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The Economics of Bio-renewable Materials
Overview

- Ethanol: A Cautionary Tale
- BCAP: The Chicken or the Egg?
- Bioplastics: Discovering *True* Consumer Valuation
Why is ethanol used as a transportation fuel additive?

- Oxygen helps gasoline burn more completely, reducing harmful tailpipe emissions from motor vehicles.
  - the oxygen dilutes or displaces gasoline components such as aromatics (e.g., benzene) and sulfur.
  - oxygen optimizes the oxidation during combustion.
- The Clean Air Act Amendments of 1990 (CAA) require the use of oxygenated gasoline in areas with unhealthy levels of air pollution.
There are many potential oxygenates

- MTBE (117-121 RON)
  - In 1996, the city of Santa Monica learned that two of its drinking water wellfields, Charnock and Arcadia, were contaminated with MTBE at levels as high as 610 ppb and 86 ppb respectively
- Ethanol (~113 RON)
Ethanol became the oxygenate of choice.
Renewable Fuels Standard

- Energy Independence
- Air Quality Improvement
- Curb Global Climate Change

- RFS I – 2005 Mandated 7.5bn gal by 2012
- RFS II - 2007 Mandated 56 bn gal by 2022
Renewable Fuels Standard

- Renewable Biofuel
- Advanced Biofuel
- Cellulosic Biofuel
- Biomass-based Diesel
- Undifferentiated Advanced Biofuel
The RFS assured the development of corn-based ethanol

**U.S Ethanol Production Capacity**
2003-2011

Source: Data from RFA and individual company websites and literature
Total Ethanol Production Capacity and Number of Production Facilities, 1978-2011, U.S.
World Food Price Spike
Potential Adverse Effects

- Drives up food prices
- Deforestation

- Water pollution
  - “If projected future increases in the use of corn for ethanol production do occur, the increase in harm to water quality could be considerable”
    - National Research Council, 2007
Corn Yield
by Ethanol Production Facility Presence

No facility

Has facility
Corn and Ethanol Prices
Biomass Crop Assistance Program

The chicken or the egg?
BCAP hopes to solve the chicken-egg problem

- Established by the 2008 farm bill
- A pilot program that the Senate wants to continue in the current farm bill
- Attempt to build the infrastructure that makes the production of lignocellulosics profitable
1. 75% cost share
   - NOT for equipment
   - NOT for annual crops
2. 5 (15) years of annual payments for grassy (woody) crops
   - payments reduced by 1% if sold for cellulosic biofuels
   - -10% if sold for advanced biofuels
   - -25% if sold for heat, power, or biobased products
   - -100% if sold for anything other than heat, power, or biobased products (?)
3. $45/ton price match (Subsidy) for first 2 yrs
   - must be purchased at fair market prices (to defeat collusion)
   - Not more than 20% of funds can be used for matching (in original NOFA)
4. Must have an approved stewardship/conservation plan + harvest plan
5. Cellulosic bonus (?) details?)
The geography first BCAP program
Eliciting consumers’ willingness to pay for bio-renewable material

Experiments or Ebay?
The context matters for peoples’ valuation decisions

- Willingness to pay
- Willingness to accept
- Bounds consumers’ *true* valuation
- Marketers/advertisers have always known about the importance of context
Experimental auctions try to make the purchase decision *real*.

- Auctions mimic a market
  - Real prices
  - Real purchase decision
  - Competition
- Control information “consumer” receives
Experimental auctions have some shortcomings

- The auctions are experiments that take place in a lab
- Experimenter demand effects
- Demographics of experimental subjects don’t match actual consumers characteristics
- Ebay is a possible solution to these concerns
Conclusions

- Viability of bio-renewable materials depends on the price of alternatives
- Federal ‘mandates’ are typically used to establish the infrastructure needed to make bio-renewable materials profitable