



OFFICE OF THE
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CANADA

**The Canada-EU
Comprehensive
Economic and Trade
Agreement**
A Prospective Analysis

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The mandate of the Parliamentary Budget Officer (PBO) is to provide independent analysis to Parliament on the state of the nation's finances, the Government's estimates and trends in the Canadian economy; and, upon request from a committee or parliamentarian, to estimate the financial cost of any proposal for matters over which Parliament has jurisdiction.

This report provides estimates of the impacts of the recently signed Comprehensive Economic and Trade Agreement with the European Union which has been tabled as Bill C-30 for implementation in Canada. It outlines the effects at a sectoral level, as well as on an aggregate basis for the whole economy.

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Executive Summary

Key points

Bill C-30 was introduced in the House of Commons on October 31, 2016, to implement the Comprehensive Economic and Trade Agreement (CETA) between Canada and the European Union (EU). This report analyzes provisions of CETA and estimates some of the economic impacts likely to follow.

CETA represented Canada's attempt to diversify trade.

The negotiations were initiated with the goal of diversifying Canada's external trade. In 2016, some \$39.8 billion worth of merchandise exports went to the EU, which makes it Canada's second most important export destination, almost twice the merchandise that went to China (\$21 billion). But this is still only a tenth of the exports that go to the United States. Canada's sales of oil and gas to the United States alone are worth more than all the goods and services it sells to the EU.

CETA is an extensive document. Its goal is to create a high level of economic interaction between the two regions and encourage economic diversification. Though the economic integration that it targets between Canada and the EU may not be as deep as that among European Union members, it is still much more than what has been achieved with Canada's other recent trade agreements.

Report focuses on quantifiable aspects of the agreement.

This report focuses on the parts of the agreement that can be studied analytically. These include: (1) tariff reduction for goods; (2) reduction in trade impediments for services; and (3) intellectual property (that is, external royalty payments for patented drugs). It also examines the overall impact that CETA might have on Canada's GDP through investment.

Some key findings:

- CETA will lead to some gains for Canada, but they will be modest.
- Canada and the European Union have different tariff levels going into the agreement. Canada's tariffs are higher on average (weighted). Canadian and European exporters both faced tariffs greater than 10 per cent on almost 500 products (Harmonised System, 6-digit level).
- Tariffs facing Canada's exporters will decline on average by about the same amount they did under the Canada-United States free trade agreement. Canada will be lowering its tariffs significantly less than it did vis-à-vis the United States and Mexico.

- Canada's trade balance with the European Union will deteriorate slightly, by about \$2 billion in 2015 dollars. Sectors adversely affected, that is, those possibly showing slower output growth, include some dairy and agricultural products, textiles, and some machinery and manufacturing goods. Sectors that could show increasing growth include transport and motor vehicles, non-ferrous metals, and wheat.
- Canada will gain in terms of increased economic output (almost \$8 billion, or 0.4 per cent of GDP, over the long term) and investment (0.6 per cent of GDP), even though the trade balance deteriorates. Greater specialisation and increased production efficiency lead to net economic gains.
- The diversion of trade to the EU will reduce Canada's exports to the United States by more than a billion 2015 dollars over the long term. To the rest of the world, by another third of a billion dollars.
- Lowering regulatory impediments within the Canadian economy are projected to make Canadian service providers more efficient domestically and better able to compete in foreign markets.
- CETA's extension of patent protection on pharmaceuticals would have added roughly \$71 million to Canada's external royalty and dividend payments in 2011.

Context

With the signing of CETA, questions arise concerning the magnitude of the benefits and impacts, as well as how they will be distributed. Liberalizing trade is intended to bring benefits through greater specialization (based on comparative advantage). This is the projected effect on the overall economy, but the impact on sectors could be uneven.

This report focuses on quantifiable aspects of CETA.

The overall impact of CETA can be summarized for the net gains it is projected to bring in major areas: trade in goods, trade in services, investment, and GDP. It will also lead to some outflows of royalty payments on pharmaceuticals. It is illustrative to consider the situation where the agreement had been in place for 2015 and the economy had fully responded to it. Exports would have been higher, as would investment and GDP (Summary Table 1).

Summary Table 1

Illustrative summary of effects of CETA on Canada

<i>Units, 2015 Canadian dollars</i>	Long-term change
Exports of goods to EU	\$4.0 billion
Exports of services to EU	\$2.2 billion
Investment	\$3.1 billion
GDP (quantified components)	\$7.9 billion
<i>NB External royalties (pharmaceuticals)*</i>	<i>\$71 million/year</i>

Note: For each item, the change is relative to 2015 where CETA was not implemented. So if the agreement had been fully in place for 2015, Canada's annual exports of goods to the EU would have been \$4 billion higher. Looking forward, as the economy grows, the gains will be proportionately bigger.

Note *: In 2011 (\$2011), if all patented drugs then available had been under CETA's extended intellectual property rights provisions (patent restoration).

The combined effect on Canada's gross domestic product (GDP) would have been about \$7.9 billion. This is a small effect in a \$2 trillion economy, but nonetheless represents an average gain in income of about \$220 per person (\$2015). Throughout this executive summary, all results will be reported in 2015 dollars (CAD) relative to the economy in 2015.

These are quantified changes that the agreement is estimated to bring about. The details underlying those impacts show a distribution across economic sectors (goods) that is varied (Summary Table 2).

The aggregate effect masks a heterogeneous distribution of effects.

Summary Table 2

Tariff-reduction induced changes in bilateral export of goods

Units, million Canadian dollars (2015)

Product groups	Bilateral exports	
	Canada	EU
Agriculture, forestry and fishing	742	33
Food & beverages	727	1,177
Energy	52	38
Metals and minerals	608	250
Textiles, apparel, footwear	185	1,582
Chemicals	449	452
Transport	554	2,308
Manufacturing	651	629
Overall trade in goods	3,968	6,469
Memo: Change in GDP	3,235	3,175

Note: These are gains in exports that would have been experienced in 2015 if CETA had been in force and the economy had responded to it.

Some sectors in Canada gain significantly ...

For Canada, exports across all products would have increased at this level of aggregation – though exports decline slightly in some sub-sectors (Appendix A). Agriculture, forestry and fishing, as well as metals and minerals, have the largest gains, but food and beverages also have solid gains. The textiles and

apparel sector achieve only a small dollar gain, but it represents an increase of almost 70 per cent.

... as do those of Europe.

For the European Union, its exports of textiles and apparel expand in particular, as well as transport equipment (automobiles) and food and beverages. Those are areas of strong comparative advantage for the EU, given its long history of automobile development – particularly in high-end vehicles (Germany) – and its leadership in fashions (France and Italy).

Some trade diversion occurs.

One consequence of the increased trade with the EU is that there is some trade diversion away from existing trade partners. Canada's exports to the United States decline by \$1.4 billion (again relative to 2015; Canadian dollars). Its exports to Mexico could fall by about \$38 million, while exports to the rest of the world may decline by more than \$384 million. Since this trade diversion was not accounted for in Summary Table ES2, the overall net projected gain for Canada's export of goods is a third less than is reported in that table.

The gain in trade for Europe is larger than it is for Canada.

The overall gain in trade is larger for the European Union than it is for Canada. This happens because, on an export-weighted basis, Canada's exporters were facing lower tariffs than were Europe's prior to the agreement. As a result, Canada will reduce the tariff protection faced by European exporters by more than the European Union will have to on Canadian goods.¹ Though not as straightforward, a similar analysis can be conducted of CETA's changes for the service sectors of the economy. To do so, the change brought about by CETA has to be converted either directly or indirectly to a change in tariff equivalents.

After doing so using the OECD's services trade restrictiveness indicator (STRI), PBO's analysis suggests a modest increase in Canada's services exports. This is most likely to occur in transport services, but other sectors will also gain (Summary Table 3).

Summary Table 3 CETA's impact on bilateral trade in (services)

Units, million Canadian dollars (2015)

	Change in Canada's exports to EU	Change in EU exports to Canada
Communication	\$89	\$37
Computer	\$107	\$246
Construction	\$13	\$97
Professional services	\$42	\$138
Trade/distribution/courier	\$102	\$38
Transport	\$324	\$455
Insurance	\$60	\$146
Financial services	\$76	\$311
Included service sectors	16%	13%

Note: "Included Service sectors" reports the change in trade for included service sectors only. Since not all service sectors are covered by the STRI, the overall impact on services trade would be different. Extrapolating to sectors not covered by the STRI but covered by CETA, Canada's exports of all services would increase by about 14 per cent. Results are based on Purdue University's GTAP version 9 database, and OECD EBOPS services trade database. Nec: not elsewhere classified.

This estimated change in trade in services is necessarily understated. One reason is that the tools used to calculate the reduction in impediments are not sufficiently comprehensive to cover all areas that could be affected (Section 5). Projecting reductions in impediments to areas not covered would lead to a 14 per cent increase in exports of all services to the EU, or about \$2.2 billion in 2015 dollars.

Even though Canada's deficit in trade in services increases, CETA-induced improvements in service-sector efficiency will result in a net gain in GDP.

CETA will also cause Canada's external payments for patented drugs to increase.

Another area that has been of particular interest concerns CETA's impact on pharmaceuticals. Under CETA, Canada will grant additional market exclusivity (patent restoration) to the patent holder for two years – when it is justified by delays in the regulatory system.

The impact of the extension can be estimated as a proportion of the additional sales of patented drugs: 9 per cent of increased sales under patents. For 2011, this would have amounted to roughly \$71 million Canadian leaving the country as royalty and dividend payments (or \$85 million in 2015).

1. Introduction

Bill C-30 was introduced in the House of Commons on October 31, 2016, to implement the Comprehensive Economic and Trade Agreement (CETA) between Canada and the European Union (EU). The negotiations were initiated with the goal of diversifying Canada's external trade. PBO has undertaken a quantitative analysis of some aspects of the agreement.²

The work focuses on three areas where impacts can be quantified: (1) tariff reduction for goods; (2) reduction in trade impediments for services; and (3) intellectual property (that is, external payments for patented drugs). These three areas are not exhaustive of the sources of impacts and benefits that the agreement will have on Canada (Box 1-1).

To some extent, even the three areas of focus cannot themselves be fully evaluated quantitatively since they rely on subsequent rule-making by both government and private-sector participants. Nonetheless, they represent substantive parts of that agreement.

Box 1-1 – Overview of the CETA agreement

The CETA agreement introduced changes in a number of areas of Canada's economic relations with the European Union. Broadly outlined, these include,

- Trade in goods
 - Most tariffs will be eliminated
- Trade in services
 - Reduces non-tariff barriers in many service sectors and professions
- Investment
 - Investments and investors treated in non-discriminatory manner
- Government procurement
 - Opens both markets with some notable exceptions
- Intellectual property
 - Enhances protection, extends market exclusivity for pharmaceuticals
- Dispute settlement
 - Creates a Dispute Settlement mechanism, and panels for a number of sectors
- Sustainable development, environment and labour
 - Provides for exceptions for policies in these areas

Box 1-1 – Continued

The changes are intended to make both economies more open and transparent for trade across all areas of the economy. Nonetheless, there are significant provisions that exclude sensitive areas. For example, dairy and beef industries have special treatment, as do cultural and audio-visual industries. Governments retain the right to regulate as they deem necessary for natural resources, as well as in health care, the environment, public education, and other social services.

An important change over previous agreements such as NAFTA is that decisions by the three-person tribunal empowered to resolve disputes concerning investments (Dispute Settlement) can be subjected to review by an appellate body. This means that decisions can be scrutinized to ensure there are no errors in the legal reasoning behind them, or expansion by the tribunal through evolving interpretation of its purview.

Another facet of the agreement is that some evolution and adaptation are clearly envisaged. There are numerous committees dealing with specialized subjects guiding their development, for example, sustainable development, regulatory cooperation, and so on. They will be overseen by an overarching CETA Trade Committee.

Foreign direct investment (FDI) that results from increased trade is one area where additional benefits might occur (e.g. Ciuriak, Dadkhah and Xiao, 2015, for Canada's trade agreement with Korea). It is not covered in this report.

Nonetheless, for the Korean trade agreement, over a horizon of 10 years FDI was projected to add a negligible amount to GDP.

Europe, however, is one of Canada's largest sources of FDI (about 30 per cent of the total stock) so the effect is potentially bigger with CETA than it was with the Korean agreement.

Still, almost two-thirds of the FDI from the EU comes from just four small countries: Belgium, Ireland, Luxembourg and the Netherlands; the United Kingdom provides a substantial part of the remainder. Arguably, those sources would be limited in their ability to expand future FDI.

The Dispute Settlement mechanism in CETA has also left some ambiguities concerning its implementation and the potential for FDI (unlike the agreement with Korea). As a result, any projection would be conditional on how that uncertainty is resolved.

Studies that attempt to be comprehensive have quantified some of Canada's recent trade agreements. They show that the effects are generally small. Both the Transpacific Trade Partnership and the trade agreement with Korea were projected to add about 0.05 per cent of GDP to Canada's economy after

about 10 years (Ciuriak, Dadkhah and Xiao, 2015; Ciuriak, Dadkhah and Xiao, 2016).

Looking back to lessons from the past, in the lead-up to the passage of the Canada-US free trade agreement there were estimates that Canada would gain substantially in employment (e.g. Economic Council of Canada, 1988). During the period following its implementation, Canada and the United States both went into recession, so assessing it is not straightforward. Nonetheless, observers see evidence that it was beneficial for Canada (Schwanen, 1997), though its impact across sectors was uneven and led to some dislocation (Trefler, 2005).

Other studies that have looked at CETA anticipate small, but positive, effects. Looking at the trade effect in isolation, the tariff reductions could lead to increased merchandise exports for Canada of about \$1.4 billion by 2022 (Chu and Goldfarb, 2015).

Earlier results that examined complete tariff elimination in a fuller model projected increased merchandise exports of just over 11 per cent (Cameron and Loukine, 2001), equivalent to about \$4.4 billion in 2015 dollars. However, that work reported a GDP gain of only 0.04 per cent for Canada, and even less for Europe.

An analysis done before the agreement was finalized, which nonetheless anticipated some of its final terms, projected a gain for Canada of 0.45 per cent of income per person (Kitou and Philippidis, 2010). It accounted for sensitive areas that would be excluded, and some vaguely-defined, non-tariff barriers that would be reduced.

Another study undertaken for the Government of Canada and the European Commission estimated a much larger gain in GDP (0.8 per cent for Canada). That work was done with a model that included the effects of investment on expanding the economy (Government of Canada and the European Commission, 2008). It used a methodology similar to that used here, but also made some additional assumptions about gains from removing non-market barriers.

The work outlined in this report projects a small, but positive, overall effect on Canada's economy (about 0.4 per cent of GDP once the economy has fully adapted to the agreement; Table 1-1). Starting from relatively low levels, exports of goods will increase by 9.3 per cent, and services by 14 per cent.

This report differs from earlier studies by undertaking an analysis of the impacts in the service sectors, and including the effects of capital accumulation on expanding the economy's output. It also separately looks at the effect of some provisions in the agreement concerning intellectual property.

Table 1-1 Canada's projected increases from CETA

	Long-term change
Exports of goods to EU	9.3%
Exports of services to EU*	14%
Investment*	0.6%
GDP (quantified components)*	0.4%
<i>NB External payments (pharmaceuticals)**</i>	<i>\$71 million/year</i>

Note: In each case, the change is relative to a baseline where CETA was not implemented. Results from Sections 2, 3 and 5 are included.

Note*: This result accounts for extensions of the projected trade in services, as well as the capital-expanding effects of investment (described in Section 5). FDI is not included in these results – its effect above the investment already accounted for is projected to be limited.

Note**: In 2011 (\$2011). Payments leaving Canada – assuming that the provisions in CETA for patent restoration had been fully in place for all patented drugs then for sale in Canada.

The remainder of this report is structured as follows. Section 2 outlines the impacts of tariff reductions on trade in goods (first row of Table 1-1). This is done using a numerical model of the economy (GTAP).

Section 3 examines how CETA affects each region's regulatory regime, that is, changes in rules that create impediments to trade in services. Those changes can also be linked to trade (second row of Table 1-1).

Section 4 outlines the potential impact of some changes to rules governing intellectual property, and provides an estimate of the increased external payments that could result (last row).

Finally, Section 5 examines investment (third row) and CETA's impact on the economy as a whole (forth row). PBO's macroeconomic framework is used to link investment to an expansion of the overall economy. This is missing from the numerical model (GTAP; so is not included in sections 2 and 3), but can be an important source of change.

2. Trade in goods

Canada's goods-producing sectors account for about 30 per cent of the economy (2015), and 22 per cent of employment. An important part of CETA is the call for tariff elimination across the majority of those sectors. In around 95 per cent of them, the tariffs will be eliminated on implementation.

For the sectors where tariffs are not eliminated, CETA leaves some tariff-rate quotas in place that will nonetheless allow each region to increase exports. Those sectors include agriculture, food, automobiles, textiles and alcoholic beverages. (Table 2-1).

Table 2-1 Change in tariff protection on goods faced by each region

Product groups	Applied duties (pre-CETA)		Changes to tariffs	
	<i>(simple average, %)</i>		<i>(to zero, except as noted)</i>	
	Canada	EU	Canada	EU
Animal products	24.6	17.7	Poultry and eggs excluded	TRQ: 50 kt of beef carcass, 81 kt of pork carcass, 3 kt of bison carcass
Fruit, vegetables, plants	3.3	10.9		
Cereals & preparations	21.4	14.9		
Other agricultural products	3.0	3.6		TRQ: 3 kt of corn
Fish & fish products	0.9	12.0		For some products: RoO and various TRQs
Dairy products	248.9	42.1	TRQ: 18.5 kt of cheese; no change in dairy other than milk protein	
Coffee, tea	10.4	6.1		
Oilseeds, fats & oils	4.0	6.8		
Sugars and confectionery	3.8	25.2		For some products, RoO and various TRQs
Beverages & tobacco	3.9	20.7	Existing wines and spirits rules remain, negotiations continue	
Metals and minerals	1.0	2.0		
Textiles	2.6	6.5	RoO; various TRQs	RoO; various TRQs
Clothing	16.5	11.4	RoO; various TRQs	RoO; various TRQs
Leather, footwear, etc.	3.8	4.1		
Petroleum	0.9	2.5		
Chemicals	0.8	4.5		
Transport equipment	5.8	4.3		some RoO; some TRQs
Non-electrical machinery	0.4	1.9		
Electrical machinery	1.1	2.8		
Wood, paper, etc.	0.9	0.9		
Manufactures, n.e.s.	2.5	2.6		

Source: World Integrated Trade Solution database (September, 2016).

Note: Simple average across sub-sectors. The overall simple average excludes the dairy sectors, where large tariffs but small quantities traded would distort the average. RoO means rules of origin; TRQ means tariff rate quota (a certain amount is allowed to enter free of tariffs, after which the full tariff will apply).

The calculated average tariff reductions can be sensitive to a number of factors (Box 2-1), so they should be treated as indicative rather than precise. However, in the case of a comparative analysis (as below) they are precise and useful.

The tariff reductions create considerable scope for trade between the two regions to be affected by the agreement. Nonetheless, in 2015 only 12.6 per cent of Canada's exports went to the EU (and 1.1 per cent of EU exports went to Canada). Consequently, the impact from tariff reduction on GDP for each region as a whole is likely to be small.³

Box 2-1 – Sensitivity of tariff measurement

In most countries, tariffs, or customs duties, are imposed with some specificity regarding the goods that are included. So rather than a single tariff on goods classified as "electrical machinery", there may be a number of tariffs that are specific to various categories of electrical machinery.

Apart from hinting at industrial policy working to achieve particular objectives, this means that when electrical machinery is combined with another sector (for example, non-electrical machinery), the concept of an average tariff becomes vague. This is because one of those sectors might be significantly larger than the other, so a simple average that treats them equally can be misleading.

This also means that using different levels of aggregation (one sector for the economy as a whole, versus 10 sectors, or 100 sectors, etc.), will give different answers as to what the level is of the average tariff.

Within the context of a quantitative analysis, the framework itself will use a model-specific aggregation that will then give its own answer to the question of what is the average tariff. This will even create a source of variation across model results when tariff elimination is studied. That is because the average tariff that is being reduced across models will be different, and models are sensitive to the magnitude of the tariff change.

A number of alternative metrics exist for getting around the issue of measuring tariffs, but none is particularly satisfying. Weighted averages, for example, seem intuitive but introduce their own problems. If a weighting system based on the volume of trade is used, then goods with high tariffs will likely get a small weight since the higher price will limit trade, whereas goods with low tariffs will get a larger weight.

To get around that, the weights might be based on domestic production of goods. So Europe's import tariffs would be weighted with Europe's domestic production to get a sense of the protection of their markets.

Box 2-1 – Continued

It has the drawback of assuming that all goods are equally tradable, which is not strictly correct given differences in shipping costs. Also, when doing an analysis across time, this introduces the problem of trying to find correspondences between trade classifications and national accounts classifications, which have changed a number of times over the past few decades.

To illustrate, when Canada's agricultural and industrial sectors are aggregated into a 29-sector grouping, an import-weighted average effectively-applied tariff on goods from the EU is about 2.9 per cent, whereas an output-weighted average tariff is 3.5 per cent. A simple average of those tariffs is 3.0 per cent.

The divergence in these measures becomes larger as the number of sectors increases into the hundreds and thousands since the asymmetries in the tariffs and sector size become larger.

Indeed, at high levels of aggregation (two-digit aggregation in the Harmonized System) only 12 of Canada's goods exported to Europe faced tariffs above 10 per cent. This rises to 105 at the four-digit level, and 468 at the six-digit level.

To gauge that impact, a useful tool is a simulation model that incorporates many of the interactions between the prices of imports, exports and the rest of the economy (see Appendix A). In that framework, some 44 goods-producing economic sectors are represented.

For some of the sectors in Table 2-1 the tariff was not eliminated, but a tariff-rate quota (TRQ) was implemented. A tariff-rate quota specifies the amount of the product that can be imported into the country without a duty.

Quantifying the impact of a TRQ is not straightforward. However, for the work here, the tariff rate was adjusted to reflect an increase in supply in the importing country. Since the quota was generally quite low (mostly less than 5 per cent of domestic production), the tariff rate generally only required minor adjustment.

Given the sectoral structure of the GTAP model (which is different from that illustrated in Table 2-1), and the TRQs just outlined, the output-weighted average tariff reduction for Canada's exporters is estimated to be 1.4 per cent (using Europe's output levels to weight Europe's tariffs).

For the European Union, the reduction is roughly 2.5 per cent using Canada's output as weights. Just as with NAFTA and the United States, Canada is lowering its protection by a greater amount than the Europeans are.

The results from this analysis suggest that the aggregate impact of tariff reductions will be relatively small (Table 2-2). The GDP impact on Canada is

about one-sixth of 1 per cent of GDP, and even smaller for the European Union.

Nonetheless, for some individual sectors, the change in bilateral exports will be significant. This is particularly so with textiles, apparel and footwear where Canada will increase exports by 84.9 per cent and the EU by 98.6 per cent. Canada's global exports of those goods, however, will only increase by 6.1 per cent.

Table 2-2 Change in exports of goods

	<i>Units, per cent</i>		<i>Units, per cent</i>	
	Bilateral exports		World exports	
	Canada	EU	Canada	EU
Agriculture, forestry and fishing	31.6	5.2	1.2	-0.3
Food & beverages	63.1	30.5	2.7	0.2
Energy	3.5	4.6	-0.1	0.0
Metals and minerals	3.6	6.3	0.6	-0.1
Textiles, apparel, footwear	84.9	98.6	6.1	0.5
Chemicals	12.9	5.1	0.7	0.0
Transport	12.5	19.5	0.7	0.1
Manufacturing	9.7	4.9	0.1	0.0
Overall trade in goods	9.3	12.6	0.56	0.04
Memo: Change in GDP	0.16	0.02		

Note: These are results relative a baseline with growth. So a negative number result means that sector does not grow as rapidly as in the baseline. More detail is available in Appendix A.

These results compare to an earlier study of tariff elimination where Canada was projected to increase its exports of goods to the EU by just over 11 per cent (Cameron and Loukine, 2001).

The increased trade with the EU causes some trade diversion away from other trade partners. Canada's exports to the United States would decline by 0.4 per cent (more than a billion dollars in Canada's economy of 2015). Those to Mexico by about 0.7 per cent (\$30 million in 2015), and to the rest of the world by another 0.7 per cent (\$310 million in 2015). The overall gain in exports is less than two-thirds the increase in exports to the EU (detailed in Appendix A).

The change in output in a few sub-sectors (Appendix A, Table A-3) was negative relative to the baseline. This seems counter-intuitive since each region has lowered its tariffs on imports – almost all firms are more competitive in their trade markets. However, greater competition in domestic markets causes consolidation as both regions focus on their comparative advantage. Moreover, this does not necessarily mean that output will contract in those sectors. The changes are small enough that they can be achieved with slower growth.

These results illustrate a long-term effect. But the transition may include stronger impacts as labour and capital relocate between sectors. Indeed, at the highly detailed (six-digit) sectoral breakdown of the Harmonised System of trade accounting there are almost 500 goods with tariffs greater than 10 per cent and almost 50 goods with tariffs of more than 25 per cent. As a result, some dislocation can be expected when those tariffs are removed or reduced.

Again, it is noteworthy that Canada gains in GDP, even though it is lowering its tariffs by more than the Europeans. As was the case with the agreements with the United States, and then Mexico, there is a gain in economic efficiency that more than makes up for the “concessionary” reduction in protection. (Table 2-3 compares tariff reductions in CETA to those in the Canada-US Free Trade Agreement.)⁴

Table 2-3 Tariffs at time of entry into trade agreements

<i>Units, per cent</i>	CETA	CAN-USA FTA
Canada	2.5	5.6
European Union	1.3	
United States		1.0

Source: TRAINS database, import-weighted average of six-digit product classification.

Note: The table reports the reduction in tariffs undertaken by countries (row labels) in the two trade agreements (column labels).

3. Trade in services

CETA attempts to make the two-thirds of the economy that provides services more open to trade by lowering non-tariff (e.g., regulatory) barriers. The analysis, however, is less straightforward to implement, since non-tariff barriers are not easily quantified.

Nevertheless, in some recent work administrative barriers to trade have been quantified by scoring a number of factors that are thought to impede trade. Those scores can be turned into tariff-equivalents by considering how much additional cost they impose on firms. Obtaining a tariff-equivalent for a non-tariff barrier allows quantitative tools – such those used in the previous sections – to help gauge the impact of changes to those non-tariff barriers.

Time spent, administrative or legal fees, waiting periods, etc., can be monetized to determine a unit-cost for each service traded, or tariff-equivalent. These obstacles have been aggregated by international organisations, such as the OECD and World Bank, into scores in a number of areas (Box 3-1).

Box 3-1 – Scoring the administrative burden

While it is difficult to fully measure the ways in which foreign firms are impeded in any economy (for example, through rules that reflect concerns regarding sovereignty), there are some quantifiable measures of obvious ones that can be used for comparative analysis.

Recent progress in creating such measures has focused on specifying questions in binary terms. So, for example, if there is a requirement that directors of a firm be nationals of the host country, then the score is one, versus zero otherwise. These can then be added to form an index of trade obstructions.

Such choices have the disadvantage of asserting that very different impediments have equal effect in creating barriers. There is, however, an attempt to minimize the impact of that assumption by sub-dividing an issue into a number of binary choices. Thus, a requirement that board members be nationals of the host country can be re-specified into four questions: can only one board member be a foreign national, two, half, or all members.

Three areas in which significant work has been done, particularly by the OECD, to quantify the administrative burden include:

Box 3-1 – Continued

Trade Facilitation Indicator

- Scores countries on the basis of 11 factors (information availability, involvement of the trade community, advance rulings, appeal procedures, fees and charges, document formalities, automation formalities, procedural formalities, internal border agency cooperation, external border agency cooperation, governance and impartiality)

Services Trade Restrictiveness Indicator

- Scores 18 service sectors (air transport, legal, accounting, broadcasting, courier, maritime, architecture, rail freight, telecoms, engineering, insurance, banking, motion pictures, computer, construction, road freight, sound recording, and distribution) on the basis of sector-specific criteria (limitations for foreign entry, limitations on movement of people, other discriminatory measures, barriers to competition, regulatory transparency).

Foreign Direct Investment Restrictiveness Indicator

- Score based on nine factors (foreign equity limits, screening and prior approval, foreign key personnel restrictions, other restrictions).

The Services Trade Restrictiveness Indicator (STRI) in particular is a gauge of regulatory impediments that have impacts in two areas: international trade, and international investment (foreign direct investment – FDI). With respect to international trade, regulatory impediments are, not surprisingly, associated with lower imports of services (Nordas and Rouzet, 2016).

With international investment, however, the predicted impact of impediments is less clear. This is because cross-border trade and foreign direct investment may be either complements or substitutes. They are substitutes in cases where restrictions (e.g., burdensome licensing procedures) discourage imports but increase foreign investment in an effort to “jump over” the impediment.

Conversely, they are complements in cases where lower impediments (e.g. lower foreign equity limits) increase both investment and imports. This could be caused by firms who both set up a new business in the host country, and then import components needed in to manufacture a good or provide a service.

There is thus some ex-ante ambiguity in the predicted impact of a change in regulatory impediments, An attempt to empirically resolve that ambiguity (Nordas and Rouzet, 2016) finds that a negative relationship between the STRIs and service imports dominates, though it is not universal.

In the analysis for this section, only the part of the CETA agreement that can be scored using the OECD's STRI is examined (second item in Box 3-1). That means roughly 30 per cent of the economy – or almost 40 per cent of the service sectors (but a smaller proportion of traded services).

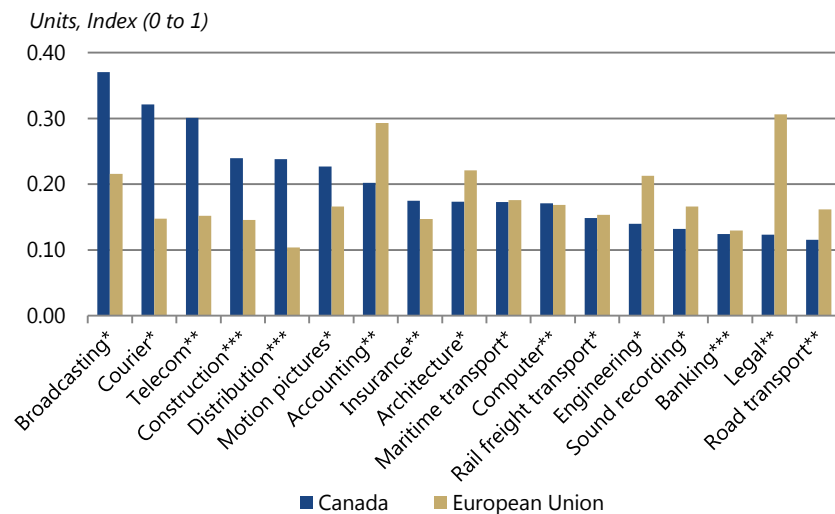
To be sure, the agreement extends more broadly into all service sectors; for example, it generally affords national treatment in competitive economic processes to citizens of each region (though the annexes outline a considerable number of reservations by both the EU and Canada).

Each Party shall accord to service suppliers and services of the other Party treatment no less favourable than that it accords, in like situations, to its own service suppliers and services.⁵

So the analysis presented here would appear to be conservative. But the limitations outlined in the annexes to the agreement mean that there are some caveats to that perspective.

A decline in the STRI score as a result of CETA means that the agreement has reduced the impediments (Appendix B). Of the 17 sectors where the STRI score is available, Canada has a higher score in eight of them (Figure 3-1).

Figure 3-1 OECD STRI scores for Canada and EU



Sources: OECD STRI database, June, 2016.

Note: Includes only 20 EU countries: Austria, Belgium, Czech Republic, Germany, Denmark, Spain, Estonia, Finland, France, United Kingdom, Greece, Hungary, Ireland, Italy, Netherlands, Poland, Portugal, Slovakia, Slovenia, and Sweden. These sectors represent about 40 per cent of the total service sectors, or about 25 per cent of the trade in services.

Note: * Implies the sector size is less than 1 per cent of the output of all Services sectors; ** between 1 per cent and 3 per cent; *** Construction is 12 per cent, Distribution 9 per cent and Banking 6 per cent.

Nonetheless, the figure suggests that when a common level of barriers is agreed, Canada should be lowering protection by more, since it has a number of sectors with significantly higher scores. A simple average supports this view (0.20 versus the EU's 0.18).

Looking at it even more carefully by using an output-weighted STRI score, Canada's would be 0.21 and the European Union's 0.14. This conjecture of a larger effect on Canada is affirmed in the quantified results below where trade impacts are illustrated.

In most cases, CETA has a relatively small impact in lowering the STRI scores (Table 3-1). Nonetheless, Nordas and Rouzet (2016) estimate that even small changes have significant impacts on trade. That study used the OECD's STRI (those underlying Figure 3-1).⁶

An important contribution of Nordas and Rouzet (2016) is that it also found a link between STRI and exports; domestic providers who operate in a less regulated environment tend to be more competitive. This is reflected in relative STRI across countries having an inverse relationship to measures of competitiveness (particularly in telecommunication, finance and transport).

Explanations for that result include:

1. Regulations impose costs on local suppliers as well as on foreign ones, so export prices will necessarily be higher.
2. Less regulated sectors engender higher efficiency in the cost of production as a result of having more contestable markets. This motivates domestic suppliers to become more efficient and to innovate so as to maintain market share. This then gives them an edge in export markets.
3. There are scale economies; less restrictive regulations are likely to find more in common with those of other countries, and thus enable suppliers to expand the scale of their activities.

The combination of both Canada and the EU reducing their impediments to trade in services (as reflected in lower STRI indexes) causes a robust increase in trade in many sectors (though admittedly from a low level).

Canada actually lowers its STRI by more than the EU (compare the first and third columns in Table 3-1). This induces a stronger competitive response from domestic firms that leads to proportionally larger gains in exports (compare the second and fourth columns of Table 3-1).

Table 3-1 CETA's impact on services trade

<i>Units, per cent</i>	Change in EU STRI (index)	Change in CAN exports to EU (%)	Change in CAN STRI (index)	Change in EU exports to CAN (%)
Communication	-0.05	20%	-0.10	11%
Computer	-0.08	13%	-0.08	12%
Construction	-0.03	15%	-0.07	19%
Professional services	-0.06	13%	-0.05	12%
Trade/distribution/courier	-0.03	23%	-0.11	15%
Transport	-0.04	17%	-0.04	13%
Insurance	-0.02	12%	-0.01	14%
Financial services	-0.01	17%	-0.01	12%
Included service sectors		16%		13%

Note: The "Included service sectors" only accounts for activities covered by the STRI index. This represents roughly a quarter (for Canada) to a third (for EU) of all services sectors.

That Canada will be lowering its protection of services by more than the European Union is similar to the outcome in the goods sectors, where Canada also lowered its protection by more than the European Union. Whether intentional or not, Canada seems to have pursued a strategy of using increased trade openness to obtain economic gains through improvement in domestic efficiency (that is, gains in GDP and investment). A similar strategy that was pursued in the trade agreement with the United States arguably produced substantial long-term gains for Canada.

Between one-quarter and one-third of the trade in services between Canada and the EU is covered by the STRI index. Trade in services as a whole represents just under one-third of all trade. So less than one-sixth of Canada's trade is covered by the index.

Given that the CETA text is general (for example, it refers to "national treatment" of firms), the changes outlined for the included sectors should similarly apply more broadly. Section 5 projects the effect of lowering impediments more broadly.

4. Intellectual property

CETA also requires changes to Canada's rules governing intellectual property (IP), particularly pharmaceuticals. There are two changes specifically that are consequential: (1) patent restoration, and (2) patent appeal. The first concerns the period of market exclusivity granted to new drugs. The second concerns the process for allowing generic drugs to enter the market.

The changes would prolong the period of protection granted to a patent holder. This would be manifested in two ways in particular. One is through higher prices to consumers. Another is on external balance when royalties and dividends go to parent companies outside Canada.

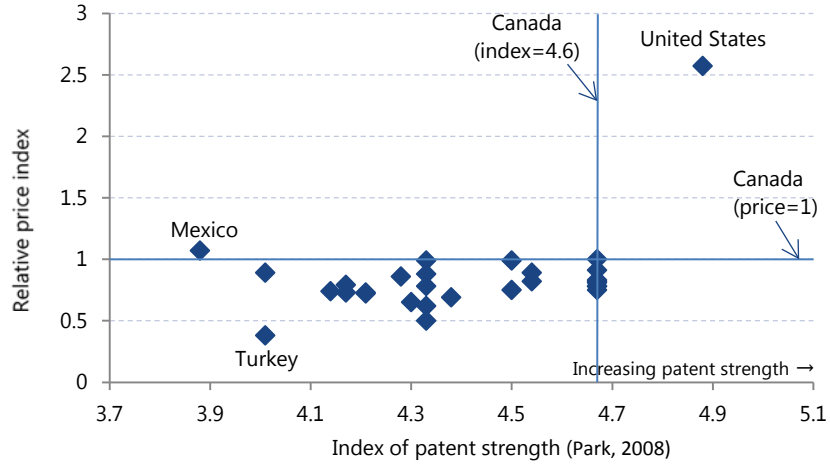
This section will primarily focus on the latter of these two effects. However, the first can have important redistributive effects within Canada, and even lead to a slightly lower use than would be the case if the price had fallen.

Canada has a well-developed capability in generic drug manufacturing. Indeed, CETA excluded exports of generics from the two years of patent restoration. Those firms compete with brand-name manufacturers that are required to patent in Canada all drugs that will be sold there. But even though the patent is in Canada, there are still royalty payments from the Canadian company for the use of intellectual property.

Canada's Patent Act gives 20 years of protection from the date of filing. This is similar to that in most other countries; it has been standardised by international agreements. Even so, the protection afforded to intellectual property can vary significantly across countries (Park, 2008). In 2005, Canada was tied for second-strongest intellectual property protection in a list of 122 countries (behind only the United States).

Prices, on the other hand, can also vary considerably. As reported by the Patent Medicines Price Review Board (PMPRB, 2016), Canada has high drug costs, fourth highest among 31 OECD countries. Major European countries have intellectual property protection that is as strong as Canada's, though most have prices that are lower. So strict protection need not engender high drug cost (Figure 4-1).

Figure 4-1 Patent strength and drug prices across countries



Sources: PMPRB (2016), Park (2008).

Note: The index of patent strength is for 2005, though few, if any, changes have occurred since then. Relative prices are: United States: 2.57; Mexico: 1.07; Canada: 1.00; Germany: 0.99; Switzerland: 0.99; Japan: 0.91; New Zealand: 0.89; Sweden: 0.89; Austria: 0.88; Chile: 0.86; Ireland: 0.83; United Kingdom: 0.82; Finland: 0.82; Italy: 0.81; Australia: 0.79; Belgium: 0.78; Spain: 0.78; France: 0.78; Hungary: 0.75; Netherlands: 0.75; Luxembourg: 0.74; Norway: 0.73; Slovakia: 0.73; Poland: 0.72; Slovenia: 0.72; Portugal: 0.69; Greece: 0.65; Estonia: 0.64; Czech Republic: 0.62; South Korea: 0.50; Turkey: 0.38. The median for the OECD is 0.78.

The justification for CETA to make changes to intellectual property originates in the process required to bring a drug to market. On the one hand, filing a patent to protect IP gives 20 years of coverage from the date that the patent is filed (Box 4-1). On the other hand, a regulatory process must be engaged to obtain approval for trials and subsequent marketing. This latter can be lengthy as it requires studies to prove the drug’s efficacy and safety.

Since the 20-year patent period begins to count down from the date the patent is filed, the delay in getting it to market means that market exclusivity is shorter than the patent life (by roughly 10 to 15 years). After that, the drug will sell at a price closer to its production cost since generic drugs will be able to enter the market.

While five to 10 years is still a considerable length of time for a drug that is particularly popular, other countries tend to have longer exclusivity periods by using what is termed “patent restoration”.

That is, companies can argue that the approval process was long and burdensome and a longer period is required for them to recover development costs. In the EU, United States and Japan, this period is for up to five years. The CETA agreement will create that in Canada for two years.

Box 4-1 – Patent protection and pharmaceuticals in Canada

The argument in favour of protecting intellectual property (IP) is that firms require an assurance that they will be able to recover large investments in developing drugs that are easy to replicate once marketed.

Biological drugs are also expensive to develop, but their generic counterparts (biosimilars) are less easily replicated, though experience thus far has been price reductions of about one-third when the biosimilar is introduced. In general, only a few compounds of the many that firms explore will prove successful in the market.

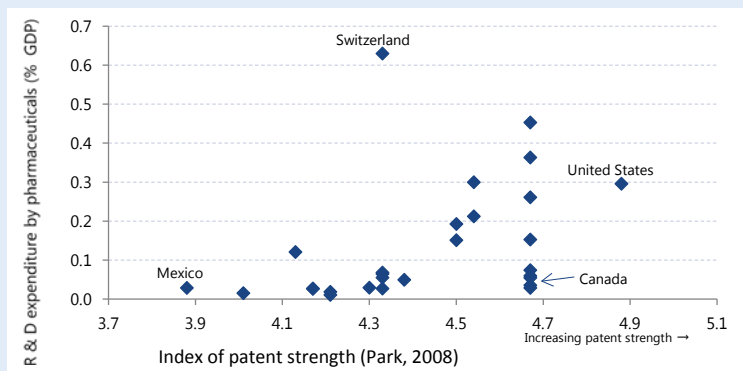
On the other hand, as some have pointed out (for example, Hore, 2000), the rate of return on investment that pharmaceutical companies are able to generate is significantly higher than the average of other sectors (for example, Fortune 500 companies).

Some justification for higher returns can be found in the variability of finding successful compounds – a risk premium. But the decline in financial market risk premiums (linked to the “savings glut”) in the first half of the 21st century seems not to have been reflected in pharmaceuticals.

In Canada, there was an explicit linking of pharmaceutical patent protection (enacted in 1987; implemented in Bill C-22 in 1993) and research and development expenditure by the industry. The patent protection was granted in exchange for promises to maintain prescribed levels of R & D expenditure in Canada relative to sales (10 per cent).

In addition, the Patent Medicines Price Review Board was created to ensure that prices at the wholesale level for patented drugs in Canada were not excessive. It has authority to demand that a producer lower its price.

Box Figure 4-1-1: Patent strength and R & D expenditures (2011)



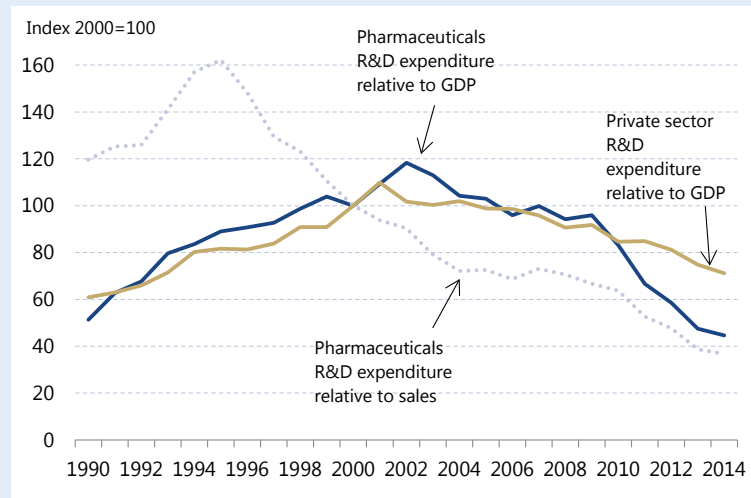
Source: OECD (2015), Park (2008)

Box 4-1 – Continued

The explicit link between patent protection and R & D expenditure was necessary because the two are only weakly linked by market forces (Box Figure 4-1-1 show a very weak link). A statistical analysis shows no significant correlation between the two for OECD countries.

Moreover, R & D expenditure in Canada for pharmaceuticals has not necessarily followed changes in the protection of intellectual property. After some initial increases following the extension of protection in 1987, R & D expenditures relative to sales have been declining. This coincides with the conclusion of the NAFTA and trade-related aspects of intellectual property (TRIPS) agreements (Box Figure 4-1-2, dotted line).

Box Figure 4-1-2: R & D expenditures



Notes: Drugs sales includes all drugs for human use.

R & D expenditures relative to GDP, however, continued to increase through to about 2002 (blue line). Since sales of patented drugs accelerated from 1994 to about 2002 with annual increases over 10 per cent (in some years, substantially more so), it suggests that at least during the late 1990s, the industry's sales were growing too rapidly for R & D expenditures to keep up.

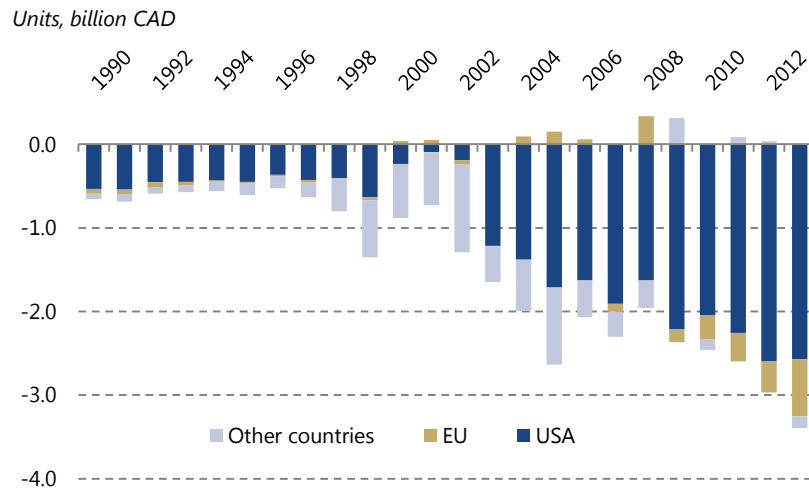
After 2002, the issue appears to be larger than just R & D expenditures for pharmaceuticals. It is more general to firms in Canada that work with intellectual property (gold line). Following more than a decade of increasing R & D expenditures relative to GDP, there has now been more than a decade of declines in an aggregate of all R & D activities.

Since the PMPRB should prevent any increase in the price of the drug during the two-year patent restoration, it will only have the effect of prolonging the existing revenue flow to the patent holder.

The question of interest here is to what extent that would also generate increased payments that were sent abroad. Giving a precise answer to that question would be difficult. But estimating its rough magnitude may be possible.

The background, however, is one where considerable change occurred in Canada's external balance regarding intellectual property. From an imbalance of roughly \$0.5 billion through most of the 1990s, it began to grow in 2002 and was more than \$3 billion by 2013 (Figure 4-2). Most of this occurred as a result of increased payments.

Figure 4-2 Canada's external balance on royalty payments for patents



Sources: Statistics Canada CANSIM Table 376-0033.

Note: The payments include all patents for industrial processes, not just pharmaceuticals. However, the main other sources of those payments are electronic equipment manufacture and transport equipment manufacture. External payments for software, trademarks, copyrights, and franchises are not included.

Noteworthy is that there was not a discernible spiking in either 2001 or 2002. A two-part WTO ruling that went against Canada led to a six-month average extension in 2001 for about 30 drugs of some significance. At the same time, all patented drugs were given, on average, another six months of protection.⁷ Royalties from those extensions seem to be lost in the "noise" of year-to-year changes.

Canada's imbalance vis-à-vis the United States increased by about CAD\$2 billion between 2003 and 2013. This occurred as the United States's intellectual property surplus with the rest of the world grew by some US\$50 billion – so there was a wide-spread shift in favour of the United States.⁸

Nonetheless, there is some evidence that in the later years even European Union countries garnered larger imbalances with Canada (Figure 4-2). This

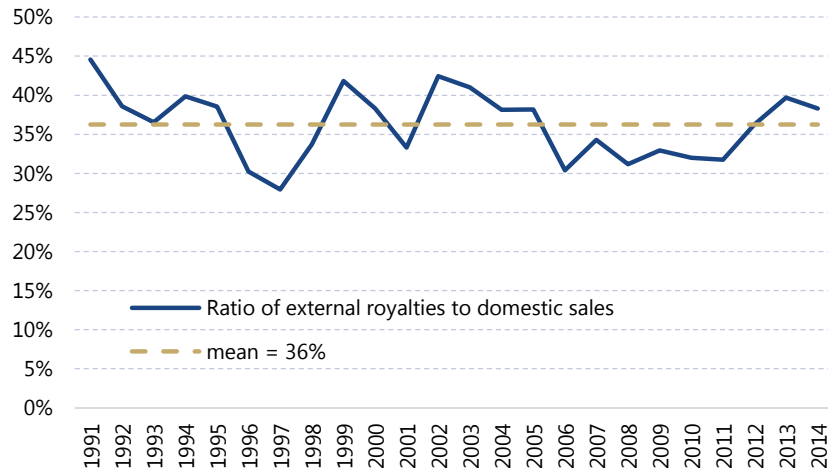
suggests a more broadly-based increase in the importance of intellectual property.⁹

Regarding CETA, analysis undertaken from initial proposals projected that it would cause Canadians to pay almost \$2.8 billion more for patented drugs (Grootendorst and Hollis, 2011; five years of patent restoration, combined with prolonged data exclusivity, and right of appeal for patent holders). Since sales of patented drugs amounted to roughly \$12.8 billion in 2011, this represented a substantial increase.

An update of that work in 2014 – after the text was agreed and patent restoration was set at 2 years – lowered the additional cost to \$795 million (Lexchin and Gagnon, 2014; their estimate, but omitting their extension of data exclusivity – CETA only formalised existing practice).

Those additional expenditures can be linked to Canada’s external royalty and dividend payments on intellectual property. In the past, an aggregate of all royalty payments abroad has fluctuated at around 36 per cent of sales patented pharmaceuticals (Figure 4-3). This includes royalty payments on all patents and industrial designs. Other indicators also suggest that over that period there were increased external imbalances in all payments for products embodying intellectual property (i.e., software, copyright, trademarks, etc). So whatever is underlying the increased value of external payments for patented pharmaceuticals is paralleled in other IP products (see CANSIM Table 376-0033).

Figure 4-3 Canada’s external royalty payments for patents and domestic pharmaceutical sales



Source: Statistics Canada CANSIM Table 376-0033, PMPRB (2016).

Note: External payments on all patents relative to sales of patented drugs. See also note for Figure 4-2.

External payments on patented drugs represented about 10 per cent of all external royalty payments in 2014 (and a similar amount in 2013).

In addition, dividends (and re-invested capital) by pharmaceutical companies to foreign entities more than doubled those external payments.

When combined with Grootendorst and Hollis's (2011) estimate of CETA-induced increases in costs patented drugs (3.1 per cent annually, so 6.2 per cent for CETA's change), CETA-caused external payments can be estimated. For patented pharmaceuticals this is \$71 million per year. That is, if the regime that CETA has created were fully in place for the drugs available in 2011, the additional external royalty and dividend payments in that year would have been \$71 million (\$2011).

Expenditures on patented drugs have been increasing; in 2015, they reached \$15.2 billion (PMPRB, 2016) – so those payments would have been \$85 million on the basis of that year's sales (using 2015 dollars).

The Chief Actuary for Canada's public accounts uses a future rate of growth of 4.6 per cent for future liabilities for health care.¹⁰ If expenditures on patented drugs keep increasing at that rate, then at the time that the measures are fully implemented (roughly 2037) the additional cost will be \$209 million annually (again, using 2015 dollars). The measures would not be fully implemented until 2037 since they are not retroactive and are applied only at the end of a patent life. So in the short term, only drugs whose patent was about to expire will benefit from the change.

5. Additional impacts, and observations

The quantitative results outlined thus far are fairly comprehensive in covering CETA's impact on trade. The impact on Canadian GDP reported from increased trade in goods was 0.16 per cent of GDP, and the impact of increased trade in services was 0.02 per cent of GDP.¹¹

Nonetheless, these estimates do not include the effects of increased investment on the capital stock, nor do they include any repercussions of liberalised trade in services for the sectors not covered by an STRI index. They also do not include the impact on employment, which warrants further comment.

Service sectors not covered by STRI

The trade impacts reported earlier from the change in STRIs may under-report the effects of CETA. This is because the STRI is not comprehensive enough to cover all the changes that will be brought about by the agreement. For example, the change due to "national treatment" of firms is likely to be deeper and affect most sectors by more than the change measured in the STRI, even with all the reservations specified in CETA's annexes.

CETA also lists numerous professions that will be permitted more latitude in moving between regions for short- to medium-term engagements. This includes professionals who will be allowed temporary entry (similar to Canadians using the L-1 visa to enter the United States), and contract service providers who will be allowed to enter the EU for a year based on their skills and qualifications (similar to the TN-1 visa created with NAFTA).

In most cases, the requirement is for post-secondary education in a specialised field, and a limited-time offer of employment. The STRIs cover only four professions (accounting, auditing, legal and engineering) where mobility is scored.

In 2015, more than 650,000 Canadians were working in the United States under a TN-1 visa. So the potential for these provisions to lead to temporary movement of people is significant. Though the TN-1 visa to the United States was initially for one year, it was eventually extended to three years.

Taking this into account and projecting the effect of similar impacts on CETA-included sectors not covered by the STRI would result in a gain of roughly 0.1 per cent of GDP. This increase is still small, but not insignificant.

Investment

The results reported in sections 2 and 3 also do not include the expansion of the economy that would result from investment in new capital. While investment itself is included in the change in GDP as part of aggregate demand, not accounted for is that the accumulation of those investments into new capital that then, in turn, makes additional output possible.

In total, investment would go up by almost 0.4 per cent from the increased trade in goods and services reported in Sections 2 and 3. The inclusion of other sectors not covered by the STRI index would increase this to almost 0.6 per cent. This would increase the capital stock and, in turn, increase GDP by another 0.08 per cent over a six-year horizon (PBO's projection model), and 0.16 per cent over the long term.

In sum over the long term, CETA is projected to add about 0.17 per cent to GDP from the trade factors identified earlier, and another 0.19 per cent from an extension of other factors (investment and STRI; Table 5-1).

In total, this is about one-sixth of the GDP gain that would have been projected from a similar methodology for the Canada-US free trade agreement (that is, implementing the 1989 tariff reductions in the model used for this report).

Table 5-1 Expanded impact of CETA on Canada's economy

<i>Units, per cent</i>	Long-term
Exports of services to EU	14%
Investment	0.6%
GDP (quantified components)	0.4%

Note: This includes the effects of extending the STRI reductions to sectors not currently covered, and the increased capital stock that will result from investment.

Employment

The framework used in sections 2 and 3 also does not directly project a change in employment. The working assumption is that employment is close to being on a stable path and unemployment would be difficult to lower without inducing inflation.

In that case, when GDP increases, it will come from increased labour productivity, stemming from improved technology and more capital. So gains in output result in higher incomes, rather than greater employment.

That assumption, however, is made for simplicity. Allowing employment to increase would not change the gain in GDP that the framework projects. More employment would simply translate to smaller income gains for the people already employed.

Any increases in employment that did occur, and were not inflation-inducing, would have two sources.¹² One is the reduction in equilibrium unemployment (Ball and Mankiw, 2002) as structural impediments are reduced. Another would occur when more individuals are drawn into the labour force (Blundell, Blozio and Laroque, 2011) as incomes increase.

While any decrease in equilibrium unemployment is likely to be small in response to CETA, the effect of higher incomes in drawing in more workers would be more pronounced.

Nonetheless, without a rigorous framework for allocating GDP gains to either productivity increases or employment increases, any projection of employment increases would be speculative. As such, the best that could be noted in this report is that there is likely to be a positive impact on employment, but its magnitude is too uncertain to be informative.

Caveats

Some general caveats regarding these estimates are also in order. A first is that this report has focused on quantifiable aspects of the agreement. But CETA also calls for important integration in areas such as phytosanitary measures, regulatory harmonization, standards harmonization, etc. These additional impacts are more difficult to quantify and thus missing from the results above.

A second is that many components of CETA will have their impacts in the future. CETA has numerous committees that are tasked with filling out the details of the agreement. Moreover, there is a framework for professional groups to negotiate mutual recognition of professional qualifications. This means that the professional groups themselves become gatekeepers, rather than bureaucrats outside the profession.

Regarding areas that are quantified within this report, a common caveat is that they can be sensitive to the methodology used, as well as to the interpretation by the researcher as to what the agreement changes (Ciuriak, 2016).

Analysis of other trade agreements, both prior to, and after, implementation shows a wide range of estimated impacts (e.g. discussion in Villarreal and Fergusson, 2015; Raza, Troster and von Arnim, 2015). For studies of *ex ante* projections, the disparities are often caused by differing methodologies that focus on particular issues. For example, an emphasis on investment will lead researchers to highlight the channels through which trade influences capital

formation, leading to sectoral and aggregate economic expansion (Harms and Meon, 2016).

As such, the primary usefulness of the estimates given in this report concerns the scale and distribution of the impacts, rather than the precise numerical result.

More specifically concerning the estimates for trade in services, while they are built from empirically determined links between STRI and trade, two observations make them approximative.

The first is that since the STRI indexes are built from dozens of questions in each of five sub-categories, there is an implicit assumption that within each sub-category, all impediments are equal in affecting trade. This is a questionable proposition, but it is somewhat muted by an averaging over a number of countries and sectors; the outliers have less influence.

The second is that there is some evidence that the effects of the impediments are non-linear (Gooris and Mitaritonna, 2015). That is, at higher levels they have a disproportionate effect.

This suggests that there is a threshold effect, beyond which the impediments stop being a nuisance and start becoming a barrier. Since Canada has significantly higher index scores in a few areas, and is lowering them by more than the EU, Canada's gains may be understated.

Appendix A: A computable general equilibrium model

Introduction

PBO analysed the CETA trade agreement using a computable general equilibrium (CGE) model provided by the Global Trade Analysis Project (GTAP).¹³ This CGE model is often used to conduct trade policy analysis, and has been referred to as the “workhorse of trade policy CGE analysis” by the United Nations (UNCTAD - 2008).¹⁴ Similar models have been used in previous analysis of the economic impacts of the CETA agreement.¹⁵

CGE models are best suited for analysing the impacts of tariff rate changes to the trade in goods. They are less well suited for analysis of non-tariff barriers (NTBs). As free trade agreements are becoming more tailored around NTBs, and less around tariff rates, the relative importance of CGE modelling results has decreased.

Nonetheless, they remain useful for quantifying the impact of trade agreements, and some effort has been made to link NTBs to tariff-equivalents – as was done in this report.

The GTAP model in particular is a multi-region and multi-sector framework with efficient competition and constant returns to scale.¹⁶ Inherent in the model is the Armington assumption, which states that similar goods are differentiated by their country of origin. That is, commodities that would otherwise be perfectly interchangeable are imperfect substitutes based on their country of origin.

Further, CGE models assume a state of equilibrium in the economy; the analysis is conducted by determining a new equilibrium after the application of a shock, in this case changes to tariff schedules.¹⁷ Theoretically, this new equilibrium will occur over time, with an adjustment period. Therefore, the results are presented on the assumption that CETA provisions have been fully phased in.¹⁸

PBO analysis

PBO used the GTAP CGE model to examine the impact of changes to tariffs outlined in the CETA agreement on the economy. Most directly, these tariffs change the final price faced by consumers; thus, alterations to the tariff schedules will have an impact on demand for European goods.

The GTAP model characterizes 57 sectors of goods and services. For the purposes of modelling, almost all of the tariffs were set to zero, save for seven sectors for the European Union, and eight sectors for Canada.^{19,20}

For these sectors, tariff rates were reduced proportionally to the share of imports within the sectors that remained under tariff restrictions.²¹ The expected impact of tariff changes on these sectors on bilateral exports is outlined in Table A-1.

Table A-1 Bilateral exports

<i>millions of 2015 Canadian dollars</i>	\$ change	
	Canada to EU	EU to Canada
Paddy rice	0.0	0.0
Wheat	705.6	0.3
Cereal grains nec	1.5	0.2
Vegetables, fruit, nuts	6.8	13.4
Oil seeds	-6.5	0.0
Sugar cane, sugar beet	0.0	0.0
Plant-based fibers	0.0	0.0
Crops nec	7.1	7.2
Bovine cattle, sheep and goats, horses	0.3	0.1
Animal products nec	6.6	11.7
Raw milk	0.0	0.0
Wool, silk-worm cocoons	0.0	0.0
Forestry	0.1	0.0
Fishing	20.2	0.2
Coal	-0.3	0.0
Oil	-0.9	0.0
Gas	0.0	0.1
Minerals nec	-5.1	0.7
Bovine meat products	31.3	7.0
Meat products nec	5.0	72.9
Vegetable oils and fats	15.3	15.5
Dairy products	26.7	175.6
Processed rice	0.0	0.0
Sugar	18.5	0.3
Food products nec	627.8	877.6
Beverages and tobacco products	2.1	28.1
Textiles	32.2	249.8
Wearing apparel	136.3	929.0
Leather products	16.9	403.4
Wood products	19.7	166.5
Paper products, publishing	-4.4	1.4
Petroleum, coal products	53.7	38.0
Chemical, rubber, plastic products	449.3	452.1
Mineral products nec	11.1	111.8
Ferrous metals	3.3	2.5
Metals nec	528.4	5.0
Metal products	69.9	129.8
Motor vehicles and parts	119.6	2018.3
Transport equipment nec	434.5	289.3
Electronic equipment	95.5	16.9
Machinery and equipment nec	524.2	297.0
Manufactures nec	16.1	147.0
Total	3,968	6,469

Sources: GTAP CGE model and PBO calculations.

Note: "nec" refers to "not elsewhere classified". The construction and dwellings sectors have been combined for this analysis.

The model results imply that both Canada and the European Union will experience export gains in various sectors, as well as small decreases in exports in other sectors.

Europe will experience gains in some areas. For instance, Canada will import a greater number of prepared food products (listed as, food products nec) as a result of the removal of more than 75 per cent of the Canadian tariffs on a trade weighted basis. Further, complete removal of Canadian tariffs on wearing apparel and leather products allows for an increase in European exports in these sectors.

Both the EU and Canada will experience an increase in bilateral exports of motor vehicles and parts in the range of 30 per cent, suggesting a greater integration of automobile manufacturing within the two regions. Canada has reduced almost their entire tariff protections in this sector (98.5 per cent on a trade-weighted basis). At the same time, the EU, while still largely reducing tariff protections, has maintained most passenger vehicle protections (71.1 per cent on a trade-weighted basis).

The CETA agreement affects more than bilateral trade between Canada and the EU. Other countries are also marginally affected. As resources are diverted towards trade between Canada and the EU, there is a slight reduction in the exports of, and to, the rest of the world, particularly the two other NAFTA countries, Mexico and the United States (Table A-2). These changes are minor in aggregate, but the impact varies by sector.

Table A-2 Change in total exports - selected regions

Relative to baseline	% change				
	CAN	EU	USA	MEX	ROW
Paddy rice	16.50	-0.03	0.02	-0.04	-0.03
Wheat	5.74	0.88	0.12	-0.50	0.03
Cereal grains nec	-0.08	-0.01	0.01	0.00	-0.01
Vegetables, fruit,	-0.34	0.12	0.02	-0.01	0.00
Oil seeds	-0.68	0.06	0.07	0.16	0.04
Sugar cane, sugar	-0.74	0.04	0.17	0.50	0.13
Plant-based fibers	-0.68	-0.05	-0.01	-0.02	-0.03
Crops nec	-0.62	0.27	-0.02	0.01	0.00
Bovine cattle, sheep and goats,	-0.37	0.03	0.05	0.18	0.00
Animal products	0.34	0.08	-0.01	0.00	-0.02
Raw milk	-1.04	0.00	0.10	-0.04	-0.01
Wool, silk-worm	-1.44	-0.01	0.05	0.01	0.00
Forestry	-0.04	-0.08	0.04	0.09	0.02
Fishing	0.79	0.07	0.33	0.14	0.01
Coal	-0.09	-0.01	0.02	-0.01	0.00
Oil	-0.16	0.01	0.08	0.00	0.00
Gas	-0.13	0.01	-0.01	0.15	0.01
Minerals nec	-0.07	0.01	0.11	0.02	0.00
Bovine meat	0.99	0.17	0.12	0.07	0.01
Meat products nec	-0.64	0.42	0.02	0.07	0.02
Vegetable oils and	0.51	0.24	0.02	-0.11	0.00
Dairy products	13.66	1.52	-1.06	-0.11	-0.16
Processed rice	2.72	-0.08	0.04	0.00	-0.01
Sugar	3.54	-0.04	0.09	-0.04	0.00
Food products nec	4.41	1.90	-1.11	-0.11	-0.11
Beverages and	0.05	0.05	-0.01	0.00	0.00
Textiles	2.10	0.64	-0.31	-0.09	-0.03
Wearing apparel	11.11	3.04	-0.91	-0.22	-0.16
Leather products	9.76	1.54	-0.58	-0.18	-0.15
Wood products	-0.38	0.39	-0.23	-0.07	0.01
Paper products,	-0.56	-0.04	0.16	0.15	0.06
Petroleum, coal	0.32	0.12	-0.03	0.02	0.00
Chemical, rubber,	0.68	0.05	0.02	0.05	0.00
Mineral products	0.31	0.30	-0.16	0.00	-0.01
Ferrous metals	-0.40	-0.05	0.12	0.06	0.02
Metals nec	1.06	0.02	0.06	0.18	-0.02
Metal products	0.29	0.16	0.01	0.03	0.01
Motor vehicles and	0.28	0.56	-0.65	-0.15	-0.04
Transport	2.04	0.10	0.00	0.00	-0.04
Electronic	0.58	-0.09	0.12	0.04	0.00
Machinery and	0.50	-0.04	0.11	0.03	0.01
Manufactures nec	0.40	0.26	-0.02	-0.02	-0.01
Total	0.57	0.21	-0.05	-0.01	-0.01

Sources: GTAP CGE model and PBO calculations.

Note: "nec" refers to "not elsewhere classified". The construction and dwellings sectors have been combined for this analysis.

This change in exports has an impact on production in both Canada and the EU (Table A-3). Of 42 goods producing sectors, some 18 are projected to

decrease output – though in most cases it is relatively small, and relative to a growing baseline.

Table A-3 Sectoral output

Relative to baseline	% change	
	Canada	EU
Paddy rice	0.0	0.0
Wheat	4.8	-1.1
Cereal grains nec	0.1	0.0
Vegetables, fruit, nuts	-0.2	0.0
Oil seeds	-0.4	0.0
Sugar cane, sugar beet	0.4	0.0
Plant-based fibers	0.2	0.0
Crops nec	-0.4	0.0
Bovine cattle, sheep and goats, horses	0.1	0.0
Animal products nec	0.0	0.0
Raw milk	-1.5	0.0
Wool, silk-worm cocoons	0.0	0.0
Forestry	-0.3	0.0
Fishing	0.7	0.0
Coal	-0.1	0.0
Oil	-0.1	0.0
Gas	-0.1	0.0
Minerals nec	0.2	0.0
Bovine meat products	0.2	0.0
Meat products nec	-0.4	0.0
Vegetable oils and fats	0.3	0.0
Dairy products	-2.0	0.1
Processed rice	0.0	0.0
Sugar	0.8	0.0
Food products nec	0.6	0.1
Beverages and tobacco products	0.1	0.0
Textiles	-0.3	0.1
Wearing apparel	-0.8	0.3
Leather products	-1.8	0.2
Wood products	-0.3	0.1
Paper products, publishing	-0.1	0.0
Petroleum, coal products	0.1	0.0
Chemical, rubber, plastic products	0.2	0.0
Mineral products nec	0.0	0.0
Ferrous metals	-0.1	0.0
Metals nec	0.8	-0.2
Metal products	0.0	0.0
Motor vehicles and parts	-0.1	0.1
Transport equipment nec	1.3	-0.1
Electronic equipment	0.1	-0.1
Machinery and equipment nec	0.1	0.0
Manufactures nec	-0.1	0.0
Total	0.2	0.0

Sources: GTAP CGE model and PBO calculations.

Note: "nec" refers to "not elsewhere classified". The construction and dwellings sectors have been combined for this analysis.

In total, the price effects of the tariff reductions cascade through the economy via income and substitution effects, resulting in an overall change to gross domestic product (GDP) for both Europe and Canada (see Table A-4 and Table A-5). In sum, Canada benefits from a 0.16 per cent increase in GDP.

Table A-4 GDP impacts – Canada

Canada Change	Consumption	Investment	Government	Exports	Imports	Total
	0.17%	0.39%	0.18%	0.40%	0.62%	0.16%

Sources: GTAP CGE model and PBO calculations.

The EU exhibits a similar GDP decomposition profile as Canada. However, the GDP impact of these tariff changes is smaller than that for Canada in percentage terms. This is a consequence of Canada comprising less of the EU's international trade than the EU trade does for Canada.

Table A-5 GDP impacts – European Union

European Union Change	Consumption	Investment	Government	Exports	Imports	Total
	0.02%	0.03%	0.02%	0.02%	0.03%	0.02%

Sources: GTAP CGE model and PBO calculations.

This analysis pertains only to the tariff rate changes outlined in the CETA agreement, and not to the non-tariff barriers to trade.

Appendix B: CETA's impact on STRI indexes

Introduction

The OECD has created services restrictiveness indices (STRIs) for specific sectors of the economy. The STRI are composite indices that incorporate binary scores for a number of measures within each sector. A score of one for a given measure means that it restricts trade in services; while zero is indicative of liberalised trade (Gelosso Grosso, *et al*, 2015).

For each sector where an STRI exists, the measures are separated into five policy areas (Table B-1).

Table B-1 STRI measures

Measures
Restrictions on foreign entry
Restrictions on the movement of people
Other discriminatory measures
Barriers to competition
Regulatory transparency

Under each of these groupings, there are dozens of issues that are addressed (for example, the number of months that an intra-corporate transferee is permitted to stay in the host country). These policy measures are assigned a weight based on expert judgement.

All five measures are applied to 14 sectors (Table B-2).

Table B-2 STRI indexes

Activity
Accounting
Architecture
Financial services
Computer
Construction
Courier
Distribution
Engineering
Insurance
Legal
Maritime transport
Rail freight transport
Road freight transport
Telecom

Note: For the European Union, these scores were calculated for Austria, Belgium, Denmark, Czech Republic, Estonia, France, Finland, Germany, Greece, Hungary, Italy, Ireland, Luxemburg, The Netherlands, Portugal, Slovak Republic, Slovenia, Sweden, UK, Poland and Spain.

The weights put on policy measures of Table B-1 are unique to each of the activities in Table B-2.

When utilizing the binary scoring for a number of measures, there is sometimes a hierarchical nature of the measures. There are measures that, if scored as restrictive, automatically determine the score of subsequent measures.

For example, if there are nationality requirements to practise law, then measures concerning the licensing of legal professionals are automatically scored as restrictive.

Once binary scores for all measures in a policy area are provided, the following equation is used to obtain the corresponding STRI:

$$w_{ji} = \frac{score_j w_i}{\sum_i n_i w_i}$$

where w_{ji} is the measure j under the policy category i , $score_j$ corresponds to the binary score for the measure j , n_i is the number of measures under policy category i , and w_i is the weight assigned to the policy area through expert judgement.²²

PBO methodology

Using the OECD STRI binary scoring methodology, PBO used the CETA text to provide a new score for each measure under the 14 activities of Table B-2.

PBO was able to recreate the STRI using the formula noted above. This made it possible to calculate the change in the score, with some confidence that it reflected changes that would occur in the OECD's questionnaire, though obviously this remains somewhat subjective.

In doing so, the first step was to obtain a binary score of zero or one for each measure under each sector. The measures that we focused on were those under the first three policy areas (restrictions on foreign entry, restrictions on the movement of people, and other discriminatory measures).

The last two policy areas (barriers to competition and regulatory transparency) are less important for this analysis; they do not play as large a role in services trade agreements as do the first three policy areas. These binary scores were then compared to the corresponding current STRI data.

If CETA appeared to lessen the restriction corresponding to a unique question in a sector (obtaining a zero binary score) and the original STRI was zero, the new STRI remained zero. If CETA lessened the restrictions corresponding to a measure and the original STRI indicated some restriction (a value above zero), we concluded that with the implementation of CETA the new STRI score would be zero.

If CETA were to create a restriction where one didn't previously exist – some countries wanted the flexibility to impose the restriction in the future – we assumed that the resulting score would remain zero. This assumption was made on the basis that any future restriction would be temporary since it is generally in the long-term economic best interest of a country to remove economic impediments.

This latter can be further supported by what has been called "Water in the GATS (General Agreement on Trade in Services)." This term refers to "the difference between the bound level of trade restrictiveness permitted by the GATS and the actual trade regime." The GATS represents an upper bound on restrictions, but there is no lower bound and many countries see it in their interest to lower the restrictions.

After the new STRI was established based on the above methodology, the new STRI scores for each measure are subtracted from the original STRI to obtain a difference, which captures the effect of CETA on the services trade restrictiveness.

This change was then applied to the estimation results reported in Nordas and Rouzet (2016) to obtain a projected change in trade.

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Notes

1. Measures of average tariffs are sensitive to the level and manner of aggregation (see Box 2-1 in the main text). As such, this report will cite a number average tariffs for Canada and EU, but note how they were derived in each case.
2. Trade agreements have become the subject of considerable discussion lately with researchers linking them to the increase in inequality in the United States (Autor, *et al*, 2016), as well as in other countries (Goldberg and Pavcnik, 2016). Though technological change has been a bigger factor in dislocations in the United States economy (Gordon, 2016). The concept of *comparative advantage* that underlies the advocacy of liberalized trade implies that some people will gain, while others will be displaced as production is made more efficient by greater specialization. But that concept also makes clear that the overall economy will gain, so the unequal impact on individuals need not be the long-term outcome.
3. As was noted by the Government at the time of negotiation, the primary benefit of CETA may be in diversifying Canada's external trade so that business cycles in one particular region do not dominate Canada's trade cycle.
4. These numbers are not strictly comparable to those in Table 2 or those used in the GTAP model since the sectoral disaggregation is different.
5. Chapter 9, Article 9.3 of the 5 July 2016 draft.
6. Jafari and Tarr (2015) provide a tariff equivalent for the World Bank's STRI. Those can be used in analytical work in the same way tariffs are; i.e. they make it possible to turn the STRI change into a tariff change, which can then be used in a trade model.
7. Outlined in the public record of Bill S-17's enactment (http://www.lop.parl.gc.ca/About/Parliament/LegislativeSummaries/bills_ls.asp?Language=E&ls=S17&Mode=1&Parl=37&Ses=1&source=library_prb). The 30 drugs were those under an older regime of 17 years of patent life. All other patented drugs were affected by a prohibition against generic manufacturers from stockpiling their products so as to be ready for market at patent expiration.
8. A relatively high corporate tax rate in the United States creates an incentive for some firms to avoid repatriating profits, so the \$50 billion may not fully reflect the imbalance.
9. Though Canada appeared to be losing ground, recent data show that for most Canadians, their first choice of venue to patent is the United States. So the trend may be somewhat misleading.

10. Actuarial assumptions found in Volume 1 (Section 2.24, no. vii) of the Public Accounts of Canada 2014 (Receiver General of Canada, 2014), and supported in: Actuarial Report: Retirement Benefits under the Public Service Health Care Plan , March 31 2013, Office of the Chief Actuary of Canada.
11. This compares to the 0.45 per cent gain in GDP projected using the GTAP model in an analysis that extended the non-tariff barriers more broadly than is done in this report (Kitou and Philippidis, 2010). It omits the add-on effect of investment on the capital stock.
12. This would be net of job losses in the sectors adversely impacted by trade – see Trefler (2004, 2005) for a discussion of NAFTA’s sectoral impacts on Canadian industries.
13. Global Trade and Analysis Project. Available at: <https://www.gtap.agecon.purdue.edu/>
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16. This PBO analysis used version 6.2 of the GTAP model.
17. The assumption of a starting equilibrium can be true or untrue. Real world data underlies the calibration of the dataset, with the real world rarely being in a state of equilibrium. However, arguments can be made that the world economy is generally “close” to equilibrium.
18. A number of tariff changes have three, five, and seven year phase-in periods. Indeed, even the tariff-rate quotas are phased in over 7 years.
19. For European Union tariff rates the sectors and trade-weighted reduction percentages are: Vegetables, fruits and nuts (99.8%), Animal products nec (99.8%), Bovine meat products (0.5%), Meat products nec (56.6%), Sugar (<100%), Food products nec (89.5%), Motor vehicles and parts (71.1%).
20. For Canadian tariff rates the sectors and trade-weighted reduction percentages are: Animal products nec (99.4%), Meat products nec (92.7%), Vegetable oils and fats (94.5%), Dairy products (7.7%), Food products nec (75.1%), Beverages and tobacco products (99.0%), Motor vehicles and parts (98.5%), Transport equipment nec (98.3%).
21. For example, according to the GTAP trade database Canadians imported \$1.66 billion in tariffed dairy products from the EU prior to the implementation of CETA. Post-CETA \$1.53 billion of those imports would remain under tariff protection. As a result, PBO analysis of the rate changes involved reducing the effective tariff rate for the entire dairy products sector by 7.7 per cent.
22. This number corresponds to the share of the total number (100) of points allocated to the policy area by the experts.