AAE 215 – Introduction to Agricultural and Applied Economics (Spring 2020)

Midterm Exam 2 - Questions

April 7, 2020

Instructions:

- The total number points possible in the exam is 102 (there are 2 bonus points, explained below).
- There are 6 multiple-choice questions worth 3 points each (18 points in total), and 4 exercises worth a total of 82 points (the max amount of points for each question is shown in parentheses).
- Each multiple-choice question has only one correct answer.
- When answering questions in the exercises, please do not repeat information from the textbook or from our answer keys. These are your answers: use your ideas and your words.
- Also, be brief. Avoid writing unnecessarily long answers.
- To receive full credit in exercise questions that require calculations you must show your work.
- In questions with graphs, please carefully label all axes, curves/lines, points, intercepts, etc.
- To complete this exam, **you must upload your answer sheet in the corresponding assignment created on Canvas by Apr 8, at 1pm** (see detailed instructions below).

Submission and bonus points:

Please follow the directions below to help the work of your graders and **to get up to 2 extra points** in your grade for this exam. Note that these instructions are the same you follow for submitting worksheets for discussion sections.

1. Check the file "Midterm 2 - Answer Sheet" on Canvas (path: Assignments --> Midterm 2).
2. Print this answer sheet and use it to answer the exam **OR** make your own answer sheet.
3. If you go with the second option (making your own answer sheet):
   a. Follow the structure of the answer sheet (use it as a template).
   b. Start with a table summarizing your answers for the multiple-choice questions, then follow with your answers to the exercises.
   c. Label each question clearly (number & letter) following the order they appear on the exam.
   d. Leave some space between answers to increase readability.
4. You can use scanning-apps on your cellphones or take pictures of your answer sheet if you don't have access to a scanner.
5. Save your file(s) in pdf, doc, docx, jpeg, or png format.
6. Label each file/page in order if you are uploading multiple ones.
7. **Upload your answer sheet on Canvas until Apr 08, 1:00 pm** (path: Assignments --> Midterm 2).

**Part I: Multiple-choice questions (choose only ONE answer)**

For questions 1 to 3, consider the following diagram showing the determinants of employment rents.
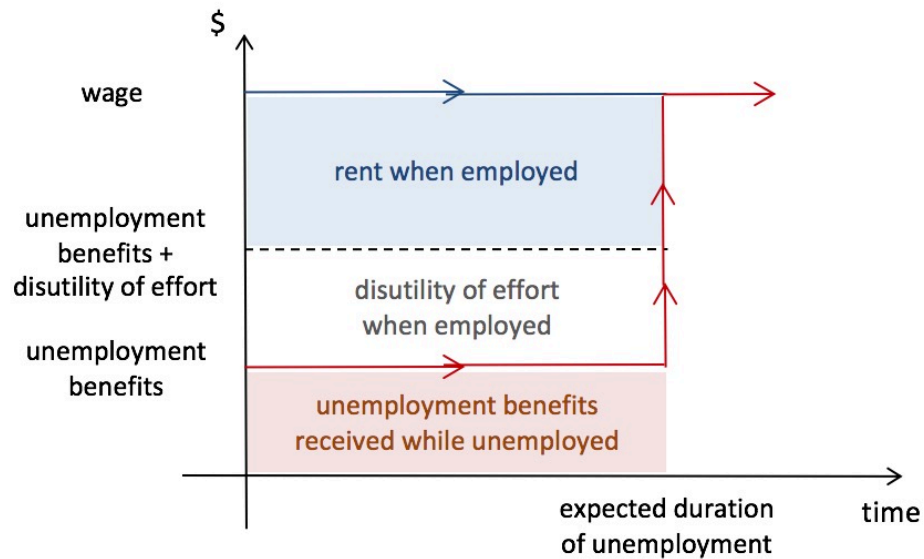
1. Which of the following is **correct**?
   a. An increase in unemployment benefits is beneficial to workers, therefore, it increases their employment rent.
   b. An increase in the expected duration of unemployment is detrimental to workers, therefore it reduces their employment rent.
   c. An increase in the disutility of effort is detrimental to workers and reduces their employment rent.
   d. An increase in wages is beneficial to workers but reduces their employment rent.

2. Let wage be $15, the unemployment benefit be $5, the disutility of effort be $3, the number of work hours per week be 40, and the expected duration of unemployment be 20 weeks. Which of the following is **correct**?
   a. The employment rent goes from $ 8,000 to $10,000 when the expected duration of unemployment increases to 25 weeks.
   b. A reduction in the number of hours worked per week increases the employment rent to $4,900.
   c. An increase of 20% in the wage raises the employment rent by 20% as well.
   d. An increase of 20% in the wage raises the employment rent from $5,600 to $8,000.

3. Considering the current economic crisis, which of the following statements **CANNOT be true**.

    a. All else equal, the tax breaks and cash transfers implemented as a response to the crisis represent an increase in unemployment benefits and, therefore, raise employment rents.

    b. A nurse working longer hours and facing increased risk of contagion experiences an increase in her disutility of effort and, therefore, a reduction in employment rent.

    c. The prospect of higher unemployment in the future increases the employment rent of those still working in the restaurant industry.

    d. Workers in grocery stores who get a pay raise may still have their employment rent unchanged due to other factors such as an increase in the disutility of effort.

For questions 4 to 6, consider the following diagram showing the firm's cost-minimizing choices in the context of the labor discipline model.[1]
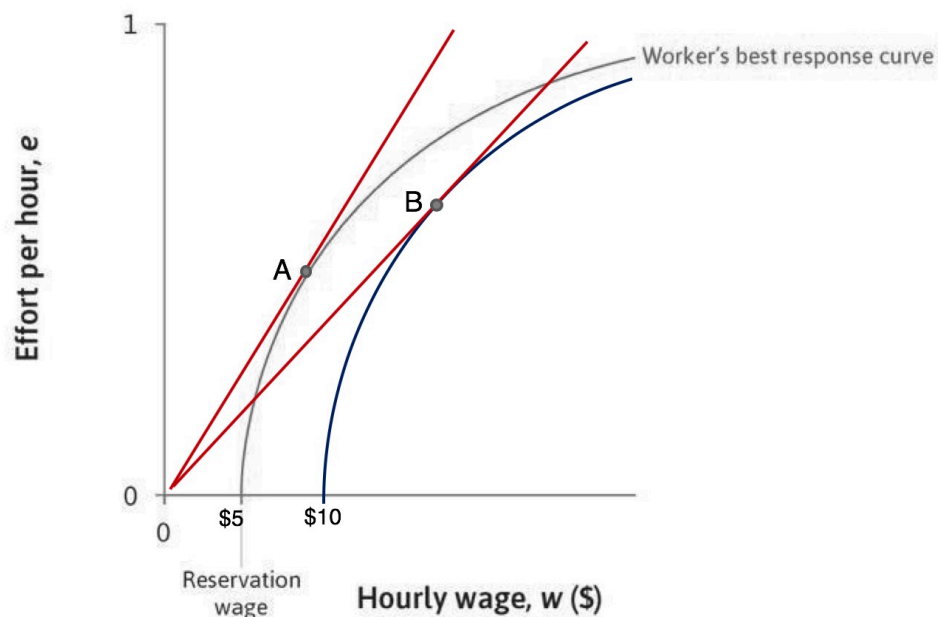
4. Which of the following statements about the firm's isocost lines (red lines in the diagram) is **correct**?

    a. The steeper isocost line going though point A denotes a higher cost (dollars per effort) for the firm than the flatter line going though B.

    b. If the wage at point A is $8 and the level of effort is .5 the firm is paying $4 per unit of effort.

    c. If the wage at point B is $15 and the level of effort is .6 each dollar buys 0.04 units of effort for the firm.

    d. The slope of the isocost line represents the firm Marginal Rate of Substitution between effort and wages and it is measured in dollars per effort.

5. Which of the following statements about the worker's best response curves (blue curves in the diagram) is **correct**?

    a. An increase of 100% in unemployment benefits can explain the movement from A to B.

    b. The worker prefers to receive the wage given by point B and to exert the corresponding level of effort than to receive $10 dollars per hour and exert zero effort.

    c. From A to B, the reservation wage increases, but the effort level and the hourly wage decrease.

    d. A drop in the unemployment rate in the economy cannot explain the movement from A to B.

6. Considering the movement from A to B, which of the following statements is **correct**, *ceteris paribus*?

    a. The workers' reservation wage falls.

    b. The firm's profit level falls.

    c. The efficiency wage falls.

    d. The firm's cost of labor falls.

Part II: Exercises

Question 1: *Profit-maximizing choices (17 points)*

The pre-lecture discussion forum on Tuesday, Mar 24 asked the following:

1. If you were the owner/manager of a firm selling a differentiated product, which product would you like to produce/sell? Why?
2. How sensitive would your potential costumers be to increases in the price of your product? In other words, would total quantity demanded decrease "a lot" or "just a bit"?

Think about the differentiated product you suggested in your answer to that discussion and use it to answer the following questions (feel free to pick a new one if you changed your mind). Assume every unit produced is also sold.

a) *(1 point)* What differentiated product would your firm produce and sell? Do you expect the demand for your product to be generally price-elastic or price-inelastic?

b) *(2 points)* Sketch a graph showing the demand faced by your firm. Add your (increasing) marginal cost curve and your (decreasing) marginal revenue curve to this graph.

c) *(3 points)* Why would your marginal cost increase with production? Give at least one reason.

d) *(4 points)* Why does your marginal revenue decrease with sales? And why does it decrease "faster" than the demand curve? By faster, we mean that the slope of the MR curve is steeper than the slope of the demand curve at any point.

e) *(4 points)* Show the profit-maximizing quantity and price for your firm in your graph for "b" (label this point using the notation Q^* and P^*). How did you find this point? Why did the $MR = MC$ rule help you finding it?

f) *(3 points)* What is your profit margin at this profit-maximizing combination of price and quantity? What is your markup? Give an expression (i.e., a formula) for each. Use Q^* and P^* to represent the profit-maximizing quantity and price, and $MC(Q^*)$ to represent the marginal cost at the profit-maximizing quantity.

Question 2: *Profit and elasticities (19 points)*

The post-lecture discussion forum on Tuesday, Mar 24 asked the following:

1. How do you compare your price elasticity for hand sanitizer before and after the COVID-19 crisis? Did it change? If so, why?
2. The demand for hand sanitizer increased sharply during the crisis (assume that the price increased too). How did the quantity supplied respond in the first weeks? How do expect this quantity to respond in the next weeks and months?

In this question, you will do a similar thought experiment <u>using your answers to the previous question</u>. Start by considering how an economic crisis can change how sensitive your costumers are to price changes. You can consider the current crisis, a recession in the past like 2008/09, or the next one (we will refer to it simply as "the crisis" and to "now" as the period post-crisis).

a) *(1 point)* Do your costumers become more or less elastic after the crisis? Pick one of these options:

1. My costumers were generally <u>elastic</u> before and became even <u>more elastic</u> after the crisis;
2. My costumers were generally <u>elastic</u> before the crisis, but now are generally <u>inelastic</u>;
3. My costumers were generally <u>inelastic</u> before and become even <u>more inelastic</u> after the crisis;
4. My costumers were generally <u>inelastic</u> before the crisis, but now are generally <u>elastic</u>.

b) *(2 points)* Give estimates for the price elasticity of your costumers. Use the notation ε_{D1} and ε_{D2} to denote the price elasticity before and after the crisis, respectively. You don't have information to actually calculate an estimate but you can guess two numbers (any two numbers, as long as they match your answer in "a").

c) *(2 points)* By how much, in percent terms, would your total sales drop if you increased the price of your product by 10% before the crisis? How about now, after the crisis?

d) *(3 points)* When analyzing estimates for the price elasticity of demand, why do we take the negative sign out and look only at their magnitudes? And why do we compare them against the value of 1? Use the formula $\varepsilon_D = -\%\Delta Q/\%\Delta P$ to support your answer.

e) *(2 points)* Sketch two graphs—one before and one after the crisis. Add the demand curve for your product and the corresponding marginal revenue curve. Add also the marginal cost curve, which did not change.

f) *(3 points)* Did the graphical representation of your demand curve change? If so, why? In your answer, mention the relationship between the slope of the demand curve and the price elasticity of demand and why—all things equal—a steeper (flatter) demand represents a more inelastic (elastic) one.

g) *(1 point)* What happened to your profit-maximizing quantity and price? Did they increase or decrease?

h) *(3 points)* What happened to your profit margin and markup? Why did they change in this way? In your answer, mention the relationship between the markup of a firm selling a differentiated product and the price elasticity of its customers.

Question 3: *Gains from trade (19 points)*

Consider a price-setter firm whose demand, marginal revenue, and marginal cost curves can be written as the following linear functions in terms of the output produced and sold (Q):

$$P(Q) = 100 - 2Q, \quad MR(Q) = 100 - 4Q, \quad MC(Q) = 10 + Q$$

a) *(2 points)* Sketch a graph showing the three curves and labeling the relevant intercepts. (Use the left frame in the answer sheet for this graph).

b) *(3 points)* What is the firm's profit-maximizing combination of quantity and price? Find this combination numerically and graphically (use the notation Q^* and P^*).

c) *(3 points)* What are the total gains from trade at the profit-maximizing combination of price and quantity chosen by this price-setter firm and how are they distributed? In other words, calculate the consumer surplus (CS), the producer surplus (PS), and the total surplus (TS).

d) *(3 points)* Is this situation efficient? Why or why not? If there is any deadweight loss (DWL), calculate and graph it.

e) *(3 points)* Now consider that the supply side in this market if formed by several price-takers instead of one price-setter. How would your answers for items "b" change? Sketch a new graph (use the right frame, next to your graph in "a"). Find, numerically and graphically, the price and quantity of competitive equilibrium (use the notation Q^{ce} and P^{ce}).

f) *(2 points)* Still considering several price-takers instead of one price-setter. How would your answers for items "c" change? Calculate the consumer surplus (CS), the producer surplus (PS), and the total surplus (TS) under competitive equilibrium.

g) *(3 points)* Is the competitive equilibrium efficient? Why or why not?

Question 4: *The effect of taxes (27 points)*

The post-lecture discussion forum on Tuesday, Mar 31 asked the following:

1. If you could impose a tax on a consumption good, which good would you pick?
2. What do you intend with this tax, raise government revenue or discourage consumption?
3. Would you impose this tax on the producers or the consumers?

Think about the tax you suggested in your answer to that discussion and use it to answer the following questions (feel free to pick a new one if you changed your mind).

a) *(1 point)* Which consumption good are you taxing?

b) *(1 point)* What do you intend with this tax, raise government revenue or discourage consumption?

c) *(3 points)* Are you imposing this tax on consumers or producers? Why? Give at least one reason to justify your choice.

d) *(2 points)* Give an estimate for the price elasticity of the consumers of the consumption good you are taxing. Assume the market for this good is competitive and is in equilibrium. Are consumers in this market price-elastic or price-inelastic? Again, you don't have information to actually calculate an estimate but you can guess a number (any number, as long as it matches your answer to the elastic/inelastic question posed here).

e) *(4 points)* Assume the price elasticity of supply in this market is 1. How does the price elasticity of consumers inform the success of your tax in achieving the goal you stated in "b"? In other words, does the price sensitivity of consumers help you raising revenue or discouraging consumption? Use a graph to support your answer.

f) *(4 points)* Below you have five different expressions for the demand curve and one for the supply curve. Based on your previous answers, pick one of these five demand curves. Justify your choice mentioning the relationship between the slope of the demand curve and the price elasticity of demand at a given point (remember that we assumed this market is in competitive equilibrium).

　　Demand curve A: $P(Q) = 100 - 0.25Q$
　　Demand curve B: $P(Q) = 100 - 0.5Q$
　　Demand curve C: $P(Q) = 100 - Q$
　　Demand curve D: $P(Q) = 100 - 2Q$

Demand curve E: $P(Q) = 100 - 4Q$

Supply curve: $P(Q) = 10 + Q$

g) *(6 points)* Using the demand curve you picked calculate the following (1 point each):

1. Price and quantity of competitive equilibrium before the tax.
2. Price elasticity of demand before the tax.
3. The increase in price caused by a $12 tax per unit imposed on producers.
4. The decrease in quantity caused by this tax.
5. The tax revenue generated.
6. The deadweight loss associated with this tax.

h) *(3 points)* Still using the demand curve you picked and your answers to "g" above, calculate the tax burden borne by consumers (what percent of the tax consumers end up paying). Do the same for producers.

i) *(3 points)* Did you pick the "right" demand curve? Justify your answer using the results in "g" and your goal stated in "b".