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The Economic Impacts of US Tariffs for Fuel Ethanol and Biodiesel

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This article provides a review of production, price, and trade data for fuel ethanol and biodiesel for the 2000-2016 period and projections for the 2016-2021 period. The Food and Agricultural Policy Research Institute (FAPRI) model is used for the projections. We find that the 2.5% US ethanol tariff could be eliminated with almost no consequences. For biodiesel, the situation is different. The 6.5% biodiesel tariff provides modest protection for US producers—US domestic production is estimated to be around 3.5% lower without the tariff, and domestic prices about 2.4% lower. A major decision about antidumping rules is likely forthcoming, in part, because US producers lost the domestic biodiesel subsidy in 2016. Proposed antidumping restrictions are in the range of 50-64% for Argentina and 41-68% for Indonesia. But this does not take into account the fact that by 2022, the Argentina export subsidies will be essentially zero. An antidumping suit is likely in near future.

Key words: ethanol, biodiesel, trade, tariffs, antidumping.

Introduction

The biofuel industry has grown in importance and become a significant source of demand for US agricultural feedstocks, primarily corn and soybeans. By 2016, US fuel ethanol (hereafter referred to as ethanol) production had reached almost 59 billion liters, accounting for 52% of world output. In the same year, US biodiesel production reached 6 billion liters, accounting for 20% of world output. The United States imports ethanol, primarily from Brazil, but since 2010 has been a net exporter. In recent years, US exports to the EU have been small due to trade restrictions, which have provided incentives for significant increases in EU domestic production. Brazil has exported small amounts of ethanol in years when large sugar crops have reduced sugar prices and made ethanol exports relatively more attractive. Argentina, Indonesia, and Malaysia have increased their exports of biodiesel in recent years and the United States has become a net importer of that biofuel.

The United States has imposed tariffs and restrictions on imports of biodiesel (until 2017) and ethanol (continuing), and the level of market protection and nations to which it applies have varied across time. Nevertheless, the economic effects of these trade restrictions have received little research attention to date. An early study used a partial equilibrium model calibrated to a single data point to conclude that the US ethanol tariff has a small impact on US ethanol prices, but increases the world price by almost the full amount of the tariff (de Gorter & Just, 2008). Another study, also using a calibrated partial equilibrium approach—but including ethanol feedstock markets in the model—found that removing the US ethanol tariff would have much larger effects, reducing domestic production by approximately 7% and US prices by approximately 14% (Elobeid & Tokgoz, 2008). Several other studies have investigated the joint effects of US biofuel tariffs in combination with other biofuel subsidies and mandates (e.g., Babcock, 2012; Cui, Lapan, Moschini, & Cooper, 2011; de Gorter & Just, 2011; Thompson, Whistance, & Meyer; 2011). However, most of these studies use a model calibrated to a single data point and parameterized with assumed elasticities. In part, this is because sufficient data was not yet available to generate direct econometric estimates. Most existing studies have also focused on ethanol and not included biodiesel.

This article has two goals. The first is to provide an up-to-date discussion of trends and tariff policy issues in world biofuel markets. This discussion helps set the scene and provides context for the second goal, which is to provide quantitative estimates of the economic impacts of US import tariffs and antidumping duties applied in ethanol and biodiesel markets. The main innovation in our approach compared to past research is that we use a structural econometric model rather than a simulation model calibrated to a single data point. We also investigate biodiesel tariffs in addition to ethanol and find that biodiesel tariffs now have more significant effects than the ethanol tariff. We have not been able to find any previous research that provides estimates of the economic effects of biodiesel tariffs. The estimates in

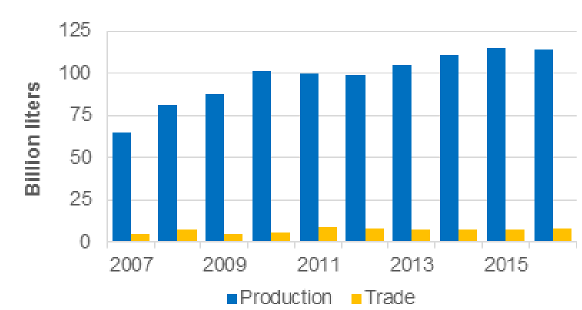

Figure 1. Global ethanol production and trade.
Source: F.O. Licht (n.d.)

our article are also based on more—and more recent—data than those from previous research. This allows us to provide some new perspectives on the economic impacts of US biofuel tariffs.

Three main outcomes from tariff policy are investigated: (1) impacts on production and consumption levels in the United States and other major biofuel countries; (2) impacts on trade flows between countries; and (3) impacts on US and world biofuel prices. Knowledge of these effects is important for policymakers as they consider future changes to biofuel trade policy and evaluate the effects of historical policies.

A structural econometric model is used to estimate the effects of US biofuel tariffs. Specifically, we use the FAPRI (Food and Agricultural Policy Research Institute) model to estimate production, consumption, trade flows, and prices in different countries under the historical US trade policy regime for biofuels. Then the model is simulated under the counterfactual situation where US tariffs are removed. Comparing results with and without the tariffs provides a quantitative estimate of their effects.

The article begins with a discussion of historical data on world production and trade in ethanol and biodiesel, along with a review of biofuel trade restrictions applied in different countries. Because the data for biofuels are from different sources, there are several units of measure used, such as liters, tonnes, barrels, and gallons. This article uses the original units reported, but to enable comparison across units, Appendix Table 1 provides conversion factors for the various units of measure. This discussion provides background information on recent trends in world production and trade and context for discussion of the quantitative estimates of tariff effects provided later. Then the FAPRI model is outlined and projection results are provided, followed by a discussion of policy implications of the results and major conclusions.

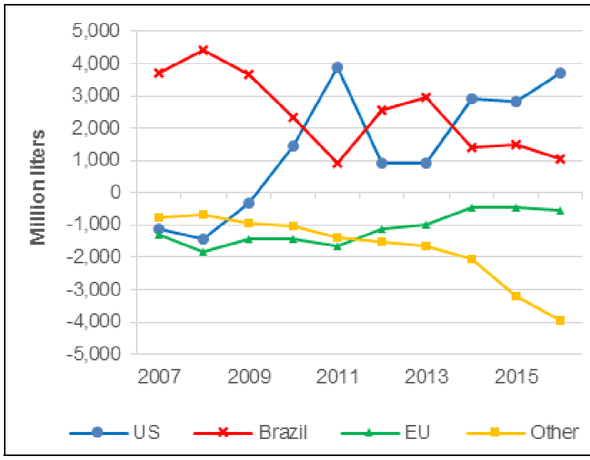

Figure 2. Ethanol net exports.
Source: F.O. Licht (n.d.)

A Brief Review of World Biofuels Production and Trade

Production of ethanol and biodiesel is concentrated in a small number of countries. The United States and Brazil are the major ethanol producers, accounting for nearly 75% of the approximately 120 billion liters of current annual global output. The United States alone produces about 50% of the world's ethanol. Ethanol is consumed primarily in the countries where it is produced, and global trade is only 6-7% of world production (Figure 1).

In addition to being the primary ethanol producers, the United States and Brazil dominate global exports (Figure 2). Historically, the EU has been the main destination for ethanol exports. In recent years, however, the EU has become nearly self-sufficient in ethanol and other countries are beginning to import from the United States and Brazil.

Biodiesel production is also concentrated in a small number of countries. The major producers are the EU and the United States, with significant production also occurring in Brazil. For biodiesel, however, the major producing countries are not the major exporters. The biggest biodiesel exporters are Argentina, Indonesia, and Malaysia, none of which is a major producer (although production in those countries is increasing). Biodiesel is more widely consumed than ethanol, which results in 12-15% of global production being traded (Figure 3).

The EU has used tariff and tax policies to support biodiesel production, generating near self-sufficiency in biodiesel since 2013 (Helmar, Johnson, Myers, Deepayan, & Baumes, 2017). As a result, the EU no longer

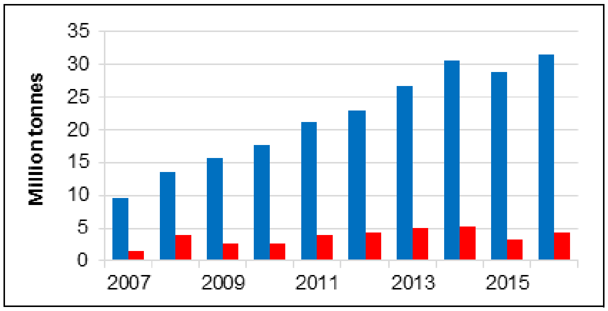

Figure 3. Global biodiesel production and trade.
Source: F.O. Licht (n.d.)

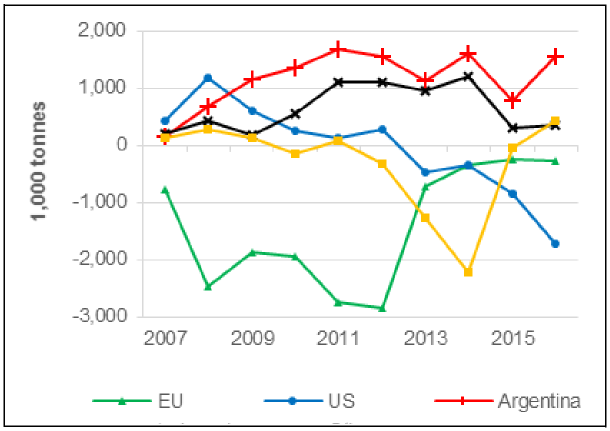

Figure 4. Biodiesel net exports.
Source: F.O. Licht (n.d.)

absorbs the majority of biodiesel exports, as it had done previously for many years. The United States and a number of other smaller importing countries have taken over as major biodiesel importers. Argentina, Indonesia, and Malaysia are increasing their biodiesel production, but most of this production is for export rather than domestic consumption. These three countries account for a relatively small share of global production but have gained significant export market share (Figure 4). In the past decade, the United States has transitioned from being the largest exporter of biodiesel to becoming the largest single importer during the past two years.

Biofuels in the United States

With the implementation of the Renewable Fuels Standard (RFS) in 2006, the United States has become the largest single-country consumer of ethanol. Yet US ethanol production has increased even faster, allowing the United States to become more than self-sufficient, with exports exceeding imports since 2010 (Figure 5). The United States does import ethanol in most years and for most of the past decade Brazil has supplied the majority

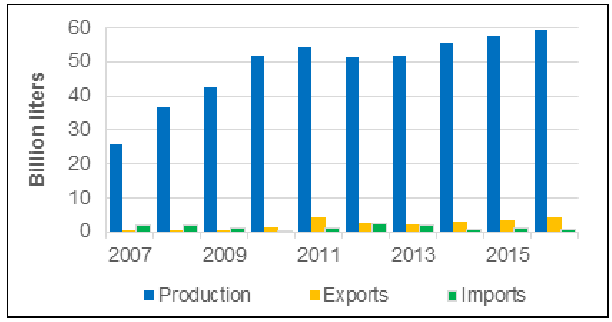

Figure 5. US ethanol production and trade.
Source: F.O. Licht (n.d.)

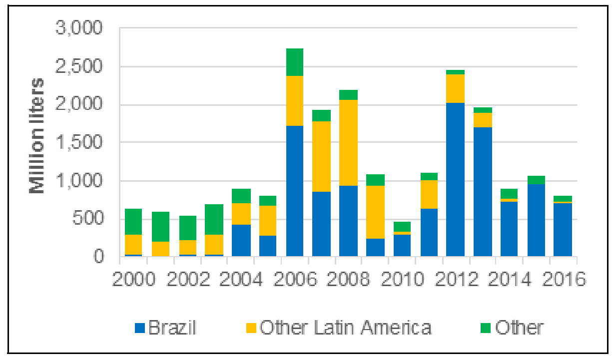

Figure 6. US ethanol imports by source.
Source: USDA FAS (n.d.)

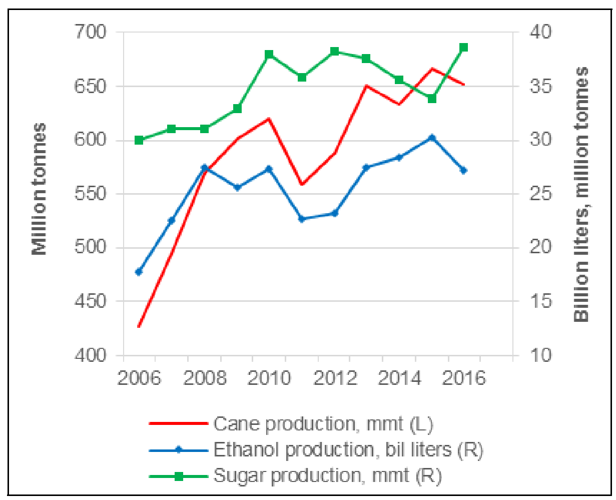

Figure 7. Brazilian sugar and ethanol.
Source: UNICA (n.d.)

of US imports (Figure 6). In recent years Brazil has captured nearly the entire US import market. Brazil's ethanol is from sugarcane which means their ethanol production competes with sugar as an alternative product. The result has been that sugarcane production fluctuations result in more volatility in ethanol production than in sugar production (Figure 7) and, to a lesser

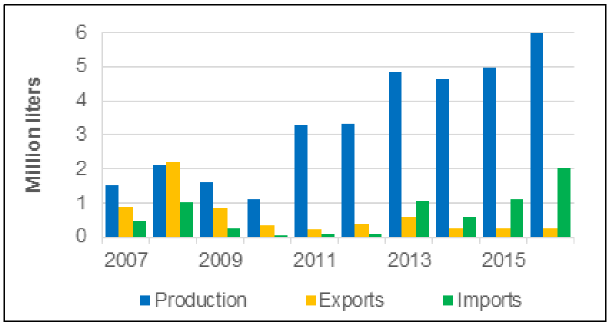

Figure 8. US biodiesel production and trade.
Source: F.O. Licht (n.d.)

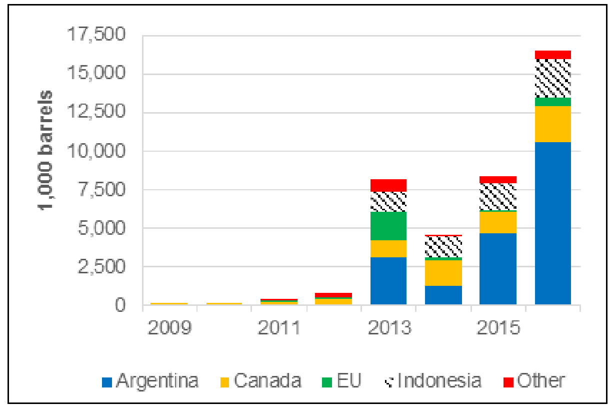

Figure 9. US biodiesel imports by source.
Source: US Energy Information Administration (n.d.)

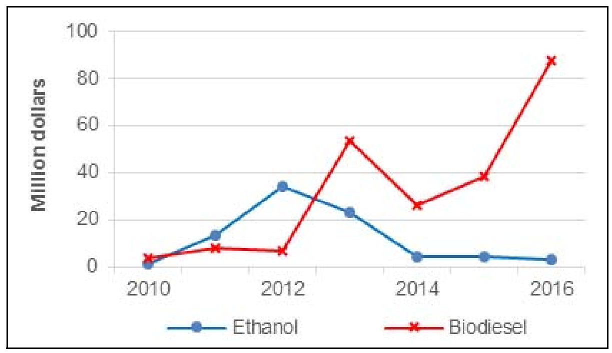

Figure 10. US biofuel import tariff revenue.

extent, results in fluctuations in Brazilian ethanol supplies available for export. Additionally, changes in relative prices of ethanol and sugar shifts allocation of sugarcane from one product to the other, contingent on adequate capacity available to increase ethanol or sugar production.

The US biodiesel market has expanded rapidly since 2011. Domestic production of biodiesel more than doubled from 2011 through 2016 and yet the United States transitioned from a net exporter to a net importer (Figure 8), due to a more than proportionate increase in domestic demand. US self-sufficiency fell from 110% to less than 80% by 2016. Yet the United States still exports biodiesel. The traditional market for US biodiesel was the EU, but EU tariff and tax policy has largely eliminated US access to that market (Helmar et al., 2017). The United States has found other buyers for its biodiesel, with the largest being Canada. However, US consumption growth has more than absorbed increases in US production, and the United States is now a net biodiesel importer.

As US imports of biodiesel have risen since 2012, the primary exporters to the United States have been Argentina, Canada, and Indonesia (Figure 9). Argentina alone supplied nearly 65% of US imports in 2016. Biodiesel trade between Canada and the United States nearly balances. Other Asian exporters, such as Indonesia and Malaysia, have also exported to the United States. These Asian countries are palm oil producers and rapid production increases in recent years have resulted in expansion of their biodiesel production and exports.

US Biofuel Import Tariffs

The United States has imposed tariffs and trade restrictions against imports of both ethanol and biodiesel. Figure 10 provides estimates of revenues from tariffs on ethanol and biodiesel entering the US market from 2010-2016. The tariff for ethanol has been quite low at 2.5%, and US imports of ethanol have declined since 2012. Hence, revenues have dropped to around only $3 million per year in 2016. With the small revenue stream expected from continued low imports, the budgetary value of maintaining the ethanol tariff in the face of administrative costs is questionable. Figures 5 and 6 show that the United States is more than self-sufficient in ethanol and that Brazil is the major exporter. As previously discussed, Brazil tends to export ethanol when world sugar prices are low or when sugar cane production is higher than expected. But US imports from Brazil are currently quite small and the tariff rate is only 2.5% so it seems likely the economic impacts of the US ethanol tariff have become minor.

US tariffs on biodiesel have historically been larger than on ethanol. The estimates In Figure 10 assume the tariff rate the United States applies to Argentine biodiesel (4.6%) is applied to all imports. This is an oversimplification because there have been different tariff rates applied to different countries. Biodiesel from Canada, for example, has no tariff due to the North American Free Trade Agreement. There are also slight tariff differ-

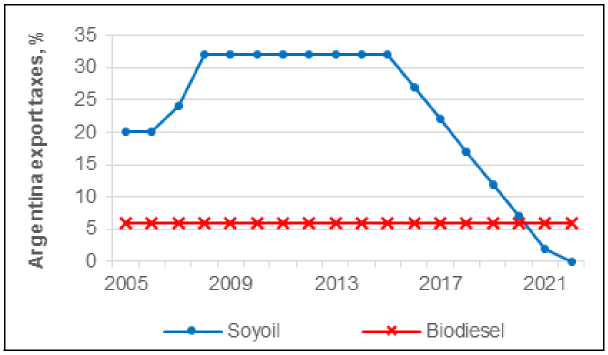

Figure 11. Argentine export taxes favor biodiesel.

ences for other countries but since Argentina is the major exporter to the United States we have used 4.6% for illustrative purposes. In 2016, the estimated US biodiesel tariff revenue was approximately $88 million.

There has been major controversy surrounding the “dumping” of biodiesel from Argentina and Indonesia into the US market (Kotrba, 2017; Swift, 2017; Thompson, 2017). For Argentina, the dumping claim stems from different export taxes for soybean oil and biodiesel. Argentina currently collects a 6% tax on exports of biodiesel but in 2016 the export tax on soybean oil was 27% (Figure 11). This effectively reduces the internal soybean oil price more than the biodiesel price. Since soybean oil is the feedstock used for Argentine biodiesel, this amounts to a sizable subsidy for biodiesel producers. However, the export tax on soybean oil is scheduled to fall from 32% in 2015 to 0% in 2022. If the tax falls according to the projected schedule the subsidy provided to Argentine biodiesel producers will disappear around 2020, eventually becoming an implicit tax (Figure 11).

Palm-oil-based biodiesel imported from Indonesia has a lower price than biodiesel from other feedstocks because palm oil has a relatively low world price, which reduces production costs. However, palm-oil-based biodiesel is not a perfect substitute for US soybean-based biodiesel because of its higher cold-filter plugging point, which limits its use to warmer months and climates. Nevertheless, palm-oil-based biodiesel has made inroads into the US market. Indonesia imposes a variable export tax on crude palm oil and palm oil products (not including biodiesel). This export tax, like that in Argentina, acts as a subsidy for domestic biodiesel producers by effectively lowering the domestic palm oil price, and therefore the cost, of the feedstock. In addition, part of the export tax revenue is used to further subsidize biodiesel production. The level of the subsidy depends on the export tax rate, which is set by the Indonesian Government from month to month, and can vary considerably over time. Because Indonesian palm oil production has recovered from low levels two years ago, exports and export tax revenue are both expected to increase this year, providing increased funding for biodiesel export subsidies (Chow, 2017).

Recently, the US International Trade Commission voted 5-0 to impose antidumping restrictions on both Argentina and Indonesia because of their subsidization of domestic biodiesel production. The duties will be from 50-64% on imports from Argentina and 41-68% on imports from Indonesia. These antidumping duties will likely eliminate the incentive for those countries to export to the United States (Swift, 2017; Thompson, 2017). These developments illustrate the importance of understanding the economic effects of US biofuel tariffs and trade restrictions.

Empirical Results on the Impacts of US Biofuel Tariffs

The econometric model of world production, consumption, and exports/imports of biofuels used for the analysis in this article is based on the FAPRI model maintained at the University of Missouri (Debnath, 2017). The model has a multimarket supply/demand structure that can be used to solve for world ethanol and biodiesel prices that clear international markets in each year. The supply sector consists of beginning stocks, production, and imports, while the demand sector includes domestic disappearance, exports, and ending stocks. Ethanol and biodiesel production depend on the respective prices of ethanol and biodiesel, and domestic feedstock prices. Domestic disappearance depends on mandated consumption, petroleum prices, biodiesel and ethanol prices, and income. Imports and exports depend on relative international and domestic ethanol and biodiesel prices. The basic structure of the model takes the general form:

- Capacity = f(biofuels price, feedstock price)
- Capacity Utilization = f(biofuels price, feedstocks price)
- Production = Capacity * Capacity Utilization
- Biofuel Use = f(ethanol/biodiesel price, gasoline price, mandates, GDP)
- Total Fuel Use = f(ethanol/biodiesel price, gasoline price, GDP)
- Anhydrous Ethanol Fuel Use = Blending mandates * Total Fuel Use

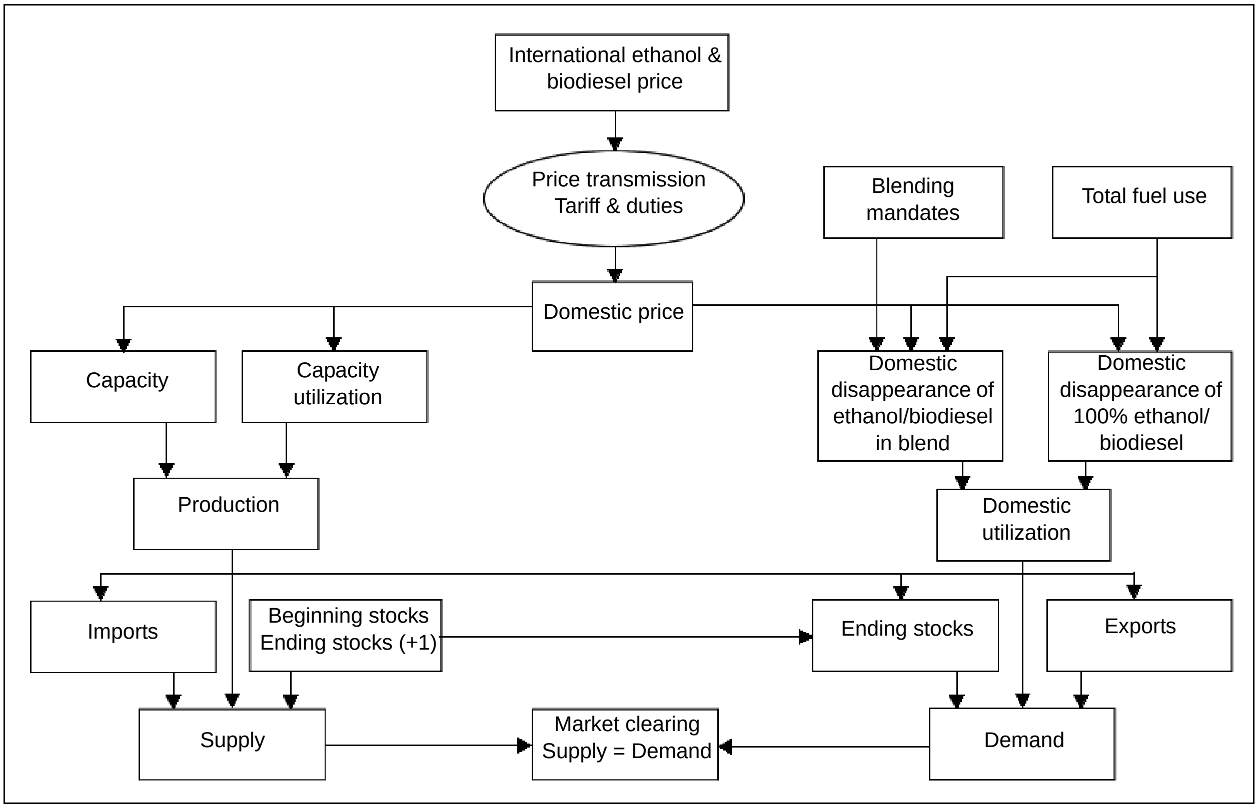

Figure 12. Schematic representation of an individual market within the international biofuels model.

- Domestic Ethanol Disappearance = ethanol fuel use + other uses
- Stocks = f(biofuels prices, production)
- Exports/Imports = f(domestic biofuels prices, international biofuels prices, trade policy)
- Stocks $_{t-1}$ + Production + Imports = Domestic disappearance +Exports + Stocks

Figure 12 represents the main features of the FAPRI biofuel model for one country. Note that the tariffs and duties are represented as a wedge between international and domestic prices. With blending mandates, the domestic prices are then fed into biofuel use. Capacity and capacity utilization rates are also represented in Figure 12. Combining these equations then generates domestic production and utilization, along with beginning and ending stocks. Excess demand is calculated as the difference between demand and supply, giving the net trade position. Excess demand positions are then summed to give a global excess demand position. Global prices are then adjusted until the global market clears, leaving excess demand of zero and global market equilibrium.

The econometric model was used to project world biofuel market outcomes over the 2016-2021 period. Outcome variables of interest are production, consumption, trade flows, and prices for the major exporters (the United States, Argentina, Indonesia, and Canada). First, a baseline scenario was projected where tariffs were set at the historical values that were used in the model for 2016 (the status quo). Next, an ethanol tariff elimination scenario was run where the ethanol tariff was set to zero but the biodiesel tariff remained at its baseline level. Finally, a biodiesel tariff elimination scenario was run where the biodiesel tariff was set to zero but the ethanol tariff remained at its baseline level. Comparing projected outcome variables under the tariff elimination scenarios to the baseline provides a quantitative estimate of the economic impact of the tariffs.

Other outcome variables may also be of interest. For example, concerns have been expressed about negative side effects from the increase in biofuel production. These include food security issues, excessive water consumption, environmental concerns, and undesirable land use changes (e.g., Carter & Schaefer, 2015; Chen, Weber, Khanna, & Onal, 2014; De Beer & Smith, 2011; Earley, 2009; Hertel, Tyner, & Binur, 2010; Hoekman,

Table 1. US biomass-based diesel sector.

Calendar year	2016	2017	2018	2019	2020	2021
Production			(Million gallons)			
Baseline	1,907	2,011	2,132	2,236	2,288	2,292
Scenario change	0	-51	-48	-64	-72	-80
Percent change	0.0	-2.5	-2.2	-2.9	-3.2	-3.5
Domestic disappearance						
Baseline	2,431	2,759	2,833	2,966	3,016	3,056
Scenario change	0	-1	-1	0	1	0
Percent change	0.0	0.0	0.0	0.0	0.0	0.0
Net imports						
Baseline	551	762	709	734	731	765
Scenario change	0	50	47	64	73	81
Percent change	0.0	6.6	6.6	8.7	10.0	10.5
Prices			$/gallon			
US biodiesel rack						
Baseline	3.22	3.31	3.42	3.58	3.66	3.68
Scenario change	0.00	-0.10	-0.10	-0.09	-0.09	-0.09
Percent change	0.0	-2.9	-2.9	-2.5	-2.5	-2.4
Argentina, FOB						
Baseline	2.74	2.92	2.98	3.19	3.33	3.44
Scenario change	0.00	0.05	0.04	0.05	0.05	0.05
Percent change	0.0	1.6	1.4	1.7	1.6	1.4
Exports						
Argentina						
Baseline	465	509	510	534	559	590
Scenario change	0	6	7	9	11	12
Percent change	0.0	1.3	1.4	1.8	2.0	2.1
Indonesia						
Baseline	108	257	272	296	286	304
Scenario change	0	7	8	14	19	23
Percent change	0.0	2.6	3.1	4.6	6.6	7.7
Other						
Baseline	127	201	178	176	132	101
Scenario change	0	22	17	24	26	28
Percent change	0.0	10.7	9.7	13.8	19.9	28.2

2009; Oladosu & Msangi, 2013; Searchinger et al., 2008; Switzer & McMahon, 2011; Tyner, 2013; Ziolkowska, Meyers, Meyer, & Binfield, 2010). We acknowledge these issues but they are not the subject of this article. Here we focus on production, consumption, trade, and price effects of historical US tariff policies.

The descriptive analysis earlier in this article suggested that the US ethanol tariff is likely to have little effect over the projection period because it is only 2.5%, and ethanol imports into the United States are now small. The econometric analysis supports this conclusion with only minor differences in key outcome variables with and without the 2.5% ethanol tariff. Because these effects are so small we do not report them here. The conclusion is that the US ethanol tariff could be eliminated with little impact on the US or world markets.

The effects of US biodiesel tariffs are more important. Table 1 reports projections with and without biodiesel tariffs, as well as the projected differences between the two scenarios to isolate the effect of the tariff. Domestic US production of biodiesel is projected to be

Table 2. Argentina soy-based biodiesel subsidy.

	2016	2017	2018	2019	2020	2021	2022
Prices				**(Dollars per gallon)**			
Soy diesel	3.22	3.31	3.42	3.58	3.66	3.68	3.72
Soybean oil	2.54	2.61	2.52	2.70	2.76	2.83	2.81
Export tax				**Percent**			
Soy diesel	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Soybean oil	27.0	22.0	17.0	12.0	7.0	2.0	0.0
Export tax				**(Dollars per gallon)**			
Soy diesel	0.19	0.20	0.21	0.21	0.22	0.22	0.22
Soybean oil	0.69	0.57	0.43	0.32	0.19	0.06	0.00
Biodiesel subsidy							
$/gal	0.49	0.38	0.22	0.11	-0.03	-0.16	-0.22
Percent	15.3	11.4	6.5	3.0	-0.7	-4.5	-6.0

Source: FAPRI data

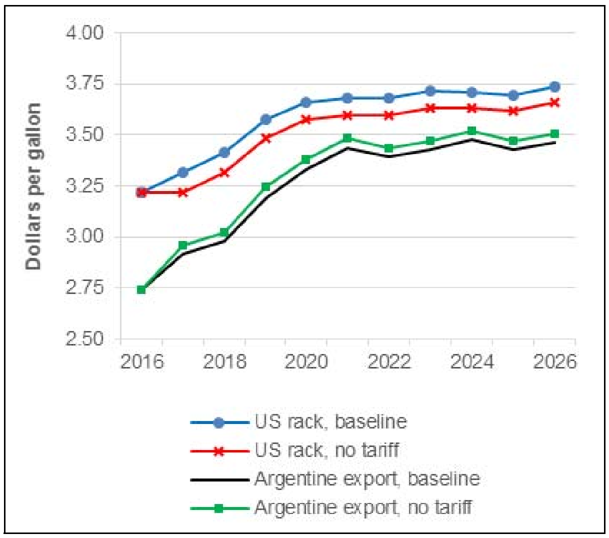

Figure 13. Biodiesel prices.

3.5% lower by the end of the projection period (2021) without the tariff compared to the baseline, indicating the tariff provides a modest boost to the US domestic biodiesel production sector. However, US consumption is not affected by the tariff due to mandates. This leads to the projection that US biodiesel imports would be about 10% higher by 2021 without the tariff compared to the baseline, while US price would be 2.4% lower. The US biodiesel tariff has the expected effect of protecting domestic production, reducing imports, and increasing domestic prices. However, the domestic US production and price effects of the tariff are modest.

Argentine exports are projected to be 2.1% higher by 2021 without the tariff compared to the baseline, and the Argentine price would be 1.5% higher. These effects seem rather small for Argentina but occur because other exporters, in particular Indonesia, are also able to take advantage of the US tariff reduction. Indonesian imports are projected to be 7.7% higher by 2021 without the tariff compared to the baseline, and imports from other countries are projected to be 28.2% higher if the tariff is eliminated. So although the US biodiesel tariff is estimated to have modest price effects, the influence on imports and trade flows are projected to be proportionately larger.

Figure 13 provides more detail on the price effects of the biodiesel tariff. In the figure, US and Argentine biodiesel price projections are compared graphically under the baseline and no tariff scenarios. Results indicate the US price would be lower and the Argentine price higher without the tariff, that the proportional price effect is greater for US prices compared to Argentine prices, and that neither effect is large in percentage terms (both prices change by less than 3%).

Policy Implications

The US biodiesel tariff is projected to have minor impacts on US producers and consumers but more significant effects on exporters and trade flows. One factor that will influence future Argentine prices is the scheduled reduction in export taxes for soybean oil from 27% in 2016 to 0% in 2022. As the differential between biodiesel and soybean oil taxes declines, the implicit Argentine biodiesel production subsidy will also fall. Table 2 provides projected estimates of biodiesel subsidies resulting from the tax differential. By 2020, the soybean diesel producer subsidy provided by the tax differential disappears and if the soybean diesel export tax remains in place, Argentine biodiesel producers will eventually face an implicit tax.

After 2016, the $1 per gallon biodiesel tax credit for US blenders was eliminated. Table 2 shows that the Argentine market protection provided by the export tax differential was about $0.50 in 2016. After the US tax credit was removed, the biodiesel industry lobbied for—and was successful in obtaining—antidumping protection against Argentine and Indonesian biodiesel. If the $1 per gallon credit were to be restored, US subsidies would again be larger than those for Argentina and the rationale for protecting the domestic market would be severely weakened, if not eliminated.

Domestic US prices are lower as a result of imports from Indonesia and Argentina. As already mentioned, Canadian imports and exports about cancel so the major price impact is on Argentine and Indonesian imports. With the elimination of US tariffs, net US imports grow by about 10% in 2021. Concern about the necessity for antidumping restrictions against Indonesia and Argentina seems a bit overblown from the viewpoint of price and trade impacts. Nevertheless, while global prices and trade patterns are not severely affected, the US biodiesel industry has been, and will continue to be, negatively impacted until trade barriers are dismantled by all trading nations.

Trade barriers, especially US antidumping restrictions, are unlikely to continue to be applied to Indonesia or Argentina. For Argentina, the antidumping restrictions are likely to become unnecessary with the reductions in benefits to biodiesel exports. Indonesia is a major consumer of biofuel and, in particular, biodiesel and their domestic demand is growing and likely to reduce Indonesian exports of biodiesel (Chow, 2016; Kharina, Malins, & Searle, 2016).

The key implication from these results is that Argentina, Indonesia, and other exporters will increase exports to the United States if US tariffs are eliminated, but the price effects are somewhat small. Furthermore, Argentine dumping will be less of an issue than it appears to be now because of the gradual reduction in their implicit subsidization of biodiesel production.

Conclusions

There are several key conclusions from this analysis. First, the US ethanol tariff now has only minor effects on the United States and its trading partners. Hence, the ethanol tariff could be eliminated without major implications for US producers, consumers, or government revenues, and without major implications for ethanol trade flows.

The US biodiesel tariff is projected to have more important impacts. This tariff provides modest support for domestic producers (domestic production estimated to be around 3.5% lower and domestic price around 2.4% lower without the tariff). However, the biggest proportional impact is on US imports, which are estimated to be around 10.5% higher without the tariff. Hence, the tariff has effects on biodiesel exporters, particularly Argentina and Indonesia. Effects on Argentina are modest (exports estimated to be around 2.1% higher and price 1.4% higher without the US tariff) but the proportional influence on Indonesian exports (7.7% higher in 2021 without the US tariff) and exports from other countries (28.2% higher in 2021 without the US tariff) is more significant. Therefore, elimination of US biodiesel tariffs would have some important effects.

Argentine export tax changes are likely to have a major influence on US import tariffs on Argentine biodiesel. Argentine export taxes on soybean oil feedstock are set to decline to zero by 2022, eliminating the implicit subsidy for biodiesel producers. This reduction would reduce Argentina's export advantage and is already codified in the Argentine legal framework (and is therefore likely to occur). The decrease is linear and may soon alleviate the rationale for antidumping restrictions against Argentina. For this reason it seems likely that Argentina will soon challenge the US antidumping regulations, likely leading to elimination or reduction of US biodiesel tariffs against Argentina.

Elimination of the US biodiesel tariff would likely lead to major proportional increases in Indonesian and Malaysian exports to the United States. However, the actual quantity imported to the United States from these countries will be limited by the higher cold-filter plugging point of palm-oil-based biodiesel, which limits the use of this biodiesel to warmer regions and months.

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Authors' Notes

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Appendix Table. Weights and measures conversions.

Unit	Liter	US gallon	Barrel	Tonne (ethanol)	Tonne (biodiesel)
1 liter =	1	0.264	0.006	0.0008	0.0009
1 US gallon =	3.785	1	0.026	0.003	0.003
1 barrel =	159.0	42.0	1	0.125	0.139
1 tonne of ethanol =	1,267.4	334.8	7.97	1	n/a
1 tonne of biodiesel =	1,142.9	331.1	7.19	N/A	1