

**Macroeconomics 2**

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Time Allowed: 3 hours.

Answer **ALL** ten questions in **Section A (3 marks each)**, **ALL** four questions in **Section B** (10 marks each) and **ONE** of the two questions in **Section C (30 marks)**. Answer Section A questions in one booklet, Section B questions in a separate booklet; and Section C questions in a separate booklet.

Approved pocket calculators may be used.

Read carefully the instructions on the answer book provided and make sure that the particulars required are entered on each answer book. If you answer more questions than are required and do not indicate which answers should be ignored, we will mark the requisite number of answers in the order in which they appear in the answer book(s): answers beyond that number will not be considered.

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**Section A: Answer ALL TEN Questions**

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1. Which of the following is true? The production function  $Y = 2\sqrt{KL}$  : **(3 marks)**

- (a) Is not increasing in capital,
  - (b) Does not feature decreasing marginal product of capital,
  - (c) Is a constant return to scale production function,
  - (d) Is not a well-defined production function,
  - (e) Is convex in K and L.
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2. Which of the following variables does not affect the optimal desired capital stock of a firm? **(3 marks)**

- (a) The real interest rate.
  - (b) The depreciation rate.
  - (c) That firm's markup.
  - (d) The shape of the production function.
  - (e) The previous period profits.
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**3. Which assumption is necessary for the existence of a long-run steady state in the Solow Growth model? (3 marks)**

- (a) The production function is increasing in capital.
  - (b) The production function is concave in capital.
  - (c) The saving rate is larger than the depreciation rate.
  - (d) The saving rate is lower than the depreciation rate.
  - (e) None of the above.
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**4. The IS-LM model shows: (3 marks)**

- (a) How production and prices are determined for a given money supply,
  - (b) How the money supply and production are determined for a given interest rate,
  - (c) How the interest rate, the money supply, and production are determined,
  - (d) How production and the interest rate are determined for a given money supply,
  - (e) How interest rate and money supply are determined for a given production level.
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**5. Which of the following scenarios are likely to incentivise the central bank to increase interest rates? (3 marks)**

- (a) A decline in consumers' confidence (decrease in expected future income).
  - (b) A decline in inflation.
  - (c) An increase in the output gap.
  - (d) An increase in money demand.
  - (e) None of the above.
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**6. What do we know about business cycle fluctuations in advanced economies? (3 marks)**

- (a) Business cycles are caused by temporary changes in technology.
  - (b) Business cycles are a regular pattern of ups and downs superimposed on a trend growth path.
  - (c) Business cycles are fluctuations in GDP, which are then reflected in other macroeconomic variables like consumption and investment.
  - (d) GDP, consumption, employment and investment move closely together over the business cycle, but employment is a lot more volatile than the other series.
  - (e) None of the above
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**7. Consider the following three statements about the RBC model: (3 marks)**

- (i) The consumption Euler equation describes the optimal savings behaviour of consumers. This forward-looking equation is the equivalent of the consumption rule in the Gottfries textbook.
  - (ii) The labour supply equation is derived from the consumer's utility optimization. This supply curve may be downward sloping if the income effect of a wage increase dominates the substitution effect, but in the calibration of the model we assume the curve is upward sloping.
  - (iii) The capital accumulation equation is a backward-looking equation. This means that agents do not have rational expectations or perfect foresight about how the capital stock will evolve in the future.
- (a) Only statement (i) is incorrect
  - (b) Only statement (ii) is incorrect
  - (c) Only statement (iii) is incorrect
  - (d) Two or more of the statements are incorrect.
  - (e) All statements are correct.
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**8. Which of the following statements is correct? (3 marks)**

- (a) If the real exchange rate is constant, the rate of depreciation of the exchange rate must be equal to foreign inflation minus domestic inflation.
  - (b) If the real exchange rate is constant, the rate of depreciation of the exchange rate must be equal to foreign inflation plus domestic inflation.
  - (c) If the interest parity condition holds and the foreign interest rate is higher than the domestic interest rate, there must be an expected depreciation of the exchange rate.
  - (d) If the interest parity condition holds, the expected depreciation of the exchange rate is equal to the domestic interest rate minus the foreign interest rate.
  - (e) If the interest parity condition holds, the expected appreciation of the exchange rate is equal to the domestic interest rate minus the foreign interest rate.
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**9. Suppose a country experiences an exogenous decrease in (domestic) investments. Assume that the output gap is zero and inflation is on the desired level, and take the expected future exchange rate as given. In which of the cases below will the impact on the output gap be smallest? (3 marks)**

- (a) The country has a fixed exchange rate and the central bank keeps the interest rate fixed.
  - (b) The country has a fixed exchange rate and the central bank tries to keep inflation constant.
  - (c) The country has a floating exchange rate and the central bank keeps the interest rate fixed.
  - (d) The country has a floating exchange rate and the central bank tries to keep inflation constant.
  - (e) The country is in a currency union and therefore does not have its own central bank.
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**10. Consider the following statements about the search and matching model of the labour market: (3 marks)**

- (i) One of the advantages of a model with frictions on the labour market is that it allows us to model wage rigidity in a more realistic way.
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(Question 10 continued)

- (ii) The standard search and matching model has very little to say about business cycle fluctuations in labour input along the intensive margin. The model does describe fluctuations along the extensive margin, but some of the main predictions of the model about these fluctuations are not consistent with the data.
  - (iii) An important concept in the search and matching model is the ‘option value of search’. The option value of search explains why workers are willing to search for jobs while they receive unemployment benefits.
- (a) Statement (i) is correct
  - (b) Statement (ii) is correct
  - (c) Statement (iii) is correct
  - (d) Two or three of the statements are correct.
  - (e) All the statements are incorrect.
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### Section B: Answer ALL FOUR Questions

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- 11.** Describe in words the problem of a firm that chooses the price of its product under monopolistic competition. Then, formally set up the maximization problem and derive the equilibrium condition. Finally, derive the condition that determines the optimal price. **(10 marks)**
- .....
- 12.** Explain accurately what are the substitution effect and the wealth effect in the context of households’ maximization decision in a two-period model. **(10 marks)**
- .....
- 13.** What is calibration? Give two examples of good calibration and two examples of bad calibration. **(10 marks)**
- .....
- 14.** A country has a fixed exchange rate, that is, the central bank has set an official target for the exchange rate. The foreign interest rate is 5 percent. What interest rate must the central bank set if investors (a) expect the exchange rate to remain unchanged, and (b) are convinced that the country will devalue its currency 10 percent in the coming year. Explain the intuition for the difference. **(10 marks)**
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**Section C: Answer ONE Question**

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15. (a) Write the IS equation and describe it in words. Make sure to clearly state what are the determinants of the variables. **(3 marks)**
- (b) Write the LM equation and describe it in words. Make sure to clearly state what are the determinants of the variables. **(3 marks)**
- (c) Write the Phillips Curve and describe it in words. **(3 marks)**
- (d) Assume that a negative confidence shock hits consumers, which means that consumers become more pessimistic about the future. Display this scenario in a graph depicting the IS-LM curves (top panel) and the Phillips curve (bottom panel). Then, explain how the monetary authority can counteract this shock. **(7 marks)**
- (e) Assume that the price of imported-oil increases, which means that there is a positive shock to inflation. Display this scenario in a graph depicting the IS-LM curves (top panel) and the Phillips curve (bottom panel). Then, explain how the monetary authority should respond to this shock and which are the challenges it faces. **(7 marks)**
- (f) Assume that a new central bank governor releases an interview that the central bank will aim, starting today, for a much higher inflation rate than the current one. Describe in words what would be the consequences of this change of policy for the economy, and display the answer using a graph depicting the IS-LM curves (top panel) and the Phillips curve (bottom panel). **(7 marks)**
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16. Consider a modified version of the search and matching model of unemployment. As in the standard model, workers can be unemployed or employed. An unemployed worker receives an unemployment benefit  $b$  and finds a job with probability  $p(\theta)=\theta^{1-\mu}$ , where  $0<\mu<1$ ,  $\theta=v/u$  is aggregate labor market tightness,  $v$  are vacancies and  $u$  is the fraction of workers that are unemployed. Firms create vacancies at a flow cost  $k$ . A vacancy finds a worker with probability  $q(\theta)=p(\theta)/\theta$ , in which case the vacancy turns into a filled job, which produces output  $y$  and ends with flow probability  $\lambda$ . There is free entry of firms.
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(Question 16 continued)

The difference with the standard model is that we distinguish between probationary jobs and solid jobs. When an unemployed worker and a vacancy meet, they form a probationary job. A probationary job ends with flow probability  $\lambda$ , turns into a solid job with flow probability  $\mu$  or continues as a probationary job with flow probability  $1-\lambda-\mu$ . Wages in probationary jobs are set by Nash bargaining, where  $\varphi$  denotes workers' bargaining power. However, wages in solid jobs are rigid: the wage in a solid job forever equals whatever the wage was when probation ended and the job became a solid job.

- a) Write down the Bellman equations for an unemployed worker  $U$ , a worker in a probationary job  $W_p$  and a worker in a solid job  $W_s$ , a vacancy  $V$ , a firm with a probationary job  $J_p$  and a firm with a solid job  $J_s$ . **(10 marks)**
  - b) Write down the additional equations you need to solve for all endogenous variables in this model. **(10 marks)**
  - c) Calculate total match surplus in solid jobs over probationary jobs,  $S_s-S_p$ , where  $S_s=W_s+J_s-U-V$  and  $S_p=W_p+J_p-U-V$ . Briefly explain the intuition for your result. **(10 marks)**
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