



On the current account - biofuels link in emerging and developing countries: do oil price fluctuations matter?[☆]

Gabriel Gomes^a, Emmanuel Hache^b, Valérie Mignon^{c,*}, Anthony Paris^d

^a *EconomiX-CNRS, University of Paris Nanterre, France*

^b *IFP Energies nouvelles, 1 et 4 avenue de Bois Préau, 92852 Rueil-Malmaison, France*

^c *EconomiX-CNRS, University of Paris Nanterre, and CEPIL, Paris, France*

^d *EconomiX-CNRS, University of Paris Nanterre, LED, University of Paris 8, and IFP Energies nouvelles, 1 et 4 avenue de Bois Préau, 92852 Rueil-Malmaison, France*

ARTICLE INFO

JEL classification:

Q16
Q43
F32
C23

Keywords:

Biofuels
Oil
Current account
Panel smooth transition regression

ABSTRACT

Many developed countries promote the use of biofuels for environmental concerns, leading to a rise in the price of agricultural commodities utilized in their production. Such environmental policies have major effects on the economy of emerging and developing countries whose activity is highly dependent on agricultural commodities involved in biofuel production. This paper tackles this issue by examining the price impact of biofuels on the current account for a panel of 16 developing and emerging countries, and the potential nonlinear effect exerted by the price of oil on this relationship. Relying on the estimation of panel smooth-transition regression models, we show that positive shocks in the price of biofuels lead to a current-account improvement for agricultural commodity exporters (resp. producers) only when the price of oil is below 45 (resp. 56) US dollars per barrel. When the price of oil exceeds these thresholds, the effect of fluctuations in the price of biofuels on the current account tends to weaken and become non significant. Under these conditions, our findings indicate that, for agricultural commodity exporters which are also oil importers, the current account is pulled by two opposite forces, making its overall reaction modest or even nil.

1. Introduction

For the past two decades, a strong interest has emerged in favor of the integration of renewable energies in the electricity mix and in the transportation sector. This constitutes a major concern for developed economies as well as for developing and emerging countries in order to ensure energy transition policies, to fight against climate change and reduce Greenhouse Gas Emissions. Implementing renewable energies is all the more relevant because they allow the country to earn double dividends, as their diffusion *de facto* reduces the volume of imported fossil fuels in parallel of environmental objectives (Criqui and Mima, 2012). Along these lines, the use of biofuels is encouraged in developed countries and in emerging economies such as Brazil,¹ China and India for environmental concerns, as well as for promoting energy security, agricultural opportunities and economic growth. For instance, the European Union introduced a blending target of biofuels in petroleum products in 2003, and the Renewable Fuel Standard program (2005)

combined with the Energy Independence and Security act of 2007 (36 billion gallons of biofuels by 2020) allowed the establishment of mandatory target of biofuels utilization in the United States' transportation sector. However, such environmental policies may cause externalities or adverse effects on the economy of emerging and developing countries whose activity is highly dependent on agricultural commodities used in biofuel production. Aiming at investigating those topical issues, this paper analyzes the price impact of biofuels on the economy of such countries, focusing on the current account.

By concentrating on the current account, we fall into the spirit of the oil - macroeconomy literature. Indeed, it is well known that oil-exporting countries experiment large current account improvements following a sharp rise in oil prices (see Allegret et al., 2014 and the references therein). In other words, for such countries, oil windfalls constitute a key source of foreign exchange and income. The price of oil is also a key element behind agricultural commodity prices (see Paris, 2016 and the references therein, and Section 2). Shocks in the price of

[☆] This research has been supported by the French Energy Council, Paris, France. We would like to thank Cécile Couharde, Anne-Laure Delatte, Sébastien Jean and two anonymous referees for helpful comments and suggestions.

^{*} Corresponding author at: EconomiX-CNRS, University of Paris Nanterre, 200 avenue de la République, 92001 Nanterre Cedex, France.

E-mail addresses: gabriel.gomes@outlook.fr (G. Gomes), emmanuel.hache@ifpen.fr (E. Hache), valerie.mignon@parisnanterre.fr (V. Mignon), anthony.paris@ifpen.fr (A. Paris).

¹ Brazil launched the Proalcool program in 1975 just after the first oil shock. This program triggered an acceleration in the use of ethanol for the transportation sector and innovations on flex-fuel engines for the car industry.

oil spill over agricultural production costs which comprise fertilizer and fuel (Baffes, 2007, 2010; Berument et al., 2014), thus decreasing supply. On the consumer side, the impact can be either negative or positive. On the one hand, positive shocks in the price of oil have a negative impact on demand if in their food purchasing decisions, households account for price changes in other goods among those oil products (Gohin and Chantret, 2010). In this case, oil and agricultural commodity prices would have a negative relationship. On the other hand, a positive link between agricultural commodity demand and oil prices is likely to occur through the development of biofuels: due to the substitution effect between fuel and biofuel, a rise in the price of oil could lead to an increase in the demand for biofuel (Ciaian and Kancs, 2011). In this context, oil and agricultural commodity prices would be positively related.

The preceding arguments show that important links exist between the price of agricultural raw materials used in biofuel production, the price of oil and the current account of emerging and developing countries exporting or importing agricultural commodities.² While the impacts caused by biofuel production development are likely to be highly significant on the economy of such countries, the literature on this topic is very scarce.³ This paper aims at filling this gap by examining the price impact of biofuels, through the price of its agricultural inputs, on the current account for a panel of 16 countries—9 developing and 7 emerging economies—which are either exporters, producers or importers of agricultural commodities used in biofuel production. As stressed above, due to the links existing between the price of agricultural commodities, the price of oil and the current account, the biofuels-current account nexus is likely to depend on the dynamics in the oil market. Indeed, for a country exporting (resp. importing) agricultural commodities used in biofuel production but importing (resp. exporting) crude oil, a high price of oil could strengthen (resp. weaken) the effect of biofuel prices on the current account *via* the link between oil and agricultural prices. However, this high oil price could affect negatively this biofuel price effect with an increase in the country's import spending for crude oil.

Acknowledging this major role played by the price of oil, we account for such nonlinearities by estimating a panel smooth-transition regression (PSTR) model. In this type of modeling, the price impact of biofuels on the current account varies, depending on the value of another observable variable, i.e., the price of oil. Specifically, the observations in the panel are divided into two homogeneous groups or “regimes”—high oil price and low oil price regimes—, with different coefficients depending on the regimes. Regression coefficients are allowed to change gradually when moving from one group to another: PSTR is a regime-switching model where the transition from one state to the other is smooth rather than discrete. To our best knowledge, this paper is the first to address the price impact of biofuels on the current account for such countries by accounting for nonlinearities exerted by the price of oil.

Estimating PSTR models over the 2000–2014 period for emerging and developing countries classified into three groups—exporters, producers, importers of agricultural commodities used for biofuel production—our results can be summarized as follows. We show that,

² The rise in the price of agricultural commodities may exert important effects on the current account of emerging and developing countries. Regarding countries exporting agricultural commodities, the effect may be not clear cut at a first sight. Indeed, the direct effect may be positive on the current account if the price increase is sufficient to compensate the potential decrease in the quantity of exported agricultural commodities. However, the commodity price increase is detrimental for domestic consumption which, in turn, negatively affects economic activity and the current account.

³ Indeed, most of the studies dealing with developing and emerging countries have been concerned with the impact of current and targeted domestic biofuel production on land or agricultural commodities' availability, on water resources required for cultivation and on food prices (see, e.g., Khanna et al., 2008; Yang et al., 2011; and Khanna and Crago, 2012). The main exception is Chakravorty et al. (2015) who have addressed the impact of US biofuel mandate on poverty in India.

overall, a rise in the biofuel price tends to improve the current-account position for exporting and producing countries. However, this biofuel price impact is nonlinear, depending on the level reached by the price of oil. For low values of the price of oil, a 10% increase in the price of biofuels significantly improves the current account by around 2%. When the price of oil exceeds the threshold of 56 US dollars per barrel for producers and 45 US dollars for exporters, changes in the price of biofuels on the current account tend to weaken until becoming negligible. For agricultural commodity exporters which are also oil importers, these findings indicate that, in the case of an oil price increase, the current account is pulled by two opposite forces, making its overall reaction moderate or even nil.

The rest of the paper is organized as follows. Section 2 provides some stylized facts regarding the links between agricultural commodity and oil prices, and their evolution. Section 3 describes the data and methodology. Section 4 presents our findings and Section 5 concludes the paper.

2. Some stylized facts

The various concerns previously mentioned in Section 1—regarding environmental issues, energy security, agricultural opportunities and economic growth—have lead to a sharp rise in biofuel production since the mid-2000 s. As shown in Fig. 1, while biofuel production was on average around 30 thousand barrels from 2001 to 2005, it started to take off in 2006 with a production that has increased more than ten-fold compared to the beginning of the first half of the 2000 s. First-generation biofuels being produced with agricultural commodities (animal fats, starch, sugar and vegetable oil),⁴ this dynamics has been accompanied by an increase in the price of those raw materials (see Fig. 1).⁵

Specifically, let us now provide a first insight regarding the links between agricultural commodity prices and the price of oil, and their evolution along with the development of biofuel production. To this end, we consider monthly price series ranging from January 1980 to June 2016. All agricultural commodity and oil price series are taken from IMF.⁶ Table 1 reports the correlations of some agricultural commodity price series with the price of oil, all series being expressed in first-logarithmic difference.

As shown, correlations are quite low over the whole period, the highest value being equal to 16% for palm oil. These results indicate that the links between agricultural commodity and oil prices are not very strong on the full sample. As stressed above, the development of biofuel production has been particularly important since the mid-2000 s and not accounting for this dynamics may mask important evolutions in the link between our series of interest. Indeed, the rise in biofuel production may have intensified the relation between agricultural commodity and oil prices.

To simply illustrate the hypothesis of a stronger link between agricultural commodities and oil prices since the development of biofuel production, we also calculate the previous correlations over two

⁴ Typical first-generation biofuels are sugarcane ethanol, starch-based or ‘corn’ ethanol, biodiesel and Pure Plant Oil (PPO). The feedstock for producing first-generation biofuels either consists of sugar, starch and oil bearing crops or animal fats that, in most cases, can also be used as food and feed or consists of food residues (IEA, 2010).

⁵ In particular, the “food versus fuel” debate that followed the large increase in commodity prices in 2007–2008 triggered several articles about co-movements between commodity prices, subsidies policy in the agricultural sector and economic development based on biofuels production policy (see, e.g., Thompson, 2012 and the references therein). Moreover, in addition to biofuels, the upward dynamics of agricultural commodity prices during the 2000 s comes from a combination of demand and supply shocks. On the demand side, strong economic growth in developing and emerging countries (especially China) has played a positive impact on the global call for commodities (Abbott and Borot de Battisti, 2011; Abbott et al., 2011). On the supply side, adverse local agro-climatic conditions (temperature and precipitation) in major producing countries (OECD, 2008) negatively affected the volume of commodities available in the market.

⁶ The crude oil price index is the simple average of Dated Brent, West Texas Intermediate, and the Dubai Fateh spot prices.

Download English Version:

<https://daneshyari.com/en/article/7397473>

Download Persian Version:

<https://daneshyari.com/article/7397473>

[Daneshyari.com](https://daneshyari.com)