**MACROECONOMICS 2018**

**Problem set n° 2**

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1. Consider the OLG with money seen in class, where the two periods endowments of the consumption good for the representative agent are and , with the population growing according to the following equation

Suppose the good is perishable, that is the storage technology is characterized by a return rate .

1. Write down the budget constraints, for the two periods, and the inter-temporal budget constraint.
2. If , discuss the dynamic stability of monetary stationary state, that is the stability of the real- money market equilibrium equation , when the utility function of the representative agent is
3. ii)
4. Consider the OLG without money seen in class, where the two periods endowments of the consumption good for the representative agent are and . Population grows as in problem 1. Suppose the utility function of the representative agent and the production function , with . Find the dynamic law driving the evolution of the equilibrium *per capita* capital , discuss its stationary states and its dynamics
5. Consider the following one variable , discrete time, dynamical system

Draw a graph of the function, find the Stationary States and discuss their stability. Can the system ever exhibit cyclical dynamics?

1. Consider the two variable, first order linear difference equation, system

Find the stationary state of the system and discuss whether or not is a saddle point.

**Discussion**

 The system could be written in matrix term as

Where , , . The stationary state is

Note that solves the equation hence where

The eigenvalues are and . Therefore, is a saddle point and the unique path converging to it the saddle path. But what is the saddle path in this variation of the linear model, with the vector adding up to ?

This is how to proceed. The model can be written as . Define and so

But

 hence

Therefore

can be written as

As stationary state the above system has the origin . Therefore, the saddle path of is the eigenvector of associated to . As a consequence, if must be located on the vector to converge to it follows that , that is the must be initially located on the vector to which the stationary state is added. This means that must be located over the parallel to crossing , as we saw in class.