ENVR 252

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(1) When is it appropriate to evaluate a situation in static terms? What two conditions describe a state of "static efficiency"?

(2) The Demand (Marginal Benefit) for some good is defined as: $Q_d = -P+10$
The Supply (Marginal Cost) is defined as: $Q_s = 2P - 4$
($Q_d$ = quantity demanded; $Q_s$ = quantity supplied)

(a) Plot these functions

Note: Although P is generally considered to be the independent variable whose value corresponds to a specific Q, economists generally represent in a "backward" fashion with P along the ordinate (as the dependent variable) and Q along the abscissa. These are sometimes referred to as the "inverse" supply and demand functions. Moral: Plot the inverse functions.

i. Why is demand typically represented by a negative slope?
ii. Why is supply typically represented by a positive slope?

(b) Calculate the equilibrium (or "market clearing") price?
(c) Calculate the quantity produced at equilibrium?
(d) Calculate the Total Benefits?
(e) Calculate the Total Costs?
(f) Calculate the Net Benefits?
(g) Calculate the Consumer Surplus? What does this represent?
(h) Calculate the Producer Surplus? What does this represent?
(i) Calculate the price elasticity of demand at the equilibrium price (convention assumes these calculations are made for a 1% increase in $/unit)? What does this represent?
(j) Calculate the elasticity of supply at equilibrium (assume a 1% increase in $/unit)?
(k) Repeat (i) and (j) at a price of $4/unit. Compare these results with those obtained in (i) and (j). Do linear demand/supply functions exhibit constant price elasticity?

(3) The Cobb-Douglas (i.e. power function) form is another common way of representing demand functions. This has the form of:

$$Q = a * P^e$$

where,
a, e = constants

Assume:

Demand (MB): $Q_d = 1732 * P^{-0.5}$
Supply (MC): $Q_s = 100 * P^{0.5}$

Answer (a) – (j) same as above (no need to repeat the verbal descriptions).

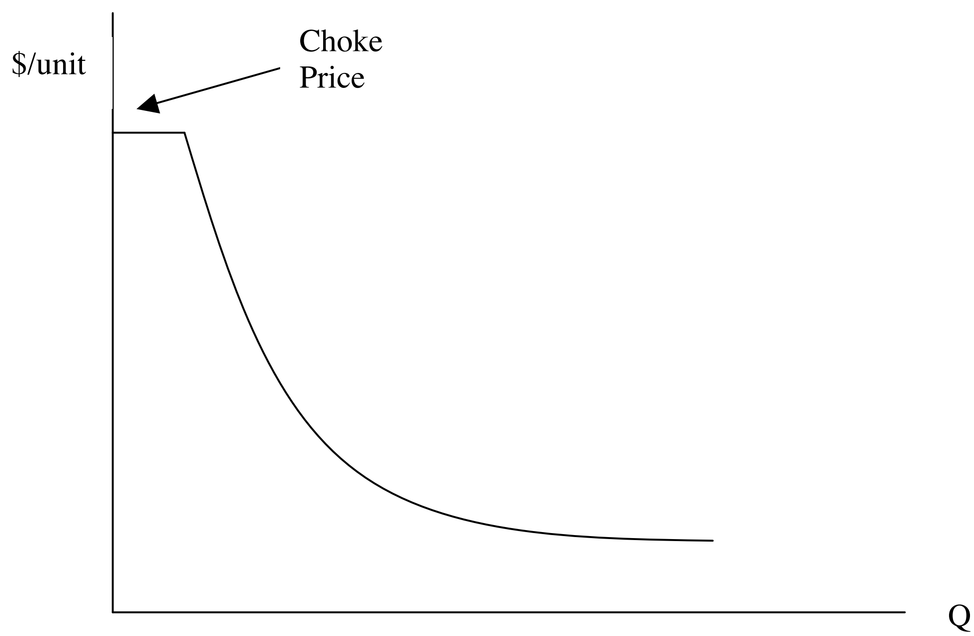
(k) Repeat (i) and (j) at a price of $25/unit. Compare these results with those obtained in (i) and (j). Do power functions exhibit constant price elasticity? Demonstrate this analytically by using the definition of elasticity:

$$e = (dQ/Q)/(dP/P)$$

(l) What is the significance of the exponent in the Cobb-Douglas function?

Warning: You will quickly realize that the demand function approaches the vertical axis asymptotically. This makes integrating beneath the demand function impossible. There is a concept known as a "choke price" (which we will discuss in greater detail later) that represents the price above which the Q demanded falls to 0. People will still pay the choke price for the remaining quantity, but no more.

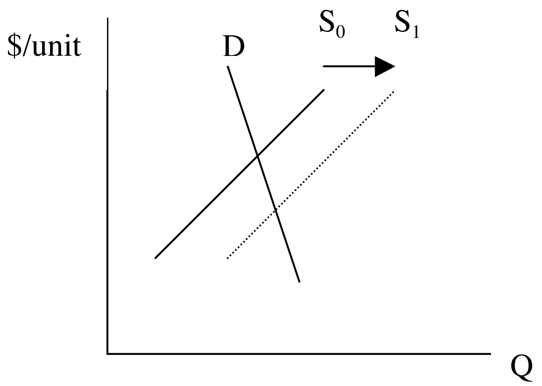
For this problem assume a choke price of $500/unit.



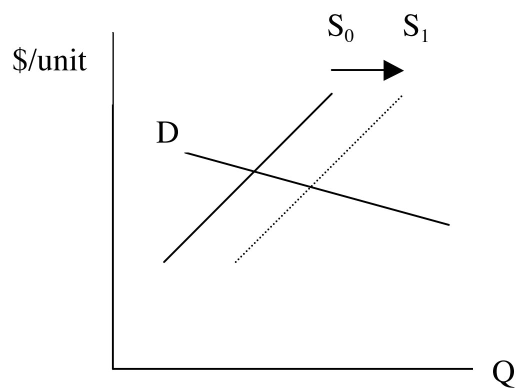

(4) Compare (graphically, in the panels provided) the price and quantity effects of an similar shift ($S_0$ -> $S_1$) in the supply function for a situation involving both a relatively inelastic (i) and relatively elastic (ii) demand function. Do the same for a similar shift in the demand function ($D_0$ -> $D_1$) for situations involving relatively inelastic (iii) and relatively elastic (iv) supply functions.

Given (from the reading) that we know both supply and demand are generally more elastic in the long-run, briefly discuss the price and quantity implications of short-term versus long-term shifts in supply and demand.

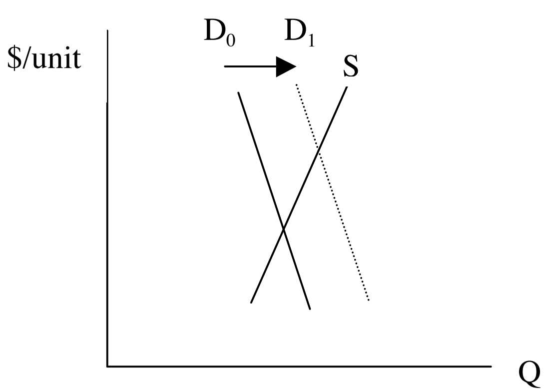
(i)




(ii)




(iii)




(iv)