Final Homework

You are asked to write an essay (between 1200 to 1500 words) answering to the questions in Part 1 of this homework. Then, work out the exercise on RBC model in Part 2 and comment your plots and tables of figures. (Hint: You may use Octave and Dynare to do the computational tasks.)

Deadline: Your work is due to the beginning of Session #8.

Documents


Part 1: Questions

Text 1:

- How can tax rates differentials explain the gap in hours worked between European countries and United States?

- Show how the effective marginal tax rate on labor income is determined in equation 8. Give an economic intuition on the effects of a high marginal tax rate on the supply of hours.
Text 2:

- Summary the point of view of Blanchard. To what extent the introduction of the minimum wage could help explain the gap in hours worked between Europe and US?

Text 3:

- Briefly expose the Alesina et al. argument in the debate. What is the role of unions?
- Explain the “social multiplier” argument by Alesina et al. versus the Blanchard “culture” argument in explaining the hours worked gap.

**Part 2: Real Business Cycle Model (Prescott, 2003)**

In this exercise, we investigate the role of labor taxation and its effects on BC properties and steady state of the canonical model. Consider the economy of country A with a representative consumer and a representative competitive firm. The consumer’s behaviour derives from the following program:

$$
\max_{\{c_t, h_t, k_{t+1}\}_{t=0}^{\infty}} E_0 \left[ \sum_{t=0}^{\infty} \beta^t [\ln(c_t) + \theta \ln(1 - h_t)] \right]
$$

subject to

$$w_t h_t + r_t k_t + (1 - \delta)k_t + s_t \geq c_t + k_{t+1}, \quad \forall t \geq 0, \quad k_0 \text{ given} \tag{2}
$$

where $c_t$, $h_t$, $k_t$, and $s_t$ represent respectively the consumption, labor effort paid at wage $w_t$, capital stock rented at price $r_t$, and public transfers. Parameters $\beta \in (0; 1)$, $\theta > 0$, $\alpha \in (0; 1)$, $\delta \in (0; 1)$ are respectively the subjective discount factor, Frisch elasticity, the share of capital in value added, and the depreciation rate. Finally, the stochastic process $z_t$ follows the law of motion $z_t = \rho z_{t-1} + \epsilon_t$, where $|\rho| < 1$, and $\epsilon_t \sim N(0, \sigma^2)$ and iid. A unique, representative firm produces competitively the final good according to the production function

$$y_t = \exp(z_t) k_t^\alpha h_t^{1-\alpha} \tag{3}
$$

for a total cost of

$$r_t k_t + (1 + \tau_A) w_t h_t, \quad \tag{4}
$$

where $\tau_A$ is the labor tax rate, that is used to finance transfers, i.e. $s_t = \tau_A w_t h_t$. 


1. Derive the first order conditions for the consumer’s optimal path \( \{c_t, h_t, k_{t+1}\}_{t=0} \). Then give the first order conditions for the firm. Compute the value of all the endogenous variables \( (c_t, h_t, k_{t+1}, y_t, i_t, r_t, w_t) \) at the steady state, where

\[
i_t = k_{t+1} - (1 - \delta)k_t. \tag{5}
\]

Comment on the effect of labor tax on the labor’s steady state value.

2. Use Dynare to solve the model and plot the Impulse Response Functions for each variables. Use the following calibration: \( \beta = 0.984, \theta = 3.48, \alpha = 0.33, \delta = 0.025, \rho = 0.98, \sigma_e = 0.0072, \tau_A = 0.2 \). Discuss your graphs.

3. Simulate the model with 50 draws of 115 periods long. After logging and detrending, compute the standard deviation and correlation with output for the endogenous variables.

4. Consider now country B where the labor tax rate is \( \tau_B = 0.5 \). Take the same calibration of country A except for the labor tax rate. Plot IRF for all variables.

5. Focus now on the labor supply response. How the response and level of hours worked are affected by the different tax system? Which elements of heterogeneity between country A and B other than taxation could affect the hours worked? Discuss.