Global Aspects of USDA’s Baseline Projections for Biofuels

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Oil price expectations have jumped considerably

Outline

• What is the USDA baseline?
• How we modeled biofuels
• Country assumptions and projections
• “The Story”: Impact of expanded biofuel demand

What is the Baseline?

• 10 year annual projections for agriculture
  – Departmental annual baseline publication in February
• Projections, not forecasts
  – Conditional, long-run scenario
  – Neutral assumptions
• Prepared through an interagency process
  – Composite of models & judgment-based analysis

U.S. Agricultural Sector Model

• Food and Agricultural Policy Simulator (FAPSIM)
  – Annual model
  – Over 700 equations
  – Covers major U.S. agricultural crop and livestock commodities
  – Models major supply and demand categories
  – Incorporates U.S. agricultural policy provisions
  – Solves for prices that clear markets by equilibrating supply and demand
Global Agricultural Trade Model

- **Country-Commodity Linked Modeling System** ("Linker")
  - 24 commodity markets
  - 39 countries/regions
  - Solves for prices and trade that clear country markets & world commodity markets
    - Equilibrates supply and demand
    - Equilibrates global imports and exports
  - Global trade totals

24 World Commodity Markets

- **Coarse grains**
  - Corn
  - Sorghum
  - Barley
  - Other coarse grains
- **Food grains**
  - Wheat
  - Rice
- **Other crops**
  - Cotton
  - Sugar
- **Animal Products**
  - Beef and veal
  - Pork
  - Poultry meat
  - Eggs

Country & Regional Coverage

- Algeria
- Argentina
- Australia
- Bangladesh
- Brazil
- Canada
- Cent. Am. & Caribbean
- China
- Egypt
- European Union-25
- Hong Kong
- India
- Indonesia
- Iran
- Iraq
- New Zealand
- Pakistan
- Philippines
- Russia
- Saudi Arabia
- South Africa, (Rep of)
- Japan
- Malaysia
- Mexico
- Morocco
- South Korea
- Taiwan
- Thailand
- Tunisia
- Turkey
- Ukraine
- United States (Fapsim)
- Vietnam
- Rest-of-region models:
  - Other Asia
  - Other Europe
  - Other Former Soviet Union
  - Other N. Africa and Middle East
  - Other South America
  - Other Sub-Saharan Africa
  - Rest of World

How we modeled biofuels

- Main focus: feedstocks, rather than biofuels
- **Approach #1** (main countries):
  - Assumptions about growth in biofuels:
    - USA - EU - Brazil
    - Canada - Argentina - China
  - Assumptions are transparent and easy to modify.

U.S. corn used for ethanol

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<td>Million bushels</td>
<td>0</td>
<td>500</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
<td>2500</td>
<td>3000</td>
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Brazil

- Major ethanol producer & exporter
  - Sugarcane is feedstock
- Biodiesel
  - Small capacity compared to ethanol, but significant increase projected
  - Biodiesel substitutes for regular diesel trucked in from the coast.
European Union

- EU biofuels mandate
  - 5.75%
  - Assumed EU does not meet mandate
- Rapeseed oil makes up the 80 percent of bio-diesel oil
- Other oils (tropical) make up the other 20 percent of bio-diesel
- Limited ethanol production (from wheat)

Argentina: Biofuels Production

- Biodiesel from soybean oil
  - Large crushing capacity
  - Export tax structure favors exporting products rather than soybeans
  - Biodiesel plants being built with production destined for exports
- Ethanol
  - Limited capacity being planned.

Canada

- Biodiesel
  - Rapeseed oil is feedstock in west
  - Vegetable wastes & animal fats feedstocks in east
- Ethanol
  - Produced from corn and wheat

China

- 3rd largest ethanol producer behind Brazil and the US
- Assumed to continue to develop their ethanol sector
  - But constrained by food and feed demands for corn
  - Future growth focused on nongrain feedstocks

Other Countries: Indirect Price Impacts

- Approach # 2: Feedstocks affected through changes in world prices:
  - Rapeseed oil production, for EU market
    - Ukraine
    - Russia
    - Romania
    - Bulgaria
  - Palm oil production, for EU market
    - Malaysia
    - Indonesia

Ethanol production from grain feed stocks
Bio-diesel production

Projected prices have risen 2007 baseline compared with 2006 baseline

Price ratios: history and projected

Relative price changes: Soybeans, soyoil, & soymeal

Relative price changes: Corn and soybean meal

Global corn exports

1/ Republic of South Africa, Brazil, EU, former Soviet Union, and others.

Source: USDA Agricultural Projections to 2016
Global area planted: 10 major field crops

Other secondary impacts

- **Global Food Aid Donations:**
  - Donor countries may budget fixed amounts for food aid.
  - If food prices rise, fixed budgets buy less food.
  - Then, food aid shipments to low-income, food-deficit countries decline.

- **Consumption by low-income households:**
  - If cost of food increases,
  - Bigger percentage of income allocated to food,
  - or eat less.

Summary

- **Demand:** Biofuels are a new, high value product source of demand. Demand for feedstuffs will be strong.

- **Supply:** The supply chain will need more resources, and increased efficiency.

- **Trade:** Some countries will increase production and exports of feedstocks. Other countries will become importers of feedstocks. Trade in feedstocks and biofuels will likely increase.

- **Prices:** Farm output prices rise, and price relationships among crops change from traditional patterns.

Uncertainties

- Energy prices (oil & natural gas)
- Responsiveness to price changes
  - Demand for biofuels vs. petroleum prices
  - Supply of feedstocks vs. biofuels prices
  - Costs of feedstock production vs. feedstock prices
  - Fertilizer & natural gas, irrigation, farmland
- Additional crop land
- Water availability
  - Manufacturing process
  - Increased irrigation
- New technological developments in biofuels industry
  - Manufacturing process
  - New crop varieties: (higher yields; more suitable for biofuels)
  - New byproducts (with high value?)
- Biofuels policies & funding

Get the full USDA baseline report through the USDA-ERS baseline briefing room

http://www.ers.usda.gov/briefing/baseline

More information on biofuels available at:

http://www.ers.usda.gov/briefing/bioenergy

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