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Do oil prices drive food prices? The tale of a structural break

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A B S T R A C T

It is frequently argued that biofuel (and ethanol) promotion policies in the United States have created a link between oil and corn prices that has accentuated the recent rally in the price of that crop and its substitutes (especially soybeans). Even though it is intuitively appealing, one problem with this hypothesis is that ethanol policies have been in place in the US for more than 35 years, whereas the run up in food prices dates back only to 2006. However, a significant change in US biofuel policy during that year provides an adequate framework to test for the existence of a structural break in the stochastic properties of the corn and soybean price processes. The results show that structural stability is rejected, and the transmission of oil price innovations to corn prices has become stronger after 2006 (no changes with respect to soybeans). There is also a significant transmission of corn price innovations to oil and soybean prices. Moreover, the data show evidence of a previously non-existent cointegration relationship between oil and corn prices.

1. Introduction

The remarkable rally in commodity prices since the start of the new century, even in the face of the most acute financial and economic crisis since the Great Depression, has raised the interest of both policymakers and economists in general. Volatility has increased significantly since 2008, but after a

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sharp drop in the last quarter of 2008, commodity prices have quickly returned to levels that are close to, or in some cases higher than, the already lofty peaks reached before the collapse of Lehman Brothers.

Several macroeconomic explanations for the widespread rise in the prices of all sorts of commodities have been proposed.[1] The usual suspects are the expansive monetary policy pursued by central banks since the onset of the crisis in the second half of 2007, the growing financialisation of commodity markets, and increased demand for basic materials from rapidly growing emerging markets. All of these hypotheses have merits but also theoretical drawbacks, and the empirical evidence is not conclusive. However, a clear understanding of the circumstances and causes of the current strength of commodity markets is relevant for both developed and emerging markets. For developed markets, typically net importers of commodities, such understanding would allow them to adjust policy in order to counter a substantial drag on growth, and a worrying source of inflationary pressures. For many emerging markets, especially in Latin America, high commodity prices underpin the solid fiscal and external positions that these countries have enjoyed in the last few years, and such understanding would help policy-makers to better assess the risk for their own macroeconomic outlook.[2]

This paper steps out of the literature's typical emphasis on macroeconomic drivers and, focussing on some agricultural commodity prices, explores the impact that energy policy in advanced economies (in particular the promotion of biofuels) has had on food markets. Biofuels have long been considered a potential source of disruption in the market for those crops that are basic inputs for their production (mainly corn, sugar, and oilseeds like soybeans). However, there are few quantitative assessments of their relevance and the nature of their impact. Zhang et al. (2009), using data through December 2007, found a long-term relationship between oil and food (corn and soybeans) prices. In the short run, they found no relationship, although before 1999 causality seems to run in reverse of the expected direction (from crops to oil and ethanol). Arshad and Hameed (2009), using a longer sample, find evidence of a long term relationship between oil, corn, wheat and rice, with causality flowing from the fuel to the crops. They relate this effect to cost factors, namely, the growing reliance by modern agriculture on seed fertilizer technology that is highly dependent on chemical inputs derived from oil. They also argue that biofuel production is another dimension of the problem. But they focus on the indirect effect of acreage competition between wheat and corn. However, that is probably not a major factor for wheat (as it is for soybeans) since wheat and corn have limited land overlap. Trujillo-Barrera et al. (2011) study volatility spillovers in the US from energy to agricultural markets in the period 2006–2011. They found significant spillovers from oil to corn and ethanol markets, which seem to be particularly strong in high volatility periods for oil markets. They also identified significant volatility spillovers from corn to ethanol markets. More from a policy perspective, the 2011 report of the G20 Study Group on commodities recognized two channels connecting oil and food prices: first, the growing energy intensity of food production (energy is a major input and cost component in food production and distribution). The second channel is biofuel production, which significantly adds to the demand of specific commodities. The Study Group found no clear evidence in the literature about the price impact of biofuel production.

This study explores the second channel, but from a slightly different point of view. The prevalent view in this matter is that recent increases in biofuel demand have been driven essentially by mandatory quantitative standards of use. Therefore, according to this view, there is new exogenously determined demand that adds pressure on certain food markets. The reality seems more nuanced. As we will see below, mandatory standards are flexible, and at least in the case of ethanol, they have not been binding yet (i.e. ethanol consumption has exceeded mandatory quantities). The actual use of biofuels above this regulatory minimum depends on the relative price of oil with respect to the biofuel, which in turn depends essentially on the price of its feedstock (corn in the case of ethanol). As a result,

[1] See Frankel and Rose (2010) for a summary. Also Bastourre et al. (2010), Calvo (2008), Domanski and Heath (2007), Frankel (2006), Hamilton (2009), and more recently G20 Study Group on Commodities (2011), IIF (2011), and IMF (2012).

[2] See, for instance Lipsky (2008), Avalos (2011), Cecchetti and Moessner (2008), Céspedes and Velasco (2011), Medina (2010).