Homework: Asymmetric Information Economics 304

1) What is asymmetric information? Give *one* example of asymmetric information in a market other than in an insurance market. How does asymmetric information effect the outcomes in that market, and institutional arrangements implemented to deal with this market imperfection.

Asymmetric information happens when one party knows more information about a transaction than the other party. E.g. there is asymmetric information on both sides of the market for Airbnb (renter and homeowner). The renter doesn't have full information on the quality of the rental unit, while the homeowner doesn't know if the renter is going to hold a party and destroy their property.

Some of the solutions in this case are: the rating system in Airbnb, insurance against damages, etc.

2) Compare and contrast adverse selection and moral hazard. Use examples.

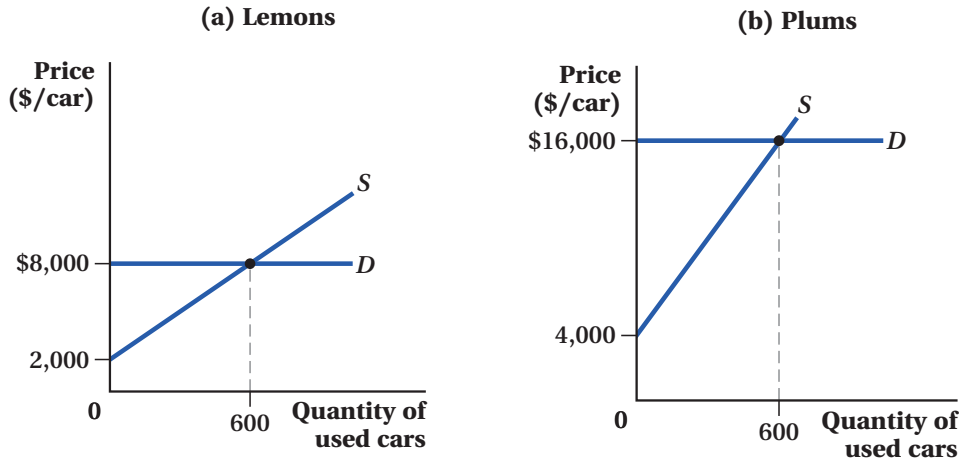
Adverse selection is the challenge where there is asymmetric information resulting in issues before a transaction, while moral hazard results in issues after the transaction. Many insurance examples, such as flood insurance are examples of moral hazard, while not being able to ascertain the quality of a good or service is an issue of adverse selection.

Interestingly, health care often has both adverse selection and moral hazard. Health insurance companies struggle to figure out who the "healthy type" is vs the "unhealthy type" and further, when someone gets insurance that insulates them from the risk of their decisions they often take fewer precautions i.e. moral hazard.

3) Why does a signal need to be costly? Explain.

Signals are potential solutions to the adverse selection problem, where asymmetric information makes it challenging to determine different "types" of individuals. The goal of a "signal" is separate out a "good" vs a "bad" individual. In education it was "high productivity" vs "low productivity." A signal has to be costly so that it is not easy to replicate by the "bad" individual, so that the uniformed party can actually separate the 2 "types" of individuals.

4) Consider the market for used cars shown in the figure below. Panel (a) shows the market for low-quality cars (lemons); panel (b) shows the market for high-quality cars (plums). If all buyers and sellers had full information about the quality of automobiles being offered for sale, lemons would sell for $8,000 and plums would sell for $16,000.



a. Suppose that buyers recognize that the chance of getting a lemon is 50%, but are unable to tell whether a car is a lemon or a plum. What is the expected value of a used car to a buyer?

Expected value = 0.5*$8000 + 0.5*$16,000 = $12,000

b. If the market works to the extent that prices reflect the expected value of a used car, how many high-quality automobiles will be offered for sale at the price determined in (a)? How many low-quality automobiles will be offered for sale? Of the automobiles offered for sale, what is the proportion of low-quality automobiles?

Lemons market: P = 2,000 + 10Q => 12,000 = 2,000 + 10Q $Q^{Lemon} = 1{,}000$

Plum market P = 4,000 +20Q. **=> 12,000 = 4,000 + 20Q.** $Q^{Plum} = 400$

c. Compared to a market with perfect information, what kind of deadweight loss does the information loss generate in the market for high-quality used cars? Is there a deadweight loss in the market for lemons, too?

Perfect information: 600 lemons sold for $8,000 and 600 plums sold for $16,000.

Imperfect information 1,000 lemons and 400 plums sold for $12,000

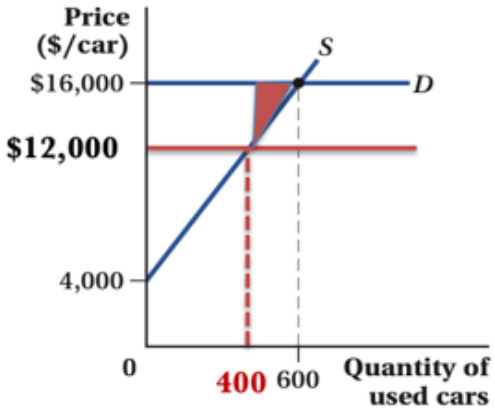
Deadweight loss in plum market due to the lower level of cars sold 600 -> 400

So we look at the reduction in economic surplus just from those 200 cars that would have been sold if the price was higher (reflecting full information)

0.5*(600 – 400) * ($16,000 - $12,000) = $400,000

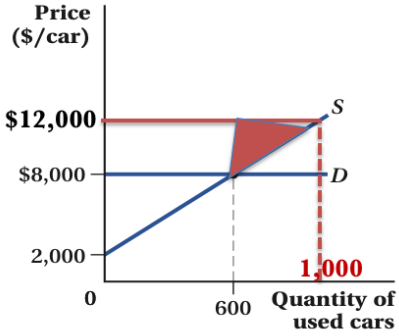
0.5 * Rise * Run

Deadweight loss for Plums



Similar story for lemons. There may be a deadweight loss in the fact that some used cars that were lemons were sold for $12,000 that should not have been

0.5*(1,000 – 600) * ($12,000 - $8,000) = $800,000



5) Harry is dating Sally. Because he is devastated at the thought of being dumped, he spends considerable resources making himself attractive to her: expensive haircuts, ballroom dancing classes, a gym membership, and so on. Harry's marginal cost of making himself attractive to Sally is given by *MC* in the graph below. Sally, of course, appreciates his efforts: The marginal benefit Harry receives from his efforts (which account for the probability of being dumped) is shown as *MB*.

a. On the graph, determine the optimal amount of resources Harry should expend making himself more attractive to Sally.

Optimal actions are with MB = MC at A*

b. Harry marries Sally. The marriage contract raises the cost of exiting a relationship, and thus, for any given level of Harry's expenditure, Sally is less likely to dump Harry. Illustrate the effects of the marriage contract in the accompanying graph by shifting the appropriate curve in the appropriate direction.

Shifts MB curve back / in resulting in lower quantity of self-improvements

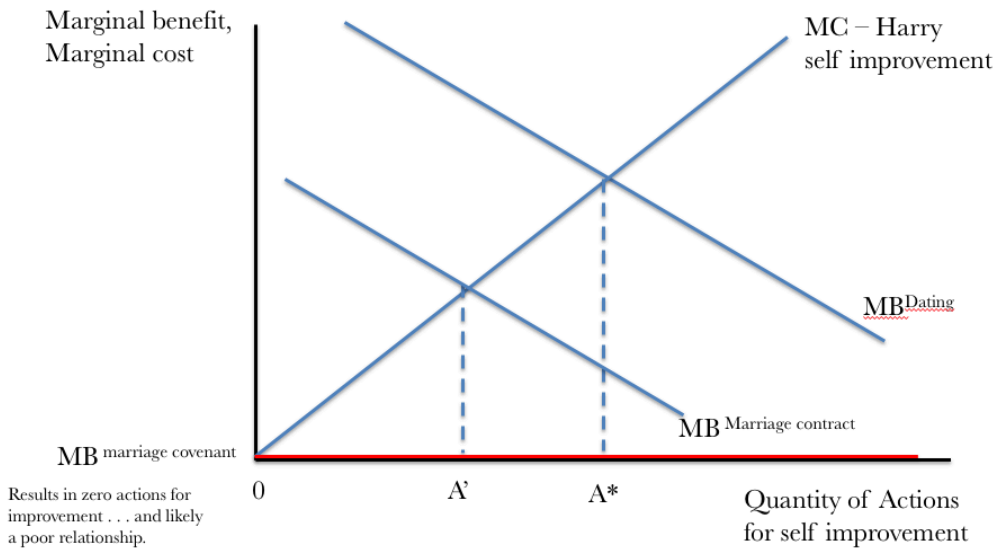
c. "Harry has really let himself go since we got married. He burps too much, seldom shaves, and never takes out the trash." Is this commonly heard statement consistent with the illustration you have drawn?

Yes, marriage makes the probability of getting dumped lower, decreasing the marginal benefit of self-improvement actions.

d. What kind of problem does this illustrate: adverse selection or moral hazard?

Moral hazard. By being "insured" against the loss of relationship through marriage, it reduced the incentive for self-improvement.

e. A "covenant marriage" is one that is virtually impossible to exit for a given period of time. Illustrate the effects of a covenant marriage on your graph, and comment on the predictions your graph holds for the quality of relationships fostered by covenant marriages.



6) Princess Buttercup has a multitude of potential suitors. She wishes to separate them into two groups — those who are truly interested in her hand in marriage, and those who are only interested because she's convenient, pretty, and rich. Let's call these two groups "interested" and "non-chalant," respectively. In an attempt to separate the two groups, Princess Buttercup devises a plan under which potential suitors must slay dragons before coming to the castle to court her. (See section 15.4 in the book on signaling) **Use the graph below to help you answer the following questions.**

- Those who slay the requisite number of dragons, *D*, will be allowed to court her.
- Those who do not slay the requisite number of dragons will only be allowed to court Buttercup's ugly half-sister, Princess Poison Ivy.
- To a member of either group, the benefit to courting Princess Buttercup is equal to $1,000.
- To a member of either group, the benefit to courting Princess Poison Ivy is $64.
- To a member of the "interested" group, who pursue their goal with unbridled passion, the cost of passing Buttercup's test is given as D^2 (that is the equation D^2 i.e. D*D), where *D* is the number of dragons slain.
- To a member of the "nonchalant" group, who pursue their goal halfheartedly, the D^3 (that is the equation D^3 i.e. D*D*D) cost of passing Buttercup's test is given as *D,* where *D* is the number of dragons slain.

a) Princess Buttercup wants to sort the interested suitors from the nonchalant suitors. What is the *minimum* number of dragons Princess Buttercup can ask potential suitors to slay if she wants them to separate into groups? (You can round to an appropriate integer.)

11 dragons. Nonchalant's decision where cost > benefits

$D^3 > 1000 \Rightarrow D = \sqrt[3]{1,000}$ D = 10 for the nonchalant suitor.

So if she asks for 11, then the nonchalant suitor isn't interested any more.

b) Suppose that Princess Buttercup asks suitors to slay *three fewer* dragons than you indicated in your answer to (a). Why will asking suitors to slay this many dragons not help Princess Buttercup filter out the nonchalant suitors?

The cost of slaying 8 dragons (11-3) is lower for each type of suitor than the benefit from Buttercup ($1,000). So both are willing to slay 8, and she can't tell the different between their "types"

c) What is the *maximum* number of dragons Princess Buttercup can ask potential suitors to slay if she wants to be able to distinguish between interested and nonchalant suitors? (Again, you may round your answer to an ap- propriate integer.)

The answer it 31.

D^2 <$1,000. $D < \sqrt[2]{1000} = 31.6$

d) Suppose that Princess Buttercup asks potential suitors to slay *three more* dragons than you indicated in your answer to (c). Why will asking suitors to slay this many dragons not help Princess Buttercup filter out the nonchalant suitors?

Asking suitors to slay 34 dragons as a condition of courtship will result in neither suitors slaying any dragons for Buttercup, because the cost > benefits for both types of suitors.

e) Suppose that Princess Buttercup has appropriately set the number of dragons, filtered out the nonchalant suitors, and from the pool of interested suitors chosen her prince. Now, she wishes to see if her prince wants her because of love, or whether her prince is only interested given her vast fortune. What modern American legal device might Princess Buttercup use as a screening tactic to discover the true answer? Explain your response.

A prenuptials agreement "prenup." The suitor won't get any of Buttercups wealth if they separate.