The Partial Equilibrium Effects of Canada-India Trade Liberalization

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Abstract

The current negotiations between Canada and India have focused on an unrestricted and mutually beneficial free trade relationship between the two countries. A partial equilibrium model is used in this paper to predict the effects of this proposed free trade agreement in terms of the imports and exports across the industries of each country, as well as the trade creation, trade diversion, and welfare implications for both countries. The paper additionally identifies the trading partners which are most affected in each industry, and the most affected industries for each trading partner. The results suggest that the removal of all existing tariff barriers between the two countries would moderately increase their trade volume, and that China, the Russian Federation, and the United States would be the countries most affected by this increase in bilateral trade.

Keywords: Canada, Free Trade, India, Welfare.
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1 Introduction

As of February 2013, a new comprehensive economic partnership agreement continues to be negotiated between Canada and India, a process which began in 2010. While this proposed agreement covers many aspects of economic integration, such as the liberalization of direct investment and further cooperation in regulatory policies, free and unrestricted bilateral trade is considered to be the main priority of these negotiations.[1] Because both Canada and India are presently interested in diversifying their trade profiles, it is both important and timely to investigate the possible effects of this potential agreement on their trade patterns, trade partners, and overall structure of trade protection.

Within the previous decade, the trade relationship between Canada and India has become significantly stronger. The total value of trade has grown from $1.12 billion in 2001 to $5.13 billion in 2011, leading to an overall increase of 334 percent. Canada's imports from India constituted $2.56 billion of this volume in 2011, whereas Canada's exports to India made up $2.60 billion. The bilateral trade has been especially flourishing in agricultural products, natural resources, and manufactured products. That said, there is still significant potential for the mutually beneficial integration of these two countries going forward.

India is a growing global force that has one of the fastest growing economies in the world, with an average GDP growth of 7.4 percent between 2001 and 2011. In 2011, Indian trade increased by 19 percent, recording one of the fastest rates of trade growth globally.[2] At the same time, India remains to be among the most protectionist economies, with an average tariff rate that is three times higher than the world average. Despite the importance of trade integration with this emerging power, only a handful of studies have been written on the subject. The current study addresses this gap by investigating the impact of a free trade agreement between Canada and India using a partial equilibrium model that allows for a detailed sector-specific analysis, and identifies the trade creation effect as well as

[1] Canadian Chamber of Commerce (2012). More specifically, the proposed agreement may include regulatory cooperation, liberalization in services and investment, liberalization in the rules of origin, further transparency in customs procedures, and the enforcement of high standards in intellectual property rights.

[2] World Development Indicators (2012). The numbers are in constant 2000 USD.

the trade diversion effect for each trading partner of both countries.

The most notable study in the literature comes from the Government of Canada (2010), which predicts substantial gains due to this trade agreement. However, the Global Trade Analysis Project (GTAP) model which is used in this report, while popular, is subject to some major caveats. First, this model does not take adjustment costs into account, as it refers to only the long-run scenario. This is likely to be important for a country such as India, where there exist structural rigidities in the economy. The model also assumes perfect mobility of factors across sectors, while it has been well documented that inter-industry labor mobility is very limited in India (Amin, 2007; Besley and Burgess, 2004; Li et al., 2011). For these reasons, the GTAP model is likely to overestimate the impact of a preferential trade agreement between Canada and India.

In addition, this type of general equilibrium analysis may neglect the institutional considerations that can affect the amount of trade generated by preferential trade agreements, such as stringent rules of origin, administrative procedures, and non-tariff barriers such as quotas and import licenses. These factors can significantly reduce trade, even in cases where existing tariffs are completely removed. The GTAP model also divides the world into regions, where all other countries are aggregated as 'the rest of the world'. In this case, it is not possible to assess how a free trade agreement between two countries will displace trade with other countries, nor examine how the existing trade partners will be affected overall.

The current paper instead uses a partial equilibrium model in order to assess the impacts of a free trade agreement between Canada and India. This is a flexible model which evaluates one industry at a time, and therefore, can provide estimates at a very detailed level to assess the sector-specific gains and losses. In contrast to the perfect factor mobility assumption which is not likely to hold in India, even in the long run, this model allows factors to be fixed in their respective industries. Second, the model lifts the non-tariff barriers, as well as tariffs, to permit the increase in the amount of imports. In addition, the partial equilibrium model has the advantage of estimating the impact of a free trade agreement on each individual country, allowing for the identification of the most affected trade partner for each sector, as well as the most affected sector for each trade partner, for all of the beneficiary countries involved in the trade agreement.

Another advantage of the model used in this paper is that it allows for the decomposition of the increase in bilateral trade due to a trade agreement into trade creation and trade diversion components. The trade creation effect is the part of the increase in trade that would have been domestic production in the absence of a trade agreement. This newly created trade has a negative impact on domestic prices, which leads to welfare gains for consumers by reducing their cost of consumption. The trade diversion effect, on the other hand, is the part of the increase in bilateral trade that would have been imports from another trade partner. This partner could be more efficient, or subject to lower trade costs due to various reasons, such as distance. A preferential trade agreement would reduce trade costs for the beneficiary countries, creating a cost advantage over other partners, thus diverting some of the trade away from other partners and towards the beneficiary countries.

The results of the analysis suggest that a complete removal of the trade barriers between the two countries will have only a moderate effect on their trade volume. Specifically, imports from India will increase by eleven percent, and exports to India will increase by twenty-six percent, leading to a twenty percent increase in the total bilateral trade between the two countries. Indian imports from Canada particularly increase in the food and live animals industry, as well as in heavy industrial products such as machinery and transport equipment. In the natural resource industries, the impact is predicted to be around a five percent increase. On the other hand, Canadian imports from India increase mostly in manufactured products, in particular for textiles and other related sectors. Both Canada and India benefit from the agreement through an increase in their overall consumer welfare. In addition, the results suggest that about two-thirds of the increase in Indian exports and about half of the increase in Canadian imports will be newly created trade, while the rest will be diverted away from other trade partners.

With respect to its impact on their trade partners, the most affected countries are found to be China and the United States due to their reduced exports to both Canada and India. In particular, the food exports from the U.S. to India, and the manufacturing and natural resource exports from China to Canada, are reduced. The Russian federation is the third most impacted country, due to its reduction in chemical exports to India. Overall, the results suggest that the trade agreement

will result in further diversification of the trade profiles for both Canada and India by diverting trade away from their largest trade partners, rather than their smaller or less efficient partners.

2 Background

Since India's independence in 1947, Canada and India have shared a productive trade relationship. While the total amount of traded goods has grown at a slow pace during the early decades of independence, with a decline during the 1970s, both imports and exports have increased substantially during recent decades. This was largely due to India's economic liberalization, which slowly progressed during the 1980s and was followed by a comprehensive trade liberalization that took place in 1991.

Prior to 1991, the average tariff rate for manufacturing products was around 152 percent, while the rate for agricultural products was roughly 115 percent. India was virtually a closed economy prior to this trade reform, as tariff rates in most industries were prohibitive. In addition, there were significant barriers in the form of import licenses and quantitative restrictions, which were effective for 90 percent of the value added in the manufacturing sector (Mitra and Ural, 2008). This period coincides with very low bilateral trade volume between Canada and India.

The most significant developments were achieved after the Indian trade liberalization in 1991. This reform included the reduction of tariffs, non-tariff barriers, export restrictions, trade monopolies, import licenses, the broadening of export incentives, and the full convertibility of the domestic currency. Within the six years following the trade liberalization, the average tariff rates were reduced to less than 40 percent in manufacturing industries and less than 25 percent in agricultural industries. Non-tariff barriers were also significantly reduced. By 2003, only five percent of industries were subject to non-tariff trade restrictions.

Figure 1 shows the average tariff rates in India between 2000 and 2011, where each bar represents an average tariff rate and each line represents the value of imports from and exports to India. The tariff rates are only presented up to 2009, as this is the last year for which the tariff data are available for both countries.

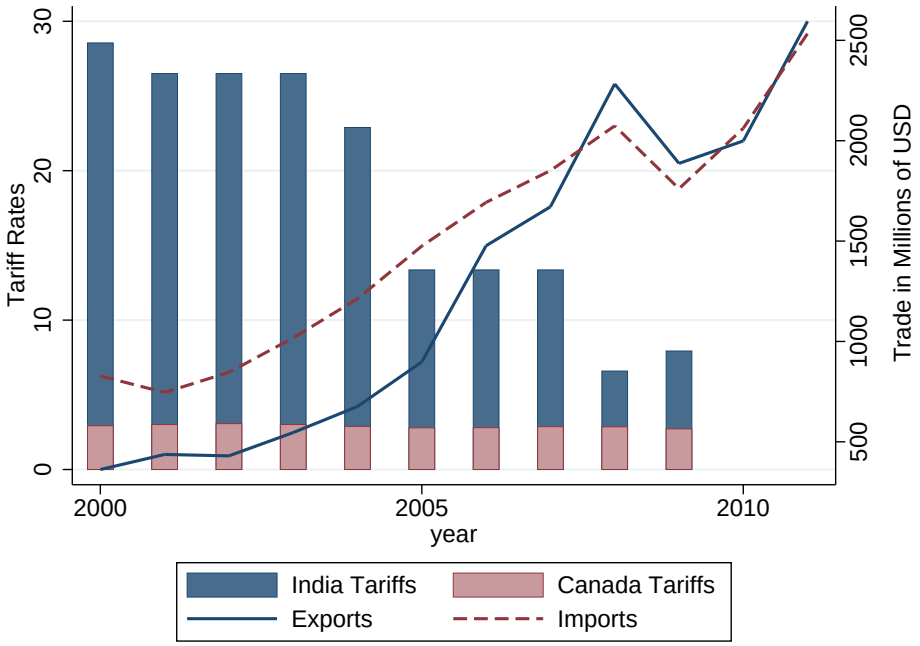
The figure shows that the Indian tariff rates applied to Canadian imports were significantly reduced, from 28.6 percent in 2000 to 7.9 percent in 2009. As the Indian tariff rates were reduced, naturally there were higher levels of exports from Canada to India, increasing from $362 million in value in 2000 to $2,595 million in 2011. The Canadian tariff rates have been much lower historically, between two to three percent, and were not significantly changed over this period. Nevertheless, the total value of imports from India to Canada have also increased substantially, from $828 million in 2000 to $2,534 million in 2011. Within these eleven years, there was a seven-fold increase in exports and a three-fold increase in imports between the two countries, leading to a four-fold increase in the total value of bilateral trade.

However, this substantial improvement cannot be attributed to the Indian tariff reductions alone. First, India's trade performance within the last few years has been one of the strongest in the world. For example, India's trade increased by 39 percent between 2009 and 2011, compared with a 17 percent growth rate in Canada and a 21 percent growth rate worldwide. Within the last decade, between 2001 and 2011, Indian exports of goods and services increased by 319 percent, compared to a one percent reduction in Canada and a 75 percent increase worldwide.[3] The increase in service exports from India was particularly notable over this period, moving from $17 billion in value to $124 billion, recording a seven-fold increase. This increase is observed despite the very complex Indian trade regime, which lead to significant inefficiencies and high administrative costs (Balasubramanyam, 2003). There are still numerous restrictions on imported products, such as pharmaceuticals and automobiles, due to reasons of health, environment, safety, and public morality. As Balasubramanyam (2003) notes, there is also considerable uncertainty in the future of trade policy due to the wide disparity between the bound tariffs and applied tariffs in India.

Second, trade relations between the two countries have been getting stronger, independent of the trade barriers or the improved overall trade performance. Beginning in 2003, there was a series of twenty-seven agreements signed between the two countries, ranging from letters and memorandums of understandings to other various programs, while there were only five agreements signed prior to 2003

[3]World Development Indicators, 2012. The numbers are in constant 2000 USD.

Figure 1: Trends in Trade and Protection between Canada and India



Notes: The trade data are from the OECD STAN Database (2012) and the World Development Indicators (2012). The last year for which the data are available for both countries is 2009 for tariffs and 2011 for bilateral trade. The average tariff rates are weighted by the import shares of the corresponding industries. The trade data show Canadian exports to and imports from India. The right axis shows the value of trade in millions of USD, and the left axis shows the tariff rates in percentages.

(High Commission of India, 2012). These agreements covered scientific, technological, environmental, and agricultural cooperation, as well as cooperation in the fields of energy, mining, and earth sciences.

The investment ties have also been gaining in strength, especially in the form of Indian investment in Canadian mining operations. As a result, the total Indian investment in Canada has increased from 211 million dollars in 2006 to over four billion dollars in 2011 (High Commission of India, 2012). On the Canadian side of the relationship, investment in India is often considered to be preferable to China as it has better corporate standards and higher returns to assets as a result of a well-developed institutional framework (Qureshi and Wan, 2008).

The only period of time when bilateral trade volume has declined within the

last decade was in 2009, which occurred globally due to the financial crisis. Until 2007, Canada had a trade deficit with India, which followed with a trade surplus between 2007 and 2009, particularly due to an increased volume in the exporting of agricultural products and natural resources, and they have had a balanced trade since 2009. However, the amount of trade is still relatively low, representing less than one percent of total trade for both Canada and India, and neither Canada nor India is within the top ten trading partners of one another. This implies that there is significant room for mutually beneficial improvement. The volume of trade between two countries has been strongly correlated to the movement in tariff rates and removing these trade barriers could substantially increase their trade.

The first panel of Table 1 shows the composition of trade between the two countries, where exports are decomposed with respect to industry, technological intensity, and end use according to the OECD definitions.[4] Almost the entire amount of Indian exports is manufactured products, with a 96 percent share. Forty-eight percent of total exports from India are in low-technology manufacturing. This is intuitive as India is a labor abundant country and textiles, which are classified as a low-technology product, are the major exports from India.

Canadian exports to India are somewhat more diversified, with 25 percent of their exports in agricultural products and 66 percent in manufacturing products. About one-third of the total exports to India is classified as medium-to-high technology manufactured items, including chemicals and machinery in particular. The decomposition of trade by end use shows that approximately half of the bilateral trade is in intermediate goods. Household consumption goods represent 38 percent of India's exports to Canada and 26 percent of Canada's exports to India.

A comparison of their macroeconomic characteristics reveals that there are substantial obvious differences between the two countries, presented in the second panel of Table 1. India has a much larger labor force than Canada, saves more, and has agricultural land that is three times as large as Canada. In India, agricultural

[4]The OECD classifies industries based on R&D intensity and R&D embodied in intermediate and investment goods. For example, some of the high technology industries include aircrafts, computers, and televisions; medium-high technology industries are electrical machinery, motor vehicles, and chemicals; some of the medium-low technology industries are rubber, plastic, refined petroleum, minerals, and metals; and finally, some of the low-technology industries are textiles, wood, and paper products.

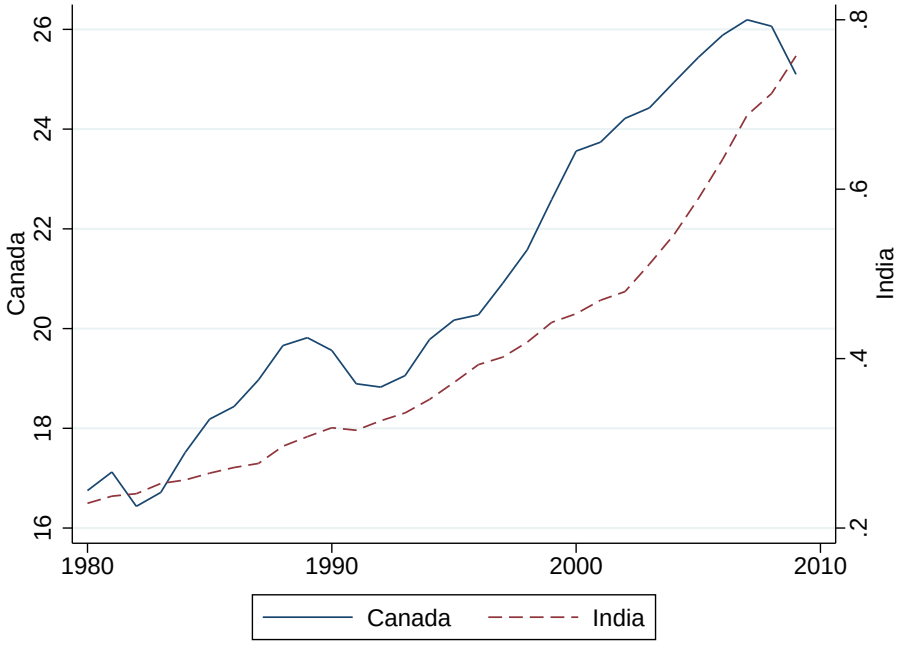
Table 1: Bilateral Trade and Macroeconomic Characteristics

	(1) India	(2) Canada
Decomposition of Bilateral Trade		
Total Bilateral Exports (millions of USD)	2,535	2,595
By Industry, % of exports		
Agriculture, Forestry and Fishing	3.46	25.10
Mining and Quarrying	0.43	6.25
Total Manufacturing	95.93	65.78
By Technology Intensity, % of exports		
High Technology Manufactures	9.47	10.72
Medium-High Technology Manufactures	25.11	33.95
Medium-Low Technology Manufactures	13.00	10.23
Low Technology Manufactures	48.34	10.87
By End Use, % of exports		
Intermediate Goods	48.9	51.9
Household Consumption	38.4	25.9
Capital Goods	4.2	13.9
Mixed end use	8.2	7.2
Macroeconomic Characteristics		
GDP Per Person (Current USD)	507	39,655
GDP Growth (5-year average)	7.67	1.16
Trade (% GDP)	54.49	63.56
Labor Force (millions)	472.62	19.00
Population (millions)	1,224.61	34.13
Gross Savings (% of GDP)	33.74	18.43
Current Account Balance (% of GDP)	-3.07	-3.13
Agricultural Land (sq. km.)	1.799,630	676,000
Agricultural Value Added per Worker	507.01	50,579.39
Agricultural Value Added (% of GDP)	17.78	1.91
Average Applied Tariff Rates	11.50	2.92

Notes: The data on bilateral trade are from the OECD STAN Database (2012). The trade data are shown for 2011. Column (1) represents India's exports to Canada, and column (2) represents Canada's exports to India. The data on their macroeconomic characteristics are from the World Development Indicators (2012). GDP growth shows the average growth between 2007 and 2011.

production constitutes a higher share of the economy (18 percent vs. 2 percent in Canada). Each agricultural worker produces about $507 in value added in India, but this number is about $50,579 per worker in Canada. This implies that agricultural production in India is more labor intensive, as it uses more labor per unit of production than Canada does, and labor is much less productive in India. The labor productivity in the agricultural sector is low even when compared to other sectors within India, with a productivity rate that is about one-third of the national average (Balasubramanyam, 2003). While India is abundant in land as well as labor, it is not a net exporter of agricultural products due to this low productivity. The trade patterns are generally such that Canada exports agricultural and medium-to-high technology manufacturing products to India, while India exports low-technology manufacturing products to Canada.

Figure 2: GDP Per Capita (thousands of USD)



Notes: The data are from the World Development Indicators (2012).

Figure 2 shows the GDP per capita starting from 1980. The figure indicates that there are significant level differences between the two countries, while the growth rates are both faster and more consistent in India than in Canada. Indian

growth rates did not suffer substantially from the financial crisis, nor did it suffer from the bust effects due to the decline in energy prices. The GDP per capita in India has increased exponentially since 2000, while Canadian GDP has followed a relatively linear trend with periods of slowdowns in each decade.

3 Impacts of a Free Trade Agreement

In countries with rigid factor markets, the general equilibrium model is not likely to yield accurate predictions, even in the long run, as the institutional framework often leads to frictions where capital, and especially labor, cannot allocate efficiently across sectors.[5] In addition, the high level of aggregation and the assumptions underlying the calibrated parameters make these models highly sensitive. Shafaeddin (2003, 2004) criticizes the GTAP model for these reasons, as it predicted that China's economic accession to the World Trade Organization would lead to a large trade deficit and employment loss for China, a result that was surprising at the time and found to be inaccurate in the long run.

This paper uses a simpler partial equilibrium model, which avoids the strong assumption of perfect factor mobility. The model also allows for the disaggregation of the impact of trade at a very detailed country and industry level, the decomposition of the impact with respect to the source of the new trade, and the estimation of the impact for each trading partner of each beneficiary country in the agreement. Partial equilibrium models are widely used to assess the impacts of trade liberalization or regional integration. Some examples are Hoekman et al. (2004) for agricultural tariffs, Sapir and Baldwin (1983) for the impact of the Tokyo round on India, Cernat et al. (2003) for the impact of EU's 'everything but arms initiative' on developing countries, and Datta and Kouliavtsev (2009) for the impact of NAFTA on textile trade.

The simulations used to produce the results of this study are based on the United Nations Conference on Trade and Development (UNCTAD) Trade Policy

[5]While the CET production function built into the GTAP model can be used to restrict intersectoral factor mobility, by default the model assumes that land is fixed and capital and labor are perfectly mobile across sectors.

Simulation Model.[6] This is an ex-anté partial equilibrium model which predicts the first-order impacts of trade liberalization between particular groups of countries, as in regional trade agreements, or between two specific countries, as proposed for the India-Canada trade agreement. This study covers all agricultural, manufacturing, and mining commodities.

The data for this paper are from the Trade Analysis and Information Systems (TRAINS) of the UNCTAD. The base year in this data was chosen as 2009, as this is the most recent year for which both countries have complete data. Given the level of detail involved in the TRAINS database, the next round of data may not be available before the current negotiations between Canada and India are completed. In addition, this is a good year for the analysis, as the trade volume was particularly low in 2009 due to an overall slowdown in global trade linked to the recent recession. Therefore, the results of this paper may be interpreted as the lower bound of what could be achieved through a free trade agreement.

3.1 The Effect on Bilateral Trade

The removal of tariffs, and the ad-valorem equivalent of non-tariff barriers, will lead to an increase in bilateral trade between the two countries. First, the demand for the imported commodity will increase due to the reduction in relative prices. Second, assuming that the products imported from different sources are imperfect substitutes, the differential price changes will lead to substitution between different varieties. Because the relative price of the beneficiary country will decrease due to the trade agreement, the demand for that country's variety will increase and the demand for other varieties will decrease. If there are no supply adjustments, the first-stage increase in demand determines the trade creation effect, while the substitution between different varieties determines the size and the direction of the trade diversion effect.

The trade creation effect of commodity i from country j to country k is given by:

[6]The World Integrated Trade Solutions (WITS) Global Tariff Cuts and Trade Simulator, and the Software for Market Analysis and Restrictions on Trade (SMART) model were used in this analysis. The Global Simulation Model (GSIM) model also provided very similar results due to having little to no impact on the world prices.

$$TC^i_{jk} = dM^i_{jk}\eta_m \frac{d\tau^i_{jk}}{1+\tau^i_{jk}} \tag{1}$$

where M^i_{jk} is the current level of imports, η_m is the import demand elasticity, dt^i_{jk} is the change in the tariff rate, and t^i_{jk} is the current tariff rate.

On the other hand, the trade diversion effect shows the portion of the increase in trade that replaces the imports from the non-beneficiary countries that would have taken place in the absence of a trade agreement. It is given as:

$$TD^i_{jk} = \frac{M^i_{jk}M^i_{j,-k}}{M^i_{jk}+M^i_{j,-k}}\sigma\frac{d\tau^i_{jk}}{\tau^i_{jk}} \tag{2}$$

where σ is the elasticity of substitution, $M^i_{j,-k}$ is the imports from countries other than k. The expression is positive for the beneficiary country k, as both σ and $d\tau^i_{jk}/(1+\tau^i_{jk})$ are negative. The last term enters the model through perfect pass-through of tariff rates onto the domestic prices.[7] The expression is therefore negative for non-beneficiary countries, as they will see an increase in their relative prices. The total trade effect for country k is then simply the summation of the trade creation and trade diversion effects:[8]

$$T^i_{jk} = TC^i_{jk} + TD^i_{jk} \tag{3}$$

The import demand elasticities are provided by UNCTAD, and the export supplies are assumed to be perfectly elastic. The latter assumption is made based on the low magnitude of trade relative to the domestic production of both countries, as well as their total trade.[9] This model is run for the scenario of total trade liberalization, where both India and Canada have reduced their tariffs, and the

[7] The tariff pass-through is documented to be less than unity in India (Ural Marchand, 2012). Relaxing the perfect pass-through assumption would require pass-though elasticities for each industry for both Canada and India, which are not available in the literature.

[8] The details of this model are provided in the Appendix and can also be found in Jammes and Olarrega (2005), Laird and Yeats (1986), and Sapir and Baldwin (1983).

[9] In order to test the importance of this assumption, the model was re-estimated using the export supply elasticities provided by Tokarick (2010). Using these elasticities, the trade effect is found to be approximately two percentage points lower for both countries. Note that these elasticities are with respect to the total export supply and may not necessarily hold for the bilateral trade between Canada and India. These results, as well as the main results at the 6-digit level of disaggregation are available upon request.

ad-valorem equivalent of their trade barriers from their current levels to zero. The results are aggregated by the 1-digit Standard International Trade Classification (SITC) and are presented in Table 2 for India and in Table 3 for Canada. The most affected trade partner within each industry group is found by evaluating equation 2 for the non-beneficiary partners, and by identifying the non-beneficiary country that experienced the highest loss of exports due to increase in its relative prices. Therefore, this shows the countries for which the trade diversion effect is equal to $min\{TD^i_{js}\}$ for each industry group where s is a non-beneficiary country. These results are provided in column (7) of Tables 2 and 3.

The composition and levels of the current average tariff rates, presented in the first column, show that India has a relatively more protectionist trade policy. The Indian average tariff rate applied to Canadian imports was 14.16 percent, whereas Canada's average tariff rate applied to Indian imports was only 2.86 percent. The tariff rates of India are particularly high for agricultural products such as food, beverages, and tobacco. The Canadian tariffs are highest for manufactured products, with an average rate of 12.58 percent. These are the commodities where the model identifies a significant potential for mutually beneficial bilateral trade, which is discussed in more detail below.

Currently, the Indian imports from Canada are valued at $2.275 billion and are concentrated in chemicals, food and live animals, and machinery and transport equipment. While the magnitude is smaller than what was presented in the previous section, as the data for this analysis are only available for 2009, the composition remains the same. According to the second column of Table 3, Canadian imports are concentrated in manufactured goods and the total value of these imports is $1.751 billion. About 27 percent of the total trade between the two countries are in chemicals, with 20 percent in manufacturing goods, 16 percent in machinery, and 15 percent in food and live animals. The structure of this trade, as well as the level of trade, is expected to change as a result of the trade agreement.

The results suggest that the impact of India's tariff removal is largely in the form of a trade creation effect rather than a trade diversion effect. A total value of $395 million of imports will be created and $196 million of imports will be diverted. Thus, two-thirds of the increase in imports can be considered as newly created trade. As the tariff rates in the food and the live animal industry are cur-

rently very high, the removal of all tariffs implies that the highest tariff reduction, and therefore the largest impact on trade, is observed in this industry. Specifically, $137 million dollars of new imports of food and live animals, $88 million of machinery and transport equipment, $75 million of chemicals, and $67 million of manufactured goods will be created as a result of the tariff removals by India.

Although it is smaller in magnitude, the trade diversion effect is also among the highest in the food and live animals industry, with $47 million per year of value diverted from the other trade partners of India and towards Canada. In addition, $47 million dollars of new imports of chemicals, $36 million of manufactured goods, $29 million of machinery and transport equipment, and $14 million of crude materials are diverted away from other trading partners and towards Canada.

In order to understand the source country of the trade diversion effect, the most affected partner for each industry is found as described above and presented in the last column. The results suggest that the U.S. is the most affected partner for the food and live animals industry. This means that the U.S. will experience the highest reduction in the exports of food and live animals to India. According to the disaggregated results (not reported), more than half of the total trade diversion effect in this industry is diverted away from the United States and towards Canada.[10] The U.S. is also the most affected trade partner of India for machinery and transport equipment, as well as for miscellaneous and manufactured articles, although the effect is more uniformly distributed across countries for these particular industries. Similarly, mineral fuel imports, which include petroleum and natural gas, are largely diverted away from China, making up 23 percent of the trade diversion effect. The United Kingdom is the most affected country for edible oil imports, and the Russian Federation is the most affected partner for chemical imports.

The trade creation and trade diversion effects lead to the total increase in Indian imports from Canada in column (5) and the percentage increase in imports in column (6). Clearly the largest effect is observed in the food and live animals industry, with a 34 percent increase in imports. While the beverage and tobacco

[10]To provide more detail for the first line of column (7), the top three most affected partners of India for food and live animal imports are the United States, Australia, and France, comprising 51, 23, and 18 percent of the trade diversion effect, respectively.

industry displays a higher percentage change, the bilateral trade in this industry is negligible. Trade in the machinery and transport equipment industry will increase by 22 percent, followed by manufactured goods with a 19 percent increase, and animal and vegetable oils with a 17 percent increase. Overall, the partial equilibrium impact of a total tariff removal by India is estimated to be a 26 percent increase in imports from Canada. The structure of imports will also change, as the post- agreement composition is more heavily weighted towards food and live animals and away from other industries.

What is the impact of the complete removal of Canadian tariffs? Because these tariff rates are currently on the order of only two percent, with the exception of manufactured goods, the impact is predicted to be smaller. Table 3 presents these results. Both the trade creation and trade diversion effects are prevalent in manufactured goods and in miscellaneous and manufactured articles. The total trade in these industries will increase by 55 percent and 120 percent, respectively. This is consistent with the literature that India has revealed a comparative advantage in textiles, clothing, and leather, which are included in the classification of manufacturing (Qureshi and Wan, 2008).

The most affected trade partner in terms of its exports to both Canada and India is China, comprising 17 percent and 30 percent of the trade diversion effect, respectively.[11] The disaggregated results (not shown) reveal that this increase will come mainly through textile imports from China, a country that has a comparative advantage in similar manufacturing products as India. United States is the second most affected partner, especially due to reduced exports of food and live animals. In other industries, while the United States is listed as the most affected trade partner, the magnitude and percentage share of this trade diversion is relatively small.

To summarize the results, a preferential trade agreement between India and Canada that involves the complete removal of tariffs by both countries will increase the value of trade among them by 20 percent. This prediction is lower than the prediction of the Government of Canada (2010), which estimated an increase of

[11]For manufactured goods, China is followed by the United States (8 percent) and Pakistan (3 percent). For miscellaneous and manufactured articles, China is followed by Bangladesh (6 percent) and the United States (4 percent).

Table 2: The Effect of India's Total Tariff Removal on the Amount Traded (millions of USD)

Industry	(1) Applied Tariff Rate	(2) Initial Imports	(3) Trade Creation	(4) Trade Diversion	(5) Total Effect	(6) % Increase in Imports	(7) Most Affected Trade Partner
Food and Live Animals	34.80	403.59	137.48	46.89	184.37	34.06	United States
Beverages and Tobacco	30.30	0.01	0.00	0.00	0.01	42.76	France
Crude Materials Except Fuels	13.89	267.53	14.58	13.63	28.20	5.45	Russian Federation
Mineral Fuels and Related Materials	9.59	7.12	0.28	0.46	0.75	3.99	China
Animal and Vegetable Oils	9.33	0.25	0.04	0.06	0.10	16.60	United Kingdom
Chemicals and Related Products	10.00	718.46	74.64	57.47	132.11	10.39	Russian Federation
Manufactured Goods	9.61	360.05	66.86	35.54	102.41	18.57	Korea, Rep.
Machinery and Transport Equipment	7.43	400.33	88.54	28.66	117.20	22.12	United States
Miscellaneous and Manufactured Articles	8.01	61.14	7.42	6.01	13.43	12.13	United States
Commodities and Other Transactions	8.65	56.59	5.26	7.67	12.93	9.29	U.A.E.
Total	14.16	2,275.07	395.11	196.41	591.52	26.00	

Notes: The results of the simulation analysis are presented. Column (7) indicates the country with the highest reduction in imports to India for each industry as a result of the increase in bilateral trade between Canada and India. For example, each year India will divert a total value of $46.89 million in food imports away from other countries and towards Canada, and the highest diversion will be from the United States. In addition, $137.48 million in new imports will be created, increasing food imports from Canada to India by 34.06 percent.

approximately 50 percent. The Indian simulations within the same report noted a 31 percent increase with tariff reductions, and a 35 percent increase once trade facilitation and productivity gains are incorporated. While these models are too complex to trace through and pinpoint the exact reasons for the discrepancy, the potential reason behind these high estimates is based on the assumptions of the models, particularly with respect to the macroeconomic adjustments within the economy such as for factor mobility. In addition, the supply side adjustments were not incorporated into the current paper, due to structural rigidities and the very small magnitude of bilateral trade compared to domestic production.

The sector-specific results suggest that most of this increase in trade will be in the form of exports from Canada to India, particularly food and live animals, chemicals, manufactured goods, and machinery. Approximately one-third of this increase in exports will be diverted away from other countries, especially from the United States, and one third would be diverted away from Indian producers. On the other hand, Indian exports to Canada will increase particularly in manufacturing products, half of which will be diverted away from other countries, while the other half will be newly created trade. Because manufacturing products, especially textile and apparel, are characterized as heterogenous goods, it is reasonable to deduce that different varieties of these goods will be imported, which will not have a substantial impact on Canadian producers. This is unlike the Indian imports of food products, which can replace domestic production. However, the size of this bilateral trade is quite small, and these impacts on domestic production are likely to be negligible.

3.2 The Effect on Other Trading Partners

In order to assess the total impact on non-beneficiary trading partners, the trade diversion effects across industries are aggregated by country as $TD_{.js} = \Sigma_i TD^i_{js}$, where $TD_{.js}$ is the total effect on the non-beneficiary partner s. The trading partners are then ranked according to the total trade diversion effect, $TD_{.js}$. The top twenty most affected partners of India and Canada are presented in Table 4, where columns (1) and (2) present the results for Canada's trade partners, and columns (3) and (4) present the results for India's trade partners.

Table 3: The Effect of Canada's Tariff Removal on the Amount Traded (millions of USD)

Industry	(1) Applied Tariff Rate	(2) Initial Imports	(3) Trade Creation	(4) Trade Diversion	(5) Total Effect	(6) % Increase in Imports	(7) Most Affected Trade Partner
Food and Live Animals	1.09	182.70	2.58	2.67	5.24	2.87	United States
Beverages and Tobacco	2.43	2.49	0.10	0.11	0.22	8.67	United States
Crude Materials Except Fuels	1.24	34.21	0.07	0.08	0.15	0.43	United States
Mineral Fuels and Related Materials	1.44	0.42	0.00	0.00	0.00	0.00	-
Animal and Vegetable Oils	1.43	8.75	0.05	0.06	0.11	1.29	United States
Chemicals and Related Products	5.08	365.54	3.41	3.38	6.79	1.86	United States
Manufactured Goods	12.58	437.73	33.88	21.39	55.28	12.63	China
Machinery and Transport Equipment	1.01	241.08	1.90	1.95	3.86	1.60	United States
Miscellaneous and Manufactured Articles	0.82	478.91	50.82	69.54	120.35	25.13	China
Commodities and Other Transactions	1.47	0.09	0.00	0.00	0.00	0.48	United States
Total	2.86	1,751.91	92.81	99.18	192.00	10.96	

Notes: The results of the simulation analysis are presented. Column (7) indicates the country with the highest reduction in imports to Canada for each industry as a result of the increase in bilateral trade between Canada and India. For example, each year Canada will divert a total value of $21.39 million in manufactured good imports away from other countries and towards Canada, and the highest diversion will be from China. In addition, $33.88 million in new imports will be created, increasing manufactured good imports from India to Canada by 12.63 percent

Table 4: The Trade Diversion Effect by Country (millions of USD)

	Canada's Partners			*India's Partners*	
	(1)	(2)		(3)	(4)
Country	Total Diverted (millions)	Share	Country	Total Diverted (millions)	Share
China	46.99	0.47	Russian Federation	43.85	0.22
United States	13.49	0.14	United States	38.14	0.19
Bangladesh	8.16	0.08	Belarus	14.90	0.08
Cambodia	2.76	0.03	Australia	11.54	0.06
Pakistan	2.67	0.03	France	11.44	0.06
Mexico	2.56	0.03	China	11.18	0.06
Italy	2.31	0.02	Korea, Rep.	8.69	0.04
Vietnam	2.28	0.02	U.A.E	8.56	0.04
Indonesia	1.55	0.02	Germany	6.34	0.03
Turkey	1.48	0.01	United Kingdom	5.63	0.03
Thailand	1.17	0.01	Belgium	4.37	0.02
Honduras	0.92	0.01	Singapore	4.28	0.02
United Kingdom	0.82	0.01	Japan	4.07	0.02
Portugal	0.63	0.01	Italy	3.59	0.02
France	0.60	0.01	Brazil	2.62	0.01
Germany	0.56	0.01	Sweden	2.45	0.01
Peru	0.54	0.01	Netherlands	2.40	0.01
Taiwan, China	0.52	0.01	Hong Kong, China	1.69	0.01
Sri Lanka	0.52	0.01	Finland	1.36	0.01
Philippines	0.46	0.00	Chile	0.97	0.00
Other Countries	8.20	0.08	Other Countries	8.36	0.04
Total	99.18		Total	196.41	

Notes: The results of the simulation analysis are presented for the top 20 most affected trade partners. The trade diversion effect is aggregated by the non- beneficiary trade partners of India and Canada.

According to Table 4, Canada will divert $47 million of trade from the United States, corresponding to 47 percent of the total trade diversion, and $13 million from China, corresponding to 14 percent of the total trade diverted towards Canada. This effect is mainly in the form of manufacturing imports from India that would have been imported from China or the U.S. in the absence of the trade agreement. The third country which is affected from the India-Canada trade agreement is Bangladesh, with an $8 million reduction in imports to Canada. The rest

of Canada's trade partners experience very small trade diversion effects.

India's most affected trade partner is the Russian Federation, with a $44 million reduction in its exports to India. The fact that more trade with Canada would be diverted from the Russian Federation is intuitive as both Canada and Russia are abundant in resources, and a large part of this diversion is in the chemicals and related products industry. It is followed in size by the United States, largely in the form of reduced food and live animal exports to India. The results suggest that Belarus is also one of the top countries to be affected, with almost the entire $14 million reduction in their exports occurring in the chemicals and related products industry.

Overall, China experiences the highest impact of the trade diversion effect due to an increase in trade between India and Canada. The total reduction in the value of Chinese exports is $58 million. It is followed by the United States, with a $52 million reduction in exports, and the Russian Federation, with a $44 million reduction in exports.

3.3 The Effect on Welfare

The final component of the model presented in this paper is the effect on welfare. Assuming quasi-linear preferences, the second-order Taylor approximation of the indirect utility function yields the well-known expression for the welfare effect of a change in tariffs:

$$dW^i_{jk} = (0.5)dt^i_{jk}dTC^i_{jk} \tag{4}$$

where dW^i_{jk} is the net welfare gain for country j due to the reduction of tariffs it applies to country k for commodity i. This definition of welfare is the increase in a country's imports, given by the trade creation effect, multiplied by the reduction in average tariffs across all trade partners.

The results are presented in Table 5. In the post-agreement period, India's overall average tariff rates are reduced by 0.19 percentage points, from 20.07 percent to 19.88 percent. The corresponding welfare gain was $64 million, where more than half of this amount is in the food and live animals industry. Because India is importing more agricultural products overall, the domestic price is reduced, lead-

ing to a large consumer surplus increase in this industry. Indian consumers also experience significant gains in the chemical, manufactured goods, and machinery and transport equipment industries.

Table 5: Welfare Impact of Trade Liberalization

	India			*Canada*		
	(1)	(2)	(3)	(4)	(5)	(6)
	Initial Tariffs	Post Tariffs	Welfare Effect	Initial Tariffs	Post Tariffs	Welfare Effect
Food and Live Animals	30.4	29.59	37,641.92	0.67	0.64	39.76
Beverages and Tobacco	91.44	91.43	3.33	1.23	1.23	3.40
Crude Materials Except Fuels	11.11	10.76	897.68	0.14	0.13	0.56
Mineral Fuels and Related Materials	6.45	6.43	13.26	0.14	0.14	0.00
Animal and Vegetable Oils	15.78	15.46	9.82	0.93	0.92	1.55
Chemicals and Related Products	8.51	8.43	10,908.44	0.6	0.58	59.05
Manufactured Goods	8.74	8.65	5,454.46	1.83	1.68	2,376.02
Machinery and Transport Equipment	9.17	9.06	7,842.24	0.48	0.48	28.97
Miscellaneous and Manufactured Articles	9.09	9.01	634.04	5.42	5.13	5,418.95
Commodities and Other Transactions	10	9.98	522.36	0.09	0.09	0.00
Average	20.07	19.88		1.15	1.10	
Total			63,927.56			7,928.27

Notes: The welfare effect is presented in thousands of USD. Average tariff rates are the averages across all trading partners weighted by their respective import shares.

In Canada, the average tariffs are reduced by 0.05 percentage points, from 1.15 percent to 1.10 percent. The largest welfare gain was experienced in the manufactured goods and miscellaneous and manufactured articles industries. This is consistent with Table 3, which showed that most of the trade creation effect is experienced by these industries. This is due to the high initial tariff rate in this industry, as well as the fact that the tariff reduction generates some comparative advantage for India over China by reducing the cost of trade. Overall, the Canadian welfare gain is valued at $8 million.

The definition of welfare used in the current study differs from the Government of Canada (2010) definition, which predicted a 0.41 percent welfare gain for Canada. The current model focuses on the demand side only, assuming that export supply is perfectly elastic. There are therefore no gains on the production

side, and the welfare gain here only reflects gains in consumer surplus. Second, the economy-wide adjustments in terms of factor reallocations are assumed to be minimal or insignificant, as previously discussed. These assumptions were made due to the low magnitude of bilateral trade relative to domestic production, and the rigidities in factor markets in the Indian economy.

4 Conclusion

The comprehensive economic partnership agreement which is presently being negotiated between Canada and India has mainly focused on the liberalization of trade between the two countries. Whether or not large benefits to either country should be expected from this agreement remains an open question. Currently, both India and Canada constitute a very small share of total trade for one another, which may be a result of geographical factors, such as the distance between the two countries affecting trade costs. The impact of a preferential trade agreement on bilateral trade will then depend on the extent to which the cost advantage generated by the removal of trade barriers can overcome this intrinsic disadvantage due to the large trade costs. Even if the cost reductions are substantial, the amount of trade generated depends on the complementarity of the comparative advantages between the two countries.

The current paper uses a global ex-anté trade simulation model, in particular a partial equilibrium model, in order to predict the likely impacts of the complete removal of all bilateral trade barriers. The model used in this paper treats one industry at a time, and by doing so, it can predict the impacts at a very detailed level, more specifically at the 6-digit industry level of disaggregation for each of the beneficial and non-beneficial countries. In addition, this model allows for the decomposition of the increase in imports into newly created trade and trade that is diverted away from other partners, thereby identifies of the source of this diversion for each commodity.

The results show that the value of bilateral trade would increase moderately from the proposed agreement, by approximately twenty percent. Canada's exports to India would increase by $592 million in value per year, which is an overall increase of twenty-six percent, with approximately one-third of this amount being

diverted away from other countries. The largest increase in Canada's exports to India comes in the form of agricultural products and mineral fuels, while the largest increase of India's exports to Canada is in manufacturing products. The results also indicate that the most affected trading partners of the two countries are China, the Russian Federation, and the United States.

The general equilibrium model used by the Government of Canada (2010) predicts substantial gains from the agreement, as high as a fifty percent increase in bilateral trade. Their model takes into account the economy-wide effects and efficiency gains through reallocations between sectors. It further predicts that this trade would increase symmetrically, implying that Indian exports would increase as much as Canadian exports. This is unlikely to be the case for two reasons. First, the current level of tariffs is much higher in India relative to Canada. Therefore, the total removal of tariffs corresponds to a larger percentage reduction in the tariffs for India, which should lead to a larger increase in Indian imports. Second, significant output impacts are not expected, as the current amount of trade between the two countries is quite low compared with the domestic economy. In addition, the Indian economy is characterized by its rigid factor markets, which would make any supply-side adjustments less likely. Therefore, the impact of trade liberalization on the amount traded is likely to be lower.

On the other hand, the results presented in the current paper can be considered as a lower bound, as the impact may be higher for several reasons. First, the model does not account for any productivity gains, which could be important if the increased trade leads to the adoption of more efficient technologies. In addition, the data for bilateral trade in services are not incorporated into the results of this study. This is expected to have an additional impact on the trade volume, as India is a large exporter of services, accounting for four percent of exports in this industry worldwide. Secondly, both this model and the general equilibrium model assume that all traded goods are final goods. The increased trade in intermediate goods, however, would introduce further gains for both countries by reducing production costs regardless of the target consumer of the final product.

An important point to keep it mind is that the perfect pass-through of tariff rates onto domestic prices is a very strong assumption, which will likely not hold in India where the local markets are not highly integrated with each other, and there

are substantial price differences between inland and coastal states. In addition, the domestic prices of agricultural commodities are highly regulated in India, which may restrict the extent to which Canada will be able to gain some cost advantage in this sector.

In conclusion, an economic partnership between Canada and India that involves free and unrestricted trade will strengthen the trade relationship between the two countries. However, the increase in bilateral trade associated with the trade liberalization is expected to be moderate. While the removal of trade barriers may not be adequate to generate substantial gains, other aspects of economic integration may be important. The liberalization of investment that establishes strongly linked supply chains between the two countries is likely to increase this impact, as it is expected to lead to efficiency gains and higher trade volume by vertically integrated companies in both Canada and India.

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A Appendix

This section presents the derivation of the trade effects. The details of this model are from Jammes and Olarrega (2005), Laird and Yeats (1986), and the World Trade Organization (2012), and follows the standard terms and definitions of trade simulations. The demand for imports of country j from country k for commodity i depends on the domestic price, the foreign price, and the income in the importing country. It can be written as $M^i_{jk} = F(Y_j, p^i_j, p^i_k)$. The export supply of the exporting country is given by $X^i_{kj} = F(p^i_{kj})$.

The pricing equation is given by $p^i_{jk} = p^i_{kj}(1 + t^i_{jk})$, where p^i_{jk} is the domestic price and p^i_{kj} is the price in the exporting country. The total differentiation of the pricing equation reveals:

$$dp^i_{jk} = p^i_{kj} d\tau^i_{jk} + (1 + \tau^i_{jk}) dp^i_{kj} \tag{A.1}$$

This expression can be modified by noting that the elasticity of import demand with respect to the domestic price is given by:

$$\frac{dM^i_{jk}}{M^i_{jk}} = \eta_m \frac{dp^i_{jk}}{p^i_{jk}} \tag{A.2}$$

Substituting for dp^i_{jk} and recognizing that $p^i_{kj} = p^i_{jk}/(1+\tau^i_{jk})$, the following expression can be obtained:

$$\frac{dM^i_{jk}}{M^i_{jk}} = \eta_m \left(\frac{d\tau^i_{jk}}{1+\tau^i_{jk}} + \frac{dp^i_{jk}}{p^i_{jk}} \right) \tag{A.3}$$

The elasticity of export supply can be written as:

$$\frac{dp^i_{kj}}{p^i_{kj}} = \frac{1}{\eta_x} \frac{dX^i_{kj}}{X^i_{kj}} \tag{A.4}$$

Substituting this into equation A.3, assuming a perfectly elastic export supply, and equalizing imports and exports, the trade creation effect can be written as the increase in imports due to the tariff change:

$$TC^i_{jk} = dM^i_{jk} \eta_m \frac{d\tau^i_{jk}}{1+\tau^i_{jk}} \tag{A.5}$$

The changes in the domestic price of commodity i will lead to changes in relative prices and changes in imports from non-beneficiary trade partner s. In the first step, the relative price of country k (beneficiary partner) relative to country s will decrease as a response to the tariff reduction, given by:

$$\frac{dp^i_{js}}{p^i_{js}} = -\frac{d\tau^i_{j,-s}}{1+\tau^i_{j,-s}} \tag{A.6}$$

where $\tau^i_{j,-s}$ is the average tariff applied to countries other than s. Because one country in the set of $-s$ is receiving a tariff reduction, the $d\tau^i_{j,-s}$ is thus negative, and the relative price of country s increases. The trade diversion effect depends on this increase in relative prices, the initial level of imports for each country, and the elasticity of substitution between the two sources. The diversion effect for country s is given by:

$$TD^i_{js} = \frac{M^i_{js} M^i_{j,-s} \frac{dp^i_{js}}{p^i_{js}} \sigma}{M^i_{js} + M^i_{j,-s} + M^i_{js} \frac{dp^i_{js}}{p^i_{js}} \sigma} \tag{A.7}$$

where σ is the elasticity of substitution between k's and s's varieties, and $M^i_{j,-s}$ is the total imports from countries other than s. Re-aaranging A.7 yields:

$$TD^i_{js} = \frac{M^i_{js} M^i_{j,-s}}{M^i_{js} + M^i_{j,-s}} \sigma \frac{dp^i_{js}}{p^i_{js}} \tag{A.8}$$

where A.6 can be substituted into above for dp^i_{js}/p^i_{js} .

The trade diversion effect for the beneficiary country k is straightforward. Assuming perfect pass-through, dp^i_{jk}/p^i_{jk} is equivalent to $d\tau^i_{jk}/\tau^i_{jk}$, implying that the relative price will decrease for country k. This will lead to an increase in demand given by the elasticity of substitution. An additional constraint built into the model assures that the sum of trade diversion across all s does not exceed the trade diversion for k in absolute value. Thus, A.8 is positive for k, and negative for each s, indicating the magnitude and the source of the diversion.