Strategic Trade Liberalization*

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Abstract

We analyze strategic trade policy within a WTO compliant framework. Countries are assumed to select an FTA partner by comparing the domestic welfare implications of each potential agreement. First, we evaluate theoretically the features of import demand and domestic supply that can produce heterogeneous effects for different FTAs. In particular, we show how the pass-through of tariff reductions and ease of substitution between imports and domestically produced goods depend on the underlying demand parameters. Second, we compute domestic welfare effects using counterfactual simulations of alternative FTAs between Canada and either South Korea, Japan, or the E.U., focusing solely on the automotive sector. Third, we develop a simplified methodology to calculate comparable effects for all major importing sectors using only trade information. Applied to the Canadian case, we find that to rationalize the choice of Korea as first negotiation partner, the Canadian government must have placed a disproportionate weight on domestic producer surplus or a disproportionate weight on low-income households in consumer surplus.

JEL Codes: F1, F6, L1

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1 Introduction

During the 1980s, international economics literature witnessed a flurry of studies on exploiting strategic interaction between firms in the oligopoly framework for 'strategic trade policies' that shift profits (rents) from foreign firms to boost national welfare. Brander and Spencer (1984a) demonstrate that imposing a tariff protection to attract rents from imperfect competitive foreign firms is usually welfare improving from the perspective of the domestic country. The (partial) noncooperative trade policy equilibria depend crucially on model settings, e.g. specific or ad valorem tariff, competition behavior of Cournot or Bertrand, homogeneous or differentiated products, entry barrier or free entry, and so on[1] (see Brander and Spencer (1984b), Brander and Krugman (1983), Eaton and Grossman (1986), and Brander (1995)).

After a rapid development, 'strategic trade policy' literature quickly confronted two important drawbacks. First, the advocated policy had strong 'beggar-thy-neighbor' effect that the domestic welfare gains at the expense of other countries. The likely retaliation provoked in which more than one countries intervene trade may lead to a Prisoner's Dilemma that everyone is worse off than the cooperative Nash equilibrium of no intervention. Second, World Trade Organization (WTO) agreements do not allow the member countries to impose new import tariffs or export subsidies to shift rents. Under most-favoured-nation (MFN) principle countries can not discriminate between their trading partners. A crucial alternative tool of trade policy that effectively discriminates between members within WTO rule book is the possibility to start a Regional Trade Agreement (RTA), such as a Free Trade Agreement (FTA).[2] Paraphrasing Article XXIV of GATT, FTAs are allowed if (i) trade restrictions imposed on other WTO members do not increase and (ii) restrictions on 'substantially all trade' between FTA partners are eliminated.[3] Doha round of multilateral trade negotiations stagnated after significant and broad-based tariff reductions achieved in Uruguay round. More and more countries start pursuing bilateral trade deals.

Instead of investigating optimal trade tariffs or subsidies, new research question becomes: which partner to pick for a FTA? We analyze 'strategic trade liberalization' to exploit strategic interaction between firms in oligopolistic industries for choosing the favorite trade partner to eliminate all bilateral import tariffs. It limits the possible retaliation and dispute within a WTO compliant framework. Our underlying political economy model is that government is

[1] Similar to applications of game theory in the field of industrial organization, the optimal trade policy turns out to be highly sensitive to specific modeling assumptions and parameter choices.

[2] As of November 15, 2011, WTO reports that it has been notified of 505 intended RTAs, covering goods and/or services, and that 212 physical RTAs are already in effect. 90% of these are Free Trade Agreements. The statistics are from WTO website: http://www.wto.org/english/tratop_e/region_e/region_e.htm.

[3] In our analysis, we will simplify this and assume that when a FTA is formed, tariffs with the rest of the world do not change and all tariffs between the contracting parties are eliminated.

maximizing national welfare, but focuses only on domestic markets. Opposite to Brander and Spencer (1984a), domestic welfare could be reduced by a cut in tariffs, but this can be minimized by picking the 'right' FTA.

In the current 212 FTAs or similar RTAs in effect, industrialized countries, appear to be more eager to form a FTA with Korea than with Japan in Asia, and to form a FTA with Mexico than with Canada in North America.[4] For instance, Canada initiated FTA negotiations with Korea in 2005 before Economic Partnership Agreement (EPA) negotiation with Japan started in 2012. Similarly, the E.U. signed FTA with Mexico in 1997 rather than with Canada. To investigate the economic rationale behind, in this paper we compare Canadian welfare effects of potential FTAs with Korea, Japan, E.U. and China respectively.[5]

We first evaluate theoretically the features of import demand and domestic supply that can produce heterogeneous effects for different FTAs. Our argument is motivated by endogenous pricing behavior and asymmetric competition in oligopoly models. We do not focus on the capture of economic rents, but on the sources of asymmetries on the import side of differentiated products. First, endogenous price setting leads to differential pass-through rates of tariff reduction. This determines which fraction of lost tariff revenue for the government is re-captured by domestic consumers in the form of lower prices. Agreements where consumers receive most of this lost revenue back are more likely to gather support in decision making. Second, market segmentation and composition of imports naturally lead to different competitive effect on domestic production. The producers that are close substitutes to the importers from where trade is liberalized tend to suffer most in the losses of market shares and accompanying profits. Agreements where most of these losses fall on importers from other trading partners rather than on domestic producers are again more likely to gather support.

We then conduct empirically the counterfactual simulations to recover full domestic welfare effects of alternative FTAs between Canada and either South Korea, Japan, or the E.U., solely on the automotive sector, taking into account imported components in domestic production and consumer heterogeneity. Impact on domestic producers will be mitigated if they import intermediate inputs that also benefit from FTA. Introducing heterogeneous consumers in demand can decompose the support on agreements across population. Agreements where more population, especially the poor, are in favor rather than those where small rich groups are disproportionately beneficial are more likely to gather support by the benevolent policy makers averse to income inequality.

Finally, we develop a simplified methodology to estimate comparable effects from observed

[4]See Table A.1 in Appendix for all the agreements that Korea and Japan have already entered into or that they are negotiating.

[5]In contrast to the other industrialized countries such as the U.S., Canadian government could be less influenced by interest groups or other political diplomacy pressures.

equilibrium for all major importing sectors. It uses only trade flow information and does not compute simulated (general or partial) equilibrium. Without the data of domestic substitution, we simply ignore the effects of consumer surplus and imported inputs associated with domestic products but focus on the dominant welfare effects, i.e. domestic profit loss and incomplete tariff pass-through of foreign imports that benefit from FTA.

The results suggest that countries prefer the trade partners that have high price-through of tariff reduction and specialize in sectors with high demand elasticities to maximize the price benefits of domestic consumers, and the trade partners that have weak substitution with domestic products and specialize in sectors with high import penetration to limit the domestic profit loss. To rationalize the observed preference of liberalization, Canadian policy makers must prioritize the concerns about domestic production or income inequality in choosing FTAs.

The standard tool to evaluate ex ante the effects of FTAs in the past three decades is computable general equilibrium (CGE) models of trade, such as GTAP (Urata and Kiyota, 2003) and new Michigan model (Brown et al., 2005). Since the worldwide tariff protections have dropped to a fairly low level after Uruguay round of multilateral negotiation, one single FTA might have negligible impacts on income and factor prices such that the trade policy effects can be studied within each single industry. We model tariff cut as reduction of marginal costs for chosen products that leads to new market equilibria, taking into account the impact on supply chains and consumer differentials in income elasticity of demand.

Our analyses offer an alternative economic intuition on the fact that some countries have been a lot more active than the others in signing FTAs, other than the literature that compared trade strategies of countries in a political view. Ravenhill (2010) indicates that Korea has clear and ambitious road map to eliminate goods tariff with trading partners while Japan stressed comprehensive partnership in a wider scope including services, trade facilitation and investments. Consistent with Rodrik (1995) who illustrated the importance of producer surplus relative to consumer surplus in political debate, we argue that strategic trade liberalization selection is likely to imply government's disproportionate weights within and between consumer and producer surpluses.

This paper is related to literatures that investigate welfare effects of trade policies. Berry et al. (1999) illustrate that Voluntary Export Restraints (VER) on the automotive exportation from Japan to the U.S. during the 1980s has raised total U.S. economic welfare. The domestic producer surplus increased significantly, mainly at the expense of domestic consumer welfare, while the profits of Japanese firms were less affected. Friberg and Ganslandt (2003) evaluate the domestic welfare effects of Swedish bottled water imports and find that pro-competition effect offsets transport cost losses in two-way trade for this particular market of goods close to homogeneous. In this case, trade is motivated mainly from more varieties.

We compute counterfactual simulation of FTAs from existing markets of differentiated good. Using a similar discrete choice model of demand and a model of oligopoly and product differentiation on the supply side, Irwin and Pavcnik (2004) assess the impact of US-EU agreement on limiting subsidiaries in civil aircraft and simulate market outcome of A-380 introduction. Goldberg (1998) examined the reduction of fuel consumption and shift between domestic and imported products by Corporate Average Fuel Economy Standards in U.S. car industry. However, we do not take into account possible consequences on varieties, productivity and foreign direct investment (FDI) decision although those potential impacts of trade liberalization could also play important roles in strategically choosing FTA partners. Lileeva and Trefler (2010) and Konings and Vandenbussche (2008) suggest positive effects of tariff reduction and antidumping protection on firm-level productivity. Response of firms is heterogeneous. In the literature taking into account intermediate inputs, Goldberg et al. (2010) indicate that lower import tariffs beget more import varieties and more new products. Amiti and Konings (2007) show that fall in import tariff leads to more productivity gains than the gains of reducing output tariffs. Interaction between FTA and FDI depends on the motives for FDI of Multinational Enterprises (MNEs). Horizontal FDI that seeks access to local or regional markets usually rises as trade costs increase (Markusen (1984), Markusen and Venables (1998)). Vertical FDI that takes advantage of low cost structure rises as trade costs decrease (Helpman, 1984). Consequently, FTA has negative impact on horizontal FDI but positive on vertical FDI.

The rest of this paper is organized as follows. The next section illustrates a theoretical framework to estimate welfare effects of ad valorem tariff reduction in oligopoly model. In section 3, we give a snapshot on the import protectionism in Canada. In section 4 we perform counterfactual simulations for a range of possible FTAs in Canadian automotive market. Section 5 extends the methodology to all major importable sectors using trade flow data. We discuss the implication on North-South FTA in section 6 and conclude in section 7.

2 Theoretical framework

In order to evaluate the welfare effect of a FTA, we first define a domestic welfare function. Here we assume a simple oligopoly model for differentiated goods. Consider firm 1 as the domestic producer, firm 2 as the producer of a foreign country from where an ad valorem import tariff τ_2 is to be abolished, and firm 3 as the non-beneficial foreign producer with an unchanged ad valorem tariff τ_3. Firms are strategically choosing prices, p_1, p_2 and p_3, and have constant marginal costs, c_1, c_2 and c_3, in production.

National welfare in the domestic market aggregates equally-weighted domestic firm's profit

π_1, consumer surplus CS and tariff revenue of government TR:

$$\begin{aligned} W &= \pi_1(p_1,p_2,p_3) + CS(p_1,p_2,p_3) + TR(p_1,p_2,p_3) \\ &= (p_1-c_1)q_1(p_1,p_2,p_3) + CS(p_1,p_2,p_3) + \tau_2\frac{p_2}{1+\tau_2}q_2(p_1,p_2,p_3) + \tau_3\frac{p_3}{1+\tau_3}q_3(p_1,p_2,p_3) \end{aligned}$$

where consumer surplus $CS(p_1,p_2,p_3) = \frac{V(p_1,p_2,p_3)}{\alpha}$ with indirect utility $V(p_1,p_2,p_3)$ and marginal utility of income α.

In this theoretical framework, we simply put an equal weight on both producer profit and consumer surplus. However, in reality policy makers could attach disproportionate importance to domestic production or surplus gains of selective consumers, which will be discussed in the empirical section of comparing simulated Canadian FTAs to rationalize the observed preference.

Producer surplus in export markets is not included based on three concerns. First, opposition to free trade of domestic industries is often the biggest obstacle and outweighs concerns for export benefits in political debates (Rodrik, 1995). Second, gains on export markets are likely to vary when the trade partners sign new FTAs with other competing countries. Third, export creation by FTA could be constrained by other policy instruments. Kohpaiboon (2010) found that export increase after FTA was very limited and concentrated on a small range of goods in Thai manufacturing due to the rules of origin that determines the product origin as the country where last substantial transformation took place instead of the importing country..

2.1 Full welfare effects of FTA in domestic market

Prices can be written as functions of τ_2 in view of the price interaction of all market participants in response to the tariff reduction for firm 2. Using firm 1's first order condition in profit maximization and applying Roy's identity $q_i = -\frac{\partial CS}{\partial p_i}$ in consumer's surplus, we obtain the domestic welfare effect of the FTA that eliminates import tariff τ_2 by three components:

$$\begin{aligned} dW &= \int_{\tau_2}^{0}(\frac{\partial \pi_1}{\partial \tau_2} + \frac{\partial CS}{\partial \tau_2} + \frac{\partial TR}{\partial \tau_2})d\tau_2 \\ &= \int_0^{\tau_2}(q_1p_1\frac{\eta_{12}}{\eta_{11}}\frac{\rho_2}{1+\tau_2} + q_1p_1\frac{\eta_{13}}{\eta_{11}}\frac{\rho_3}{1+\tau_2})d\tau_2 \qquad [PS] \\ &+ \int_0^{\tau_2}(q_1p_1\frac{\rho_1}{1+\tau_2} + q_2p_2\frac{\rho_2}{1+\tau_2} + q_3p_3\frac{\rho_3}{1+\tau_2})d\tau_2 \qquad [CS] \\ &- \frac{\tau_2}{1+\tau_2}q_2p_2 - \frac{\tau_3}{1+\tau_3}\int_0^{\tau_2} q_3p_3\left[\eta_{31}\frac{\rho_1}{1+\tau_2} + \eta_{32}\frac{\rho_2}{1+\tau_2} + (1+\eta_{33})\frac{\rho_3}{1+\tau_2}\right]d\tau_2 \qquad [TR] \end{aligned}$$

where $\eta_{ij} = \frac{\partial q_i}{\partial p_j}\frac{p_j}{q_i}$ are the price elasticities with $i,j \in \{1,2,3\}$. ρ_i are the marginal cost pass-through elasticities of prices.[6] Direct pass-through ρ_2 indicates the fraction of tariff reduction

[6]Let pass-through function be

$$p_2(\tau_2) \equiv \overline{p}_2(\underbrace{(1+\tau_2)c_2}_{c_2^*})$$

reflected in the final price of product 2.

$$\begin{aligned}\rho_1 &= \frac{\partial p_1}{\partial \tau_2}\frac{1+\tau_2}{p_1}\\ \rho_2 &= \frac{\partial p_2}{\partial \tau_2}\frac{1+\tau_2}{p_2}\\ \rho_3 &= \frac{\partial p_3}{\partial \tau_2}\frac{1+\tau_2}{p_3}\end{aligned}$$

The first component in home welfare effect of a FTA is negative as domestic profits go down especially if there is a low import penetration (large $q_1 p_1$) and a big pass-through ρ_2 and if domestic firms are close substitutes (high cross-product elasticity η_{12}). The positive terms in the second component are the increase of consumer surplus from prices reduction passed on to domestic consumers especially when the direct- and cross- pass-through (ρ_2, ρ_1 and ρ_3) are large. The last component is the loss of government tariff revenue. Tariff imposed on product 2 is entirely eliminated while the revenue impact of importables from the third country is relatively small and depends on the existing tariff protection and demand elasticities of product 3.

In section 4, we examine all these parameters and calculate counterfactual domestic profits and consumer surplus in FTA simulations for Canadian automotive market. The counterfactual analysis that estimates the impact of alternative FTAs consists of 3 ingredients. First, we infer the underlying marginal cost for each car model with the estimated demand assuming the observed price is the Bertrand-Nash equilibrium. Second, each alternative FTA simulation that eliminates ad valorem tariff τ_i scales uncovered marginal cost by $\frac{1}{1+\tau_i}$ for the imported products from the specific country i.[7] Marginal costs of domestic producers fall only if they import intermediate inputs from country i. Third, firms' price interactions lead to a new Bertrand-Nash equilibrium such that no firm is able to increase its profit by unilaterally changing its price. The differences between the simulated and actual welfare, $\pi_1|_{\tau_2}^0 + CS|_{\tau_2}^0 + TR|_{\tau_2}^0$, reveal the total welfare impact in domestic market.

Ignoring export benefits in political economy analysis is extraneous for Canadian automotive industry as Canadian-made cars are mainly exported to the countries in North America and have negligible market shares in Korea, Japan or Europe. It is more natural for policy makers to evaluate consumer surplus gains for different groups of population in domestic markets.

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so that

$$\frac{\partial p_2}{\partial \tau_2} = \frac{\partial \overline{p}_2}{\partial c_2^*} c_2$$

Starting from the usual definition of pass-through elasticity we can get

$$\rho_2 = \frac{\partial \overline{p}_2}{\partial c_2^*}\frac{c_2^*}{p_2} = \frac{\partial \overline{p}_2}{\partial c_2^*}\frac{(1+\tau_2)c_2}{p_2} = \frac{\partial p_2}{\partial \tau_2}\frac{1+\tau_2}{p_2}$$

Similarly for ρ_1 and ρ_3.

[7] First order condition of firm 2's profit maximization gives $p_2(1+\frac{1}{\eta_2}) = (1+\tau_2)c_2$. Similar to exchange rate pass-through, ad valorem tariff removal is scaling marginal cost by $\frac{1}{1+\tau_2}$ or reducing a percentage of $\frac{\tau_2}{1+\tau_2}$.

We introduce price heterogeneity following an empirical income distribution. Total consumer's surplus CS turns into the aggregate of the individual surplus $\sum_{h=1}^{H} CS_h$, where $h = 1, ..., H$ represents each household with distinct income elasticity of demand. This leads to a more flexible elasticity pattern and allows us to strip total consumer's surplus to provide more political economy concerns. We specify an individualistic social welfare function incorporating the relative worthiness of each individual's welfare in society. Policy makers could impose distinct weights on individual consumer's surplus for appropriate degree of inequality aversion.

2.2 Welfare effects of FTA by product

First order approximation can further restructure the welfare effects by three types of product:

$$
\begin{aligned}
dW \approx & \frac{\tau_2 q_1 p_1}{1+\tau_2}\left(\frac{\eta_{12}}{\eta_{11}}\rho_2 + \frac{\eta_{13}}{\eta_{11}}\rho_3 + \rho_1\right) && [Prod1] \\
& - \frac{\tau_2 q_2 p_2}{1+\tau_2}(1-\rho_2) && [Prod2] \\
& + \frac{\tau_2 q_3 p_3}{1+\tau_2}\left[\rho_3 - \frac{\tau_3}{1+\tau_3}\left(\eta_{31}\rho_1 + \eta_{32}\rho_2 + (1+\eta_{33})\rho_3\right)\right] && [Prod3]
\end{aligned}
$$

The first row is the net of profit decline and consumer surplus gain for domestic products.[8] The second row combines the consumer surplus gain on FTA-beneficial products and the loss of tariff revenue as the proportion of tariff reduction that foreign firms are keeping in profit margin instead of passing on to domestic consumers. The last term aggregates the cross-product price pass-through and tariff revenue change associated with the other imported products that are not directly affected by the FTA.

Cross-product elasticity and price change of one single rival product under FTA are negligible if the market is fragmented.[9] Beneficial imports have significant price decline passed through by the tariff elimination. The other firms usually also lower somehow their prices to suppress the impact on sales. But the reduction must be limited as their marginal costs do not alter. Therefore, the dominant term for product 1 is the domestic profit loss directly affected by the business stealing from product 2. Large domestic production ($q_1 p_1$), substitution between domestic and FTA-beneficial imports (η_{12}) and direct pass-through (ρ_2) give rise to a more negative impact on domestic producers.

Following Feenstra et al. (1996), we can differentiate first order condition of single firm's profit maximization and express direct pass-through as $\rho_2 = 1 + \frac{1+\tau_2}{\eta_{22}(\eta_{22}+1)}\frac{d\eta_{22}}{d\tau_2}$. If elasticity of

[8] The domestic welfare impact associated with product 1 is positive if $\eta_{12}\rho_2 + \eta_{13}\rho_3 + \eta_{11}\rho_1 < 0$.

[9] Using a simple logit model of demand as an example in a duopoly model, we can obtain $\frac{\partial p_2}{\partial \tau_2} = \frac{-(\eta_{22}+1)}{\alpha(1-s_1 s_2)(1+\tau_2)}$ and $\frac{\partial p_1}{\partial \tau_2} = \frac{-s_1(\eta_{22}+1)}{\alpha(1-s_1 s_2)(1+\tau_2)}$ where s_1 and s_2 are market shares of two products. Rival product price change can be ignored, i.e. $\rho_1 \approx 0$, when its market share is very small. And pass-through ratio simplifies as $\rho_2 = \frac{\eta_{22}+1}{\eta_{22}+1-\varepsilon_2}$ ($\frac{\eta_{22}}{\eta_{22}+1-\varepsilon_2}$ for specific tariff pass-through) with price elasticity of elasticity $\varepsilon_2 = \frac{\partial \eta_{22}}{\partial p_2}\frac{p_2}{\eta_{22}}$.

demand in absolute value is increasing in price as many realistic demand models demonstrate, direct pass-through of tariff revenue reduction to consumers is incomplete, i.e. $\rho_2 < 1$, because tariff reduction lowers prices.[10] Therefore, aggregate welfare effect on product 2 is usually negative as FTA-beneficial firms will not pass all the tariff reduction on to domestic consumers in the form of lower prices. A high ρ_2 is preferable as domestic consumers benefit more from larger price reduction. Notice that ρ_2 works in different directions for the first and second product. More price reduction will mitigate the incomplete pass-through but deteriorate domestic profit loss.[11]

τ_3 is zero when the third country already has a FTA with the domestic country and otherwise equals τ_2 in the framework of WTO. In the case of Canada, imports from the U.S. are already duty free. For the other WTO countries without a FTA with Canada, the average tariff protection for major importable sectors is quite low at about 5%. In spite of the limited price reduction ρ_3 and tariff revenue variation on rival import products, we retain this component as non-beneficial imports could account for a large share of total market (big q_3p_3) in reality.

In section 5, we construct above three product-channels from a demand system built on the trade flow data for major importable sectors. This simplified methodology implicitly shuts down two channels on consumer's surplus. First, the first order approximation ignores the different consumption. Households will consume more cheaper FTA-beneficial products while the other producers lose somehow their market shares. Second, consumer surplus associated with price impact on domestic products is not taken into account, i.e. $\rho_1 = 0$, as domestic substitutes for imports are simply treated as outside goods with no price reaction. The welfare impact of the first missing channel can be positive or negative while the second one usually has a positive effect. Moreover, without further information we also ignore the impact of global supply chain on domestic producers in aggregating welfares of major importable sectors.

Nevertheless, we focus on two dominant components, i.e. domestic profit loss and incomplete pass-though in response to tariff elimination. How domestic profit interacts with price reduction of import goods is the political concern with priority. Willingness of foreign firm to transit its profit to consumers in terms of a lower price is a big part of the consumer surplus gains. They are both negative if elasticity of demand decreases in absolute value as tariff reduces. Total domestic welfare usually declines through these two channels. Preferable FTA candidates thereby minimize aggregate domestic welfare losses. Specifically, the ideal FTA partner is supposed to (i) specialize in sectors that have high import penetration (low q_1p_1), (ii) specialize in sectors with large demand elasticities and pass-throughs, (iii) have higher direct

[10] Price declines more when the foreign country has high elasticity and low elasticity variation. The special case would be the demand of constant price elasticities where $\frac{d\eta_{22}}{d\tau_2} = 0$ and the price reduction is maximized by a complete pass-through.

[11] Incomplete pass-through effect is larger if $q_2p_2 > \frac{\eta_{12}}{-\eta_{11}} q_1p_1$.

pass-through ρ_2 than the other trade partners within major importable sectors, and (iv) have low cross-product elasticity of domestic products η_{12} within major importable sectors.

2.3 Demand model

Impact of FTA depends crucially on the features of demand. To estimate new market equilibrium in the counterfactual simulation and key parameters that channel the welfare effects, we employ a structural system of demand that recovers market composition and segments. With the estimated elasticities and elasticity curvatures, we can solve the strategic price responses to the tariff reduction, ρ_1, ρ_2 and ρ_3, by totally differentiating the first order conditions of all the market participants.[12]

Discrete choice model has become the prevalent approach to model demand of differentiated products. It generates flexible substitution patterns using limited parameters, e.g. standard nested logit model in Anderson and Palma (1992) and Verboven (1996). The automobile industry is among the most popular sectors attracting the related studies, e.g. Goldberg (1994), Fershtman and Gandal (1998), Berry et al. (1999), Brambilla (2005), Brenkers and Verboven (2006) and Van Biesebroeck (2007). After the introduction by Berry (1994) and the first empirical study in Berry et al. (1995) to estimate U.S. demand for automobiles, many literatures have put efforts on estimating random coefficients for consumer heterogeneity. In section 4, we follow Brenkers and Verboven (2006) and use a two-level nested logit specification of demand with random price coefficient and flexible substitution for each market segment. Consumers are assumed to share the valuation on all observable characteristics but have different price sensitivity and heterogeneous preference over the goods located in different segments.

In the automotive market, a consumer i can choose one car or light truck j among J available models, one of which is a zero-utility outside good, i.e. purchasing a second hand vehicle or postponing the purchase to a future year.[13] The indirect utility function of consumer i from purchasing product j that belongs to subgroup h of nest g is given by:

$$u_{ij} = \sum_{i=1}^{K} x_{jk}\beta_k + \xi_j - a_i p_j + \zeta_{ihg} + (1-\sigma_{hg})(\zeta_{ig} + (1-\sigma_g)\varepsilon_{ij})$$

[12]Here we extend to the market with more than three products. Price impacts for all n products are $X = (I_n - CJ_e)^{-1}B$, where X and B are $n*1$ vector, $X_i = \frac{\partial p_i}{\partial \tau}$ and

$$B_i = \begin{cases} \frac{p_i}{1+\tau} & \text{if product } i \text{ benefits from FTA} \\ 0 & \text{Otherwise} \end{cases}$$

I_n is identity matrix of size n, C is $n*n$ diagonal matrix with $C_{ii} = \frac{p_i}{\eta_i(\eta_i+1)}$, and J_e is the Jacobian matrix of own-price elasticity. Matrix C and J_e can be estimated from any given structural model of demand.

[13]In the unit demand specification, every household is supposed to choose one good. Therefore, we need an outside good for households who do not buy a new car or just use a second-hand car.

K dimensional vector of product characteristics x_j is valued the same by all consumers. $\delta_j = \sum_{i=1}^{K} x_{jk}\beta_k + \xi_j$ aggregates the terms identical to all individuals where ξ_j is the characteristics unobservable to econometrician. The remaining part in utility, $-a_i p_j + \zeta_{ihg} + (1-\sigma_{hg})(\zeta_{ig} + (1-\sigma_g)\varepsilon_{ij})$ is individual specific. We model the price effect inversely proportional to income y_i, $a_i = \frac{\alpha}{y_i}$, to incorporate that high-income consumers are usually less price sensitive than the low-income.[14] In our two-level logit, the first level nest is 15 JATO categories[15], and the second one is domestic/foreign firm that further divides each JATO category into two subgroups according to the brands' origin. Thence, ζ_{ihg} captures the random taste of consumer i for vehicles from the brand's origin h and in the JATO category g. And ζ_{ig} measures the preference of individual i on JATO category g. The random term ε_{ij} is assumed to follow Gumbel extreme value distribution.[16] The nesting parameters σ_g and σ_{hg} proxy the preference correlation of grouping products and measure the degree of substitution within the nests. The vehicles in the segment with higher σ parameter are more substitutable to each other and have higher own and cross-model price elasticities. In practice, the nesting parameters can be constant or specific across all the subnests/nests. We allow flexible substitutions within a more general classification of JATO categories, i.e. 5 market segments in terms of vehicle types: regular cars, luxury and sporty cars, SUVs, pickup trucks, and minivans, to specify both nesting parameters. The products in the same segment share common features, for which consumers have correlated preferences.

Distributional assumptions yield the following demand system:

$$s_j(p) = \frac{1}{N}\sum_{i=1}^{N} \frac{\exp((\delta_j - \alpha_i p_j)/(1-\sigma_{hg}))}{\exp(I_{ihg}/(1-\sigma_{hg}))} \frac{\exp(I_{ihg}/(1-\sigma_g))}{\exp(I_{ig}/(1-\sigma_g))} \frac{\exp(I_{ig})}{\exp(I_i)}$$

where N is the number of individuals drawn from the empirical income distribution, I_{ihg}, I_{ig} and I_i are the inclusive values for individual i:

$$\begin{aligned} I_{ihg} &= (1-\sigma_{hg}) \ln \sum_{j=1}^{J_{hg}} \exp((\delta_j - \alpha_i p_j)/(1-\sigma_{hg})) \\ I_{ig} &= (1-\sigma_g) \ln \sum_{h=1}^{H_g} \exp(I_{ihg}/(1-\sigma_g)) \\ I_i &= \ln \sum_{g=1}^{G} \exp(I_{ig}) \end{aligned}$$

[14] If price is small relative to income, this specification approximates Cobb Douglas specification in Berry et al. (1995).

[15] JATO categories include Budget, Small, Low-mid, Mid, Upper mid, Sporty, Sports, Near luxury, Luxury, Small SUV, SUV, Full-size SUV, Compact pickup, Full-size pickup and Minivan.

[16] ζ_{ig} and ζ_{ihg} have the (unique) distributions with the properties that $\zeta_{ig} + (1-\sigma_g)\varepsilon_{ij}$ and $\zeta_{ihg} + (1-\sigma_{hg})(\zeta_{ig} + (1-\sigma_g)\varepsilon_{ij})$ are both extreme values. (Berry (1994) and Cardell (1997))

This sophisticated model incorporating two-level nested logit, segment specific σ and consumer heterogeneity on price sensitivity allows for more flexible own and cross elasticities. Price heterogeneity makes it impossible to obtain a closed form solution estimated by least squares but requires a simulation estimator (Grigolon and Verboven, 2011).

However, product characteristics are not observed in all the importable sectors. In section 5, we follow Khandelwal (2010) and employ a one-level nested logit model of demand using trade flow information. Here we define high-end and low-end segments following the approach of Van Biesebroeck (2011). The disaggregate trade-flows at 6-digit of Harmonized Commodity Code (HS) from each country that have unit value larger than the median in each 4-digit industry are classified as high-end products. Hence, for each HS 4-digit industry, the indirect utility function for consumer i from purchasing product ch of HS 6-digit h from country c that belongs to (high-end or low-end) segment g at year t is

$$u_{icht} = \xi_c + \xi_h + \xi_t + \xi_{cht} - a_i p_j + \zeta_{ig} + (1 - \sigma_g)\varepsilon_{icht}$$

ξ_c, ξ_h and ξ_t control for the effect of country, HS 6-digit category and time. We still assume price sensitivity a_i inversely proportional to income and segment specific σ_g. Domestic substitutes for imports is used as outside goods. Its market share s_{0t} is one minus the import penetration.

ξ_{jt} (or ξ_{cht}) as the error term in the common valuation part is observed by firms to make price setting decision. In the context of a nested logit model, the endogeneity problem also carries over to the nesting parameters. In section 4, we employ BLP type instruments. The numbers of competing products and the average rival characteristics within the same level of nests and segment are used as excluded instruments for the segment variables and price respectively. As we allow for the nesting parameters differ across five segments, all those instruments are interacted with segment dummy variables. In addition, we also control for unobserved product features that do not change over time and the time-varying preference of a new car over outside goods using a model-fixed effect ξ_j and a year effect ξ_t.

In section 5, we use differences of the unit value reported by export and import countries as the proxy for transport and insurance costs. Feenstra and Romalis (2012) address that the exporter's report are calculated prior to the inclusion of any cost of shipping product, i.e. f.o.b. prices, while the unit values uncovered from importer's report reflect c.i.f. prices. Washington Apples' effect that long distance countries tend to export high quality products is controlled by the country effect ξ_c. This proxy of transportation cost is thereby independent of the error term ξ_{cht} but is correlated with prices. The other price instruments include exchange rate and the interaction of distances with oil prices as in Khandelwal (2010). We use the number of varieties (country at HS 6-digit) by country, by segment and by country-segment as the instruments to identify nesting parameters.

3 Import tariffs in Canada

Empirically we will investigate the decision of Canadian government in strategically choosing potential FTA partners. As of the end of 2011, Canada has been participated in FTAs or similar RTAs that eliminate bilateral protection on goods with 11 countries.[17] The U.S. as the neighbor is also the largest trading partner and partakes in the trade liberalization under the scheme of NAFTA. However, Canada still protects its domestic producers in many industries against competitors from the other big economies in the world, such as E.U., China, Japan and Korea.

To illustrate the import protection that Canada imposed in a snapshot, we list 20 sectors that import the most value of goods in 2010 from the countries having no FTA with Canada in Table 1. The data is extracted from United Nation's Comtrade database at 6-digit level and is aggregated at 4-digit level sectors. These 20 industries cover 47.1% of total import from non-FTA partners.

Rauch (1999) classified Standard International Trade Classification (SITC) rev. 2 commodities into three different types: traded on an organized exchange (homogeneous), reference priced and differentiated products. We map our HS sectors into SITC coding and take the conservative classification of Rauch to categorize our product differentiation.[18] Most of the major importable sectors produce differentiated goods, which will be more affected by trade barriers (Chaney, 2008). The only 4 sectors that produce homogeneous goods in top 20, i.e. crude oil, refined oil, aluminum oxide and gold, account for 20.5% of total non-FTA partner import. However, tariffs that are applied on those primary resources import are largely free.[19]

But not all the differentiated products are duty-free. In order to quantify and compare the degree of import protection across sectors, we calculate a weighted ad valorem tariff per sector. Most of the differentiated goods use ad valorem tariff with only a few exemptions, such as wine, that use specific tariff. Canada imposes tariffs at 8-digit level of HS code, which is not observed in Comtrade database. We instead choose the maximal ad valorem tariff at 8-digit for 6-digit products and compute the weighted average at 4-digit level. Import fraction from U.S. is used as the weight since it is presumed to be the equilibrium product composition in

[17] They are the U.S. and Mexico in NAFTA, Costa Rica, Colombia, Peru, Chile, Iceland, Norway, Switzerland, Liechtenstein and Israel.

[18] In our case, commodities traded on an organized exchange and reference priced are both considered as homogeneous goods.

[19] Unlike the other three duty-free single resource production, sector 2710 of refined oil includes a set of products close to homogeneous and has 8% and 5% tariffs for synthetic oil and retail lubricating oils respectively. Taking into account the fact that most of refined oil imports are gasolines and diesel fuels that are free for import, we argue that average tariff imposed on refined oils is still close to zero.

Table 1: Top 20 Canadian sectors importing from countries having no FTA with Canada

hs4	Sectors	Import %	Differentiated goods	Import Tariff	Import Penetration
2709	crude oil from petroleum and bituminous minerals	14.05%	No	**0.00%**	**41.34%**
8703	motor cars & vehicles for transporting persons	6.66%	YES	**6.10%**	**80.00%**
8471	automatic data process machines	4.10%	YES	**0.00%**	**95.77%**
2710	oil (not crude) from petrol & bitum mineral etc	3.04%	NO	**0.00%**	**17.43%**
7108	gold (incl put plated), unwr, semimfr or powder	2.56%	NO	**0.00%**	**17.58%**
8708	parts & access for motor vehicles (head 8701-8705)	2.44%	YES	**6.79%**	**77.44%**
8517	elec apparatus for line telephony, telephone sets, pts	2.14%	YES	**0.00%**	**93.13%**
8443	printing machinery, machines ancil to printing, pt	1.30%	YES	**5.38%**	**76.85%**
8542	electronic integrated circuits & microassembl, pts	1.27%	YES	**6.50%**	**81.86%**
9403	furniture nesoi and parts thereof	1.07%	YES	**5.60%**	**42.29%**
8528	television receivers (incl monitors & proj receivers)	1.02%	YES	**4.31%**	**70.02%**
2204	wine of fresh grapes, grape must nesoi	0.99%	YES	**3.01%**	**64.70%**
4011	new pneumatic tires, of rubber	0.89%	YES	**6.84%**	**93.42%**
9504	articles for arcade, table or parlor games, parts	0.86%	YES	**0.00%**	**97.01%**
2818	aluminum oxide (incl art corundum), alum hydroxide	0.83%	NO	**0.00%**	**66.03%**
8525	trans apparatus for radiotelephony etc	0.81%	YES	**0.00%**	**70.02%**
9503	toys nesoi, scale models etc, puzzles, parts etc	0.80%	YES	**0.00%**	**97.01%**
8803	parts of balloons etc, aircraft, spacecraft etc	0.78%	YES	**0.00%**	**68.27%**
6110	sweaters, pullovers, vests etc, knit or crocheted	0.77%	YES	**18.00%**	**77.04%**
6403	footwear, outer sole rub, plastic or lea & upper lea	0.73%	YES	**18.00%**	**91.25%**

free trade for all countries.[20] The results indicate that tariffs on six differentiated goods sectors have already been eliminated while Canadian government still impose significant import tariffs on the remaining ten differentiated good sectors.[21]

We estimate import penetration of sectors in the last column using Canadian trade data by industry.[22] The results are in line with our expectation that a country tends to open the market when there's few domestic production. Most of the sectors with more than 90% import penetration have zero tariff such as toys and computer hardware. They are hardly produced in Canada. Footwear makes a small exception by having the highest 18% ad valorem tariff while only a bit less than 10% market share is possessed by domestic producers.

Automotive and related sectors (passenger cars, parts and tires) are the most important differentiated good sectors for Canada that add up to 10% of non-FTA import. They also have the largest tariff protection after textile sectors. Canada imposed 6.1% tariff on both cars and light trucks. This rate is lower than the analogous tariff imposed by E.U. and Korea, 10% and 8% respectively, but is higher than the U.S. tariff on cars of 2.5%. The U.S. protect light trucks by imposing ten times of cars' rate, 25%. Japan is the first car making country that unilaterally eliminates import tariff for all (nonmilitary) transportation vehicles and parts.

Moreover, Canadian car assembly plants are very active in supplying domestic market as well as in exporting to other NAFTA countries. About one-fifth of vehicles sold in Canada are assembled domestically. 85% of vehicles produced in Canada are exported mainly to the U.S., which suggests that FDI decision of assembly plants be hardly influenced by FTAs of Canada. Korea, Japan and E.U. are the major origins of vehicle imports after the U.S. for Canada. Trade liberalization with any of them reduces tariff revenue most in automobile industries. Therefore, in section 4 we will focus our empirical study on Canadian car market and evaluate full domestic welfare effects of counterfactual FTA scenarios.

Despite the absence in car market, China is the second largest trade partner of Canada and provide a large share of import in the other major manufacturing sectors that still have significant tariff production. To quickly aggregate comparable welfare effects across industries, we examine the dominant components by product in section 5.

[20] This compromised approach may overestimate somehow the protectionism of some sectors in two aspects. First, extreme tariffs of 8-digit products, such as fermentation prevented wine with $1.1/litre plus 15% tariffs, may raise the estimate at 6 digit even though only small amount of them are in fact imported. Second, import from U.S. is likely to concentrate on the goods with more import protection against other countries. Weighting by U.S. import fraction also leads to a upward bias over the estimates.

[21] Winery is the only sector that use specific tariff. We calculate the ratio of tariff revenue over import value to compare with the other ad valorem tariffs.

[22] Source: http://strategis.ic.gc.ca/sc_mrkti/tdst/tdo/tdo.php?lang=30&productType=NAICS

We map our HS code into North American Industrial Classification System (NAICS).

4 Automobile industry

4.1 Data

We focus on this single industry not only because automotive sector is the key point of content in Canada's negotiation with Korea and Japan, but also because we have complete information on the domestic passenger vehicle market. Our data set consists of prices, sales and product characteristics of all the car and light truck models available for sale in Canadian market between 1998 and 2010. There are in total 2,752 observations after dropping the models that sells less than 50 units per year and luxury brands such as Ferrari and Porsche. The number of models grows from 153 in 1998 to 244 in 2010. We use the manufacturer's suggested retail price (MSRP) for base model, the cheapest variety of each model in a given year. Sales are observed at the model level. Annual sales grow from 1.34 million in 1998 to 1.56 million in 2010 with a summit of 1.67 million in 2002. The characteristics include power per weight (maximum power in kw divided by weight), size (length * width * height) and fuel efficiency (liters of gasoline per 100 km). Those variables are also calculated using the specifications of the base model. Moreover, we include a dummy variable whether the brand has originally been owned by American firms to define the origin nest and capture the dealer proximity due to historical reasons.

Rather than the firms' nationality, we care more about the location where cars are assembled for trade liberalization analysis. Multiple origins of one model in a certain year are possible especially when Korean or Japan firms are switching their production to North America. In such as case, we take the country where the majority of production takes place. In 2010, American brands, mainly GM, Ford and Chrysler, produced 97.8% of their sales in the NAFTA area. Only one third of the vehicles under Japanese brand sold in Canada are imported from Japan while two thirds of the sales were already produced in the region. Korean and European firms still import approximately 70% of their sales from their home countries.

Table 2 depicts the summary statistics for the Canadian automobile market in 2010. Exactly one fifth of vehicles sold in Canada are assembled domestically while the rest is imported. The NAFTA partners, i.e. U.S. and Mexico, are the primary source of imports and all those vehicles enter the country duty-free already. Market shares of the vehicles imported from Japan, Korea and E.U. are respectively 11.6%, 7.9%, and 6.7%. The average prices (weighted by sales quantity) indicate that while the vehicles made in Canada, U.S./Mexico and Japan have fairly similar prices, the imports from Korea and E.U. are clear outliers at the bottom and at the top. This might be explained by two observations. First, Korea sells cheaper cars than the other countries in all the segments. Second, about three-quarters import from Korea are concentrated in the regular car segment while 46% of import from Europe are luxury & sporty cars. The average price of regular cars is only about half of the luxury ones.

Table 2: Summary statistics on Canadian car market in 2010 (244 models)

	Average	Standard Deviation
Sales (units)	6,275	12,087
Model characteristics:		
Price (1000 $)	37.542	19.759
Power/weight	9.67	2.697
Size	14.224	3.015
Liter/100 km	10.526	2.485
Domestic brand	0.336	0.473
Production location	Share of sales	Average price
Canada	19.96%	$25,003
U.S. & Mexico	53.90%	$25,523
E.U.	6.70%	$36,986
Japan	11.58%	$23,376
South Korea	7.87%	$18,375
Segments	Share of sales	Average price
Regular cars (all sizes)	39.50%	$19,149
Luxury or sporty cars	5.80%	$38,866
SUVs	28.60%	$30,081
Pickups	19.70%	$25,474
Minivan	6.40%	$27,892

Furthermore, an outside good is required to reserve for the consumers who did not purchase a vehicle. We take the total number of households, e.g. 12.91 million in 2010, as the potential market size. As such, in an average year we find that 87% of households choose not to buy a new vehicle.

Table 3: Demand of Canadian automobile market estimates

	Coefficient	Standard error
Price	-1.565	(.344)***
Power/weight	0.010	(.008)
Fuel efficiency (Liter/100 km)	-0.010	(.008)
Size	0.081	(.014)***
$\sigma 1$ (regular cars)	0.836	(.031)***
$\sigma 2$ (luxury & sporty cars)	0.727	(.064)***
$\sigma 3$ (SUVs)	0.189	(.224)
$\sigma 4$ (pickup trucks)	0.798	(.051)***
$\sigma 5$ (minivans)	0.068	(.117)
Sub_$\sigma 1$ (regular cars)	0.836	(.031)***
Sub_$\sigma 2$ (luxury & sporty cars)	0.754	(.040)***
Sub_$\sigma 3$ (SUVs)	0.399	(.067)***
Sub_$\sigma 4$ (pickup trucks)	0.798	(.051)***
Sub_$\sigma 5$ (minivans)	0.518	(.108)***
Observations	2752	
Adjusted R2	0.822	

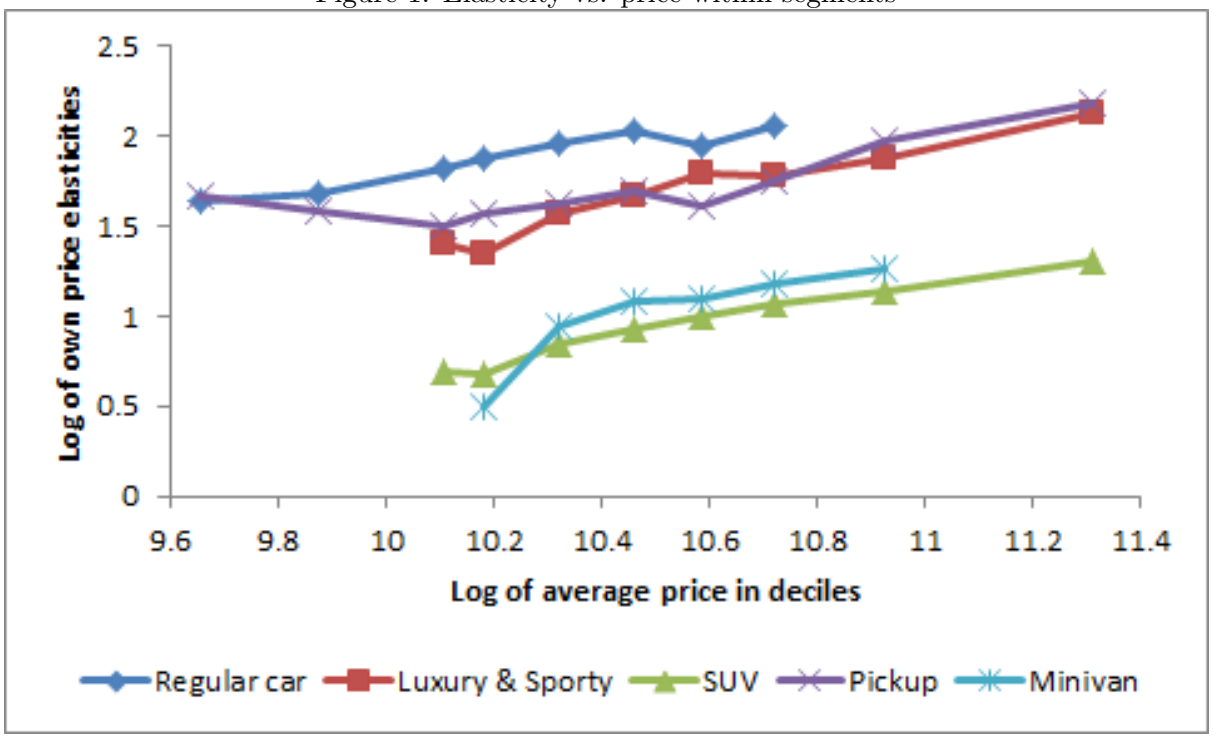
Note: Estimator also includes year and model-fixed effects as controls. Instruments are average rival characteristics for price and numbers of rival products for nest parameters. The price variable is normalized by the average income level ($28,300). *** indicates significance at the 1% level. Sub_σ is constrained to be equal to σ for regular cars and pickup to satisfy random utility maximization. (Mcfadden, 1978)

4.2 Demand Estimates

Table 3 presents the demand estimates. All coefficient estimates have the predicted signs. Consumers dislike high price and low fuel efficiency. They prefer vehicles with a higher power to weight ratio and a larger size. More important for our study are estimates of the nesting parameters, which are all positive and between zero and one. The preference of consumers over

products in the segment with higher nesting parameters are more correlated such that those products are more substitutable to each other. The estimates suggest that product substitution of 'SUVs' and 'minivans' are barely higher within the segment than between the segments.

Figure 1: Elasticity vs. price within segments



An ad valorem tariff revenue pass-through is incomplete when the own elasticity is increasing in its price. This is a general feature of logit or the nested logit model. However, aggregating individual demands on the random draws from empirical income distribution might break the property. Figure 1 illustrates how the own elasticities of vehicles within the same segments differ with price. The average own price elasticities in absolute value are plotted against the deciles of price distribution. We take the logarithm on both axes. All five segments have an upsloping elasticity towards price in general, except that elasticities slightly drop in the cheapest and middle deciles. We may still expect the incomplete pass-through given the elasticity patterns. All the curvatures are quite linear, especially for the segment of SUVs. The slope in this graph roughly approximates the price elasticity of elasticities ε_2, which lays on a relatively low level on average, i.e. smaller than 1. It turns out that price elasticities are inelastic for both cheap and expensive models and direct tariff pass-through would be mainly determined by the own price elasticity.

Substitution patterns are important for studying alternative FTAs as high own price elasticity leads to more tariff pass-through and low cross-product elasticity of Canadian models minimizes domestic profit losses. Table 4 summarizes the own price elasticities of models from

Table 4: Substitution patterns

			Total	regular cars	luxury & sporty	SUVs	pickup trucks	minivans
Korea	Own elasticity		-4.27	-4.90	-3.88	-2.05		-2.33
				(-5.35)	(N/A)	(-2.00)		(-2.68)
	Cross elasticities	all	.025	.033	.000	.006		.009
	of Canadian	same segment	.069	.083	.000	.014		.074
	cars from	different segment	.003	.004	.000	.001		.001
Japan	Own elasticity		-4.27	-5.12	-6.30	-2.28		-2.23
				(-5.11)	(-6.36)	(-2.10)		(N/A)
	Cross elasticities	all	.030	.046	.009	.005		.013
	of Canadian	same segment	.084	.118	.075	.012		.105
	cars from	different segment	.003	.004	.000	.001		.001
E.U.	Own elasticity		-5.00	-5.89	-5.69	-2.76		-2.74
				(-5.25)	(-5.19)	(-2.18)		(-2.74)
	Cross elasticities	all	.025	.046	.023	.005		.005
	of Canadian	same segment	.130	.121	.200	.011		.041
	cars from	different segment	.001	.002	.001	.001		.000
Total	Own elasticity		-4.16	-5.54	-5.40	-2.21	-4.60	-1.92

Notes: Quantity weighted average elasticities. Number in brackets are own elasticities at median price of the segment.

Korea, Japan and E.U. by segments and cross-product elasticities of Canadian cars with respect to the price of imports from Korea, Japan and E.U. within and between segments. Korean products have almost the same average own elasticity as Japanese. This is a result of import composition rather than elasticity of Korean models being similar to the Japanese one within each segment. We list the breakdown of import in Table 5, which indicates that about 80% of Korean import, mainly regular cars, are sold in the segments with highest price elasticities (in absolute value). Japan however sells more SUVs and minivans, about one-third of car import from Japan, where average elasticities are far lower. Sold at cheaper prices, Korean cars have lower elasticities than those from Japan and Europe within the segment. Import from E.U. has the largest average price elasticities in all the segments among the three origins and thus is likely to have the highest tariff pass-through in the liberalization. Moreover, a more apples-to-apples way of comparing elasticities at the same price level suggests that Korean firms charge the least price-cost margin for a regular car of the same price and focus on the low end within the segment.

Cross-model elasticity should also be understood in market segments. Canadian policy makers would prefer a FTA partner from where the imported vehicles are predominantly sold in the segments with a small share of domestic products. When there is a high overlap between domestic production and imports in market segments, domestic producers are bound to lose more market shares to the imported models that benefit from the tariff reduction. The number of models from the FTA candidate could also matters. The profit-maximizing competitors will

Table 5: Breakdown of imports by market segment

	Canada	Korea	Japan	E.U.
Total turnover ($billion)	7.64	2.21	4.15	3.79
regular cars	46.1%	75.2%	59.7%	28.8%
	(17%)	(9)	(14)	(9)
luxury & sporty	2.4%	3.3%	7.3%	45.7%
	(2%)	(2)	(14)	(24)
SUVs	30.7%	14.9%	28.7%	22.6%
	(43%)	(4)	(14)	(11)
pickup trucks	1.0%			
	(1%)			
minivans	19.8%	6.7%	4.2%	2.9%
	(38%)	(3)	(1)	(1)

Notes: Number in brackets are profit proportion for Canada and number of models

respond to a price cut of their rivals, generally also by reducing their prices. This will be most pronounced in segments with many models that benefit from a FTA. Table 5 allows us to evaluate these concerns. Japan has the best overlap with the domestic production, strongly competing with Canadian firms in 'regular cars' and 'SUVs'. The E.U. and Japan provide much more models than Korea.As a result, cross-product price elasticities in Table 4 reflect the substitution of made-in-Canada vehicles by the imports. The average cross-product elasticity of Canadian models with respect to Korean imports has the smallest magnitude within the same segment. On average Korean imports are less substitutable to the vehicles made domestically, which makes Korean competition more easily accepted by the domestic industry.

Own- and cross- price elasticities demonstrate intuitively how the two dominant channels work in selecting the FTA partners. However, in order to complete these two channels' contribution to the domestic welfare, we need to consider more concerns. First, the (incomplete) pass-through effect depends on the current degree of protectionism and current magnitude of tariff revenue. The more imports exist before FTA, the larger effect pass-through would give rise to. If consumer surplus gain fails to offset the tariff revenue loss, fewer existing imports is preferred to minimize the loss in net welfare, and vice versa. $2.21 billion turnover is obtained in 2010 by Korean firms from exporting vehicles to Canada, $4.15 billion and $3.79 billion for Japan and E.U. respectively. If pass-throughs are incomplete in most cases as the demand is still approximately increasing in price, small revenue could lower welfare losses in the pass-through channel under a FTA with Korea. Second, profit margins vary a lot across segments due to

the big difference in average price elasticity. Lost sales to import are more damaging if they occur in the segments where domestic firms have more sales and earn more profits (low price elasticities). Canadian producers make more than 80% of their profits in the SUV and minivan segments. Japanese SUV imports that benefit from a possible FTA would be particularly damaging for domestic profit, similarly for Korean minivan but with less penetration. Third, high pass-through affects the domestic profit channel but in an opposite way. More import price reduction will take more market share from the domestic producers and worsen the profitability. Slightly lower pass-through of Korean cars in each segment would be one minor factor that limits the impact of a Korea FTA on domestic profits.

4.3 Counterfactual equilibrium for various FTAs

In the theoretical framework, we simply assume that each firm produces one single product. In reality, however, firms might produce different range of products and will internalize effects on all their products to maximize the profit at firm level. We make an extension on oligopoly model to incorporate multiple products of firms. Suppose there are n products. Define matrix θ^F as the manufacturing firms' product ownership matrix that $\theta^F(j,k)$ equals 1 if products j and k are produced by the same firm, and 0 otherwise. $q(p)$, p and c are now $n * 1$ quantity, price and marginal cost vectors. Using $\odot$ to denote Hadamard product, or element-by-element multiplication of two matrices of the same dimension, we can uncover the marginal cost vector as price minus markup:

$$c = p + (\theta^F \odot q'(p))^{-1} q(p)$$

Eliminating tariffs is directly modeled as a reduction in the marginal costs for beneficial products, leading to a new Nash equilibrium. The marginal cost change due to FTA impact on global supply chain seems limited for Canadian car market. First, NAFTA impose a 62.5 per cent of North America content requirement for passenger automobiles. Only about one third of components are allowed to import from outside North America. Second, car parts for assembling could be imported from countries other than E.U., Korea and Japan, such as China. Third, no Korean maker has assembly lines in Canada, while plants of Honda and Toyota produce a range of models in Canada. Volkswagen produces only minivan in Canada. They have the legacy to import parts from Japan and Europe respectively. The other American car makers would mainly import from U.S. and Mexico. I add the tariff reduction of car parts into marginal cost change for models of Honda, Toyota and Volkswagen that are produced in Canada, assuming that they maximize import from outside America and half of those imports are coming from Japan and Europe respectively.

In the new equilibrium with price p^* after selected FTA, we compute the welfare changes. Consumer i's surplus is the expected value of the maximum of indirect utility divided by

marginal utility of income. Under the distributional assumption of nested logit model, the change in consumer surplus for individual i is

$$\Delta CS_i = \frac{I_i(p^*)}{\alpha_i} - \frac{I_i(p)}{\alpha_i}$$

where I_i is the inclusive value in a function of the price vectors before and after FTA. The change in producer surplus that aggregates profits of domestic producer j^d is given by

$$\Delta PS = \sum_{j^d} \pi_{j^d}(p^*) - \sum_{j^d} \pi_{j^d}(p)$$

The counterfactual market equilibria and full decomposition of welfare effects are listed in Table 6. The boost in imports from a FTA are modest in the case of Korea relative to its initial import volume. Since plants of Japanese car makers in Canada import components from home country, FTA with Japan reduced the least purchases of Canadian-made cars by 1,599 units in comparison with 4,718 and 3,390 for FTA with Korea and E.U. respectively. The average pass-throughs of three candidates increment from Korea to Europe. This is in line with the average own elasticity patterns shown in demand estimates. On average about four-fifths of the tariff reduction would be passed on to consumers in the form of lower prices. The price changes of the other imported models that do not benefit from FTA are quite small. Canadian-made vehicles respond with slight price changes except for the models of Honda and Toyota whose marginal costs fell due to imported intermediate inputs in the FTA with Japan. However, strategic complement prices do not hold in FTA with Korea. Prices of the models that do not benefit from FTA increase by 0.02% on average. This is a numerical distortion that occurs in aggregating the heterogeneous consumers drawn from a skewed income distribution.

The decline in government tariff revenue is much lower under a FTA with Korea than the other FTAs. This is attributed to the low average prices of Korean imports. However, FTAs with Japan and E.U. give rise to more than doubled consumer's surplus (in cost-benefit criterion) as does a FTA with Korea. Japan and E.U. largely outperform Korea as a FTA partner in comparing net welfare of tariff revenue loss and consumer surplus gain. Apart from the direct price pass-through, the strategic complement pricing and other trade efficiency gains/losses associated with different bundle of consumption contribute additional 8% consumer surplus gains for the FTAs with Japan and E.U. but cause 12% consumer surplus losses for the FTA with Korea. Total consumer's surplus under FTA with Korea is pulled down as all the competing firms raise slightly their prices.

However, so far the social welfare is summing the individualistic Marshallian consumer's surplus in the money equivalent value. The justification is that the gainers can compensate the losers through a compensation or tax system such that a Pareto improvement is possible. Stern (1977) states that in most cases this compensation is hypothetical and will not take place. In

Table 6: Counterfactual analysis

FTA with	Korea	Japan	E.U.
(initial market share)	(7.9%)	(11.6%)	(6.7%)
Import from FTA partners	+21,807	+36,624	+21,828
Purchase of Canadian-made cars	-4,718	-1,599	-3,364
Pass-through of 5.75% tariff cut[1]	-4.51%	-4.91%	-5.04%
Price change of other models	+0.02%	-0.01%	-0.03%
Price change of Canadian-made cars	+0.00%	-0.28%	-0.07%
Government tariff revenue	-133.6	-276.6	-226.9
Consumer surplus (Cost-benefit criterion)	+87.8	+259.0	+215.4
Consumer surplus (Generalized Utilitarianism)	+85.9	+237.3	+182.1
Consumer surplus (Benthamite Utilitarianism)	+88.9	+230.8	+162.7
Profits of American models made domestically	-1.3	-5.3	-12.4
Domestic welfare (Cost-benefit criterion)	-47.0	-22.9	-23.9
Domestic welfare (Generalized Utilitarianism)	-49.0	-44.6	-57.4
Domestic welfare (Benthamite Utilitarianism)	-46.0	-51.1	-76.6

Notes: Change from the observed 2010 market situation for counterfactual market equilibria under three different FTAs.

[1] 5.75%=6.1%/(1+6.1%)

theory, aggregation of willingness-to-pay may result in preference reversals and intransitivity, i.e. a move from one Pareto-efficient state to another yields a positive sum of compensating variations (Boadway Paradox). When lump-sum transfers are feasible, a positive aggregate surplus is necessary but not sufficient for a Potential Pareto Improvement (Boadway, 1974). One may escape the inconsistencies by assuming preference where the marginal utility of income is constant. This condition for a representative consumer is however implausible in real economies. More importantly, Blackorby and Donaldson (1990) argue that the ethical judgments implied by compensating-variation test in cost-benefit analysis are not defensible. The cost-benefit criterion treats a dollar (money equivalent value) of consumer's surplus as a dollar to whomsoever it accrues as Harberger (1971) advocated. This indifference towards inequality is inconsistent with social policy and the overwhelming majority of individual preferences although there is no clear consensus on the appropriate level of inequality-aversion.

Figure 2 illustrates the utility rise by income distribution decile for three possible FTAs. The secondary axis denotes the reciprocal of marginal utility of income for consumers in each decile. FTA with Korea will increase utility most in the lower middle deciles and do not please the rich populations so much as FTA with E.U. or Japan. Division by marginal utility of income translates utility to consumer's surplus in monetary values. Cost-benefit criterion aggregating individual surpluses provides larger weight on utility increase of rich people with low income elasticity and favors the trade policy with advanced countries. The government should to some extent care more about the poor and is likely to give a lower weight to the large low-price benefit for the consumers buying very expensive vehicles under FTAs with E.U. and Japan.

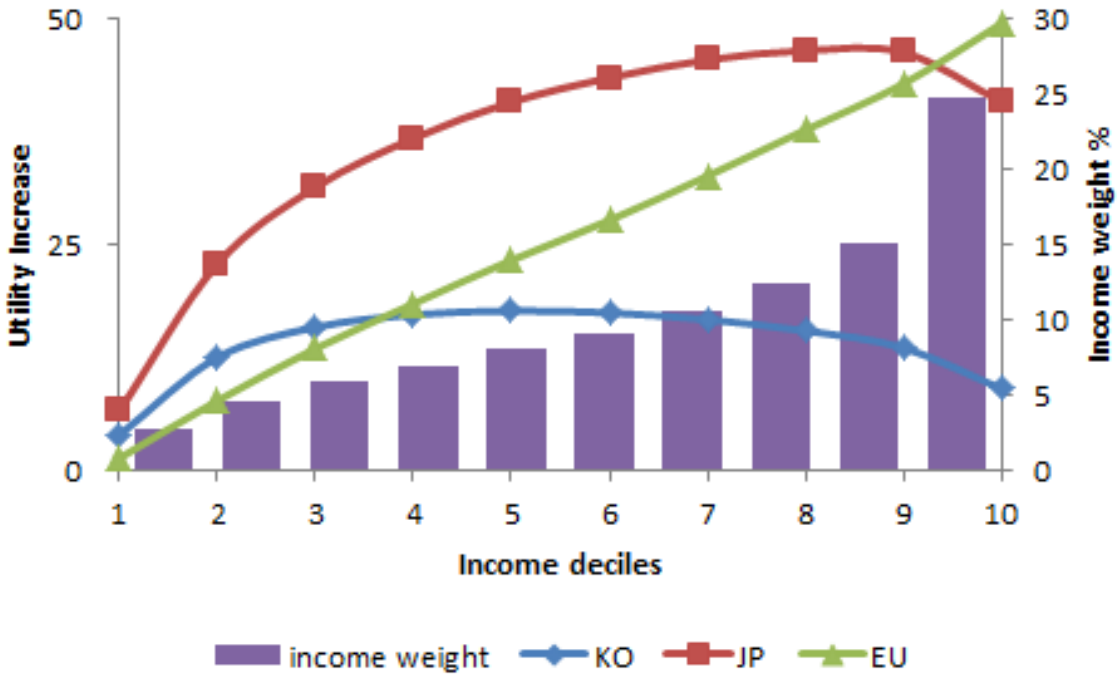
We follow Hau (1986) and specify an individualistic social welfare function incorporating the relative worthiness of each individual's welfare in society.

$$SW = \frac{\sum_i w_i (MCS_i)^{1-\varepsilon}}{1-\varepsilon}$$

where MCS_i is Marshallian consumer's surplus in money equivalent value. $w_i = (\frac{y_i}{\bar{y}})^{\gamma}$ is welfare weight for individual i with individual income y_i and the average income of population $\bar{y}$. The policy maker chooses the degree of inequality aversion in terms of γ and ε that capture the speed by which the weights decline with income. We introduce a particular cardinality by normalizing y_i by $\bar{y}$ and restricting $\varepsilon = 0$. When $\gamma = 0$, cost-benefit criterion is obtained with the social welfare $SW = \sum_i MCS_i$; when $\gamma = -1$, social welfare is $SW = \frac{1}{\lambda} \sum_i EU_i$ with EU_i the utility index associated with individual i and marginal utility of income at average income $\bar{\lambda} = \frac{\alpha}{\bar{y}}$. This leads to unitary utility weights of Benthamite Utilitarianism that society is seeking to maximize an unweighted sum of individual utilities. We also investigate an in-between case of $\gamma = -0.5$ where social welfare takes the form of a generalized utilitarian SWF.

Applying different social welfare weights leads to opposite conclusions. Benthamite u-

Figure 2: Change in utility by income decile



tilitarianism promotes the FTA with Korea above the other two alternatives in terms of total domestic welfare. FTA with E.U. becomes the last choice in both generalized and Benthamite utilitarianism because it benefits most the rich population. Domestic welfare losses associated with FTAs of Japan and E.U. increase as the surplus gains of rich population are less weighted in the social welfare. Therefore, welfare analysis result is largely determined by the policy makers' choice of the form of social welfare function and distributional weights, which would depend on preferences of the politicians or the electorate that they represent. The government more averse of income inequality is more likely to form a FTA with Korea before with E.U. or Japan. Canada started the FTA negotiation with Korea in 2004 when Paul Martin was in the office of Canadian prime minister but no concrete agreement has been made so far in the term of Prime Minister Steven Harper since 2006. In the meanwhile U.S. and Korea started FTA negotiation in 2006 and established the agreement in 2011. It turns out that Martin government was more averse of income inequality than Prime Minister Harper.[23]

Government's response to domestic producers could also be heterogeneous. Since American car makers usually have much larger political power than subsidiaries of Honda, Toyota

[23]This is in line with the characteristics of the prime minsters and their representing parties. Martin was backed by Liberal Party of Canada, a center-left party, and is famous for his promise of spending 0.7% of Canadian GDP on foreign aid. Harper and his Conservative Party on the center-right wing advocated a tax cut that benefit the rich most.

and Volkswagen on Canadian politics, we compute domestic profit loss component only for American car models produced in Canada. Trade liberalization with Korea would cause the least damaging on the profits of Canadian producers. This is driven by the weak substitutions between Korean and Canadian vehicles as depicted in demand estimation.

In total domestic welfare of Table 6, we aggregate the equally weighted effects of domestic profit and consumer surplus. In reality, governments may care more about profits and jobs moving aboard and get more tangible pressure from the opposition of domestic firms. Rodrik (1995) stated that opposition by the domestic industry is often pitted against the potential benefits for consumers in political debate. An envelop calculation of putting more than six times larger weight on the effects of domestic profit would also result in a preference of Korea over Japan.

5 Major importable sectors

The simplified methodology exploiting all tradable sectors focuses on dominant effects for three types of products but shuts down the other surplus effects under plausible assumptions. We use Canadian import data between 1998 and 2010 extracted from Comtrade database. Each observation indicates the import trade flow from one specific country to Canada for 6-digit HS product in one particular year. Variables include year, origin, HS code, quantity and value of the import flows.

In the calculation, we also make three simple assumptions to adapt to the constrained data. First, domestic production is not included in trade flows. The market shares and revenues of domestic substitutes ($q_1 p_1$) are deduced from one minus import penetration. Profitability of the domestic firms (η_{11}) is proxied by the average own elasticity of imports in the sector. Second, trade data is aggregated by origin of country. Varieties from the same country may substitute to each other such that the average price elasticity at country level is lower than the average of elasticities at firm level and sometimes is even lower than 1 in absolute value. In such a case, we simply assume those countries' products have big enough market power to keep the whole tariff reduction in the profit margin, i.e. $\rho_2 = 0$. Third, since we do not observe imported intermediate input in domestic production, benefits of global supply chain for domestic producers are simply ignored.

Table 7 presents the three product channels of FTA simulations for ten tariff-protecting differentiated good sectors that import most from the non-FTA trade partners. Since elasticity is increasing in price for logit models, imports from Europe is likely to pass most the tariff reduction on to consumers. We tackle this property with two settings in the model. First, we define the high-end and low-end segments. European products are found largely located in the

Table 7: Welfare effects of FTA in major importable sectors

	2010	Sum of three channels				Domestic profit loss channel				Incomplete pass-through channel				Rival import channel			
hs4	Sectors	KO	JP	EU	CN	KO	JP	EU	CN	KO	JP	EU	CN	KO	JP	EU	CN
8703	motor cars & vehicles for transporting persons	-43.56	-98.67	-47.27		-9.81	-28.13	-39.94		-32.17	-74	-33.60		-1.58	3.39	26.26	
8708	parts & access for motor vehicles (head 8701-8705	-4.10	-19.53	-5.39	-14.52	-3.97	-17.46	-6.62	-11.69	-0.55	-4.33	-0.54	-2.94	0.42	2.25	1.77	0.11
8443	printing machinery, machines ancil to printing, pt	-0.27	-4.46	-1.06	-9.49	0.00	0.00	0.00	0.00	-0.27	-4.46	-1.06	-9.49	0.00	0.00	0.00	0.00
8542	electronic integrated circuits & microassembl, pts	-36.46	-2.75	-3.44	-3.17	0.00	0.00	0.00	0.00	-36.46	-2.75	-3.44	-3.17	0.00	0.00	0.00	0.00
9403	furniture nesoi and parts thereof			-4.2	-12.4			-2.75	-6.47			-1.30	-5.45			-0.20	-0.51
8528	television receivers (incl monitors & proj receivers)	0.08	-0.06	0.08	-2.80	-0.05	-0.10	-0.07	-3.00	-0.07	-0.29	-0.11	-10.04	0.20	0.33	0.26	10.24
2204	wine of fresh grapes, grape must nesoi			-6.51				-4.26				-2.31				0.06	
4011	new pneumatic tires, of rubber	-3.78	-16.21	-5.52	-9.42	-0.06	-0.08	-0.11	-0.33	-5.17	-18.22	-6.57	-17.78	1.45	2.09	1.16	8.69
6110	sweaters, pullovers, vests etc, knit or crocheted	-0.19		-0.26	-40.64	-0.01		-0.15	-5.63	-0.18		-0.21	-27.84	0.00		0.10	-7.18
6403	footwear, outer sole rub, plastic or lea & upper lea	-0.01		-1.26	-47.34	0.00		-0.64	-1.76	0.00		-0.98	-36.67	0.00		0.36	-8.90
	Total	**-88.3**	**-141.7**	**-74.9**	**-139.8**	**-13.9**	**-45.8**	**-54.5**	**-28.9**	**-74.9**	**-104.0**	**-50.1**	**-113.4**	**0.5**	**8.1**	**29.8**	**2.4**

high-end segment while China is more active in the low-end. Substitution in low-end segment is indeed higher than in high-end segment of most industries. The difference of nesting parameter estimates is not big enough (.1 on average) but will mitigate the elasticity gap between segments. Introducing price heterogeneity is another overture to adjust the elasticity within segment. It flattens the elasticity pattern by allowing different price effect across population. Those settings shorten the elasticity gaps between countries but do not reverse the pattern.

In contrast to Table 6, here we basically use different data set. Canada-EU FTA gives consistent market outcome for car industry in both analyses. The total turnover of European automobile imports are comparable in magnitude between two data sets, i.e. \$3.65 vs. \$3.79 billions. And the study of FTA with E.U. is less influenced by the elasticity underestimation in aggregate trade data as it has one observation for each country. This leads to similar direct price pass-throughs of E.U. regular car models, i.e. 85% vs. 88%. Consequently, net of tariff reduction and consumer surplus gains in Canadian automotive sector is \$-7.34 millions (26.26-33.6) in Table 7 vs. \$-9.5 millions (215.4-226.9) in Table 6 under Canada-EU FTA.

However, FTA with Korea has lower net welfare effect in Table 7. The total turnover of Korean automobile imports is just about two-thirds of the aggregate revenue in car data, i.e. \$1.48 vs. \$2.21 billions. The difference is likely to be the entrepot trade from U.S. to Canada, given the lower tariff rates on passenger cars in U.S. than in Canada. Unfortunately we are unable to identify the origin of re-export data. Moreover, this could also be linked somehow to the majority classification for multiple origins in Canadian car data.

The difference of Canada-Japan FTA impacts is much bigger in Table 7. Car data includes only normal cars, i.e. cylinder between 1500 and 4500cc (HS code 870323 and 870324) while trade flows include all transportation vehicles. Japanese cars dominate vehicles traveling on snow etc. (870310) and with cylinder below 1500cc (870321 and 870322), which account for \$11 million domestic welfare loss under a FTA with Japan. Moreover, elasticity of Japanese cars might have been underestimated somehow because of the multiple models aggregating at country level. The pass-through of code 870323 sector is only 0.55 for Japan compared to average of 0.8 in Table 6. This results in a greater incomplete pass-through of tariff reduction for the FTA with Japan.

Not surprisingly, we obtain larger domestic profit losses in Table 7 as we could not separate domestic producers with significant political power using trade data. However the results are coherent. FTA with Korea has the least impact on total domestic production. Moreover, welfare in Table 7 equally aggregates individual consumer surplus. Korean cars are competing in the low end segment of market as they have the lowest unit value of imports. FTA with Korea would benefit the people in low income deciles more than those with high income. Therefore, the main implication still holds that Korea is preferred over Japan as FTA negotiation partner

if policy makers put more weights on domestic profit loss or consumer surplus of low-income households.

Heterogeneity in sector composition is also important in choosing the strategic FTA partner. The ideally preferred country should specialize in sectors with large demand elasticities to maximize price reduction and in sectors with high import penetration to limit domestic profit loss.

Automobile and electronic integrated circuit are the main products imported from Korea. Car sector would allow Korea to pass through moderate part of its trade benefits to consumers while the tariff reduction in IC sector would fully go to the profit of Korean companies. Relatively small value of total import from Korea limits the tariff revenue loss and the effect of incomplete pass-through under FTA with Korea. In contrast, Japanese and Chinese firms would retain a large amount of tariff reduction from automobile sector and textile sectors respectively. This is attributed more to the big import turnover of Japan and China, since elasticities are relatively high for automobile and textile industries. FTA with E.U. has the largest impact on the other imports that are not directly affected. It arouses great consumer surplus gains by systematically reducing prices of car models assembled in U.S. and Mexico.

In the aggregation of ten major importable sectors with significant tariff protection, Korea and China have small influence on the profits of Canadian producers on top of two aspects. First, different segmentation with Canadian competitors and low prices would lead to low cross-product price elasticities of Canadian products with respect to price change of Chinese and Korean imports within the same industry. Second, the overlap of Canadian domestic production and importation from Korea and China is low. Canadian import penetration is high in the electronic IC and textile industries.

In summary, FTA with Europe may raise most the consumer's surplus in a cost-benefit analysis while a FTA with Korea has the least impact on domestic profits. Korea slightly lags behind Europe but clearly stays on top of the other two Asian neighbors in sum of three product channels. Since the consumer's surplus gains associated with E.U. FTA mainly originate from the rich strata and policy makers might focus more on the impact of domestic production, Canadian government could be more likely to accept a FTA with Korea before the others.

6 Discussion on North-South FTA

We theoretically demonstrate that ideal FTA partners are supposed to specialize in sectors with high elasticity and high import penetration, and within each sector have higher elasticity and are less substitute to the domestic production. This suggests that North-South FTA should be more desirable than North-North or South-South FTAs because developed and developing countries

are basically competing in different industries or market segments, and developing countries often concentrate on more competitive labour-intensive sector or low segment of industry.

Empirically, we look at the example of China, the largest developing country in the world. Despite the negligible car import from China to Canada, China is second largest trade partner of Canada. FTA with China would have important welfare effects in most of the importable sectors.

In our results, China has the least elasticity in most of the biggest importable sectors, mainly driven by the cheap price and large market share. However, Table 8 indicates that imports from China have the highest value weighted average own price elasticity. This is attributed to different import composition as China concentrates on the sectors with high elasticities, such as television, seat/furniture, and textiles. Tariff reduction will be largely passed on to consumers in those sectors. Import penetration in those sectors is usually high for Western countries. Protection against import from China for U.S. or Canada will benefit more the countries like Mexico rather than their domestic production. Cross-product elasticities of domestic products with respect to imports from China within the sectors could also be low because Chinese import is still located in the low-end segment of industry. Moreover, FTA with China is likely to benefit the poor population more than the rich one, which is preferable for the policy makers that are averse of income inequality. Relatively large domestic welfare loss in a FTA with China mainly stems from big trade volume between two countries.

Table 8: Value-weighted average elasticity for different imports

Import	Med. Elasticity	Mean Elasticity
Korea	-1.46	-1.76
Japan	-1.68	-2.93
E.U.	-2.27	-3.23
China	-2.98	-4.89
U.S.	-1.51	-2.94

There exist other potential benefits of North-South FTA for both sides that are not taken into account in our study. First, tariff reduction enhances productivity especially in developing countries. Brandt et al. (2012) show that WTO accession of China leads to a significant productivity growth at extensive margin. Second, removing significant import protection for a big export market such as China will lessen horizontal FDI from North to South and keep manufacturing in the advanced countries. On the other hand, it will encourage more vertical FDI into the developing countries and avoid the decamping of MNEs as labour costs start to rise.

Motivated by the benefits of trade liberalization, Chinese policy makers are becoming more

aggressive, e.g. Shanghai pilot free trade zone created in 2013 and ongoing FTA negotiation with Korea and Australia. Our approach also provides a practical tool for developing countries to evaluate possible FTA partners.

7 Conclusions

This paper investigates the domestic welfare effect of alternative FTAs in a theoretical framework and empirically suggests that Korea is a more preferable FTA partner over Japan for Canada, if policy makers attach more importance to the concerns of domestic profit losses and income inequality. The loss of tariff revenue is minimized under a FTA with Korea as a result of relatively small import value from Korea. Since Korean products are less substitutable to Canadian-made goods, domestic producers would suffer the least from the reduction in market shares and profits under a FTA with Korea. In addition, the government that cares more about income inequality tends to choose the FTA with Korea as it benefits the low and middle strata more than the rich population in society.

The similar preference pattern is observed for Mexico being preferred over Canada by European countries. The economic intuition is also similar except that Mexico could specialize more in the sectors with high elasticities such as textile. Tariff cuts would be passed to a much greater extent on to domestic consumers.

However, some caveat of the methodology must be added in the end. First, different trading partners bring asymmetries not only on import but also on export. This paper focuses on the impact of FTAs on domestic markets rather than export benefits. Second, impact of global supply chain for domestic producers is ignored in the simplified methodology. This is likely to overestimate domestic profit loss and underestimate consumer surplus gains. Third, we examine only the counterfactual welfare effects from existing market equilibrium. Potential positive or negative impacts of FTA are not taken into account, such as improvement of variety and productivity, and influence on FDI decision.

In the future work, we could also estimate the counterfactual producer surplus in export markets although it requires much more data. If we assume countries export the same range of products to most of trade partners, exploiting their own comparative advantage, export benefits are approximately proportional to the market size and existing level of import protection in partner country.[24] It is relatively easy to qualitatively assess and compare the impact on exportation. For instance, China and E.U. have large market size while Korea and China have more protectionism on industries.

[24]Sector shares in Canadian export to Japan and to Korea are indeed very much correlated in our data.

A Appendix Table

Table A.1: Regional Trade Agreement outcomes

Partners	South Korea	Japan
Chile	FTA (2004)	Strategic EPA (2007)
Peru	FTA (2011)	EPA (2011)
Mexico	FTA negotiations (2005)	Strengthening EPA (2005)[3]
ASEAN	FTA (2006)[1]	Comprehensive EPA (2008)
India	FTA (2010)[2]	Comprehensive EPA (2011)
Australia	FTA negotiations (2009)	EPA negotiations (2009)
EFTA	FTA (2006)	
Switzerland		FTA & EPA (2009)
E.U.	FTA (2011)	
U.S.	FTA (2011)	
FTA negotiations ongoing	Canada, New Zealand, Colombia, Turkey, GCC	
	Japan[4]	Korea[4]
Joint feasibility study (FTA considered)	China, Vietnam, Mongolia, Indonesia, Malaysia, Russia, Israel, SACU, MERCOSUR, S. America	

[1] *The agreement subsequently added services and investment;*

[2] *Agreement was labeled a Comprehensive EPA;*

[3] *Updated in 2011;*

[4] *FTA negotiations died in 2004, but consultations to create a favorable environment for resumption of the negotiations started again in 2008.*

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