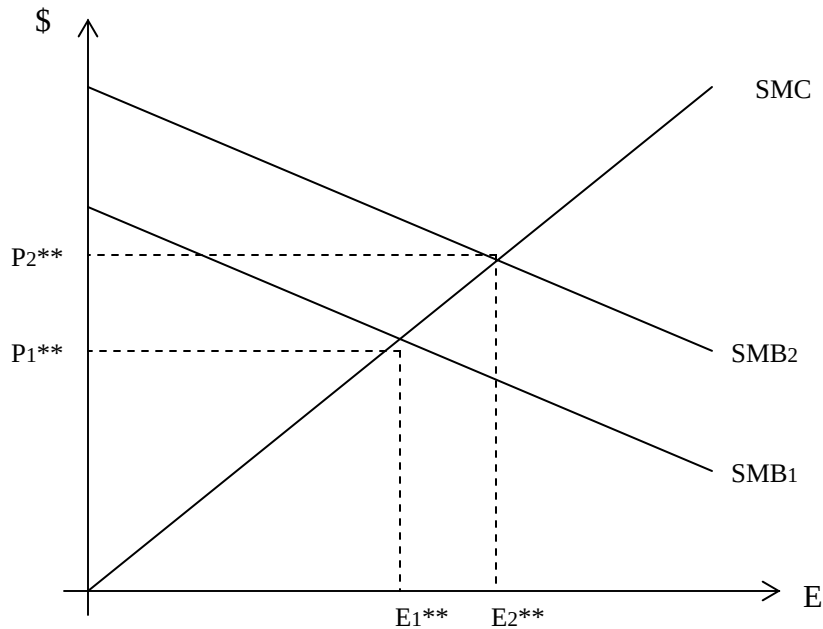


ENSC 290 – Assignment # 1 Answer Key
Fall Term 2007

1. (a) Advertising increases the amount of information available to individuals (therefore changing preferences) and increases their willingness to pay for each unit. Therefore, we should expect the SMB curve to shift up/right. There is no information in the question that relates to the SMC (ie. the \$10 m spent by the government is just a transfer among society, not an additional cost).



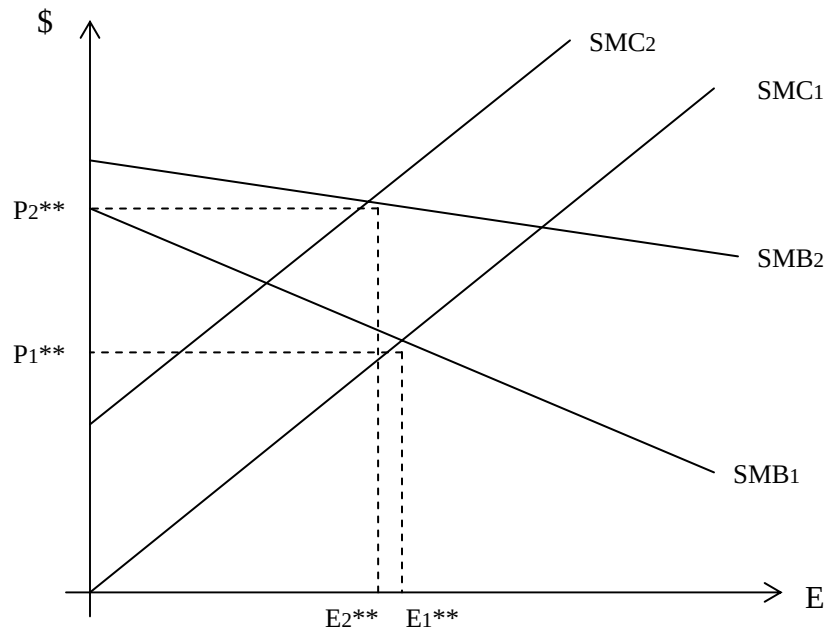
- (b) Population growth adds more individuals to the society. Therefore, we add more private marginal benefit to the social marginal benefit function by horizontally summing across the new individuals. This decreases the slope of the SMB without changing the vertical intercept.

Income growth shifts the SMB (it could change the slope as well, but this would be unusual and would require some careful explanation). If we assume E is a normal good, then SMB shifts up/right. If we assume E is an inferior good, then SMB shifts down/left.

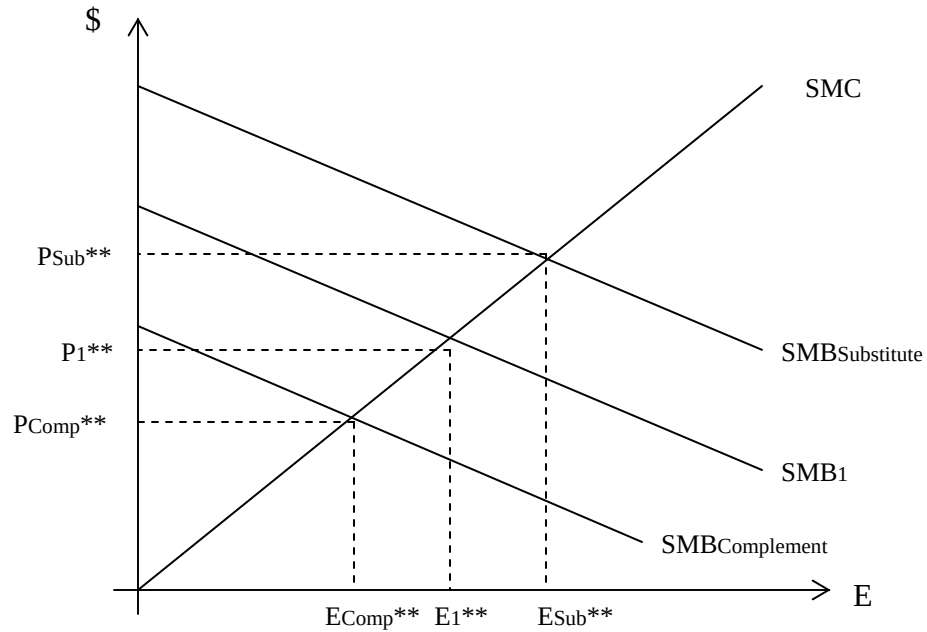
Congestion increases travel time (an input cost), which increases the opportunity cost of a trip to E . Therefore, SMC shifts up/left.

A flat entry fee per visit (again an input cost) shifts the intercept of the SMC up.

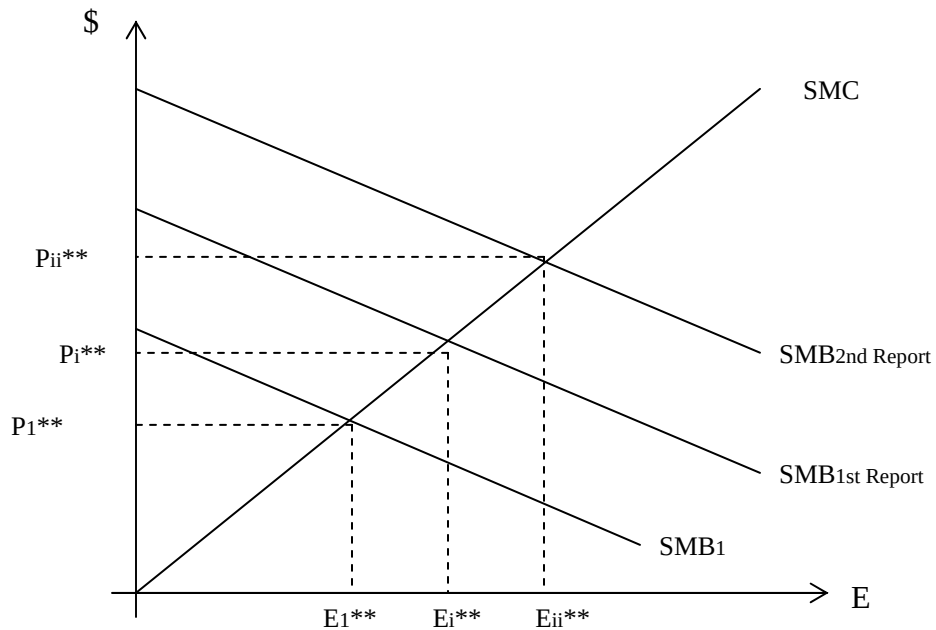
Therefore, the first two changes increase SMB, while the last two changes increase SMC. The net effect on E^{**} will be indeterminant, but P^{**} will definitely increase.



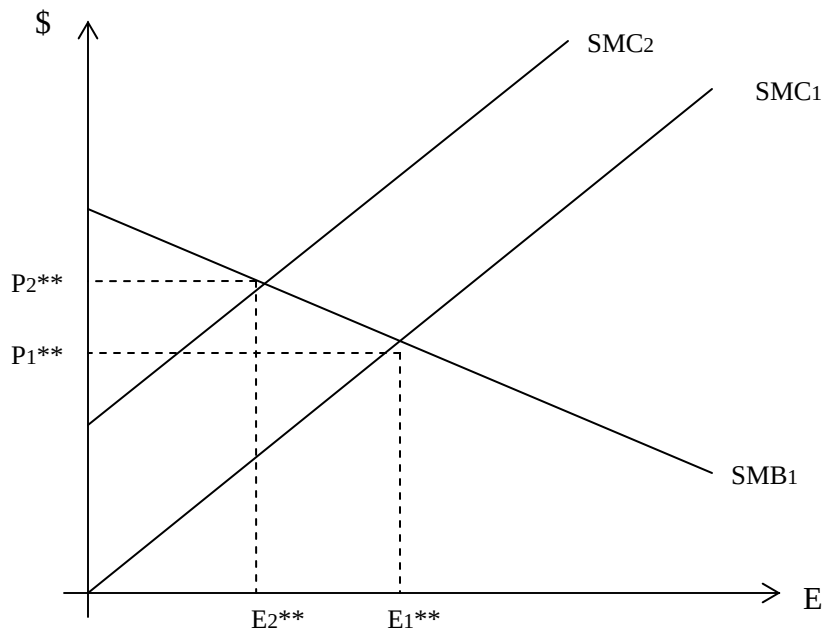
- (c) The key to this question is the families' travel decision. Once they choose Disney World and travel there, then Disney World and E may be considered substitutes if they are right next to each other. However, when making their choice (ie. before they travel), Disney World and its neighboring E will be complements, and the E that is on the other side of the country will be a substitute. Therefore:
- (i) Assuming families travel to Disney World, then visit E at the same time (since they are right next to one another), then Disney World and E are complements. Therefore, an increase in the price of Disney World will shift SMB down/left.
 - (ii) If Disney World and E are far apart, then it seems reasonable to consider them substitutes for one another. Therefore, an increase in the price of Disney World will shift SMB up/right.



- (d) (i) This new information about health benefits has an impact on preferences and will increase SMB, but because it is future generations who benefit, these values will be “discounted” due to human impatience. Therefore, the shift in SMB will not be as great as it would be if the benefits were to for the current generation.
- (ii) Now SMB shifts even farther up/right because discounting disappears.



- (e) When fuel prices increase this implies an increase in the travel cost to E (an input cost). Therefore, SMC will shift up/left. The difficult question is whether or not we should shift or move along the SMB. We have made no changes to the number of individuals in society, no change in income, no change in preferences, and no change in the prices for complements or substitutes. Therefore, the increased value of the view is merely reflecting a movement along the SMB as trips to E by society fall (ie. those that still make the more expensive trip derive greater marginal value from their visit).



$$2. (a) \quad PMB_1 = 20 - E_1 \Rightarrow E_1 = 20 - PMB_1$$

$$PMB_2 = 20 - 2 E_2 \Rightarrow E_2 = 10 - \frac{1}{2} PMB_2$$

$$\begin{aligned} \text{Unweighted:} \quad & (1.0 \times E_1) + (1.0 \times E_2) = 30 - \frac{3}{2} PMBA_{agg} \\ & E_{agg} = 30 - \frac{3}{2} PMBA_{agg} \\ & PMBA_{agg} = 20 - \frac{2}{3} E_{agg} \end{aligned}$$

$$\begin{aligned} \text{Weighted:} \quad & (0.25 \times E_1) + (1.75 \times E_2) = 5 - \frac{1}{4} PMB_1 + 7\frac{7}{8} PMB_2 \\ & E_{agg} = 9\frac{9}{4} - \frac{9}{8} PMBA_{agg} \\ & PMBA_{agg} = 20 - \frac{8}{9} E_{agg} \end{aligned}$$

$$(b) \quad \begin{aligned} PMBA_{agg} &= 20 - \frac{2}{3} E_{agg} \\ PMC &= \frac{1}{3} E \end{aligned}$$

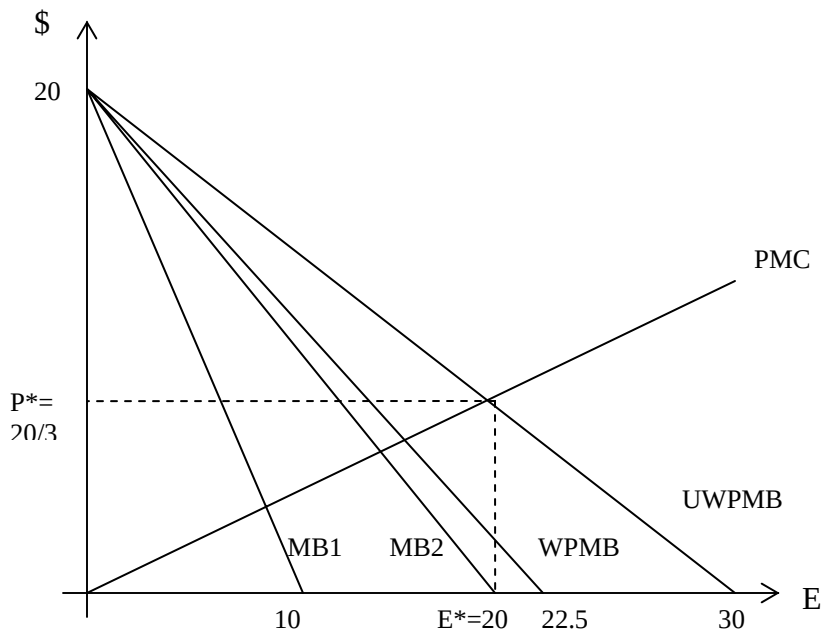
$$\begin{aligned} PMB &= PMC \\ 20 - \frac{2}{3} E &= \frac{1}{3} E \\ E^* &= 20 \end{aligned}$$

$$PMB^* = PMC^* = \frac{1}{3} E^* = 20 - \frac{2}{3} E^* = 20/3$$

$$\begin{aligned} CS &= \frac{1}{2} \text{ Base} \times \text{Height} \\ &= \frac{1}{2} \times 20 \times (20 - 20/3) \\ &= 400/3 \end{aligned}$$

$$\begin{aligned} PS &= \frac{1}{2} \text{ Base} \times \text{Height} \\ &= \frac{1}{2} \times 20 \times 20/3 \\ &= 200/3 \end{aligned}$$

$$\text{Social Welfare} = CS + PS = 400/3 + 200/3 = 600/3 = 200$$



(c) $EMB = 8$

$$EMC = 1/6 E$$

$$\begin{aligned} SMB &= PMB + EMB \\ &= 20 - 2/3 E + 8 \\ &= 28 - 2/3 E \end{aligned}$$

$$\begin{aligned} SMC &= PMC + EMC \\ &= 1/3 E + 1/6 E \\ &= 1/2 E \end{aligned}$$

$$\begin{aligned} SMB &= SMC \\ 28 - 2/3 E &= 1/2 E \\ E^{**} &= 24 \end{aligned}$$

$$SMB^{**} = SMC^{**} = 1/2 E^{**} = 28 - 2/3 E^{**} = 12$$

$$\begin{aligned} \text{Welfare at } (E^*, P^*) &= \frac{1}{2} \text{ Base x Height} + \text{Base x Height} + \frac{1}{2} \text{ Base x Height} \\ &= \frac{1}{2} \times 20 \times 10 + (44/3 - 10) \times 20 + \frac{1}{2} \times 20 \times (28 - 44/3) \\ &= 100 + 280/3 + 400/3 \\ &= 980/3 \end{aligned}$$

$$\begin{aligned}
 \text{Welfare at } (E^{**}, P^{**}) &= \frac{1}{2} \text{ Base} \times \text{Height} + \frac{1}{2} \text{ Base} \times \text{Height} \\
 &= \frac{1}{2} \times 24 \times 12 + \frac{1}{2} \times 24 \times (28 - 12) \\
 &= 336
 \end{aligned}$$

$$\begin{aligned}
 \text{Gain in Welfare} &= 336 - 980/3 \\
 &= 28/3 = 9 \frac{1}{3} \\
 &= \frac{1}{2} \text{ Base} \times \text{Height} = \frac{1}{2} \times (44/3 - 10) \times (24 - 20) \\
 &= 9 \frac{1}{3}
 \end{aligned}$$

