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The impact of the U.S. transitioning toward electric vehicles on the corn and soybean complexes

Nicholas Piggott

North Carolina State
University, Raleigh, North
Carolina, USA

The United States is a significant producer of corn and soybeans, with the most recent five-year average production of corn of 14.175 billion bushels and soybeans of 4.188 billion bushels for a combined total of 18.363 billion bushels. The combined planted acreage was 176 million acres, of which 88.6 million acres is corn and 87.5 million acres is soybeans in 2022. Over the past two decades, planted acreage has trended upward, with the combined planted acreage increasing by 1.35 million acres each year, with corn acres increasing by 0.63 million acres and soybean acres by 0.72 million acres, respectively, each year. If this trend continues, combined acreage will surpass 200 million acres in 2039. Combined production will increase to an additional 10.173 billion bushels, or 36 percent, for 28.179 billion bushels by 2042. An essential factor in the sustained growth in acreage and production of corn and soybeans was the Energy Policy Act of 2005 which originated the Renewable Fuel Standards (RFS), and the Energy Independence and Security Act of 2007, which expanded and extended the RFS mandates that U.S. transportation fuels contain a minimum volume of renewable fuel. These policies have led to a substantial increase in the percentage of corn used in fuel production from 14.2 percent (or 1.603 billion bushels) in 2005 to 35.6 percent (or 5.326 billion bushels) in 2021. These policies have led to a substantial increase in soybean oil used in biofuel from 8.1 percent (1.555 billion pounds) in 2005 to 43.7 percent (or 11.600 billion pounds) in 2022. These renewable fuels policy has impacted the composition of how corn and soybeans are utilized across the primary demands of feed, food, fuel, and exports. Recent legislation, including the Infrastructure Investment and Jobs Act of 2021 and the Inflation Reduction Act of 2022, lays the foundation for adopting electric vehicles (EV) in the U.S. and transitioning away from fossil fuel vehicles. Reducing the use of fossil fuels in vehicles will also mean a reduction in renewable fuels which will, in turn, reduce the demand for corn and soybean oil used in renewable fuel production. Such a reduction begs the question of what this EV policy might mean for corn and soybean production in the U.S. and, in particular, the acreage planted, the amount of corn and soybean oil that will be available for other uses such as feed, food, and exports, and the price of corn and soybeans. An economic model of the U.S. corn and soybean complexes is constructed to model and simulate the potential effects of a reduction in the demand for corn and soybean oil used in renewable fuel production on the corn and soybean complexes, including the production and prices of products derived from crushing corn and soybeans including oil, meal, ethanol, and DDG's. The potential changes in U.S. production and price impacts of these products have implications for competing products, such as canola oil in the edible oil market which are assessed and evaluated using estimates from the economic model.