

Midterm

Econ 205B, Winter 2017

- You have 60 minutes to complete the exam. The maximum points possible is 50.

1. Consider an RBC model with productive government spending. The household's problem is to choose c_t, h_t, i_t to maximize the discounted-sum of utility:

$$\begin{aligned} \max_{c_t, h_t, i_t} E \sum_{t=0}^{\infty} \beta^t u(c_t, h_t), \quad 0 < \beta < 1 \\ \text{s.t.} \quad c_t + i_t + \xi_t \leq w_t h_t + r_t k_{t-1} \\ k_t = (1 - \delta)k_{t-1} + i_t \end{aligned}$$

where ξ_t is a lump-sum transfer and we specify

$$u(c_t, h_t) = \ln c_t - \varphi \frac{h_t^{1+\eta}}{1+\eta},$$

where φ and η are parameters. The government spending G_t follows an AR(1) process:

$$\ln G_t = (1 - \rho_G) \ln \bar{G} + \rho_G \ln G_{t-1} + \epsilon_{G,t}.$$

The production function is given by

$$Y_t = z_t \times \left(\frac{G_t}{\bar{G}} \right)^\theta \times K_{t-1}^\alpha H_t^{1-\alpha},$$

so the productivity is higher when the level of government spending is high. $\theta \geq 0$ is a parameter that determines the sensitivity of productivity to the spending level. z_t is a standard technology shock: $\ln z_t = \rho_z \ln z_{t-1} + \epsilon_{z,t}$.

- (a) (5 points) State the government budget constraint.
- (b) (5 points) Define the sequential market equilibrium, including the household's problem and the firm's problem.
- (c) (5 points) Define the recursive competitive equilibrium, including the household's problem and the firm's problem.
- (d) (5 points) Derive the equilibrium conditions of this economy.

- (e) (5 points) Consider the case $\theta = 0$. What happens to consumption, hours, and output when there is a positive government spending shock? What is the size of government spending multiplier to output?
- (f) (5 points) Consider the case of sufficiently large θ . What happens to consumption, hours, and output when there is a positive government spending shock? What is the size of government spending multiplier to output?

2. Consider an RBC model with an indivisible labor.

- (a) (10 points) Explain how the indivisible labor model is equivalent to a divisible labor model with infinite labor supply elasticity at the aggregate level. Make sure to include a discussion of the social planner's problem.
- (b) (10 points) Describe how to solve the indivisible labor model using value function iteration. For simplicity, consider a case with no technology shock.