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**CATPRN**

Canadian Agricultural Trade Policy Research Network

# **THE EFFECTS OF BIOFUELS POLICIES ON GLOBAL COMMODITY TRADE FLOWS**

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## **BACKGROUND**

In the later part of the past decade, biofuels have become associated with an overwhelming number of policy issues. The ability of biofuels to meet their purported policy goals has been both hailed and criticized, with experts on both sides of the debate weighing in.

Biofuels, transportation fuels currently produced from biological (primarily agricultural) sources, have been increasing in both production and consumption worldwide. Ethanol and biodiesel are currently the most prevalent “first-generation” biofuels in terms of wide-scale commercial use. Both are most commonly used as low-level blends with regular gasoline or diesel, with the exception of ethanol in Brazil, where consumers are able to fill up their modified engines with E100 (100 percent ethanol). It should also be noted that vehicles with flex-fuel technology are becoming more popular in the US, and allow drivers to choose between low-level ethanol blends such as E5 (5 percent ethanol, 95 percent gasoline) and higher blends such as E85. The efficacy of this technology depends on the availability of fuel stations supplying E85; in the US, this number is roughly 1200, while only two Canadian fuel stations have E85 publicly available.

While ethanol production is dominated by the United States (US) and Brazil, the rest of the world is also increasing production capacity and with it demand. As of January 2008, production capacity in the US had increased to roughly 27 billion litres of corn-based ethanol per year, relative to an estimated 2006 Brazilian capacity of 17 billion litres of sugarcane-based ethanol. Ethanol is also the main biofuel in Canada, with production of roughly 580 million litres in 2007. The feedstock used in Canadian ethanol production is also primarily corn, although about 30 percent, mainly in Western Canada, is produced from wheat. Ethanol production in the European Union (EU) is not as widespread, although it is significant, estimated at 1,592 million litres in 2006. Germany, Spain and France are the three highest producing countries, utilizing feedstocks ranging from sugar beets to wheat to wine.

Biodiesel is currently the more significant biofuel in the EU, with 2006 production in the range of 3.6 billion litres. Production is relatively concentrated, with Germany, Italy and France retaining roughly 63 percent of total EU biodiesel production capacity. Rapeseed oil is the common input in Northern Europe, while sunflower oil and waste oil are more common in Southern Europe. The biodiesel industries in Canada and the US are growing rapidly, with expected construction and expansion projects bringing canola and waste-based biodiesel capacity in Canada to roughly 325 million litres per year in the foreseeable future. American capacity numbers from 2006 suggest a projected capacity of nearly one billion litres per year of biodiesel moving forward.

## **BIOFUELS POLICIES AND MOTIVATIONS**

Commonly, biofuels policies are designed to stimulate both domestic consumption and production, often as a response to issues in several policy areas. Government administrations pursue biofuel policies to address concerns as varied as rural

development and national energy security, while issues regarding the environment and the demands of agricultural lobbyists are also factored into policy actions.

Government tactics to boost domestic production and consumption come in many forms, including consumption mandates, import tariffs, excise tax exemptions and assistance with capital construction and/or expansion costs. The EU has also incorporated consumption mandates into its biofuels strategy, striving for a 2 percent share of transportation fuel to be replaced with renewable fuels in 2005 and a 5.75 percent share in 2010. By 2005, this target was not met, and the European Commission has stated that it is unlikely that the 2010 goals will be ratified. Perhaps most notably in terms of border measures, the US imposes a 54 cents per gallon import tariff on ethanol entering the country, as well as a 2.5 percent ad valorem tariff, although there have been indications that the first tariff may not be permanent. With respect to excise tax exemptions, the Government of Canada exempts fuels blended with renewable content from federal excise taxes; this amounts to 10 cents per litre applicable to petroleum fuel and 4 cents per litre on diesel fuel. Also through the federal government, Natural Resources Canada has funded two rounds of the Ethanol Expansion Program to provide long-term capital loans to biofuel producers, and more recently announced significant funding through the NextGen Biofuels Fund, designed to support the development and construction of cellulosic or “second generation” biofuels.

## **PRICE AND TRADE IMPACTS**

This study looks at the price and trade effects of the biofuels boom on agricultural commodities, including those that serve as the inputs for the production process. Using AGLINK, the multi-region, multi-commodity dynamic partial equilibrium model maintained by the OECD and its member countries, the effects of increased demand for commodities due to the biofuel production was analyzed. Given that ethanol production was modeled for Canada and the US, and biodiesel production was modeled for Canada, the US and the EU, the direct impact of biofuels was analyzed for coarse grains (corn, barley, rye, oats and sorghum), wheat and vegetable oil. The projection period was from 2005 to 2015.

The direct impacts of biofuels policies are simulated by first constructing a baseline scenario with no biofuel demand included, and then “shocking” the model to include biofuel demand. A comparison of the two scenarios provides supply, demand, trade and price impacts resulting from biofuel demand over the 2005 to 2015 projection period. For corn, the average relative increase in price over the baseline was roughly 45 percent, while wheat markets showed smaller increases at 9 percent. Vegetable oil prices reached a high of 24 percent over the baseline in 2008, with an average increase of 17 percent. For the three commodities mentioned, increases were seen in the initial three or four years of the ten-year projection period, with more of a converging trend between the price path and the baseline as the period ended.

The implications of these numbers are not only significant for grain farmers, but also for livestock producers and the ethanol production companies themselves. While grain

farmers may see increases in their gross revenue, the prices of many energy-based inputs are increasing as well. Recent numbers out of both Canada and the US suggest that the gains from high commodity prices are being capitalized into agricultural land values, both cropland as well as land more suitable for pasture. Higher grain prices also mean higher feed costs for livestock producers. Results from this analysis show that Canadian livestock producers in general, face an average increase of 28 percent for total wheat, coarse grains and oilseed meal feed expenditures over the projection period. These numbers, as well as the increases in pork and beef market prices seen in the analysis (12 percent and 6 percent, respectively), suggest that contraction occurs in Canadian hog and cattle herds. As grain prices increase, margins on ethanol production also become tighter. Reports out of the US confirm that some plants are closing their doors, and other planned construction is being put on hold.

Aside from the price impacts, the sheer amount of feedstock being fed into biofuels production leads to questions about the effects on world-wide grain trade. From this analysis, the net trade (the difference between exports and imports of a specific commodity for a certain country) impacts for several commodities were determined on a per country basis. In the US, coarse grains exports declined by 62 percent, due to the sheer amount of corn going directly into ethanol production. Beef and veal exports of meat, as well as live animals, also decreased by about 13 percent. Oilseed exports in Canada fell by about 6 percent, with slightly larger numbers estimated for the US. This is partially due to the emerging biodiesel industry, but more likely is a result of producer crop rotation decisions, as increasing amounts of land are switched into corn and away from soybeans. Canadian net trade in wheat also dropped by about 14 percent. In the EU25, coarse grain exports fell by roughly 8 percent, accompanied by a fall in beef exports by about 16 percent. European oilseed imports remained fairly constant relative to the baseline; however, in Canada, net trade in oilseeds declined by 7 percent. Producer prices for pork and beef in Canada also increased by 12 percent and 6 percent, respectively.

These results are based on a significant amount of distillers grains (a by-product of ethanol production) being fed back into the feed market, as these by-products are able to substitute for the energy and protein components of livestock rations. For dairy cattle, beef cattle, pork and poultry, the substitutability of distillers grains for corn and soy meal (energy and protein) varies. It should be noted that our results are based on ambitious substitutability assumptions of distillers grains. Future work will vary these assumptions to provide a sensitivity analysis around the results.

## **WTO IMPLICATIONS**

Due to both ambitious consumption mandates being set world-wide and the inability of many countries to domestically source feedstock to produce these biofuels, it is expected that trade in biofuels will continue to increase. As of 2006, Brazil is the most significant exporter of ethanol, shipping to countries as diversified as the US, Sweden and Japan. This raises questions as to how biofuels fall into the framework of the organizations overseeing international trade. Under the structure of the World Trade Organization,

biofuels could potentially fall under agricultural, industrial, or even environmental goods. This distinction is significant for their inclusion in various types of negotiations, and ultimately, to the level of bound tariffs member countries can apply. Currently, ethanol is considered an agricultural good, although imports for industrial purposes and for fuel use are indistinguishable. Biodiesel is classified as an industrial good; however, future biofuels, particularly those from non-agricultural sources need a better defined method for incorporation into the existing WTO framework.

In most cases, large-scale biofuel production is both highly subsidized and heavily protected with border measures to prevent imports. However, once imports do enter, any national or state-level measures to promote the consumption of locally-sourced biofuel or biofuel feedstocks, would violate the principle of national treatment, in that imports be treated equivalently to the same goods produced in-country. Those with a vested interest in ensuring this principle is upheld are biofuel producers in tropical areas capable of producing renewable fuels with low-cost labour and cheaper, more effective feedstocks. These producers are often in developing countries and would also benefit from reduced government support for domestic production in developed countries, as well as from liberalization in the form of reduced border measures.

## **CONCLUSIONS**

The biofuels industry affects and is affected by government policies in countries around the globe. Government involvement takes many forms, most of which are intended to stimulate domestic production and create a fixed demand for bio-blended fuels. Regardless of whether government intervention involves consumption mandates, excise tax exemptions or subsidized capital loans, the motivations behind biofuels are influenced by policy-makers in many areas including, but not limited to energy, agriculture, the environment and rural development. This analysis shows conservative impacts of biofuels consumption on the prices of grains and oilseeds, as well as livestock.

Ambitious consumption mandates in developed countries, and increasingly, in developing ones as well, are bringing forth the need to incorporate a politically-complex product into an existing system of trade laws and principles based on liberalization. It also illustrates the need to anticipate the arrival of second generation biofuels and to be able to create distinguishable classifications within the current framework.