

Final Exam

Quant Macro II

May 2022

*You have 2 hours for this exam. Neither books, nor class notes are permitted. Please, provide **concise and legible/readable** answers. If you think you need to make additional assumptions to answer some questions, please go ahead, and state them clearly in your answer.*

Consider an economy populated by a continuum of infinitely lived households with preferences given by

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t [u(c_t^i) + v(m_t^i)]$$

where c_t^i denotes market consumption expenditures and m_t^i denotes medical expenditures of household i . Medical expenditures are idiosyncratic exogenous shocks: they follow an exogenous stochastic process represented by the Markov chain $\pi_m(m, m')$. There are I types of households, indexed by $i = 1, \dots, I$. Each type i corresponds to a different (fixed) labor productivity level ε^i . All households supply labor inelastically to the competitive labor market. Production takes place through the aggregate production function $F(K_t, N_t)$, where K_t is aggregate capital and N_t is aggregate labor input. Households can trade non-state contingent claims to physical capital, subject to a zero-borrowing limit.

1. We first assume that there is no government. Assume that the economy is in steady-state.
 - 1a. Write down the household's problem in recursive form. **(2 points)**
 - 1b. Define formally a stationary recursive competitive equilibrium. **(3 points)**
 - 1c. Explain briefly how you would solve numerically for the equilibrium defined above. **(3 points)**
2. We now assume a government in this economy. The government runs a compulsory medical insurance program whereby every household must pay an insurance premium θ at the beginning of each period, and a fraction ϕ of its realized medical expenditures are covered by the government. The government also taxes capital income at the proportional rate τ . The premium θ is determined to keep the government budget balanced. Assume again that the economy is in steady-state.
 - 2a. How does the household's budget constraint changes? **(2 points)**
 - 2b. Write down the government's budget constraint. **(2 points)**
 - 2c. Explain how you would adjust your algorithm to incorporate the government. **(2 points)**

3. Suppose that, unexpectedly, the government announces that it will raise the coverage rate from ϕ to ϕ' . The economy converges to a new steady-state with higher ϕ' .
- 3a. How would you compute the sequence of equilibrium insurance premia $\{\theta_t\}$? **(3 points)**
- 3b. How do you expect the long-run steady-state distribution of wealth to compare to the initial steady-state distribution? **(2 points)**
- 3c. How do you expect households to react along the transition? Who may or may not support the reform, when announced? **(2 points)**