ECO 601 Problem Set # 5 KEY Fall 2003

1. $U = S + \ln B$

(a) $\mathcal{L} = S + \ln B + \lambda(I - P_S S - P_B B)$

$\frac{\partial \mathcal{L}}{\partial S} = 1 - P_S = 0$

$\frac{\partial \mathcal{L}}{\partial B} = \frac{1}{B} - P_B = 0$ } $B = \frac{P_S}{P_B}$, or $P_B B = P_S$

$\frac{\partial \mathcal{L}}{\partial \lambda} = I - P_S S - P_B B = 0$

$I - P_S S - P_S = 0$

$S^* = \frac{I - P_S}{P_S}$

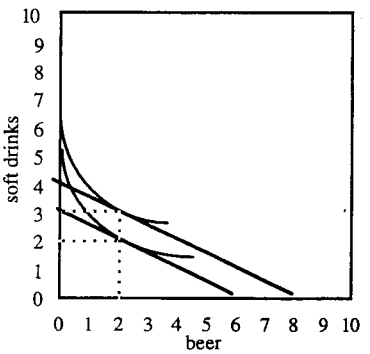
$B^* = \frac{P_S}{P_B}$, which doesn't depend on I!

(b) If $I = 6$, $P_B = 1$, and $P_S = 2$, then

$S^* = 2$ and $B^* = 2$

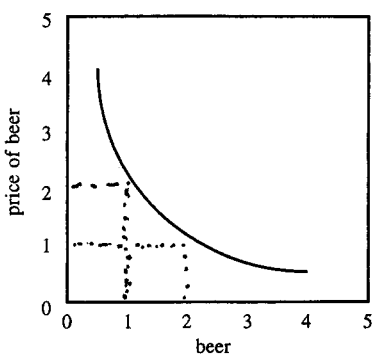
If $I = 8$, $P_B = 1$, and $P_S = 2$, then

$S^* = 3$ and $B^* = 2$



(c) If $I = 5$ and $P_S = 2$,

then $B^* = \frac{2}{P_B}$



P_B	B
2	1
1	2

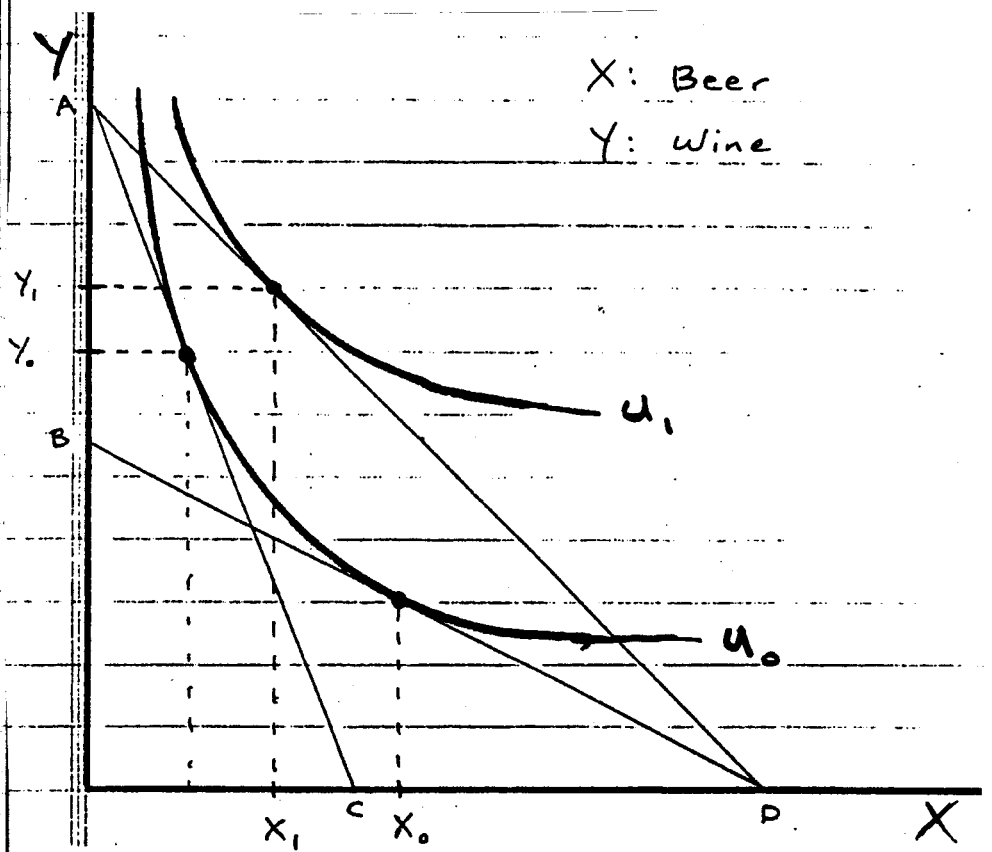
(d) $\frac{\partial B}{\partial I} = 0$, so compensated demand curve for beer coincides with the above uncompensated demand curve.

2. $\left.\frac{\partial W}{\partial P_B}\right|_{\bar{u}} = \left.\frac{\partial B}{\partial P_W}\right|_{\bar{u}} > 0$

i.e., beer and wine are net substitutes

$\frac{\partial W}{\partial P_B} < 0$, i.e. beer is a gross complement for wine

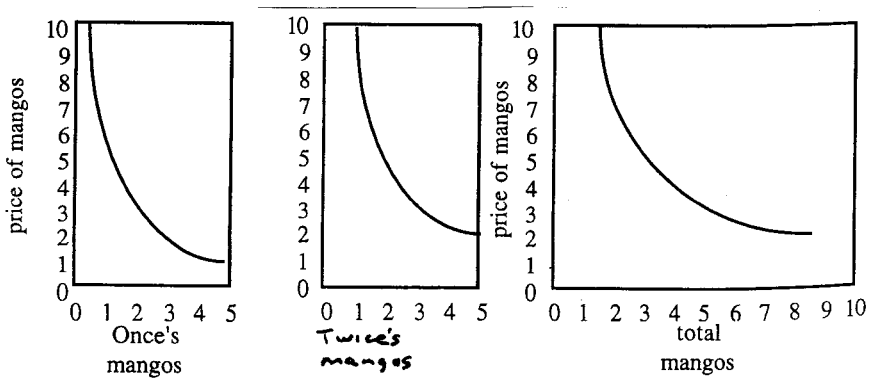
$\frac{\partial B}{\partial P_W} > 0$, i.e. wine is a gross substitute for beer



3. (a) Once: $m_0 = P_c I / (2P_m^2)$ Twice: $m_T = P_c I / (2P_m^2)$

$P_c = 1$ $I_0 = 10$ $P_c = 1$ $I_T = 20$

$m_0 = 10 / 2P_m^2$ $m_T = 20 / 2P_m^2$



3. (b) $M_{once} = {}^{10}/_{2P_m^2}$ $\quad M_{TWICE} = {}^{20}/_{2P_m^2}$

$M_{MKT} = M_o + M_T = {}^{30}/_{2P_m^2}$

P_m	M_o	M_T	M_{MKT}
1	5	10	15
2	1.25	2.5	3.75

✓

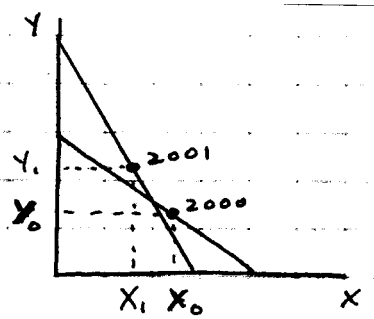
(c) $M_{MKT} = (P_c I_{TOTAL}) / (2P_m^2)$ where $I_{TOTAL} = I_o + I_T$

$\varepsilon_{M,P_m} = \frac{dM}{dP_m} \cdot \frac{P_m}{M} = -P_c I P_m^{-3} \cdot P_m \cdot 2P_m^2 / P_c I = -2$

$\varepsilon_{M,I} = \frac{dM}{dI} \cdot \frac{I}{M} = \frac{1}{2} P_c P_m^{-2} \cdot I \cdot 2P_m^2 / P_c I = 1$

$\varepsilon_{M,P_c} = \frac{dM}{dP_c} \cdot \frac{P_c}{M} = \frac{1}{2} I P_m^{-2} \cdot P_c \cdot 2P_m^2 / P_c I = 1$

4. FALSE, you may be better off or you may be worse off.



$P_x^\circ X_1 + P_y^\circ Y_1 > P_x^\circ X_0 + P_y^\circ Y_0$

5. $\varepsilon_{x,P_x} = \varepsilon^S_{x,P_x} - S_x \varepsilon_{x,I}$

If $\varepsilon_{x,I}$ is negative, then income effect works counter to substitution effect. The bigger the budget share (S_x) the greater is this effect, so FALSE.

6. $\varepsilon_{x,P_x} + \varepsilon_{x,P_y} + \varepsilon_{x,P_z} + \varepsilon_{x,I} = 0$

$(-2) \quad (.4) \quad (.8) \quad (?)$

$\varepsilon_{x,I} = .8$ so X is a necessity, TRUE