Bottlenecks, Drought, and Oil Price Spikes: Impact on U.S. Ethanol and Agriculture

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Outline

Based on an update of our earlier study “Emerging Biofuels: Outlook of Effects on U.S. Grain, Oilseed, and Livestock Markets”

http://www.card.iastate.edu/publications/synopsis.aspx?id=1050

Updated with available 2006 and 2007 data

The objective is to estimate:

- how large the biofuels sector in the U.S. could become
- the impact of the biofuels sector on crops markets, trade, and on livestock markets
- the response of world agricultural markets
Current ethanol capacity: 131 plants, 6.92 billion gallons/year

Total capacity under construction and expansion: 6.56 billion gallons/year

73 new ethanol plants and 10 expansion projects underway

2.2 billion bushels of corn were used in producing fuel ethanol in 2006/2007 marketing year.

3.2-3.5 billion bushels of corn are expected to be used in producing fuel ethanol for 2007/2008 marketing year.
Three Cases

- Baseline
  - Current policies, “normal” weather

- Higher oil prices throughout projection period
  - Adding $10/barrel to the crude oil price

- Drought in the 2012 crop year
  - Placing a 1988-style drought in the middle of the projection period
Projected U.S. Ethanol Production

Annual production based on Jan.-July 2007 numbers ~ 6.4 billion gallons
Wholesale Gasoline and Ethanol Prices

![Graph showing wholesale gasoline and ethanol prices from 2006 to 2016. The graph indicates a downward trend in prices over the years. The x-axis represents the years from 2006 to 2016, and the y-axis represents the prices in US$/gallon.]
Projected U.S. Dry Mill Margins

US$/bushel


Margin Over Operating Costs
Margin Over Total Cost
## A Quick Look at Ethanol Blending

<table>
<thead>
<tr>
<th></th>
<th>January 2007 ($/gallon)</th>
<th>September 2007 ($/gallon)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unleaded</td>
<td>E-10</td>
</tr>
<tr>
<td>Gasoline</td>
<td>1.490</td>
<td>1.341</td>
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<tr>
<td>Ethanol</td>
<td>0.226</td>
<td></td>
</tr>
<tr>
<td>Price before Taxes</td>
<td>1.490</td>
<td>1.567</td>
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<td>Fed. Gas Tax</td>
<td>0.184</td>
<td>0.184</td>
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<tr>
<td>Ethanol Tax Credit</td>
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<td>-0.051</td>
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<tr>
<td>Price after Fed. Taxes</td>
<td>1.674</td>
<td>1.700</td>
</tr>
</tbody>
</table>
Ethanol Usage in 2004 (latest available)

Blending Percentage

- 0%
- 1 - 25%
- 25 - 50%
- 50 - 75%
- 75 - 100%
Projected U.S. Corn Planted Area

million acres
Projected U.S. Soybean Planted Area

million acres


60 65 70 75 80
Projected U.S. Corn Production and Prices

- **Production (billion bushels):**
  - 2006: 10
  - 2007: 12
  - 2008: 14
  - 2009: 16
  - 2010: 18
  - 2011: 16
  - 2012: 14
  - 2013: 12
  - 2014: 10
  - 2015: 8
  - 2016: 6

- **Price ($ per bushel):**
  - 2006: 2.90
  - 2007: 3.00
  - 2008: 3.10
  - 2009: 3.20
  - 2010: 3.30
  - 2011: 3.40
  - 2012: 3.50
  - 2013: 3.60
  - 2014: 3.70
  - 2015: 3.80
  - 2016: 3.90
Projected U.S. Distillers Grains Production and Prices

- Production (million tons)
- Price ($ per ton)

For years 2006 to 2016, the graph shows the projected production of Distillers Grains and the corresponding prices.

- Production values range from 15 million tons in 2007 to a peak of 35 million tons in 2008.
- Price values fluctuate, with a peak of $120 per ton in 2007 and a trough of $95 per ton in 2016.

The chart indicates a general decline in production and a slight increase in price over the years.
Projected U.S. Soybean Meal Production and Prices
Projected Brazilian Ethanol Production

million gallons


Brazil
Projected Ethanol Production

million gallons

China EU India

Projected Argentine Area Harvested

thousand hectares

Corn
Wheat
Soybeans


20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0


Corn
Wheat
Soybeans
Projected Brazilian Area Harvested

thousand hectares

Corn Wheat Soybeans

- Corn
- Wheat
- Soybeans
Projected U.S. Biodiesel Production

million gallons

Impact of Higher Crude Oil Price

- Increased crude oil price by $10/barrel over the projection
- Margins on ethanol plants increase
- New incentive to invest in added capacity for ethanol production
- Eventually, a new equilibrium reached where there is no incentive to invest in or exit the ethanol industry
- Will demand for ethanol be enough?
  - E-10 market will saturate around 15 billion gallons
  - Drop in ethanol price will eventually encourage increase in demand for the flex-fuel cars
Projected U.S. Ethanol Production

billion gallons

Scenario Baseline
Wholesale Gasoline and Ethanol Prices

US$/gallon


Unleaded Gasoline Ethanol

Unl. Gas (Sept. 2007) Ethanol (Sept. 2007)
Projected U.S. Corn Planted Area
Projected Utilization of U.S. Corn

- Feed
- Fuel
- HFCS
- Seed
- Food, Other
- Exports

million bushels

Usage of Distillers Grains by Species

- Beef: 66%
- Pork: 13%
- Poultry: 12%
- Dairy: 9%
Projected U.S. Soybean Meal Production and Prices

![Graph showing projected U.S. Soybean Meal Production and Prices from 2006 to 2016. The graph illustrates the trend in production and prices over these years.](image-url)
Projected U.S. Meat Production

billion pounds


Beef

Pork

Broiler
Projected U.S. Biodiesel Production

million gallons


Scenario Baseline
Impact on Rest of the World

- World grain and oilseed prices increase
- Result in higher feed and food prices
- Higher livestock production cost
- Countries in South America and Asia fill the crop gap
Impact of Short Crop Scenario

- Drought in 2012 similar to 1988
  - Regional yields of corn, soybeans and wheat changed from trend levels
  - Yields were off by 25% for corn, 18% for soybeans, and 11% for wheat in 1988
- Ethanol mandate for 2012 assumed to be 14.7 billion gallons
Corn, Soybean and Ethanol Markets

- Corn price increases by 44% above baseline levels
- Soybean price rises by 22%
- Corn exports and stock levels decline by more than 60%
- Corn exports from South America, China, etc. fill part of the gap from decline in U.S. corn exports
- Corn feed use declines by 16% (switch to other feeds)
- Ethanol trade increases moderately
Livestock Market

- Higher feed costs affect the livestock sector but to a lesser extent as shock is perceived as temporary
- Production declines
  - Broiler production declines the most (over 2.5%)
  - Milk production declines the least (0.5%)
Thank You