

Due: Nov. 13, 2002

Health Economics
Economics 156
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Problem Set 3

A. **Demand Elasticities**

1. This is your chance to calculate demand elasticities for health care. Suppose you are collecting data from a country (like Japan) where the government sets the price of health care. Each prefecture in Japan has a different set of prices (for example, Tokyo has higher prices than rural Hokkaido). Suppose you observe the following data for 1999:

	# doctor visits per month	Price per doctor visit
Tokyo	1.0 visits	20 Yen
Hokkaido	1.5 visits	10 Yen

What is the arc price elasticity of demand for health care consumers in Japan (using only these data)?

Using your estimated elasticity, what would the demand for health care be if the price in Tokyo were raised to 30 Yen per visit? What would the demand in Hokkaido be if the price were lowered to 5 Yen per visit?

2. You continue your observations of the Japanese health care system into the year 2000. For inscrutable reasons having to do with internal Japanese politics, the government changed the price in both Tokyo and Hokkaido that year, and you observe the following demand:

	# doctor visits per month	Price per doctor visit
Tokyo	0.9 visits	30 Yen
Hokkaido	1.4 visits	15 Yen

Calculate the price elasticity of demand for health care in Japan using only data from the year 2000.

3. Use data from both years to calculate the elasticity of demand for health care for Tokyo and Hokkaido separately.

Using your estimated elasticities, what would the demand for health care in each prefecture be if the price were raised to 60 Yen per visit next year (for both prefectures)?

Suppose the population of Tokyo and Hokkaido are given in the following table:

	Population
Tokyo	10 million
Hokkaido	2 million

4. Combine the Tokyo and Hokkaido estimates from question 3 to get a single estimate of the health care demand elasticity for all of Japan.
5. Which set of estimates in questions 1-4 come closest to a “natural experiment” – the estimates that rely on differences in price between Tokyo and Hokkaido, the estimates that rely on difference in price in 1999 and 2000, or the combined estimates? What are strengths and weaknesses of each of the estimates? (Hint: What could introduce error in the estimates? What makes each situation different from a randomized trial?). Would a similar study in the U.S. (where the government does not set the price of health care) be as convincing as your study in Japan?
6. Estimates of the price elasticity of demand for health care vary greatly among studies. Studies that base their estimates on natural experiments tend to find demand elasticities that are similar to the ones found in the RAND Health Insurance Experiment, while non-natural experiment studies tend to find much larger elasticities. Which set of estimates is more plausible? What are some reasons to prefer one set of estimates over another?

B. Socioeconomic Status and Health

Over the past century, there has been a substantial increase in the body mass index (BMI) of the average American. The graph on the following page tracks over this period the average BMI by age in America. For reference, it is useful to know that the National Center for Health Statistics defines a person as obese if his BMI is over 30. BMI is defined, in turn, as weight in kilograms divided by height in meters, squared. Obesity can sometimes lead to serious medical conditions (like diabetes) that require substantial medical resources to treat. This trend toward rising BMI is present not only in America, but also in many other industrialized countries, including Britain. Furthermore, the greatest increases in BMI, and in rates of obesity, have been in the poorest populations.

Economists who have studied this rise in obesity believe that in the adult population, the rise in obesity can be attributed to decreasing prices for food (due to technological improvements in agriculture) and a shift away from strenuous jobs in the workplace (due to a substitution of service-sector for industrial jobs). Other explanations include the increase in labor force participation by women (leading to less time spent by family members to produce healthy meals at home) and rising wages in the economy (which increases the value of time leading to an increased demand for fast food).

In response to rising BMI, many public health officials have suggested imposing a tax on fatty food (a “fat tax”). For example, here is an article from the BBC News on January 28, 2000:

“Putting value added tax (VAT) on fatty food could prevent between 900 and 1,000 premature deaths a year in the UK, a dietary expert has said. Most food is currently exempted from VAT.

Dr Tom Marshall, of the University of Birmingham, has considered the impact that diet has on cholesterol concentrations in the UK population.

High levels of cholesterol are strongly linked to heart disease.

Dr Marshall, writing in the British Medical Journal, says cholesterol concentrations are increased by eating saturated or polyunsaturated fats.

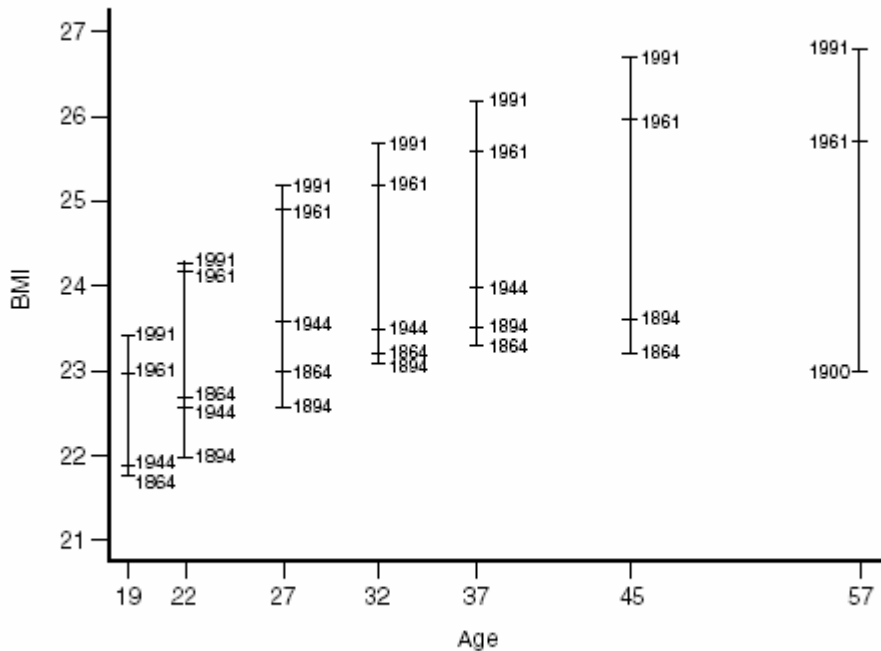
He argues that a reduction in consumption would lead to a drop in the number of people suffering heart disease.

According to Dr Marshall, the main sources of saturated fat in the British diet are: full fat milk, cheese, butter, biscuits, buns, cakes, pastries, puddings and ice-cream.

He says the current pricing system encourages people to eat too many things that are bad from them.

However, if VAT were to be extended to the major culprits, Dr Marshall argues, the public would be more likely to buy cheaper, lower fat alternatives.”

Figure 1: Historical Change in US Body Mass Index: 1863-1991.



SOURCE: Costa D. and R. Steckel (1995), NBER Historical WP #76.

1. Is Dr. Marshall right? That is, will the fat tax solve the obesity crisis, if the economic theories of the causes of the obesity crisis are correct?
2. Analyze the equity effects of such a tax on the rich and poor. You should consider both income effects and utility effects. You may assume that for the poor the price elasticity of demand for fatty foods is less than that for the rich. Furthermore, you may assume that fatty foods are an inferior good (increases in income lead to a decreased share of the budget devoted to fatty foods). What other positive questions need to be answered to be certain your answer is correct?