

i Candidate instructions

ECON5300/9300

This is some important information about the exam in ECON5300/9300. Please read this carefully before you start answering the exam.

Date of exam: Monday, November 25, 2019

Time for exam: 09.00 a.m. - 12.00 noon (3 hours)

The problem set: The problem set consists of 3 questions with several sub-questions. They will count as indicated.

Sketches: You may use sketches on all questions. You are to use the sketching sheets handed to you. You can use more than one sketching sheet per question. See instructions for filling out sketching sheets below. It is very important that you make sure to allocate time to fill in the headings (the code for each problem, candidate number, course code, date etc.) on the sheets that you will use to add to your answer. You will find the code for each problem under the problem text. You will NOT be given extra time to fill out the "general information" on the sketching.

Access: You will not have access to your exam right after submission. The reason is that the sketches with equations and graphs must be scanned in to your exam. You will get access to your exam within 2-3 days.

Resources allowed: Open book examination where all printed and written resources, in addition to two alternative calculations are allowed.

Grading: The grades given: Students on master's level are awarded grades A-F, with A as the best and E as the weakest passing grade. F is fail. Students on phd-level are awarded either a passing or failing grade. The pass/fail scale is applied as a separate scale with only two possible results.

Grades are given: Monday, December 16, 2019

Consider an economy with a set of infinitely-lived households. Each household maximizes

$$\max \sum_{t=0}^{\infty} \beta^t \frac{(c_t)^{1-\gamma}}{1-\gamma}$$

where c_t is consumption in period t . The size of the population is constant. Output is produced by a large set of firms with a production function

$$Y_t = A \cdot K_t^\alpha \cdot L_t^{1-\alpha}$$

where K_t and L_t are aggregate capital and labor, respectively. Factor and product markets are competitive. Each household supplies one unit of labor and earn a wage w_t . Firms rent capital from households at a rate $r_t + \delta$, where δ is the depreciation rate.

1 Question 1

QUESTIONS:

1. Define a competitive equilibrium and provide the equilibrium conditions.
2. Explain why the competitive equilibrium can be found by solving a social planner problem.
3. Illustrate graphically the dynamics of the equilibrium. Make sure you explain all graphs.
4. Suppose there is a one-time increase in TFP A . Explain how the economy will adjust to the new steady state.
5. Suppose the households' risk aversion suddenly increases. Explain whether or not this will affect the steady state. Explain how the change in γ would affect the transition to steady state.

Fill in your answer here and/or on sketching paper

Maximum marks: 35

Consider a Lucas tree model: the economy has one tree with output Y_t each period. Output grows at a stochastic rate ε_t ;

$$\log Y_t = \log Y_{t-1} + \varepsilon_t,$$

where ε_t is i.i.d.. Assume that GDP growth is log-normally distributed, i.e.,

$$\log(Y_{t+1}/Y_t) = \varepsilon_{t+1} \sim N\left(-\frac{\sigma^2}{2}, \sigma^2\right).$$

Households are infinitely lived and maximize

$$\max E_0 \sum_{t=0}^{\infty} \log(c_t)$$

Households are identical and own an equal share of the tree. The budget constraint of the representative household is

$$c_t + P_t \cdot a_{t+1} = (Y_t + P_t) \cdot a_t,$$

where P_t is the price of the tree and a_t is the share of the tree owned by the household

2 Question 2

QUESTIONS:

1. Define a competitive equilibrium and write down the equilibrium conditions.
2. Solve for the competitive equilibrium allocations and prices.
3. Consider a risky one-period asset which gives a claim to GDP next period, Y_{t+1} (and nothing thereafter). The asset is in zero net supply (so the return on the asset does not affect GDP). Derive the equilibrium condition for the price of this asset and solve for the price.
4. Suppose a one-period bond in zero net supply is introduced in the economy. The bond pays one unit of consumption next period. Derive the equilibrium condition for the price of the bond and solve for this price.
5. Explain why the risky asset yields a higher expected return than the bond. Give the intuition for this result.
6. Consider now taking this model to the data. Explain why assuming complete markets would allow us to focus on a representative agent version of the economy and why it is reasonable to let the counterpart to Y_t be aggregate consumption.
7. Explain why this model can be expected to yield quantitatively wrong implications for asset pricing.

Fill in your answer here and/or on sketching paper

Maximum marks: 43

3 Question 3

Consider a New-Keynesian model. Households have preferences over a final good C_t produced with a continuum of goods: $C_t \equiv \left(\int_0^1 C_t(i)^{\frac{\epsilon-1}{\epsilon}} di \right)^{\frac{\epsilon}{\epsilon-1}}$. The producer of each good is a monopolist for this good. Firms are subject to a Calvo price friction. Namely, a random set θ of all firms are forced to keep their price fixed at the same level as last year, while the rest of the $1 - \theta$ of firms are free to choose the current price of their good. Suppose the economy is in steady state in period $t=0$.

1. Suppose the economy is hit by a temporary demand shock, where consumers get a low discount factor for one period. Namely, they discount next period utility by a factor $\tilde{\beta}$, where $\tilde{\beta} < \beta$, and next period they return to the regular discount factor β . Explain the dynamics of GDP, hours worked, consumption, and inflation following this shock. In particular, emphasize the intuition for the effects.
2. Suppose the economy is hit by a transitory productivity shock, where TFP is $Z_1 = \bar{Z} + \varepsilon$ in the initial period and $Z_t = \bar{Z}$ thereafter. Explain the dynamics of GDP, hours worked, consumption, and inflation following this shock. In particular, emphasize the intuition for the effects.
3. How would the economy react to a TFP shock if prices instead were flexible?

Fill in your answer here and/or on sketching paper.

Maximum marks: 22