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University of California, Berkeley

ECONOMICS 2

SECOND MIDTERM EXAMINATION SOLUTIONS

INSTRUCTIONS

1. Put your name, your SID number, and your GSI's name or your section number in the blanks provided on the front of the exam. ***Please do not put your name or your GSI's name anywhere else on the exam.***

2. The exam is written on ***both sides of the page***. Be sure to answer all the questions.

3. Write all of your answers directly on the exam in the spaces provided. **Use a dark enough pen so that answers remain legible** after electronic scanning.

4. Use blank pages at the back for scratch paper NOT your own paper.

5. The exam consists of three parts. There are 201points in total. Part I counts for 7 points; Part II counts for 7 points; and Part III counts for 7 points.

6. Turn off and put away all cellphones and other electronics.

7. We collect the exams at exactly 6:30 p.m.

PLEASE DO NOT OPEN THE EXAM UNTIL INSTRUCTED TO DO SO.

Name _____

SID Number _____

GSI or Section Number _____

During the exam, I will NOT obtain help from anyone, provide help to anyone else, or use any notes or other resources. Sign below:

_____

PAGE FOR GRADING ONLY (STUDENTS SHOULD SKIP IT)

QUESTION 1: _____

QUESTION 2: _____

QUESTION 3: _____

QUESTION 4a: _____

PROBLEM 4b: _____

PROBLEM 5a: _____

PROBLEM 5b: _____

PROBLEM 5c: _____

PROBLEM 5d: _____

MULTIPLE CHOICE: _____

TOTAL: _____

PART I: PROBLEMS [14 POINTS TOTAL]

Answer all questions. Be sure to explain your answers and to draw diagrams where they are appropriate.

1. If the Consumer Price Index was 100 in March of 2021 and 108 in March of 2022, what is the inflation rate over this period? Which measure of GDP rose more over the same period, nominal GDP or real GDP, why? **[1 point]**

Inflation rate is 108/100-1=8%, nominal GDP rose faster than real GDP because nominal GDP growth does not adjust for price changes and prices increased over the period.

2. Suppose you were given a choice between receiving $A dollars 5 years from now or $B dollars 2 year from now, and suppose the nominal interest rate is i. What calculations would you need to make to compare the present value of the two options? **[1 point]**

The present value of a single payment to be received in the future is $\$F/(1 + i)^t$,

Where $F is the amount of the payment, i is the nominal interest rate (expressed as a decimal), and t = number of years in the future the payment is to be received.

Thus, you need to calculate $\$A/(1 + i)^5$ and $\$B/(1 + i)^2$ and then choose the larger one.

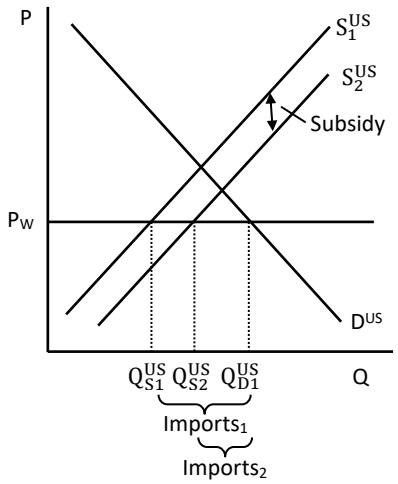
3. When there is a negative externality associated with a good, is the socially optimal level of production and consumption of the good zero? **[1 point]**

No, when there is a negative externality, social efficient quantity is such that SMC=SMB. This is generally not zero but a positive amount.

4. Consider the market for sugar, a good that we import. Suppose that the government decides to provide a subsidy to domestic sugar producers for each ton of sugar they produce. (For simplicity, assume that there are no positive or negative externalities associated with the production or consumption of sugar, and that the U.S. still imports sugar after the subsidy is imposed.)

a. What would the subsidy do to the U.S. production, consumption, and imports of sugar? Draw a graph to explain your answer **[2 points]**

Important Points:

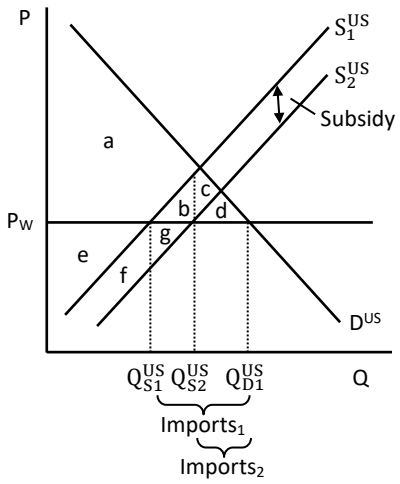


- The problem states that sugar is a good that the U.S. imports. For this to be the case, we know that the world price (P_W) must be below the price that would equilibrate domestic supply and domestic demand.
- Before the subsidy, the U.S. produces quantity Q_{S1}^{US} and consumes quantity Q_{D1}^{US}. The difference between the two are imports ($Imports_1$).
- The per-ton subsidy paid to domestic sugar producers shows up as a shift down in the U.S. supply curve by the amount of the subsidy (to S_2^{US}). The price it would take to get domestic suppliers to produce any quantity of sugar is less than before because they know that on top of the price they receive in the market, they will also get a payment from the government.
- At the same world price, American producers are willing to supply more sugar than before the subsidy. They now supply where S_2^{US} intersects the world price line (which is at Q_{S2}^{US}).
- Because the world price hasn't changed, the quantity demanded by American consumers is unchanged. As a result, imports fall to $Imports_2$.
- This problem illustrates the idea that a subsidy to domestic production is a kind of protection—it reduces imports.

b. What will the subsidy paid to U.S. sugar producers do to the consumer surplus of U.S. consumers, the producer surplus of U.S. producers, and the total surplus in the U.S.? Draw a graph to explain your answer **[2 points]**

Important Points:

- Consumer surplus is the same before and after the subsidy. It is area a+b+c+d. Consumer surplus doesn't change because the world price doesn't change.
- Producer surplus is larger after the subsidy. It is area e before the subsidy and area e+f+g after the subsidy. This makes sense—the subsidy lowers the supply curve for domestic producers, but the world price doesn't change.
- With the subsidy, government expenditure is area f+g+b. This is the area between the two supply curves between 0 and Q_{S2}^{US}.
- The total surplus with the subsidy is lower than the total surplus without the subsidy by area b. Below is the full welfare analysis.



	Before the Subsidy	After the Subsidy
Consumer Surplus	a+b+c+d	a+b+c+d
Producer Surplus	e	e+f+g
Government Expenditure		–(f+g+b)
Total Surplus	a+b+c+d+e	a+b+c+d+e–b

- The intuitive explanation for why there is a deadweight loss of area b is that on the units between Q_{S1}^{US} and Q_{S2}^{US} true marginal cost is greater than the world price.

5. [7 points total] Consider a competitive economy with 10 firms owners and 90 workers. In the competitive equilibrium, each firm owner hires 9 workers and gets 10% of the value of production as profit. The remaining 90% of the value of production is paid as wages to workers. All firms are identical and all workers are also identical.

a. What is the income share for the bottom 90% in this economy? Using this information, plot the Lorenz curve that shows the fraction of income earned by the bottom X% of people where X goes from 0% to 100%. What is the Gini coefficient in this economy? **[2 points]**

In each firm, the owner gets 10% and the 9 workers get 90% total or 10% each. Hence, owners and workers have the same income. There is no inequality. Bottom 90% share is 90%. Lorenz curve is diagonal and Gini coefficient is zero.

b. Suppose firm owners organize as a monopsony so that they can pay lower wages. While the hourly wage in question a. was $10, the hourly wage under monopsony is now only $5. Assuming that employment and production does not change, recompute the income share for the bottom 90%, replot the Lorenz curve, and recompute the Gini coefficient approximately in this monopsony situation. **[2 points]**

Workers now get half of what they were getting in a. Therefore, instead of getting 90% of the income, they get only 45%. The bottom 90% income share (workers) is therefore 45%. The top 10% income share (owners) is the remaining 55%. The Lorenz curve is a straight line with slope .5 up to percentile 90 where it hits 45%, and then a straightline from there to 100% from percentile 90 to percentile 100 with slope .55/.1=5.5. The Gini is a bit less than 50%. Eyeball is 45%.

The exact value of the Gini is actually 45%.
Lorenz curve if L(p)=.5*p+5*max(0,p-.9).
Area below the Lorenz curve is (computed using basic integration, int_0^1 means integral from 0 to 1, etc.)
A= int_0^1 L(p)dp = int_0^1 [.5*p]dp + int_.9^1 [5*(p-.9)]dp= .5/2+5*.01/2=.55/2
Gini is 1-2*A=1-.55=.45=45%
You can also find the result by measuring triangles and rectangles around Lorenz curve (but integration is easiest)

c. Suppose firm owners stay competitive but now workers organize as a union and succeed in increasing their hourly wage from $10 to $11. Assuming again that employment and production do not change, compute the income share for the bottom 10%, replot the Lorenz curve, and recompute the Gini coefficient in this union situation. **[2 points]**

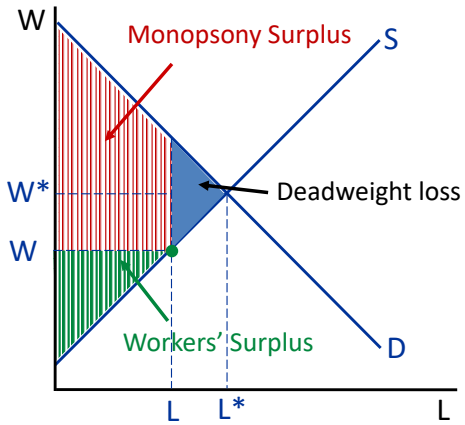
The workers now get $99 out of $100 produced by each firm leaving only $1 to the firm owner. The bottom 10% (firm owners) get only 1%, the top 90% income share (workers) is the remaining 99%. The Lorenz curve is a straight line with slope .1 up to percentile 10 where it hits 1%, and then a straight line from there to 100% from percentile 10 to percentile 100 with slope .99/.9=1.1. The Gini is a bit less than 10%.

The exact value of the Gini is 9%.
Lorenz curve if L(p)=.1*p+max(0,p-.1).
Area below the Lorenz curve is (computed using basic integration, int_0^1 means integral from 0 to 1, etc.)
A= int_0^1 L(p)dp = int_0^1 [.1*p]dp + int_.1^1 [(p-.1)]dp= .1/2+.81/2=.91/2
Gini is 1-2*A=1-.91=9%
You can also find the result by measuring triangles and rectangles around Lorenz curve (but integration is easiest)

d. In b. we assumed that employment and production would not change under monopsony. What is the assumption needed on labor supply to get this result? If this assumption does not hold, what would happen to employment? **[1 point]**

You need inelastic labor supply (vertical line) to get the result from b. If this assumption does not hold and employment is elastic with the wage, then the monopsony will reduce employment at it is profitable to the monopsony to lower the wage even if it loses some profit on the marginal workers as shown on the graph below from the lecture slides.

Monopsony: employer chooses W to maximize its surplus subject to L=S(W)



Monopsony chooses W to maximize red area. It squeezes workers' surplus (inequitable) and creates deadweight loss (inefficient)

PART III: MULTIPLE CHOICE **[7 POINTS TOTAL]**

Each question is worth 1 point. Please write the letter of the ***best*** answer for each multiple choice questions below, like so:

1. __E__

2. __F__

…

1. __A__

2. __A____

3. __B____

4. __E____

5. __E____

6. __B____

7. __D____

1. Suppose a fall in the purchase price of capital causes PV(stream of future MRP_K's) to be greater than the purchase price of capital at a firm's old level of investment. As that firm increases its investment, what will change to bring those two quantities back to being equal is:
A. the MRP_K's will fall.
B. the interest rate will fall.
C. the purchase price of capital will rise.
D. all of the above.
E. none of the above

2. If a country that produces two goods becomes more productive in producing both goods, this will:
A. shift the country's CPC outward parallel to its original CPC.
B. shift the country's CPC inward parallel to its original CPC.
C. shift the country's CPC outward asymmetrically from its original CPC.
D. shift the country's CPC inward asymmetrically from its original CPC.
E. not affect the country's CPC.
F. none of the above

3. A small economy consists of 400 individuals. 80 are working; 20 are not working but are actively looking for work; and 300 are not working and not actively looking for work. The unemployment rate in this economy is:
A. 5% (calculated as 20/400).
B. 20% (calculated as 20/(20+80)).

C. 25% (calculated as 20/80).
D. 80% (calculated as (20+300)/400).
E. None of the above

4. The U.S. government is currently paying a nominal interest rate of about 4% on its debt, and expected inflation is about 3%. The real interest rate that the government is paying is therefore about:
A. −3%.
B. −2%.
C. −1%.
D. 0%
E. 1%.
F. 2%.
G. 3%.
H. 4%

5. Consider a payment of $F to be received two years from now. The interest rate in the economy for the first year will be 3%, and the interest rate in the economy for the second year will be 10%. The present value of the payment is:
A. $F.
B. $F/$1.03^2$.
C. $F/$1.10^2$.
D. $F/1.07.
E. $F/(1.03 • 1.10).
F. $F/($1.03^2$ • 1.10^2).
G. None of the above

6. If a large number of low-skilled recent immigrant workers leave the US and go back to their home countries, according to the competitive labor market model, the gap between high-skill and low-skill wages in the U.S. will:
A. rise.
B. fall.
C. stay the same.
D. rise if the supply curve of high-skilled labor is inelastic, and fall if it is elastic.
E. rise if the supply curve of high-skilled labor is elastic, and fall if it is inelastic.

7. A profit-maximizing competitive firm hires L identical workers all paid the same wage W. Which one below is true?
A. Each worker gets paid its marginal contribution to the revenue of the firm.
B. The firm gets more in value from its workers that what it pays them.
C. All workers (except one) get paid less than their contribution to the revenue of the firm.
D. All of the above.
E. None of the above.

SCRATCH

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