Computational Methods: Task list 5

To be handed in by November 24, 2020

1) Solve the planner version of the RBC model by dynamic programming

   a) Start from the file 'consinterp.m', and modify it so as to solve the RBC model with the parameters as in rbc1.mod. For the baseline, use a standard deviation of $\sigma = 0.007$ for the TFP shock.

      Hints:

      * First compute the steady state and choose a grid of capital that is ± 20 percent of the steady state capital. Use 1001 equispaced grid points for capital (make sure the deterministic steady state is a grid point).
      * Approximate the TFP process by the function 'markovappr.m', using 11 grid points. More precisely, use markovappr to approximate an AR(1) around 0, and then add 1 to get TFP (do not use exp, because then the mean of TFP is not 1).
      * At each grid point, choose as the decision variable labor L. Given L, you can compute the wage rate as the marginal productivity of labor, and you choose consumption c from the static first order condition for labor supply.
      * As in 'consinterp.m', solve for optimal L by golden search.

      For the golden search, you need boundaries for L. In general, use a wide interval, say $L \in (0.1, 0.6)$. However, this can make end-of-period capital to jump outside the grid. Therefore, and separately for every grid point, if $L = 0.1$ leads to $Knext < gridK(1)$, find the level of L such that $Knext = gridK(1)$ and use this as the lower bound. Do the same for the upper bound.

   b) After solving the model for $\sigma = 0.007$, solve it again with $\sigma = 0.0001$. Use the same grid of capital. Compare the optimal consumption choice between the two values of σ

      * at the steady state value of K and TFP=1
      * in the mean over all K with TFP=1

      to measure the effect of precautionary saving. Compare this to the precautionary saving effect obtained from the Dynare second order solution (use the file 'dxdsigma.m' from the libm.tar.gz library).

      Plot the difference between the two consumption functions (at TFP=1), to check whether the precautionary saving effect is constant across the state space (which is the outcome of the second order solution).

Please hand in the Matlab files that do this by email. Any explanations should be written as comments in the Matlab files. As always, you can work and hand in in teams of two or three.