

Econ 001: Final Exam (Dr. Stein) Answer Key
Dec 19, 2006

Instructions:

- This is a 120-minute examination.
- Write all answers in the blue books provided. Show all work. Use diagrams where appropriate and label all diagrams carefully.
- Write your name and your Recitation Instructor's name in every blue book that you use.
- This exam is given under the rules of Penn's Honor system.
- All blue books, blank or filled, must be handed in at the end of this exam. No blue books may be taken from the room.
- The use of Programmable Calculators is in violation of Departmental rule. It is strictly forbidden!

Check: The Exam has 2 parts.

Part 1 consists of 16 multiple-choice questions. Please write your answers in blue book 1. Part 2 consists of 4 short answer questions. Please use a separate blue book for Q1, Q2 & Q3&4 (combined).

Part I: Multiple Choice Questions (2.5 points each/40 points total):

1. The UA has signed an agreement with Ruckus Network to provide a set of restricted music download services for free. One alternative that was not chosen was Rhapsody. That service would cost each student \$30 a year but is on average \$40 better than the free service. What was the true cost, per student, of choosing Ruckus?
 - a. \$0
 - b. \$10
 - c. \$40
 - d. -\$10

2. In Tuscany, the opportunity cost incurred when 10 bottles of wines are produced is 4 pairs of shoes. For China, the opportunity cost incurred when 2 bottles of wines are produced is 10 pairs of shoes. Which of the following statements is correct?
 - a. Tuscany has the comparative advantage in producing shoes
 - b. Tuscany has the absolute advantage in producing shoes
 - c. China has a higher opportunity cost in producing wines
 - d. China has a lower opportunity cost in producing wines

3. A car producer recently raised the price for cars, which resulted in an increase in the total revenue. This suggests that:
 - a. A car is a normal good
 - b. A car is an inferior good
 - c. Demand for cars is elastic
 - d. Demand for cars is inelastic
 - e. As long as demand is downward sloping an increase in price will always lead to a decrease in revenue, so the seller must be mistaken.

4. If prices and income in a two-good society double, what will happen to the two goods consumed by each individual?
 - a. No change in consumption.
 - b. Increase in both goods if they are normal.
 - c. No clear answer as we do not know the substitution effect.
 - d. Decrease in both goods if they are inferior.

5. A consumer spends a given amount of income on soy burgers and steaks. Steak is a normal good and soy burger an inferior good. If the price of steak decreases, then the consumer buys _____ steak and _____ soy burgers.
 - a. more, more
 - b. more, less
 - c. less, more
 - d. less, less
 - e. none of the above

6. Consider the following statements when answering this question:
 - I. A firm's average variable cost curve does not depend on the level of fixed costs.
 - II. For every quantity for which average variable cost is increasing, a firm's marginal cost curve will be higher than the average total cost.
 - a. I is true, and II is false.
 - b. I is false, and II is true.
 - c. I and II are both true.
 - d. I and II are both false.
 - e. None of the above

7. The market for heaters is perfectly competitive, and the industry is currently in a long run equilibrium. Suppose the government imposes a new licensing fee on all firms in the industry. In the new long run equilibrium, which statement about the number of firms, N , aggregate quantity supplied, Q , quantity supplied by the individual firm, q , and the price P .

- a) N is lower, Q is lower, q is lower & P is lower.
- b) N is lower, Q is lower, q is lower & P is higher.
- c) N is lower, Q is lower, q is higher & P is higher.
- d) N is lower, Q is higher, q is higher & P is higher.
- e) N is higher, Q is higher, q is higher & P is higher.
- f) N is higher, Q is higher, q is lower & P is lower.
- g) N is higher, Q is lower, q is lower & P is lower.
- h) N is higher, Q is lower, q is lower & P is higher.

8. Which of the statements below is true for a firm under perfect competition, but false under monopolistic competition?

- a. The marginal revenue curve is horizontal
- b. There excess capacity in the long run.
- c. Profits can be non-zero in the short run
- d. Profits can be non-zero in the long run

9. A monopolist faces the following demand curve, marginal revenue curve, total cost curve and marginal cost curve for its product:

$$Q=200-2P$$

$$MR=100-Q$$

$$TC=5Q$$

$$MC=5$$

Suppose that a tax of \$5 for each unit produces is imposed by state government. What is the profit maximizing level of output?

- a. 0
- b. 90
- c. 95
- d. 100
- e. None of the above

10. Using the information from the previous question, suppose in addition to the tax, a business license is required to stay in business. The license costs \$1000. What is the profit maximizing level of output?

- a. 0
- b. 90
- c. 95
- d. 100
- e. None of the above

11. Comparing the results of questions 9 & 10 we find that:

- a. Producer surplus is the same in both cases.
- b. Profits are the same in both cases.
- c. Both producer surplus and profits decrease due to the license fee.
- d. None of the above.

12. Suppose a doctor's office and a record store move into the same building. The record store plays loud music during the day which prevents the doctor from practicing medicine. The doctor files a lawsuit and claims that the record store owes him damages because he cannot practice medicine. The economist's response would be:

- a) The record store has a negative externality on the doctor and should be forced to compensate him.
- b) It's not clear whether the record store harms the doctor with loud music or the doctor harms the record store by demanding quiet: if there were well defined property rights this situation could be resolved by the market.
- c) Doctors and record store should not locate near each other.
- d) None of the above.

13. Suppose that when the price of good x is \$5, the last unit Joe rationally purchases has a marginal social benefit of \$8. Which of the following must be true?
- Good x generates a negative externality of \$3 per unit.
 - In terms of his own utility, Joe should be buying more x.
 - The firm producing good x is selling at a price below marginal cost.
 - If Joe is acting rationally, then there is a positive externality being generated.
 - The industry producing x is imperfectly competitive.

14. Suppose the government cuts taxes on labor income. This will cause:

- Lower employment.
- Higher employment.
- Unchanged employment.
- Cannot determine.

15. Amy can borrow up to \$50,000 from a bank at an annual interest rate of 5%. However, she must pay it back in full in two years. She wants to take advantage of this opportunity and invest in something with higher returns. Her two options are stocks and real estates. The table below summarizes the cash flow associated with each option:

Year	0	1	2
Stocks	-50,000	1,000	60,000
Real Estates	-50,000	5,000	55,000

Where should she invest the \$50,000?

- Stocks
- Real Estates
- Both investments are equally profitable in terms of NPV
- Neither investment can cover her borrowing cost. Thus, she should not take out the loan and invest.

16. In Fantasia, everybody used to earn the same amount of money \$100/day. They developed a new technology to make cookies, so now everybody earns \$120/day. What happens to their GINI ratio and Lorenz curve?

- GINI ratio increases since everybody is richer now.
- Lorenz curve moves upward since everybody is richer now.

- c. Both a and b are correct.
- d. Lorenz curve stays the same as 45 degree line.

Answer key:

1. b

2. c

3. d

4. a

5. b

6. a

7. c

8. a

9. b

10. b

11. a

12. b

13. d

14. b

15. a

16. d

Part II: Short Answer Questions:

Please use a separate Blue Book to answer each of the 3 questions.

Q1. (20 points)

Ann and Bob live together in an apartment. Ann is taking violin classes, and her marginal willingness to pay (or marginal benefit) (in dollars) for the Qth hour of lesson in a week is $P=100-0.5Q$.

Ann is a price-taker, and the market price for violin lessons is 80\$ per hour.

- a) Draw on a graph Ann's marginal benefit and marginal cost curves.

Graph.

2 points.

- b) How many hours per week would Ann buy?

$$\mathbf{MB=P \text{ or } 80=100-.5Q. Q=40.}$$

2 points (1 method).

Ann has just started studying violin, and during the first year of classes Bob finds her classes pretty annoying: he claims that his willingness to pay **not** to hear Ann playing the violin is 10\$ per hour. (at each hour, Bob is indifferent between paying 10\$ or hearing Ann playing the violin).

- c) what is the marginal "social" (i.e. referred to the two roommates) benefit from Ann's violin lessons? (draw a graph and write the equation).

$$\mathbf{Graph: SMB=MB-10=90-.5Q}$$

2 points. 1 for graph. 1 for equation.

- d) what would be the socially optimal level of hours per week? How does it compare with your answer to question b?

$$\mathbf{SMB=MC \rightarrow 90-.5Q=80 \text{ or } Q=20. \text{ This is less than found in part b.}}$$

3 points. 1 for method, 1 for Q=20, 1 for "less than part b".

- e) compute and compare the total social welfare for the optimal level and for that from question b.

In part b the total welfare is (Ann benefit's from 40 units)-(externality at 40 units) or:

$$\mathbf{(100-80)*40/2-10*40=400-400=0}$$

If 20 units are produced we get (Ann benefit's from 20 units)-(externality at 20 units) or:

$$\mathbf{((100-80)+(90-80))*20/2-10*20=100}$$

4 points. 2 each (1 method, 1 answer)

- f) Suggest a tax or a subsidy to Ann's violin lessons that would induce her to demand the socially optimal number of hours per week.

A tax of \$10 per lesson would internalize the negative externality and achieve efficiency.

3 points. 1 for tax + 1 for \$10 + 1 for "per lesson"

One year has passed, and Ann has improved a lot in playing violin. Indeed, Bob feels that the more she plays, the more he likes listening to her. Bob's marginal benefit from Q hours of Ann's lessons is now $MB=0.3Q$.

- g) What is the marginal social benefit of Ann's classes during the second year?
Now it is the sum of both Ann MB & Bob MB or: $100-.5Q+.3Q=100-.2Q$.
2 points. 1 for understanding that it is the sum of MB, + 1 if did so correctly.

- h) Suggest a tax or a subsidy to Ann's violin lessons that would induce her to demand the socially optimal number of hours per week.

A subsidy of $.3Q$ per lesson where Q is the number of lessons taken would work.

Note that this per unit subsidy is a function of the number of lessons taken.

2 points. 1 subsidy, + 1 for $.3Q$ per lesson.

Q2. (20 points)

A recent article in the New York Times (December 3rd, 2006) discusses the impact of growing imports of garlic on the farming sector. The following questions ask you analyze the effects on the farming labor markets. Use our labor market model to do this. Make sure you use clear and well labelled graphs and that explain your answers.

Start with a market with no imports of garlic.

a. Draw a typical supply & demand graph for labor. Assume that the supply is upward sloping throughout.

Usual graph. Need to label axis & curves.

1 point.

b. Why is the demand for labor downward sloping? Does your answer depend on whether the market for garlic is perfectly competitive or not?

Demand for labor is downward sloping because firms purchase labor up to the point where $w=MRP(l)$ where $MRP(l)=MP(l)*MR$. The $MP(l)$ is downward sloping because of the law of diminishing marginal productivity and therefore so will be the $MRP(l)$. Note that this is true whether MR is constant (perfect competition) or downward sloping (Not perfectly competitive).

2 points:

1 for relating demand to to diminishing marginal productivity

1 for explaining that it does not depend on market structure.

c. We are assuming here that the supply is not backward bending. Is this a good assumption in this market? Explain carefully.

It probably is. We are assuming here that the substitution effect of higher wages is greater than the income effect. We think this is correct for low wage earners as these farm workers probably are.

2 points:

1 for understanding that this implies substitution effect > income effect

1 for relating to this market in a consistent way.

d. The price of a 30-pound box of California garlic is \$28. If the only labor needed is in picking the garlic and the going wage rate for pickers is \$7 an hour how many boxes of garlic does the least productive picker pick?

$W=MRP(l)$ so $7=28*MP(l)$ or $MP(l)=7/28=.25$ boxes.

2 points:

1 set up

1 answer

Now, assume that the world price of garlic is \$16 a box and that with imports this will push down the US price to a similar amount.

e. What will the effect of the imports be on the market for pickers? What will happen to employment, unemployment and wages for pickers?

The demand for pickers will shift in (rotation). Wages and employment will decline. No unemployment.

Note: need to show graphically.

4 points:

1 for rotation of demand (1/2 if just shift in)

1 employment down.

1 zero unemployment.

1 wages down.

f. How would your answer to e change if you learnt that California has a minimum wage law of \$7 an hour?

The demand for pickers will still shift in (rotation). But now wages cannot adjust. Quantity supplied of labor will be as before and with the decrease in demand we will get unemployment.

Note: need to show graphically.

2 points:

.5 for rotation of demand (1/2 if just shift in)

.5 employment down.

1 unemployment > zero.

California farmers are asking the government for subsidies of their produce. One option is to give a per unit subsidy per box of garlic.

g. Assuming there is no minimum wage, what would the effect of a \$12 a box subsidy be on the markets for pickers? Explain your answer.

Assuming that the subsidy increase the marginal revenue per box back to the original \$28 we are back to the original graph described in parts a & b.

2 points

h. What are the equity and efficiency implication of such a policy?

This is inefficient as we will have dead weight loss in the market for garlic. Note that consumers will purchase up to the point where $MB=16$ while the true cost to society of each box is \$28. It may be inequitable too: why should we subsidize the wages of farmers? These issues can be explained in various ways. I am looking for a constant understanding of terminology.

2 points: 1 for efficiency (not), 1 for equity (look for understanding).

Another option the farmers are considering is a lump sum subsidy that will be used to enhance the productivity of the workers by providing training & education.

i. Again, assuming there is no minimum wage, what would the effect of such a subsidy be on the markets for pickers? Explain your answer.

**This will shift demand out because with the new training $MP(L)$ is bigger.
2 points**

j. What are the equity and efficiency implication of such a policy?

This doesn't cause dead weight loss and is not an inefficient intervention. Though a Libertarian economist would wonder why the government needs to be enhancing productivity. After all, isn't that something that the employer or the workers themselves should finance? From an equity standpoint you could state that it is fine for the government to support workers by encouraging their growth in human capital, or you could state that it is not fair that the government is helping only certain workers.

1 points: .5 for efficiency (yes), .5 for equity (look for understanding).

Q3. (10 points)

A small town has two residents Tim and Janet. The town is considering building a public (open) park that costs \$520 to build. Tim values the park at \$500 and Janet values the park at \$100.

a. Is it efficient to construct this park? Explain.

It is. $SMB=500+100>520=MC$.

2 points: 1 set up, 1 for answer.

b. Suggest a payment scheme that both Tim & Janet would support for financing this park. Explain why your scheme is suitable.

Many correct answers. For example: Tim would pay 490 and Janet 30.

A correct answer must have for each member $MB>payment$ and $sum\ payments=520$.

3 points: 1 scheme, 1 for proving each $MB>payment$. 1 for showing $sum\ payments=520$.

c. Is the scheme you suggested equitable? Explain *briefly*.

I don't think the scheme suggested above is equitable as Tim only gets a surplus of \$1 and Janet gets a surplus of \$70.

But you are welcome to argue otherwise. I want to see an understanding of the meaning of equity and a correct application to you suggested answer in b.

1 point for explanation.

If people come from nearby towns to use the park, Tim and Janet's value for the park each declines by \$50.

d. With this new information, is it efficient to construct this park? Explain.

Now it is not. $SMB=450+50<520=MC$.

2 points: 1 set up 1 for answer.

Suppose the park can be gated and restricted to local resident.

e. If the cost of an ungated park is still \$520, what is the highest amount Tim & Janet would be willing to pay for adding the gate?

\$80 $SMB-MC=600-520=80$. Note that any price above this they will forgo the park altogether.

2 points: 1 set up, 1 for answer.

Q4. (10 points)

A recent report by Sir Nicholas Stern published in the U.K. suggests that we should pay for reducing carbon emissions today in order to prevent global warming in the future. Suppose the cost of reducing emissions is 5% of GDP. The harm of global warming is valued at 10% of GDP. *Using the formula for Net Present Value* discuss the economic efficiency of reducing carbon emissions. In particular:

- a. How does the calculation depend on the time lag between when carbon emissions need to be reduced and when the impact of global warming will be felt?

$PV = FV / (1+r)^n$. Where n is the number of periods until the impact of global warming will be felt. The larger is n the smaller is the PV, the less valid is the demand to reduce emissions today.

Points: correct formula: 2

Relating bigger n to lower PV: 2 points

Stating therefore less important to reduce emissions: 1 point.

- b. How does the calculation depend on interest rate used in comparing costs today vs. consequences tomorrow?

As above, $PV = FV / (1+r)^n$. Where r is the interest rate. The larger is r the smaller is the PV and the less valid is the demand to reduce emissions today.

Points: correct formula: 1

Relating bigger r to lower PV: 2 points

Stating therefore less important to reduce emissions: 2 point