RBC Model With Endogenous Labor Supply and Aggregate Uncertainty

The Matlab code in this folder solves a canonical RBC model with Frisch elasticity labor supply and aggregate uncertainty (TFP) shock.

Folder Guide:

- `./RBC_Frisch_GNLS_Slow.m` solves the model using time loops (slow).
- `./RBC_Frisch_GNLS_Fast.m` solves the model using vectorization instead of loops (fast)
- `./Functions` has all auxiliary functions used in the main Matlab code
- `./Figures` has useful plots given the solution

The algorithm used to solve the model follows Hanbaek, L. (2022). *"A Dynamically Consistent Global Nonlinear Solution Method in the Sequence Space and Applications."*

Model:
The individual state vector for the household is $\mathbf{s} = (a, K, A)$ where a is individual capital/asset level, K is the aggregate level if capital, and A is the exogenous TFP shock. The household's recursive problem is formulated as follows:

$$V(a, K, A) = \max_{c,n,a'} \left\{ \frac{c^{1-\sigma}}{1-\sigma} - \eta \frac{n^{1+1/\chi}}{1+1/\chi} + \beta \mathbb{E}_{A'} V(a', K', A') \right\} \tag{1}$$

$$\textbf{s.t.} \quad c + a' = (1 + r(K, A))a + w(K, A)n, \quad c \geq 0, \quad n \in [0, 1], \quad a' \geq 0$$

The representative firm-side problem is as follows:

$$\max_{K,L} AK^{\alpha} L^{1-\alpha} - (\delta + r(K, A))K - w(K, A)L \tag{2}$$

The Market clearing conditions are:

$$a = K \tag{3}$$
$$n = L \tag{4}$$

and where the good's market clears by Walras' Law.

The consistency condition for a Recursive Competitive Equilibrium becomes:

$$a'(a, K, A) = K' \tag{5}$$

Finally, the TFP follows a stochastic log-AR1 process:

$$\log(A') = \mu + \rho \log(A) + \sigma_{\epsilon} \epsilon, \quad \epsilon \sim iid\, N(0, 1). \tag{6}$$