MIDTERM MACRO II

MACROECONOMICS II
FIRST HALF
MARCH 18 2024

Instructions

Total time is 90 min. Maximum score is 60 pts. Formulas are often a more concise way to express relationships, but make sure that you explain how or why your formulas answer a given question. If you believe that you need additional assumptions to answer a question, state these clearly in your answer. There are spare blank pages to write on at the end of the exam if you need more space.

Q1: The basic New Keynesian business cycle model **(30pts)**

Consider the New Keynesian model described by the following specification (notation as in Gali's textbook). The representative household maximizes

$$\max E_0 \sum_{t=0}^{\infty} \beta^t \left(\frac{C_t^{1-\sigma}}{1-\sigma} - \frac{N_t^{1+\varphi}}{1+\varphi} \right)$$

where

$$C_t \equiv \left(\int_0^1 C_{t,i}^{\frac{\varepsilon-1}{\varepsilon}} di \right)^{\frac{\varepsilon}{\varepsilon-1}} : \varepsilon > 1$$

subject to the budget constraint

$$P_t C_t + Q_t B_t \leq B_{t-1} + W_t N_t + D_t$$

for $t = 0, 1, 2, ...$ Good i is produced by firm i with technology

$$Y_{it} = A_t N_{it}^{1-\alpha}.$$

Labor markets are competitive.

Date: March 18, 2024.

(1) What are the decisions taken by the household? What are the optimality conditions determining these decisions? **(5pts)**

(2) What is the optimal price set by firm i when prices are flexible? How does a firm's price setting decision change when prices are subject to a Calvo-type friction? For what parameter value(s) is the optimal price with sticky prices the same as with flexible prices?
Note: You don't need to derive the optimal price under sticky prices, but you should explain what it depends on, perhaps using a formula. **(10pts)**

(3) What are the sources of inefficiencies in the model? Which parameters determine the severity of these inefficiencies? For each parameter, describe how a marginal change in the value the parameter affect efficiency. **(5pts)**

(4) Derive the optimal employment subsidy τ such that the level of output is efficient. Explain the "divine coincidence" and how it relates to the steps you used to derive the optimal employment subsidy. **(10pts)**

Q2: Sticky wages and unemployment **(20pts)**

(1) Explain how labor supply is determined in the New Keynesian model when wages are sticky. How does it differ from labor supply in the basic model with competitive labor markets? **(5pts)**

(2) To make the steady state level of output efficient, do you need a larger or smaller production subsidy than in the model with competitive labor markets? Why? **(5pts)**

(3) In the version of the New Keynesian model with unemployment, what is the difference between the participation constraint/condition of a worker and actual labor supply? How does it relate to Gali's definition of unemployment? How does Gali's definition of unemployment differ from other common definitions, e.g. the definition used to collect unemployment data? **(10pts)**

1. Q3: Empirical strategies (10pts)

(1) Describe the empirical strategy that Kydland and Prescott (1996) calls a *computational experiment*. What is the *calibration stage* and the *validation stage*? What are the weaknesses of calibration as a strategy to choose parameters for a model? Under what circumstances should calibration be the preferred strategy? **(10pts)**