US Biofuel Policy Effects on Agricultural Commodity Exports

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Orlando, Florida
November 15-17, 2009
Objective

• Background
  – Concerns about US biofuel policy effects
    • Food versus fuel
    • Indirect land use
  – Biofuel policy effects sensitive to context

• Problem
  – Range of US biofuel effects?
  – Measured by US agricultural exports
Policies and Impacts

• Key biofuel policies
  – Tax credit
  – Specific ethanol tariff
  – Mandates (Renewable Fuel Standards)

• Impact on US trade?
  Gardner: Tax credit → corn feed and exports -1%
  Birur et al.: mandate → share of coarse grain production exported falls (23% to 10%)
  Westhoff et al.: eliminate all → +19% corn exports
  Meyer et al.: no ethanol supp’t → +25% corn exports
  Tyner and Taheripour: price effect sensitive to petro price
Contribution

• Build on Westhoff et al. and Meyer et al.
  – Similar
    • Model and stochastic simulation
  – Different
    • Updated base data from Westhoff et al.
    • Not just ethanol focus as in Meyer et al.
    • Focus on US agricultural exports
  – Caveat
    • Focus on US markets and policies
Approach

• FAPRI-MU model
  – partial equilibrium, non-spatial, forward-looking
  – US agricultural and biofuel markets
    • crop and livestock commodity markets
    • ethanol, biodiesel
  – biofuel and agricultural policies

• Stochastic simulation
  – repeated random draws on errors
  – petroleum price, yields, demands
Expect a Range of Possibilities

A binding mandate
→ higher quantities and a price gap

A non-binding mandate
→ no change to quantities or prices

Simulated Range of Possibilities

500 observations of 2015 Conventional Mandate Cost per Gallon

Conventional RIN price, dollars per gallon

Petroleum price, dollars per barrel
Results

Stochastic simulation over 10-year period

Baseline with policies

Scenario without policies
  tax credit, ethanol specific tariff, mandates

Difference = effect of removing policies
Ethanol Use

percent change in average value of 2012-18 of stochastic output

<table>
<thead>
<tr>
<th>2012-18 averages</th>
<th>BASE</th>
<th>SCEN-ARIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg</td>
<td>17.0</td>
<td>10.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-37%</td>
</tr>
<tr>
<td>10th per.</td>
<td>16.5</td>
<td>8.4</td>
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<tr>
<td></td>
<td></td>
<td>-49%</td>
</tr>
<tr>
<td>90th per.</td>
<td>17.6</td>
<td>13.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-24%</td>
</tr>
</tbody>
</table>

Note: the percent differences compare the average, 10th percentile, and 90th percentile of the 500 scenario values for ethanol use relative to average, 10th percentile, and 90th percentile of the 500 baseline results for ethanol use.

Food and Agricultural Policy Research Institute
University of Missouri
Corn Price
percent change in average value of 2012-18 of stochastic output

<table>
<thead>
<tr>
<th>Percent change caused by US biofuel policy</th>
<th>2012-18 averages</th>
<th>BASE</th>
<th>SCEN-ARIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg</td>
<td>4.07</td>
<td>3.53</td>
<td>-13%</td>
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<tr>
<td>10th per.</td>
<td>3.76</td>
<td>3.17</td>
<td>-16%</td>
</tr>
<tr>
<td>90th per.</td>
<td>4.41</td>
<td>3.93</td>
<td>-11%</td>
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</tbody>
</table>

Note: see note to table of ethanol use results.
Soybean Oil Price

percent change in average value of 2012-18 of stochastic output

Note: see note to table of ethanol use results.
Corn Exports
percent change in average value of 2012-18 of stochastic output

Corn exports
billion bushels

<table>
<thead>
<tr>
<th>2012-18 averages</th>
<th>BASE</th>
<th>SCEN-ARIO</th>
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</thead>
<tbody>
<tr>
<td>Avg</td>
<td>2.1</td>
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<td>+23%</td>
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<tr>
<td>10th per.</td>
<td>1.7</td>
<td>2.1</td>
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<tr>
<td></td>
<td></td>
<td>+24</td>
</tr>
<tr>
<td>90th per.</td>
<td>2.5</td>
<td>3.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+22%</td>
</tr>
</tbody>
</table>

Note: see note to table of ethanol use results.
Soybean Oil Exports
percent change in average value of 2012-18 of stochastic output

Soybean oil exports
billion pounds

<table>
<thead>
<tr>
<th>2012-18 averages</th>
<th>BASE</th>
<th>SCEN-ARIO</th>
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</thead>
<tbody>
<tr>
<td>Avg</td>
<td>3.0</td>
<td>4.9</td>
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<td>10th per.</td>
<td>2.1</td>
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<td>+82%</td>
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<td>90th per.</td>
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<td>+52%</td>
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</table>

Note: see note to table of ethanol use results.
Wheat Exports

percent change in average value of 2012-18 of stochastic output

Wheat exports
billion bushels

<table>
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<tr>
<th>2012-18 averages</th>
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<tbody>
<tr>
<td>Avg</td>
<td>1.08</td>
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<td>+1%</td>
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<td>10th per.</td>
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<td>90th per.</td>
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<td>1.2</td>
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<tr>
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<td>+2%</td>
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</tbody>
</table>

Note: see note to table of ethanol use results.
Summary

Question  As first step to world market effects, how do US biofuel policies affect US ag trade?

Finding  discontinuing US biofuel support …

  Increases crop exports
    \( \frac{1}{4} \) corn, \( \frac{2}{3} \) soybean oil, less for others

  Sensitive to context
    +10-40% corn, 40-100% soybean oil, less for others

• Caveats:
  Focus on US
  Discontinue support, not eliminate biofuel
More information and other work in progress

http://www.fapri.missouri.edu/

FAPRI baseline
US ethanol and biofuel policy analysis
Renewable Identification Number (RIN) markets
Effects of climate policy on US crop production costs

Articles

“Renewable Identification Numbers Are the Tracking Instrument and Bellwether of US Biofuel Mandates” Eurochoices 2009

“Ethanol Policy Changes to Ease Pressures in Corn Markets: Could They Work?” Choices 2009