The Economics of Canada Biofuel Policies

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Abstract
Most developed countries and several developing ones have renewable policies for motor fuels. In Canada, federal regulation has required minimum renewable contents in gasoline and diesel since 2010. On average, gasoline and diesel produced or imported into Canada must have a renewable content of at least 5% and 2%, respectively. Fuel producers meet these requirements by blending ethanol into gasoline and biodiesel into diesel. Many provinces have blend mandates that exceed the federal requirements. Saskatchewan and Manitoba mandate 7.5% and 8.5%, respectively, of ethanol in gasoline. British Columbia and Ontario mandate 4% of biodiesel in diesel fuel.

Disciplines
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Comments
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Most developed countries and several developing ones have renewable policies for motor fuels. In Canada, federal regulation has required minimum renewable contents in gasoline and diesel since 2010. On average, gasoline and diesel produced or imported into Canada must have a renewable content of at least 5% and 2%, respectively. Fuel producers meet these requirements by blending ethanol into gasoline and biodiesel into diesel. Many provinces have blend mandates that exceed the federal requirements. Saskatchewan and Manitoba mandate 7.5% and 8.5%, respectively, of ethanol in gasoline. British Columbia and Ontario mandate 4% of biodiesel in diesel fuel.

Canada has two primary motives for mandating renewable fuels. The first is to reduce greenhouse gas (GHG) emissions. To qualify, renewable fuels must attain certain GHG emission targets in comparison to fossil fuels. Early literature shows that the net GHG emissions from biofuel results in increased GHG emissions, in particular because of indirect land use change. However, recent literature shows that biofuel policy leads to a small reduction in GHG emissions. A second motive for the adoption of biofuel policies in Canada is to support the agricultural sector. Indeed, the main feedstock in the production of first generation biofuels are grains (wheat, corn, canola and soy). Biofuel mandates effectively increase the demand for grains, hence increasing agricultural commodity prices and therefore providing indirect support to farmers. National security is a motive for the adoption of biofuel policy in several countries, including the United States, but not in Canada. These countries seek to reduce their reliance on imports of fossil fuels.

Consumption, production and trade of biofuels in Canada

We can quantify the obligation of Canada’s renewable policies utilizing data on fuel consumption (Cansim Table 134-0004). In 2016, gasoline and diesel consumption was about 37 billion litres and 26 billion litres respectively. Applying the minimum federal blend rates of 5% for gasoline requires minimum ethanol volumes of 1.9 billion litres. Likewise, applying the 2% blend rate for diesel results in a minimum blending for biodiesel of about 500 million litres. We expect the actual consumption of ethanol and biodiesel to be larger because of provincial blend rates that exceed the federal mandates.

Indeed, the data indicate that the effective blend rate exceeds the minimum federal requirement. According to Renewable Industries Canada (see http://ricanada.org/), domestic production of ethanol was about 1.8 billion litres and production of ethanol

1 There are differences between biodiesel and renewable diesel such as the production processes and use in diesel blends. For simplicity, I will not distinguish between biodiesel and renewable diesel and will use the term biodiesel for both.
was about 400 million litres in 2016. Using data from the Government of Canada and the United States International Trade Commission, Canada’s net imports in 2016 were about 900 million litres for ethanol and 1.14 billion litres for biodiesel. Summing up domestic production and imports of ethanol implies that Canada blended about 2.7 billion litres of ethanol in gasoline in 2016 for an effective blend rate of 6.8%. The higher blend rate reflects higher provincial mandates but also that blenders may use more ethanol than mandated because it adds octane to gasoline at a low cost. The import line for biodiesel is defined as biodiesel mixtures containing less than 70% petroleum oil by volume. Hence, the large import volumes of 1.14 billion litres exaggerate the actual import volumes for biodiesel. Most likely, Canada consumes just enough biodiesel to meet federal and provincial mandates because the cost of producing biodiesel significantly exceeds the cost of producing diesel. In addition, biodiesel does not have properties that make it more valuable than diesel. Thus, blenders will tend to use as little biodiesel as required by law.

Impact on food prices
One of the motives of biofuel policy is to increase prices of agricultural commodities to support farms. Canada is a small country and its biofuel policies, taken in isolation, have a marginal impact on agricultural commodity prices, which are determined on the world market. However, as several countries adopted biofuel policies around the same time, the global effects of biofuel policies are non-negligible. The impact of biofuel policies on agricultural commodity prices is perhaps its most controversial aspect and is often referred to as the “food versus fuel” debate. The debate heated up in 2008 when droughts, stock out conditions and trade policies contributed along with the new demand for biofuel production to cause a surge in prices for agricultural commodities.

The economic literature provides plenty of evidence that biofuel policies around the world have caused a surge in the price of agricultural commodities. The estimated impacts of biofuel policies on prices vary significantly across studies for methodological reasons. In general, studies find that biofuel policies increase the price of corn between 10 and 30 percent. These estimates use counterfactuals where there are no biofuel policies. It is safe to say that the demand for grains would be lower today without biofuel policies and the work continues as it did before developed countries adopted mandates on biorenewables. However, because ethanol is an octane enhancer that costs less to produce than aromatics, and because ethanol is less polluting, there would be a demand for ethanol without biofuel policies. The amount of demand for what ethanol would be today without biofuel policies is unknown.

Most Canadians and consumers in developed countries did not likely notice an impact on food prices as a result of biofuel policies. The reason is that the cost of agricultural commodities is a small share of the total cost of food purchased at retail. Indeed, most of the cost of producing food is from value adding after the farm. This is less true, however, for food in developed countries where the farm value share of food is much larger. Therefore, while biofuel policies increased agricultural commodity prices globally, and subsequently supported farmers in developing countries, they negatively impacted consumers, especially those in poor countries (even in those countries that do not have biofuel policies).

Note that biofuel policies also have a distributional impact among farmers. Grain farmers gained from increased grain prices but, livestock, hog and poultry farmers lost because of higher feed costs.

Biofuels going forward
Biofuel policies are here to stay but will evolve and even possibly expand in some countries. The absolute market impacts of biofuel policies are slowly diminishing as yields for agricultural commodities keep increasing. The technology to produce second-generation biofuels from crop and wood residues is slowly improving and reducing production costs. It is unlikely that these costs will diminish enough to compete with first-generation biofuels in the short-run.

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