Food vs. Fuel?

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Which food, which fuel?
- Ethanol (EtOH) derived from corn grain
- U.S. leading producer at 13.2 billion gallons in 2010 (RFA)
- Nearly 40% of US corn harvest currently goes to EtOH production

How does it work?
- Supply-side
  - Diversion of finite cropland
  - Diversion of total corn harvest
  - Reduced supply → increased price

- Demand-side
  - 45¢/gal subsidy, 54¢/gal tariff
  - 15 billion-gallon mandate by 2015
  - High energy prices
  - Increase demand → increase price

How does it work?
- Commodity Price Cascade Effect
  - Increased corn price leads producers to shift non-corn crops to corn
  - Decrease supply → increase price

End of Cheap Food?

“[T]he rise in prices is also the self-inflicted result of America’s reckless ethanol subsidies. This year biofuels will take a third of America’s (record) maize harvest. That affects food markets directly: fill up an SUV’s fuel tank with ethanol and you have used enough maize to feed a person for a year. And it affects them indirectly, as farmers switch to maize from other crops. The 30m tonnes of extra maize going to ethanol this year amounts to half the fall in the world’s overall grain stocks.” – The Economist
Who’s affected?

- The world’s poor, disproportionately
  - Food expenditures eat up much higher share of already-marginal income
  - In developed world food processors act as buffers, absorbing much of the increases in commodity prices through economies of scale
- In developing countries larger proportion of food purchased in its ‘raw’ un-buffered form

United States: The Revis family of North Carolina
Food expenditure for one week: $341.98

Chad: The Aboubakar family of Breidjing Camp
Food expenditure for one week: 685 CFA Francs or $1.23

Historical Growth of US Ethanol

<table>
<thead>
<tr>
<th>Year</th>
<th>Millions of Gallons</th>
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<tbody>
<tr>
<td>2000</td>
<td>1,630</td>
</tr>
<tr>
<td>2001</td>
<td>1,770</td>
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<tr>
<td>2002</td>
<td>2,130</td>
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<td>2003</td>
<td>2,800</td>
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<td>2004</td>
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<td>2005</td>
<td>3,904</td>
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<td>2006</td>
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<td>2007</td>
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<tr>
<td>2009</td>
<td>10,600</td>
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<td>2010</td>
<td>13,230</td>
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Source: RFA

Are biofuels to blame?

- Certainly in part
  - 2007/2008 spike in world food prices provided focal point for analyses
  - World Bank: 100m people worldwide pushed below poverty line by food price spike in 2008
  - More recent spike again in 2010/2011
  - Methodologies, study periods, and political motivations vary widely
  - Estimates range from 3%-75% of 2008 food price increase attributable to increases in (US) biofuel production
- Many confounding factors

Source: ICTSD
"Perfect Storm" of Influences

<table>
<thead>
<tr>
<th>Long-term / Structural</th>
<th>Short-term / Cyclical</th>
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<tbody>
<tr>
<td>1. Increased biofuel production (supply- and demand-side)</td>
<td>1. Depreciation of US Dollar</td>
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<td>2. Increase in oil price</td>
<td>2. Bad weather / disease in major producing regions</td>
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<td>3. Rising demand for meat (feed) in developing world</td>
<td>3. Increase in protective export bans on commodities as</td>
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<tr>
<td>4. Under-investment in ag/rural research and infrastructure</td>
<td>4. Speculative investment in commodity markets</td>
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Summary of Literature

<table>
<thead>
<tr>
<th>Source</th>
<th>Factors</th>
<th>Biofuels</th>
<th>Commodity Speculation</th>
<th>Export Bans</th>
<th>Weather / Disease</th>
<th>Weak US Dollar</th>
<th>Rural / Ag Under-Investment</th>
<th>Developing Demand</th>
<th>Oil Price</th>
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Highlights from Literature

- **US Gov’t**
  - U.S. Government press release on 14 May 2008 reports outlandishly low 3%.
  - USDA report three days later says up to 10%.

- **World Bank**
  - Stark contrast to US Gov’t at 75% estimate.
  - Stalls publication of report for fear of embarrassing US Gov’t.
  - Highest estimate - claims speculation and export bans indirectly caused by biofuel policies.

- **ICTSD (Int’l Ctr for Trade & Sust. Devpt.)**
  - Market-driven expansion of ethanol much more effectual than subsidies.
  - "There is no rationale for the blender tax credit. It does little to help the biofuel industry as long as mandates are in place except in years when high gasoline prices have already stimulated demand beyond mandated levels."

- **Rajagopal 2009** – highlights counter-effect of lower gasoline prices.
  - Benefit to energy consumers.
  - Tempered energy-price effects on food prices.

- **CME Group**
  - Large Chicago-based commodity-trading corporation.
  - Explicitly denied role of speculation in commodity markets.

- **Biofuels Platform**
  - Swiss governmental agency.
  - Refrained from assigning relative weights to factors, in characteristically neutral fashion.
  - De-emphasized the contribution of EU biofuel production and policies.

Conclusions from Literature

- **Extent of biofuels’ impact on food prices is significant, but impossible to know** with certainty.
- **Based on literature review presented, a fair estimate would fall between one-quarter and one-third.**
- **US corn ethanol the main culprit.**
Other Considerations – Corn Ethanol Co-products

- “40% corn harvest diverted to ethanol”
  - True but misleading
  - Appx. equal amount “diverted” to feed
  - Highlights issue of conversion inefficiencies

- EtOH co-products make valuable cattle feed
  - Dry Distiller’s Grains (DDG)
    - 145% the feed value of raw corn
  - Also corn oil, gluten & brewer’s rations

- Distortion of soy feed market

- 2012 marked the end of the $6 billion/year ethanol subsidy
  - High energy prices likely to continue to fuel ethanol demand
  - Shift to 2nd gen (cellulosic) ethanol
  - These will involve tradeoffs as well!

Looking to the Future

- Billion-ton Study II – key findings
  - “Dedicated energy crops” are the way forward, producing as much as half the total biomass available by 2030
  - Volumes are highly impacted by price
    - Baseline of $60 per dry ton biomass
    - 30 million acres cropland, 49 million acres pastureland shift to energy crops by 2030
    - Up to 4x current forest biomass contributions

- Billion-ton Study II – food vs. fuel
  - “For the baseline scenario, results do show a loss of commodity crop acres to energy crops and higher commodity crop prices...The large-scale deployment of energy crops could require the displacement of tens of millions of acres of cropland and pasture.”
Looking to the Future

Figure ES.4: Summary of currently used and potential resources at $30 per dry ton or less identified under baseline assumptions

<table>
<thead>
<tr>
<th>Year</th>
<th>Biomass</th>
<th>Feed</th>
<th>Bioenergy</th>
<th>Fuel</th>
<th>Industrial</th>
<th>suburban</th>
<th>Total</th>
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<tr>
<td>2002</td>
<td>100</td>
<td>50</td>
<td>30</td>
<td>20</td>
<td>10</td>
<td>5</td>
<td>220</td>
</tr>
<tr>
<td>2007</td>
<td>200</td>
<td>100</td>
<td>50</td>
<td>40</td>
<td>20</td>
<td>10</td>
<td>420</td>
</tr>
<tr>
<td>2022</td>
<td>500</td>
<td>300</td>
<td>150</td>
<td>200</td>
<td>100</td>
<td>50</td>
<td>1200</td>
</tr>
</tbody>
</table>

References

- Collins, Keith, “The Role of Biofuels and Other Factors in Increasing Farm and Food Prices: A Review of Recent Development with a Focus on Feed Grain Markets and Market Prospects,” June 19, 2008.