Assignment 2

Submitted by Zhihan Yu (2101111618)
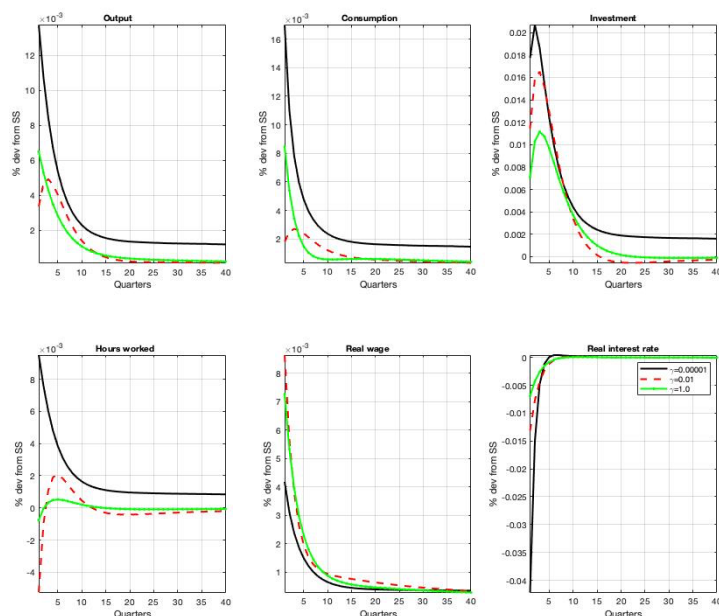
Part I: RBC Model with JR utility function

What needed to be done
- Change Line 7 of given code to read from correct directory path;
- Change Line 19 to label actual parameter values used.

Output Results
For code, see attached file "graphs_irfs_compare_RBCs.m"

Interpretation

The different γ values of the JR preferences govern the magnitude of the wealth effect on labor supply. This interaction between the wealth effect and labor supply is most clearly seen in the "Hours Worked" subfigure. As $\gamma \to 1$, JR preferences convers to the KPR preferences (a variant of the Cobb-Douglas with an extra weight parameter for work hours). Under this specification, a positive TFP shock will slacken households' budget constrain. With greater wealth, households will substitute labor away for more consumption to increase utility (since leisure and consumption are separable). As $\gamma \to 0$, JR preferences converges to the GHH preferences. Under GHH preferences, consumption and labor are not additively separable and the wealth effect on labor supply becomes muted. Looking at the "Hours Worked" subfigure, we see exactly this: with a positive TFP shock, hours worked did not decrease on impact, but instead, increased. This increase reflects the increased willingness to work due to increases in productivity (aka. increases in wages under marginal pricing conditions).

Part II: RBC Model with External Habitat

What needed to be done
- Change expression for utility (level) and marginal utilities (wrt. C and H);
- Change steady state model bloc accordingly:
  - Rewrite steady state utility (level) and marginal utilities;
  - Only utility changed, so in steady state, only labor supply will change.

Output Results
For code, see attached files "RBC_hab.log", "RBC_hab.mod"
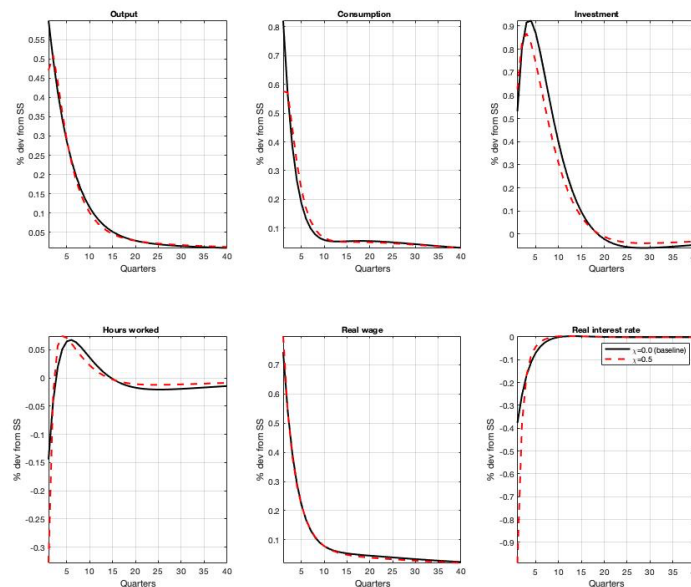
Interpretation

Habit formation in consumption is a feature added to the utility function to reflect the idea that current utility from consumption depends not only on current consumption levels but also on past consumption levels. The parameter χ characterizes the strength of this habit formation. **[Consumption]** Consumption initially rises less than output because the habit formation (due to lagged consumption) dampens the immediate response of consumption to the income shock. **[Investment]** Investment shows a very sharp initial increase, suggesting that firms are rapidly adjusting their capital stock in response to higher productivity. The presence of habit formation seems to affect the trajectory of investment over time, possibly because it influences how much of the output is consumed versus saved and invested. **[Work]** Because of the wealth effect, hours worked decreased immediately following the positive TFP shock. **[Interest Rate]** The sharper drop in the real interest rate with stronger habit formation suggests that the immediate effect of the shock on savings and investment decisions is sensitive to past consumption levels, which could be due to changes in how utility is derived from consumption versus saving.