Chapter 10

Insurance

10.1 Introduction

A market for insurance exists whenever consumers face uncertainty about the future and some attendant risk. Consider health care. Consumers are uncertain about the future state of their health. They may become sick or they may remain healthy. What they do know is that if they become very sick, their medical bills will be enormous. Most people can't afford to pay huge medical bills so they purchase health insurance. They pay a yearly premium and the insurance company agrees to pay for some portion of their medical bills. This creates a problem—if consumer's aren't paying the full price for health care, they may not ration it appropriately. As I will show in this chapter, this is a difficult problem to solve.

10.2 A Model of Insurance

I'll begin by assuming that consumers are either healthy or sick—there are no gradations of illness (or health). If I let H denote health care received, I can graph an individual consumer's demand for health care. In figure 10.1, D_W shows the consumer's demand when healthy (or well) and D_S shows her demand when sick.

At every price, my consumer demands far more health care when she is sick than when she is well. Let E_W denote my consumer's expenditure on health care when she is healthy. If the price of health care is P, E_W is represent by the box $ABCD$. My consumer's expenditure when sick, E_S, is

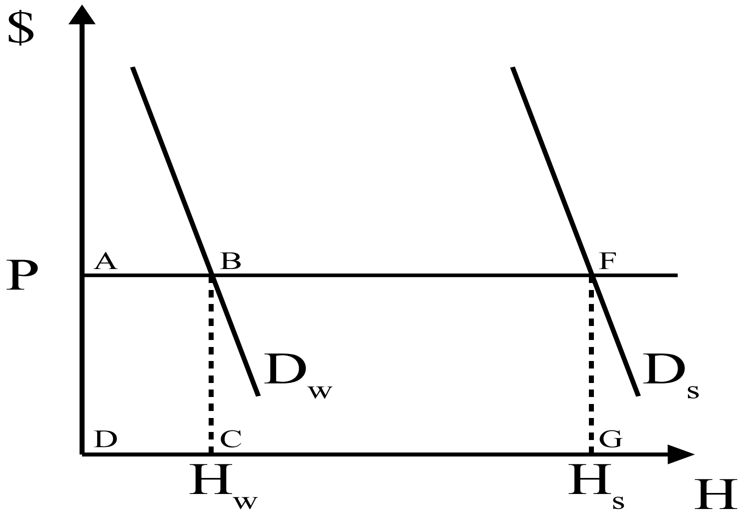

Figure 10.1: A Consumer's Demand for Health Care

represented by the box $AFGD$ if the price of health care is P.

My consumer faces risk because she doesn't know if she will be healthy or sick. If she is sick, she will need to spend a lot on health care; if she is healthy, she will not need to spend a lot on health care. To analyze the affect of uncertainty on my consumer, I must model her attitude towards risk.

I shall assume that my consumer is risk averse, which means that she tries to avoid risk. To illustrate, consider two games, A and B. In game A, my consumer is paid \$100 for sure. In game B, she gets \$200 half of the time and \$0 half of the time. For game B, my consumer's expected winnings are \$100:

$$E[\text{Winnings}] = \frac{1}{2}200 + \frac{1}{2}0 = 100 \tag{10.1}$$

I will say that my consumer is risk averse if she prefers game A to game B; that is, if she prefers \$100 for sure to expected winnings of \$100.

If my consumer is risk averse, she will want to reduce the risk that she will get sick and face huge medical bills. One way of doing this is to buy health insurance. Before considering the nature of her insurance policy, let me briefly investigate why the insurance company is willing to bear risk that consumers are unwilling to bear.

Insurance companies work by pooling risks. For an individual consumer, there is a large difference in her total health care expenditure if she gets sick (the difference between E_W and E_S). Now imagine that 100 consumers form a group and agree to share health care costs. Some consumers in the group get sick, most stay healthy. Because the consumers form a larger group, the variation in total health care expenditure is much lower than for an individual. As a result, the risk of the group facing huge unexpected payments is low, and consumers have more certainty—and less uncertainty—about their health care costs. Now imagine a group of 10,000; the variation in total health care expenditure is tiny. This, in essence, is an insurance company.

Returning to my consumer, I shall assume that she pays a premium to the insurance company every year. In return, the insurance company pays all of her medical bills. I'll also assume that all consumers in the economy purchase the same policy. Figure 10.2 depicts the industry-wide demand and supply for health care before insurance is introduced. (I've drawn the supply of health care as fixed since the total number of doctors changes slowly.)

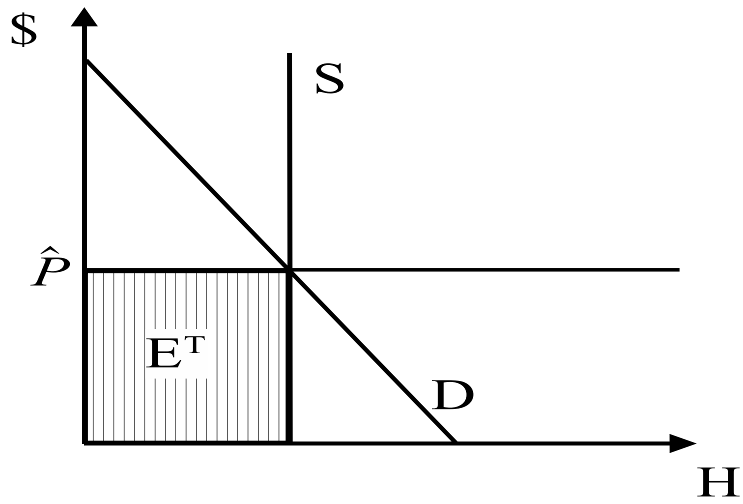

Figure 10.2: Aggregate Supply and Demand for Health Care

The insurance company calculates the premium to charge each consumer by dividing the area of the shaded box E_T by the total number of consumers.

This calculation of the premium may seem reasonable, but it will not work. The area E_T was determined when consumers paid for each unit of health care. Under their new insurance policy, they don't pay anything after they have paid the premium. So they will demand health care all the way up to the point where the demand curve hits the X-axis (since health care is free after they have paid their premium). This level of demand exceeds the total amount of health care that can be produced, so this is not an equilibrium.

10.3 Co-payments: A Solution?

A potential solution to this problem is to introduce a co-payment. Under the co-payment system, a consumer pays $C\%$ of every medical bill. A common value for C is 20. At this value, consumers pay 20% of their medical bills and insurance companies pay the remaining 80%. This reduces consumers' tendency to seek health care, but still allows them to reduce their risk. This is an attractive solution, but it will not work.

The problem is that when a co-payment is introduced, consumers and doctors see different prices. For example, suppose that C is equal to 20 and that doctors charge \$100 for a checkup. The price that doctors see, P_D, equals \$100. The price that consumers see is

$$P_C = P_D C = (.2)100 = 20 \tag{10.2}$$

Figure 10.3 illustrates using a 20% demand curve. To find the demand at a given price P_D, read across to the demand curve and then go down to the 20% demand curve. From there, go across to the demand curve and read down. This point is the demand at price P_D.

You can see that if doctors charge the old equilibrium price $\hat{P}$, there will be excess demand. Faced with excess demand, doctors will increase their price. What price will bring about an equilibrium?

$$P_D = 5\hat{P} \tag{10.3}$$

At this price, consumers will pay

$$P_C = (0.2)5\hat{P} = \hat{P} \tag{10.4}$$

But now consumers are paying in co-payments what they used to pay up-front and they are paying large premiums. To see this, I must draw the 500%

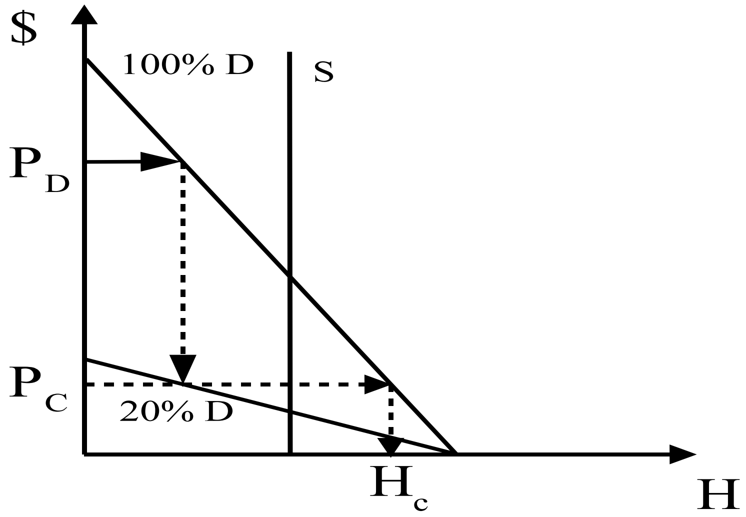

Figure 10.3: The Effect of a Co-payment on the Demand for Health Care

demand curve. It is illustrated in figure 10.4 along with the demand curve. The two boxes show the total co-payments and premiums[1] that consumers pay. Introducing the co-payment system has made consumers worse off than they were without insurance. Doctors, on the other hand, are a lot better off.

[1]the insurance company's total premiums must match its insurance payments or the company will lose money.

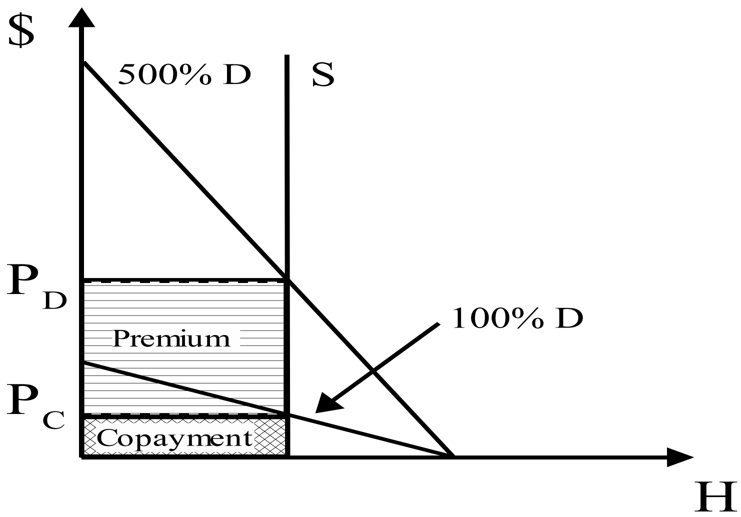

Figure 10.4: Aggregate Supply and Demand with a Co-payment