Effects of Increased Renewable Energy Production on the Agricultural Sector

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Background

- Production in 2006:
  - Ethanol: 4.9 billion gallons
  - Biodiesel: 0.373 billion gallons

- Current US production capacities:
  - Ethanol: 5.6 billion gallons
  - Biodiesel: 0.864 billion gallons

- New capacity under construction:
  - Ethanol: 6.2 billion gallons
  - Biodiesel: 1.7 billion gallons
Fossil Energy Situation

- Prices high by historical standards, but somewhat lower than the end of last year
  - Fund re-weighting
  - Geopolitical issues
- Substantial uncertainty
  - Soon-to-be-declining rate of global petroleum production?
  - Economic growth in China, India
  - OPEC
Policy Situation

- Current Renewable Fuel Standard unlikely to bind
- Current ethanol subsidy rapidly getting expensive, even as market incentives for ethanol production are high
- Proposals for higher RFS
- Proposal for variable ethanol subsidy
Given all of this uncertainty, where are we going?
Agricultural and Energy Market Interaction (AEMI) Model Overview

- **Fossil Energy Markets** (exogenous)
- **Ag Markets** (Econometric + Equilibrium Displacement Approach)
- **Renewable Fuels Markets** (Optimization Approach)
Agricultural and Energy Market Interaction (AEMI)

- Models the optimizing behavior of representative wet and dry mill ethanol producers, and representative biodiesel producers
- Fossil energy price forecasts come from NYMEX
- Ag market forecasts come from a large-scale econometric model
- Ag equilibrium is displaced based on bio-energy activity
- Stochastic simulation
AEMI Advantages

- Employs market-based price forecasts for fossil energy
- New stochastic forecasts can be generated very rapidly in response to changing fossil energy market conditions
- Stochastic analysis of alternative energy policy scenarios can be performed very rapidly
Ethanol Demand

Price
($/84K BTU)

\[ P_{unleaded} \]

Max (RFS - \( Q_{\text{biodiesel}} \), min. oxygenate use)

Quantity (gallons)
Four Policy Scenarios

- Current situation continues
- Higher RFS is set (and current subsidy remains)
- Variable ethanol subsidy replaces the fixed subsidy (and RFS is unchanged)
- Higher RFS and variable ethanol subsidy
Current and Proposed Renewable Fuel Standards

Million Gallons

2007 2008 2009 2010 2011 2012 2013

Current and Proposed Renewable Fuel Standards

Current
Bush
Lugar, Harkin, Dorgan, Biden

AFPC
The Agricultural and Food Policy Center
at Texas A&M University
Variable Ethanol Subsidy Assumptions

- Senator Lugar proposed a variable subsidy that establishes an effective $45 per barrel price floor for oil.

- No details!
  - Assume that current subsidy of $0.51 per gallon of ethanol is received when crude oil is $45 per barrel.
  - Assume that subsidy changes as the oil price changes at the approximate rate at which the gasoline replacement value of ethanol changes.
  - Minimum subsidy is zero.
  - \[ VS = \max\{ 0, 1.455 - 0.021 \times P_{\text{LSCO}} \} \]
Assumed Variable Ethanol Subsidy

**Diagram:**
- **X-axis:** Light Sweet Crude Oil Price ($/bbl.)
- **Y-axis:** Dollars per Gallon

The diagram shows a linear relationship between the Light Sweet Crude Oil Price and the assumed variable ethanol subsidy. As the oil price increases, the subsidy decreases linearly.

**Key Points:**
- **Subsidy Values:**
  - $0.00
  - $0.10
  - $0.20
  - $0.30
  - $0.40
  - $0.50
  - $0.60
  - $0.70
  - $0.80
  - $0.90

**Price Range:**
- $30 to $80

**Graph Details:**
- The line is depicted with blue triangles, indicating the trend of the subsidy as oil prices change.

**Source:**
AFPC
The Agricultural and Food Policy Center at Texas A&M University
Light Sweet Crude Oil Price
Cushing, OK

[Graph showing the price of Light Sweet Crude Oil from 2001 to 2012. The graph includes historical data, forecast, and 75% confidence interval.]
Biodiesel Production
United States

Million Gallons


History
Forecast 75% Confidence Interval

Forecast
75% Confidence Interval
History
Corn Planted Acres
United States

Million Acres

00/01 01/02 02/03 03/04 04/05 05/06 06/07 07/08 08/09 09/10 10/11 11/12

- Current
- Higher RFS
- Higher RFS & Variable Subsidy
- Variable Subsidy
- History
Corn Feed Use

![Graph showing corn feed use over time with different scenarios: Current, Higher RFS, Higher RFS & Variable Subsidy, Variable Subsidy, and History. The graph indicates a decrease in corn feed use from 2000 to 2012.](image-url)
Conclusions

- We are likely to produce a lot more ethanol in coming years, and somewhat more biodiesel
- Biodiesel capacity glut possible
- Higher prices for ag commodities are likely to continue
- Declining exports of ag commodities, especially corn
- More acres in corn
Conclusions

- Effects on ag economy of different policy scenarios are minimal over the next 5 years
- Variable ethanol subsidy would reduce expected federal government expenditure somewhat