## Notes on Solving the Finland Model

These notes briefly describe how to solve the simple growth model without taxes for the case of Finland. Detailed documentation is also available at www.greatdepressionsbook.com.

Organize your work by first downloading the Matlab m-files "depressions.m" and "solveModel.m" from the website www.greatdepressionsbook.com. Also, download the "FinlandModel.xls" file from the course website. "FinlandModel.xls" already contains the model output generated from the m-files. These notes simply explain how to reproduce this output.

In order to reproduce the model output for Finland, parameter values and the values of the exogenous variables need to be assigned. These values appear under the sheet "Finland calibration" in the "FinlandModel.xls" file. Assuming the growth accounting for Finland has already been completed, the only remaining values to be chosen are for $\beta$; $\gamma$; $\eta$, the growth rate of the working-age population; $g$, the growth rate of TFP; and $K_o$, the initial capital stock for the beginning of the period under study.

Recall, the values for $\beta$ and $\gamma$ are derived from the consumer's first order conditions:

$$\beta = \frac{C_{t+1}}{C_t} \cdot \frac{1}{(1 + r_{t+1} - \delta)} \quad \text{and} \quad \gamma = \frac{C_t}{C_t + w_t(N_t \bar{h} - L_t)}.$$

The values of $r_t$ and $w_t$ can be derived from the growth accounting data by recognizing the following relationships from the firm's first order conditions:

$$r_t = \alpha \frac{Y_t}{K_t} \quad \text{and} \quad w_t = (1-\alpha)\frac{Y_t}{L_t}.$$

The values for consumption follow from manipulating the feasibility condition:

$$C_t = Y_t - I_t.$$

The data used to calibrate $\beta$ and $\gamma$ should be from a different time period than the period of interest. For the case of Finland, the values for $\beta$ and $\gamma$ are calculated as the average over the period 1970-1980.

The initial capital stock is assigned the value of the capital stock in 1980, as the period of interest in the case of Finland is 1980-2000.

The growth rates of working-age population and TFP are taken as the average growth rates over the period 1970-2000 and are derived in each period from the following equations:

$$N_{t+1} = \eta N_t \quad \text{and} \quad A_{t+1} = gA_t.$$

All the values for the parameters and exogenous variables should now appear in the "Finland calibration" sheet. The program for the base case model uses two text files as inputs, paramBase.txt and dataBase.txt. Paste the values of the parameters into a new worksheet. Save the file as "paramBase.txt" with type "Text (Tab Delimited)." Click OK to save only the active worksheet. Next select exogenous variables and paste the values into a new worksheet. Again, save the file as "dataBase.txt" with type "Text (Tab Delimited)." Click OK to save only the active worksheet. Everything is set. Open MATLAB and run "depressions.m" from the editor window, or make sure the file is in

the active directory and type “depressions” in the command window without the quotes. The program saves output to “output.xls.” Copy these results into “Finland results” sheet. The graphs on sheets “L%N Finland,” “Y%N Finland,” and “K%Y Finland” now compare the data to the model.