Predicting the Future of the Ethanol Industry Under Uncertainty

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August 8, 2016 Camp Resources XXIII

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This research was completed in partial fulfillment of PhD requirements at the University of Illinois at Urbana Champaign. All information presented is my own and not affiliated with the EPA.

Overview

- What do I do?
 - Use a conditionally parametric logit method to estimate the probability of ethanol production in Corn Belt counties in the future.

Main Contribution:

- First paper to extrapolate probability of ethanol in each county to determine locations of new plants/plants at risk of idling
- What do I find?
 - Ethanol capacity will concentrate in core ethanol producing region
 - New plants will locate in the ethanol producing states, weak plants are on the edges of the ethanol producing region

Ethanol plant locations and capacity



Uncertainty in future corn ethanol production

Future RFS mandate levels

- 2007 initial mandate implied 14 bill gal ethanol
- May 2015 proposal mandate implied 15 bill gal ethanol
- November 2015 final mandate implied 14.5 bill gal ethanol
- Domestic gasoline demand
- Blend-wall
 - Biofuel Infrastructure Partnership Program
- Production of alternate renewable fuels
 - Biodiesel, renewable diesel

Method

- Use a conditionally parametric spatial logit regression model to estimate probability of ethanol in each county
 - Local spatial effects are allowed to vary over space
 - Nearby observations weight greater than those farther out
 - Less sensitive to model misspecification than spatial AR models
 - Does not require a large spatial weights matrix specification
 - Rank estimated probability for all counties
 - Split results into counties with and without ethanol production
 - **Lowest ranked** counties **with** production most **at risk** of ethanol plants going **idle**
 - Top ranked counties without production most likely to host new production in the future

Data

- County level data across 19 Corn Belt states
- Data used includes:
 - Producing ethanol plant locations in 2010
 - 2009 corn production and 2006 near-by basis (as a proxy for corn price)
 - Access to livestock markets (competitors and by-product purchasers)
 - ▶ 2002 survey of agriculture
 - Distance to Joliet, IL (major ethanol storage and distribution hub) and the density of rail lines (proxies for transportation cost)

Main results: strong and weak counties and idled ethanol plants



So what?

The information presented in this research can help expand the knowledge base of how municipalities can better manage changes to the ethanol industry in their area

	U.S. Economy	Effects of Domestic Production	Future Uncertainty
Ethar	nol 🗲 #2 user of corn	Job creation	Blend wall
		Tax revenue	Export demand
└→ Corn → #1 crop in planted		Lower GHG emissions	Alternate renewable fuels
	acreage and gross farm receipts	Increased household income	Gasoline demand
		Decreased crude oil imports	Future mandate levels
	l→ Agriculture → 1.3% U.S. 🤇	GDP	

Thank you



Questions?



Additional information and results

Corn Production, 2007²



Change in ethanol capacity (100MGY) by state, 2005 to 2010



Two levels of capacity change

Examine results under two levels of ethanol capacity expansion or reduction

- Low Level: change in total demand ~300MGY
 - Difference between actual production in 2014 and 2014 implied mandate level from revised RFS
- ► High level: change in total demand ~1,500MGY
 - ▶ About equal to total capacity idled or closed in Corn Belt between 2011 and 2015
- For ethanol expansion: Assume new plants are 100MGY
- For ethanol contraction: actual capacity used, adding capacity of lowest ranked plants until sum reaches given level without exceeding it

Results: strong and weak counties



Rank of ethanol producing counties



Results compared to corn production



Full results, ranked by quintile



Average 2006 Basis



90

2009 Corn Production



Distance to Will County





Rail Density

Milk Cows



Beef Cattle



Hogs





