

# ECON2103: Intermediate Macroeconomics II

## Past Exam Questions

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### 1 SECTION A: True, False or Uncertain

Answer whether the statement is true, false or uncertain. In each case you should explain your answer very carefully. Answers that are not accompanied by an explanation automatically receive a mark of zero. You may find it helpful to use diagrams.

#### 1.1 Aggregate Demand Review

1. If investment becomes more responsive to changes in the interest rate then the short-run effects of a monetary expansion will be greater.
2. In the  $IS - LM$  model the stronger the response of consumption to the real interest rate the steeper the  $IS$  curve and therefore the greater the effect of a monetary expansion on output.
3. If money demand becomes more responsive to changes in the income then the short-run effects of a fiscal expansion will be greater.

#### 1.2 Aggregate Supply

4. Suppose that the cost of printing new menus falls due to the introduction of word processing and low cost printers. An implication of this from the sticky price model is that the short-run aggregate supply curve will become flatter.
5. The pro-cyclicality of the real wage is inconsistent with the worker misperception model of aggregate supply.
6. Consider the sticky wage model. Suppose that in the past 25% of firms and workers renegotiated the nominal wage each period. Now 50% of firms and workers renegotiate the nominal wage each period. As a result, the aggregate supply curve has become steeper.

### 1.3 Inflation & Unemployment

7. The increase in the natural rate of unemployment between the 1960s and 1980s can be explained by the increased labor force participation of women and teenagers.
8. A policy to reduce inflation will lead to a rise in unemployment as the economy moves along the Phillips curve.
9. An unanticipated increase in inflation redistributes wealth from borrowers to lenders.

### 1.4 Monetary Policy

10. One way for the Bank of Canada to increase the money supply is to sell Government of Canada Treasury Bills.
11. If the monetary base is  $B = 100$  the currency-deposit ratio is  $cr = 0.2$  and the reserve-deposit ratio is  $rr = 0.05$  the money supply is  $M = 480$ .
12. According to the Lucas critique policy makers may not rely upon a single Phillips curve relationship between inflation and unemployment to predict the effects of changes in monetary policy.
13. According to Kydland and Prescott a central bank's announcement that it will set low inflation is time consistent if it cares about reducing unemployment as well as inflation.

## 2 SECTION B: Long Answer

### 2.1 Aggregate Demand Review

1. This question uses the  $IS - LM$  model to consider the implications of using monetary policy to offset declines in household consumption caused by the recent financial crisis. Assume that Canada is a closed economy and that consumption and investment are given by:

$$C = 100 + 0.8Y - 400r \quad (1)$$

$$I = 200 - 600r, \quad (2)$$

where  $Y$  is real output and  $r$  is the real interest rate. Government spending and taxation are both equal to zero. Money demand is given by:

$$M^d = P(0.8Y - 500(r + \pi^e)). \quad (3)$$

Suppose  $\pi^e = 0$ ,  $\bar{Y} = 1000$  and the nominal money supply is  $M = 750$ .

- (a) Derive the  $IS$  and  $LM$  curves and solve for the *long-run* equilibrium values of  $Y$ ,  $C$ ,  $I$ ,  $r$  and  $P$ .
- (b) Suppose that the financial crisis means that firms and consumers find it harder to get access to credit. Consumption and investment are now given by:

$$C(r) = 80 + 0.8Y - 400r \quad (4)$$

$$I(r) = 150 - 600r, \quad (5)$$

Find the new *short-run* values of  $Y$ ,  $C$ ,  $I$ ,  $r$  and  $P$ . Illustrate your answer with an  $IS - LM$  diagram.

- (c) What would the Bank of Canada have to set the money supply at in order to offset the effects of the financial crisis and keep output at its natural rate in the short-run? Illustrate your answer with an  $IS - LM$  diagram.
2. This question uses the  $IS - LM$  model to look at how output in the short-run depends on taxation and the money supply. Assume that the consumption function is given by:

$$C(r) = 100 + 0.75(Y - T) - 500r, \quad (6)$$

the investment function is given by:

$$I(r) = 150 - 500r \quad (7)$$

and money demand is given by:

$$\frac{M^d}{P} = Y - 1000r. \quad (8)$$

Assume that in the short-run the price level is fixed at  $P = 1$ .

- (a) Derive the  $IS$  curve and use a diagram to show what would happen to this curve if taxes ( $T$ ) were cut by \$100. According to the  $IS$  curve how much would output rise by in response to this \$100 tax cut?
- (b) Derive the  $LM$  curve.
- (c) Solve for the equilibrium level of output as a function of  $M$ ,  $T$  and  $G$ . According to this equation, how much does output rise by in response to a \$100 tax cut? Your answer should differ from what you found in part (a), carefully explain why this is the case and illustrate your answer with a diagram.
- (d) Use a diagram to show how monetary policy could be used in conjunction with the tax cut in order to generate an increase in income equal to what you found in part (a).

## 2.2 Aggregate Supply

3. This question studies the sticky wage model. Assume that the production function in Canada is given by  $Y = 50L^{0.5}$  and the target real wage is  $\omega = 1$ .
- Derive the aggregate supply curve as a function of the price level and the expected price level.
  - Assume that velocity is constant at  $V = 1$  and use the quantity equation to derive the aggregate demand curve for  $M = 1000$ . Solve for equilibrium price level and output if  $P^e = 0.8$ .
  - Now suppose that an unanticipated monetary contraction reduces  $M$  to  $M = 900$ . Solve for the new equilibrium values of  $Y$  and  $P$  and carefully explain the intuition behind your answer. You should illustrate your answer with a diagram. What is employment in the short-run?
4. This question looks at the implications of the sticky price model for the effects of monetary policy. Consider an economy in which a fraction  $s$  of firms set their prices in advance using  $p = P^e$  and fraction  $(1 - s)$  of firms have flexible prices, and so set their prices according to  $p = P + (Y - \bar{Y})$ .
- Derive the aggregate supply curve for this economy.
  - Now suppose that velocity is constant at  $V = 1$  and use the quantity equation to derive an aggregate demand curve in which output depends on the price level and the money supply.
  - Solve to find the equilibrium quantity of output and the equilibrium price level under the assumption that  $s = 0.5$ ,  $\bar{Y} = 1$ ,  $P^e = 1$  and  $M = 4$ .
  - Now redo part (c) under the assumption that  $s = 0.25$ . If your answer differs from what you found in part (c) explain why. If it does not, explain why not.

## 2.3 Inflation and Unemployment

5. Consider an economy where inflation and unemployment are determined by the following equations:

$$\begin{aligned}\pi_t &= \pi_t^e - (u - \bar{u}) \\ \pi_t^e &= \pi_{t-1} \\ \bar{u}_t &= 0.5u_{t-1} + 0.5\bar{u}_{t-1}\end{aligned}$$

Suppose that  $\pi_0 = 0.08$  and  $u_0 = \bar{u}_0 = 0.06$ . A new central bank governor decides that inflation is too high and must be reduced to a target of  $\pi = 0.02$ .

- If the central bank tries to reach its new target in one year (i.e.  $\pi_1 = 0.02$ ), what will be unemployment in year one and year two?

- (b) If the central bank aims to reach its new inflation target in two years by setting  $\pi_1 = 0.05$  and  $\pi_2 = 0.02$  what will be unemployment in year one and year two?
- (c) Now suppose the central bank is able to send an informative signal of current inflation to the public. This has the result that inflationary expectations are now given by:

$$\pi_t^e = 0.5\pi_t + 0.5\pi_{t-1}$$

Solve for  $u_1$  and  $u_2$  if the central bank uses the one year approach to reducing inflation. Is this signal good for the economy?

- (d) Now suppose that the public are unsure about the signal that is sent by the central bank. This means that the signal contains an error and so:

$$\pi_t^e = 0.5\pi_t + 0.5\pi_{t-1} + x$$

where  $x$  is the signal error. If the central bank cares only about  $u_1$  how small must the signal error be for the central bank to still use the signal when undertaking the two year approach to reducing inflation?

## 2.4 Monetary Policy

6. This question looks at the difficulties that a government may have in committing to a low rate of inflation. Assume that this government minimizes the following loss function by the choice of the inflation rate  $\pi$

$$L = \pi^2 + (Y - 1.2\bar{Y})^2 \tag{9}$$

Output is determined by an aggregate supply curve

$$Y = \bar{Y} + 2(\pi - \pi^e) \tag{10}$$

and the natural rate of output is  $\bar{Y} = 10$ .

- (a) Suppose the government announces that it will set  $\pi = 2$  and the public believes it, and sets  $\pi^e = 2$ . What are the values of output, inflation and the loss function if the government keeps its promise?
- (b) Given that the public believes the government's promise that it will set  $\pi = 2$ , what is the optimal level of inflation for the government to set? What are the values of output and the loss function in this case? Carefully explain the intuition behind your answer.
- (c) Suppose the public has rational expectations find the Nash equilibrium values of inflation, output and the loss function. Again, carefully explain the intuition behind your answer.