Economics 222: Macroeconomic Theory 1
Midterm
October 18, 2007

Instructions

1. Read all questions carefully.
2. You have **120 minutes** to write the exam. There are no word limits (unlike assignments).
3. Clearly write your name, student number and class section (A: Byrne, B: Liu) on the front page of your exam booklet.
4. Draw diagrams to support your answers where appropriate, labelling axes, lines and curves.
5. Show all work, part marks will be given for different parts of questions.
6. **Section 1** consists of short answer questions. Do **four of five** questions.
7. **Section 2** consists of long answer questions. Do **three of four** questions.
8. Grades
   - 8a. Your name and student number are worth 2 points.
   - 8b. Section 1 is worth 28 points (7 points per question).
   - 8c. Section 2 is worth 90 points (30 points per question).
9. You may use a non-programmable hand calculator (with a gold or blue sticker, or a Casio 991).
10. There are 120 points and 120 minutes. This should help you allocate your time efficiently.

Section 0: Freebies (Do both - 2 marks)

1. What is your first and last name? (1 mark)
2. What is your student number? (1 mark)

Section 1: Short Answer (Do 4 of 5 - 28 marks)

For each statement, claim whether it is TRUE, FALSE, or UNCERTAIN, and justify your claim.

1. Government spending (G) in a closed economy model affects desired national savings S^d both directly and indirectly (assume Y constant).
2. The great depression was characterized by high, and persistent, unemployment. To explain this historic economic event, a macroeconomist should use the equilibrium of a classical labour market, rather than the Keynesian approach to labour markets.
3. In the classical model, the labour demand curve can be derived from the profit-maximizing behaviour of firms, who, pay a real wage w to workers who yield a marginal product MPN.
4. Suppose Y is output, C is consumption, G is government expenditure, NFP is net factor payments, T is taxes, TR is government transfers, and INT is interest paid on government debt. If total savings in the economy, S, is the sum of government and private savings, then the following equation holds:
$$S = Y + NFP - C - G$$
Suppose NX is net exports. If this above equation is true, then we can also show the following identity also holds:
$$S = I + CA$$
where CA is the current account. (i.e.: If you answer TRUE, derive these equations; if you answer FALSE, show why they are incorrect.)
5. Consider a small open economy model for a country that runs a current account surplus. If there is a *positive* technology shock, then the current account (CA) *falls*, while if there is a *negative* supply shock, such as a war, the current account *rises*.

Section 2: Long Answer (Do 3 of 4 - 90 marks)

1. Firm XYZ invests in capital (K) to earn profits. Capital investment yields a marginal product of capital (MPK) given by:

$$MPK = 100 - 50K$$

The price of a unity of capital is given by $p_K = 180$, capital depreciates at a rate of $d = 0.12$ and the real interest rate is $r = 0.04$.

a. Define, and compute the user cost of capital, *uc*. Explain, in words, why r is included as part of the user cost of capital.

b. Assuming firm XYZ profit maximizes, compute the optimal capital level, and illustrate how it is determined with an appropriate figure.

c. Now suppose there has been a negative technology shock, so that the marginal product of capital falls for each level of K. The MPK is now:

$$MPK = 75 - 50K$$

Assuming *uc* is unchanged, compute the new profit-maximizing level of K, and illustrate the result in a figure.

d. Finally, consider a tax on MPK so that the after tax marginal return to capital is $(1 - \tau)MPK$. Assume p_K, d, r, and MPK are the same as the were in part a. Find the value of τ that yields the same profit-maximizing K that arose from the negative technology shock in part c.

2. Consider a country called Orangeland, which owns an orange farm and an orange juice company. The residents of Orangeland likes to consume both oranges and orange juice.

During the current year, the orange farm produces 15 oranges. It sells 5 to the public and 10 to the orange juice company, each for a price $4. The orange farm borrows from a bank to purchase the farming equipment, paying $5 interest, and has a labour cost of $40.

The orange juice company produces 10 bottles of orange juice with the 10 oranges it purchased from the orange farm. It sells them at a unit price of $10 plus 10% indirect tax collected by the Orangeland government (so the price paid for a bottle of orange juice is $11). The orange juice company pays total wages of $35. It also has to pay a $5 depreciation expense to replace the orange juice extractor that is not working properly due to its use during the current year. The following table summaries the transactions of each business.

Orange Farm:

Wages paid to workers	$40
Interest on debt	$5
Revenue received from sale of orange	
Sold to Public	$20
Sold to Orange Juice Company	$40

Orange Juice Company

Wages paid to workers	$35
Oranges purchased from Orange Farm	$40
Revenue received from sale of orange juice	$110
Depreciation	$5
Indirect tax	$10

a. Compute the GDP of Orangeland using the income approach, product approach, and expenditure approach. Be sure to give your reasoning for each calculation.

b. What is the Net National Income of Orangeland? What is the Net Domestic Product?

c. Now suppose that the Orangeland government uses the income from indirect tax to subsidize the workers who work in the Orange Juice company. What is the Net National Income in this case? How does the new transaction affect the calculation of GDP in each approach (product, expenditure and income approach)?

3. Suppose your life is divided into two aggregate blocks of time: the "working" and "retired" period. In the working period, you make $y = \$500$. When you retire, your earnings will drop to $y^f = \$200$. In each period, you have to pay a lump-sum tax to the government of $t = \$125$ and $t^f = \$35$. Your lifetime budget constraint is

$$c + \frac{c^f}{1+r} = y - t + \frac{y^f - t^f}{1+r}.$$

You want to perfectly smooth consumption over time, so that $c = c^f = c^*$. The real interest rate is 10 percent ($r = 0.1$). Assume Ricardian Equivalence does not hold.

a. What is your present value of lifetime resources? What is the highest feasible consumption in the current period? What is the highest feasible consumption in the future period? Use these results to graph the budget line.

b. Find the optimal consumption in each period, c^*, and the amount of saving/borrowing. Plot the optimal consumption point (c^*, c^{f*}) on the graph.

c. Now suppose that a conservative government decides to reduce government spending, allowing it to reduce the current tax to $t = \$100$, with no change in the future tax. Compute the new consumption plan, c^*, again under the assumption of perfect consumption smoothing. Accurately compute the new budget line in the same manner as part a., and show where the new optimal consumption point lies.

d. How does the new tax policy affect the saving/borrowing behaviour found parts b. and c.? In words, discuss how you would expect the result to differ under the assumption of Ricardian Equivalence.

4. Consider the country of Lesotho as initially being a closed economy. You have the following information:

$$\begin{aligned} C^d &= 10 + 0.8(Y - T) - 100r \\ I^d &= 30 - 300r \\ G &= 10 \\ T &= 0 \\ Y &= 100 \end{aligned}$$

a. What are the equilibrium values of C^d, I^d, and r? Show your result in a figure.

b. Suppose now that Lesotho becomes a small-open economy, and that $r^w = 0.05$ (also assume that $NFP = 0$). What are the equilibrium values for C^d, I^d, and CA. Illustrate this in a figure.

c. The government is concerned about the current account value found in b. How should the taxes be set to have $CA = 0$?