

ECON 222
Macroeconomic Theory I
Winter Term 2010

Due: Drop Box 2nd Floor Dunning by noon 12 February 2010

No late submissions will be accepted
No group submissions will be accepted
No “Photocopied” answers will be accepted

Remarks: Write clearly and concisely. Devote some time to any graphs you are asked to produce. Note: the way that you present your answers matters for your grade – be clear and concise.

Question 1: Productivity, Output and Employment (20 Marks)

This question will test your knowledge of Chapter 3.

You are given the following information about this economy.

(1) $Y = AK^{\alpha}N^{(1-\alpha)}$

Where Y is output, A is the level of total productivity, K is the capital stock and N is the amount of labour in this economy. In addition, assume that $A = 5$; $\alpha = 0.25$; $K = 625$. The price level in this economy is 1.

- a) Use the production function to derive an algebraic expression for the demand curve for labour, explaining your reasons. Assuming that the wage rate for the economy was constant at 9.25, what would be the level of employment? Show your results graphically. **(6 Marks)**
- b) Now suppose that the supply curve is upward sloping and has the following form:

$$N^s = 1.5w, \text{ where } w = \text{real wage rate}$$

Show how this addition affects your results by calculating the new wage rate and new demand for labour. What has been the effect? **(9 Marks)**

- c) Going into the current recession, Canada’s potential growth rate was estimated to be 3.5% and the unemployment rate, which had fallen to around 6% of the labour force, had been constant for some time. Assuming that the recession has damaged potential growth by $\frac{1}{2}$ a percentage point and that the unemployment rate has risen to 8%, what would you expect to happen to actual growth in the economy? Compare your results with what was happening to growth prior to the recession. Explain how you arrive at your results. **(5 Marks)**

Question 2: Determining consumption (30 Marks)

This question will test your knowledge of the determinants of consumption as laid out in Chapter 4 and Appendix 4.A (which is in the 4th edition and is available on the class website). In answering the questions, be sure to show your steps.

In this economy, identical individuals live for two periods, the present and the future. Their present income, y , is 10 and their future income, y^f , is 11. The economy's real interest rate is 10%. The slope of the utility curve facing each consumer is $-(13/12)(c^f/c)$. For this economy:

- a) Derive an expression for the budget constraint and then explain what it means. What is the slope of the budget constraint and what is its interpretation? Based on the information above, show what it looks like in a graph. **(5 Marks)**
- b) Now rewrite the budget constraint in terms of the present value of lifetime consumption (PVLC) and of lifetime resources (PVLRL) and explain what it means. Use what you know about consumers' preferences to find the levels of present and future consumption. Verify that your results make sense by ensuring that PVLC is equal to PVLRL. What is the level of saving? Locate current and future consumption on your graph of the inter-temporal budget constraint by using an indifference curve. **(10 Marks)**
- c) Now suppose that the interest rate rises to 20%. Calculate what happens to c and c^f . Comparing your results with what you found in question b, what can you say about the relative strengths of the income and substitution effects? Make reference to what is happening to saving in each case. Is the starting point (your results from question b above) important? **(5 Marks)**
- d) For the new interest rate (*i.e.*, $r = 20\%$), derive again the budget constraint and plot it in a new graph with the previous budget constraint. At what point do they cross and what is special about that point? **(5 Marks)**
- e) Assuming again that the interest rate is 10%, suppose that each individual receives assets worth 5. How does this affect the inter-temporal budget constraint? **(5 Marks)**

Question 3: Determining goods market equilibrium (20 Marks)

This question will test your knowledge of how investment and saving and how goods market equilibrium is determined. Knowledge of Chapter 4 is important.

For the total economy, you are given the following information:

The marginal product of capital for next period, MPK^f is:

(1) $MPK^f = 70 - 2K_{t+1}$

where K_{t+1} is the stock of capital in the next period. As well, the rate of depreciation is 8%, corporate taxes are levied at a rate of 50% and the price of capital, P_k , is 150. In your answers be sure to show all your steps.

- a) Assuming that the rate of interest is 5%, how much capital is the economy going to demand? Explain briefly how you arrived at your results and illustrate your answer graphically. Now find what the level of capital would be for two different situations: 1) if the price of capital rose by 25% and 2) there was an improvement in productivity such that the intercept in equation was raised by 10%. **(5 Marks)**
- b) Suppose that the initial level of capital, K_t , in the economy is 10. Use the formula for capital accumulation (equation 4.5 in the text) to derive an investment function in terms of just the level of the interest rate. Assume that the depreciation rate, the corporate tax rate and the price of capital are as given in the beginning of the question. **(5 Marks)**

The desired level of consumption (C^d) for this economy is given by the following:

(2) $C^d = 14 - 100r + 0.5Y$, where Y is GDP or total income in the economy.

Suppose further that government spending (G) in this economy is 6 and the level of full-employment GDP is 32 (and is fixed) and that the economy is closed.

- c) Derive an equation for aggregate “desired” saving (S^d) in this economy spelling out the steps you take to arrive at that equation and the reasons why. Be careful with the signs associated with each variable. **(3 Marks)**
- d) Show how equilibrium is attained in this economy and calculate the level of the real rate of interest that clears the market for goods and services. Use your results to calculate the level of S and I in equilibrium. Show your results graphically. **(7 Marks)**

Question 4: Saving and Investment in an open economy (20 Marks)

To answer this question you will need to know Chapter 5, which deals with a number of open economy issues.

Assume that the economy is open to trade and that there are no impediments to capital movements. As well, assume that the economy takes the world rate of interest as given. For simplicity assume that net factor payments (NFP) are zero.

- a) Using both national accounts identities and graphs, briefly explain how the fact that the economy is open to trade affects goods market equilibrium? Under what conditions would the economy have a current account surplus or deficit. **(3 Marks)**
- b) Start with the investment function that you derived in Part b) and the saving function that you derived in Part c) of Question 3. If the world interest rate were

8%, what would be the levels of saving, investment and the current account? Is the economy using or adding to world savings. **(4 Marks)**

- c) Suppose that one of the benefits of opening up the economy to international trade is that capital goods are now much less expensive. In particular, the price of capital (P_k) falls from 150 to 100. Relying on the investment function that you derived in Question 3, Part b), calculate what are the implications for the current account. Show your results graphically. **(5 Marks)**
- d) Starting with the price of capital of 150, assume that the government wishes to encourage investment and it decides to lower the corporate tax rate to zero. At the same time it is concerned about the implications of this policy on the current account and decides to lower its spending from 6 to 3 to help finance the tax cut with national saving. Starting from the initial conditions and equilibrium that you derived in part b), calculate the implications for the current account for this economy of these developments. Show your results graphically. **(8 Marks)**