PPOL 8640/ECON 6090 Test 2 Answers

December 13, 2022

1. (20 points) Suppose a policy maker wants to design an auction to allocate a resource.

    a (5 points) In our discussion of mechanisms, we used the assumption that individuals had symmetric independent private values and were risk-neutral (SIPV-RN). Explain what is meant by those assumptions.

    Answer:

    The SIPV means symmetric, independent, private values while the RN means risk neutral. The latter part is easy – risk neutral means that the bidders have risk-neutral preferences. Symmetric means that the bidder values are drawn from the same known distribution. Independent means that the value draws are statistically independent – the value drawn by one bidder does not affect the value drawn by another bidder. Private means that while the bidders know the value distribution from which values are drawn and they know their own value, they do not know the value draw of other bidders.

    b (5 points) Suppose that the policy-maker is concerned with knowing exactly how much each individual values the resource. Would a first-price sealed bid or second-price sealed bid be best to implement to obtain this knowledge? Explain, assuming the SIPV-RN assumptions hold.

    Answer:

    In a second-price sealed bid auction bidders should bid their values. Technically, if individuals are bidding according to equilibrium strategies in a first-price sealed bid auction, then the policy-maker should be able to back out the values of the individuals from the bids. So if everyone is bidding according to the equilibrium strategies then it should not matter which auction is used, though the second-price sealed bid is the better auction to use because there is no need for bidders to calculate their bids based upon the number of other bidders in the auction.

    c (5 points) Suppose that the policy-maker is concerned with generating the most revenue from the auction. Would a first-price sealed bid or second-price sealed bid be best to implement to obtain this knowledge? Explain, assuming the SIPV-RN assumptions hold.

    Answer:

    We know that with the SIPV-RN assumptions the revenue equivalence theorem holds, so it should not matter which auction format is used.

    d (5 points) Now suppose that the policy maker believes the bidders are risk averse. Do either of your answers to parts **b** and **c** change? Explain why or why not.

    Answer:

    If the policy maker believes the individuals are risk averse then they should use the second-price sealed bid auction in part **b** and the first-price sealed bid auction in part **c**. Regardless of whether risk aversion is present, bidders in the second-price sealed bid auction should still bid their values. While it should be able to back out the values from risk averse bidders in a first-price sealed bid auction, the policy maker now must assume that all bidders know the risk aversion levels of all other bidders in the auction. It is unlikely that bidders have that knowledge. If risk aversion is present, bidders in the first-price

auction should increase their bids relative to when they are risk-neutral. If the expected revenue for the first-price and second-price sealed bid auctions are equal when the bidders are risk-neutral, if risk averse bidders are bidding higher than risk-neutral bidders in the first-price sealed bid auction but the same in the second-price sealed bid auction then the policy maker should expect a higher revenue from the first-price sealed bid auction.

2. (10 points) In the U.S., a price support program for dairy farmers was established in 1949. These price supports act as price floors in the dairy market, guaranteeing a minimum price for dairy products in which the federal government purchases the dairy products. The U.S. dairy industry is about 1% of U.S. Gross Domestic Product.

   a (2 points) Why might this program have been established?

   Answer:

   It was very likely established to guarantee dairy farmers a minimum level of income for their production.

   b (4 points) Would we expect overproduction of dairy products or underproduction of dairy products with the price support in place? Explain.

   Answer:

   We should expect overproduction if the price floor is binding (and equilibrium production if the price floor is not binding) because the government is guaranteeing that dairy products will be purchased at some minimum price. If that price floor is binding it will be above the equilibrium price, incentivizing farmers to supply more. Note that when we looked at the minimum wage as a price floor that the policy created a surplus of workers willing to work, but there was a reduction in the number of individuals who were employed because firms chose not to hire as many workers. However, with the price support in the dairy market being a guaranteed purchase by the government, overproduction will occur.

   Without looking up the origin of the phrase, this price support program is likely related to the phrase "government cheese."

   c (4 points) What effects would we expect the price supports to have on the prices paid for resources (labor, land, capital, cattle, etc.) needed to produce the dairy products? Explain whether we would expect any price effects in these resource markets to be felt in non-dairy markets.

   Answer:

   If overproduction is occurring because farmers can sell their goods at a price higher than the equilibrium price, then they would likely bid up the value of the resources needed to produce those products. Given the size of the dairy market (being 1% of U.S. GDP is a big number), these increased resource costs are likely to be felt in other markets. If the dairy market was smaller, the effect of these resource costs may not be felt in other markets.

3. (20 points) Consider an individual who makes a labor-leisure decision. The individual earns $20/hour and has 16 potential working hours in a day[1] for which the individual could substitute for leisure hours. The individual's budget constraint is given by:

   a (4 points) Suppose the individual's optimal labor-leisure decision is to work 9 hours per day. Draw an indifference curve such that this choice of work hours and income is the optimal choice for this individual. You will want to draw the same indifference curve on both graphs – you will use the graphs separately in the questions that follow.
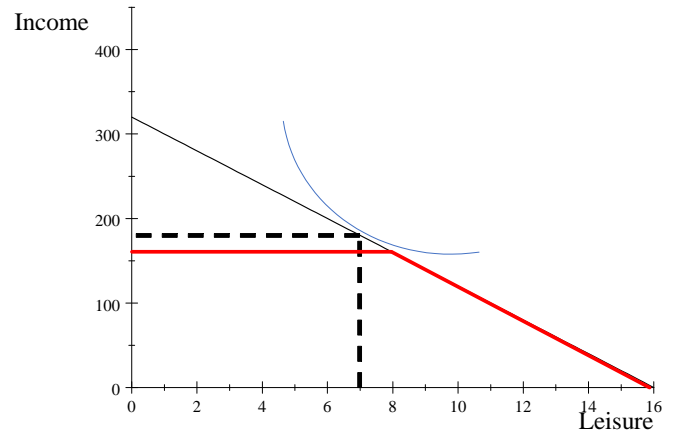
   Answer:

   The dashed black lines show the individual's optimal choice of 9 work hours (7 leisure hours) and $180. The indifference curve is tangent to that point.

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[1] We are assuming that 8 of the 24 hours in a day cannot be used for working.
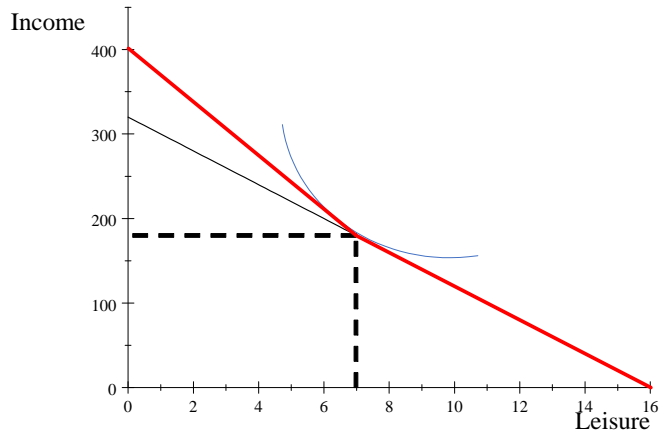
Overtime policy implemented   Firm limits hours

b (8 points) Suppose that the firm is now required to pay overtime wages, at the rate of 1.5 times the individual's hourly wage, for any hours worked over 8 hours in the day.

    i What is the maximum pay the individual can earn in a day if all 16 hours are worked for the same employer?

Answer:

For the first 8 hours the individual will receive $20 * 8 = \$160$ and for the second 8 hours the individual will receive $30 * 8 = \$240$. So the maximum amount is $400.

    ii Draw the individual's new budget constraint on the "overtime policy implemented" graph.

Answer:

The individual's new budget constraint is in red. Note that it begins on the income axis at $400 because that is the most the individual can earn, and connects with the original indifference curve at 8 leisure hours. So this budget constraint has a kink at 8 hours.

    iii Is the individual better off or worse off under the overtime policy? Explain making reference to the individual's original indifference curve.

Answer:

The individual is clearly better off under the new policy. At the original hours worked of 9 the individual now has $190 rather than $180. The individual could reduce hours worked a little (say by 15 minutes) and have 8.75 hours worked and $160 + \$22.5 = \$182.50$ in wages, so more leisure and more money. We can also see that the new budget constraint cuts through the original indifference curve (it is difficult to see on the graph, but it does), so the individual must be able to move to a higher indifference curve.

c (8 points) Suppose now that the firm decides to limit all employees to 8 hours of work per day and the individual cannot find additional work at another firm.

    i What is the maximum pay the individual can earn in a day?

Answer:

The individual can only work 8 hours in a day now, so the maximum pay the individual can earn is $160.

    ii Draw the individual's new budget constraint on the "firm limits hours" graph.
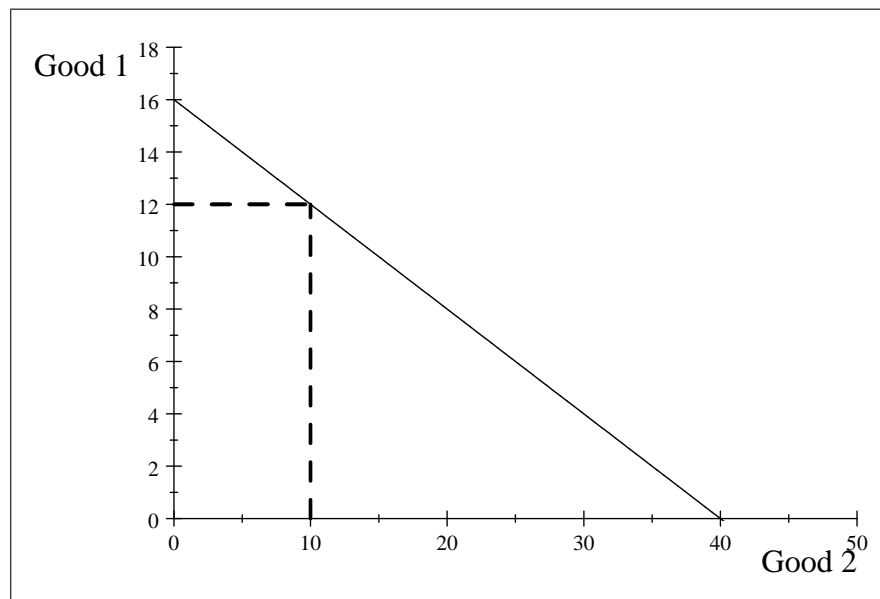
Answer:

The maximum the individual can earn is \$160. I have drawn that as a straight line until it intersects the original budget constraint to provide an illustration, but really the individual does not have the choice to work more than 8 hours (the individual cannot choose to work 9 hours and earn \$160) so the entire picture should just be truncated at the 8 hour mark (like we have cut off the 8 hours that cannot be used for work in the original picture) with the original budget constraint from 8 to 16 hours of leisure being the only feasible choices. However, the flat line at \$160 is helpful in illustrating that the original indifference curve does not intersect the new budget constraint.

   iii Once the firm has implemented its response to the overtime policy, is the individual better off or worse off under the overtime policy? Explain making reference to the individual's original indifference curve.

Answer:

The individual is clearly worse off after the overtime policy is implemented. Note that the individual could have originally chosen 8 hours of work and \$160 but chose 9 hours of work and \$180. When looking at the new budget constraint, the individual cannot attain the original level of utility, so changing to a bundle with fewer hours worked and lower wages must decrease the individual's utility.

4. (20 points) Consider the production possibilities of the U.S. for two goods, Good 1 and Good 2. The U.S. chooses 12 units of Good 1 and 10 units of Good 2 in autarky.

   a (4 points) What is the rate at which the U.S. domestically (or internally) exchanges Good 1 for Good 2?

Answer:

The U.S. gives up $\frac{16}{40} = \frac{2}{5}$ of a unit of Good 1 for one unit of Good 2. Alternatively, the U.S. must give up 2.5. units of Good 2 for a unit of Good 1.

   b (4 points) Suppose that a trading partner offers to trade the U.S. a unit of Good 1 for one unit of Good 2 (the U.S. receives one unit of Good 1). Explain whether the U.S. would find it beneficial to agree to these terms of trade.

Answer:

The U.S. would agree to this trade because it has to give up $2.\dot{5}$ units of Good 2 to get 1 unit of Good 1 domestically; a one for one swap of Good 2 for Good 1 is much better.

c (4 points) The U.S. would like 18 units of Good 1. Suppose that the U.S. asks for two units of Good 1 for one unit of Good 2. The trading partner agrees but tells the U.S. it must restrict the trade amount to ten units of Good 1.

- How much Good 1 and Good 2 does the U.S. produce?

Answer:

The U.S. will need to produce 8 units of Good 2 because it will only receive 10 units of Good 2 from the trading partner. If the U.S. produces 8 units of Good 2, it will only be able to produce 20 units of Good 1. You can use the domestic exchange rate in part **a** to find that number or just realize that 8 is the halfway point to the maximum amount of Good 1 that the U.S. could produce so it must produce the halfway point (20) of Good 2.

- After trading, and assuming the U.S. still wants 18 units of Good 1, what is the amount of Good 1 and Good 2 that the U.S. consumes?

Answer:

The U.S. will need to trade 5 units of Good 2 to the trading partner to receive 10 units of Good 1, so the U.S. will have $20 - 5 = 15$ units of Good 2 and $10 + 8 = 18$ units of Good 1.

d (4 points) Suppose that the negotiator for the trading partner tells the U.S. negotiator that with a one for one trade (part **b**) they would trade an unlimited amount of Good 1 for Good 2, but if the trade is two Good 1 for one Good 2 then the restriction of trading at most 10 units of Good 1 would be in place (part **c**). Assuming the U.S. wants to consume 18 units of Good 2, under which of these trading scenarios does the U.S. consume more Good 1? Explain whether the improved terms from trade in part **c** is beneficial to the U.S. when the trading partner restricts the quantity traded.

Answer:

(Note: This was supposed to read assume that the U.S. wants to consume 18 units of Good 1; either way, it still works out that the unlimited trades are better). From part c we know that the U.S. consumes 18 units of Good 1 and only 15 units of Good 2. If the U.S. were to produce only Good 2 and be able to make unlimited trades on a one for one basis, then the U.S. could have 18 units of Good 1 and 22 units of Good 2.

If we focus on the typo, the U.S. could have 18 units of Good 2 and 22 units of Good 1 with unlimited trading, which still makes it better off.

e (4 points) There is no guarantee that a trade negotiator knows the production possibilities of the trading partner. With the information provided, can we tell if the countries are specializing in the correct goods to increase global production? Explain.

Answer:

Without knowing the actual production possibilities of the trading partner there is no way to truly know if the countries are specializing in the correct goods to increase global production. However, we do know that the U.S. is voluntarily agreeing to the terms of trade and is able to expand consumption beyond its autarky point. If the trading partner has proposed the terms of trade (or agreed to a renegotiation), then its likely that they are the lowest opportunity cost provider of Good 1 and have expanded output. From the perspective of a negotiator, what is important is the terms of trade and whether they are beneficial to the negotiator's country, not the global output. But as long as the two sides are voluntarily agreeing they should be specializing in the lowest opportunity cost goods.

5. (20 points) The graph shows the demand for a monopolist's product and its cost curves.
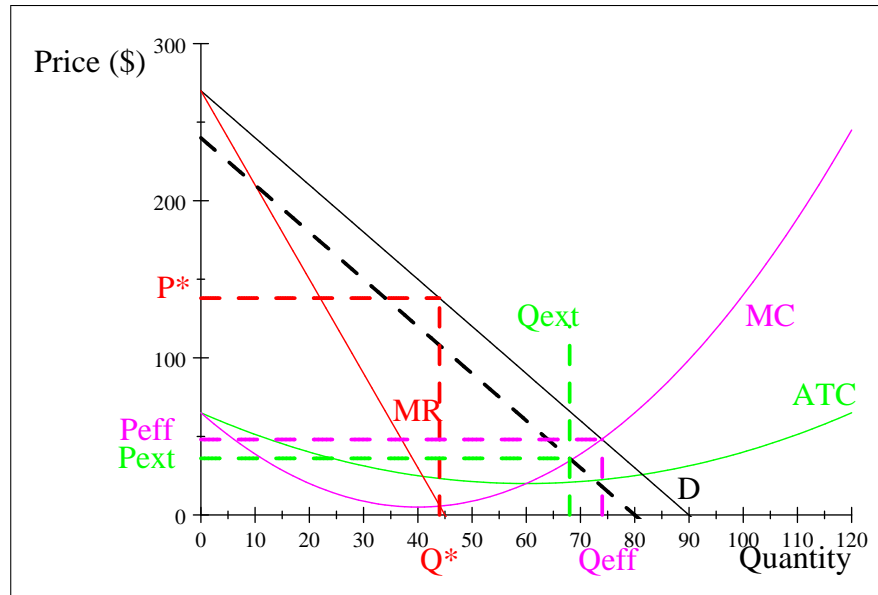
a (3 points) Identify the monopolist's profit-maximizing price and quantity on the graph as P^* and Q^*, respectively.

Answer:

Labelled on the graph with the red dashed lines. The price is about \$138 and the quantity is about 44.

b (3 points) Is this monopolist a natural monopolist? Explain how you know.

Answer:

The monopolist is not a natural monopolist because ATC is increasing when it intersects demand. If this monopolist was a natural monopolist ATC should be decreasing when it intersects demand.

c (3 points) On the graph, identify the price and quantity that minimizes deadweight loss in the market as P_{eff} and Q_{eff}, respectively.

Answer:

Deadweight loss is minimized where MC intersects demand. Labelled on the graph with the magenta dashed lines. The price is about \$48 and the quantity is about 74.

d (5 points) Suppose that this good creates a negative externality. Assume this negative externality affects the demand curve.

    i Illustrate this negative externality by drawing a new demand curve that reflects this negative externality

Answer:

A negative externality should reduce society's benefit of the good, so the demand curve should decrease (shift to the left). The dashed black line is the new demand curve as I have drawn it.

  ii Based on the demand curve you drew, identify the new price and quantity that minimizes deadweight loss.

Answer:

Labelled on the graph with the green dashed lines as P_{ext} and Q_{ext}. The quantity axis is a little crowded so I have labelled the quantity up above the demand curves. The price is about \$36 and the quantity is about 68.

e (6 points) Based on your answers above, discuss whether a monopolist operating in a market with a negative externality is beneficial or detrimental to achieving the socially efficient outcome when the negative externality is considered.

Answer:

The efficient quantity when considering the negative externality is less than the efficient quantity when the negative externality is not considered, so in the market with a negative externality we would not want the market to produce Q_{eff}. The monopolist also produces a quantity Q^* that is less than Q_{eff}, though the way I have drawn the new demand curve Q^* is still less than the efficient quantity when the externality is considered. Thus the monopolist is actually a little helpful in reducing the quantity produced in the market, though there is still underproduction relative to the efficient quantity when the externality is considered, and a higher price.

6. (10 points) Shorter questions

   a (5 points) Suppose that two gas stations are located on opposite sides of a main road leading into the city; station A is easily accessible by commuters on their way into the city in the morning while station B is easily accessible by commuters on their way out of the city in the evening. Station A charges slightly higher prices in the morning while station B charges slightly higher prices in the evening. Based on this information alone, is there evidence of collusion and antitrust violations by the stations? Explain.

   Answer:

   Based on this information, it is unlikely that there is evidence of any antitrust violations by the stations. What the stations are doing is responding to fluctuations in demand – on the commute into the city gas station A is more accessible, so the owner recognizes that the consumers will pay a little more to not have to cross the street. On the commute out of the city gas station B is more accessible so the owner recognizes that the commuters will pay a little more. While it may seem like the stations are acting in a collusive manner, prices fluctuating based on demand is not evidence of collusion.

   When I was in grad school there were two gas stations that were located as in the problem and they exhibited this very behavior; one station would have a price per gallon a penny or two higher in the morning and the other a penny or two higher in the evening.

   b (5 points) The U.S. presidential election has primary elections in which the two major parties select their presidential candidates. Assume that only registered members of the party can vote in the primary election for that party and that there is very little overlap along the policy spectrum for registered members of each party (i.e. the members of one party are primarily left of center and the members of the other are primarily right of center). In primary elections candidates tend to take more extreme positions than they do in the final presidential election. Explain whether the median voter theorem applies to candidate policy locations in primary elections as well as the final presidential election.

   Answer:

   The median voter theorem states that candidates will tend to choose policy locations towards the center of the policy spectrum (technically wherever the median voter is located) because the candidates want to appeal to the most voters. In the primary elections, when the voter preferences tend to be skewed either more to the left or the right depending upon the party, the candidates tend to take more extreme positions because the median voter in the primary election is more left or more right than the median voter in the final election. The median voter theorem can be used to predict candidate locations in the primary elections as the candidates are responding to the voters that are relevant to that election. Then when the candidates win the primary they tend to shift to more moderate policies to appeal to the broader set of voters who will be casting votes in that election.