

Quantitative Macroeconomics - Problem Set III

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Part I

Question 1. Computing Transitions in a Representative Agent Economy

The model is given by:

$$\begin{aligned} \max_{\{c_t, k_{t+1}\}_{t=0}^{\infty}} \quad & E_0 \left[\sum_{t=0}^{\infty} \beta^t \ln c_t \right] \\ \text{s.t.} \quad & c_t + i_t = y_t \\ & y_t = k_t^{(1-\theta)} (zh)^{\theta} \\ & i_t = k_{t+1} - (1-\delta)k_t \end{aligned}$$

Parameters are set to the following values: $\theta = .67, h_t = h = .31$.

1 Steady-state such that z matches $\frac{k}{y} = 4$ and $\frac{i}{y} = .25$

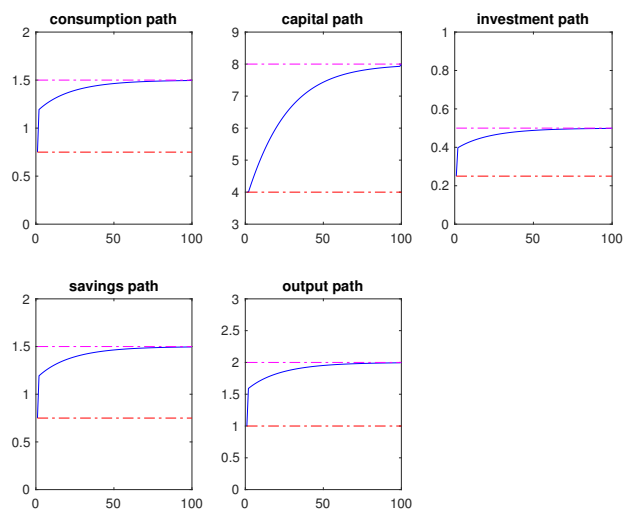
The SS was computed with the following code and functions: *Q1.m, steady_state.m, steady_state2.m*

2 Permanent Shock: new Steady-state after doubling permanently the productivity parameter z

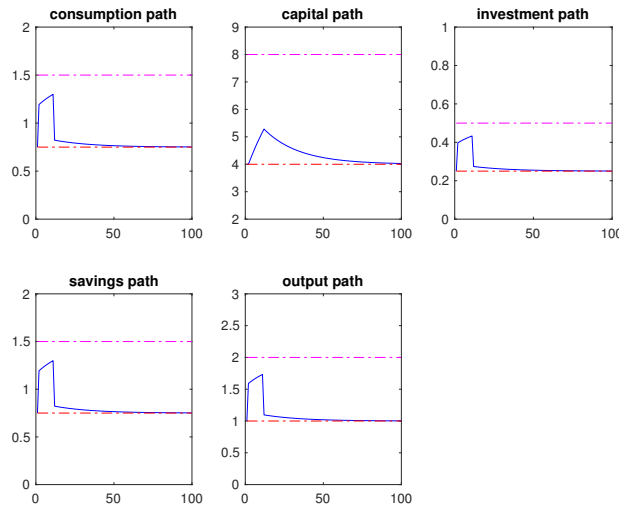
Along with the above, this second SS was computed with the following code and functions: *Q1.m, steady_state.m, steady_state2.m*

3 Transtion from first to second SS

Graphical solutions:



4 Unexpected Shock: transitions



Part II

General Equilibrium with Labor Supply, Uncertainty, and Progressive Labor Income Tax

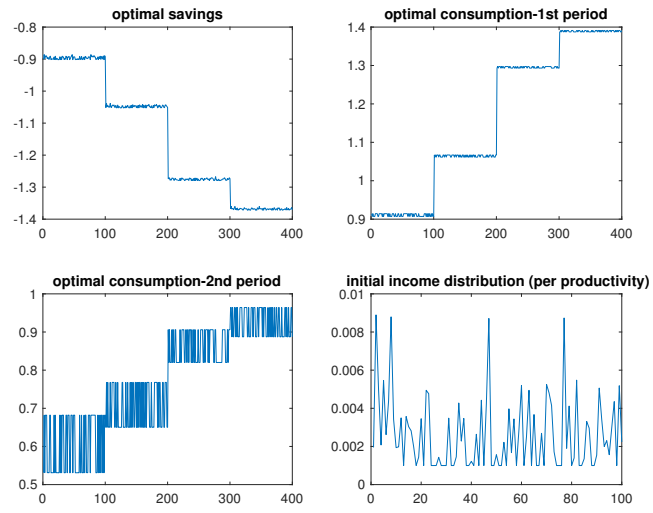
The following code was used to compute the first part (with no tax) of the question: *Q2_1.m*.

Even though the code runs, I was not able to find the equilibrium interest rate. Thus, I got strange results and was not able to provide the graphical solutions.

I thought about doing a bisection on the interest rate values in order to find the equilibrium. Due to lack of time, I was not able to implement this.

Please, take a look at the code because it does compute the equilibrium but it give the wrong asnwers since the guessed interest rate is not the equilirium one.

Below is graphical solution of the optimal paths I found .



For the remainder of the question, when introducing tax, the code should be the same except that I would have to include a market clearing condition for T in order to find its equilibrium value.