Suggested Answers, Problem Set 5
Health Economics

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1. The graph is at the end of the handout. Fluoridated water strengthens teeth and reduces incidence of cavities. As a result, at all price levels, people are willing to consumer fewer dental visits. Therefore, the demand curve shifts in from D1 to D2.

2. a. This is an acute condition that needs treatment now and there are few substitutes, so elasticity of demand should be low (in absolute value).
   b. Mammographies are typically preventative services. Use of this service can be delayed over time. Higher.
   c. Length of a hospital stay. The patient typically has little control over this decision. Lower
   d. These are typically non-acute (elective) procedures that are expensive. Higher.

3. Please see the graph at the end of the handout. For the first \$295, out of pocket spending equals total spending. After that amount and through \$2700 in total spending, the coinsurance rate falls to 25% and at \$2700 in total spending, out of pocket spending is now \$295 + 0.25(2700-295)=\$865.25. From that point until total spending reaches \$6153.75, the consumer is on their own and the coinsurance rate now equals 1. After that level, the coinsurance rate falls to 5%. Note that with \$6153.75 in spending, out of pocket spending is \$295 + 0.25(2700-295)+(6153.75-2700)=\$4350.

4. The graph is at the end of the handout. The demand curve without insurance is line (ab). With insurance and a zero dollar copayment, the costs of each prescription is \$0, so demand is a vertical line (bc). When the copayment is increased to \$9/prescription, then demand curve now shifts to line (bde). If P=\$15 and consumers did not have insurance, consumers would demand 15=45-5Q or 6 units. With a zero coinsurance rate (insurance pays for everything), demand would be 9 units since P=\$0. With a \$15 price and a \$9 copay, each prescription costs \$9, so they would demand 9=45-5Q, or 36=5Q and q=7.2.

5. The graph is at the end of the handout. Demand without insurance is P_d =150-30Q and the graph is illustrated by line (ab). With a coinsurance rate of c, the price faced by consumers is $P_d = P_s c$ where P_s is the price received by sellers. In this case, c=0.25 so the price paid to sellers is $P_d = P_s(0.25)$ = 150-30Q which means that the price transacted in the market is now P = (150/0.25) - (30/.25)Q = 600 - 120Q. This demand curve is line (ac). With a price of \$60/unit, consumers would demand 60=150-30Q or 90=30Q or Q=3 units. With a 25% coinsurance rate, if price is \$60, consumers only pay \$15/visit, so the demand is really \$60 = 600 - 120Q, or 540 = 120Q and Q=4.5. DWL is this case is area (def). Note that in order to sell 4.5 units to people without insurance, price would have to fall to P=150-30(4.5) = \$15. Therefore, the area of (def) is (½)(60-15)(4.5-3) = 33.75.

6. The graph is at the end of the handout. The demand curve without insurance is line (ab). At a price of zero, 20 units will be demanded and the maximum price that would be paid is \$100. Without insurance, it is easy to establish that the equilibrium price would be \$60 and the equilibrium demand would be 8. $P_s=P_d$ and therefore 20+5Q=100-5Q so 80-10Q and Q=8. Plug Q=8 into supply and you get P=20+5Q = \$60. With insurance, the demand curve would now be equal to (100-5Q)/0.2 = 500 –25Q and is represented by line ac. Equilibrium price and quantity in this market is generated by setting supply equals to demand and therefore 20+5Q=500-25Q so 480=30Q and Q=16 and therefore P=20+5Q =100. The dead weight loss associated with insurance is area (def) which can be calculated as ½ height times base. The height is 8 (16-8) and the base is the difference between points e and f. Point e is \$100 and point f is 20. (In order to sell Q=16 without insurance, price would have to fall to P=100-5(16) = 20). Therefore, the dead weight loss is (1/2)(8)(80)=320.

7. Purchase of these insurance policies are an anomaly and cannot be explained well with economic theory. Since a large fraction of elderly meet their deductible levels each year, there is little 'risk': although they experience a loss, the loss is fairly certain. Since policy prices are based on the actuarial risk and 'loading factors' such as administrative expenses, in many cases, people would be paying large administrative costs to cover a risk that almost surely will happen.

8. The arc elasticity of demand is defined as $e_d[(Q_2-Q_1)/(Q_2+Q_1)]/[(P_2-P_1)/(P_2+P_1)]$. In each case, the denominator in the elasticity is the same. For free care, P_1 =0 and with a 50% coinsurance rate, P_2 =.50 so $[(P_2-P_1)/(P_2+P_1)] = 1$.

	Doctor Visits	$ Hospital Care	$ all care
Q1	4.55	769	1410
Q2	3.03	846	1078
(Q2-Q2)/(Q1+Q2).	-0.201	0.047	-0.133
$[(P_2-P_1)/(P_2+P_1)]$	1	1	1
Arc elasticity	-0.201	0.047	-0.133

9. A) Those that had insurance prior to the law will not experience a change in the copayment rate so their demand will not change. Those without insurance before January 1 will experience a drop in copayments of from 100 to 25 percent, a price drop of (0.25 - 1)/1 = -0.75 or a 75% drop in price. Given an elasticity of -0.4, this will increase demand by -0.4(-0.75) = 0.3 or 30%. The new level of demand for these people will then be $29*(1.3)= $37.7 billion.

B) Everyone without insurance will now be covered and therefore, the government will end up paying 75% of $37.7 billion. Everyone with coverage from another source will now receive coverage from the federal government so the government will end up paying 75% of $73 billion, for a grand total of (0.75)($73+37.7)= $83.025 billion.

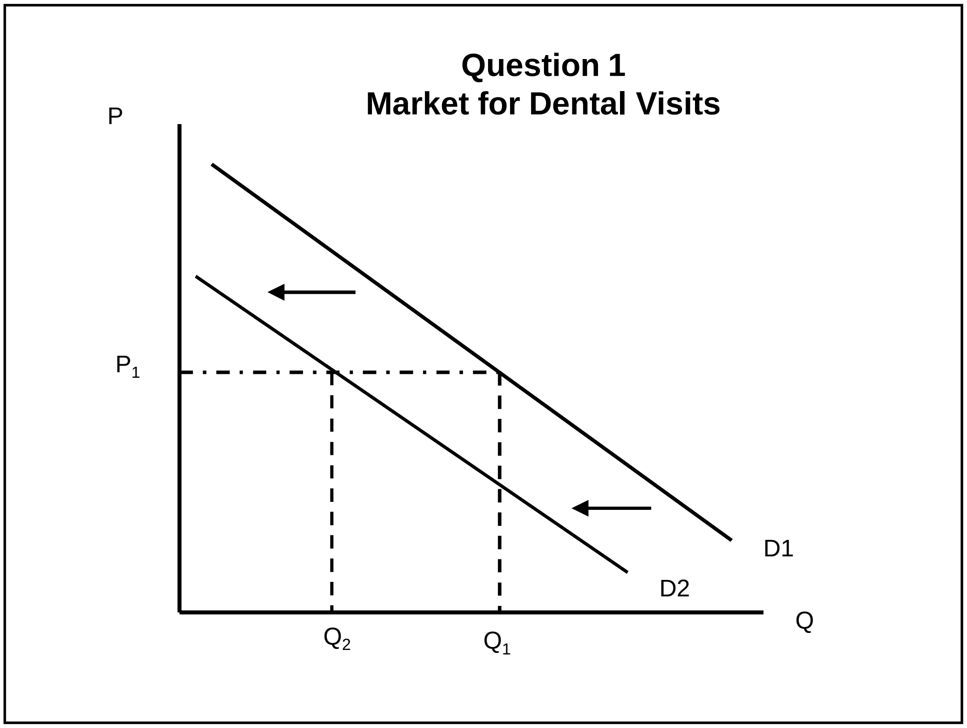
C) Outlays for the program will be $83 - $22 = $61 billion.

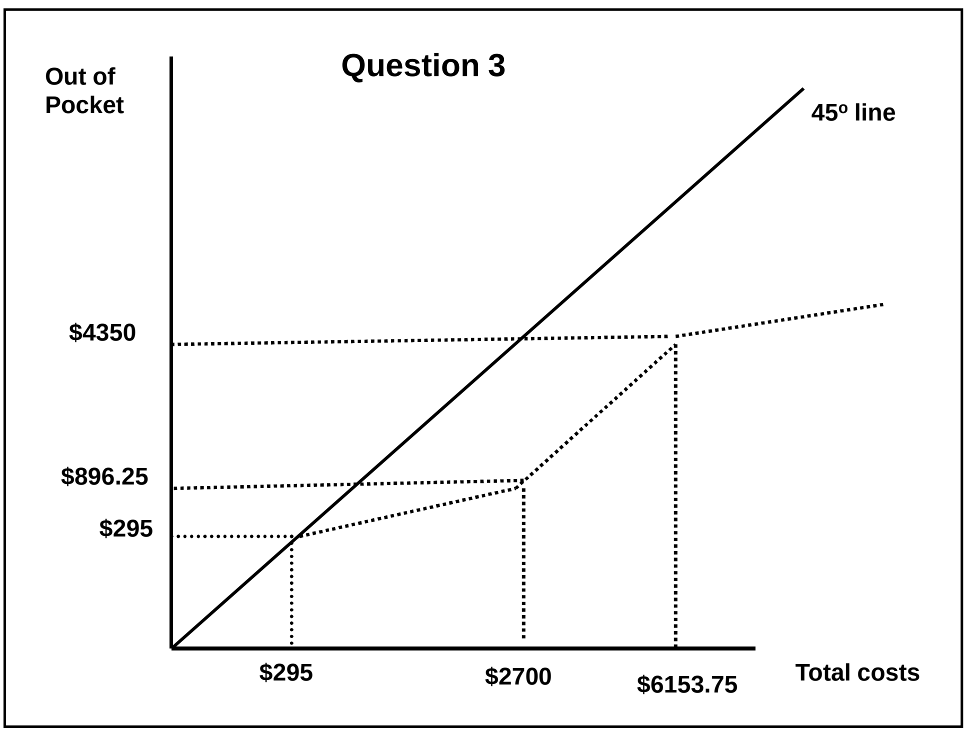
D) An estimate from the CBO can be found at http://www.cbo.gov/showdoc.cfm?index=6139&sequence=0 and these numbers suggest that the outlays should be roughly $55 billion a year. Not bad for back of the envelope!!!

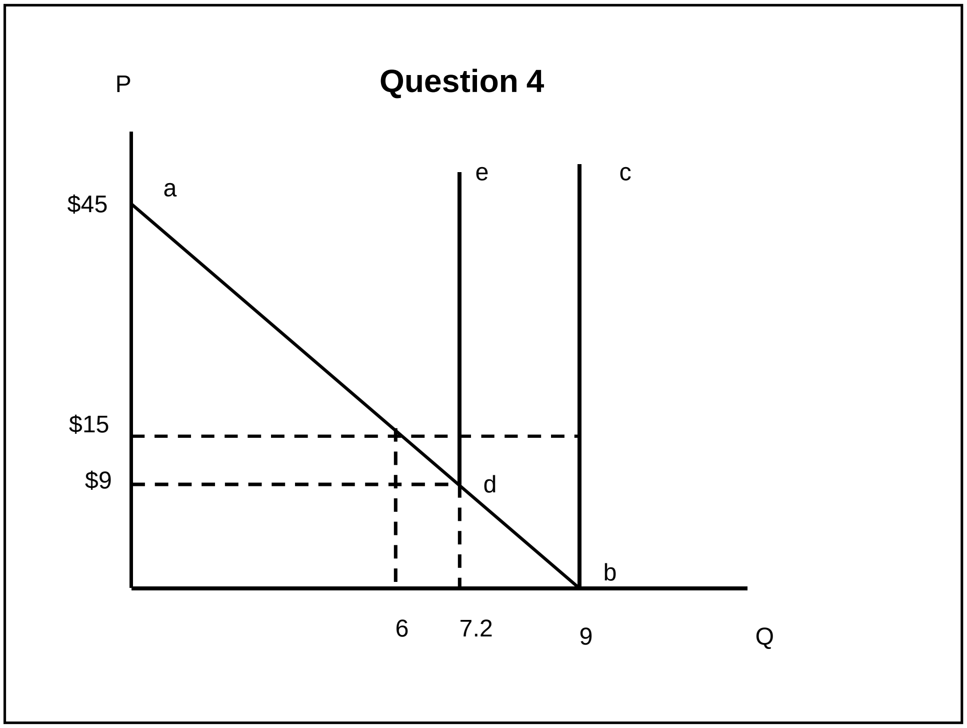
10. There are two potential answers. One can say the expenditures are high for those with insurance because of moral hazard. However, it is hard to explain a three-fold difference in spending due to moral hazard – elasticities of demand are typically not that large. A more likely explanation is adverse selection -- those with insurance are those most likely to need insurance so it is no surprise that this groups spends more on prescription drugs than those without insurance.

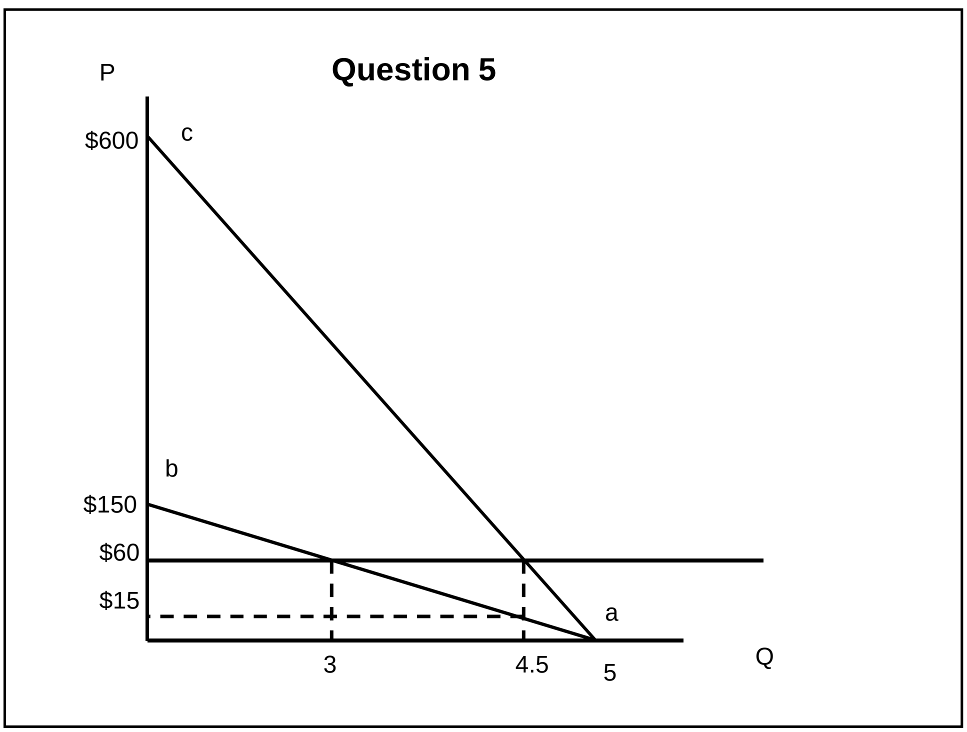
11. a) In the real world, people with and without insurance are very different. Those with insurance tend to be from higher income families, have more years of education and have otherwise better health. In some situations however, the purchase of insurance is due to adverse selection: people who need the insurance the most are most likely to purchase. Therefore, is one were to compare health spending across groups of people, some with and without insurance, it is impossible to tell whether the observed differences in use are due to insurance or due to some of these other unobserved factors. By randomly assigning insurance to children, we do not have to worry about the underlying reasons they have insurance.

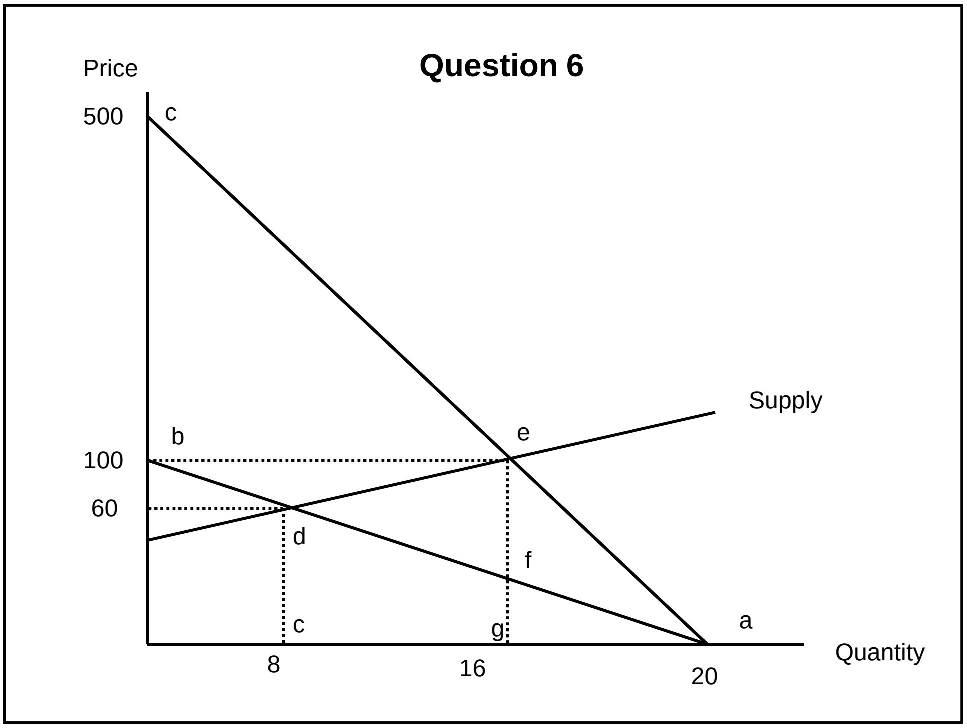
b) The authors identified the impact of insurance on demand by looking at the difference in insurance use before and after the students had insurance. They attribute all of the increase in use over time to insurance. However, this could be a biased estimate. Suppose for example that medical care use is naturally increasing over time, either because of market effects (maybe prices are going up) or because as children age they consume more medical care. In either of these cases, we would have expected use to increase over time anyway so the author's are overstating the impact of insurance on demand. The authors could eliminate this problem by adding a 'control' group where they collect data on a group of children who were not offered insurance. Their change in use over time would represent what would have happened to use in the absence of the treatment program.


Question 1
Market for Dental Visits
P
P_1
D1
D2
Q
Q_2
Q_1


Question 3
Out of
Pocket
45º line
$4350
$896.25
$295
$295
$2700
$6153.75
Total costs


Question 4
P
$45
a
e
c
$15
$9
d
b
6
7.2
9
Q


Question 5
P
$600
c
b
$150
$60
$15
a
3
4.5
5
Q



Question 6
Price
500
c
Supply
b
e
100
60
d
f
c
g
a
Quantity
8
16
20