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Problem Set 4

Advanced Macroeconomics

Winter 2025/26

One-Period Model with Public Sector

Consider the one period model from the lecture extended by consumption taxes and public spending. Assume the following utility function:

$$u(c, n) = \frac{c^{1-\sigma}}{1-\sigma} - A_h \frac{n^{1+\varphi}}{1+\varphi},$$

where A_h is a labor disutility weight. Public budget is given as

$$g = \tau P c = \gamma y,$$

where g is public consumption, $P = 1$ the price index, τ the consumption tax, and γ the share of public spending on GDP. The goods market clears if aggregate output is equal to aggregate demand:

$$y = g + c.$$

1. * Derive the first-order conditions for a profit maximum of the representative firm.
2. Derive the budget constraint and the first-order conditions for a utility maximum of the representative household.
3. Derive the analytical steady state. Assume that one third of the day is spent for labor hours $n = 1/3$. To balance the labor market equilibrium condition, derive an expression for A_h.
4. Compute the general equilibrium using the toolbox Dynare. Calculate the tax rate for which 20 percent of GDP are used for public spending.

*Note: the task marked with * follows directly the lecture and is intended for independent self-study.*