Lecture XXVIII: Ethanol Policy – Before the Mandatory Blend

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1. Policy Goals for Ethanol

2. Modeling the Derived Demand for Corn from Ethanol

Ethanol in the Supply Chain

- U.S. federal and state governments have subsidized biofuels since 1978.
- The federal subsidy has ranged from 40 to 60 cents per gallon. In 2007 it was 51 cents per gallon.
- The objectives of this policy have changed over time.

- Initial support was to increase farm income.
- The Clean Air Act of 1990 claimed that ethanol was a means to add oxygen to gasoline (making it cleaner burning - methyl teriary butyl (MTBE) substitute).
- Post 9/11, ethanol was seen as a way to supplement domestic energy sources in order to reduce our dependence on foreign oil.
- Finally, some contend that ethanol is a way to reduce green house gas emissions (recycling atmospheric carbon)

Consumer Versus Derived Demand

- There are a variety of ways to classify demand curves – one is consumer demand versus derived demand.
- The consumer demand curve is derived from consumer tastes and preferences (utility), the of consumption goods facing the consumer, and consumer income

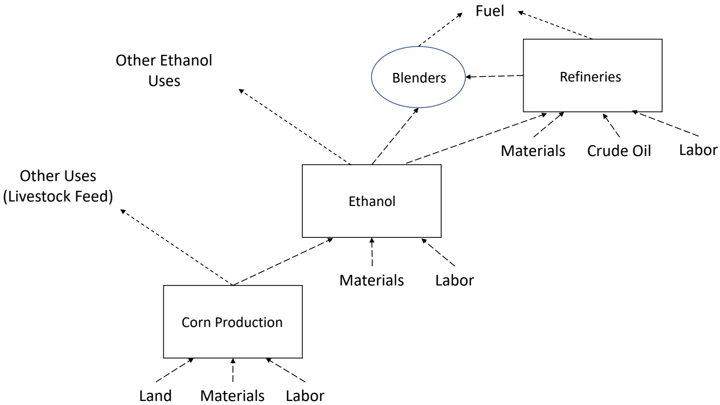
$$\begin{aligned} &\max_{q} U(q) \\ &\text{s.t. } p'q \leq Y \\ &\Rightarrow q^*(p, Y) \end{aligned} \tag{1}$$

Consumer Versus Derived Demand, Continued

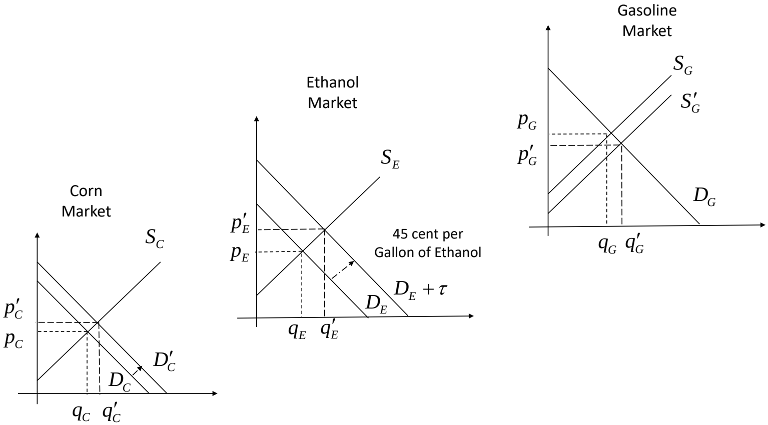
- Derived demands are the result of production decisions. Typically, we assume that the producers choose levels of input to produce different outputs in a way that maximizes profit

$$\begin{gathered} \max_{x,y} p'y - w'x \\ \text{s.t. } F\left(y,x\right) = 0 \\ \Rightarrow y^{*}\left(p,w\right),\ x^{*}\left(p,w\right) \end{gathered} \tag{2}$$

Market Channel for Ethanol



Market Shifts from VEETC



Production Decisions

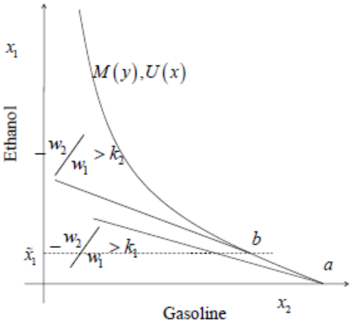
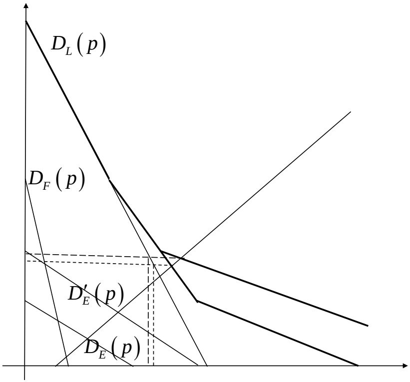


Figure 1. Consumer and Business Demand of Ethanol

Mathematical Details

- a is a corner solution where no ethanol is produced for the energy market - this holds as long as the price ratio is is less than k_1.
- If the price of ethanol falls or the price of gasoline increases, the price ratio increases to k_2 at which $\tilde{x}_1$ units of ethanol are produced and used for fuel.
- In the Energy Independence and Security Act of 2007, this shift in price occurred through a Volumetric Energy Excise Tax Credit.

Better Model of the Corn Market



Better Development of Welfare Effects