Problem Set 7
Intermediate Macroeconomics, Fall 2012
The University of Notre Dame
Professor Sims

Instructions You may work on this problem set in groups of up to four people. Should you choose to do so, please make sure to legibly write each group member’s name on the first page of your solutions. This problem set is due in class on Thursday, November 1.

(1) Graphically Analyzing Our Equilibrium Model of the Economy: This problem asks you to graphically derive the $Y^d$ and $Y^s$ curves associated with the graphical depiction of equilibrium in our production model of the economy. Household optimization gives rise to a consumption demand curve and a labor supply curve:

$$ C_t = C(Y_t - G_t, Y_{t+1} - G_{t+1}, r_t) $$
$$ N^s_t = N^s(w_t, C_t) $$

A representative firm produces output according to:

$$ Y_t = A_t F(K_t, N_t) $$

The firm chooses current labor and investment to maximize the present value of profit. Optimization leads to a demand curve for labor and a demand curve for investment:

$$ N^d_t = N^d(w_t, A_t, K_t) $$
$$ I_t = I(r_t, A_{t+1}, K_t) $$

The total demand for goods in this economy is given by:

$$ Y^d_t = C_t + I_t $$

(a) What are the exogenous variables in this economy? What are the endogenous variables?

(b) Write down the definition of a competitive equilibrium for this economy.

(c) What is the definition of the $Y^d$ curve? Graphically derive the $Y^d$ curve.

(d) How does the marginal propensity to consume affect the slope of the $Y^d$ curve? In particular, if the MPC is bigger (closer to 1), will the $Y^d$ curve be steeper, flatter, or the same slope? Assume that the effect of a change in $r_t$ on desired consumption and investment is independent of the MPC.

(e) What is the definition of the $Y^s$ curve? Graphically derive the $Y^s$ curve.
(f) Suppose that there is an exogenous increase in $A_t$. Graphically show how this affects equilibrium. Write out the sign of the effect on the endogenous variables of the model.

(g) Suppose that there is an exogenous increase in $A_{t+1}$. Graphically show how this affects equilibrium. Write out the sign of the effect on the endogenous variables of the model.

(h) Suppose that there is an exogenous increase in $G_t$. Graphically show how this affects equilibrium. Write out the sign of the effect on the endogenous variables of the model.

(i) Suppose that there is an exogenous increase in $G_{t+1}$. Graphically show how this affects equilibrium. Write out the sign of the effect on the endogenous variables of the model.