SOLUTIONS MANUAL

Health Economics

Theory, Insights, and Industry Studies
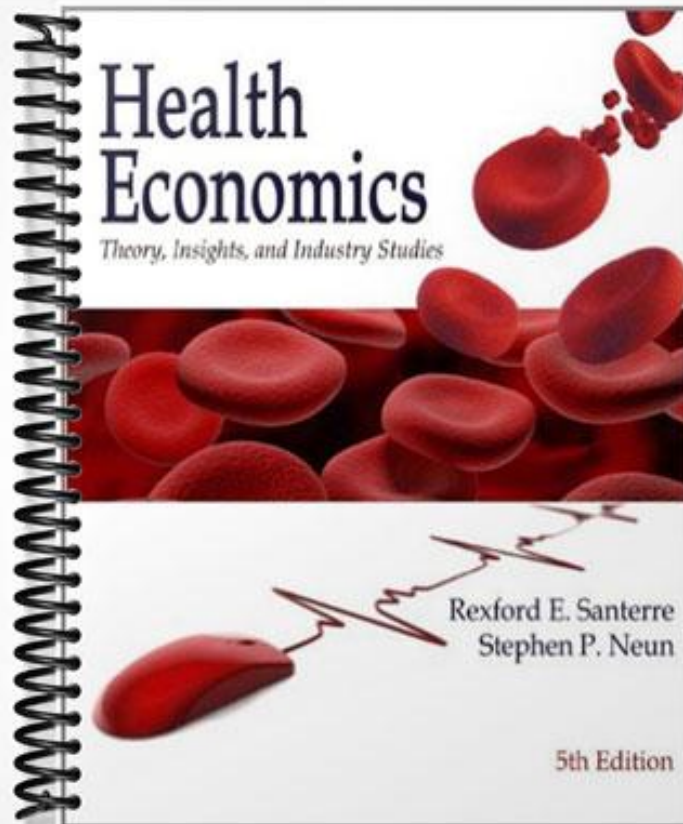
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CHAPTER 2

1. Describe the factors that make it difficult to measure output in medical care markets.
Medical care poses numerous measurement problems because it is a service rather than a tangible product in most instances. As a service, medical care exhibits the four characteristics that distinguish it from a good: intangibility, inseparability, inventory, and inconsistency.

2. As mentioned at the beginning of the chapter, the life expectancy rate in Russia fell significantly from 1989 through 1994. Use health production theory to explain what would happen to the relationship between good health and medical care in Russia if alcohol consumption diminished and the market economy strengthened. Provide a graph to illustrate your explanation.
The improvement in lifestyle would enhance health and bring about an increase in the marginal product of any health care consumed. The total product curve shifts and rotates upward. If the market economy improves on a permanent basis, how health changes depends on the theoretically complex relationship between increases in income and health.

3. Use health production theory to explain the role gender plays in the production of health during pregnancy. Provide a graph to illustrate your answer.
During pregnancy the total product curve of a woman is likely to shift downward and become steeper (i.e., rotate upward) at the same time. The curve shifts downward because the overall health of the woman may decrease as a result of the pregnancy. If the woman's initial endowment of health is low and medical complications develop during the pregnancy, the shift in the total product curve may be greater. The curve rotates upward because the marginal product of medical care increases during pregnancy.

4. Use production theory to graphically illustrate the case in which a medical innovation improves health without any change in the consumption of medical care.
The total product curve shifts upward and a completely vertical movement takes place from the original total product curve to the new product curve. The implication is that more output of health can now be obtained from the same level of medical services.

5. In your own words, use utility analysis to explain why people demand health. How does the law of diminishing marginal utility fit into the analysis?

Health is a durable good that is desired for consumption and investment purposes and people demand health because it generates utility or satisfaction. From a consumption perspective, an individual desires to remain healthy because he or she receives utility from an overall improvement in the quality of life. The investment element is concerned with the relation between health and time. A healthy person allocates less time to sickness and therefore has more healthy days available in the future to work and to enhance income or to pursue other activities. The law of diminishing marginal utility states that each successive incremental improvement of health generates smaller and smaller additions to total utility. Thus, utility increases a decreasing rate with respect to health.

6. Explain how an increase in income would affect the level of health in a relatively affluent country like the United States compared to a relatively poor country like Haiti.

Since average income in the United Sates is already at the level where most of the population can afford nutrition and housing, an increase in real income is likely to have only a marginal impact on overall health (i.e., higher income leads to more spending on medical care, but on the flatter portion of the total product curve for medical care). In fact, it is conceivable that overall health may decrease if the added income results in more detrimental lifestyle choices. In Haiti, the impact of an increase in income is likely to be more pronounced. If the increase in income is distributed more evenly and used to provide better public health conditions, nutrition and housing, the impact on total health would be substantial.

7. You have just been appointed to the post of surgeon general of the United States. The president wants you to develop an advertising campaign called "A Healthy America by the Year 2020" that encourages Americans to lead a healthier lifestyle. What types of behavior would you try to influence? Why?

Based on the empirical evidence, the advertising campaign should stress the health benefits of improved lifestyle, education, and the environment. Research on the determinants of health among infants also indicates that the campaign should stress educating young mothers, maximizing the impact of public policies, and alleviating poverty.

8. You have just been hired by a major metropolitan city as a health policy analyst. Your assignment is to devise a plan that city authorities could implement to lower the infant mortality rate. Based on the results cited in

this chapter, what types of policies would you recommend? Substantiate your answer.

Based on the empirical research, your plan should include programs that raise the educational level of young mothers and decrease the rate of poverty. Your plan should also make maximum use of public policies already in place.

9. Explain how a change in each of the following factors would alter the shape of the total product curve for medical care.

A. An increase in education.
The total product curve shifts and rotates upward.

B. An improvement in lifestyle.
The total product curve shifts and rotates upward.

C. An improvement in the environment.
The total product curve shifts and rotates upward.

10. Some people believe cigarette and alcohol advertisements should be banned completely in the United States. If this were the case, what would likely happen to the shapes of the total and marginal product for medical care?
If cigarette and alcohol advertisements were banned in the United States, the consumption of those products would most likely diminish. That would result in an improvement in lifestyle and cause the total product curve to shift and rotate upward. The marginal product curve would shift upward.

11. Explain why a researcher must be careful when interpreting findings from a survey that finds a positive association between education levels and health outcomes.
It is possible that this relationship is distorted by some third variable. The third variable problem results from a third unobservable and therefore immeasurable factor that may simultaneously affect both original variables and thereby produce the observed association. Finally, a regression analysis may reveal association, but the true causation is the opposite of what the researcher assumed. This is the problem of reverse causation.

12. Consult the website of your state or county Public Health Department. Are there any public policy initiatives currently in place aimed at improving lifestyles, enhancing access to health care, or impacting the environment? Explain the intent of these policies in the context of production theory.

Student answers will vary, but the analysis should reflect the idea that, in the context of the total product curve, public health initiatives cause the curve to shift and rotate upward

13. In a 1991 issue of the *Cato Journal*, Santerre, Grubaugh, and Stollar estimate an infant mortality equation using a sample of 20 countries belonging to the Organization for Economic Cooperation and Development (OECD) during the 6 adjacent half decades from 1960 to 1985 and a fixed effects model. They obtained the following (abbreviated) results:

$$IMR = 3.93 - 0.069TIME - 0.892RGDP - 0.539PHYS + 0.707*URBAN - 0.004FLFPR - 0.135ED$$
$$(2.60)(1.11) \qquad (6.83) \qquad (6.89) \qquad (4.21) \qquad (1.21) \qquad (2.34)$$

$$\text{Adjusted } R^2 = .954 \ N = 110$$

All of the variables have been converted to logarithms so the coefficient estimates can be treated as elasticities. The numbers below the estimated coefficients represent *t*-statistics.

IMR = infant mortality rate in each country for each year

TIME = a time trend from 1 to 5 (1960 to 1985) capturing changing technology and knowledge

RGDP = real gross domestic product per capita in each country for each year

PHYS = number of physicians per capita in each country for each year

URBAN = percentage of the population in urban areas in each country for each year

FLFPR = female labor force participation rate in each country during for year

ED = level of education in each country for each year.

Based upon these findings answer the following questions:

A. What percentage of the variation in the infant mortality rate is explained by the independent variables? How do you know that?
The percentage of the variation in the infant mortality rate explained by the independent variables is 95.4 percent. This result is shown by the coefficient of determination, R^2.

B. Using health production theory as much as possible, provide a hypothesis or theory about the relationship (direct or inverse) between the first three independent variables and the infant mortality rate.

Time (capturing technology and knowledge), real gross domestic product per capita (representing income), and number of physicians per capita each has an inverse relationship with infant mortality. Increases in time, RGDP, and number of physicians per capita shift upward the total product curve for medical care. Therefore, at each level of medical care, more health (less infant mortality) is achieved. The converse is also true.

C. Are those three hypotheses supported by the regression results? Explain.
The results for RGDP and number of physicians per capita are statistically significant because their *t*-statistics are greater than or equal to 2. The inverse relationships between these two variables and infant mortality are supported by the regression results. The result for the time variable is not statistically significant.

D. Given that the estimated coefficients are also elasticities, interpret the coefficients on the number of physicians and real GDP.
Because the coefficients are less than one, infant mortality is inelastic in response to number of physicians per capita and real GDP per capita. A given percentage increase in either variable will lead to a lower percentage decrease in infant mortality.

E. Should we expect the physician elasticity to remain constant if increasingly more physicians are employed in the typical health economy? Why or why not?
An increase in the supply of physicians per capita, ceteris paribus, will lead to a decrease in the price of physician services, which in turn will lead to an increase in the quantity demanded. If people are using more physician services, we would expect the physician elasticity to increase, leading to even larger decreases in infant mortality for each unit of physician services.

F. Based upon those findings explain why the infant mortality rate may be so much higher in Turkey than Japan?
For statistically significant variables with an inverse relationship to infant mortality (real GDP per capita, number of physicians per capita, and level of education), Turkey lags behind Japan. These results increase Turkey's infant mortality rate relative to Japan.