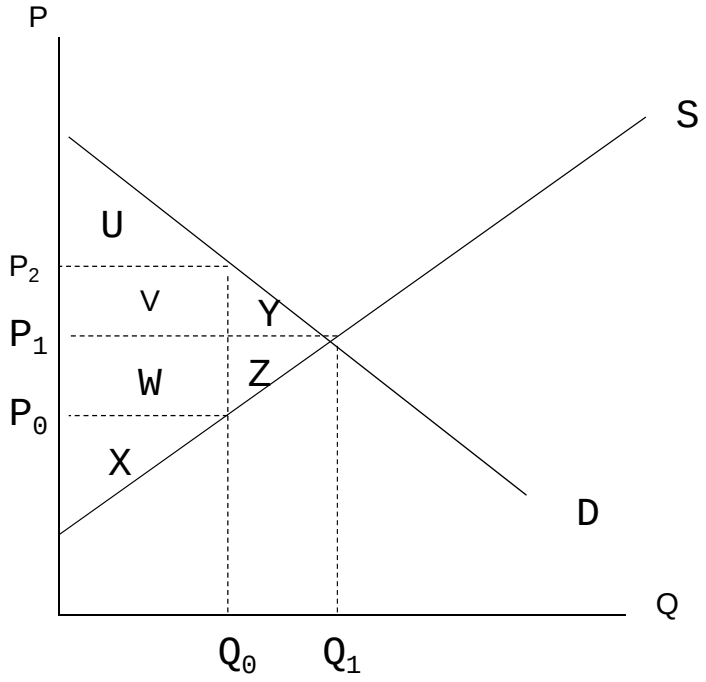
PROBLEM SET ONE--MBA 5110

1. Going to school now for 4 years will cost (direct & indirect) $40,000 per year & will add to your earnings by $20,000 per year. If r = 4% & you will work for 40 years, what is the net *PV* of this investment?

2. a) Using Figure 1, what are *CS* & *PS* when the market clears?
   b) If there is a price ceiling of P_0 & *P* can not implicitly increase, what are *CS* & *PS*?
   c) If there is a price ceiling of P_0 & *P* can implicitly increase, what are *CS* & *PS*? How does this answer depend on the manner in which *P* implicitly increased?

3. Start with the following supply & demand schedules: $P = 200 - 2Q$ & $P = 20 + 4Q$.
   a) Find the market-clearing *P* & *Q* and the E_p^D & E_p^S at the equilibrium *P* & *Q*.
   b) If there is a $30 tax on sellers, find the equilibrium *P* & *Q*.
   c) With no tax on sellers, but a $30 tax on buyers, find the equilibrium *P* & *Q*.

Figure One



Answers

1. We must find the *PV* of a $1 per year for 4 years ($d_{.04,\,4}$), the present value of a $1 per year for 40 years ($d_{.04,\,40}$), & $1/(1.04)^4$ since the individual receives the benefits starting 5 years (& not 1 year) from now.

$d_{.04,\,4} = 3.63$, $d_{.04,\,40} = 19.8$, & $1/(1.04)^4 = .855$.

Thus, *PV*(benefits) = (.855)(19.8)($20,000) = $338,580. *PV*(cost) = (3.63)($40,000) = $145,200.
Net *PV* = $193,380.

2. a) At market clearing, *CS* = *U* + *V* + *Y*, & *PS* = *W* + *X* + *Z*.

b) With a price ceiling = P_0 & no *implicit P* increase, *CS* = *U* + *V* + *W*, *PS* = *X*

c) With a price ceiling = P_0 & an *implicit P* increase via tied sales or quality reductions, the implicit *P* increase = $P_2 - P_0$, so the total *P* is effectively P_2. *CS* = *U* & *PS* = *V* + *W* + *X*. If *P* increases implicitly by $P_2 - P_0$ due to queues, producers get only P_0 per unit, but consumers effectively pay P_2. *CS* = *U* & *PS* = *X*.

3. a) Set demand & supply (D & S) equal, find *Q*, & then insert into either D or S to find *P*:

$200 - 2Q = 20 + 4Q, \Rightarrow Q = 30$ & $P = \$140$

$E_P = \frac{1}{slope}\frac{P}{Q}$ so $E_p^D = -\frac{1}{2}\frac{140}{30} \cong -2.33$, & $E_p^S = \frac{1}{4}\frac{140}{30} \cong 1.17$.

b) A $30 tax on sellers $\Rightarrow$ S is now $P = 50 + 4Q$---each seller now sells the same *Q* only if *P* is $30 higher. Now solving D & S yields $Q = 25$ & $P = \$150$. $\Delta P = \$10$---1/3 of the tax. Each seller gets to keep $120---$20 less than before, so sellers bear 2/3 of the burden of the tax. Sellers bear a larger tax burden because they are less responsive to *P* than are buyers: $|E_p^D| > E_p^S$.

c) With a $30 tax on buyer, each buyer is willing to pay $30 less, so D is: $P = 170 - 2Q$; solving D & S yields $P = \$120$ & $Q = 25$. Buyers again end up paying $10 more, & sellers keep $20 less per unit compared to the case with no tax.