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US biofuels policy, global food prices, and international trade obligations

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The Renewable Fuels Standard created under the 2007 Energy Independence and Security Act establishes minimum biofuels blending mandates in the United States. The regulation raises world food prices by diverting a substantial portion of US corn and soybeans away from global markets and into the production of ethanol and biodiesel. Despite these distortionary effects and opposition to the policy worldwide, the global community likely has no recourse to challenge this policy under existing international agreements. To make any meaningful reductions in government intervention in agriculture, trade negotiations must expand beyond trimming farm payments to curtail broader policy instruments that affect food prices.

It has been 20 years since the international community implemented the World Trade Organization (WTO) Agreement on Agriculture (AoA) to curtail farm subsidies and lessen their distortive impact on international trade. Yet the US agricultural industry remains heavily protected. The 2014 US Farm Bill introduced new programs that are likely to result in generous farm subsidies for major row crops and the dairy sector and that increase distortions in domestic production and trade patterns. However, the 2014 Farm Bill is only one vehicle through which the US government intervenes in the agricultural sector. Federal health, environmental, and energy programs also have important effects on domestic and global crop and livestock markets and prices.

Among the broader set of US government policies that affect agriculture and food prices, the Renewable Fuel Standard (RFS) established by the 2007 Energy Independence and Security Act has had substantial economic impacts. The RFS requires that transportation fuel sold in the US contain a minimum of 15 billion gallons of ethanol by 2015 (Environmental Protection Agency 2010), about 10 percent of the nation's motor fuels supply. Unless Congress acts to modify or terminate the RFS, the minimum requirement will be expanded to 36 billion gallons of total biofuels by 2022, of which 16 billion must be produced using cellulosic raw materials (for example, switchgrass), 5 billion must consist of other advanced biofuels (a certain portion of which must be biodiesel),[1] and up to 15 billion gallons can be conventional biofuels (Environmental Protection Agency 2010).

[1] The minimum biodiesel requirement was set at 1 billion gallons for 2012 (Environmental Protection Agency 2013). Subsequent mandates are determined year to year based on the availability of biodiesel and other criteria (Union of Concerned Scientists 2012).

US Biofuels Policy

At this point, almost no experts believe that the required volume of either the cellulosic or other advanced biofuels is commercially or even technologically feasible. In the US, conventional biofuel is produced almost exclusively from corn, and in 2014, 5.1 billion bushels of corn—37 percent of the US harvest and 13 percent of global production—were required for ethanol production.

The diversion of 13 percent of global corn production to an industrial use and away from the animal feed and human food markets has raised the global price of corn. The result has also increased world food prices more generally, both because corn is a major input in the livestock industry and because growers in various countries respond to higher corn prices by reallocating land to corn production and away from the production of other crops.

Biodiesel production mandates under the RFS have also affected food markets. In 2013, approximately 50 percent of US biodiesel output was produced from soybean oil, requiring 468 million bushels of US soybeans, about 15 percent of that year's harvest (US Energy Information Administration 2014). This raised soybean prices, increasing animal feed costs and the prices of human foods containing soybean products. Given that large-scale commercial ethanol production based on cellulosic material is simply infeasible because of high costs and poor conversion efficiency, the increasingly large RFS mandate for the use of advanced biofuels would almost surely have to be satisfied using biodiesel fuels and, by implication, soybeans as a fuel source.[2]

One recent study by economists at the Universities of California at Davis and at Berkeley has estimated that world corn prices are about 30 percent higher than they otherwise would be as a result of the RFS (Carter, Rausser, and Smith 2015). A relatively recent NBER working paper reports that the RFS increases the price of staple foods more generally by about 20 percent (Roberts and Schlenker 2010). These food price impacts are substantial and imply that the RFS may result in hunger and increased rates of malnutrition for many of the approximately 700 million people in the world who currently live in dire poverty.

In fact, US biofuels policy *did* contribute to world hunger during the 2007–08 food crisis. Partially as a result of increased RFS ethanol mandates, food prices began to rise at an alarming rate in the first quarter of 2007. In response to these price spikes, at least 32 countries, including major grain exporters like Argentina, China, and Russia, restricted agricultural exports in an attempt to bolster their domestic food supplies and quell political unrest (Anania 2013). These export restrictions drove world food prices even higher (Martin and Anderson 2012). Altogether, global prices for corn, soybeans, wheat, and other crops more than doubled between the first quarter of 2007 and the second quarter of 2008 (United States Department of Agriculture 2015). Studies from Bangladesh, Cambodia, and Mauritania reported that the level of acute malnutrition among poor children under five years old increased by around 50 percent over that 15-month period (Compton, Wiggins, and Keats 2010, 99).

Not surprisingly, many developing countries and nongovernmental organizations, and even the United Nations, have urged the United States to repeal its ethanol mandates.[3] Given the widespread global condemnation of the RFS and its unambiguously distortionary effects on international food markets, one important question is why the policy has not been the subject of a WTO dispute. Biofuels mandates have never been adjudicated by the WTO Dispute Settlement Body, but the general consensus among academics is that such policies—somewhat surprisingly—are probably beyond the organization's remedial reach.[4]

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[2] The US Energy Information Administration (EIA) estimates that the actual volume of cellulosic biofuel available in 2022 will likely be at least 80 percent lower than the RFS mandated amount (US Energy Information Administration 2015).

[3] For example, in August 2012 the director-general of the UN Food and Agriculture Organization called on the US to suspend its biofuels mandates (Graziano da Silva 2012). Similarly, a special representative to the UN secretary-general referred to US biofuel policy as a "criminal path" that contributed to the rise in global food prices (UN News Centre 2008).

[4] There are a few caveats to the analysis that follows. First, we examine only whether RFS blending mandates constitute a per

The RFS and International Trade Obligations

The most persuasive argument against biofuels mandates stems from article 2.2 of the Agreement on Technical Barriers to Trade, which requires that technical regulations, such as blending mandates, are both necessary to fulfill a legitimate objective and the least trade-restrictive means by which to achieve the objective.[5] Legitimate objectives include environmental protection and national security requirements. It is now widely recognized that corn ethanol is not a low-carbon fuel and is therefore not beneficial to the environment. This is corroborated by the fact that many US ethanol refineries have been exempted from lifecycle greenhouse gas emissions requirements (Fargione, Plevin, and Hill 2010; Environmental Protection Agency 2013).

There is, nevertheless, an alternative justification: the claim that biofuels mandates reduce US dependence on foreign oil. Scholars agree that this could qualify as a legitimate national security objective if it were true. However, it takes almost one gallon of fossil fuel energy to produce one gallon of ethanol, adjusted for its energy content. Furthermore, any national security argument in favor of the RFS is increasingly subject to criticism given the recent rapid expansion of domestic oil production in the US (Howse, van Bork, and Hebebrand 2006).

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The legality of blending mandates presumably hangs on the degree to which the measures restrict trade.[6] As we have discussed, the RFS redirects substantial quantities of corn and soybeans away from international markets. This doubtlessly impedes trade, but it may not qualify as *trade restrictive* under existing rules. Previous interpretations of the term by WTO dispute resolution panels have focused on measures that limit market access or discriminate against some or all foreign competitors (Charnovitz 1993). The Dispute Settlement Body would have to expand its definition to include regulations that operate as de facto export restrictions for blending mandates to qualify.

But what about the effects of US biofuels policy on food prices? The preamble of the WTO AoA explicitly recognizes each nation's right to food security. Allowing rich countries to divert corn otherwise destined for export certainly impinges on poor countries' food security, but the AoA provides no recourse when one country's actions affect another's food security. Instead, it authorizes countries to take actions within their sovereign ability to ensure their own food security. Accordingly, food-producing countries often respond to rising food prices by restricting food exports (WTO 1994a, 1994b). These export restrictions drive food prices higher and make poor countries even less food secure (Switzer 2012).

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se violation of international obligations. Even if the United States can implement blending mandates, the RFS, as implemented, may still run afoul of WTO commitments, such as the most-favored-nation and national treatment requirements. For a discussion of these issues, see Howse, van Bork, and Hebebrand (2006) and Switzer and McMahon (2011).

Second, the RFS blending mandates do not exist in a vacuum; they are only a part of US biofuel policy landscape. De Beer and Smyth (2012) discuss this issue. Often, any finding requires that a complainant show that the policy caused injury, which may be more or less difficult in the complex biofuels policy environment. Finally, although this analysis is based on the opinions of leading international trade scholars, it is impossible to be certain about whether the RFS complies with international obligations because the Dispute Settlement Body has never addressed the issue of biofuels mandates.

[5] Some scholars have also put forward an argument based on the WTO Agreement on the Application of Sanitary and Phytosanitary Measures, which requires that standards that purport to protect human, animal, or plant life be based on scientific evidence (for example, see Howse, van Bork, and Hebebrand 2006).

[6] Upon a determination that the RFS fulfills a legitimate objective, the Dispute Settlement Body would likely apply the two-tiered test set forth in *Brazil-Tyres* to establish whether the technical regulation is necessary (Feld 2011).

Developing and least-developed countries have been largely displeased with the results of the AoA. The complexity and ambiguous wording of the agreement have allowed rich countries to keep the level of payments made under traditional commodity support programs largely unchanged over time. Developing countries have responded in the Doha Round by calling for substantial reductions in the aggregate measure of support, known in the most recent Doha drafts as Overall Trade-Distorting Support, but the international community has so far been unable to reach a consensus on any meaningful rule changes related to agriculture.

To resolve the Doha deadlock with any meaningful reductions in government intervention in rich countries' agriculture, negotiations must expand beyond trimming farm payments to curtail the broader policy instruments that affect agricultural terms of trade. One of the most egregious of these broader policies is the US biofuels scheme we have discussed here, which currently removes from the market about 35 percent of US corn and 23 percent of US soybean oil.

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