

Queen's University Department of Economics
Economics 222, Sections A and B
Midterm Examination October 26th, 2006

Instructions:

Please read all questions carefully. On the cover page of your exam booklet clearly write your name, student number, and class section (A=Warman, B=Tapp). Record your responses in the answer booklet provided.

You are encouraged to draw diagrams to support your answers. Label the axes and lines or curves on your diagrams. Show all of your work; only part marks will be given for part answers.

The exam is out of 100 marks and has two main parts and an extra question:

Part I consists of shorter questions. Do any **three of the four** questions. Each question is worth 8 marks for a total of 24 marks.

Part II consists of longer questions. Do any **three of the four** questions. Each question is worth 25 marks for a total of 75 marks.

Here is a simple question for 1 mark. Do only the question corresponding to your section:

Section A:

Section B: Explain the following acronym from class: WWACSD?

The exam is 120 minutes long. Try to budget your time accordingly based on the relative marks given for each question.

You may use a non-programmable hand calculator (with a gold or blue sticker or a Casio 991).

Part A: Do 3 of 4 full questions for a total of 24 marks for this section.
(8 marks for each)

A1) Labour Force Statistics: As an economist at the IMF, you receive the following data for the country of Chad: the working age population (WAP) = 28.5 million people; 3.5 million of them are not in the labour force (N); the employment rate is 70.175%. Your boss would like to know the following:

- a) How many people are in Chad's labour force (LF)? (2 marks)
- b) How many of them are employed (E)? (3 marks)
- c) What is the participation rate (PR)? (3 marks)

A2) Ricardian Equivalence: You are acting as advisor to a politician. With an election soon approaching, it will improve your candidate's chances of winning if the economy gets a boost before voters go to the polls. You consider possible temporary changes in taxes (assuming the budget must eventually be balanced in the future period).

- a) Unfortunately, your busy politician didn't take Econ 222, so briefly explain the idea of the Ricardian equivalence (RE) proposition to her and the implications of it for national consumption and savings. (4 marks)
- b) Would your campaign prefer the case where the Ricardian equivalence holds to the case when it does not? (2 marks)
- c) Give some reasons why RE might not hold? (2 marks)

A3) Growth and Interest Rates:

Year	Y	K
1880	200	100
1980	500	240

Suppose the production function is: $Y = AK^{.4}N^{.6}$

- a) What does the superscript on K represent? (2 marks)
- b) If N grew by 50% between 1880 and 1990, find (total factor) productivity growth. (4 marks)
- c) If the nominal interest rate is 4% and people expect an inflation rate of 3%, what is the expected real interest rate? If inflation turns out to be 5% who benefits, borrowers or lenders? (2 marks)

A4) Shocks to Stocks:

a) There is an oil spill that temporarily wipes out half of the fish stock. What impact do you predict for full-employment output, full-employment employment, labour demand, labour supply and the real wage. Use relevant graphs to explain. (5 marks)

b) How would your answer differ if the oil spill had a permanent negative impact on the fish stock? (3 marks)

Part B: Do 3 of 4 full questions for a total of 75 marks for this section. (25 marks for each answer)

B1) The Market for Capital: On a question in Assignment 2 we considered solving for equilibrium in the labour market; now apply the same principles to the capital market. Assume the firm's cost of capital is the real interest rate, r .

India's economy can be described by the following production function:

$$Y = AK^{\frac{1}{2}}N^{\frac{1}{2}}$$

a) Derive the marginal product of capital (MP_K), and the economy's optimal capital demand (K^D) as a function of (A, N, r) . (6 marks)

b) Demonstrate that capital demand falls as the real interest rate rises, i.e. $\frac{\partial K^D}{\partial r} < 0$. (4 marks)

c) Treat the demand for capital (K^D) derived in (a) as the investment curve (I^D) in our usual Savings-Investment diagram. Households' supply of savings curve is given by:

$$S^D = 2r.$$

Total productivity, $A = 2$, and there are 16 workers in the economy, $N = 16$. Find the real interest rate, r^* , which clears the market for borrowing and lending. (6 marks)

d) How much do Indian households save? (i.e. $S^D = ?$) (4 marks)

e) If $P_K = 48$, $r = r^*$ (solved above), and depreciation, d , is 10, what is the user cost of capital (uc)? (5 marks)

B2) To Consume, or Not to Consume, That is the Question:

Acclaimed news anchorman Ron Burgundy, sits down with his beloved dog Baxter and contemplates his lifetime consumption. In his working life, Ron will make $y = \$60,000$. When he retires his earnings will drop, but he can still make $y^f = \$30,000$ with paid t. v. appearances. The government (credibly) announces it will collect lump-sum taxes from Ron of $t = \$20,000$ and $t^f = \$5,000$. The bank will lend to, or borrow from, Ron at a real interest rate of 15%, so $r = 0.15$. Ron's lifetime budget constraint is:

$$c + \frac{c^f}{1+r} = (y - t) + \frac{y^f - t^f}{1+r} \quad (1)$$

a) Solve for Ron's optimal consumption such that $c = c^f = c^*$. How much does Ron save or borrow in the first period? (7 marks)

b) The government decides to cut taxes in Ron's working life, and raise them in his retirement. The new taxes are $t = \$0, t^f = \$28,000$. Once again find optimal consumption $c^* = c^{f*}$ and first period savings/borrowing. Comment. (6 marks)

c) We are back to the world in part (a) where $t = \$20,000, t^f = \$5,000$. The bank offers to raise the real interest rate (which applies to both borrowing and lending) from 15% to 25%. Is Ron better, or worse off by this change (i.e. what happens to c^*)? (6 marks)

d) Describe the two opposing effects of the increase in r for a saver. Which effect dominates in our example? (6 marks)

B3) Current Accounts:

Suppose there are two economies in the world, Shelbyville (country A) and Springfield (country B).

$$\text{In country A: } S_A^D = ?; \quad I_A^D = 40 - 1000r^w$$

$$\bar{Y} = 500, T = 150, INT = 10, TR = 110, G = 190, C = 300 - 500r^w$$

where $\bar{Y}$ is full-employment output, T is taxes, INT is domestic interest paid by the government, TR is transfers, G is government spending and C is consumption.

$$\text{In country B: } S_B^D = 20 + 2500r^w; \quad I_B^D = 110 - 4000r^w$$

a) If citizens can trade and borrow and lend to each other, what is the world interest rate which clears the world borrowing/lending market? What are the current account balances in Shelbyville and Springfield? (8 marks)

- b) Find private savings and government savings in Shelbyville. (5 marks)
- c) Suppose the level of government spending in Shelbyville (country A) increases to \$250. Find the new equilibrium world interest rate and current accounts. (6 marks)
- d) If a Shelbyville firm buys insurance from a Springfield firm, explain in words how would this affects the Shelbyville and Springfield balance of payments accounts. Give an offsetting transaction that would leave $CA + KA = 0$. (6 marks)

B4) The Simpsons' GDP:

Bart Simpson buys a factory for \$1 and hires his friend Milhouse to help out. Bart borrows the dollar from Fat Tony to purchase the factory and pays him 200 percent interest. In his factory Bart makes Industrial waste. He sells some of the waste to the public and some to the Springfield Nuclear Power Plant, which is owned by Monty Burns and where Homer works. Burns uses the industrial waste to create power to sell to consumers.

Bart's Industrial Waste Company

Wages paid to Milhouse	\$5
Taxes to government	\$10
Interest on debt	\$2
Revenue received from sale of industrial waste	
Sold to Springfield Nuclear Power Plant	\$20
Sold to Public	\$10
Inventory of Industrial waste	\$12

Springfield Nuclear Power Plant

Wages paid to Homer	\$10
Taxes to government	\$5
Revenue received from sale of power	\$30
Inputs purchased from Bart's Industrial Waste	\$20

- a) Show that the three approaches to national income accounting are equivalent using this example. (15 marks)
- b) Bart's sister Lisa visits Canada to research the Pickering Nuclear Power Plant. Using the expenditure approach, show what would happen if Bart was able to sell his \$12 worth inventory to the Pickering Plant? (5 marks)
- c) Homer wins the lottery and will receive \$100,000 each year for the rest of his life. Using the income and substitution effects, explain how this will affect his labour supply. (5 marks)