Problem Set I

Quant Macro II

January 23, 2024

Deadline: January 29, 12pm. Please send the Matlab codes plus a PDF (made with Latex) to both Eustache and me by January 29, 12pm. One submission per team of 2 students (not 1, not 3).

Exercise 1. We want to solve a basic Aiyagari model in steady-state. Starting from the codes attached, please do the following changes.

1. Improve the guess for the value function. Start with a first guess implied by the constant policy $a' = a$. After updating the interest rate, use the value function of the previous guess for r as a new guess.

2. Add the Howard step.

3. Update the measure using matrix computations instead of a simulation.

4. Update the search for r using the implied interest rate (with slow weights!) rather than a simulation.

5. Update the algorithm to use a Golden search rather than a grid search.

    (a) Create a function to linearly interpolate your value function between two asset points.

    (b) Use a Golden algorithm to find the optimal a', and compute the new value function. Use the Golden code I've sent you.

    (c) Adjust the matrix computation of the measure.

6. Finally, revisit your asset grid. Implement a log-grid. Increase the upper bound to 50. What does it change? Do you want to increase the number of points for the asset-grid?

Instructions to submit a solution:

- Please do these changes one after the other (that is, change the guess for the value function; save this code [create a folder called v1]; then, using this new code with an updated guess for the value function, add the Howard step; save this second version [in a folder called v2]; then, using this new code, etc.).

- For each intermediate step, please report in your Tex file how your changes alter the code: is it faster? more precise? do policies look smoother? does the distribution makes sense?