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Clean Affordable Transportation for Our Future

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Americans have been burning corn ethanol in engines for as long as the combustion engine has existed.¹ Americans produce over 30 percent of the world's corn supply,² corn makes up a substantial amount of global calorie consumption,³ and corn by-products are key inputs in countless commercial goods.⁴ And while corn is one of the most important crops in the global economy, unfortunate American policy has had an adverse impact on consumers, producers, and the planet at large. If Congress were to simply eliminate burdensome mandates as well as slash market-distorting subsidies, consumers, drivers, governments at every level, and the planet would all benefit.

Background on Ethanol

Out of all the corn produced in the United States, anywhere from 30 to 40 percent goes directly into the production of ethanol.⁵ In the 70s and 80s, regulations banning the use of certain fuel additives led to companies contemplating the use of ethanol as a fuel additive,⁶ and when the Energy Tax Act of 1978 was passed, it created a forty-cent-per-gallon subsidy for every gallon of ethanol blended into fuel.⁷ Legislation since then has continued to favor ethanol production, with some claiming that the unique nature of the Iowa caucus has led to disproportionate political gains for the corn lobby.⁹

Nearly all domestic transportation fuel is 10 percent ethanol (E10), while pure gasoline (E0) represents less than 5 percent of all fuel consumed.¹⁰ This change has largely been driven by a crucial mandate: the Renewable Fuel Standards (RFS) created in the 2005 Energy Policy Act and expanded by the Energy Independence and Security Act of 2007, which mandated that a percentage of all transportation fuels contain renewable fuels. The policy had unintended consequences: using ethanol in transportation fuels led to efficiency losses. According to the Energy Information Administration (EIA), "Vehicle fuel economy decreases by about 3 percent when using E10 relative to ethanol-free gasoline."¹¹ Even more dramatic efficiency losses are caused by using E85, which has an efficiency of only 28 percent that of E10.¹²

In the years between 2005 and 2013, the Congressional Budget Office estimated that motorists have incurred over \$83 billion in costs as a result of these mandates.¹³ That translates to an additional \$272 per driver a year in fuel costs alone.¹⁴ Consumers pay other costs as well, as all new domestic automobiles were mandated to be E10-compatible, which necessitates several parts being replaced with more costly corrosion-resistant parts and is associated with higher maintenance costs.¹⁵

But the costs are not just felt at the pump and on the road. Economists estimate that American ethanol demand adds at least an additional 20 percent to the cost of corn.¹⁶ In turn, the rising cost of corn impacts grocery costs in four ways:¹⁷

1. Raising the cost of corn itself
2. Increasing the price of meat via feed costs
3. Indirectly lifting the prices of other crops via land-use changes
4. Increasing energy prices

Via these mechanisms, the CBO estimates that American households spend roughly \$400 million extra annually.¹⁸ Just as stunningly, however, they found that the overall impact of ethanol policy led to a nearly 2 percent increase in the CPI-U for food.¹⁹ They also concluded that the rising costs of groceries disproportionately hurts poorer communities.²⁰

Since ethanol is so energy inefficient, and because growing corn is carbon intensive, using corn ethanol as fuel produces substantially more carbon dioxide than an energy equivalent amount of gasoline. Estimates vary regarding the amount of that increase, but researchers found that feedstock changes alone resulted in emissions that are 63 percent more carbon intensive than gasoline emissions.²¹ According to the CBO, “Evidence suggests that replacing gasoline with corn ethanol has only limited potential for reducing emissions, and some studies indicate that it could increase emissions.”²² Even the Intergovernmental Panel on Climate Change (IPCC) has adopted a cautionary position: “Indirect emissions [for biofuels] can lead to greater total emissions than when using petroleum products.”²³ And the Sierra Club has described the biofuel mandate as “[an] unconscionable [action] that the EPA continues to turn a blind eye to.”²⁴

But the environmental harm doesn't end with carbon emissions. When the National Oceanic and Atmospheric Administration announced that the dead zone in the Gulf of Mexico tripled in size, the Harte Research Institute at Texas A&M found that a fertilizer used in ethanol production was the culprit.²⁵ Similar research at Iowa State found that fertilizer usage associated with ethanol production led to dangerous nitrogen and phosphorus runoff into lakes and streams.²⁶ Similarly, Dr. Jacobson at Stanford found that using E85 in place of E0 increased human mortality, hospitalization, and asthma incidents by 4 percent in the nation as a whole, and 9 percent in urban areas.²⁷

In sharp contrast to the failings of public policy in the last two decades, trends in automotive markets have been highly promising, as the average American passenger vehicle went from getting 21.7 mpg in 1990 to 24.6 mpg in 2015, an increase of over 13 percent in fifteen years.²⁸ If that trend continues, in the year 2035 the average American car would get 27.88 mpg, and by 2045 the average mileage would be around 30.12 mpg. Fuel economy in the United States is now rising far more rapidly for a simple reason: the rising price of gasoline, paired with contrac-

tions in the economy, is driving American consumers to demand more efficient cars. These trends drove changes in industry that led to the development of two major fuel-efficiency technologies rolled out in the last decade: gasoline direct injection and variable displacement. Clearly, the market-driven gains in fuel efficiency have been increasing independently of policy changes regarding ethanol in the last half century.

Policy Recommendations

Congress should take bold steps to remedy previous mistakes by eliminating distorting policies on both sides of the ethanol market. The easiest change would be to end the Renewable Fuel Standards that mandate the use of ethanol. The technical impossibility of using “advanced” biofuels has become so evident that the EPA has admitted to implementing laxer standards than those outlined in the original legislation!²⁹ The failures of the law and the benefits to consumers as a result of terminating RFS make these moves politically desirable. Simply offering consumers the option to put any blends of gasoline into their cars would be a substantial step in the right direction.

The next most politically feasible set of reforms would be to eliminate the plethora of infrastructure subsidies, including the 30 percent tax credit for installing ethanol refueling on commercial and residential properties, the loan guarantees and grants extended by the Rural Energy for America Program created in the Food, Conservation, and Energy Act of 2008, and the USDA’s loans that issued from the Commodity Credit Corporation for ethanol-related purposes. Similar measures should be considered by state and local legislatures. While these legislative changes would be uphill battles, some of them have been fought and won before.

In an ideal world, government at every level would push through even more aggressive actions, namely ending the subsidization of corn itself. In the world of agricultural subsidies, corn is king. Tax breaks for corn are some of the most frequent tax breaks claimed in the agricultural sector, not to mention numerous Department of Energy and EPA programs that subsidize corn and ethanol production. The harm that these economic policies create is far too great a cost to bear for the minor upside of enriching farmers. Unfortunately, the political feasibility of these projects is greatly restricted by the substantial influence that the agricultural lobby wields in rural areas.

Potential Benefits

Calculating the savings to federal and local governments upon ending these programs is complicated. The spending threshold for the majority of these federal programs is de minimis, meaning that the CBO doesn’t calculate the costs for these programs. Even so, the federal government should save at minimum \$541 million per year by ending direct subsidies for ethanol, in addition to the extra \$900 mil-

lion that the CBO estimates that we spend on the Supplemental Nutrition Assistance Program and the Women, Infants, and Children Program as a result of higher corn costs, totaling savings of \$1 billion per year, and up to \$6 billion based on the CBO's highest estimates.³⁰

Given that the United States used roughly 25.7 quads of petroleum in 2016 in the transportation sector,³¹ with about 260 million cars in the United States,³² forecasting future energy usage with these changes is simple. Based on future population projections from the Census,³³ and knowing that roughly 80 percent of Americans own cars,³⁴ it can be expected that there will be roughly 308 million cars in the United States by the year 2045. Based on the previously mentioned projections of future efficiency gains, and a conservative estimate of a 3 percent gain of fuel economy from switching all E10 to a lower ethanol blend, the average fuel economy would be approximately 31.0236 mpg by 2045, implying a 26 percent increase in fuel economy, or in overall usage, a fall in the United States to 25.378259554 quads, which would mark the first substantial fall in domestic fuel use since the 70s.³⁵

Lowering the costs of living by removing these ethanol policies will have a positive impact on domestic consumers as well. The increased use of corn for ethanol production has crowded out acreage devoted to other important crops, like wheat and soybeans. All else being equal, this means higher prices for those crops. One salient example from researchers at Texas A&M estimated that the retail prices of eggs, bread, and milk increased from corn price rises alone by 6.4, 4.6, and 4 percent, respectively, from 2005 to 2008.³⁶ From 2003 to 2006, the Organisation for Economic Co-operation and Development (OECD) estimated that US farm policy raised food prices enough to cost consumers an extra \$12 billion annually—in effect, an average annual food tax of \$104 per household.³⁷

The single biggest beneficiary of ending the dominance of domestic ethanol is the planet. A ranking of nine energy sources in relation to global climate found that corn-based ethanol was the worst of nine technologies with respect to climate, air pollution, land use, wildlife damage, and chemical waste.³⁸ While all energy production consumes water, ethanol particularly requires a lot. Researchers estimate that refining a gallon of corn ethanol today requires thirty-five gallons of water, while three times as much water is needed to grow the corn that yields a gallon of ethanol. That brings the tally to 140 gallons of water per gallon of corn ethanol produced.³⁹ Furthermore, corn requires more fertilizers, pesticides, and herbicides than most other biofuels, resulting in this runoff entering waterways, creating more low-oxygen dead zones, and causing local shortages in drinking and irrigation water. The National Academy of the Sciences concluded their ethanol brief with the note that, regarding biofuels, “the increase in harm to water quality could be considerable.”⁴⁰

Conclusion

The average American is thus hit with a triple dividend: reducing fiscal burdens on both the federal government and state governments, savings at the pump, and savings at the grocery store. Spending less on gas and cheaper groceries will help all Americans, but especially the poorest Americans. Given that ethanol policy is also unjustifiable on environmental grounds, Congress should work to eliminate burdensome regulations that hurt American consumers and the planet.

Shane Reed is from a small cornfield south of Grand Rapids, Michigan, that masquerades as a town. He is currently pursuing his undergraduate degree from the University of Michigan in economics & cognitive science. During the last two school years, he worked as an intern for the Michigan football team in the recruiting department of Team Blue. This past year he started working as a research assistant in the forecasting arm of the Research Seminar in Quantitative Economics at Michigan. When he isn't cheering for Coach Harbaugh and the Team, he's likely sinking his teeth into a burger somewhere.

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