

Econ 4545: First Midterm: Fall 2014

Oct 21, 2014

This exam has five questions and 50 points. Some of the questions have multiple parts. Make sure to separately answer each part in the order they are asked.

If you are in class when we go over the exam, I will add 3 points to your raw score.

If you have a question during the exam I will answer it for points.

Sometimes I gave full credit for an incorrect answer. I did this because the answer was “close” in some sense to a correct answer. If I ask the same question again and you provide the same incorrect answer, you will not get full credit.

Please read the questions more carefully, answering what was asked and only what was asked. Many of you lost points simply because you did not carefully read the question and check that you had specifically asked what was asked.

I asked you to read all the questions before you answered any of them because what is said in one question often provides information that helps you to answer other question.

(Question 1: 18 points total, 3 for each part A-F) When I drive sober I produce no external effects. When I drive drunk I produce negative external effects. Consider the efficient amount of driving drunk, specified in miles. Assume I currently choose to drive 100 miles a week, 40 of them drunk. From society’s perspective, assume the efficient amount for me to drive drunk is 20 miles a week. Society does not care how many miles I drive sober.

The government’s goal is to get me to reduce my drunk-driving miles from 40 to 20 and to produce the reduction efficiently. Consider two different tax schemes: a per-mile tax on every mile I drive or a per-mile tax on every mile I drive drunk.

(Question 1 Part A) Can the government get me to reduce my miles of drunk driving from 40 to 20 with either a tax on drunken miles or a tax on all miles? Yes, No or uncertain. Explain your answer.

Could change wording to “with a tax on drunken miles?” And, “With a tax on all miles?”

**Answer:** Will **either** tax work to reduce drunken miles to 20? Yes, one can achieve the reduction from 40 to 20 with either tax.

In explanation, there is a per-drunk mile tax rate that will cause me to reduce my miles of drunk driving from 40 to 20, and there is a per-mile tax rate that will cause me to reduce my miles of drunk driving from

40 to 20. Both types of taxes increase the cost of driving drunk, so cause me to reduce my consumption of drunk-driving miles. (As an aside, so would a tax on fuel.)

Some of you answered in a way that implied the tax rate for either type of tax was set incorrectly. For example, some of you said that a tax on every mile driven would not cause you to drive only 20 miles drunk. But this just implies the tax per mile on every mile is set incorrectly. For example if the tax is \$1 a mile and you choose to drive 30 miles drunk the tax rate is too low. So, raise it until you choose to drive 20 drunken miles.

Some of you did not answer the question asked. The part of the question did not ask whether one tax was more or less efficient than the other. It simply asked whether it was possible to reduce from 40 to 20 with either tax? Did you specifically answer that question?

The answer to this part of the question **does not depend** on whether there is a fixed relationship between total miles and drunken miles.

Make sure that you understand that a “per-unit tax is a tax on all units produced.

(Question 1 Part B) What did I mean in the question when I said, “and to produce efficiently the reduction from 40 to 20 miles?”

**Answer:** It means that efficiency requires that the reduction in drunken miles from 40 to 20 is brought about in the minimum-cost way from society’s perspective.

(Question 1 Part C) Thinking about efficiency, is there an advantage to either type of tax? Yes or No and, if so, which tax. Explain your answer.

**Answer** Yes: The tax on drunken miles is directly taxing what the government wants to influence. A tax on total miles is not a direct tax on what it wants to influence. Only the direct tax will achieve the reduction efficiently. Efficiency requires that I reduce my drunken miles in the minimum-cost way from society’s perspective (my perspective) and there are two ways from me to reduce drunken miles: drive fewer miles in total or drive fewer miles drunk. What if I strongly prefer drinking less to driving less as a way of reducing the miles I drive drunk? Taxing total miles gives me no incentive to reduce the proportion of miles that are driven drunk.

(Question 1 Part D) Under what conditions would it not matter whether one tax miles or drunken miles?

Answer: If, for some reason I was constrained to drive 40% of all my miles drunk.

It won’t matter if you drive drunk a fixed proportion of your miles (40%, 100%, whatever).

Some you said it would not matter if it was 100% which is correct, but saying this alone does not describe all of the conditions under which it does matter.

Some of you answered with assumptions that contradicted what was assumed in the question.

(Question 1 Part E) Which tax would I prefer? A tax per-mile driven or a tax per-mile of drunk driving?

**Answer:** I would prefer the tax on drunken miles. In explanation, I have more choice in terms of minimizing the impact (cost) on me of the tax. An explanation is not required.

For example the tax on total miles affective how many miles you will drive sober causing you to drive an inefficient number of sober miles from your perspective; This make you worse off in a way that was not necessary to get you to drive only 20 miles drunk.

You would be indifferent between the two types of taxes if you are constrained to drive 40% of your miles drunk or your preferences were such that that you always wanted to consume drunk to sober miles in the ratio 4 to 6.

A number of you said if you always prefer driving drunk (which contradicts the assumption that you now drive drunk only 40% of the time) you would prefer the tax on all miles. This is not correct. If you always drive drunk you would be indifferent between the two types of taxes.

(Question 1 Part F) What would be an environmental example of the above?

**Answer:** An example would be pollution where there is abatement technology.

For example if there is a fixed relationship between the number of cigars Penny smokes and the amount of second-hand smoke Fred consumes it would not matter if one taxed the number of cigars Penny smokes or the second-hand smoke Fred consumes

But, if second-hand smoke can be reduced holding the number of cigars smoked constant then efficiency will only be achieved by taxing the second-hand smoke. Either type of tax can be used to get Penny to reduce her consumption of cigars down to the efficient level from society's perspective, but only the tax on second-hand smoke will bring about the reduction in the minimum cost way.

There is not a fixed relationship between the total number of miles driven and the number of those miles driven drunk. That is, there is abatement technology for driving fewer miles drunk, drinking less.

Note that the issue is whether the relationship between the amount of pollution produced and the amount of the taxed output (or input) is a fixed relationship.

Fixed does not necessarily mean "one to one"

Some students had great applications. For example, the number of trips to Yellowstone is too high from an efficiency point of view. Maybe it needs to be reduced from 40 to 20 trips. One could achieve the reduction with a tax on Yellowstone trips or a tax on all trips to either Wyoming or Montana. But since there is not a fixed relationship between trips to these two states and how many of them are to Yellowstone, taxing only Yellowstone trips will be achieve the reduction in Yellowstone trips at a lower cost.

(Question 2: 5 points total, 3 for correct answer, 2 for explanation) If all of the opportunities to make a member of society better off (without making another member worse off) have been exploited, an economy is

1. operating optimally
2. operating efficiently
3. operating inefficiently
4. operating equitably

Circle the answer that is both correct and most informative. Then explain, in words, your choice.

**Answer:** The answer is operating efficiently. The above is effectively the definition of efficiency. An efficient allocation is not necessarily an equitable allocation. Optimal means efficient and equitable.

Note that the word “market” does not appear in this question. So the allocation is not necessarily a market allocation.

Note that a potential Pareto improvement is an opportunity to make some better off without making anyone worse off.

(Question 3: 8 points total) Assume that society's concern for the future declines (we care less about the future than we used to). Does this make it more **likely** that we would want to drive species X to extinction? Yes or no, and explain.

**Answer: This question was asked and answered the review question.** The simple answer is it "it depends on the species." One can think of examples where extinguishing a species becomes more likely as concern for the future declines.

But we can also think of examples where it will become less likely.

Most people will think of examples of the former but not of examples of the latter. If you don't think of examples of the latter, you will reach the wrong conclusion, and answer incorrectly.

So, let's start with an example of the latter. Consider a species that is now a minor irritant but over time its population size will increase and it will become a big problem (like Ebola in 1985). Further assume the cost of eliminating the species is high. As concern for the future declines, it becomes less likely that we will want to drive this species to extinction now – high cost now of eliminating the species, the benefits of eliminating the species are future benefits, and the future now counts less. (Note that the future might want to eliminate the species in the future, when it is a big problem.)

Alternatively, consider a species whose meat we enjoy to eat after the animal is dead. Enjoying the meat requires that we kill members of the species. If we kill them all now, there will none in the future available for killing and eating. The more we care about the future, the more likely it is that we will want to save some of the species for the future; the less we care about the future the more likely it is that we would want to kill off and eat all members of the population now.

Consider a second example of the first type. We like to have Wambubas around (they are fun to watch), they are currently close to extinction, and we can bring the species back from the brink with a very expensive breeding program, if it is undertaken now - if we wait, they will be gone. We need to decide whether to save the species by undertaking the expensive breeding program. How to decide what is efficient. We should look at the high current cost and compare it to the present value of the stream of benefits from watching Wambubas now and in the future. If the present value of the future benefit stream is greater than the cost of the breeding program we want to save them, otherwise extinction. As our concern for the future declines, the present value of that benefit stream declines, and it becomes more likely that we will want to let them disappear now.

Comments on some of the student answers: Caring nothing about the future does imply we want

to drive a species to extinction today. It implies we want to make the decision on the basis of the current benefits and costs of killing off the population. For example, assume we care nothing about the future and like to eat beef. In this case we would only kill the last cow if the enjoyment from the last steak (we have already eaten many) is greater than the cost of killing the last cow.

The question said a “deceased concern for the future”, not the elimination of all concern for the future.

Some of the answers seemed to have nothing to do with the how **concern for the future** makes it more or less likely we want to extinct a species.

(Question 4: 5 points total, 3 for correct answer, 2 for explanation): You and I are the only members of society. If action A makes you better off and me worse off, before action A is undertaken the allocation is

1. Inefficient
2. There is not enough information to tell whether the allocation is efficient before A is undertaken
3. Efficient.

Circle the answer that is both correct and most informative. Then explain, in words, your choice.

**Answer:** there is not enough information. Only two people chose another answer. Some of the explanations were great, some not so great.

If the allocation was efficient before action A is undertaken then an action (A) that makes one of us better off must make the other worse off. Alternatively, if the allocation was inefficient before action A is undertaken there are also many reallocations that would make one of us better off and the other worse off.

If you hit me over the head because it makes you feel good, hitting me does not imply things were efficient before you hit me.

Many of you wisely answered with examples in a utility-possibilities frontier graph but stumbled a bit in the process.

Note that “A” is an “action” (a move) not an allocation. That is A is a move from some initial allocation, named “0”, to some other allocation named “1.”

(Question 5: 9 points total, 4 for each part) Remember Fred and Penny: We assumed a two-person world. Penny is a smoker, Fred is not, and the smoke makes Fred sick. Cigars are provided for free by God, the marginal cost of cigars is zero for both Penny and Fred. Continue to assume that Penny enjoys smoking some cigars and continue to assume that her marginal benefit from each additional cigar declines. Continue to assume there is a fixed relationship between the number of cigars that Penny smokes and the amount of second-hand smoke that Fred consumes. Initially assume that there is not government intervention.

(Question 5 Part A) Redraw the graphs but draw them such that from society's perspective the efficient number of cigars smoked by Penny is zero. Include the marginal benefit curve for Fred. Make sure to identify both axis and each of the lines on your graph. If you think it will make your answer clearer, describe what is going on in words.

**Answer:** You have to draw the graphs such that the  $MB_P$  starts positive (greater than zero) and then declines, hitting zero at some positive but finite amount of cigars. It also has to be the case that the  $MB_S$  of the first cigar smoked is zero or negative.

This will require that the  $MB_F$  curve for Fred starts very negative (more negative than Penny's is positive).

Most of you drew the curves so that the efficient number of cigars from society's perspective is a positive number. The question said it had to be zero.

A few of you drew curves such that every amount smoked would be efficient, including the number Penny chooses to smoke.

(Question 5 Part B) Identify the equilibrium numbers of cigars smoked by Penny from her perspective assuming not government intervention. Contrast this number with the efficient number of cigars. Explain why the market is failing.

**Answer:** On the graph I would identify the number of cigars where  $MB_P = 0$ . She will keep smoking another cigar as long as the benefits she gets from an additional cigar are positive. She will smoke a positive number of cigars, which is greater than zero, the efficient number of cigars. Why does the market fail; that is, why does Penny smoke too many from society's perspective? It is because the marginal benefit to her of smoking an additional cigar ( $MB_P$ ) is greater than the  $MB_S$ . Note that  $MB_S = MB_P + MB_F$  where  $MB_F$  is negative.

(Question 5 Part C) Suggest two different government policies for eliminating the inefficiency and explain how each would eliminate the inefficiency.

Ban smoking

Or



Tax cigar smoking with a tax high enough so she will choose to smoke zero cigars. An tax rate that is high enough to stop her from smoking, not matter how high, will achieve efficiency.

At this point in the question many of you have spaced that the efficient number is zero.

Note that compensating Fred for his damages will not eliminate the inefficiency. As I explained in class it is even likely to increase the inefficiency. Some of you do not understand this.

Consider a world where you can legally murder anyone. The number of murders would be too high from an efficiency perspective. Pay money to the families of the victims will not influence the number of murders, so not achieve the efficient number of murders.

(Question 6: 5 points)

The existence of external effects implies that the allocation is inefficient. Yes, No, or Uncertain. And explain.

Answer: No. it does not imply that the allocation is inefficient. Efficiency implies that external effects are at their efficient levels, not that there are no external effects. Don't confuse externalities (external effects produced at inefficient levels) with external effects

I was good to add a quick definition of external effects (the action of an economic agent affects other economic agents). Also maybe say, as many of you did, that there is only an externality when an external effect is produced at an inefficient level.

Many of you noted that external effects are pervasive

A few of you said, or implied, that positive external effects could not be at an efficient level because the effect is positive. This statement is incorrect. If a positive external effect is not produced at its efficient level there will be a positive externality, meaning that the amount produced is inefficient.

If "the external effect affects no one" it is not an external effect.

The answer is not "uncertain". The answer is "no." It is certain that external effects do not **imply** the allocation is inefficient. Some of you misunderstand the meaning of the word "imply"