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ARTÍCULO PARA EL DEBATE CIENTÍFICO

The nonlinear relation between biofuels and food prices

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Abstract

This paper analyzes the relationship between the production of agricultural foods (cereals and vegetable oils) and the production of energy by using food. The observed increase in economic activities that use energy has had an impulse in the energy industry with higher prices. These prices make profitable the biofuel production, and this encourage the use of cereals for biofuel production, affecting the whole food chain. This research demonstrates that the agricultural foods and energy production system has been in place at least since 2000 and that it remains active or latent depending on the price of energetics. The paper also shows that the temperature variations do not lead the system to an adjustment. To do, this research uses the econometric technique of Dynamic Conditional Correlation, and a new tool, phase synchronization. The use of the latter avoid making assumptions on the distribution or stability of the involved variables.

Keywords: Dynamic Conditional Correlation; phase synchronization; energy prices; agricultural foods.

JEL Classification: C22; C63; O13.

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Resumen

Este trabajo analiza la relación entre la producción de alimentos y la producción de energía mediante el uso de alimentos. El aumento observado en las actividades económicas que utilizan energía ha tenido un impulso en la industria energética con precios más altos. Estos precios hacen rentable la producción de biocombustibles, lo que promueve el uso de cereales aceitosos para la producción de biocombustibles, afectando a toda la cadena alimentaria. Esta investigación demuestra que el sistema de alimentos y energía ha estado en vigor al menos desde el 2000 y que permanece activo o latente dependiendo del precio de la energía. El documento también muestra que las variaciones de temperatura no llevan al sistema a un ajuste. Para ello, esta investigación utiliza la técnica econométrica de correlación condicional dinámica y una nueva herramienta, la sincronización de fase. El uso de esta última evita hacer suposiciones sobre la distribución o la estabilidad de las variables involucradas.

Palabras clave: correlación condicional dinámica; sincronización de fase; precios de energía; alimentos agrícolas.

Clasificación JEL: C22; C63; O13.

Introduction

The fall in the oil prices in 2014 decresed dramatically the average price of energy measured thruogh the Fuel Energy Index[1] (FEI). A couple of years before, the Food Index[2] (FI) began its declination, briefly interrupted by an increase from March 2016 until August 2016, almost on the same date and with a similar pattern. Morever, the Fat and Oil Index[3] (FOI) began its downward movement in the same since 2014. With these facts, it seems that there is not a direct relation between the agricultural foods and the energy prices or the oily cereals and energy prices. In fact, some recent studies as those published by Zhang *et al.* (2010), Gilbert (2010), Ajanovic (2011), and Qiu *et al.* (2012) provide empirical evidence of a no linear relationship between food and energy prices.

On the other hand, other studies as those from Kristoufek, Janda, and Zilberman (2013), Vacha *et al.* (2013) and Nazlioglu, Erdem, and Soytas (2013) found nonlinear relations among the energy, the biofuels, and the food prices. Even

1 This index includes prices of coal and oil, it is buid by the International Monetary Fund. It can be retrieved from <https://www.quandl.com/data/COM/PNRG_INDEX>.

2 This index includes prices from fats, oils, grains and other foods. It can be retrieved from <https://www.quandl.com/data/COM/WLD_IFOOD>.

3 This index includes coconut oil, groundnut oil, palm oil, soybeans, soybean oil and soybean meal. It can be retrieved from <https://www.quandl.com/data/COM/WLD_IFATS_OILS>.