

ECON 4335 Economics of Banking, Fall 2017

Problem Set 6

November 2, 2017

Overborrowing, externalities, and systemic risk

Consider a small open economy with a tradable goods sector and a nontradable goods sector. Only tradable goods can be traded internationally; nontradable goods have to be consumed domestically. The economy is populated by a continuum of identical households of measure one, living for 2 periods $t = 0, 1$, with preferences given by $u(c) = \ln c_0^T + \ln c_0^N + \ln c_1^T$, in which c_0^T , c_0^N , c_1^T are consumption of tradable goods at $t = 0$, consumption of nontradable goods at $t = 0$, consumption of tradable goods at $t = 1$, respectively.

A representative household starts with initial asset b_0 at $t = 0$, and ends after $t = 1$ with zero asset, i.e., $b_2 = 0$. Note that b_0 can be positive or negative: when $b_0 < 0$, the household starts with initial debt. The timeline of events is as follows:

- At $t = 0$, the representative household receives both an endowment of tradable goods y_0^T and an endowment of nontradable goods y_0^N for consumption. y_0^T is a random variable that is drawn from a distribution with cumulative distribution function $F(y)$, while y_0^N is constant. After (y_0^T, y_0^N) is revealed, the household can also borrow from abroad by purchasing a one-period, non-state contingent foreign bond denominated in units of tradables that demands a fixed interest rate r — normalized to be 0, determined exogenously in the world market. Normalize the price of tradables to 1 and denote the price of nontradable goods by p_0^N . In addition, the household's debt is securitized such that its total debt cannot exceed a fraction $0 < \kappa < 1$ of its total income from tradables and nontradables;
 - At $t = 1$, starting with total asset b_1 the representative household only receives an endowment of tradable goods y_1^T for consumption. y_1^T is constant.
1. Specify the representative household's budget constraints, borrowing constraint, and lifetime optimization problem.

2. Compute the first order conditions for the household's optimization problem:
 - (a) Derive the first order conditions with respect to c_0^T and c_0^N , then determine p_0^N ;
 - (b) Derive the first order conditions with respect to c_1^T and b_1 , then determine the Euler equation. Why is the borrowing constraint *occasionally* binding?
3. Determine c_0^T :
 - (a) Under what condition(s) is the borrowing constraint not binding? In this case, use the results from exercise 2(b) to determine c_0^T ;
 - (b) When the borrowing constraint is binding, compute c_0^T .
4. Consider two situations at $t = 0$: the economy can be either in normal state $y_0^T = \bar{y}$, i.e., the household receives a mean value \bar{y} , or crisis state $y_0^T = \bar{y} - 1$, i.e., y_0^T is below the mean. Suppose the household knows the true state before it borrows.
 - (a) If borrowing constraint is not binding in both states, how does c_0^T react to the crisis, compared with c_0^T in the normal state?
 - (b) If borrowing constraint is binding in both states, how does c_0^T react to the crisis, compared with c_0^T in the normal state?

📖 Bianchi, J. (2011), Overborrowing and systemic externalities in the business cycle, *American Economic Review* 101, 3400-3426.