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TRADE AND INTERNATIONAL POLICY

Quantifying the Impacts of the US Section 232 Steel and Aluminum Tariffs

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Executive Summary:

The Trump Administration is proceeding with unilateral measures to address what it has characterized as "unfair" trade, risking retaliation, but banking on a threat of massive escalation to extract a favourable outcome for itself. Notwithstanding widespread speculation that the threats to impose tariffs on steel and aluminum imports from its major allies would not be acted on, the Administration announced on 30 May 2018 that import duties of 25 percent on steel and 10 percent on aluminum would be imposed on imports from Canada, Mexico, and the European Union. These countries had been granted an exemption due to expire on 1 June 2018 when the duties were first imposed in March 2018. This note complements the analysis of the potential impacts of these tariffs by contributing computable general equilibrium model simulation impact estimates.

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The Trump Administration signalled from the very beginning that it intended to reshape America's trade and has consistently acted on this pledge, pulling out of the Trans-Pacific Partnership (TPP), launching the renegotiation of the North American Free Trade Agreement (NAFTA) with an offer designed to be rejected, and dusting off every US protectionist measure available – anti-dumping and anti-subsidy measures, the national security measures on aluminum and steel, Section 301 special measures for intellectual property, and additional national security measures on autos.

All of these special measures allow tariffs to be imposed that are much higher than the maximum tariffs to which the United States has committed under the World Trade Organization (WTO) Agreement. Working within its WTO commitments, the United States could not reshape its economy through tariff engineering; with these special measures, it could materially impact the structure of its trade.

The proper course of action for the United States, given its desire for such a fundamental revision of its bargain with the rest of global trading community, would be to renegotiate its WTO commitments, as provided for under Article XXVIII of the General Agreement on Tariffs and Trade (GATT), "Modification of Schedules." This article provides for modification of commitments by a contracting party, subject to consultation with any other contracting party that has a substantial interest (meaning a significant share in the market of the contracting party seeking to modify or withdraw the concession). In the ensuing negotiations, the GATT articles provide for the possibility of compensatory adjustments with respect to other products and require that "the contracting parties concerned shall endeavour to maintain a general level of reciprocal and mutually advantageous concessions not less favourable to trade than that provided for in this Agreement prior to such negotiations."

This is not happening. Rather the Trump Administration is proceeding with unilateral measures, risking retaliation, but banking on a threat of massive escalation to extract a favourable outcome for itself. In the face of considerable speculation that the threats would not materialize, senior members of the administration that were opposed to the tariffs (e.g., former White House Chief Economic Adviser Gary Cohn) have left the scene and negotiations with its main trading partners regarding exemptions have ended on sour notes: on 30 May 2018 the Administration

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announced that the import duties of 25 percent on steel and 10 percent on aluminum would be imposed on imports from Canada, Mexico, and the European Union, which had been granted an exemption when the duties were first imposed in March but is due to expire on 1 June 2018.

The trade wars thus appear to have been launched in earnest. There is no obvious containment strategy since war, once started, is open-ended. In the initial phase, trading partners can be expected to push back hard on the United States with retaliatory tariffs and to take additional defensive measures of their own. In the latter regard, Canada moved to align its country of origin marking regime for steel and aluminum products with that of the United States.[1]

Against this background, this note contributes to the quantitative analysis of the steel and aluminum tariffs by simulating the impact of the US measures in a computable general equilibrium (CGE) model. The note is organized as follow. Section 2 provides a brief non-technical description of the methodology and the scope of the tariffs. Section 3 provides the results of the simulation. Section 4 concludes.

Methodology

We apply a recursive-dynamic variant of the standard Global Trade Analysis Project (GTAP) CGE model to assess the impacts of the policy shocks.

General Background on CGE Models

CGE models integrate a number of accounts to provide a complete description of an economy:

- The standard national income and expenditure accounts;
- A breakdown of industry by sector that reflects inter-sectoral input-output links, which take into account internationally-sourced intermediate goods and services (in all, the GTAP dataset allows for the representation of up to 57 sectors, 43 of which are goods);
- A production function for each sector that combines sector-specific inputs of capital, skilled and unskilled labour, and intermediate inputs; and
- A trade account that models the international linkages for each sector of the economy.

On the production side, the model evaluates efficiency gains from the reallocation of factors of production across sectors. In the first stage, land, labour (skilled and unskilled), and capital substitute for one another to generate domestic value added by sector; intermediate inputs, which include imported intermediates, substitute for domestic value added in a second stage.

On the demand side of the model, an aggregate Cobb-Douglas utility function allocates expenditures to private consumption, government spending, and savings so as to maximize per capita aggregate utility. Following a shock, the changes in consumption are allocated across these three aggregates based on their income shares in each region. Private household demand responds to changes in prices and income based on the standard Constant Difference of Elasticities demand system in the GTAP model.

The trade module assumes imperfect substitution based on product differentiation across regions. The key parameter determining the scale of impacts on trade from a tariff shock is the elasticity of substitution – a high substitution elasticity generates relatively large trade impacts for a given

1 The announcement indicates that "These regulatory changes expand the scope of steel and aluminum products that need to be marked with their country of origin, and amend the criteria used to determine the country of origin for marked goods. Aligning with US requirements will help support effective customs enforcement by ensuring more consistent and predictable treatment of these goods by Canadian and US authorities. These improvements to the marking regime were made following a recent consultation through the Canada Gazette" (Department of Finance Canada 2018).

size of tariff shock. Note that the GTAP sectors reflect relatively large aggregates of individual products; accordingly, substitution elasticities are lower than they would be for product categories that are defined more narrowly and, thus, are more substitutable for each other.

Economic welfare is based on "equivalent variation," the lump sum payment at pre-shock prices that would have to be made to households to leave them as well off as in the post-shock economy.

We use a perfect competition specification of the GTAP model. For a technical description of the basic GTAP model, see Hertel (1997); for a discussion of the degree of confidence in CGE estimates, see Hertel et al. (2003).

The Recursive-Dynamic Framework

The recursive dynamic variant of the GTAP model features an investment module in which capital supply responds to changes in the rates of return (ROR) to capital. The recursive dynamic investment framework is based on the Monash-type investment function (Dixon and Rimmer 2002). In this function, the growth rate of capital (and, hence, the level of investment) is determined by investors' willingness to supply increased capital to each sector in each country, which in turn depends on changes in the expected ROR for capital in that sector and region. Assuming that investors are cautious, any shock to the ROR in a given sector and region is, however, eliminated only gradually. This results in a similar treatment of investment as in models that incorporate costs of adjustment that are positively related to the level of investment in a given year (based on, e.g., construction/installation costs of capital suppliers). The Monash model, however, instead of relying on increasing adjustment costs as the mechanism to limit investment, incorporates investor perceptions of risk for this purpose.

The parameter that mediates the supply response of capital – i.e., the elasticity of the supply of capital to RORs – is set at unity, based on firm-level gravity modelling.

Closures

Given that we use a dynamic version of the GTAP model, capital responds to changes in the ROR on capital. Both labour and capital are assumed to be mobile across all sectors within a country.

Labour can also respond to changes in the wage rate; however, for the present study, the total labour supply is assumed to be fixed, implying a long-run elasticity of labour supply with respect to wages of zero – i.e., there are no changes in total employment as a result of the policy measures being modelled. In reality there will be a positive response of labour to wage changes; accordingly, this closure understates the actual impacts.

We assume that productivity rises in line with wages, thus supporting the real wage gains generated in the simulation. This is done by splitting the increase in the factor payments to labour into productivity and real wages. With this assumption, the model behaviour is in line with historical experience concerning the co-movement of wage rates and productivity, which in turn is consistent with the microeconomic theory that labour is paid its marginal product and heterogeneous firms theory and empirics that establish that stronger firms, which gain market share under trade liberalization, are more productive and pay higher wages (Ciuriak and Xiao, 2016).

For the external closure, given the US interest in affecting its external balance through the policy measures, the closure that allows the external trade balance to adjust is necessarily adopted.

Implementation

The database for the simulations is the GTAP V9 dataset with a base year of 2011. For the simulations, the database is extrapolated to 2030 using GTAP dynamic tools and drawing on the International Monetary Fund's World Economic Outlook database (October 2016) for guidance as to growth rates for the projection period.

Table 1: US Steel and Aluminum Import Duty Shock

	US Imports of Ferrous Metals and Metal Products (*US$ millions at 2011 prices*)	Share of Targeted Aluminum Products @ 10% Tariff (*percent*)	Share of Targeted Steel Products @ 25% Tariff (*percent*)	Weighted Average Tariff
Canada	31,084	25.10	21.70	7.94
Mexico	19,479	4.10	15.80	4.37
EU28	19,612	6.90	34.90	9.41
China	20,569	9.00	13.80	4.35
Japan	6,203	2.90	42.50	10.91
Korea	5,090	2.40	58.10	14.77
ROW	8,519	6.10	33.50	8.98

Note: ROW indicates "Rest of World."

Source: Calculations by the study team.

The shock is implemented in 2018; the results are based on the full effect of the impacts once equilibrium has been restored.

The Policy Shock

The policy shock is straightforward. The steel and aluminum products targeted by the United States fall into the "ferrous metals" (GTAP sector 35) and "metal products" (which combines GTAP sectors 36, "non-ferrous metals," and 37, "fabricated metal products") sectors of the GTAP aggregation with which we work. We calculate the share of this sector that is subject to tariffs by all counterparties and calculate the weighted average tariff shock they face in the US market. We do not model retaliation at this stage. Table 1 shows the weighted tariff shocks by region.

Results

Impacts on US Trade and Shipments

Table 2 summarizes the impact on US trade and total shipments (exports plus domestic shipments) of steel and aluminum products by region, together with the impact on US downstream users – automotive, transportation equipment, machinery and equipment, and electronic equipment – and economy-wide impacts that reflect income effects of the tariff shock. In summary, the tariffs do the following:

- Reduce US imports of targeted products by $23.4 billion (US);
- Induce an endogenous reduction of US exports of targeted products (due to substitution towards the domestic market, even in the absence of retaliation) by $5.9 billion (US);
- Induce an increase of domestic shipments of $33.8 billion (US), resulting in an increase (taking into account a decline in exports) of $27.8 billion (US);
- Reduce exports and increase import penetration in user sectors, resulting in a worsening of the US trade balance in user products by $12.2 billion (US), and reduce total US shipments of user products by $12.7 billion (US); and

Reduce shipments in virtually every other sector of the US economy (the exceptions are mineral products, other manufactures, and transportation

Table 2: Impacts on US Trade, $US Millions at 2018 Prices

	Exports	Imports	US Trade Balance
US Trade in Targeted Products with:			
Canada	-1,111	-7,298	6,187
Mexico	-531	-571	40
EU28	-727	-1,534	806
China	-1,152	-2,707	1,555
Japan	-124	-805	681
Korea	-261	-1,411	1,151
Rest of World	-2,029	-9,087	7,058
Total	-5,934	-23,413	17,479
US Domestic Shipments of Targeted Products	33,756		
US Total Shipments of Targeted Products	27,822		
Impact on US Downstream User Sectors			
Trade	-8,606	3,616	-12,222
Domestic Shipments	-4,071		
Total Shipments	-12,677		
Impact on US Economy-Wide Total Shipments, All Sectors	1,485		

Source: Simulations by the study team. Conversion factor from 2011 to 2018 USD = 1.1228, based on the change in the US GDP Deflator in the IMF World Economic Outlook, April 2018 database between 2011 and 2018.

services, which experience small increases in shipments) through the negative income effects of the tariff on the United States and its trading partners; the net effect on US total economy-wide shipments is marginally positive at $1.5 billion (US), as positive terms of trade effects offset negative real output effects.

The impacts fall most heavily on Canada, which absorbs 31 percent of the reduction in US imports. China is a distant second, absorbing 12 percent of the reduction, followed by the EU28 (7 percent) and Korea (6 percent). The impacts on the rest of the world are broadly distributed. Obviously, for Canada the impact is much greater relative to the size of the domestic industry in the targeted sectors than for any other economy.

Global Macroeconomic Impacts

Table 3 summarizes the impacts on real GDP and economic welfare of the US tariffs on the global economy. While the value of economy-wide shipments rises in the United States due to price increases, the real economy experiences a negative impact: real GDP is -0.06 percent lower than it would be otherwise, when the full adjustment to the

tariff shock has been absorbed; welfare is reduced by $6.3 billion (US). Canada is the most impacted economy, as the decline in total shipments translates into a real GDP decline of -0.11 percent and a loss of welfare of $3.7 billion (US). Mexico experiences a similar decline as the United States in terms of real GDP (about -.06 percent decline) coupled with a loss of welfare of $1.2 billion (US).

Outside North America, the impacts are qualitatively different. The US tariffs undermine the competitiveness of the NAFTA region, which works paradoxically to the benefit of most other regions. While exports of targeted products to the United States decline for these other economies, the resulting expansion of supply in the rest of the world works to drive down prices, making downstream production in the rest of the world more competitive. In Canada and Mexico, the competitiveness effect is outweighed by the negative impact on targeted sectors; in the rest of the world, the latter effect dominates. China and Japan in particular make gains in real GDP (0.02 percent each), with the EU28 and Korea making slightly smaller gains (0.01 percent). These economies also make small welfare gains. The rest of the world is little impacted, with real GDP edging up marginally, but welfare declining due to the negative terms of trade effects induced by falling prices on shipments to the United States of targeted products.

Macroeconomic Impacts, United States and Canada

Table 4 provides the detailed macroeconomic impacts for the United States and Canada.

Notable features are as follows:

- The impact of the tariffs has opposite impacts on prices in Canada than in the United States. Where US prices rise (GDP deflator increases by 0.05 percent and consumer prices by 0.02 percent), Canadian prices fall (GDP deflator by -0.22 percent and consumer prices by -0.16 percent). The impact on GDP in value terms is thus relatively larger in Canada at -$8.1 billion (US) than in the United States at -$3.0 billion (US).

Table 3: Global Macroeconomic Impacts

	Real GDP	Welfare (*$US millions at 2018 prices*)
USA	-0.062	-6,311
Canada	-0.109	-3,719
Mexico	-0.058	-1,188
EU28	0.012	2,338
China	0.017	2,498
Japan	0.017	1,363
Korea	0.010	225
ROW	0.0002	-3,352
Total	-0.007	-8,146

Source: Simulations by the study team. Conversion factor from 2011 to 2018 USD = 1.1228, based on the change in the US GDP Deflator in the IMF World Economic Outlook, April 2018 database between 2011 and 2018.

- In percentage terms, the value of Canada's GDP declines by -0.33 percent, compared to the decline in real terms of -0.11 percent; this reflects the negative terms of trade impact on Canada induced by the tariffs. Conversely, for the United States, the value of GDP falls by less than it does in real terms.
- For the United States, the terms of trade improvement from the tariffs softens the blow on welfare in percentage terms compared to the loss of real GDP; for Canada, welfare losses are exacerbated by the terms of trade decline.
- Both economies become less open: US two-way trade falls in real terms by about -0.7 percent; in value terms by over $36 billion (US); meanwhile, Canada's trade decline is less at about -0.3 percent for exports and -0.6 percent for imports. In value terms, Canada's two-way trade falls by close to $4 billion (US).
- Both economies become less efficient, with labour productivity falling by about 0.05 percent in the United States and 0.08 percent in Canada.

Both economies lose total jobs. Based on a long-run elasticity of labour supply to real wages of 0.3,

Table 4: Macroeconomic Impacts, United States and Canada

	United States	Canada
Major Indicators		
Economic Welfare (USD millions)	-6,311	-3,719
Economic Welfare (% change)	-0.04	-0.17
GDP Value Change (USD millions)	-2,993	-8,077
GDP Value Change (%)	-0.02	-0.33
GDP Volume (% change)	-0.06	-0.11
GDP Deflator (% change)	0.05	-0.22
CPI (% change)	0.02	-0.16
Terms of Trade (% change)	0.12	-0.21
Real GDP Expenditure Components		
Consumption (% change)	-0.04	-0.18
Government Expenditure (% change)	-0.03	-0.13
Investment (% change)	-0.20	-0.22
Total Exports of Goods & Services (% change)	-0.75	-0.31
Total Imports of Goods & Services (% change)	-0.58	-0.58
International Trade		
Total Exports of Goods & Services (USD millions)	-16,409	-2,994
Total Imports of Goods & Services (USD millions)	-19,992	-3,121
Trade Balance (USD millions)	-3,583	-127
Factor Markets		
Capital Stock (% change)	-0.09	-0.12
Unskilled Labour (number of jobs)	-12,262	-3,081
Skilled Labour (number of jobs)	-10,429	-2,837
Unskilled Jobs (% change)	-0.015	-0.030
Productivity of Unskilled Labour (% change)	-0.047	-0.078
Productivity of Skilled Labour (% change)	-0.051	-0.080
Skilled Jobs (% change)	-0.011	-0.029
Real Wage of Unskilled Labour (% change)	-0.05	-0.10
Real Wage of Skilled Labour (% change)	-0.04	-0.10
Key Ratios		
Real GDP/Real Trade	9%	24%
Real Wages/Productivity	0.90	1.24

Source: Simulations by the study team. Conversion factor from 2011 to 2018 USD = 1.1228, based on the change in the US GDP Deflator in the IMF World Economic Outlook, April 2018 database between 2011 and 2018.

the implied job loss for the United States is about 22,700 while for Canada it is about 6,000.

The simulation exhibits realistic behaviour of the economy: Real wages fall more or less in line with the decline in productivity in both economies and the decline in real GDP is consistent with the decline in real two-way trade – for the United States, the decline in trade leverages a small decline in real GDP relative to Canada, which is consistent with the fact that trade is less important to the United States than to Canada.

Sectoral Impacts

Tables 5 and 6 provide the sectoral impacts in greater detail.

For the United States, services sectors dominate the losing sectors, as they bear the brunt of the negative impact on total incomes in the United States in real terms. Apart from the major user sectors – automotive, transportation equipment, machinery and equipment, and electronic equipment – the chemicals, rubber, and plastics complex is the most affected, reflecting this sector's inputs to the user sectors.

In Canada, the major user sectors all experience gains in shipments, reflecting competitive gains in the US and third markets for exports and reduced import penetration from the United States. The chemicals, rubber, and plastics complex gains, with wood products sectors also making export-driven gains reflecting increased competitiveness vis-à-vis US competitors. A number of agricultural sectors also realize increased shipments, reflecting largely export gains to third parties and some import replacement. As in the United States, the main losing sectors other than the directly affected sectors are services.

Discussion and Conclusions

In this paper, we develop estimates of the economic implications of the Section 232 tariffs on steel and aluminum imposed by the United States on its trading partners, including most recently the extension of these tariffs to cover NAFTA partners Canada and Mexico, as well as the European Union.

This issue is likely to be fluid and to evolve in response to both internal pressures in the United States and the responses of US trading partners, who have condemned the actions – including in an extraordinary statement from the G7 meetings of Finance Ministers and Central Bank Governors at Banff in June 2018, in which the partners asked the US Treasury Secretary to "communicate their unanimous concern and disappointment" (see Government of Canada 2018) concerning the tariffs to the US Government. The grounds of national security used to justify the tariffs are implausible and could not be sustained in WTO litigation except at the expense of making the national security exception included in the WTO Agreement broad enough to eviscerate all WTO trade disciplines. Accordingly, the measures invite retaliation, which is being prepared.

The results of our simulations suggest that the US measures will work to substantially restrict US imports of the subject goods and induce a substantial increase in US production of the same. At the same time, the measures promise to substantially increase US prices of these goods, which will raise the nominal value of the expanded US domestic shipments beyond the value of imports restricted. Higher prices have a number of consequences, including reducing US exports of the subject goods, even in the absence of retaliation by third parties, and undermining the competitiveness of US user sectors – principally automotive, transportation equipment, machinery and equipment, and electronic machinery. This loss of competitiveness is visible in reduced US exports of these products and increased import penetration. The overall impact on the US economy is negative, with real GDP reduced by -0.06 percent, economic welfare by $6.3 billion (US), and jobs by about 22,700 compared to the no-tariff case.

Canada suffers the largest negative impact from the tariffs. Real GDP falls by -0.11 percent and, taking into account the negative impact on Canada's terms of trade, the value of GDP falls by

Table 5: Sectoral Impacts, United States

	Exports to Canada	Imports from Canada	Total Exports	Total Imports	Domestic Shipments	Total Shipments	Bilateral Exports	Bilateral Imports	Total Exports	Total Imports	Domestic Shipments	Total Shipment
	(*US$ Millions*)						(*percent*)					
Targeted Sectors												
Ferrous Metals	-390.34	-3,022.88	-1,833.59	-20,597.79	28,783.48	26,949.89	-4.81	-38.99	-4.75	-39.04	13.72	10.85
Metal Products	-720.18	-4,275.10	-4,100.64	-2,815.46	4,972.30	871.66	-4.85	-14.04	-4.29	-1.86	0.89	0.13
Major User Sectors												
Machinery and Equipment	-578.34	430.16	-6,144.35	2,770.86	-2,263.78	-8,408.13	-1.13	1.44	-1.54	0.57	-0.23	-0.61
Electronic Equipment	-48.08	47.15	-762.14	-110.99	-1,843.08	-2,605.22	-0.77	1.11	-0.63	-0.03	-0.38	-0.43
Automotive	-244.68	364.84	-1,207.63	657.93	-1,269.19	-2,476.82	-0.41	0.49	-0.68	0.23	-0.21	-0.32
Transport Equipment	-54.11	137.79	-1,254.06	186.86	-538.09	-1,792.15	-0.65	1.02	-1.07	0.26	-0.24	-0.53
Gaining Sectors												
Mineral Products	-159.41	49.31	-188.98	233.94	469.30	280.31	-2.01	0.91	-0.48	0.61	0.21	0.11
Other Manufacturing	-21.71	68.96	-128.83	100.38	329.61	200.78	-0.95	1.09	-0.40	0.09	0.05	0.03
Transportation Services	-19.43	17.11	-16.40	-22.06	186.67	170.27	-0.37	0.39	-0.02	-0.02	0.02	0.01
Losing Sectors												
Trade	-16.85	11.96	-11.08	-6.66	-1,926.45	-1,937.53	-0.60	0.57	-0.04	-0.02	-0.05	-0.05
Other Services	-51.14	18.93	-39.23	-42.70	-1,757.75	-1,796.98	-0.61	0.58	-0.03	-0.07	-0.02	-0.02
Chemicals Rubber and Plastics	-86.11	322.66	-302.92	-120.06	-1,341.61	-1,644.53	-0.20	0.61	-0.08	-0.03	-0.14	-0.12
Business Services	-15.67	44.24	42.70	-71.77	-1,510.73	-1,468.04	-0.46	0.52	0.01	-0.07	-0.05	-0.05
Financial Services	-39.88	41.11	8.60	-67.21	-1,456.84	-1,448.24	-0.45	0.54	-0.03	-0.03	-0.04	-0.04
Wood Products	-68.25	182.94	-148.94	27.12	-774.24	-923.18	-0.51	0.63	-0.23	0.02	-0.08	-0.09
Construction	-0.12	0.04	-27.91	0.88	-864.14	-892.05	-0.65	0.56	-0.23	0.02	-0.04	-0.04
Recreational Services	-19.16	8.87	-9.64	-6.82	-455.30	-464.94	-0.37	0.51	0.03	-0.05	-0.06	-0.05
Total	**-2,676.76**	**-5,366.90**	**-16,403.64**	**-19,987.88**	**18,144.98**	**1,741.34**	**-0.34**	**0.50**	**-0.02**	**-0.02**	**-0.03**	**-0.03**

Source: Simulations by the study team. Conversion factor from 2011 to 2018 USD = 1.1228, based on the change in the US GDP Deflator in the IMF World Economic Outlook, April 2018 database between 2011 and 2018.

Table 6: Sectoral Impacts, Canada

	Exports to the USA	Imports from the USA	Total Exports	Total Imports	Domestic Shipments	Total Shipments	Bilateral Exports	Bilateral Imports	Total Exports	Total Imports	Domestic Shipments	Total Shipment
	(*US$ Millions*)						(*percent*)					
Targeted Sectors												
Ferrous Metals	-2,794.25	-424.67	-2,768.27	-417.46	-420.28	-3,188.55	-38.99	-4.88	-25.94	-2.64	-1.28	-7.33
Metal Products	-4,151.65	-757.24	-3,676.33	-805.98	-352.24	-4,028.57	-14.05	-4.88	-5.33	-1.78	-0.49	-2.87
Major User Sectors												
Machinery and Equipment	412.21	-605.61	652.12	-297.51	226.04	878.16	1.44	-1.14	1.30	-0.31	0.43	0.86
Automotive	349.61	-263.44	400.07	-113.16	181.84	581.90	0.49	-0.43	0.50	-0.13	0.29	0.40
Transportation Equipment	136.19	-55.26	304.88	-1.70	59.28	364.17	1.02	-0.66	1.09	-0.01	0.50	0.91
Electronic Equipment	46.30	-49.17	104.91	-71.67	53.46	158.37	1.11	-0.78	1.16	-0.25	0.28	0.57
Other Gaining Sectors												
Chemicals Rubber and Plastics	292.60	-92.44	502.03	-127.92	151.42	653.45	0.60	-0.20	0.66	-0.16	0.15	0.38
Wood Products	158.45	-75.80	344.32	-112.55	-40.00	304.32	0.62	-0.51	0.70	-0.46	-0.04	0.20
Oilseeds/vegetable oils	10.86	-1.00	59.56	-1.49	15.19	74.75	0.25	-0.06	0.39	-0.07	0.16	0.31
Pork and Poultry	11.10	-8.07	40.52	-10.20	11.73	52.25	0.77	-0.41	0.97	-0.42	0.10	0.32
Forestry	-0.39	2.10	-1.69	2.23	50.50	48.81	-0.26	0.41	-0.08	0.40	0.27	0.23
Textiles	16.55	-4.99	22.42	-22.90	14.76	37.18	0.87	-0.19	0.91	-0.24	0.15	0.31
Cereal Grains	1.13	0.35	24.90	0.34	6.82	31.72	0.07	0.06	0.25	0.06	0.11	0.19
Other Farming	7.02	-0.10	14.72	-1.22	8.43	23.14	0.29	-0.01	0.35	-0.04	0.06	0.12
Losing Sectors												
Other Services	18.93	-51.14	54.55	-74.17	-3,182.80	-3,128.25	0.58	-0.61	0.65	-0.61	-0.34	-0.34
Trade	11.96	-16.85	45.35	-53.33	-1,809.33	-1,763.98	0.57	-0.60	0.63	-0.61	-0.36	-0.35
Construction	0.04	-0.12	4.29	-3.01	-1,382.73	-1,378.44	0.56	-0.65	0.58	-0.38	-0.38	-0.38
Business Services	44.24	-15.67	233.01	-111.37	-1,110.17	-877.16	0.51	-0.37	0.59	-0.40	-0.27	-0.20
Financial Services	41.11	-39.88	88.49	-96.34	-654.10	-565.61	0.52	-0.46	0.58	-0.48	-0.30	-0.24
Mineral Products	37.66	-188.54	104.40	-327.45	-557.77	-453.37	0.87	-2.01	0.37	-1.98	-1.14	-0.59
Other Manufacturing	67.82	-22.52	104.29	-62.44	-480.57	-376.28	1.09	-0.95	1.07	-0.73	-0.56	-0.39
Transportation Services	17.11	-19.43	78.27	-87.92	-338.58	-260.30	0.39	-0.37	0.41	-0.38	-0.29	-0.19
Communications	6.28	-4.67	26.99	-19.54	-265.78	-238.79	0.54	-0.45	0.59	-0.44	-0.27	-0.23
Recreational Services	8.87	-19.16	61.18	-38.80	-205.82	-144.63	0.50	-0.34	0.58	-0.35	-0.29	-0.18
Fossil Fuels	13.42	-62.58	15.70	-78.84	-129.59	-113.89	0.08	-0.33	0.09	-0.33	-0.14	-0.10
Total	**-5,129.35**	**-2,854.99**	**-2,994.48**	**-3,121.16**	**-10,483.05**	**-13,477.53**	**-1.32**	**-0.90**	**-0.44**	**-0.49**	**-0.29**	**-0.31**

Source: Simulations by the study team. Conversion factor from 2011 to 2018 USD = 1.1228, based on the change in the US GDP Deflator in the IMF World Economic Outlook, April 2018 database between 2011 and 2018.

-0.33 percent or $8.1 billion (US). The lower prices mitigate the welfare loss in Canada, restricting it to $3.7 billion (US). Job losses in Canada are projected at about 6,000 (notably, these losses are not short-term unemployment due to structural adjustment – which might be smaller if fiscal measures are used to counter the effects – but reflect the long-run labour market adjustment to lower real wages). Not all sectors in Canada lose: the main user sectors for steel and aluminum all see expansion of sales, including through increased exports to the United States and through increased domestic sales, as Canadian products capture market share from more expensive US competing products. The downward pressure on Canadian costs also work to the advantage of other Canadian sectors, many of which see small gains. However, the overall negative income effects are reflected in declines in sales overall, with the main impact concentrated on services sectors.

Paradoxically, other trading partners of the United States targeted by the tariffs are not negatively impacted overall: the resulting damage to US trade competitiveness drives competitive gains for China, Japan, the European Union, and Korea in global trade, notwithstanding the reduction of some of their exports of the subject goods to the US market.

While we do not assess the impact of retaliation – which remains to be defined – it is possible to draw some inferences from the existing literature on protectionism and retaliation. First, for the retaliating countries, the retaliation would have negative economic impacts on their own economies. For Canada, it could double the pain, based on earlier simulations of a general 10 percent US surcharge and a retaliation in kind by Canada (Ciuriak and Xiao 2017). For other partners that actually benefit from the US erosion of its own competitiveness, retaliation would likely eliminate those gains and result in negative real GDP and welfare impacts. For the United States, the imposition of retaliatory tariffs would eliminate the terms of trade gains that it obtains from unilateral tariffs, worsening the welfare impacts.

Whether US trading partners should retaliate or not depends on how they see the current situation. In a game theoretic context, where trade is a repeated game in which players learn from the past, retaliation in tit-for-tat fashion is optimal in inducing cooperative behaviour – even if this comes at some expense, which would be the case in the present instance. That is self-evidently the current thinking of Canada and other major US trading partners that would normally be considered "friendly" to the United States. China, which is now in a clearly adversarial position to the United States, has traditionally used tit-for-tat retaliation to dissuade wider use of protectionism and can be expected to do so in this instance as well.

However, it is not clear that the current situation falls into the class of a repeat game with benefits from cooperation. US behaviour more broadly is not consistent with this characterization; rather it reflects a "hyper power" perspective that is less aimed at promoting economic development and welfare (even domestically), as it is at preserving its entrenched position. This has been true in the geopolitical realm since the fall of the Soviet Union and now appears to also be true in the international economic realm. The response to this may still be retaliation, but it might also be much more. Stay tuned.

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