Problem Set 7

Third Generation Models

Due: Monday, December 17th , before the class

Exercise 1 – Sudden Stop

Suppose a country wants to finance an investment project with foreign capital provided by many foreign investors uniformly distributed over the unit interval [0,1] with a total population of mass 1. Each investor is endowed with one unit of indivisible capital so that x is both number of investors who lend to the country and the amount of funds made available. Alternatively, investors can buy a safe asset that yields a gross return equal to $S > 1$ for each unit invested. By contrast, the gross return (that each investor receives) on the investment project depends on the amount of funds invested, i.e. $R(x) = \underline{R} + R^*x$, and thus it depends on the number x of investors who finance the project.

a) Find the value of R relative to S such that "investing in the project" is the unique equilibrium.

b) Find the value of R relative to S such that "investing in the safe asset" is the unique equilibrium.

c) Assume the value of R is between those find in a) and b). Find the possible symmetric equilibrium (a) recalling that there are many identical investors. What would be the possible equilibrium (b) in the case there were just one investor?

d) Now consider an extension of the simple model above to two periods. Suppose that the investment project must be refinanced at the end of the first period and the safe asset is one period bond. The first period return on the project is equal to 1 in the case of termination (liquidation) and that on the bond is also equal to 1 in the first period but equal to $S > 1$ in the second period. Discuss how (or ways) a sudden stop can be formalized within this simple framework.

Exercise 2

Consider the model by Chang and Velasco (2001) presented in Lecture 10.

In finding the condition for a Liquidity Crisis triggered by a Sudden Stop, $b = 0$, in period 1, we assumed that the Bank could commit to repay the (two-period) foreign debt, d, issued in period 0. (See slide 15)

Suppose instead that the Bank willingness to repay the outstanding debt, d, is uncertain, so that the Bank <u>may</u> be expected to liquidate a greater amount of investment to cope

with the liquidity crisis in period 1. After all, the sudden stop is likely to be motivated by the fear of debt default.

a) Suppose domestic depositors believe that the Bank is going to default on d; and it would liquidate, if needed, the investment project to cope with a bank run. Find the condition for a bank run triggered by the Sudden Stop. Is the bank run possible? (assume $b = 0$).

b) What happens if depositors are uncertain on whether d will be honored or not? (Continue to assume $b = 0$).

Exercise 3

Consider the Krugman's (1999) model in the case the exchange rate is fixed and output is demand determined. The net wealth of firms is equal to $W_t = \alpha y_t - D_t - \bar{p}F_t$ where α is the share of capital in total income. Finally, the finance constraint is $I_t^f \leq (1 + \lambda)W_t$

a) Write the condition for the equilibrium in the market for good and services, recalling that all labor income is consumed while all capital income is invested and the share of consumption and investment spent on domestic goods is equal to $1 - \mu$. What is the impact of investment on output?

b) Derive $\partial I_t^f / \partial I_t$ and write the condition for multiple equilibria.

c) If $\alpha = 0.4$ and $\mu = 0.2$, how large should be the leverage λ for a self-fulfilling balance-sheet crisis to be possible?

Exercise 4

This problem was in the final exam of 2016.

Consider the Krugman's (1999) model in the case the real exchange rate, p_t, is flexible and clears the market for domestic goods and services, while output, y_t, is supply determined (i.e. predetermined by the existing stock of capital). The net wealth of firms is equal to $W_t = \alpha y_t - D_t - p_t F_t$ where α is the share of capital in total income, D_t is domestic-currency debt, and F_t is foreign-currency debt. Finally, the finance constraint is $I_t^f \leq (1 + \lambda)W_t$

a) Derive the real exchange rate, p_t, from the equilibrium in the market for good and services, recalling that: all labor income $(1 - \alpha)y_t$ is consumed while all capital income is invested; the share of consumption and investment spent on domestic goods is equal to $1 - \mu$, and exports in terms of foreign goods, X, are constant. What is the impact of investment on the real exchange rate?

b) Derive the effect of (expected) investment on financeable investment, $\partial I_t^f / \partial I_t$, and write the condition for multiple equilibria.

c) If $\mu = 0.2$, and the foreign-debt-to-export ratio $F_t / X = 0.8$, how large must be the leverage λ for a self-fulfilling balance-sheet crisis to be possible? Which policy(ies) should a government implement to prevent a balance sheet crisis?