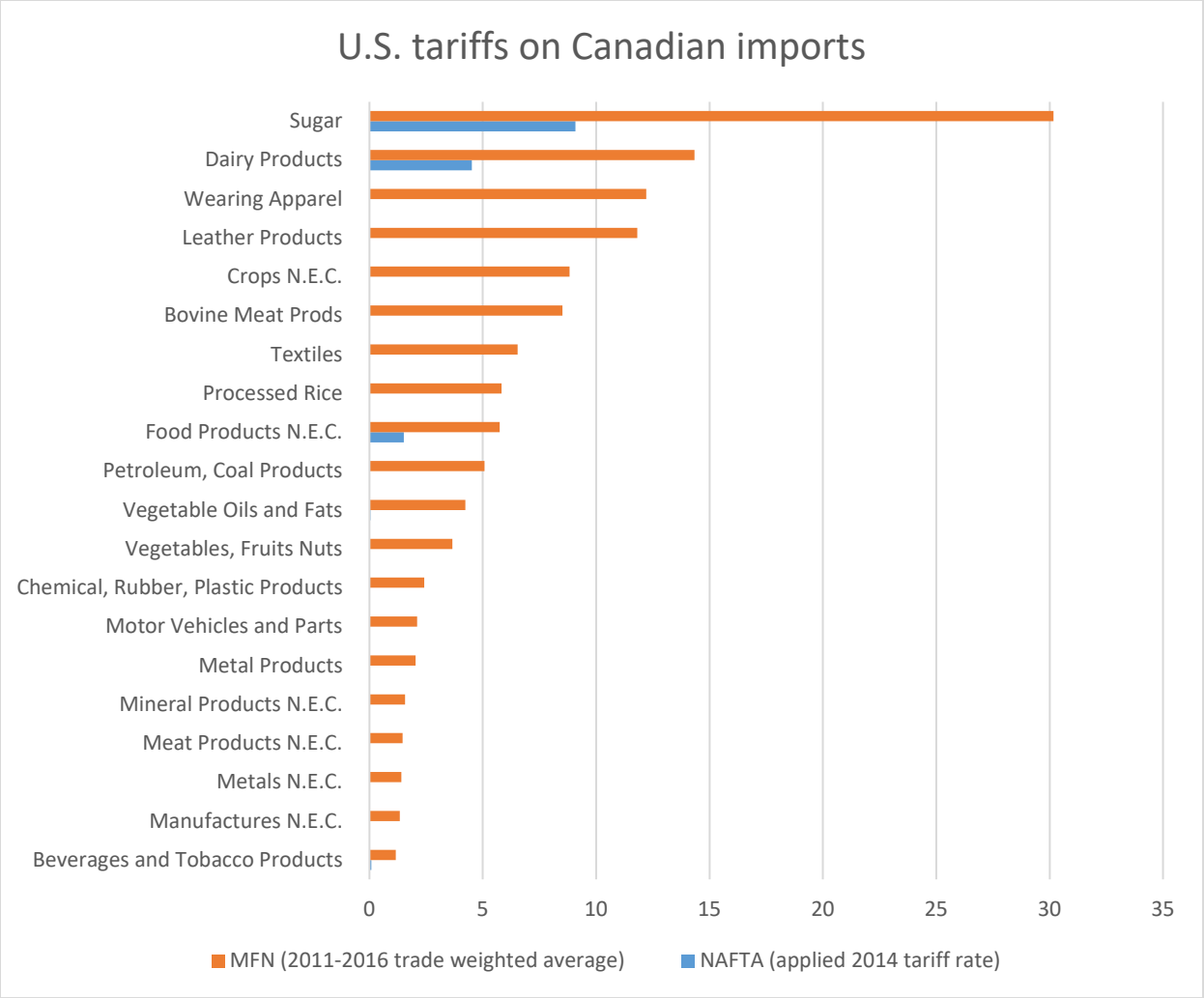

Figure F.3. U.S. tariffs on Canadian imports

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).

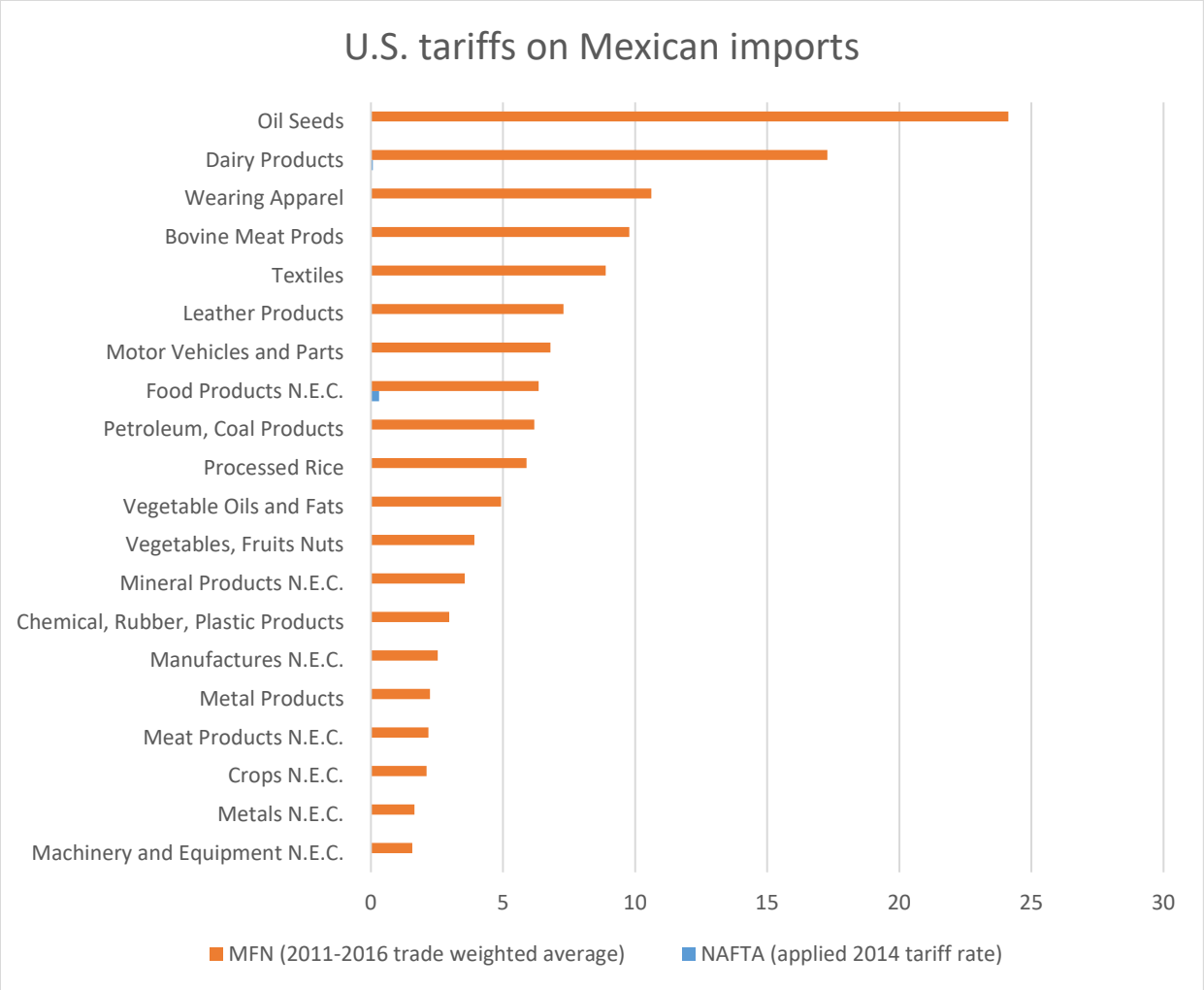

Figure F.4. U.S. tariffs on Mexican imports
Source: GTAP 10p2 database, Ciuriak et al. (2017).