Name: _____. Code: _____

Nova School of Business and Economics
Macroeconomics 1103, 2012-2013, 1st Semester
Prof. André C. Silva
TA: João Morgado

Problem Set 4
Due Date: Thursday, October 25, at the beginning of the class.
Once I start the class, I will not accept problem sets.

Turning in the problem sets is optional. For those that decide to turn in the problem sets, they have to be turned in on paper. The problem sets can be done in groups, but they have to be turned in individually.

Please, turn in your problem set with this cover page, with your name and code filled out above.

1. Consider the framework of question 4 of problem set 3, with $y_1 > 0$ and $y_2 > 0$.

a. Consider an increase in y_2. What happens to consumption and savings? Do the same for a simultaneous increase in y_1 and y_2. What does it change?

b. Suppose that the consumer is initially a borrower. Suppose then that r increases. Illustrate the substitution and income effect caused by this change.

2. To estimulate production, the government decides to pay a subsidy of 10% over the labor income of each worker. If a worker receives 200 Euros per week, this worker will receive 20 Euros per week from the government. (Note that the subsidy depends on labor income, it is not a lump sum subsidy.)

a. Will this measure estimulate production?

b. Will this measure increase welfare?

3. Questions from midterm exams:

a. A temporary increase in income will increase savings more than a permanent increase in income. True or False? Explain.

b. Can the savings rate fluctuate over time? How can it be explained?

c. A consumer has income strongly decreasing over time. His consumption will also strongly decrease over time. True or False? Justify.

4. The consumers in an economy have preferences

$$\log c_1 + \beta \log c_2,$$

where c_1 and c_2 refer to consumption at periods 1 and 2, e $0 < \beta < 1$. The consumers may borrow and lend at the rate r. Given income at periods 1 and 2, y_1 and y_2, the budget constraints are

$$c_1 + s = y_1,$$

for the first period, and

$$c_2 = y_2 + (1 + r) s,$$

for the second period. r is the real interest rate and s are savings.

a. Obtain c_1 and s, given the interest rate, y_1 and y_2.

b. Suppose that all consumers in the economy have the same endowments y_1 and y_2. Make a graph for interest rates and aggregate savings, $1 + r \times S$. Which will be the equilibrium interest rate? Explain.

c. Suppose that y_2 increases for all consumers. How will this increase affect the curve for savings? Will the equilibrium interest rate change? Explain.

d. The interest rate during a certain period was 4 percent per year. During the same period, the output growth rate was 2 percent per year. What will be the value of β compatible with these observations?

5. In the economy above, suppose that the government maintains government expenditures G_1 and G_2 and sets lump sum taxes T_1 and T_2 in each period. The government then decides to set $T_1 = 0$, although keeping G_1 and G_2 constant.

a. What will happen to consumption at time 1?

b. What will happen to savings?

6. (Extra question, you don't need to turn it in.)

A consumer has preferences

$$\log c_1 + \log l_1 + \beta \left(\log c_2 + \log l_2\right),$$

where c_t and l_t are consumption and leisure at time t. This consumer owns a firm with production function $y_t = z_t N_t$, where z_t and N_t represent the technology and labor supply at time t. Given taxes, the present value budget constraint is given by

$$c_1 + \frac{1}{1+r} c_2 \leq z_1 \left(h - l_1\right) + \frac{1}{1+r} z_2 \left(h - l_2\right) - T_1 - \frac{1}{1+r} T_2.$$

a. Write the first order conditions of this problem.

b. When the interest rate increases, what does it happen with c_2/c_1 and with l_2/l_1?

c. Obtain consumption and labor supply at each period as functions of the interest rate. When the interest rate increases, what happens to c_1 and N_1?