Notes and Corrections (2023, 2024)

Heterogeneous Agents in Macroeconomics
Rustam Jamilov

Lecture 0 (Foundations)

- Slide 4.

  The list of conditions for dynamic aggregation has been corrected. Previously, there was an error: redundancy of the complete markets assumption. Unlike in Rubinstein, we already assume rational and homogenous belief systems. In Rubinstein, however, expectations were allowed to be arbitrary at first. See Theorem (Aggregation) in Rubinstein and note the conditions on page 232, see $\{\pi_e\}$ in each of the first 4 cases (i)-(iv).

- Slide 13.

  δ^τ was missing in the denominator.

Lecture 1 (Households)

- Slide 5.

  Typo fixed. It must say $\kappa = \log(\rho) - \frac{\rho-1}{\rho}\log(1-\rho)$.

- Slide 11.

  Line 2: Typo fixed. The correct interest rate must be $\tilde{r}$. This is the price that the household takes as given. In general equilibrium, it will equal $r - \delta$, but it is not imposed in the partial-equilibrium problem of the household.

  Line 3: clarification that the upper bound k_n is non-binding.

- Slide 16.

The correct statement is "where $b \geq 0$ is an ad-hoc debt limit" with a weak inequality sign because b can be zero in which case no borrowing is permitted.

- Notes on whiteboard.

  Clarification of the comparative statics on the debt limit ϕ. An increase in ϕ represents a *relaxation* of the debt limit. Thus, following an increase in ϕ the upward-sloping asset supply curve shifts to the left, the equilibrium rate $1 + r$ goes up and approaches the intersection with $1 + \rho = \frac{1}{\beta}$, and the economy gets closer to the complete markets benchmark.

Lecture 2 (Firms)

- There was a question in class regarding the entrant's problem: Entry occurs until expected discounted profits net of entry cost are zero:

$$v_t^e(z) \leq c_e \tag{1}$$

  with strict equality when $M_t > 0$. The case of $v_t^e(z) > c_e$ is ruled by the free entry condition and can not be sustained as part of any equilibrium.

Lecture 3 (Banks)

- Clarification on the specification of Equation (7) on slides, the VaR constraint. The restriction is in terms of returns on equity. Thus the constraint can be re-written as:

$$\mathcal{P}\left(\pi_{i,t+1} - \omega < 0\right) \leq \alpha_i \tag{2}$$

  Generally, profits can be negative in theory. But that would draw down ω closer to 0 in the next period, which is ruled out because banks live for 2 periods and ω is invariant. Here, profits do not only need to be non-negative, the have to be sufficiently positive in expectation for some $\omega > 0$ such that even in the downside scenario some "equity cushion" is maintained.

- Typo fixed in equation (32): d_{it} was missing in the integral.

Lecture 4 (Regions)

- Clarification for slide 11. The mathematical argument for why the NFA in country 1 is negative is straightforward. Economically, the reason why the developed country becomes a borrower is because the less developed country has an unfulfilled need for precautionary savings. So, when international markets liberalize, country 2 fulfills that need by lending to country 1 in the b asset.

- Clarification for slide 4 on the intuition of the constraint in Equation (3). This is essentially a flow-based credit constraint in the general case of s state-contingent assets. Consider a special case where assets are restricted to one-period non-state contingent bonds. Then, the constraint takes the form of: $b_t \geq -\phi_i (\omega + zk^{\nu})$ which is more familiar and similar to what is used in standard open-economy macro models like in Bianchi (AER, 2011). The terms inside the bracket summarize income: endowment and production. For more intuition see appendix B of Mendoza et al. (2009).

- Clarification on notation in Slide 3 onwards. The i subscript denotes a country. There is no subscript denoting agents (i.e. households). Thus, Equation (1) for example is the budget constraint for each individual agent within country i. Generally, one can introduce the subscript j denoting individual agents.

Lecture 6 (HANC, TANK, and HANK)

- On page 10, the value function of the worker must include the expectation of becoming old in the next period—it did not compile properly previously but is now fixed.