The Impact of Trade Barriers on Mandated Biofuel Consumption in Canada

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In 2008 the Canadian government passed amendments to the Environmental Protection Act requiring five percent ethanol in transportation fuels sold in Canada by 2010 and two percent renewable content in diesel and heating fuels by 2012. This has important implications for the quantities demanded and supplied of biofuels both within and beyond the Canadian market. While federal policies in Canada have been designed to impose a minimum five percent of Canada's transport gasoline by 2010, some interest groups have called on federal and provincial governments to increase the mandated content beyond that level. The objective of this study is to compare the relative economic impacts in Canada of achieving a ten percent biofuel content either through increased imports or by substituting domestic production in place of increased imports.

A customized version of the deterministic Food and Agricultural Policy Research Institute (FAPRI) modeling system was used to assess the impacts of two alternative scenarios: 1) an increase in Canadian ethanol demand to ten percent of domestic liquid fuel consumption by 2011 that is met through increased domestic supply only and requires trade barriers, and 2) the same increase met through increased imports where there are minimal or no barriers to trade. In the first scenario, ethanol imports are held at the baseline levels and all additional ethanol demand is satisfied from domestic ethanol sources at a higher "made-in-Canada" price. To maintain the higher price for ethanol some form of trade barrier, tax exemption, subsidy program or domestic use requirement would be necessary. While any or all of these trade barriers would be open to challenge under the North American Free Trade Agreement or at the WTO, identifying and quantifying their economic impacts is important given the political pressure to insure demand is met locally.

Estimates of Canadian ethanol production, consumption, imports and price for 2011 for the three situations (5% baseline, 10% with trade barriers and 10% with no trade barriers) are shown in Table 1. In the baseline projection for 2011 (where five percent of the gasoline supply is made up of ethanol), ethanol consumption in Canada was estimated to be 2.198 billion litres. That would be supplied by 1.343 billion litres of domestic production and 855 million litres of imports. The estimated production is almost equal to the 1.338 billion litres of production capacity available in Canada as of April 2009.

A ten percent mandate for ethanol content would lead to an estimated consumption of 3.996 billion litres of ethanol in 2011 if trade barriers prevented additional ethanol imports (Table 1). This would come from domestic production of 3.141 billion litres of ethanol and imports of 855 million litres, the same level as in the baseline. If additional trade barriers were not imposed, Canadian consumption of ethanol would rise to 4.211 billion litres. With no increase in production from the base case (five percent mandate), all of the increase in consumption (2.868 billion litres) would be supplied by imports (Table 2). In the ten percent case with trade barriers, the price of ethanol is estimated to rise to C$ 1.13 per litre from C$ 0.62 per litre (Table 1), resulting in lower overall gasoline consumption than would be the case with no additional trade barriers.

In the case where effective trade barriers prevent the importation of additional supplies of ethanol, the increased consumption must be satisfied entirely by domestic production. Compared with the base, ethanol consumption would increase by an average of 1.016 billion litres per year over the ten year period (from 2.306 billion litres to 3.322 billion litres) – a 44 percent increase. Domestic production would increase, on average, by 69 percent. Canadian ethanol price would increase an average of 48 percent over the period but would range as much as 90 percent higher in 2011 when the difference between the ten percent mandate and the baseline is the greatest. Since ethanol imports would remain unchanged in this case, there would be no response in the world ethanol price.

In the case where no additional trade barriers are imposed, annual ethanol consumption (over the ten year period) is estimated to increase by 1.119 billion litres per year (48 percent over the baseline). The higher consumption of ethanol in this case is a result of the imports, which keeps the Canadian ethanol price nearly unchanged from the baseline. Because of the higher mandated consumption, domestic ethanol prices are expected to increase slightly (by about $C 0.01/litre) and world ethanol prices would increase by six percent (not shown in the table). In response to the six percent increase in world ethanol prices, domestic production of ethanol would increase marginally by an average of seven million litres per year (over the baseline). To meet the expected average quantity of ethanol demanded in Canada of 3.425 billion litres, average annual imports of ethanol would increase 132 percent from 0.840 billion to 1.952 billion litres. The model projects that ethanol producers in Brazil would be the most important source of increased foreign supplies in Canada. Figure 1 shows the impacts of the increased import demand on the world ethanol price as estimated by the model. The increased demand for ethanol over 2007-2016 in Canada would lead to a US$0.09 – US$0.18 per U.S. gallon increase in world prices in the short term relative to the baseline scenario. The difference falls to about US$ 0.05 per U.S. gallon by the end of 2016.

The results reveal that import barriers favour domestic suppliers of ethanol at the expense of consumers. Import barriers injure Canadian consumers by limiting their access to supplies offered for sale at lower prices by more efficient producers, particularly those that are located in subtropical regions. With freer trade, the domestic ethanol price would fall while the world price would rise due to the higher demand for ethanol in Canada. Given their comparative advantage in producing, the model suggests that Brazilian ethanol suppliers would respond to the higher world price by increasing output and exports.

The results also show that import restrictions directly undermine the effectiveness and increase the costliness of a higher consumption mandate in Canada. The relatively less expensive ethanol is for the final consumer, the more likely they will use it as fuel over available alternatives. The implication is that restricting imports of ethanol is counterproductive to the policy objective of increasing domestic ethanol consumption. The results of the study also underscores that eliminating import barriers would be costly for ethanol producers in Canada. In response to the lower prices they would receive, the quantities of ethanol they would offer for sale would decrease.

Table 1: Impacts of an Increase in Canadian Ethanol Demand, With and Without Trade Barriers, in 2011 (Million Litres)

Ethanol share of fuel consumption	Production	Consumption	Net Imports	Ethanol Price (C$/Litre)
5 percent	1343	2198	855	0.57
10 percent - Trade Barriers	3141	3996	855	1.13
10 percent -No Trade Barriers	1343	4211	2868	0.62

Figure 1: Impacts of an Increase in Canadian Ethanol Demand, With Increased Trade, on the World Ethanol Price (Scenario 1)

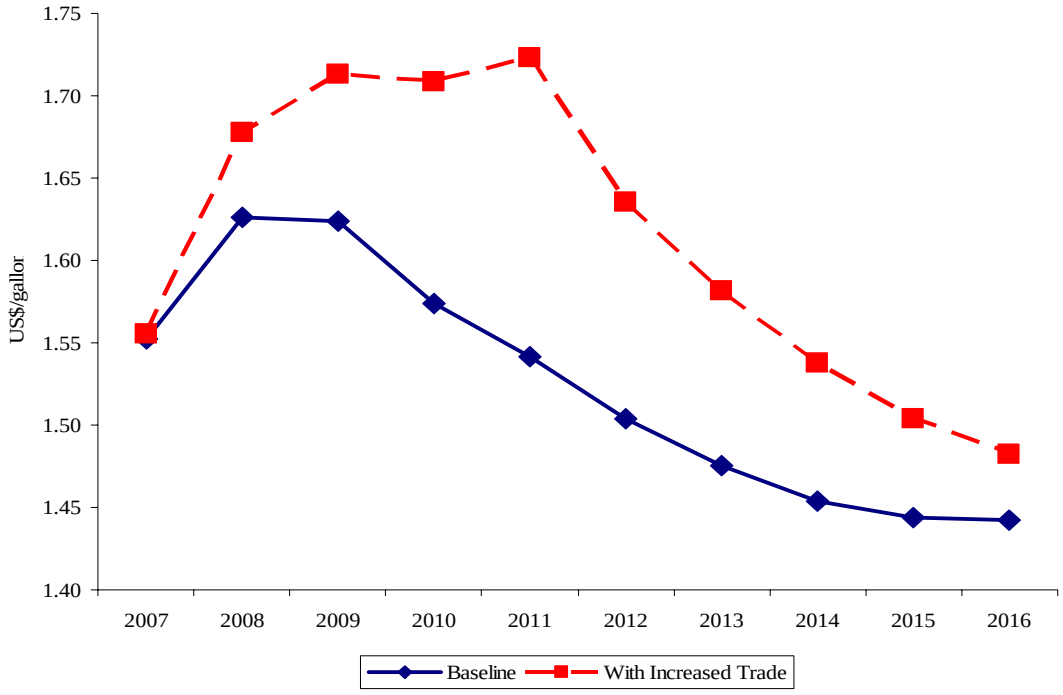

Table 2: Summary Results: Estimated Canadian Ethanol Prices, Production, Consumption and Net Imports, 2006-2016

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Avg.
Ethanol Price						**(C$/litre)**						
Baseline (5%)	0.59	0.72	0.72	0.72	0.70	0.66	0.62	0.59	0.56	0.54	0.51	0.63
Trade Barriers (10%)	0.59	0.62	0.79	0.92	1.08	1.25	1.12	1.04	0.96	0.85	0.74	0.88
No Trade Barriers (10%)	0.59	0.72	0.73	0.74	0.72	0.69	0.65	0.62	0.58	0.55	0.52	0.64
Production						**(millions of litres)**						
Baseline (5%)	337	313	584	851	1087	1343	1599	1857	2115	2349	2566	1466
Trade Barriers (10%)	337	339	1011	1665	2373	3141	3202	3245	3283	3289	3270	2482
No Trade Barriers (10%)	337	313	584	851	1087	1343	1599	1857	2115	2380	2597	1473
Consumption						**(millions of litres)**						
Baseline (5%)	380	783	1183	1599	1923	2198	2479	2768	3064	3373	3692	2306
Trade Barriers (10%)	380	810	1610	2414	3209	3996	4082	4156	4232	4313	4396	3322
No Trade Barriers (10%)	380	811	1634	2475	3335	4211	4254	4303	4354	4405	4463	3425
Net Imports						**(millions of litres)**						
Baseline (5%)	43	471	599	748	836	855	880	911	949	1025	1126	840
Trade Barriers (10%)	43	471	599	748	836	855	880	911	949	1025	1126	840
No Trade Barriers (10%)	43	498	1049	1625	2248	2868	2655	2447	2239	2025	1865	1952