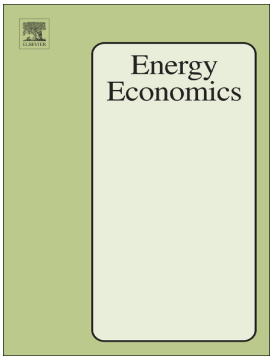

Did Oil Prices Trigger an Innovation Burst in Biofuels?

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Did Oil Prices Trigger an Innovation Burst in Biofuels?

Arthur Guillouzouic–Le Corff*

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Abstract

This paper documents an innovation burst in biofuels in the second half of the years 2000s, and empirically confronts it to the massive variations of oil prices between 1985 and 2009. Our results show that increases in oil prices greatly spurred innovation in biofuels. The elasticity of the number of patent families in biofuels with respect to oil prices is greater than 1, and holds both at the country and at the firm level. We find that the effect cannot be caused by the contagion of oil prices to cereal prices, an important input for biofuels. Similarly, we find that the effect is very specific: no such effect is found substituting oil prices with electricity prices, or substituting biofuel patents with biotechnology or environment-related patents. Delving into applicants' sectors, we find that specialized biofuel firms seemed less responsive to oil price variations than diversified firms.

JEL — O31; O33; Q41; Q55

Keywords— Biofuels; Renewable energy; Fossil fuel energy; Patents; Innovation Burst.

1 Introduction

In the period 1985-2009, the price of crude oil fluctuated greatly. In particular, it rose sharply in the years 2000s, which also saw a burst in patenting of innovations in the biofuels sector. In this paper, we formally establish a link between the price of oil and innovation intensity in the field of biofuels. Based on existing literature looking at biofuels price transmission, we argue that oil price variations are exogenous to innovation in biofuels. Since bio and fossil fuels are often sold together in blends, this is an ideal setting to test the impact of price variations of an input on innovation in a close substitute.

Although the use of biofuels originally aroused considerable interest as a versatile means of mitigating climate change by replacing oil with a clean input in standard combustion engines, the use of food as feedstock to produce them and its consequences on food prices later led to their wide unpopularity. Innovation in biofuels thus became a key issue, urging inventors to replace the main feedstock of most basic biofuels, *i.e.* cereals, with non-food products such as sludge or wood. This

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