

Past-paper walk-through

The Money Market ■ 4.5

eXercise

Questions in this set

- 2026 Q1
- 2025 Set 1 Q2
- 2024 Set 1 Q2
- 2022 Set 1 Q2
- 2022 Set 2 Q1
- 2021 Set 2 Q1
- 2019 Set 1 Q1
- 2017 Q2
- 2015 Q1
- 2014 Q2

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 1

2026 ■ Q1

The economy of Micanapy is in short-run equilibrium and is experiencing an inflationary gap.

(a)(i) Draw a correctly labeled graph of the aggregate demand, short-run aggregate supply, and long-run aggregate supply curves for Micanapy, and show each of the following.

The current equilibrium real output and price level, labeled Y_1 and PL_1 , respectively.

(a)(ii) Draw a correctly labeled graph of the aggregate demand, short-run aggregate supply, and long-run aggregate supply curves for Micanapy, and show each of the following.

The full-employment real output, labeled Y_F .

Question 1

2026 ■ Q1

The economy of Micanapy is in short-run equilibrium and is experiencing an inflationary gap.

(b) Assume that policymakers take no action to close the inflationary gap. Explain how Micanapy's economy will self-adjust to full employment in the long run.

Question 1

2026 ■ Q1

The economy of Micanapy is in short-run equilibrium and is experiencing an inflationary gap.

(c)(i) Suppose instead that Micanapy's central bank is considering using monetary policy to close the inflationary gap in the short run. The banking system in Micanapy has limited reserves.

Identify a specific open-market operation that the central bank of Micanapy would implement to close the inflationary gap in the short run.

(c)(ii) Draw a correctly labeled graph of the money market in Micanapy, and show the effect of the open-market operation identified in part C (i) on the nominal interest rate.

Question 1

2026 ■ Q1

The economy of Micanapy is in short-run equilibrium and is experiencing an inflationary gap.

(d)(i) Based solely on the interest rate change shown on your graph in part C (ii), will each of the following increase, decrease, or remain the same in the short run?

International financial capital flows into Micanapy. Explain.

(d)(ii) Based solely on the interest rate change shown on your graph in part C (ii), will each of the following increase, decrease, or remain the same in the short run?

The price of previously issued bonds in Micanapy.

(d)(iii) Based solely on the interest rate change shown on your graph in part C (ii), will each of the following increase, decrease, or remain the same in the short run?

Private domestic investment spending in Micanapy.

Question 1

2026 ■ Q1

The economy of Micanapy is in short-run equilibrium and is experiencing an inflationary gap.

(e) Based solely on the change in private domestic investment spending identified in part D (iii), will the unemployment rate in Micanapy increase, decrease, or remain the same in the short run? Explain.

Question 2

2025 Set 1 ■ Q2

The economies of Country L and Country A are currently in short-run equilibrium at output levels below full employment. Both countries intend to use monetary policy to close their output gaps. Country L has a banking system with limited reserves, and Country A has a banking system with ample reserves.

- (a)** What open-market operation would Country L implement to move the economy toward full employment in the short run?
- (b)** What specific monetary policy action would Country A implement to move the economy toward full employment in the short run?
- (c)** Draw a correctly labeled graph of the reserve market in Country A, and show the effect of the monetary policy action identified in part B on the policy rate.
- (d)** Assume instead that no policy actions are taken in Country A and that the economy remains in short-run equilibrium at an output level below full employment.

Question 2

Will short-run aggregate supply in Country A increase, decrease, or remain the same as the economy self-adjusts in the long run? Explain.

Solution 2

(a)

Mark scheme

- Country L's central bank would conduct an open-market PURCHASE of bonds (buy government securities). This injects reserves into the banking system, increasing the money supply and lowering interest rates, which stimulates spending and moves the economy toward full employment. 1 point.

Solution 2

(b)

Mark scheme

- Country A's central bank would DECREASE its administered interest rate(s) — e.g., decrease the interest rate paid on reserves (or decrease the discount rate) — to lower the policy rate and stimulate the economy toward full employment. 1 point.

Solution 2

(c) Mark scheme

- Draw the reserve market in Country A: vertical axis = Policy Rate, horizontal axis = Quantity of Reserves; a vertical supply curve S_R and a demand curve D_R that intersects S_R in the flat ('ample reserves') portion of D_R , at policy rate PR_1 (1 point). Then show the monetary policy action from part B — a decrease in the administered interest rate (e.g., interest on reserves) — shifting the flat/lower-bound portion of D_R down, so the policy rate falls from PR_1 to PR_2 (equivalently accepted: show the lower bound of the demand curve shifting down with the same PR_1 -to- PR_2 result) (1 point). 2 points total.

Solution 2

(d)

Mark scheme

- Short-run aggregate supply (SRAS) will INCREASE until it reaches full employment, as the economy self-corrects in the long run. With output below full employment, high unemployment pushes down input prices (e.g., nominal wages) and/or inflationary expectations, which increases (shifts right) SRAS. 1 point.

Question 2

2024 Set 1 ■ Q2

The table provided shows economic data for the country of Louland. The base year is year 1, and the GDP deflator in year 2 is 115.

	Year 1	Year 2
Nominal GDP	800,000	1,035,000
Population	1,000	1,200

Question 2

- (a) Calculate real GDP in Louland in year 2. Show your work.
- (b) How would the change in real GDP from year 1 to year 2 affect the demand for money and the nominal interest rate in Louland?
- (c) Did the standard of living of the average citizen in Louland increase, decrease, or remain the same from year 1 to year 2? Explain using numbers.
- (d) What was the numerical value of the inflation rate from year 1 to year 2?
- (e) If nominal wages increased by 10% from year 1 to year 2, what happened to the real wages of workers in Louland during this time? Explain.

Solution 2

(a)

Mark scheme

- Real GDP = $(\text{Nominal GDP} \div \text{GDP Deflator}) \times 100 = (1,035,000 \div 115) \times 100 = 900,000$.

Solution 2

(b)

Mark scheme

- Real GDP increased from year 1 to year 2, so the demand for money increases (more transactions require money at each price level). With the money supply unchanged, the money demand curve shifts right, so the nominal interest rate increases.

Solution 2

(c)

Mark scheme

- The standard of living of the average citizen in Louland decreased from year 1 to year 2. Real GDP per capita in year 1 was 800 and real GDP per capita in year 2 was 750 ($750 < 800$), so real output per person fell, indicating a lower standard of living.

Solution 2

(d)

Mark scheme

- The inflation rate from year 1 to year 2 was 15% (the percentage increase in the price level/GDP deflator between the two years).

Solution 2

(e)

Mark scheme

- Real wages decreased. Explanation: nominal wages increased by only 10%, which is less than the 15% inflation rate over the same period ($10\% < 15\%$), so real (inflation-adjusted) wages fell.

Question 2

2022 Set 1 ■ Q2

Assume that commercial banks must hold a minimum of 20% of their deposits as reserves. Now suppose that the central bank of the country sells 100,000 of government bonds to commercial banks.

- (a)** Calculate the maximum change and state the direction of change in the money supply as a result of the central bank bond sale. Show your work.
- (b)** Draw a correctly labeled graph of the money market and show the effect of the change in the money supply identified in part (a) on the nominal interest rate.
- (c)** Given the change in the money supply in part (a), if the velocity of money is constant, what will happen to the nominal gross domestic product? Explain.
- (d)** Based on the change in the nominal gross domestic product in part (c), what happens to the price level if the real gross domestic product is constant?

Solution 2

(a)

Mark scheme

- Maximum change in money supply = bond sale $\times$ money multiplier = $-\$100,000 \times (1/0.2) = -\$100,000 \times 5 = -\$500,000$ (a decrease of \$500,000). Show work: the money (deposit) multiplier = $1/\text{required reserve ratio} = 1/0.2 = 5$. 1 point for the correct answer (a decrease of \$500,000) with work shown and direction (decrease) stated.

Solution 2

(b)

Mark scheme

- Draw the money market: vertical money supply MS_1 , downward-sloping money demand MD_1 (axes: Nominal Interest Rate vertical, Quantity of Money horizontal), equilibrium at i_1 , Q_1 — 1 point. Shift MS_1 leftward to MS_2 (reflecting the decrease in the money supply from part a), producing a new equilibrium at a higher nominal interest rate i_2 ($i_2 > i_1$) and lower quantity Q_2 — 1 point. Total 2 points.

Solution 2

(c)

Mark scheme

- Nominal gross domestic product (nominal GDP = PY) will decrease.
Explanation: by the quantity theory of money, $MV = PY$; holding velocity (V) constant, a decrease in the money supply (M) causes nominal GDP (PY) to decrease proportionally. 1 point for the correct direction (decrease) with this explanation.

Solution 2

(d)

Mark scheme

- The price level decreases. Since nominal GDP (PY) decreased (from part c) and real GDP (Y) is held constant, the price level (P) must fall for the product PY to fall. 1 point for correctly stating that the price level decreases.

Question 1

2022 Set 2 ■ Q1

1. Assume the United States economy is in short-run macroeconomic equilibrium at an output level greater than potential output.
 - (a) Draw a correctly labeled graph of the aggregate demand, short-run aggregate supply, and long-run aggregate supply curves, and show each of the following.
 - (i) The current equilibrium real output and price level, labeled as Y_1 and PL_1 , respectively
 - (ii) The full-employment output, labeled as Y_F
 - (b) Assume government spending increases by \$100 billion. On your graph in part (a), show the short-run effect of the change in government spending on the equilibrium real output and price level. Label the new equilibrium output as Y_2 and the new equilibrium price level as PL_2 .
 - (c) Assume the marginal propensity to consume is 0.8. As a result of the increase in government spending, what is the numerical value of the maximum change in each of the following in the short run?
 - (i) Real output
 - (ii) Household savings

Question 1

- (d) Draw a correctly labeled graph of the money market and show the effect of the change in real output identified in part (c)(i) on the equilibrium nominal interest rate.
- (e) Based on the change in the nominal interest rate shown in part (d), what will happen to the prices of previously issued bonds in the short run?
- (f) The United States and the European Union are trading partners with flexible exchange rates. The currency in the United States is the dollar, and the currency in the European Union is the euro. Assume the inflation rate in the United States increases relative to the inflation rate in the European Union. As a result of the change in the United States inflation rate, what will happen to each of the following in the foreign exchange market?
- (i) The demand for dollars. Explain.
 - (ii) The international value of the dollar
- (g) Suppose the Federal Reserve attempts to keep the value of the dollar constant in the foreign exchange market. Based on the change in the value of the dollar in part (f)(ii), should the Federal Reserve buy or sell each of the following?

Question 1

- (i) The euro
- (ii) The dollar

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

Solution 1

(a) Mark scheme

- Draw an AD–AS graph: axes Price Level (vertical) and Real GDP (horizontal), with a downward-sloping AD_1 and an upward-sloping $SRAS_1$ intersecting at price level PL_1 and real output Y_1 (dashed lines to both axes) — 1 point. Second point: add a vertical LRAS curve positioned to the LEFT of Y_1 , with its base labeled Y_F (full-employment output), showing the economy currently producing above full employment ($Y_1 > Y_F$, an inflationary/expansionary gap) — 1 point. Total 2 points for a correctly labeled graph showing both the current equilibrium (PL_1, Y_1) and full-employment output Y_F .

Solution 1

(b)

Mark scheme

- On the graph from part (a), shift AD_1 rightward to AD_2 (an arrow indicating the shift), reflecting the increase in government spending. The new equilibrium is at the intersection of AD_2 and $SRAS_1$: real output rises to Y_2 ($Y_2 > Y_1$) and the price level rises to PL_2 ($PL_2 > PL_1$), both labeled with dashed lines to the axes. 1 point for correctly showing the rightward AD shift with both Y_2 and PL_2 labeled at the new, higher intersection.

Solution 1

(c)(i)

Mark scheme

- Maximum increase in real output = 500 billion. *Work : the spending multiplier = $1 \div (1 - MPC) = 1 \div (1 - 0.8) = 1 \div 0.2 = 5$. Maximum Real Output = $spending\ multiplier \times Government\ Spending = 5 \times 100\text{ billion} = 500\text{ billion}$. 1 point for the correct value (500 billion) with the multiplier calculation shown. (In the official scoring guidelines this single point is shared with part (c)(ii) — both the real-output and household-savings values are required together for the point.)*

Solution 1

(c)(ii)

Mark scheme

- Maximum increase in household savings = 100 billion. *Work* : $MPS = 1 - MPC = 1 - 0.8 = 0.2$. $MaximumHouseholdSavings = MPS \times maximumRealOutput(from\ part(c)(i)) = 0.2 \times 500\ billion = 100\ billion$ —equal to the initial increase in government spending, since with no taxes or import substitution. (Shares its official 1 point with part (c)(i); each value is graded here for its own point.)

Solution 1

(d) Mark scheme

- Draw a money-market graph: axes Nominal Interest Rate (vertical) and Quantity of Money (horizontal), with a vertical money supply curve MS_1 and a downward-sloping money demand curve MD_1 intersecting at nominal interest rate i_1 and quantity Q_1 (dashed lines to both axes) — 1 point. Second point: shift MD_1 rightward to MD_2 (an arrow indicating the shift), because the increase in real output from part (c)(i) raises money demand at every interest rate; the new equilibrium is at a higher nominal interest rate i_2 ($i_2 > i_1$, dashed line) at the same quantity Q_1 (MS is vertical/fixed) — 1 point. Total 2 points.

Solution 1

(e)

Mark scheme

- The price of previously issued bonds will DECREASE. Bond prices and interest rates move inversely, so the rise in the nominal interest rate shown in part (d) ($i_1 \rightarrow i_2$) causes the price of existing, fixed-coupon bonds to fall. 1 point.

Solution 1

(f)(i)

Mark scheme

- The demand for dollars will **DECREASE**. Explanation: the increase in the United States inflation rate (relative to the European Union) makes United States goods relatively more expensive than European goods, so Europeans buy fewer U.S. exports — reducing the quantity of dollars they need to demand in the foreign exchange market to purchase them. 1 point for stating the decrease **AND** giving this relative-price explanation.

Solution 1

(f)(ii)

Mark scheme

- The international value of the dollar will DEPRECIATE. Because the demand for dollars decreases (part (f)(i)) while the supply of dollars in the foreign exchange market is unchanged, the equilibrium price (value) of the dollar falls relative to the euro. 1 point.

Solution 1

(g)(i)

Mark scheme

- To keep the value of the dollar constant despite the depreciation pressure identified in part (f)(ii), the Federal Reserve should SELL euros in the foreign exchange market (increasing the supply of euros it offers in exchange for dollars). 1 point. (In the official scoring guidelines this is one combined point with part (g)(ii): 'sell the euro and buy the dollar' describes a single foreign-exchange intervention from two currency perspectives.)

Solution 1

(g)(ii)

Mark scheme

- Correspondingly, the Federal Reserve should BUY dollars in the foreign exchange market — using the euros it sells (part (g)(i)) to purchase dollars, which increases the demand for dollars and offsets the depreciation pressure from part (f)(ii), keeping the dollar's value constant. 1 point. (Shares its official 1 point with part (g)(i), the same single intervention stated from the dollar's side.)

Question 1

2021 Set 2 ■ Q1

Assume Smithland is in short-run equilibrium at a level of output that exceeds the full-employment level of output.

- (a)** Draw a correctly labeled graph of the aggregate demand, short-run aggregate supply, and long-run aggregate supply curves, and show each of the following.
- (i) The current equilibrium real output and price level, labeled Y_1 and PL_1 , respectively
 - (ii) The full-employment output, labeled Y_F

Question 1

2021 Set 2 ■ Q1

Assume Smithland is in short-run equilibrium at a level of output that exceeds the full-employment level of output.

(b) Assume Smithland's government cuts individual income taxes. On your graph in part (a), show the short-run effect of the tax cut on equilibrium real output, labeling the new short-run equilibrium real output Y_2 .

Question 1

2021 Set 2 ■ Q1

Assume Smithland is in short-run equilibrium at a level of output that exceeds the full-employment level of output.

(c)(i) Based solely on the change in real output on your graph in part (b), what will happen to each of the following in the short run?

The natural rate of unemployment

(c)(ii) Based solely on the change in real output on your graph in part (b), what will happen to each of the following in the short run?

Nominal interest rates. Explain.

Question 1

2021 Set 2 ■ Q1

Assume Smithland is in short-run equilibrium at a level of output that exceeds the full-employment level of output.

(d) Assume instead the central bank intervenes to correct an inflationary output gap. What open-market operation should the central bank take?

Question 1

2021 Set 2 ■ Q1

Assume Smithland is in short-run equilibrium at a level of output that exceeds the full-employment level of output.

(e) Draw a correctly labeled graph of the money market, and show the effect of the open-market operation identified in part (d) on the nominal interest rate.

Question 1

2021 Set 2 ■ Q1

Assume Smithland is in short-run equilibrium at a level of output that exceeds the full-employment level of output.

(f) Based solely on the interest rate change identified in part (e), what will happen to the international value of Smithland's currency in the foreign exchange market? Explain.

Question 1

2021 Set 2 ■ Q1

Assume Smithland is in short-run equilibrium at a level of output that exceeds the full-employment level of output.

(g) Based solely on the exchange rate change identified in part (f), will Smithland's imports increase, decrease, or remain the same? Explain.

Solution 1

(a)

Mark scheme

- Draw a correctly labeled AD–SRAS–LRAS graph. First point: a downward-sloping AD and upward-sloping SRAS intersecting at the current equilibrium, with dashed lines to the axes labeling the price level PL and real output Y at that intersection. Second point: add a vertical LRAS curve positioned to the LEFT of Y , with its base labeled Y_F (full-employment output), showing the economy is currently above full employment (an inflationary gap). 2 points: 1 for the correctly labeled AD/SRAS graph with PL , Y at the intersection; 1 for the vertical LRAS left of Y labeled Y_F .

Solution 1

(b)

Mark scheme

- On the same graph, show the short-run effect of the income tax cut: AD shifts rightward from AD to AD (an arrow indicating the rightward shift), intersecting SRAS at a higher real output level, labeled Y (with $Y > Y$, shown via a dashed line and rightward arrow along the horizontal axis). 1 point for correctly showing the rightward AD shift and labeling the new short-run equilibrium output Y .

Solution 1

(c)(i)

Mark scheme

- The natural rate of unemployment will NOT change. It is determined by structural/frictional factors in the labor market, not by short-run cyclical changes in real output, so the AD-driven increase in Y from Y_1 to Y_2 has no effect on it. 1 point.

Solution 1

(c)(ii)

Mark scheme

- Nominal interest rates will INCREASE. Explanation: the increase in real output ($Y \rightarrow Y'$) raises households' and firms' income, which increases the (transactions) demand for money; with the money supply unchanged, the higher money demand raises the equilibrium nominal interest rate. 1 point for stating the increase AND giving this explanation.

Solution 1

(d)

Mark scheme

- The central bank should SELL bonds (a contractionary open-market operation) to reduce the money supply and correct the inflationary output gap. 1 point.

Solution 1

(e) Mark scheme

- Draw a correctly labeled money market graph: vertical axis = nominal interest rate, horizontal axis = quantity of money; a vertical money supply curve MS and a downward-sloping money demand curve MD intersecting at nominal interest rate i (1 point). Second point: show MS shifting LEFTWARD to MS (consistent with the central bank selling bonds in part (d)), intersecting MD at a higher nominal interest rate $i' > i$ (dashed lines to i and i' , arrow showing the leftward shift and the upward interest-rate movement). 2 points total: 1 for the correctly labeled base money-market graph, 1 for the leftward MS shift raising the nominal interest rate.

Solution 1

(f)

Mark scheme

- Smithland's currency will APPRECIATE. Explanation: the higher domestic nominal interest rate (from part (e)) attracts financial capital inflows as foreign investors seek the higher returns available in Smithland, which increases the demand for (or decreases the supply of) Smithland's currency on the foreign exchange market, causing it to appreciate. 1 point for stating appreciation AND giving this explanation.

Solution 1

(g)

Mark scheme

- Smithland's imports will INCREASE. Explanation: the appreciation of Smithland's currency makes foreign goods relatively less expensive (cheaper in domestic-currency terms) for Smithland's residents, so the quantity of imports purchased rises. 1 point for stating increase AND giving this explanation.

Question 1

2019 Set 1 ■ Q1

Canada is an open economy that is currently in a recessionary output gap.

(a)(i) Draw a correctly labeled graph of the long-run aggregate supply, short-run aggregate supply, and aggregate demand curves, and show the current equilibrium real output and price level, labeled as Y_1 and PL_1 , respectively.

(a)(ii) Draw a correctly labeled graph of the long-run aggregate supply, short-run aggregate supply, and aggregate demand curves, and show full-employment output, labeled Y_f .

Question 1

2019 Set 1 ■ Q1

Canada is an open economy that is currently in a recessionary output gap.

(b)(i) The central bank and the government do not take any policy actions to close the output gap. Explain how the economy will adjust to full employment in the long run.

(b)(ii) The central bank and the government do not take any policy actions to close the output gap. On your graph in part (a), show how the economy adjusts to full employment in the long run.

Question 1

2019 Set 1 ■ Q1

Canada is an open economy that is currently in a recessionary output gap.

(c)(i) Suppose the Canadian government is unwilling to wait for the long-run adjustment process. The marginal propensity to consume is 0.8. The equilibrium real output is 500 billion and the full-employment output is 540 billion. Calculate the minimum change and indicate the direction of change in government spending required to shift the aggregate demand curve by the amount of the output gap.

(c)(ii) Suppose the Canadian government is unwilling to wait for the long-run adjustment process. The marginal propensity to consume is 0.8. The equilibrium real output is 500 billion and the full-employment output is 540 billion. Calculate the minimum change and indicate the direction of change in taxes required to shift the aggregate demand curve by the amount of the output gap.

Question 1

2019 Set 1 ■ Q1

Canada is an open economy that is currently in a recessionary output gap.

(d) Assume instead that the Canadian central bank takes actions to restore the economy to full-employment output by influencing investment spending. Draw a correctly labeled graph of the money market, and show the effect of the actions taken by the central bank on the equilibrium interest rate.

Question 1

2019 Set 1 ■ Q1

Canada is an open economy that is currently in a recessionary output gap.

(e) Canada and Mexico are trading partners. Draw a correctly labeled graph of the foreign exchange market of the Canadian dollar, and show the effect of the change in the interest rate in part (d) on the value of the Canadian dollar with respect to the Mexican peso.

Solution 1

(a)(i)

Mark scheme

- Draw a downward-sloping aggregate demand curve (AD1) and an upward-sloping short-run aggregate supply curve (SRAS1) on a graph with Price Level on the vertical axis and Real GDP on the horizontal axis. Their intersection is the current short-run equilibrium: drop dashed lines to the axes and label the equilibrium price level PL1 and the equilibrium real output Y1. 1 point for a correctly labeled AD1/SRAS1 graph with the equilibrium point marked Y1 and PL1.

Solution 1

(a)(ii)

Mark scheme

- On the same graph, add a vertical long-run aggregate supply curve (LRAS) positioned to the right of Y_1 (Canada is in a recessionary output gap, so full-employment output exceeds current output). Label the output level where LRAS meets the horizontal axis as Y_f , with $Y_f > Y_1$. 1 point for a correctly labeled vertical LRAS curve with Y_f shown to the right of Y_1 .

Solution 1

(b)(i)

Mark scheme

- With no policy action, the recessionary gap ($Y_1 < Y_f$) means unemployment is above the natural rate, putting downward pressure on nominal wages, other input prices, and/or expected inflation. As these fall over time, the short-run aggregate supply curve shifts rightward, lowering the price level and raising real output until the economy self-corrects back to full employment at Y_f . 1 point for explaining that falling nominal wages/input prices/expected inflation shift SRAS rightward until real GDP returns to Y_f .

Solution 1

(b)(ii)

Mark scheme

- On the graph from part (a), draw a new short-run aggregate supply curve, SRAS2, to the right of SRAS1, such that AD1, SRAS2, and LRAS all intersect at the same point directly above Y_f (at a lower price level than PL1). 1 point for showing SRAS shifting rightward until it intersects AD1 and LRAS exactly at Y_f .

Solution 1

(c)(i)

Mark scheme

- Output (recessionary) gap = $Y_f - Y_1 = 540 \text{ billion} - 500 \text{ billion} = 40 \text{ billion}$. $\text{Spending multiplier} = 1/(1 - MPC) = 1/(1 - 0.8) = 1/0.2 = 5$. $\text{Minimum change in government spending} = \text{output gap} / \text{multiplier} = 40 \text{ billion} / 5 = 8 \text{ billion}$. Government spending must INCREASE by 8 billion. 1 point for the correct calculation ($40B/5 = 8B$) and the correct direction (increase).

Solution 1

(c)(ii)

Mark scheme

- Tax multiplier = $-MPC / (1 - MPC) = -0.8 / 0.2 = -4$. Minimum change in taxes = output gap / tax multiplier = $\$40 \text{ billion} / (-4) = -\10 billion . Taxes must DECREASE by \$10 billion. 1 point for the correct calculation ($\$40B / -4 = -\$10B$) and the correct direction (decrease).

Solution 1

(d) Mark scheme

- Draw the money market with Nominal Interest Rate on the vertical axis and Quantity of Money on the horizontal axis: a vertical money supply curve MS1 and a downward-sloping money demand curve MD, intersecting at interest rate r_1 (1 point for the correctly labeled base graph). To raise investment spending and close the recessionary gap, the central bank conducts expansionary monetary policy (e.g., buys bonds / lowers the required reserve ratio / lowers the discount rate), increasing the money supply and shifting it rightward to MS2; the new equilibrium nominal interest rate r_2 is lower than r_1 (1 point for showing MS shifting right and the resulting lower equilibrium interest rate).

Solution 1

(e) Mark scheme

- Draw the foreign exchange market for the Canadian dollar with the exchange rate (Mexican Pesos per Canadian Dollar) on the vertical axis and the Quantity of Canadian Dollars on the horizontal axis: an upward-sloping supply curve S_1 and a downward-sloping demand curve D_1 , intersecting at exchange rate e_1 and quantity Q_1 (1 point for the correctly labeled base graph). Because the Canadian nominal interest rate fell in part (d), Canadian assets become less attractive relative to foreign assets, so foreign demand for Canadian dollars decreases (demand shifts left to D_2) – or equivalently, Canadians supply more dollars to buy foreign assets (supply shifts right to S_2). Either shift lowers the equilibrium exchange rate to e_2

Solution 1

< e1: the Canadian dollar DEPRECIATES against the Mexican peso (1 point for showing the correct shift and that the Canadian dollar depreciates).

Question 2

2017 ■ Q2

Assume that an economy is in long-run equilibrium. Assume that consumers wish to hold less money because they use credit cards more frequently to purchase goods and services than cash.

(a) Draw a correctly labeled graph of the money market and show the effect of the reduced holdings of money on the equilibrium nominal interest rate in the short run.

(b)(i) Based on the change in the interest rate in part (a), what will happen to each of the following in the short run?

Prices of previously issued bonds

(b)(ii) The price level and real income. Explain.

(c) With a constant money supply, based on your answer to part b(ii), will the velocity of money increase, decrease, or remain the same, or is the change indeterminate?

Question 2

(d) If the central bank wishes to reverse the change in the interest rate identified in part (a), what open market operation would it use?

Solution 2

(a)

Mark scheme

- Graph axes: nominal interest rate vertical, quantity of money (M) horizontal. Draw a vertical money supply (MS) curve and a downward-sloping money demand curve (correctly labeled) (1 point). Show money demand shifting leftward from $MD1$ to $MD2$ (due to reduced money holdings), with the equilibrium nominal interest rate falling from $r1$ to $r2$ (1 point).

Solution 2

(b)(i)

Mark scheme

- The price of previously issued bonds will increase. Bond prices and interest rates move inversely: as the nominal interest rate falls (from part a), existing bonds with a fixed coupon become relatively more attractive, so their price rises.

Solution 2

(b)(ii)

Mark scheme

- Both the price level and real income (real GDP) will increase. Explanation: the lower nominal interest rate (from part a) increases interest-sensitive spending — consumption, investment, and/or net exports — which increases aggregate demand, raising both the price level and real income/real GDP.

Solution 2

(c)

Mark scheme

- The velocity of money will increase. Using the equation of exchange $MV = PY$: with the money supply (M) held constant while the price level and real income (PY) both increase (from part b(ii)), velocity (V) must rise to keep the equation balanced.

Solution 2

(d)

Mark scheme

- The central bank would sell bonds (conduct an open market sale). Selling bonds decreases the money supply, which reverses the earlier fall in the interest rate by pushing the nominal interest rate back up.

Question 1

2015 ■ Q1

MACROECONOMICS

Section II

Planning Time—10 minutes

Writing Time—50 minutes

Directions: You have 10 minutes to read all of the questions in this booklet, to sketch graphs, to make notes, and to plan your answers. You will then have 50 minutes to answer all three of the following questions. It is suggested that you spend approximately half your time on the first question and divide the remaining time equally between the next two questions. Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. Use a pen with black or dark blue ink.

1. Assume that the United States economy is operating below full employment.
 - (a) Draw a correctly labeled graph of long-run aggregate supply, short-run aggregate supply, and aggregate demand, and show each of the following.

Question 1

- (i) Current equilibrium output and price level, labeled as Y_1 and PL_1
 - (ii) Full-employment output, labeled as Y_f
- (b) Assume that the Federal Reserve targets a new federal funds rate to reach full employment. Should the Federal Reserve target a higher or lower federal funds rate?
- (c) Given the Federal Reserve action you identified in part (b), draw a correctly labeled graph of the money market and show the effect on the nominal interest rate.
- (d) The policy makers pursue a fiscal policy rather than the monetary policy in part (b). Assume that the marginal propensity to consume is 0.8 and the value of the recessionary gap is \$300 billion.
 - (i) If the government changes its spending without changing taxes to eliminate the recessionary gap, calculate the minimum required change in government spending.
 - (ii) If the government changes taxes without changing government spending to eliminate the recessionary gap, will the minimum required change in taxes be greater than, smaller than, or equal to the minimum required change in government spending in part (d)(i) ? Explain.
- (e) Assume the government lowers income tax rates to eliminate the recessionary gap. Will each of the following increase, decrease, or stay the same?

Question 1

- (i) Aggregate demand. Explain.
- (ii) Long-run aggregate supply. Explain.

Solution 1

(a)

Mark scheme

- Setup/instruction for the graph — no separate credit. Draw axes with Price Level (vertical) and Real GDP (horizontal); a downward-sloping AD curve and an upward-sloping SRAS curve. Credit for this graph is earned via parts (a)(i) (initial equilibrium labels Y_1 , PL_1) and (a)(ii) (LRAS placement) below.

Solution 1

(a)(i)

Mark scheme

- Label the initial equilibrium — where AD intersects SRAS — as Y_1 on the real-GDP axis and PL_1 on the price-level axis. One point is earned for a correctly labeled graph showing AD, SRAS, Y_1 , and PL_1 .

Solution 1

(a)(ii)

Mark scheme

- Draw a vertical long-run aggregate supply (LRAS) curve at Y_f , positioned to the right of Y_1 (the economy starts in a recessionary gap, so $Y_1 < Y_f$). One point is earned for drawing a vertical LRAS at Y_f to the right of Y_1 .

Solution 1

(b)

Mark scheme

- The Federal Reserve should target a LOWER federal funds rate. A lower target rate is expansionary monetary policy, needed to close the recessionary gap ($Y_1 < Y_f$) and move the economy toward full employment. One point is earned for stating 'lower.'

Solution 1

(c)

Mark scheme

- Draw a correctly labeled money market graph: vertical axis = nominal interest rate, horizontal axis = quantity of money, with a downward-sloping money demand (MD) curve and vertical money supply curves MS_1/MS_2 . To lower the federal funds rate, the Fed increases the money supply — shift MS_1 right to MS_2 (from M_1 to M_2), lowering the nominal interest rate from r_1 to r_2 . One point for a correctly labeled graph; one point for shifting money supply right and showing the resulting decrease in the nominal interest rate.

Solution 1

(d)

Mark scheme

- Setup only — no separate credit. Given: $MPC = 0.8$ (so $MPS = 0.2$) and a recessionary gap of \\$300 billion. These numbers are used in parts (d)(i) and (d)(ii) below.

(d)(i)

Mark scheme

- Spending multiplier $= 1/MPS = 1/0.2 = 5$. Minimum required change in government spending $= \text{recessionary gap} \div \text{spending multiplier}$
 $= \$300 \text{ billion} / 5 = \60 billion . One point is earned for this calculation.

Solution 1

(d)(ii)

Mark scheme

- The minimum required change in taxes will be GREATER than the minimum required change in government spending from part (d)(i). Explanation: the tax multiplier = $MPC/MPS = 0.8/0.2 = 4$ is smaller in magnitude than the government-spending multiplier = $1/MPS = 1/0.2 = 5$, because part of the initial increase in disposable income from a tax cut is saved rather than spent — only the MPC share is spent — so a larger tax cut than spending increase is needed to close the same gap. One point for stating 'greater than'; one point for this multiplier explanation.

Solution 1

(e)

Mark scheme

- Setup only — the government lowers income tax rates to eliminate the recessionary gap; effects on (e)(i) aggregate demand and (e)(ii) long-run aggregate supply are graded separately below.

Solution 1

(e)(i)

Mark scheme

- Aggregate demand will INCREASE. Explanation: lower income tax rates raise households' disposable income, which increases consumption and/or investment, shifting AD to the right. One point is earned for stating AD increases with this explanation.

Solution 1

(e)(ii)

Mark scheme

- Long-run aggregate supply — any ONE of the following earns the point: (1) LRAS stays the SAME, because lowering income taxes raises consumption/investment (demand-side) but does not change the economy's inputs (labor, capital, technology, resources); OR (2) LRAS INCREASES in the long run, because lower taxes raise savings and investment in physical capital, or increase incentives to work; OR (3) LRAS DECREASES in the long run, because lower taxes cause crowding out of private investment. One point is earned for stating and explaining any one of these three positions.

Question 2

2014 ■ Q2

The Federal Reserve can influence the supply of money.

(a)(i) Assume that the Federal Reserve targets a lower federal funds rate.

What open market operation can the Federal Reserve use to achieve the lower target?

(a)(ii) Given your answer to part (a)(i), what will happen to the price of government bonds?

(b) Using a correctly labeled graph of the money market, show the effect of the open market operation from part (a)(i) on the nominal interest rate.

(c) Assume that the Federal Reserve buys government bonds from commercial banks. Based only on this transaction, will the level of required reserves in the commercial banks increase, decrease, or remain the same?

(d) Another monetary policy action involves changing the discount rate. Define the discount rate.

Solution 2

(a)(i)

Mark scheme

- The Federal Reserve should conduct an open market purchase — buy government bonds (open market operations) — which injects reserves into the banking system, increases the money supply, and lowers the federal funds rate toward the new target. 1 point for stating the Fed buys government bonds (open market purchase).

Solution 2

(a)(ii)

Mark scheme

- The price of government bonds will increase. The Fed's purchases raise demand for existing government bonds, bidding their price up (consistent with the inverse relationship between bond prices and interest rates, since the Fed is engineering a lower interest rate). 1 point for stating that the price of government bonds increases.

Solution 2

(b) Mark scheme

- Draw a money market graph with the nominal interest rate on the vertical axis and quantity of money on the horizontal axis: a downward-sloping money demand curve (MD) and a vertical money supply curve at M_1 (MS_1), intersecting at nominal interest rate r_1 . The open market purchase from part (a)(i) increases the money supply, shifting the vertical money supply curve right from MS_1 (at M_1) to MS_2 (at M_2); the new equilibrium nominal interest rate r_2 is lower than r_1 . 1 point for a correctly labeled money market graph; 1 point for shifting the money supply curve right and showing a decrease in the nominal interest rate.

Solution 2

(c)

Mark scheme

- The level of required reserves in the commercial banks will remain the same (will not initially change). Buying bonds from commercial banks increases those banks' actual reserves (and hence their excess reserves), but required reserves are determined by the required reserve ratio applied to bank deposits, which this open-market transaction alone does not change. 1 point for stating required reserves are unaffected/remain the same.

Solution 2

(d)

Mark scheme

- The discount rate is the interest rate that the Federal Reserve charges commercial banks for (short-term) loans borrowed directly from its discount window. 1 point for this definition.