

A Short Answer Questions: Total 30 points (Answer all 5 questions in Section A.)

Write your answer in the space provided. Each question is worth 6 points.

1. Suppose job-seekers and vacancies come together via a Cobb-Douglas matching function, i.e., $M = \xi u_t^\alpha v_t^{1-\alpha}$. Show that the job-finding rate is increasing in labour market tightness $\theta_t = v_t/u_t$

2. Suppose households do **not** derive any utility from holding real money balances, State whether any households would hold money in the RBC model with money. Provide a brief intuition for your answer.

3. The classical dichotomy exists in the New Keynesian model with sticky nominal wages. State whether this statement is true, and provide some brief intuition to support your answer.

4. Suppose household preferences are given by $U(c_1, c_2, m_1, m_2) = \ln c_1 + \gamma \ln m_1 + \beta \{\ln c_2 + \gamma \ln m_2\}$: and the household also has the following life-time budget constraint.

$$c_1 + \frac{c_2}{R_2} = R_1 a_1 + w_1 + \frac{w_2}{R_2} + \pi_1 + \frac{\pi_2}{R_2} + (\tau_1 - m_1) + \frac{1}{R_2} \left(\tau_2 - \left[m_2 - \frac{m_1}{\Pi_2} \right] \right)$$

where R_t is the rate of return to a physical asset, w_t is the real wage rate, π_t is dividend income and τ_t represents a transfer. Further, m_t represents real money balances while c_t represent consumption and Π_t is the gross inflation between period $t - 1$ and t . Given this information, derive an IS curve.

5. Consider the static New Keynesian model with sticky nominal wages. Explain how an increase in government spending financed by passive monetary policy affects labour, output and consumption.

B Longer Analytical Questions: 70 points.

(Answer all parts of all 2 questions in Section B.)

Question 1: 35 points

Consider the two period search model of unemployment. There is no savings by households and no capital is used in production by firms. Households get utility from consuming their income at the end of each period. We will assume log utility from consumption. Conditional on being employed, the household inelastically supplies one unit of labour to the firm and receives an exogenous wage equal to \bar{w} . This wage is constant across periods. If non-employed, the household produces home goods worth h . There is no disutility to working. Households discount the future with discount factor β where $0 < \beta < 1$. There is a measure 1 of households in the population.

A job is a single firm-worker pair. A firm needs a worker to produce. Specifically, output is given by $y_t = z_t \times 1 = z_t$ where z_t is TFP. We will assume the lowest possible value of z_t , i.e., $\underline{z} > \bar{w}$ implying that $y_t > \bar{w}$. Further assume that $\bar{w} > h$. An unmatched firm must pay a vacancy posting cost of κ to post a vacancy. Search is random and new firms in period t fill their vacancies with probability $q(\theta_t)$ and households find jobs with probability $p(\theta_t)$ where $\theta_t = v_t/u_t$ where v_t denotes vacancies and u_t denotes unemployed job-seekers. Let the matching function in this economy be given by

$$M_t = \xi \frac{u_t v_t}{(u_t^\alpha + v_t^\alpha)^{1/\alpha}}$$

where $0 < \alpha < 1$. At the start of period 1, η fraction of the individuals in the economy are employed while $1 - \eta$ fraction of individuals are non-employed. Individuals separate from their jobs with probability $s(z_t)$ where $\frac{ds}{dz_t} < 0$, that is, individuals are less likely to lose their jobs when the economy is booming and TFP z_t is high. Individuals who lose their jobs in period 1 cannot search the labour market immediately and must wait until period 2 before they can search for a job.

- (6 points) Write down the values of an employed household, non-employed household and of the matched firm at the end of period 2.
- (6 points) Write down the value of a vacancy for an unmatched firm at the start of period 2. Suppose there is free entry of firms. Solve for θ_2 .
- (6 points) Now write down the values of an employed household, non-employed household and the value of a matched firm at the end of period 1.
- (6 points) Write down the value of a vacancy at the start of period 1. Suppose there is free entry of firms. Solve for θ_1 .
- (6 points) Suppose a recession occurs in period 1 and z_1 falls. State what happens to θ_1 . Show what happens to the unemployment rate in period 1. Does it increase or decrease? In your answer, explain what are the forces contributing to the increase or decrease in the unemployment rate.
- (5 points) Suppose the recession occurs instead in period 2 and z_2 falls. State whether knowledge of tomorrow's TFP affects θ_1 and the unemployment rate in period 1. Provide some intuition to accompany your answer.

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Q1 answer continued...

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Question 2: 35 points

Consider the two period RBC model. Households have utility given by $U(c_1, c_2) = (1 - \beta) \ln c_1 + \beta \ln c_2$ where $0 < \beta < 1$. Households are born with physical asset a_1 and inelastically supply 1 unit of labour to firms each period. Households receive a gross rate of return R_t for each unit of their asset that they rent to firms and they receive a wage rate w_t for each unit of labour that they supply to firms. In addition, households receive dividend income from firms. There are N households in the economy.

Firms produce according to a Cobb-Douglas production function, $Y_t = z_t K_t^\alpha L_t^{1-\alpha}$, and rent capital at rate R_t and hire labour at rate w_t in each period t . Capital depreciates fully after use in production after 1 period.

There exists a government that spends exogenous amount G_t . Government spending is wasteful. The government balances its budget and completely finances its spending within a period by collecting a proportional tax, τ_t , on consumption expenditure in that period.

- (a) (3 points) Write down the government budget constraint in period t .
- (a) (5 points) Set up the firm's problem and solve for the firm's optimality conditions.
- (b) (6 points) Set up the household's problem and derive the optimality conditions of the household.
- (c) (6 points) Suppose $G_1 = G_2 = 0$ and $\tau_1 = \tau_2 = 0$. Denote $k_2 = K_2/L_2$. Solve for k_2 in terms of parameters of the model, exogenous variables and predetermined k_1 .
- (d) (6 points) Suppose that z_2 increases. Show that consumption, investment and output in period 1 do not respond to good news about TFP in period 2.
- (e) (6 points) Now suppose that government spending is not zero in all periods. The government decides to spend only in the first period, $G_1 > 0, G_2 = 0$. The government finances this spending by only collecting a proportional tax on consumption expenditure in period 1. Show how an increase in G_1 affects consumption and investment
- (f) (3 points) Given your answer in (e), provide some intuition as to whether government spending shocks can drive business cycles in the economy.

Q2 answer here:

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Q2 answer continued...

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END OF EXAM.