



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Adjustment of Import Demand for Corn in Mexico: Implications for U.S. Ethanol Mandate

Dong Hee Suh

Food and Resource Economics Department
University of Florida
do1ghsuh@ufl.edu

***Selected Poster prepared for presentation at the Agricultural & Applied Economics
Associations 2014 AAEA Annual Meeting, Minneapolis, MN, July 27-29, 2014.***

Copyright 2014 by Dong Hee Suh. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Adjustment of Import Demand for Corn in Mexico: Implications for U.S. Ethanol Mandate

Dong Hee Suh

Ph.D. Candidate, Food and Resource Economics Department, University of Florida

Introduction

- The expansion of ethanol production in the United States is widely considered to be a major contributor to the recent surge in corn prices (Abbott et. al., 2011; Mitchell, 2008).
- High corn prices caused by ethanol expansion may have a direct impact on the corn import of developing countries, which are highly dependent on outside sources for basic food commodities (Dyer and Taylor, 2011; Runge and Senauer, 2007; Valero-Gil and Valero, 2008).
- High corn prices caused by ethanol expansion may also cause livestock producers in developing countries to face substantial pressures with regard to feed cost because of their high dependency on corn for livestock feed.
- In particular, Mexico may be vulnerable to a surge in corn prices because it has the highest dependency on imported corn among developing countries; Mexico imports more than 30% of its corn from the United States.
- As the Renewable Fuel Standard (RFS) has led to a dramatic increase in the price of corn under the Energy Policy Act of 2005, the U.S. ethanol mandate also has the potential to influence the import demand for corn in Mexico.
- The objective is therefore to provide a comprehensive analysis of the import demand for corn in Mexico before and after the period of the U.S. ethanol mandate.

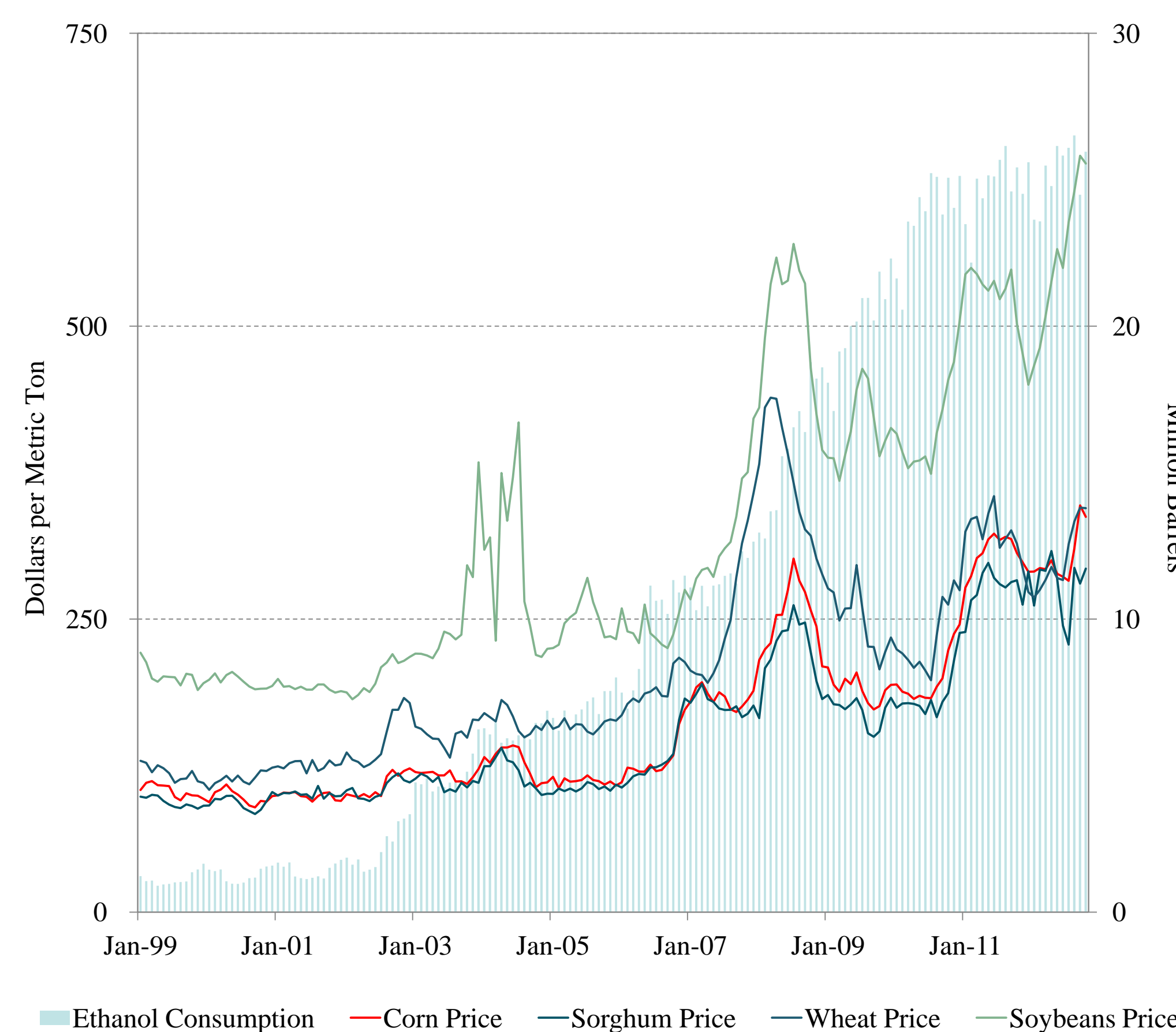
Differential Production Model and Data

- Application of Differential Production Model to Import Demand (Clements and Theil, 1978)

$$f_i \Delta \ln q_i = \theta_i \Delta \ln Q + \sum_{j \in n} \pi_{ij} \Delta \ln p_j + \varepsilon_i$$

- For the empirical analysis, monthly data about Mexico's import of primary feed grains are obtained from the Foreign Agricultural Service (FAS) of the U.S. Department of Agriculture (USDA).
- Mexico's imported grains include corn, sorghum, wheat, and soybeans, and their quantities and prices represents imports from only the United States from 1999 to 2012.

Ethanol Consumption and Feed Grains' Prices



Source: FAS, USDA.

Estimation Procedure

- The Generalized Method of Moments (GMM) is used to estimate the differential import demand system; the amount of ethanol consumed is used as an instrumental variable for the price of corn.
- Bootstrap Method (Terrell, 1996)
 - The bootstrap method is applied to obtain the estimates satisfying all theoretical conditions, such as homogeneity, symmetry, and concavity.
 - The bootstrapped estimates are checked if they obey the concavity and retain the estimates in the vector. The mean and variance of the estimated vector are used to obtain the robust estimates of the parameters and their respective standard errors.
- To identify the changes in Mexico's demand for U.S. feed grains before and after the ethanol mandate, the estimates between 1994 and 2005 are compared with those between 2006 and 2012, as the U.S. ethanol mandate has been effective since 2006 as a result of the Energy Policy Act of 2005.

Elasticities of Import Demand for Feed Grains

	Divisia Elasticity	Price Elasticity			
		Corn Price	Sorghum Price	Wheat Price	Soybeans Price
1999-2005					
Corn Demand	2.1612*** (0.2046)	-3.2153*** (1.1965)	1.0497* (0.5406)	0.6835 (0.5462)	1.4820*** (0.5731)
Sorghum Demand	0.1351 (0.1214)	1.4465* (0.7449)	-0.9026* (0.4752)	-0.1581 (0.3901)	-0.3857 (0.2686)
Wheat Demand	0.2352* (0.1228)	1.1686 (0.9339)	-0.1962 (0.4840)	-1.0874** (0.5346)	0.1150 (0.2967)
Soybeans Demand	0.9373*** (0.1440)	1.0752*** (0.4158)	-0.2030 (0.1414)	0.0488 (0.1259)	-0.9209** (0.3759)
2006-2012					
Corn Demand	1.1262*** (0.1398)	-1.8653* (0.9573)	0.4897 (0.3394)	0.5613 (0.3776)	0.8142 (0.5594)
Sorghum Demand	0.5773*** (0.1882)	2.0382 (1.4128)	-1.0959* (0.6108)	-0.5163 (0.6620)	-0.4259 (0.7609)
Wheat Demand	0.2839** (0.1296)	1.3468 (0.9060)	-0.2977 (0.3817)	-1.8614*** (0.5077)	0.8123 (0.5844)
Soybeans Demand	1.3340*** (0.1735)	0.9936 (0.6826)	-0.1248 (0.2231)	0.4131 (0.2972)	-1.2818*** (0.5938)

Note. Bootstrapped standard errors are in parentheses; ***Significant at 1%; **Significant at 5%; *Significant at 10%.

- Divisia Elasticities (1999-2005): A 1% increase in the Divisia volume index raises the import demand for corn, wheat, and soybeans by 2.16%, 0.24%, and 0.94%, respectively.
- Divisia Elasticities (2006-2012): A 1% increase in the Divisia volume index raises the import demand for corn, sorghum, wheat, and soybeans by 1.13%, 0.58%, 0.28%, and 1.33%, respectively.
- Price Elasticities (1999-2005): A 1% increase in corn prices reduces the import demand for corn by 3.22% but raises the import demand for sorghum and soybeans by 1.45% and 1.08%, respectively.
- Price Elasticities (2006-2012): A 1% increase in corn prices reduces the import demand for only corn by 1.87%.

Conclusions

- When comparing the estimates of the pre-ethanol-mandate period with those of the post-ethanol-mandate period, livestock producers in Mexico reduced corn import demand but raised the import demand for sorghum, wheat, and soybeans when they increased their outputs.
- The own-price elasticity of corn import demand significantly decreased, but that of sorghum, wheat, and soybeans increased between these two periods.
- Moreover, statistical evidence showed that there were the substitutable relationships among corn, sorghum, and soybeans in the pre-ethanol-mandate period, but these relationships disappeared in the post-ethanol-mandate period.
- Hence, if the U.S. ethanol mandate is closely associated with high corn prices, livestock producers in Mexico may face difficulty in adjusting their import demand for feed grains.

References

- Abbott, P., Hurt, C., Tyner, W. 2011. What's Driving Agricultural Prices in 2011? Farm Foundation.
- Clements, K.W., Theil, H. 1978. "A Simple Method of Estimating Price Elasticities in International Trade." *Economics Letters* 1: 133-137.
- Dyer, G., Taylor, J. 2011. "The Corn Price Surge: Impacts on Rural Mexico." *World Development* 39: 1878-1887.
- Mitchell, D. 2008. A Note on Rising Food Prices. Policy Research Working Paper 4682. World Bank.
- Runge, C., Senauer, B. 2007. "How Biofuels Could Starve the Poor?" *Foreign Affairs* 86: 41-53.
- Terrell, D. 1996. "Incorporating Monotonicity and Concavity Conditions in Flexible Functional Forms." *Journal of Applied Econometrics* 11: 179-194.
- Valero-Gil, J., Valero, M. 2008. "The Effects of Rising Food Prices on Poverty in Mexico." *Agricultural Economics* 39: 485-496.