

ECON 222 - - Assignment 2 (due Friday 6 February. 12 noon)

Question 1: (Consumption and saving, 40 marks)

Assume that your life is divided into two periods, the present and the future. You know your present income ($y = 125$) and your future income ($y^f = 100$). These are after tax dollars; the government finances its spending of 20 in each period by levying a lump sum tax of an equal amount in each period. The real interest rate that you can borrow and lend at equals 5% ($r = .05$). Your preferences are given by a set of indifference curves showing the trade-off between present and future consumption, c , and c^f . The point at which your budget constraint line is just tangent to the highest curve can be represented by $1.22(c^f/c)$ and this equals the MRIS.

- 1) In a diagram, plot the budget line that shows all combination of c and c^f that you face. Next write down the inter-temporal budget constraint and, based on the information above, derive c and c^f . Make sure that the values of c and c^f that you derive satisfy the inter-temporal budget constraint. Calculate your level of saving. From your calculations, what concept of income matters for determining c ?

Assume now that the government rebates the lump sum tax back to you for the current period and with spending unchanged, it raises the revenue shortfall in the bond market, which you buy. These bonds will be redeemed in the following period.

- 2) Write down the new inter-temporal budget constraint and illustrate how the governments actions affect your consumption patterns. Briefly explain your results.

Assume that we are back in the world described by 1) and from that position the interest rate rises to 10% ($r = .1$). Importantly, the endowments, y and y^f , are unaffected.

- 3) Plot the new budget constraint line. You will notice that it is not only steeper than the original budget line but it intersects the old line from above. Demonstrate why that point represents no saving and no borrowing. For reference, label that point as E. Recalculate the new levels of c and c^f as before. Check to see what happens to saving and what can we conclude about the income and substitution effects.

- 4) As is known, a rise in the interest rate will have both a substitution and an income effect. Show graphically how you would go about separating out the income and substitution effects. To begin with, in your graphical analysis, locate your indifference curves in an area above the point E. Would your answer be any different if the utility curves were located below point E? Illustrate this graphically as well. (Note, it will be easier for you to illustrate these effects by showing large movements in the budget constraint line.)

Question 2: (Investment and goods market equilibrium, 20 marks)

The Canadian economy is characterized by a Cobb-Douglas production function $\{Y = AF(K,N)\}$, which in 2006 had approximately the following values; $A = 22$; $K = 1100$; $N = 16.5$; and β , the share of output going to capital, $= 0.3$. Assume that these values are valid for today.

- 1) Rewrite the production function in terms of just Y and K (by substituting in the numerical values for β , A and N) and use that function to derive the future marginal product of capital (MPK^f). Plot the resulting MPK^f curve for values of K between 900 and 1400, in increments of 50. Using the equation for the tax adjusted user cost of capital, where the price of capital is unity (it is worth one unit of output in real terms), the rate of depreciation is 15% and that the marginal effective tax is 37% (see Table 4.2 in the text), calculate the interest rate implied at each level of capital. Plot this on the same graph as the MPK^f but on a different scale. What pattern do you observe in relation to the MPK^f ?
- 2) On the assumption that the existing capital stock (1100) is at its desired level, what level of the interest would clear the market for capital today? Now assume that there is a 10% improvement in total factor productivity. Holding K at its initial optimal level, by how much would the interest rate now have to change? Finally, going back to the pre-productivity change inputs, calculate the effect on market interest rates of a 2-percentage points reduction in the marginal effective tax rate?

Question 3: (Investment and goods market equilibrium (continued), 20 marks)

This section looks more closely at investment and its determinants and then goes on to examine how equilibrium is determined in the market for goods and services. Use the information on the economy as outlined above.

- 1) Assume that interest rates are 5%. Given that level, and the initial conditions described in question 2, calculate the desired stock of capital? Use the gross investment relationship to determine the desired amount of investment, assuming unchanged interest rates.
- 2) As firms move to increase the capital stock, they are assumed to have to rely on financial markets for funding. Suppose that the aggregate desired saving function for the economy is given by $S = 256 + 150r$. Using this equation, show where desired saving would be at a 5% interest rate. What do these calculations tell you about the market for goods and services? Based on this equation and the investment relationship, at approximately what interest rate would there be equilibrium in the goods market? What is the new desired capital stock?

- 3) Use the changed equilibrium capital stock to estimate the new level of GDP. Assuming that government expenditures (G) are 200, what is the level of desired private consumption in this economy? What is the level of private saving?

Question 4: (Saving in an open economy, 20 marks)

For this question, which will deal with open economy influences on saving and investment, you will be using the same set of empirical facts as in Question 2. Information obtained there will help here.

- 1) Starting where the previous two questions left off (saving = investment), assume that the economy becomes completely open to world markets for goods and services as well as capital, that Canada, along with many other economies, takes the world interest rate as given and that it is set at 8.0%. What is the new desired capital stock, and desired levels investment and saving? Now calculate the domestic saving and investment on the assumption the world interest falls to 5%, possibly because of a saving glut. What is the counterpart to the resulting saving-investment imbalances? Illustrate your results graphically.
- 2) For completeness with question 2, from a position at which the world interest rate was 5%, assume that Canada, because it is now open to world markets, experiences a positive productivity shock of 10%. Again, show the effect on the desired capital stock, investment and domestic saving.
- 3) In Canada, the government is planning a massive fiscal stimulus. Suppose for this question that it consists entirely of lump sum tax cuts on the supposition that this is the most effective way to stimulate activity. Discuss what you think would happen to Canada's current account balance, using a saving-investment perspective. What considerations should be taken in account when addressing this question? (No calculations are required but illustrate your arguments graphically.)