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## **Supporting Biofuels: A Case Study on the Law of Unintended Consequences?**

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Biofuels have been gaining new prevalence in recent years. There are primarily three reasons for this new popularity:

1. the search for substitutes to oil that is becoming more expensive to develop and is geopolitically riskier;
2. the desire to lower emissions; and
3. support for agricultural sectors, especially in the developing countries.

These are the same reasons that led to previous rush to biofuels in the 1970s. Except for Brazil, biofuels have failed to reach significant market share in other large economies. Current shares are 1-2% in the US and 4-7% in China, India and the EU. In light of this low penetration, many countries are putting policies and mandates into place to raise the share of biofuels. However, ethanol cannot compete even with today's expensive gasoline without the subsidies. Ethanol from corn yields about seven times less energy content than ethanol from sugar cane per unit of energy used in its production. Cellulosic ethanol can be twice more efficient than sugar cane-based ethanol but technology remains experimental and expensive. A recent study from Stanford concluded that using E85 in Los Angeles could actually increase health risk relative to gasoline. Others have claimed for years that ethanol emits more pollutants than gasoline when the entire life cycle of both fuels (including corn production) is taken into account. A researcher from the Agriculture and Trade Institute in Minneapolis has stated that increasing corn production is not sustainable due to increased need for water and pesticide use. The price of corn has tripled in last two years and is more than \$5 a bushel; there are several reasons for high prices including higher energy costs but also ethanol mandates. Substituting corn for other commodities such as soy is also causing an increase in the price of these commodities. Thus, it appears that none of the three drivers for stepping up biofuels production are well founded, especially in the case of corn ethanol.

It appears that the recent rush to biofuels has:

- added to pressures in factor markets and crowded out investment in other sectors;
- contributed to rising food price inflation by
  - increasing prices for corn and soy, which increase the cost of feed to livestock, poultry and fish farming industries, and
  - increasing the price of many agricultural products due to reallocation of cropland to corn to meet increased demand for corn from the ethanol industry;
  - decreased grain exports (the lost export revenue to farmers can be significant);
  - raised concerns about environmental



Image source: <http://commons.wikimedia.org/wiki/Image:Biofuels.jpg>

impacts (nutrient loading from nitrogen may cause various environmental issues, including the worsening of the “dead zone” in the Gulf of Mexico and similar phenomena worldwide, while increased use of water for farming practices cause depletion of aquifers and common pool conflicts);

- put pressure on transportation and distribution infrastructure (rail cars, tanker trucks and barges, and gas stations to move ethanol) as well as on blending capacity at refineries. These constraints raise the cost of using ethanol. Expanding this infrastructure faces the same constraints in factor markets.

Political support for corn-based ethanol has become a perfect example of the law of unintended consequences. At the societal level, the negative impact of supporting corn-based ethanol on food prices and supplies, and possibly on the environment, far outweigh the desired economic benefits. The fuel remains relatively expensive and with limited market penetration despite considerable policy support. There seems to be no justification for supporting the ethanol industry with tax and non-tax incentives or by protecting it from more efficient biofuels from Brazil and elsewhere via import tariffs. Policy makers continue to ignore market forces at their own and unfortunately society's peril. Funds could possibly be better spent on research and development of options with both fewer negative externalities and greater chance of success in a market environment.

A more expansive discussion was presented at the 2007 USAEE Conference in Houston:  
<http://www.usaee.org/usaee2007/submissions/OnlineProceedings/Gulen%20Shenoy%20paper.pdf>