International Macroeconomics 6: The Asset Approach, Dynare, and Computational Steady States Graded Homework Problems*

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1. Consider the following planning problem (all non-price variables are normalized by the aggregate population), where all notation is standard:

$$\max_{c_t, n_t} \mathbb{E}_t \sum_{t=0}^{\infty} \beta^t \left[\ln(c_t) - \gamma \frac{\varepsilon}{1+\varepsilon} l(n_t)^{\frac{1+\varepsilon}{\varepsilon}} \right]$$

such that

$$c_t = y_t$$

and

$$y_t = \bar{Z} \cdot z_t n_t^{\alpha}$$

In addition

$$\ln z_t = \chi + \rho \ln z_{t-1} + \xi_t^z$$

where $\xi_t^z \sim N(0, \eta_\xi^2)$

   (a) a) Set up the current value Lagrangian using a single constraint.

   (b) Derive the first-order conditions. Please show your work.

   (c) Solve for the steady state values of c, n, z. Please show your work.

   (d) d) Create a Dynare .mod file called RBC2 that simulates the model in the previous problem for 1,065 periods assuming the following parameter values: $\varepsilon = 4, \alpha = 2/3, \gamma = 0.0897$. You should estimate the parameters $\bar{Z}, \chi, \rho, \eta_\xi^2$ using Stata and the data provided in the Excel file called "HW6Data". As usual, all non-price variables should be normalized by the aggregate population in accordance with the model's statement.

*These lecture notes closely follow sections from: Epstein, Brendan. *Masters Level International Macroeconomics, 2013*; Feenstra, Robert C., and Alan M. Taylor. *International Economics, 2012.*

2. Following as an example the development in this Lesson, create a Matlab .m file called CONTROL_HW6.m and a Matlab function called MODEL_HW6.m that solve computationally problems 8.b. ad 8.c from the practice problems with solutions from Lesson 1, under the following parameter assumptions: $I_t = 100, p_{c,t} = 1, p_{g,t} = 2, \alpha = 0.5, \beta = 0.5$

3. Use the FX market diagram to answer the following question. Consider the relationship between the Mexican peso and the Canadian dollar ($C\$$). Let the exchange rate be defined as Mexican pesos per Canadian dollar, $E_{pesos/C\$}$. For each of the following cases, illustrate the effects on the FX market using graphs and state how the following variables change: interest rates in Mexico (i_{peso}) and Canada ($i_{C\$}$), the spot exchange rate ($E_{pesos/C\$}$), and the expected rate of return on Canadian and Mexican deposits (from the perspective of a Mexican investor). Unless otherwise noted, you may assume that the expected exchange rate is unchanged.

   (a) Canada's interest rate increases.

   (a) Investors in the market anticipate an appreciation in the peso.

   (a) Mexico's interest rate decreases.

   (a) Canada and Mexico decrease interest rates by the same amount.