The Biofuel Connection: Impact of US Regulation on Oil and Food Prices

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"Biofuel policies are frequently mentioned in the policy and academic debates because of their potential impact on food prices. In 2005, the United States authorities passed legislation under which corn-based ethanol became in practice the only available gasoline additive. Some studies have then argued that ethanol and biodiesel subsidies in advanced economies may have strengthened the link between the prices of oil and those of some food commodities.

This paper tests whether the response of food commodity prices to global demand shocks and to oil-specific demand shocks has changed following the introduction of this legislation. Our results show that corn prices exhibit a stronger response to global demand shocks after 2006. Some short-lived but statistically significant response to oil-specific demand shocks is also documented. …"

Introduction

In 2005, the US Energy Policy Act (EPAct) "introduced new quantitative methods for the amount of motor fuel coming from renewable sources," recount the researchers. In practice, only ethanol, produced from corn, could meet these standards. "The impact of the legislation on demand for corn was … remarkable: in 2008, only about 5% of US corn production (the world's largest) was used for ethanol production. … By 2010, more than 35% of US corn production was used to produce ethanol," note the authors of the research paper.

Corn prices have periodically spiked since 2007, as shown in Figure 1 on the next page. Might these price spikes be at least partly attributed to U.S. biofuel mandates? This is main research question of the paper, and the authors use sophisticated statistical techniques to provide an answer.

Why the Paper's Research Question is Important

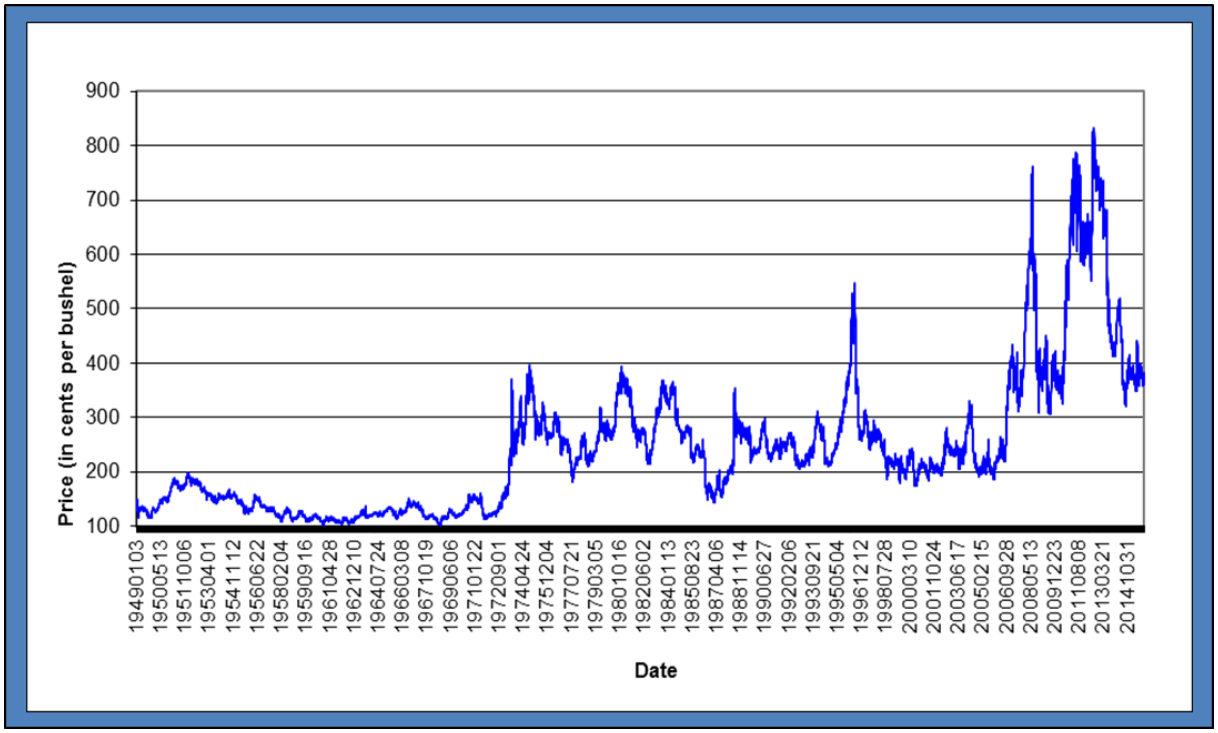
Food price spikes have quite damaging consequences for low-income countries, including significantly increasing the incidence of intra-state conflicts, according to Arezki and Brückner (2010). Even though the research paper does not cover the policy debate on how to potentially lessen future food price spikes, the paper is very useful in this debate. If one understands what actually contributed to the price spikes in the past, presumably one would be better equipped in designing smart policy, regarding dampening food price volatility in the future.

Data Description

The "authors collect data from January 1974 up to May 2013. … [They] use monthly averages of daily oil prices from Datastream, and for corn …, USDA national monthly price averages. All nominal price data have been deflated by the US Consumer Price Index. Data on crude production was obtained from the US Department of Energy."

The authors create their own measure of global economic activity, which is a function of industrial production indices and purchasing managers' indices "for the United States, United Kingdom, Germany, France, Japan, Korea, Mexico, Brazil, India, and China" combined with Kilian (2009)'s measure of real economic activity that, in turn, relies on "representative dry cargo single-voyage freight rates."

Figure 1
Rolling Corn Front-Month Futures Prices (Daily Data)
January 3, 1949 through December 28, 2015



Source: Updated from Till (2007).

Sources of Data: Commodity Systems Incorporated (CSI), the Commodity Research Bureau (CRB), and Bloomberg.

Description of Investigation

The paper largely relies on an econometric model that "capture[s] the evolution of, and the interdependencies between, multiple time series," as explained in Maggetti *et al.* (2013, p. 103). "The procedure … involves the application of 'simulated shocks' to a variable of interest in order to detect its

influence on the value of other variables …", continues Maggetti *et al.* (2013, p. 104). The paper specifically builds off of the advanced modeling work in Kilian (2009), which analyzed the drivers of historical oil price changes, including "global oil demand, oil supply, and oil-specific demand factors." The authors examine the "response of food price changes to … these shocks" after adding "individual food commodity prices to the [Kilian] model."

Results

When the authors use the full data set from January 1974 through May 2013, they find that "[c]orn prices show a weak connection with the other variables" that have been found to be important in driving changes to the price of oil. The response of corn prices "to positive shocks to oil supply or oil-specific demand shocks are statistically non-significant."

According to the authors, "Avalos (2014) argue[d] that the adoption of EPAct 2005 strengthened the connection between corn and oil markets by making corn-based ethanol the only viable additive to comply with the new renewable fuels standards." Therefore based on the work in Avalos (2014), the authors choose to examine the subsample of data from May 2006 through May 2013 and redo the analysis that had been performed over the full sample of data.

When using the subsample of data, the authors find "a stronger positive response [by corn prices] to a positive shock to the global demand factors that drive the demand for industrial commodities [including oil], which is significant … and [which] vanishes after about 20 months. Also, there is a significant positive response [by corn prices] to a positive oil-specific demand shock, but it [is] … short-lived."

Conclusion

"The question of the actual role played by biofuels in the apparently increased connection between oil prices and food prices is of significant policy relevance," note the researchers. After the "quantitative standard for the use of corn-based ethanol in gasoline .. became applicable", one can detect a statistically significant response of corn prices to the fundamental factors that drive the demand for oil.

Given this relationship, one might conclude that there is a need for creative policy responses when biofuel mandates, combined with periods of strong demand for oil, drive food (and specifically corn) prices to quite high levels. The authors stop short of naming specific policy prescriptions, but one logical idea, for example, is from a former policy advisor for Oxfam UK: developed countries might consider introducing "a price trigger so that when food prices are high, … [one would] divert … stocks of grains from fuel to food."

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Keywords

Oil price, corn price, food prices, ethanol, biofuel, VAR