Economics 442
Spring 2017
University of Wisconsin-Madison

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Problem Set 3 (revised)

Due ***in lecture*** on Wednesday, April 5th. Be sure to put your name on your problem set. Put "boxes" around your answers to the algebraic questions.

1. Secular stagnation? Suppose the national saving (NS) and investment (I) functions (as a share of GDP) for an economy are given by the following equations.

$$NS = [S] + BuS = [\alpha_0 + \alpha_1 r + \alpha_2 d] + F_0$$
$$\alpha_1 > 0, \alpha_2 < 0$$

$$I = \beta_0 + \beta_1 r + \beta_2 z$$
$$\beta_1 < 0, \beta_2 < 0$$

Where S is saving, BuS is the government budget balance (as a share of GDP), r is the real interest rate, d is a dependency rate (share of children in the economy), z is productivity of capital goods.

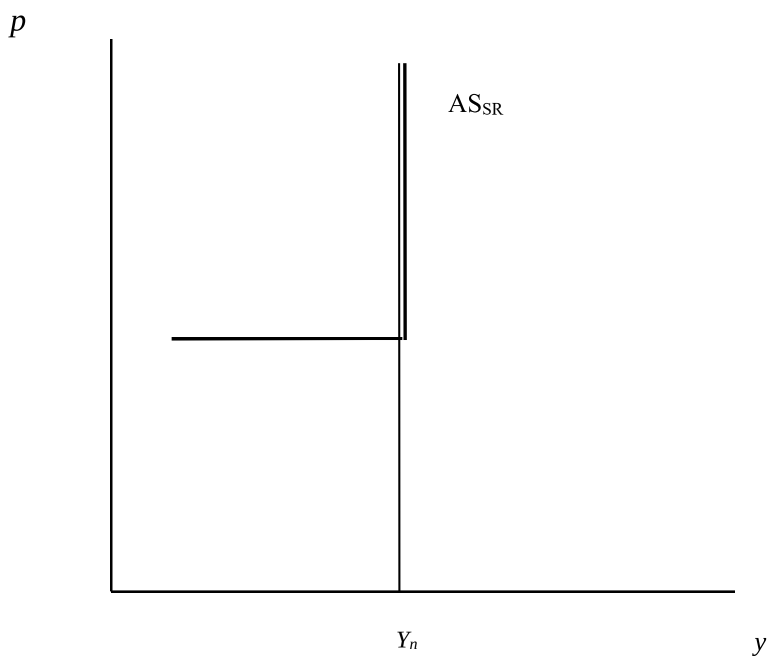
The equilibrium condition is:

$$NS = I$$

The r that solves this equilibrium condition is the equilibrium real interest rate (you can call it r^*).

1.1 Draw a graph of these curves, with the vertical axis as r, and the horizontal axis as NS, and I. Indicate the slopes of these curves, and what shifts each of the curves.
1.2 Solve for the algebraic solution.
1.3 Suppose $\alpha_0 = 0.10$, $\alpha_1 = 0.10$, $\alpha_2 = -0.20$, $\beta_0 = 0.15$, $\beta_1 = -0.20$, $\beta_2 = -0.30$. The exogenous variables take on the following values: $d = 0.2$, $z = 0.25$, $F_0 = 0$ (there is budget balance). Solve the equilibrium interest rate. (Note: for example, "0.07" is 7%).
1.4 Now suppose all the parameters stay the same, as does z, but the youth dependency rate drops to 0.05. Solve for the new equilibrium interest rate.
1.5 Suppose the real interest rate cannot drop below zero. What is the level of desired investment? What is the level of desired saving? Do these levels match? Assume $d = 0.05$.
1.6 Given the conditions in 1.4, suppose the government budget balance goes into deficit equal to 2% of GDP ($BuS = F_1 = -0.02$). Solve for the equilibrium real interest rate.

2. Multipliers. Suppose the AD-AS diagram looks like the following:



2.1 Suppose output is currently below Y_n, and interest rates are above 0. What is the size of the multiplier for government spending, assuming the final level of income is below Y_n?

2.2 Suppose output is at Y_n. What is the size of the government spending multiplier for an increase in government spending?

2.3 Using the same assumptions as in 2.2, state the size of the increase in income arising from a $1 billion real increase in the money supply.

2.4 Suppose output is currently below Y_n, but interest rates are already at zero. What is the size of the increase in income for a $1 billion real increase in money supply?

3. Consider an economy on a flexible exchange rate, and described by the IS-LM-UIP framework in Chapter 20 of the textbook (this model assumes *perfect capital mobility*).

3.1 Suppose autonomous investment collapses. Using the IS-LM-UIP diagrams, show what happens to interest rates, output, and the exchange rate.

3.2 What could monetary policy do to restore output to pre-shock levels?

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