ECO361: LABOR ECONOMICS
FIRST MIDTERM EXAMINATION
OCTOBER 8, 2015

Prof. Bill Even

DIRECTIONS

The exam contains a mix of short answer and essay questions. Your answers to the 22 short answer portion of the exam (2 points each) should be listed on the answer sheet attached to the end of the exam. No credit will be given for answers placed elsewhere. Your answers to the essays (45 points total) should be provided in the blue book provided.

You have until 3:50 to complete the exam. If you wish to purchase additional time, you may do so at a price of 5 percentage points per minute. When you complete the exam, place your exam and answer sheet inside of the bluebook.
Answer the next 5 questions using the information in the table above.

1. What is the unemployment rate in September 2014? (Give your answer as a percentage with 2 decimal points of accuracy – e.g. 10.22%).

2. What is the labor force participation rate in September 2014? (Give your answer as a percentage with 2 decimal points of accuracy – e.g. 10.22%).

3. What is the employment-population ratio in September 2014? (Give your answer as a percentage with 2 decimal points of accuracy – e.g. 10.22%).

4. Suppose that the civilian non-institutional population grows by 2 percent over the next year (i.e. rises from 251.325 million to 253.838 million) but that the labor force participation rate remains constant. How many new jobs would the economy have to produce over the next year to keep the unemployment rate constant? (Give your answer in millions with 2 decimal points of accuracy (e.g. 10.22 million).

5. Suppose that over the next year 1 million workers who previously retired decide to go back to work. Among these re-entrants, 0.8 million find jobs and 0.2 million continue searching for a job. The re-entry of these 1 million workers will cause the unemployment rate to ______ and the labor force participation rate to ______.
   a. Rise; not change
   b. Rise; fall
   c. Fall; not change
   d. Not change; rise
   e. None of the above
To answer the next 3 questions, refer to the table above. Note that the CPI is used to adjust for price changes and that earnings in “current dollars” are nominal earnings. The reference period for the CPI is 1982-84.

6. Based on the information provided, the CPI in the second quarter of 2015 is _____ (give your answer to one decimal – e.g. 103.2).

7. Based on the information provided, what was the inflation rate (i.e. percentage change in CPI) between the second quarters of 2014 and 2015? (give your answer to one decimal – e.g. 1.2%).

8. A nominal wage of $10 per hour in the second quarter of 2014 would have the same purchasing power as a nominal wage of _____ in 1982-84. (Give your answer to the nearest cent – e.g. $3.21.)

9. It is generally argued that the CPI (over-, under-) states the true growth in the cost of living and that a switch to a chain-type index like that for personal consumption expenditures would _____.
   a. Over; increase the rate of growth in Social Security expenditures.
   b. Over; decrease the rate of growth in Social Security expenditures
   c. Under; increase the rate of growth in Social Security expenditures
   d. Under; decrease the rate of growth in Social Security expenditures

10. A profit-maximizing firm in a competitive product and labor market will increase its profits by hiring more workers if and only if
   a. the marginal product of labor exceeds the wage rate
   b. the marginal revenue product of labor exceeds the wage rate
   c. the average product of labor exceeds the wage rate
   d. none of the above
To answer the next two questions, assume that a firm faces the following labor supply curve:

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<th>Daily Wage</th>
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<th>$230</th>
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<tr>
<td># of workers</td>
<td>10</td>
<td>11</td>
<td>12</td>
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11. When employment rises from 12 to 13, the marginal expense per worker is _______.

12. Suppose the marginal product of each worker is fixed at 20 units. This firm’s profits would rise if it increased employment from 12 to 13 if and only if the price per unit of output was above $_______.

To answer the next two questions, suppose that a roofing company operates in perfectly competitive product and labor markets and is paying $100 per hour for capital and $20 per hour for labor. Suppose the marginal product of capital is 800 square feet of roofing per hour and the marginal product of labor is 200 square feet per hour.

13. Based on the information provided, if the firm is going to keep production constant:
   a. It can reduce cost by using more labor and less capital.
   b. It can reduce cost by using more capital and less labor.
   c. It cannot reduce cost because it is currently using the optimal mix of labor and capital.
   d. It is impossible to tell whether it is possible to reduce cost by changing the mix of labor and capital without information on the price of roofing.

14. If the price of roofing is $.20 per square foot, this firm’s profits would
   a. Increase if it hired another unit of labor and held capital constant.
   b. Increase if it rented another unit of capital and held labor constant.
   c. Decrease if it rented another unit of capital and held labor constant.
   d. Both a and b.
   e. Both a and c.
15. According to the Hicks-Marshall Laws of derived demand, labor demand is more elastic when:
   a. Labor is a larger share of total cost since the scale effect of a wage increase would be larger.
   b. Labor is a larger share of total cost since the substitution effect of a wage increase would be larger.
   c. Product demand is more elastic since the scale effect of a wage increase would be greater.
   d. Both a and c.
   e. Both b and c

16. Computing technology has added many substitutes for labor over time. For example, many airports have added kiosks so that airline travelers can check in without the assistance of an agent. This technology should make the demand for airline workers more ______ because the ability to replace workers with kiosks would increase the size of any (substitution, scale) effect of a wage increase.
   a. Elastic; substitution
   b. Elastic; scale
   c. Inelastic; substitution
   d. Inelastic; scale

17. If the quantity of labor demanded for nurses falls from 4 million to 3 million when the equilibrium wage rises from $20 to $25, the own-wage elasticity of demand for nurses is ______. (Use the midpoint formula developed in class and give your answer to 2 decimal places – e.g. 1.23.)

18. If the elasticity of demand for labor is 0.2, a 10% increase in the wage rate will cause employment to fall by _____% and cause total income received by workers to (rise, fall) by _____%. [Be sure to indicate whether income would rise or fall in your answer!]

19. Currently, the Social Security payroll tax paid by the employer is 6.2 percent of each worker’s earnings, but the tax applies to only the first $118,500 of earnings paid to each employee during 2015. Based on this, the Social Security payroll tax
   a) Is a quasi-fixed labor cost
   b) Is a variable labor cost
   c) Is a variable labor cost for workers earning less than $118,500 per year and a quasi-fixed cost for workers earning more than $118,500 per year.
   d) Is a quasi-fixed labor cost for workers earning less than $118,500 per year and a variable cost for workers earning more than $118,500 per year.
20. Suppose that the interest rate is 10% and a worker is offered $50,000 today, $55,000 one year from today, and $60,000 two years from today. What is the present value of the three years of pay combined? Round your answer to the nearest dollar.

To answer the next 2 questions, suppose that the competitive market for carpenters is described by the following labor demand and labor supply curves:

\[ LD = 7000 - 10W \quad ; \quad LS = 1000 + 5W \]

21. What is the equilibrium wage rate in this labor market? Give your answer to the nearest penny.

22. If a $10 tax is imposed on employers for each worker employed, what would be the resulting equilibrium wage (net of taxes) received by employees? Give your answer to the nearest penny.
1. **Answer 2 of the next 3 questions**
   (10 points) It is estimated that there are approximately 11 million illegal immigrants in the U.S. If the U.S. sought out and deported large numbers of the illegal immigrants who were previously employed in the construction industry, there would be a significant decrease in labor supply in those occupations. For legal citizens employed in the construction industry, will the deportation of illegal immigrants cause an increase or a decrease in wages and employment? **Be sure to discuss the importance and direction of both the scale and substitution effects of deportation in providing your answer and whether the net effect would be positive or negative for different types of workers.**

   With the deportation of illegal immigrants that worked in the construction industry, the labor supply of such workers decreases. This drives up the wage and reduces employment of illegal immigrants. This creates two opposing effects on the demand for legal citizens employed in the construction industry. The scale effect is that the higher wages of illegal immigrants drives up the cost of construction, shifts the supply of construction goods leftward and reduces the equilibrium quantity of construction. This reduced scale causes a decrease in demand for all inputs in the construction industry – including the demand for legal citizens. The substitution effect is that legal citizens have become relatively less costly compared to illegal immigrants and thus construction companies will substitute legal for illegal labor. This drives up the demand for legal workers. If legal and illegal labor are gross complements, the scale effect dominates and the wage and employment of illegal labor fall. If legal and illegal labor are gross substitutes, the substitution effect dominates and the wage and employment of legal labor rise.

2. (10 points) One proposal for improving the financial soundness of the Social Security system is to increase contributions to the system by eliminating the cap on earnings taxed. That is, currently the payroll tax applies to only the first $108,500 of earnings. If the cap on taxable earnings was removed, how would a firm’s optimal mix of hours and workers change? Be sure to justify your answer using the relevant economic concepts and be clear about which workers would be most affected by the change.

   For workers who previously earned more than $108,500, the Social Security tax was a quasi-fixed cost (i.e. it was a “per worker cost” independent of hours worked per employee). The new rule would convert a quasi-fixed cost to a variable cost. Choosing the optimal mix of workers and hours per worker requires that the firm choose a mix where \( \frac{ME_M}{MP_M} = \frac{ME_H}{MP_H} \) where \( ME \) refers to ME, MP is marginal product, and the M and H refer to number of workers and hours per worker. If the firm was initially optimizing and the quasi-fixed costs fall and variable costs rise, the inequality will no longer hold \( \frac{ME_M}{MP_M} < \frac{ME_H}{MP_H} \). To obtain an optimal mix after the change, the firm should increase \( H \) and reduce \( M \).

   Workers who previously earned less than the cap ($108,500) should be unaffected by the change in the tax policy.
3. (10 points) Suppose that the government imposes a payroll tax of $2 per hour on any firm that employs workers to finance health insurance subsidies in the Affordable Care Act. Note that the tax is on the employer, not the employee.

a. Draw a labor supply/demand demand that shows the equilibrium wage (W0) and equilibrium employment (L0) before the tax.

b. Show the effect of the $2 payroll tax on the LS or LD curve and be sure to show how the $2 tax affects how much the curves shift. Label the new equilibrium wage and employment as W1 and L1.

c. Will the effect on worker wages be greater in a labor or capital intensive industry? Why?

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a&b) As seen in the diagram above, the tax is on the employer and thus shifts the labor demand curve downward by $2. The equilibrium after-tax wage received by the employee decreases from W0 to W1, which is a decrease of less than $2. The total wage paid by the employer (including the $2 tax) rises from W0 to W1+2. This is an increase of less than $2.
c) In a labor intensive industry, the scale effect of the tax will be greater since it will drive up total costs by a larger amount. As a result, labor demand will be more elastic in a labor intensive industry. If labor demand is more elastic, wages and employment will fall by a larger amount. This can be seen in the diagram below. In the initial example, the equilibrium moves from A to B. With the more elastic labor demand curve (LD0' before the tax and LD1' after the tax), the equilibrium moves from A to C.
Answer both 4 and 5.

4. (15 points) The city of Los Angeles recently passed legislation to gradually increase its minimum wage from $9 to $15 per hour over the next few years. Referring to the relative size of substitution or scale effects across firms,

   a. Do you expect the job loss (in percentage terms) for workers affected by this minimum wage hike (i.e. those currently earning between $9 and $15) to be greater where minimum wage workers are a large or small share of total employment? Explain using relevant concepts developed in class.

      The job loss from the minimum wage increase will be greater when labor demand is more elastic. According to one of the Hicks-Marshall Laws of Derived demand, labor demand is more elastic when labor is a greater share of total cost because any wage increase will have a larger scale effect.

   b. Do you expect the job loss (in percentage terms) to be greater at a firm located in the center of Los Angeles or one near the city limits where other firms just outside of city limits are exempt from the law? Explain using relevant concepts developed in class.

      According to one of the Hicks-Marshall Laws of derived demand, labor demand is more elastic when product demand is more elastic. Since restaurants near the city limits must compete with those outside of city limits, product demand will be more elastic since customers can avoid any price increase associated with a minimum wage hike by just driving outside of city limits. As a result, there will be more job loss at restaurants subjected to the minimum wage hike who are close to city limits.

   c. Based on my analysis of data from LA, approximately 655,000 workers currently earn between $9 and $15 per hour. For the sake of simplicity, assume that 400,000 earn $9 per hour, and 255,000 earn $12 per hour. A recent study by the Congressional Budget Office assumes that the elasticity of demand for minimum wage workers is approximately 0.3. Use this information to estimate how many workers will lose jobs as a result of increasing the minimum wage to $15.

      The estimated job loss is

      \[ e^{*(\text{change in w})}*400,000 + e^{*(\text{change in w})}*255,000 \]

      \[ = .3*(6/12)*400,000+.3*(3/13.50)*255,000 \]

      \[ =60,000+17,000=77,000 \]

      (Notice that I am using the midpoints of the wage ranges to calculate the percent change in wages).
5. (20 points) Mark Lowenstein and James Spletzer\(^1\) report evidence that workers who receive “on the job training” (OnJT) are less likely to quit their jobs than workers who do not receive any training as well as workers who receive “off the job training” (OffJT) (e.g. formal schooling through a university or community college).

a. When a firm offers more OnJT, would it want to “defer” more or less pay? Why? Be sure to explain what you mean by “deferred pay”.

*Deferred pay is when a firm pays a worker less than their best alternative wage early in the career and compensates for this by paying more than their best alternative wage late in their career. When a firm pays for OnJT, it will want to defer a larger share of pay to insure that the worker stays with the firm after the training is complete so that the firm can recover its training investment.*

b. Given your answer in (a), would a firm with more OnJT have higher or lower quit rates? Why?

*Given that workers who receive OnJT should have a larger share of their pay deferred, they should be less likely to quit. The reason is that, with deferred pay, workers are likely to take a wage cut if they switch employers after the training is complete.*

c. Would a firm with more OnJT be more or less likely to lay-off workers after a decrease in demand for their product? Explain.

*With OnJT, a firm must pay workers a wage that is less than their MP after the training is complete in order to recover their investment. Consequently, if the MP of workers decreases due to a decrease in demand for the product, a firm will retain the worker unless MP falls below the wage. In firms without training, W=MP and layoffs would begin immediately with any decrease in product demand.*

*A second consideration is that if the firm believes the decline in product demand is temporary, they may want to retain workers to avoid the need to train new workers when product demand rises in the future.*

d. Why would firms be reluctant to pay for formal schooling through a university or community college?

*This is an example of general training where, unlike specific training, the training increases a worker’s MP at a wide number of employers. Since the worker’s MP is increased at a wide number of employers, the firm that pays for the training must pay the full MP to match the wage that the worker could receive elsewhere after the training is complete. This makes it difficult to recover their investment in training by paying a worker less than their MP after the training is complete. The only way the firm could*  

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recover its investment is if it could legally enforce a contract that requires the worker commit to staying after the training is complete even though the worker could get a wage increase by switching jobs. Examples of such contracts include non-compete clauses, the military’s ability to force recruits to commit to a specific term, and professional sports teams who draft players and restrict mobility prior to free agency.
Name (please print)_____________________________________________________

Place all answers to first 22 questions in space below.

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