

ECON 222
Macroeconomic Theory I
Fall Term 2009

Assignment 2

*Due: Drop Box 2nd Floor Dunning Hall by **noon October 16th 2009***

No late submissions will be accepted

(One assignment per person)

*Remarks: Write clearly and concisely. Devote some time to give the graphs, plots and tables a format easy to understand. Also the way you present your answers matter for the final grade. Even if a question is mainly analytical, **briefly** explain what you are doing, stressing the economic meaning of the various steps. Being able to convey your thoughts effectively is an asset also in real life.*

Question 1: A Formal Model of Consumption and Saving (30 Marks)

This question studies the present value budgeting problem introduced in Appendix 4A. Suppose Mats' life is divided into two aggregate blocks of time: period 1 and 2. His lifetime budget constraint is:

$$c_1 + \frac{c_2}{1+r} = y_1 - T_1 + \frac{y_2 - T_2}{1+r} \quad (1)$$

Mats exploits its own athletic talents by working in period 1, he then earns income $y_1 = 5500$, and pays tax $T_1 = 2000$. In period 2, Mats hangs up his skates, and he receives income $y_2 = 1500$ from prospective gains while playing poker, and pays tax $T_2 = 400$. Mats desires to smooth consumption over the two periods, so that $c_1 = c_2 = c^*$. The real interest rate is 2 percent ($r = 0.02$).

(a) What is Mats' present value of lifetime resources? What is the highest feasible consumption in the future period? What is the highest feasible consumption in the current period? Use this information to graph the budget line. (5)

(b) Find the optimal consumption in each period, c^* , and the amount of saving/borrowing. Is Mats a borrower or a lender? Plot the optimal consumption point along with the budget line and the original no-borrowing, no-lending point on the graph. (5)

(c) The Bank of Canada is worried about inflation so they raise the real interest rate to 8 percent ($r = 0.08$). Find the new optimal consumption and savings plan, and graphically show the effects of this policy change. Comparing with the result in part (b), explain which effect is stronger for Mats, the substitution effect or the income effect? (10)

(d) Suppose that instead the government plans for a tax raise since it has concerns that the fiscal deficit may become too large in period 1, it does so without changing the government spending pattern over the two periods. The government decides to raise the current tax by \$300 to $T_1 = 2300$ per person. However, in period 2, the government feels generous and lowers T_2 for each taxpayer. Suppose the real interest rate is 2 percent ($r = 0.02$). What will the new value of T_2 be? Explain. (10)

Question 2: Fordlandia (20 Marks)

In 1928, Henry Ford established a community, Fordlandia, in the Amazon Rainforest in Brazil to produce rubber for tires for his car plants in the US. Fordlandia never managed to produce any rubber to send to the US and we can assume that Fordlandia was a closed economy. Its economy can be represented by:

$$\begin{aligned}
MPK^f &= 100 - 0.05K^f \\
d &= 25\% \\
K &= 1200 \\
p_K &= 2 \\
\bar{Y} &= 2000 \\
\text{tax rate } \tau &= .6 \\
C &= 50 + 0.4Y - 600r \\
G &= 125
\end{aligned}$$

- (a) Write the tax-adjusted user cost of capital in Fordlandia as a function of the real interest rate r . (4)
- (b) Write the desired future capital stock (K^f) and desired investment (I^d) as functions of r . (7)
- (c) Use the information provided and your investment function to calculate the real interest rate that clears the goods market. Find the tax-adjusted user cost of capital and the desired capital stock. Using the market clearing interest rate, find the goods market-clearing values of consumption, savings and investment. (9)

Question 3: The Effects of a Technological Innovation in a Small-Open Economy (20 Marks)

In a small open economy where numbers are in billion of dollars:

$$\begin{aligned}
S^d &= 25 + 100r^w \\
I^d &= 50 - 150r^w \\
Y &= 50 \\
G &= 10 \\
NFP &= 0 \\
r^w &= 5\%
\end{aligned}$$

- (a) Find the economy's national saving, desired investment, current account surplus (or deficit), net exports, desired consumption and show these concepts on a diagram.
- (b) Owing to a technological innovation, the country's desired investment rises by \$5 billion at each level of the world real interest rate. Repeat part (a).

Question 4: Investment and Savings in Springfield and Shelbyville (30 Marks)

(a) The world is made up of two economies, Springfield and Shelbyville.

Springfield has desired savings of $S_{sp}^d = 5 + 150r^w$ and desired investment $I_{sp}^d = 10 - 120r^w$

Shelbyville has desired savings of $S_{sh}^d = 5 + 90r^w$ and desired investment $I_{sh}^d = 30 - 140r^w$

(i) What is the world interest rate? What are the current account balance for each country? (10)

(ii) Illustrate your answer with a graph (and label the axes) (10)

(b) Discuss how the following affects the balance of payments accounts in Shelbyville and Springfield. Discuss only the initial transactions described and do not describe any possible offsetting transaction.

(i) A Shelbyville company wants to expand its production of Turnip Juice and borrows money from a Springfield bank. How does this affect the balance of payments accounts in Shelbyville and Springfield? (5)

(ii) Homer and Abe Simpson sell a 100 boxes of "Simpson and Son's Revitalizing Tonic" to a Shelbyville company. How does this affect the balance of payments accounts in Shelbyville and Springfield? (5)