8 Asymmetric Information

Practice Question 18. Suppose there are two types of cars: low quality and high quality. There is a very large (unlimited) number of buyers. The maximum willingness to pay for a high quality car is \$$b$ ($b \geq 7000$) and the maximum willingness to pay for a low quality car is \$4000. The reservation price of sellers is \$7000 for a high quality car and \$3000 for a low quality car. There are 2000 sellers, one third of them own high quality and two thirds a low quality car.

(a) Determine the market equilibrium under symmetric information when both the buyers and sellers have information about each car quality.

(b) Determine the market equilibrium under symmetric information when neither the buyers nor sellers have information about each car quality.

(c) Suppose $b = 10000$. Determine the market equilibrium if sellers have the information about the car quality but not the buyers.

(d) Discuss and interpret how the market equilibrium depends on the value b.

(e) Continue with $b = 10000$. Suppose one single buyer acquires expertise and is able to identify the quality of a car. Will she buy a car? If so which car and at what price, if not why not?

Solutions:

(a) Under full information, the high quality cars are all sold at \$$b$ and the low quality cars are all sold at \$4000.

(b) The expected maximum willingness to pay of a buyer is

$$p = \frac{1}{3} \times b + \frac{2}{3} \times 4000$$

The expected reservation price of a seller is

$$v = \frac{1}{3} \times 7000 + \frac{2}{3} \times 3000$$

Since

$$b \geq 7000$$
$$\Rightarrow p > v$$

So all cars are sold and at

$$p = \frac{1}{3} \times b + \frac{2}{3} \times 4000$$

(c) The expected maximum willingness to pay for a car of a buyer is

$$3000 < p = \frac{1}{3} \times 10000 + \frac{2}{3} \times 4000 = 6000 < 7000$$

So no high quality car is sold but all low quality cars are sold at price \$4000.

(d) As b increases, eventually the expected max willingness to pay reaches 7000, the reservation price of high quality sellers. Thus the equilibrium price becomes

$$p = \frac{1}{3} \times b + \frac{2}{3} \times 4000$$

with all cars sold.

(e) Buy only a high quality car. Since she is the only buyer of a high quality car, she can pay the reservation price of 7000 and earn a surplus of $10000 - 7000 = 3000$: Buying a low quality car would cost her 4000 and she would get no surplus.

Practice Question 19. Use the lemons model to explain why restaurants that cater to tourists are likely to serve low-quality meals. Tourists will not return to this area, and they have no information about the relative quality of the food at various restaurants, but they can determine the relative price by looking at menus posted outside each restaurant.

Solutions: Before eating, consumers can only gain information about the price of the meal and its general characteristics, such as the type of cuisine. They are generally unable to tell the quality of a restaurant meal until after it has been consumed. In a tourist environment, consumers are unlikely to return to the restaurant. A high-quality restaurant will be unwilling to sell at a cost that is between that of a low-quality restaurant and a high-quality one. But tourists will not pay the high quality price because they do not know if the restaurant is high quality. Only low-quality restaurants will operate in this case. (A side note: How does the existence of Yelp and other restaurant review apps change this?)

Practice Question 20. If you buy a new car and try to sell it in the first year—indeed, in the first few days after you buy it—the price that you get is substantially less than the original price. Use the lemons model to give one explanation for why.

Solutions: Buyers of used cars do not want to purchase a lemon but cannot readily distinguish lemons from non-lemons upon simple inspection. They are, therefore, very wary of a virtually new car offered for resale and assume some are lemons and some are not. The price they will offer will be somewhere between the value of a good car resale price and a lemon price. Assuming that the person who purchased the car (the seller) wanted it when he or she bought it (a rational assumption), if it is a good car, the price offered by buyers will be too low. So, only lemon owners will want to resell their cars at the proffered price. Thus, the buyers should offer only the low lemon price to sellers.

Practice Question 21. Education is a continuous variable, where e_h is the years of schooling of a high-ability worker and e_l is the years of schooling of a lower-ability worker. The cost per period of education for these types of workers is c_h and c_l, respectively, where $c_l > c_h$. The wages they receive if employers can tell them apart are w_h and w_l.

(a) Under what conditions is a separating equilibrium possible? How much education will each type of worker get?

(b) Find the separating equilibrium when $w_h = \$80000, w_l = \$30000, c_h = \$10000$ and $c_l = \$25000$.

(c) Under what conditions is a pooling equilibrium possible?

(d) Describe the equilibrium if $c_l \leq c_h$.

Solutions:

(a) Education of e_h is the signal. It pays the high-ability group to signal if

$$c_h e_h < w_h - w_l$$

Low-ability workers will only signal e_h if

$$c_l e_h < w_h - w_l$$

$$\Rightarrow e_h < \frac{w_h - w_l}{c_l}$$

Thus, e_h is a successful signal of high ability whenever

$$\frac{w_h - w_l}{c_l} < e_h < \frac{w_h - w_l}{c_h}$$

High-ability workers will get $\underline{\underline{(w_h - w_l)/c_l + 1}}$ years of education and receive w_h, and low-ability workers will get zero years of education and receive w_l.

(b) e_h is a successful signal of high ability whenever

$$\frac{w_h - w_l}{c_l} = 2 < e_h < \frac{w_h - w_l}{c_h} = 5$$

So high-ability workers will get 3 years of education and receive \$80000, and low-ability workers will get 0 years of education and receive \$30000.

(c) A pooling equilibrium occurs if all workers are paid based on their average ability. If such a pay scheme is used, neither group can profitably signal, and no signaling occurs.

(d) If low-ability individuals can signal at a lower cost than high-ability individuals, firms will either ignore the signal or use it against individuals who signal. Because low-ability individuals will be able to signal less expensively than high-ability individuals, low-ability individuals would be able to profitably signal when high-ability individuals cannot. Thus, firms will not be willing to pay a wage premium to those who signal. Without the wage premium, neither group has the incentive to signal. The result is a pooling equilibrium with neither group signaling.