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Faculté des sciences sociales | Faculty of Social Sciences

Département de science économique
Department of Economics

ECO 2114A MIDTERM EXAM I TIME: 1 hour and 45 minutes October 15, 2018

Professor: M. Rafiquzzaman **OUTLINE OF SOLUTION** Fall 2018

Multiple-Choice Questions (2x12 =24 points). Please write your answer in the booklet).

Multiple Choice Answers (2x12 = 24 points)

1. **A**
2. **D**
3. **C**
4. **C**
5. **B**
6. **C**
7. **A**
8. **A**
9. **C**
10. **A**
11. **C**
12. **A**

Short Answer and Problem part (Please write your answer in the booklet. Show your calculations as required. USE PEN)

PLEASE NOTE THAT GRAPHS ARE UPLOADED IN A SEPARATE FILE: MIDTDERM 1 GRAPHS

1. Define **(4 x 2 = 8 points)**

   a) Working-age Population
   b) Labour Force Participation Rate
   c) Reservation wage
   d) homogeneous jobs

<u>Answer</u>

a) Working-age Population **(WAPOP)**

- Individuals in the eligible population or potential labour force participants (that is, civilian non-institutional population, 15 years old and over, excluding Yukon, Northwest Territories, Nunavut, and those living on Indian reserves)

b) Labour Force Participation Rate **(LFPR)**

- The Labour Force **(LF**): Individuals in the eligible population (15 years and older) who participate in labour market activities, either employed or unemployed.

LFPR = (LF/WAPOP) x 100

c) Reservation wage

- A reservation wage rate at which an individual would be indifferent between participating and non-participating in the Labour force; that is, the wage at which an individual would be indifferent work in the labour market as opposed to engaging in nonlabour market activities.

d) homogeneous jobs

- Jobs that are equally desirable from workers' point of view

2. In an income - leisure model assume that an individual's indifference curves are convex to the origin.

What does the convex to origin indifference mean? **(4 points)**

<u>Answer:</u> Convex to origin indifference curves mean

- With *low* hours of leisure, individuals are willing to give up a *large* amount of income to get 1 more leisure hour.

- With *high* hours of leisure, individuals are willing to give up a *small* amount of income to get 1 more leisure hour.

3. The demand for labour is a **<u>derived</u>** demand. Why? explain. **(2 points)**

<u>Answer</u>

- The demand for labour is a derived demand because it depends on the demand for the produced and supplied goods and services.

4. Who are the main actors in the labour market, and what particular roles do they play? **(3 + 3 = 6 points)**

Answer

- **Main Actors**
  1. Individuals
  2. Firms
  3. Governments

1. Individuals' decisions: For individuals, the decisions include

- ➢ when to enter the labour force
- ➢ how much education, training, and job search to undertake
- ➢ how many hours to work,
- ➢ where to move to a different region
- ➢ occupation and industry to enter
- ➢ when to accept a job
- ➢ when to quit or look for another job
- ➢ what wage to demand
- ➢ whether to join a union or employee association
- ➢ when to retire

2. Firms' decisions: firms make decisions about

- ➢ how much and what type of labour to hire
- ➢ what wages and benefits to offer
- ➢ what hours of work to require
- ➢ when to lay off workers and when to close a plant
- ➢ what to outsource
- ➢ how to design an effective pension and retirement policy

3. Government's decisions:

- governments, through their legislators and policy makers, establish the environment in which employees and employers interact.
- they provide rights and protection to individuals while not jeopardizing the competitiveness of employers
- they also decide on as to what to provide publicly in such areas as training, employment insurance, workers' compensation, income maintenance, pensions, and public sector jobs.

5. a) State the subject matter of Labour market economics. **(2 points)**

Answer

- Labour market economics involves analyzing the determinants of the various dimensions of labour supply and demand and their interaction in alternative market structures to determine wages, employment and unemployment.

b) What are the key outcomes of labour market? Name the factors that influence the outcomes. **(2 + 2 = 4 points)**

Answer

- The interaction of labour supply and demand determines the key labour market outcomes. The outcomes are:
  - wages
  - employment
  - unemployment
  - labour shortages
- **Factors that influence the outcomes**: They are influenced by
  - the interaction of supply and demand in alternative market structure
  - the degree of competition in the product market as well as the labour market
  - unions and collective bargaining
  - legislative interventions, such as minimum wages, and equal pay and equal opportunity laws

c) Illustrate graphically how the neoclassical supply and demand model can be used to determine wages and employment in a competitive labour market. Using the model explain that in markets (or regions) with homogenous workers and homogeneous jobs, wages will be equalized across workers. **(4 + 4 = 8 points)**

Answer

We consider a simple neoclassical supply and demand model to determine equilibrium wages and employment in a competitive labour market.

Assumptions

- Buyers and sellers of labour interact competitively in the labour market – that is, they take market wage as given.
- No single agent has the power to affect the market wage by its actions.
- Homogeneous jobs and homogenous labour

In **Figure 1 (Please see the Graph File)**, let N^S labour supply curve, which depicts the desired amount of labour that individuals would like to sell at each wage rate, holding all other factors constant. Similarly, let N^D is the labour demand curve which shows how much labour firms would like to hire to each wage, holding all other factors constant. The equilibrium combination of wages and employment is (W*, N*) is given by the intersection of supply and demand for labour at E. At E, excess demand for labour = excess supply of labour = 0.

Why is equilibrium at E? That is, why will optimal level (W*, N*) prevail in the market? Consider a wage W_1 above W*. At this wage, firms demand N_1^D, because firms cannot be forced to hire any more labour. At this wage supply exceeds demand, that is excess supply of labour is greater than zero [i.e., $(N_1^S – N_1^D) > 0$]. At this swage there would be workers willing to work for slightly less and firms willing to hire at a slightly lower wage. Thus, there would be competitive pressures for the wages to fall. The falling of wage continues until W* is reached. So, (W*, N*) will prevail in the market.

A similar argument can be made in a situation where the market wage is below W*.

Using the model explain that in markets (or regions) with homogenous workers and homogeneous jobs, wages will be equalized across workers.

Answer

We can use the supply and demand models to explore the determinants of wages across markets (regions), a first step in trying to explain wage differentials across different markets (regions).

We assume that two markets (or regions) are employing same type of homogeneous labour labour, and jobs are also homogeneous.

In **Figure 2 (Panel A),** both sectors are in equilibrium. The equilibrium wage, W_{A}, is lower in sector A than that, W_{B}, in sector B. Although both sectors are in equilibrium, the labour market is not in equilibrium. This cannot be a permanent equilibrium (i.e,. temporary wage differential remains, for homogeneous workers across regions), unless there are barriers preventing workers in sector A from moving to sector B Barriers to mobility). These barriers could be imperfect information about the higher wage opportunities or other costs associated switching regions.

In the presence of full information and in the absence of mobility costs, workers would move from A to B. This implies an increase in labour supply in B and reduction of labour supply in A. As a consequence, wages decrease in B and rise in A. The process continues until wage is equalized in both sectors. This cross-sector equilibrium is illustrated in **Figure 2 (Panel B),** where the equilibrium wage is W_E in both sectors.

6. Suppose that the supply curve for school teachers is $Ls = 20{,}000 + 350W$ and the demand curve for school teachers is $Ld = 100{,}000 - 150W$, where L = the number of teachers and W = the daily wage.

   a) Plot the demand and supply curves. **(2 points)**

   b) What is the equilibrium wage and employment level in this market? **(3 + 2 = 5 points)**

   c) Now suppose that at any given wage 20,000 more workers are willing to work as school teachers. Find the new wage and employment level. Why doesn't employment grow by 20,000? **(2 + 2 + 2 = 6 points)**

a) Plot the demand and supply curves. **(2 points)**

<u>Answer</u>

See Figure 3 (Graph File)

b) What is the equilibrium wage and employment level in this market? **(3 + 2 = 5 points)**

<u>Answer</u>

In equilibrium, $L_s = L_d \rightarrow 20{,}000 + 350W = 100{,}000 - 150W$,
Or, 350W + 150 W = 100,000 – 20,000;
Or, 500 W = 80,000;
Or, W = (80,000/500) = $160

Substituting W either in the demand or in the supply curves, we get the equilibrium number of employments. Let us consider the supply equation:

L = 20,000 + 350W = 20,000 + 350(160) = 20,000 + 56,000 = 76,000.

c) Now suppose that at any given wage 20,000 more workers are willing to work as school teachers. Find the new wage and employment level. Why doesn't employment grow by 20,000? **(2 + 2 + 2 = 6 points)**

Answer

The supply curve shifts parallelly to the right by 20,000 employees, the demand curve remains unchanged.

The new labour supply is: L_2 = 20,000 + 350W + 20,000 =40,000 + 350W. Set this = L_d and solve. Then

40,000 + 350W = 100,000 = 150W;

Or, 350W + 150W = 100,000 – 40,000

Or, 500W = 60,000

Or, W = (60,000/500) = $120

Substituting W into either the new supply equation or the demand equation, we get equilibrium L. Use the new supply equation. Then

L = 40,000 + 350W = 40,000 + 350(120) = 40,000 + 42,000 = 82,000

Change of equilibrium employment = 82,000 – 76,000 = 6,000

Employment doesn't grow by 20,000 because the shift in the supply curve causes the wage to fall, which induces some teachers to drop out of the market.

7. Suppose the Working-age Population (WPOP) in a city is 9,823,000, and there are 3,340,000 persons who are not in the labor force (NILF) and 6,094,000 who are employed (E).

   a) Calculate the number of adults who are in the labor force and the number of adults who are unemployed. **(2 + 2 = 4 points)**

Answer

LF = WPOP – NILF = 9,823,000 – 3,340,000 = 6,483,000
U = LF – E = 6,483,000 – 6,094,000 = 389,000

b) Calculate the labor force participation rate (LFPR) and the unemployment rate (UR). **(2 + 2 = 4 points)**

Answer

LFPR = (LF/WPOP)x100 = (6,483,000/9,823,000)x100 = (0.65998)x100 = 66.0%

UR = (U/LF)x100 = (389,000/6,483,000)x100 = (0.06000)x100 = 6.0%

8. Assume that Linda's nonlabour income is $100 per week and she has total available time of 110 hours per week. Her current wage rate is $10.00 per hour, and she currently chooses to work 40 hours per week.

a) In an income – leisure space (leisure on the X– axis and income on the Y-axis) draw Linda's budget constraint. **(2 points)**

Answer

We are given: nonlabour income $Y_N = \$100$ per week. Total available time T = 110 hours per week; wage rate w = $10 per hour; hours worked (h) = 40 hours per week. Thus, hours of leisure consumed = l = 110 – 40 = 70 hours per week.

So, Linda's budget constraint is: $Y = Y_N + w(T - l)$, where

Y = income, Y_N = nonlabour income, w = wage rate, T = total time available, l = time spent on leisure, T – l = h = hours worked, i.e., supply of labour

- **Drawing budget constraint**

If l = 0, that is, Linda enjoys no leisure, Y = $100 + $10(110 – 0) = $100 +$1,100 = $1,200. Thus (Y = $1,200, l = 0) is a point on the budget line.

If l = T, i,e, Linda spends entire time on leisure, then Y = $100 + $10(110 – 110) = $100. Thus, (Y= $100, l = 110) is another point on her budget line.

Plotting these two points and joining them we get Linda's budget constraint (**Figure 4, Graph file**).

b) Assume that her utility function is U= U (Income, Leisure), and she seeks to maximize her utility by consuming income and leisure. Further assume that her indifference curves are convex to the origin.

How many hours of leisure per week will Linda choose to consume? How much income will she have? Show her optimal consumption bundle of income and hours of leisure on the budget line [on the same diagram in (a)]. What condition (s) must satisfy at the optimal point?
(2 + 2 + 2 + 2 = 9 points)

<u>Answer</u>

- As given, Linda will consume (110 – 40) = 70 hours of leisure.

- To calculate the value of Y*

  - **<u>Method 1</u>**

From her budget constraint,

$$Y = Y_N + w(T - l)$$

Thus, Y* = \$100 +\$10(110 – 70) = \$110 + \$10(40) = \$100 +\$400 = \$500 **(Figure 3, Graph File)**

  - **<u>Method 2</u>**

Note that the equation of a straight line in the y – x space is: y = mx + c, where m = slope of the line, and c is a constant. From the budget line slope = - w (wage rate) = - 10. Thus m = -10.

Consider any of the two points that we used to draw the budget line in (a). I consider the point (Y = 1200, l = 0). [You may consider the other point]. The problem is to find the equation of the straight line (here it is the budget line) which passes through the point (1200, 0) with slope m = -10.

y =mx + c;
Or, 1200 = -10(0) + c
Or, 1200 = c

Thus, the equation of the budget line is: Y = -10 l +1200, …. (1)
In (1) when optimal l* = 70, Y* = -10(70) + 1200 = -700 + 1200 = 500.

So, Linda will have income = Y* = \$500.

- Her optimal point is at P in **Figure 3**, where she consumes 70 hours of leisure and receives income = \$500

- At the optimal point P, the budget line is tangent to the indifference curve. In other words, the slope of the indifference curve equals the slope of the budget line. This implies that the marginal rate of substation of leisure for income equals the wage rate. That is,

$$\frac{MU(leisure)}{MU(Income)} = w$$

c) Assume that Linda's nonlabour income increases to **\$300** weekly, wage rate remains unchanged. With the increase in nonlabour income she chooses to consume 80 hours of leisure per week to maximize utility.

Now draw Linda's new budget constraint on the same diagram in (a). Show her optimal level of consumption of labour and income on the same diagram in (b). How many hours does Linda choose to supply now? How much income will she have? Is leisure here a normal good? Why? Explain. **(2 + 2 + 2 + 2 + 1 = 10 points)**

<u>Answer</u>

- New nonlabour income is, $Y_{N1} = \$300$; w = \$10 per hour, l = 80, T =110.

So, Linda's new budget constraint is: $Y1 = Y_{N1} + w(T - l)$, where

Y_1 = new income, Y_{N1} = new nonlabour income, w = wage rate, T = total time available, l = time spent on leisure, T – l = h =hours worked, i.e., supply of labour

- Drawing budget constraint

If l = 0, that is Linda enjoys no leisure, i.e. l = 0, Y_1 = \$300 + \$10(110 – 0) = \$300 +\$1,100 = \$1,400.
Thus (Y_1 = \$1,400, l = 0) is a point on the new budget line.

If l = T, i,e, Linda spends entire time on leisure, then Y_1 = \$300 + \$10(110 – 110) = \$300
Thus, (Y_1= \$300, l = 110) is a point on her new budget line.

Plotting these two points and joining them we get Linda's new budget constraint, which is a parallel shift of her old budget line (**Figure 3**).

- Her optimal point is at **E** in **Figure 3**, where she consumes 80 hours of leisure and receives income = Y_1*

- Linda's labor supply h = (T – l) = (110 – 80) = 30 hours

- To calculate the value of Y_1*

  - **Method 1**

From the new budget constrain $Y1 = Y_{N1} + w(T - l)$
So, Y^*_1 = $300 + ($10) (110 – 80) = $300 + $10(30) = $300 + $300 = $600

  - **Method 2**

As in (b), we need to find the equation of the new budget line with slope = -10.

Consider any of the two points that we used to draw the new budget line **(Figure 3)**. I consider the point (Y_1 = 1,400, l = 0). [You may consider the other point]. Again, the problem is to find the equation of the straight line (here it is the new budget line) which passes through the point (1400, 0) with slope m = -10.

y =mx + c;
Or, 1400 = -10(0) + c
Or, 1400 = c

Thus, the equation of the new budget line is: Y_1 = -10 l +1400, … (2)
In (2) when optimal l* = 80, Y_1* = -10(80) + 1400 = -800 + 1400 = 600.

So, Linda will have income = Y_1* = $600 when her nonlabour income rises.

- Is leisure here a normal good? Why?

Yes, leisure is a normal good. It is because, as income increases consumption of leisure also increases.