



Available online at www.sciencedirect.com

ScienceDirect

Journal of Policy Modeling 38 (2016) 1089–1098

*Journal of
Policy
Modeling*

www.elsevier.com/locate/jpm

Impact of biofuel policies on the use of land and energy in U.S. agriculture

Dragan Miljkovic^{*}, David Ripplinger, Saleem Shaik

North Dakota State University, Department of Agribusiness and Applied Economics, NDSU Dept. 7610, 500 Barry Hall, Fargo, ND 58108-6050, USA

Received 8 January 2016; received in revised form 22 September 2016; accepted 2 October 2016

Available online 11 October 2016

Abstract

The goal of this study is to evaluate the importance of biofuel policies on the price levels of grains that compete for the use of limited resources, as well as to the use of alternative inputs in grains production in the United States. A theoretical 2-inputs, 2-outputs model is developed to provide foundation of the relationship between ethanol policy and grains prices and agricultural inputs use. Simulations are run using the theoretical model results and empirical values of the demand and supply elasticities for given crops and inputs, and input and output shares in production, to determine the indirect and direct effects of ethanol policy on grain prices and input use. Results suggest that corn prices increase leading to an increase in wheat prices. Both land and energy use in corn production increases disproportionately more than what they decrease in wheat production. The relative increase of energy used in agriculture following the adoption of ethanol policies is especially interesting since it stands in contrast to the proclaimed goals of the policy. The results of this study may give greater knowledge to policy makers, who can be better informed with respect to the secondary effects of ethanol legislation.

© 2016 The Society for Policy Modeling. Published by Elsevier Inc. All rights reserved.

JEL classifications: Q48; Q15

Keywords: Biofuel policies; Corn and wheat prices; Inputs use in grain production; Secondary impacts; U.S. agriculture

^{*} Corresponding author.

E-mail address: Dragan.Miljkovic@ndsu.edu (D. Miljkovic).

1. Introduction

Both the early development of the U.S. ethanol industry as well as the recent expansion in ethanol plant capacity can be directly linked to government regulations (Duffield, Xiarcos, & Halbrook, 2008). The three primary motivations behind government support for ethanol are environmental, energy independence, and rural development. As in the case of many well-intended policies, the recent ethanol boom in the U.S. resulted in some unforeseen consequences with respect to proclaimed objectives. For instance, it has been demonstrated that an increase in the fuel-ethanol blend limit (so called “blend wall”) will actually increase the consumption of petroleum gasoline thus leading to greater energy insecurity (e.g., Qiu, Colson, & Wetzstein, 2014). Likewise, it has been argued that using corn for ethanol is driving up world food prices and that further growth could result in land use expansion such as, for example, cultivating land in rain forest that would be harmful to the environment (e.g., Babcock, Rubin, & Feng, 2007).

The concern of this study is directed toward the production side and inputs used in the ethanol production. A recent boom in the ethanol industry has contributed to the rise in grain prices and their respective volatilities (e.g., Babcock, 2012; Babcock & Fabiosa, 2011; Becker, 2008; Carter, Rausser, & Smith, 2012; Miljkovic, Shaik, & Braun, 2012). Ethanol production’s role in increasing grain prices stems from the fact that the majority of ethanol is produced from corn. The goal of this study is to evaluate the importance of biofuel policies on the price levels of grains that compete for the use of limited resources, as well as to the use of alternative inputs in grains production in the United States. More specifically, the land and energy use in corn and wheat production in North Dakota is analyzed here. North Dakota is a very instructive case because it used to be purely a wheat producing state. With recent ethanol boom, eastern part of the state became a part of the redefined Corn Belt that expanded north and westward including parts of Kansas, Nebraska, Minnesota, South Dakota and North Dakota. Hence, these two crops now compete for limited resources, most notably land. Energy is another input of interest since ethanol policies are based, in part, on premises of producing cleaner energy from biofuels. Yet, the use of energy in producing alternative crops, i.e., corn and wheat, differs in turn making the impact of this energy policy on energy use in agriculture an interesting issue. The objective for the study is attained via two steps: (1) a theoretical 2-inputs, 2-outputs model is developed based on Gardner (1987a, 1987b) to provide a theoretical foundation of the relationship between ethanol policy and grains prices and agricultural inputs use, and (2) simulations are run using the theoretical model results and empirical values of the demand and supply elasticities for given crops and inputs, and input and output shares in production, to determine the indirect and direct effects of ethanol policy on grain prices and input use. While numerical values of these effects vary as the elasticity values change, a qualitative pattern emerged where: corn prices increase leading to an increase in wheat prices; both land and energy use in corn production increase disproportionately more than what they decrease in wheat production. The relative increase of energy used in agriculture following the adoption of ethanol policies is especially interesting since it stands in contrast to the proclaimed goals of the policy. The results of this study may give greater knowledge to policy makers, who can be better informed with respect to the secondary effects of ethanol legislation. Understanding the effects of ethanol policies on all markets is important in lawmakers’ decision-making process.

Download English Version:

<https://daneshyari.com/en/article/5101695>

Download Persian Version:

<https://daneshyari.com/article/5101695>

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