Relaxation procedure in MATLAB. Christian Groth

Help to get started[1]

1. Open ODE.m to see the differential equations of the current model version. If you want to change something, see under point 9 below.

2. Open parini.m to see the current parameter values. You may insert new values if desired.

3. Open relaxsetting.m to see the current initial value of the predetermined variable (i.e., the "state variable"). You may insert a new value if desired.

4. Assuming the above settings are in place, you run the program this way: Select Command Window - right-click main.m in Current Directory - choose run.

5. To get graphs of the time profiles of the endogenous variables, right-click Ramseyplot.m and choose run. Remember to run main.m before Ramseyplot.m every time the model is changed. To change the range of the axes in the plot, double-click on Ramseyplot.m. In relaxsetting.m you may increase the number of mesh points if the convergence towards steady state seems awkward.

6. Ramseyplot.m also calculates half-life and the corresponding average speed of convergence (SOC) for each of the endogenous variables in the dynamic system. In addition, the asymptotic SOC (which generally is the same for both endogenous variables) is reported.

7. In Workspace you can among other things see the respective steady state values, named kss and css, as well as numerical values for the time path of the endogenous variables. They are named k and c. Note that the time axis of the variables is stored in the variable t. If you want to know e.g. the value of c at time 10, select t, find the column where the number for t is closest to 10, and note the column number. Then close, select the variable c, and find the entry in the column with the same column number. This entry is the approximate value of c at time 10.

8. To clear screen in Command Window, write 'clc'. To clear the Workspace, write 'clear'.

9. *How to change the model.* The key place to change the model is in ODE.m.
   a. If you only want to add a parameter, say a tax, you rewrite the right-hand side of the

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[1] As updated March 21, 2011. The hints below are written with the two-dimensional "Ramsey Model with a Public Sector" as the current model in mind.

relevant differential equation in ODE.m. You add the name of the new parameter to the parameter list in globalpar.m and parini.m and in the latter you enter the desired value for the new parameter. It is preferable also to adjust the formulas for the trial-and-error steady state values in relaxsetting.m.

b. If you want to consider a new saddle-point stable model with only two differential equations, you enter the right-hand sides of these in ODE.m in a way similar to the way the current differential equations are entered. The differential equation for the pre-determined variable (the state variable) should come first. Remember to adjust globalpar.m, parini.m, and relaxsetting.m.

c. If you want to consider a saddle-point stable model with three or more differential equations, you enter the right-hand sides of these in ODE.m in a way similar to the way the current differential equations are entered. The differential equations for the pre-determined variables (the state variables) should come first. Remember to adjust globalpar.m, parini.m, and relaxsetting.m. Modification of finalbound.m and varex.m is also needed, so you will probably have to consult the downloaded Instruction Manual by Trimborn, Koch and Steger.

10. To enter text in an m-file, choose Text – Comment. The text appears in green. By choosing Text – Uncomment, you go the opposite way and change text into MATLAB code.