

May/June Examination Period 2022-23

ECN346 Business Cycles

Duration: 2 hours

**YOU ARE NOT PERMITTED TO READ THE CONTENTS OF THIS QUESTION PAPER UNTIL
INSTRUCTED TO DO SO BY AN INVIGILATOR**

Answer FOUR questions. ONE question from each SECTION.

If you answer more questions than specified, only the first answers (up to the specified number) will be marked. Cross out any answers that you do not wish to be marked.

You are permitted to bring 20 x A4 pages of notes into your examination (i.e. 10 double sided pieces of paper). These can be typed or handwritten and can include graphs and images. They can include material from any source.

Your notes must be stapled together and include your student ID number and the module code on the first page. You must submit your notes at the end of the examination with your answer booklet.

Calculators are not permitted in this examination. Complete all rough workings in the answer book and cross through any work that is not to be assessed.

Possession of unauthorised material at any time when under examination conditions is an assessment offence and can lead to expulsion from QMUL. Check now to ensure you do not have more than 20 pages of notes. You should also not have mobile phones, smartwatches or unauthorised electronic devices on your person. If you do, raise your hand and give them to an invigilator immediately.

It is also an offence to have any writing of any kind on your person, including on your body. If you are found to have hidden unauthorised material elsewhere, including toilets and cloakrooms, it will be treated as being found in your possession. Unauthorised material found on your mobile phone or other electronic device will be considered an assessment offence. A mobile phone that causes a disruption in the exam is also an assessment offence.

EXAM PAPERS MUST NOT BE REMOVED FROM THE EXAM ROOM

Examiner: Dr Roman Sustek

Section A

Question 1

Briefly explain the Hodrick-Prescott filter. How do you need to transform data, before applying the filter, so that volatilities in different data series are mutually comparable?

[20 marks]

Question 2

Briefly explain the relationship between a Cobb-Douglas production function that has labour and capital as inputs and the National Income and Product Accounts. How would you estimate/calibrate the single parameter in the Cobb-Douglas production function?

[20 marks]

Section B

Question 3

Consider an individual who lives for two periods and has the following utility function: $\log(c_{1t}) + \theta \log(1 - h_{1t}) + \beta [\log(c_{2,t+1}) + \theta \log(1 - h_{2,t+1})]$. Here, c_{1t} and $c_{2,t+1}$ denote consumption in the first and second periods of life and h_{1t} and $h_{2,t+1}$ denote the fraction of time devoted to work in the first and second periods of life. The total endowment of time in each period is equal to one. The parameters satisfy: $\beta, \theta > 0$. The individual receives wage rates, per unit of time working, w_t and w_{t+1} . Both wage rates are observed at time t . The individual can borrow or save in the form of a bond b_{t+1} that pays a net rate of return R . Show that the person's labor supply in period t does not respond to an increase in the wage rate in period t if the increase in the wage rate is permanent (that is, if both w_t and w_{t+1} increase by the same percentage).

[25 marks]

Question 4

Consider a decentralised endowment economy with fiat money in which people live for two periods. Future generations have preferences over life-cycle consumption satisfying the standard four assumptions. When young, endowment is y units of a perishable good; zero when old. Denote by N the number of people of a given age. There is no population growth. The money stock evolves as $M_t = zM_{t-1}$, where $z > 1$. Newly printed money in period t is distributed in a lump-sum way to the old of period t . Using a clearly labeled diagram, determine whether or not a stationary competitive monetary equilibrium maximises the utility of future generations. What would the z that maximizes the welfare of future generations be equal to?

[25 marks]

Section C

Question 5

Consider the following two-period lives OLG model with capital and constant population. Normalize the number of young in a given cohort to one. Preferences of future generations over consumption are $\log c_{1t} + \beta \log c_{2,t+1}$, where $\beta > 0$. When young, the agents supply one unit of labour at a wage rate w_t . When old, the agents are unable to supply labour. The only asset available for saving is capital k_{t+1} , which is rented to firms in old age at a net rental rate r_{t+1} . A fraction δ of capital depreciates when rented out to firms. Capital and labour are used by firms, of which there is a measure one, to produce a single good according to a production function $Y_t = A_t K_t^\alpha N_t^{1-\alpha}$, where A_t is an exogenous stochastic level of TFP, N_t is labour, K_t is capital, and $\alpha \in (0, 1)$. Firms maximise their profits. Markets are competitive (all agents are price takers). Derive the optimal decision rule for K_{t+1} in general equilibrium (that is, as a function of the state variables A_t and K_t).

[30 marks]

Question 6

Consider an economy in which people live for two periods. The economy lives forever. Normalize the number of young in a given cohort to one. When young, people supply one unit of time to perfectly competitive firms, of which there is a measure one, at the wage rate w_t . When old, people do not have any productive time endowment. There is a fixed stock of 'prime Central London housing' in the economy, denoted by H , originally held by the initial old. This housing is used by people to store wealth but people do not actually live there. The preferences of future generations are $\log c_{1t} + \beta \log c_{2,t+1}$, where c_{1t} is consumption of the good when young, $c_{2,t+1}$ is consumption of the good when old, and $\beta > 0$ is a parameter. Denote by q_t the relative price of housing in terms of the good. Each firm produces the good according to the production function, $\exp(z_t)n_t$, where z_t is an exogenous stochastic level of technology and n_t is the total amount of productive time hired from the young. Firms maximise profits. Derive the equilibrium price of housing.

[30 marks]

Section D

Question 7

Explain the relationship between the total return on housing investment, the rental yield, and capital gains (house price appreciation). What is the empirical evidence in the cross-section of cities between total returns on housing, the rental yield, and capital gains? Explain further how capital gains are related to rents growth in the long run and how rents growth is further related to economic fundamentals.

[25 marks]

End of Paper