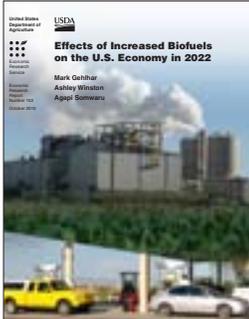


ERS *Report Summary*

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Find the full report at www.ers.usda.gov/publications/err102

Effects of Increased Biofuels on the U.S. Economy in 2022

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Diversifying the Nation's energy supply is one of the primary means for providing long-term energy security. A diverse energy portfolio can also have far-reaching economic impacts by reducing dependence on foreign oil. The Energy Independence and Security Act of 2007 (EISA) mandates a Renewable Fuel Standard (RFS-2) under which the United States will annually produce 36 billion gallons of biofuel, primarily ethanol, by 2022. Transitioning away from nonrenewable fossil fuels (such as petroleum oil) without placing additional burden on the U.S. economy is a long-term challenge. Although experts and policymakers generally agree on the importance of energy security, how best to achieve this goal and at what cost is subject to debate.

What Is the Issue?

Reducing dependence on foreign energy by expanding domestic renewable fuels can have impacts for the overall U.S. economy because of energy's importance in consumption, production, and trade. In the past, increasing energy independence would generally be expected to place a greater burden on the U.S. economy because of the higher domestic costs of producing alternative energy to replace relatively inexpensive foreign petroleum. However, according to the U.S. Department of Energy, petroleum prices are more likely to continue rising in the long term relative to the cost of producing domestic biofuels. Although the exact timing is uncertain, cost-reducing technology in biofuel production is expected to be a key factor in expanding production and making biofuels competitive with petroleum. However, without policies that provide incentives to deploy renewable energy technology, biofuel producers likely will shy away from investing in new technology because of market uncertainty. The RFS-2 mandate is accompanied by incentives in the form of tax credits to ethanol blenders. Tax credits, however, could add to taxpayers' costs and place greater burden on the economy. This study examines the potential effects of the RFS-2 on the U.S. economy as measured by gross domestic product (GDP), household income and consumption, price and quantity of energy fuels, and agricultural production and trade. We compare the U.S. economy in 2022 with and without the RFS-2.

What Did the Study Find?

If biofuel production technology advances and petroleum prices continue to rise as projected, the RFS-2 could benefit the U.S. economy. U.S. household consumption would rise because of higher real wages, increased household income, and lower import prices. By substituting domestic biofuels for imported petroleum, the United States would pay less for imports overall and receive higher prices for exports, providing a gain for the economy from favorable terms of trade. Improved technology and increased investment would enhance the ability of the U.S. economy to expand.

Gross Domestic Product

Changes in GDP and the magnitude of benefits (or costs) are highly dependent upon assumptions about alternative biofuel support policies and the future price of oil. The greater the value of displaced

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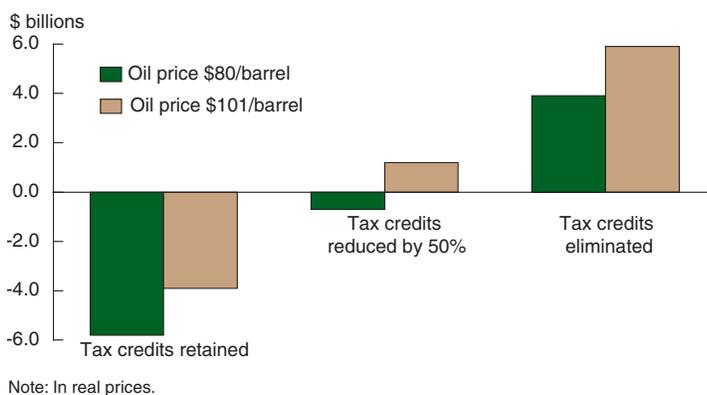
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petroleum for each dollar of biofuel produced and the lower the tax credits, the greater the benefit to the U.S. economy. Cost-reducing technology would not only reduce the costs of producing biofuels but also contribute to national GDP because production would rise as efficiency improves.

Household Welfare

Household consumption would increase regardless of whether or not tax credits were retained, with the gains primarily due to increased real income, favorable terms of trade with relatively lower import prices, and hence, greater purchasing power to the household. Consumption would increase by about \$13-\$28 billion, depending largely on oil prices. The RFS-2 would raise real wages and household disposable income as returns to labor and capital increase. Replacing imported oil with domestic biofuels would lower the cost of motor fuels. Thus, households would spend less on, but consume more, motor fuels. In addition, lower prices for imports and fuel would encourage greater consumption of other goods and services.

Impact of RFS-2 on U.S. gross domestic product



Energy and Trade

Expansion of domestic biofuel production would reduce petroleum demand, thereby reducing the quantity of imported crude petroleum. Crude oil, which is a major input for gasoline, would be displaced by ethanol. U.S. imports of crude oil would fall by 16-17 percent in 2022. The United States is the largest importer of crude oil, with imports accounting for about two-thirds of total U.S. supply. Reduced U.S. demand for petroleum would lower the price of crude oil. As a result of lower demand and a decline in the import price, the U.S. import bill for crude oil would decline by \$61-\$68 billion. With a smaller import bill, the U.S. dollar would appreciate. A stronger dollar would reduce the cost of importing other goods, including agricultural commodities, and reduce export volume because of increased prices in foreign markets for U.S. products. In addition, with greater demand for land to use for both energy crop production and all other agricultural activities, meeting the RFS-2 would reduce U.S. agricultural commodity exports and increase the demand for agricultural imports as crops must compete for limited land.

Caveats

This study does not predict the future but addresses the question of what would be the likely impacts on the U.S. economy should the RFS-2 mandate be met under different price/policy scenarios. The study acknowledges the uncertainty in meeting the mandate in 2022. The exact timing of the commercialization of new technologies to produce biofuels cannot be determined because of a myriad of uncertain factors. Future developments will also depend on new investments in infrastructure needed to support a transportation and distribution network for biofuels. Determining when such developments would take place is beyond the scope of this study. Long-term impacts on the U.S. economy from meeting the RFS-2 will depend partly on future petroleum prices. This study adopts a price projection from the U.S. Department of Energy that assumes that satisfying the growing world demand for petroleum will require accessing higher cost supplies of oil. Under these conditions, petroleum prices are likely to be higher in 2022 than current prices. Unlike previous decades, petroleum prices are likely to rise relative to the cost of producing biofuels.

How Was the Study Conducted?

The study used a detailed computable general equilibrium model for the United States—the U.S. Applied General Equilibrium (USAGE) model—comprising 534 industries. The model is a multipurpose framework for addressing a broad set of questions, including domestic and trade policy as well as macroeconomic links to trade. The model was modified to include additional sectors and industries involved in biofuel production, including conventional ethanol (corn-starch) produced from dry-milling and second-generation ethanol made from crop residues, dedicated energy crops, and other advanced biofuels. Other modifications include explicit treatment of U.S. agricultural land and regional land allocation for the production of biomass (organic material) and all other agricultural activities. A base, or reference, scenario without the RFS-2 was conducted for the year 2022 using the U.S. Department of Energy’s projections. The effects of RFS-2 were determined as alternative scenarios using scenario analysis. Volumes of all types of ethanol were based on those established by EISA.