

# The Truth About Ethanol

Environmental Science Graduate Seminar

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# **in vino veritas**

## **- Plato**

**Principle 7:**  
**Government Can**  
**Sometimes Improve on**  
**Market Outcomes**

# Principle 7: Governments

- Government Intervention is useful to correct positive and negative externalities (correct Market Failures)
  - Discourage Negative Externalities:
    - Pollution
    - Congestion
  - Encourage Positive Externalities:
    - Research
- Note that while there *are* negative externalities associated with gasoline; there are *no* positive externalities associated with ethanol.

**Principle 6:**

**Markets are Usually a Good  
Way to Organize Economic  
Activity**

# Principle 6: Markets

- Once externalities have been internalized...let markets work
  - Parry & Small (2006): US Gasoline undertaxed by ~60c/g.
  - This amounts to an implicit subsidy to gasoline & driving.
  - Optimal tax for corn-starch ethanol: ~70c (vs. \$1 for gasoline)
  - Optimal tax for cellulosic ethanol: ~60c

**Principle 5:**  
**Trade Can Make Everybody  
Better Off**

## Principle 5: Trade

- There is very little international trade in biofuels, especially imports by US
  - US imposes a 54c/g tariff on imported ethanol.
  - Brazil typically holds a 50c-\$1/g advantage over US ethanol.
    - In 2006, almost 10% of ethanol used in US was from Brazil.
    - Without the tariff, Brazilian ethanol would almost certainly be cheaper on the coasts.

# **Principle 4: People Respond to Incentives**

# Principle 4: Incentives

- Current Incentives for ethanol:
  - 51c/g tax credit (46 temp)
  - Renewable fuel standards.
  - Most of the plants being finished now were planned when annual ROI was ~50-75% p.a.

**Principle 3:**  
**Rational People Think at the**  
**Margin**

# Energy solutions need not be all or none

- At each point in time, what is the least-cost alternative to take us forward?
- 5bn gallons of corn ethanol might be more attractive than 10bn.
- What is the cost & role of conservation?
  - Different feedstocks?
  - Different technologies?

**Principle 2:**

**The Cost of Something is  
What You Give up to Get It.**

## Principle 2: Cost

- Without understanding the alternatives, we cannot understand the costs of an action.
  - What is the alternative of ethanol production?
    - Non production
    - Gasoline production
  - Because they have very different implications:
    - Water usage
    - Pollution/Emissions

# **Principle 1: People Face Trade-offs**

# You can have a gasoline replacement that is...

## Fast

- Available Now
- In Quantity
- Compatible

## Cheap

- Less than gas
- Compatible

## Good

- Eco-Friendly
- Not Food-Based
- No/Low GHGs
- Non-Fossil
- Domestic Origin

**Pick Any Two.**

# The Political Economy of Ethanol

## Environment

- Reduce C, SO<sub>x</sub>, NO<sub>x</sub>
  - Pro Cellulosic Ethanol
  - Unsure about Corn Ethanol.
  - Brazilian Ethanol?

## Peak Oil

- Prepare for Looming Oil Production Shortages

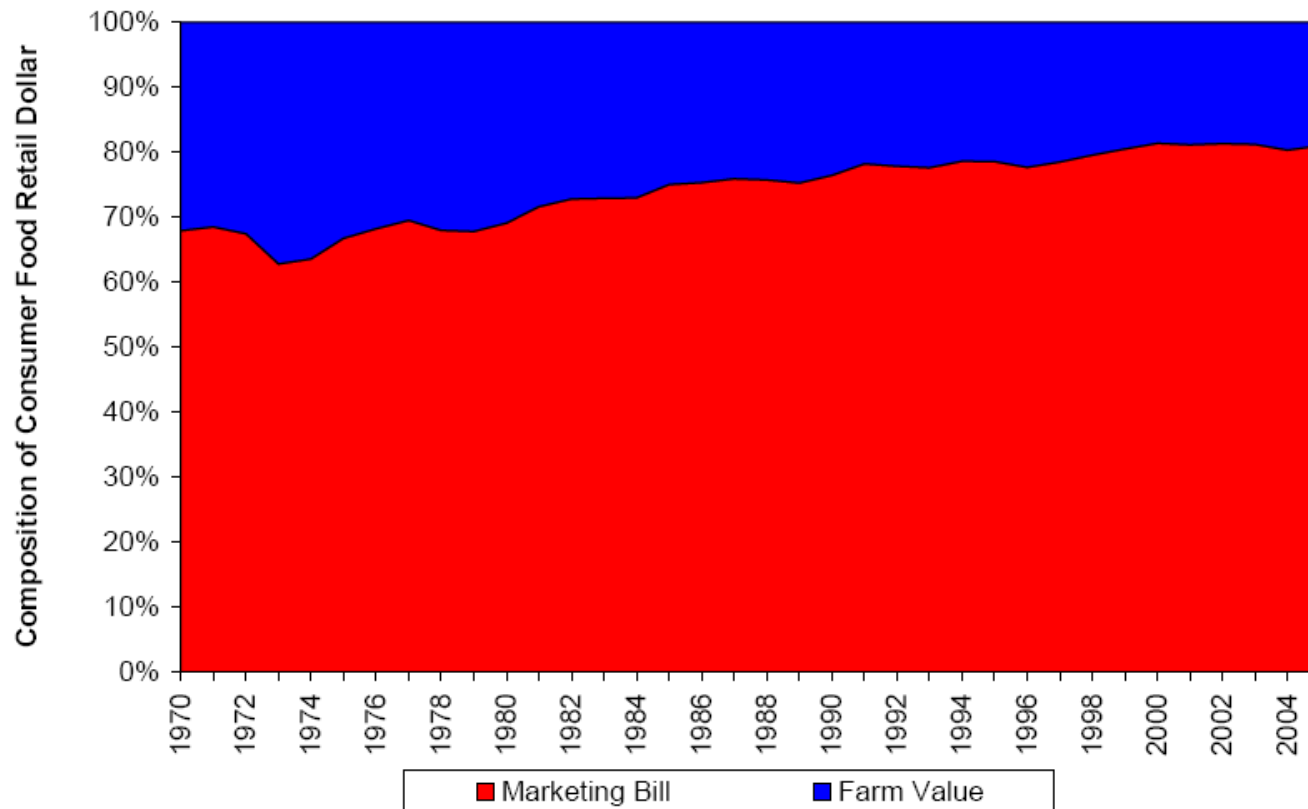
## National Security

- Energy Self-Sufficiency
  - Pro Ethanol of all types
  - Brazilian Ethanol?

## Rural Development

- Economic Revival
  - Pro All Biofuels
  - Anti Imported Biofuels

# Truth 1: Corn-based Ethanol Matters Less than You Think for Food Prices.



Source: Informa Economics/USDA Data

# Truth 1: Corn-based Ethanol Matters Less than You Think for Food Prices.

<b>Food Product Category</b>	<b>Farm Value as % of Retail Food Price</b>
Cereals and bakery items	6%
Beef	47%
Pork	30%
Chicken	36%
Dairy products	36%
Fats and oils	17%

# Truth 1: Corn-based Ethanol Matters Less than You Think for Food Prices.

Food Product	Farm Value Share of Retail Price (%) <sup>1</sup>	Example Retail Prices (\$/lb)	Cost of Input(s) Purchased from Farm (\$/lb)
Milk, 1/2 gal.	34	3.84	\$1.31
Flour, wheat, 5lbs	19	0.36	\$0.07
Bread, 1 lb	5	1.21	\$0.06
Margarine, 1 lb	15	1.26	\$0.19
Corn Flakes, 18 oz box	4	1.65	\$0.07
Corn Syrup, 16 oz. bottle	3	1.57	\$0.05
Ground Beef, 1 lb	47	2.37	\$1.11
Bacon, sliced	28	3.78	\$1.06
Chicken, fresh whole	47	1.14	\$0.54

Source: Informa Economics/USDA Data

# Truth 2: Cellulosic Ethanol Will Matter More than You Think for Food Prices

- Cellulosic Feedstocks:
  - Waste Paper
  - Stover, Straw
  - Switchgrass, Miscanthus
    - But where do we grow it?

# Truth 3: Energy Balance Doesn't Matter

- Is all energy the same?
  - 2 Twinkies have 300 calories
  - 3 large apples have 330 calories
  - 3 medium bananas have 300 calories
  - 4 Samoa Girl Scout Cookies have 300 calories
    - Are these all equivalent?

## Truth 3: Energy Balance Doesn't Matter

- In different forms, energy has different values:
  - Coal: \$2.89/mmBTU (96lbs)
  - NG: \$8/mmBTU (1,000 cubic feet)
  - Gasoline: \$24/mmBTU (8 gallons)

## **Truth 4: Gasoline prices are lower because of ethanol.**

- For every 1% increase in fuel availability in the US, fuel prices decline 14%-30% (Hughes, Knittel, Sperling)
- Ethanol provides about 3-4% of US gasoline.

# Truth 5: Energy Independence is Practically Impossible.

- Independence=No ties between US and World Markets
- Sufficiency=No need for imports

# What Would an Economist Do?

- Internalize all costs of production...
  - GHG emissions
  - Congestion effects
  - Military costs (????)
- Let the market find the optimal allocation among alternatives
- Continue to fund basic research
- Fund consumer education on alternatives and efficiency.



I believe that the great Creator has put ores and oil on this earth to give us a breathing spell. As we exhaust them, we must be prepared to fall back on our farms, which is God's true storehouse and can never be exhausted. We can learn to synthesize material for every human need from things that grow.

-George Washington Carver

# Economists' Roles in Policy

- Recommend 'socially optimal' policies
- Recommend optimal methods to achieve goals
- Evaluate alternative goals. □