The Economics of Health and Health Care

Seventh Edition

Instructor's Answers

Chapters 15, 17, 18, 20, 21 - 23

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Chapter 15 – The Physician’s Practice

1. Assuming that discretionary influence is a “bad” (i.e. causes disutility), physicians must be compensated by higher incomes to maintain the same utility levels.

2. 

\[
\pi = Q_0 + I \\
\pi = 0.5Q_0 + 0.5I \\
\]

3. If more complicated diseases imply more uncertainty in diagnoses and appropriate treatment, this would imply more variation.

4. Those with low price elasticities have the higher welfare losses. These low elasticities suggest large deviations in the marginal benefits from the marginal costs when inappropriate treatment levels are used.

5. There are N/3 people with treatment level 1 (too little), N/3 with treatment level 2 (the appropriate level) and N/3 with treatment level 3 (too much).

\[
\text{SAV Cost per person for treatment level 1} = \frac{1}{2} \times 1 \times 50 = 25 \\
\text{SAV Cost per person for treatment level 2} = 0 \\
\text{SAV Cost per person for treatment level 3} = \frac{1}{2} \times 1 \times 50 = 25 \\
\]

Total SAV cost per patient = \[25 \times \frac{N}{3} + 0 \times \frac{N}{3} + 25 \times \frac{N}{3}\]/N = $16.66.
Chapter 17 – The Pharmaceutical Industry

1. Perfect substitutes. There is a corner solution at point A or point B. Perfect complements. One is at point E at any price ratio.

2. A relative decrease in drug price to the patient leads to a shift from E to E’. Total spending (insurance + patient) decreases because the distortion caused by unequal coverages is eliminated. Drug spending will increase because D increases.
3. For the United States:
   \[ P = 60 - \frac{1}{5000} Q. \]
   \[ MR = 60 - \frac{2}{5000} Q = MC = 2 \]
   \[ 300,000 - 2Q = 10,000 \]
   \[ Q_{US} = 145,000 \]
   \[ P_{US} = 31 \]
   \[ \text{Profit}_{US} = (31 \times 145,000) - (2 \times 145,000) - 1,000,000 = 3,205,000. \]

For Mexico

\[ P = 30 - \frac{1}{8000} Q. \]
\[ MR = 30 - \frac{2}{8000} Q = MC = 2 \]
\[ 240,000 - 2Q = 16,000 \]
\[ Q_{MEX} = 112,000 \]
\[ P_{MEX} = 16 \]
\[ \text{Profit}_{MEX} = (16 \times 112,000) - (2 \times 112,000) - 500,000 = 1,068,000. \]

Total profit = 4,273,000

With first degree discrimination:

\[ \text{Profit}_{US} = (\frac{1}{2} \times 58 \times 290,000) - 1,000,000 = 7,410,000 \]
\[ \text{Profit}_{MEX} = (\frac{1}{2} \times 28 \times 224,000) - 500,000 = 2,636,000 \]
\[ \text{Profit}_{TOT} = 10,046,000 \]

This is impossible because we don’t know the maximum price each individual is willing to pay.
4. One market

\[ Q = 540,000 - 13,000P \]

\[ MR = 41.54 - \frac{2}{13,000} Q = MC = 2. \]

\[ Q = 257,000 \]
\[ P = 21.8 \]

Profit = \((21.8 \times 257,000) - 514,000 - 1,500,000 = 3,589,000.\)

5. a. Calculate the elasticities.

**United States**

\[ E_p = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = \frac{-5,000 \times 31}{145,000} = -1.069. \]

**Mexico**

\[ E_p = \frac{-8,000 \times 16}{112,000} = -1.143 \]

b. \[ \frac{P_{as}}{P_{Mex}} = \frac{1 + \frac{1}{E_{MEX}}}{1 + \frac{1}{E_{US}}} = \frac{0.125}{0.0645} = 1.94. \]

in 3a, \( P_{US}/P_{MEX} = 31/16 = 1.94. \)

c. MR = 0 implies that \( E_p = -1. \)

d. Raise P.

6. This is average-cost pricing.

\[ AC = \frac{1,000,000}{Q} + 2 = P = 60 - \frac{Q}{5,000} \]

Simplifying:

\[ \frac{Q^2}{5,000} - 58Q + 1,000,000 = 0. \]
Solving for $Q$, we get:

$$Q^* = 271,590; \ P^* = 5.68.$$ 

b. For marginal cost pricing, i.e. efficiency:

$$P = MC \text{ implies } Q = 290,000.$$ 

But average cost = 5.45.

We need a subsidy of 3.45, with $MC = 2 = P$.

7. There is no unequivocal answer. We must weigh the efficiency of markets, including incentives to innovate through profit potential, with problems of regulation (as well as equity considerations).

Some problems of regulation:

a. must deal with many products.
b. must accurately estimate demands and costs.
c. must deal with political pressures.
d. must estimate “fair” rates of return.
e. must deal with lack of incentives to control costs.
f. must deal with lack of incentives to invest in research and development.

8. Spending on drug preparations and sundries of $253.3$ billion in 2004 was about 14.0 percent of national health expenditures. Even if the share of reimbursements for drugs for an insurance company exceeds these values (e.g., 15 percent), a 20 percent increase in its drug reimbursements would only have an impact of about 3 percent on the insurer’s total costs (i.e., $0.15 \times 0.2 = 0.03$).
Chapter 18 - Equity, Efficiency, and Need

1. The slopes of the indifference curves are not equal. There is room for trade that would make both people better off.

2. Tangent point \( M \) is optimal, given budget line \( AB \). Tangent point \( N \) is optimal, given budget line \( CD \).

3. According to the Second Fundamental Theorem of Welfare Economics, any Pareto Efficient outcome (i.e. point on the contract curve) is supported by a competitive equilibrium. Thus it is not possible to find a point on the contract curve that is not a competitive equilibrium.

4. Different people may have different views of equity. As such it is unlikely that \( Q_{opt} \) would emerge as the consensus of an equitable allocation.

5. If “hard-hearted” implies no external benefits at all, then the optimum would be \( Q_m \) in Figure 18.4 of the text.

6. Given any social welfare function \( WW \), society will never choose an interior point even though an interior point may lead to higher welfare for some members than some points on the \( UU \) curve.

7. It will not represent a Pareto improvement. Fred is unambiguously better off; Harry is unambiguously worse off.

Under other criteria, such as those related to equity, social welfare may be thought to improve.

8. Answer is the same as Problem 7. However, if we believe that a $5,000 tax on Harry might not influence Harry’s work effort (unlike the $50,000 tax in Problem 7), there may be less “leakage” out of the economy from Okun’s “leaky bucket.”
Chapter 20 - Government Regulation – Principal Regulatory Mechanisms

1. a. Q* (competitive) = 180.
   b. Q* (monopolist) = 90.
   c. P* = 55. Profit = (P* - AC) x Q = (55 - 10) x 90 = $4,050.
   d. Deadweight loss = ½ x 45 x 90 = $2,025.

2. a. The hospital must substitute S. A 10% decrease in B will reduce Q by 10\(\beta\) (the coefficients would represent elasticities). Thus S must increase by 10\(\beta/\alpha\).
   b. Assuming that the hospital was operating at the least cost previously, the new expenditures must be at least as high as the previous ones.

3. Yardstick prices

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital A</td>
<td>$2,250</td>
</tr>
<tr>
<td>Hospital B</td>
<td>$2,200</td>
</tr>
<tr>
<td>Hospital C</td>
<td>$2,300</td>
</tr>
<tr>
<td>Hospital D</td>
<td>$2,075</td>
</tr>
<tr>
<td>Hospital E</td>
<td>$2,175</td>
</tr>
</tbody>
</table>

Hospitals D and E will be assigned yardstick prices that do not cover their marginal costs.

4. a. Profit = 1,000 x (10,000 – 5,000) = 5,000,000
   b. Total Cost = 4,500Q + 500,000
      Average Cost = 4,500 + (500,000/Q)
   c. Average Cost = 4,500 + (500,000/2,000) = $4,750
      i. Subsidy = (4,750 – 4,600) x 2,000 = 300,000
      ii. Profit = (4,600 – 4,500) x 2,000 = 200,000
      iii. Increase in consumer surplus is the trapezoid \(P_0MBP^*\). This is calculated as
            \[ \frac{1}{2} \times (P_0 - P^*) \times (Q_0 + Q_1) = \frac{1}{2} \times 5,400 \times (1,000 + 2,000) = 6,900,000. \]
5. The solution in this problem comes from the condition (in the Shleifer article), that in the Nash equilibrium, a decrease in marginal costs by $\Delta c$ requires $R'\Delta c$ in cost reduction, but it decreases production costs by $q(p)\Delta c$. For profit maximization $R'\Delta c = q(p)\Delta c$, or $R' = q(p)$.

Here are the answers:

a. 

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$Q^*$</td>
<td>90</td>
</tr>
<tr>
<td>$P^*$</td>
<td>31</td>
</tr>
<tr>
<td>Profit</td>
<td>810</td>
</tr>
<tr>
<td>CS</td>
<td>405</td>
</tr>
</tbody>
</table>

b. As noted above, a decrease in marginal costs by $\Delta c$ requires $R'\Delta c$ in cost reduction, but it decreases production costs by $q(p)\Delta c$. For profit maximization $R'\Delta c = q(p)\Delta c$, or $R' = q(p)$

c. Under yardstick pricing, the solution is:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$d^*$</td>
<td>2.5</td>
</tr>
<tr>
<td>$R^*$</td>
<td>250</td>
</tr>
<tr>
<td>New MC</td>
<td>19.5</td>
</tr>
<tr>
<td>$Q^*$</td>
<td>200</td>
</tr>
<tr>
<td>$P^*$</td>
<td>20</td>
</tr>
<tr>
<td>Profit*</td>
<td>150</td>
</tr>
<tr>
<td>CS*</td>
<td>2000</td>
</tr>
</tbody>
</table>

7. a. Four firm concentration ratio is 90. HHI index is 2,518.
    b. New four firm concentration ratio is 96. New HHI is 2,686.

8. We rewrite the equation in percentages:

\[
\text{% change (cost/discharge)} = \text{% change (days/discharge)} + \text{% change (services/day)} + \text{% change (cost/service)}
\]

a. If cost/service increased by 10% and days/discharge stayed constant, we would know that services/day increased by 5%. This would lead to a 15% increase in cost/discharge.

b. This tells us nothing about quality of care, unless the speaker refers to services/day as a measure of quality.

c. We cannot be sure that costs/discharge would fall. It depends on whether the services/day or the costs/service would increase to provide the same amount of care.
Chapter 21 - Social Insurance

1. Income  SS. Tax  SS Tax Rate  Medicare rate

<table>
<thead>
<tr>
<th>Income</th>
<th>SS. Tax</th>
<th>SS Tax Rate</th>
<th>Medicare rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>25,000</td>
<td>1,550</td>
<td>6.20%</td>
<td>1.45%</td>
</tr>
<tr>
<td>50,000</td>
<td>3,100</td>
<td>6.20%</td>
<td>1.45%</td>
</tr>
<tr>
<td>75,000</td>
<td>4,650</td>
<td>6.20%</td>
<td>1.45%</td>
</tr>
<tr>
<td>100,000</td>
<td>6,200</td>
<td>6.20%</td>
<td>1.45%</td>
</tr>
<tr>
<td>125,000</td>
<td>6,622</td>
<td>5.30%</td>
<td>1.45%</td>
</tr>
</tbody>
</table>

Social security tax is regressive. Medicare tax is neutral.

2. For generic drugs

<table>
<thead>
<tr>
<th>Rx charges</th>
<th>Premiums + Premium</th>
<th>Average Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1212.50</td>
<td>0.61</td>
</tr>
<tr>
<td>4000</td>
<td>2501.30</td>
<td>0.63</td>
</tr>
<tr>
<td>6000</td>
<td>4361.30</td>
<td>0.73</td>
</tr>
<tr>
<td>8000</td>
<td>5094.05</td>
<td>0.64</td>
</tr>
<tr>
<td>10000</td>
<td>5194.05</td>
<td>0.52</td>
</tr>
</tbody>
</table>

The average burden increases because over a large interval, the patient pays marginal payments close to 100% of charges.

3. Costs, Benefits in $

[Diagram of demand and supply with notation E*, demand, supply, and enrollment, E.]

With stigma, demand shifts to the left, and enrollment falls.
4. a. 25 (10%) of the 250 families represented “take up”; 25 (10%) of the 250 families represented “crowd out.”
   b. 25 (25%) of the additional 100 families were “taken up”; 25 (25%) of the additional 250 families were “crowded in” to the program.
   c. Coverage for the population has increased. More families now are covered.
   d. Coverage for the families may not have increased. If you look ahead at Figure 21-6, there are levels of point M’ that might lead to crowd-out for those who were purchasing private insurance, even though Medicare provides somewhat less generous insurance. That is because the large improvement in the ability to buy other goods offsets the decrease in insurance.

5. a. Although there are many “ifs” here, on the assumption that Tom is altruistic toward his family, he would likely prefer to be at a point like point D, where he is providing insurance for his family. Dick is more likely to be at a point like E or B, where he has little or no insurance.
   b. Given the assumptions of part a, Dick would more likely take up Medicaid.
   c. The budget constraint would pivot clockwise around point C. This would be relatively advantageous for Tom, who is purchasing more insurance, and make private insurance more attractive relative to Medicaid.

6. a. Twice the poverty line had more care in both periods, even though it is likely that the poor were “sicker.”
   b. Utilization for those below the poverty line increased at much greater percentages, indicating relative increase in utilization.
Chapter 22 - Comparative Health Care Systems

1. Expenditures in NHS will rise to $p \times Q_o$, at an increased $p^*$. Demand in the private market will shift downward, reducing price $P_p$ and expenditures $P_pQ_p$.

2. % Change in Quantity / % Change in Income. Share falls, because expenditures are not rising at as large a percentage as the income.

3. Share will decrease because the total expenditures will decrease.

4. \[
\log \left( \text{Exp/capita} \right) = -4.636 + 1.228 \log \left( \text{GDP/capita} \right) \quad R^2 = 0.812 \\
(4.03) \quad (10.81) \quad \text{(t-statistics in parentheses)}
\]

In logarithms, the elasticity is the coefficient, hence the elasticity is 1.228.

5. \[
\log \left( \text{Deaths/1000} \right) = 4.492 - 0.222 \log \left( \text{Expenditures/capita} \right) \quad R^2 = 0.120 \\
(3.58) \quad (1.85) \quad \text{(t-statistics in parentheses)}
\]

In logarithms, the elasticity is the coefficient, hence the elasticity is −0.222. This would suggest that expenditures provide some modest effectiveness in addressing infant deaths.

7. a. As drawn, panel B expenditures appear larger. Whether they are, in fact, larger than panel A depends on the price elasticity of the demand curve.

   b. The total expenditures in panel B are larger than in panel C. The resource costs, however, are the same in both panels, because they are determined by the same supply curves at the same outputs.

   c. If the demand curves truly reflect consumer preferences, panel A is economically efficient. The deadweight losses in panels B and C reflect the differences between the demand and the supply curves, and as drawn are identical. Panel B gives a transfer of economic rents from the consumers to the providers.
Chapter 23 – Health System Reform

1. The firm’s marginal cost curve shifts upward. With market power, the firm’s marginal revenue curve lies below the demand curve, and the new equilibrium results in a higher price for the good. The amount of this price increase depends on the demand elasticity for the final product. Refer to the diagram for exercise E2-2 (for Chapter 2).

2. a. \( P^* = 80; \ Q^* = 300 \).
   b. \( P^* = 85; \ Q^* = 250 \)
   c. The workers pay for some of the benefit increases, because some will be laid off as output falls. The customers pay for some of the benefit increases in the form of higher prices.

3. The initial demand curve \( D_1 \) reflects a certain level of patient cost sharing, leading to an initial price and level of expenditures. Increased cost sharing would rotate the \( D_1 \) curve counterclockwise to \( D_2 \), presumably reducing expenditures.

4. [Diagram showing demand curves and budget lines for health care and other goods]
Two policies as noted.

a. As drawn, unhealthy household is likely to take plan B. Healthy household is like to take low deductible policy, plan A.

b. If the money not used is lost, then the unhealthy household may enroll in the HSA, feeling that they will spend all of it. The healthy household is unlikely to enroll, because they feel they will lose their money.

c. In this circumstance the healthy household may also enroll in plan B, feeling that they are unlikely to need the insurance, but if they do not need the insurance, they won’t lose the money.