

QUEEN'S UNIVERSITY AT KINGSTON

FACULTY OF ARTS AND SCIENCE

Department of Economics

ECONOMICS 112

Final Examination

December 13, 2017

Course Sections and Instructors:

Econ 112 Section 700 – Xiaoran Guo

Time Limit: 3 Hours

Permitted Calculator:

Pre-Approved: Casio 991

Instructions:

Part A: Mark your selections in PENCIL on the Scantron Answer Sheet. Fill in the appropriate rectangle completely, but stay within its limits. There is only one correct answer for each question; multiple answers will be marked as incorrect. If you make changes, be sure to erase completely. Please record your *Student Number*, *Name*, and *Test Form A* in the appropriate sections of the Answer Sheet. For detailed instructions on filling in this information see the next page.

Parts B and C: Use answer booklet provided to answer parts B and C.

Marking Scheme:

Part A [60 marks] FORTY Multiple-Choice Questions - 1.5 marks each

Part B [20 marks] FOUR of SIX True/False/Uncertain Questions - 5 marks each

Part C [20 marks] ONE of TWO Problems - 20 marks

Notes:

- Proctors are unable to respond to queries about the interpretation of exam questions. Do your best to answer exam questions as written.
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Before You Begin the Exam:

1. Write your Student # under “**I.D. Number**” on the Answer Sheet and fill in the appropriate rectangle below each number. See example below.
2. Print your **Last Name** followed by first name in the appropriate space, and fill in the appropriate rectangle under each letter. (If your name is too long to fit in the spaces provided, please enter as many letters as you can.) See example below.
3. Under “**Test Form**”, fill in “**A**”. See example below.

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Part A: MULTIPLE-CHOICE QUESTIONS

Choose the one alternative that best completes the statement or answers the question. There are forty questions in the section and you must answer ALL of them.

- 1) Which of the following statements belongs more properly in the field of normative economics than positive economics?
 - A) Technological change has reduced the cost of cell phone service.
 - B) When a drought occurs, the price of vegetables tends to rise.
 - C) An increase in the minimum wage leads to more unemployment.
 - D) Canadian governments should provide assistance to the auto industry.
 - E) The price of one Canadian dollar is \$0.85 U.S.

- 2) An economist has data showing household income and energy consumption for 10 000 Canadian households. The best way to illustrate these data is
 - A) a time-series line graph.
 - B) a cross-sectional bar-chart graph.
 - C) a logarithmic scale diagram.
 - D) a time-series bar chart diagram.
 - E) a scatter diagram.

- 3) Suppose that the demand curves for goods A, B, and C have the following functional forms; where Q denotes quantity demanded and P denotes price:

$$Q_A = 120 - 3.5 P_A - 6 P_B$$

$$Q_B = 100 - 2 P_B + 3 P_C$$

$$Q_C = 1500 + 3.5 P_A - 0.5 P_C.$$
 Based on these demand curves, which of the following pairs of goods are known to be complements?
 - A) A and C
 - B) B and C
 - C) A and C, and B and C
 - D) A and B
 - E) none of the pairs are complements

The table below shows the total output and prices for an economy that produces only two goods, potatoes and oil. Data is provided for the years 2005 and 2015.

	Quantities Produced			Prices	
	Potatoes (kilograms)	Oil (barrels)		Potatoes (\$/kilogram)	Oil (\$/barrel)
2005	1000	50		4	55
2015	1100	65		6	60

TABLE 20-6

- 4) Refer to Table 20-6. If 2005 is the base year, the GDP deflator in 2015 was
 - A) 59.1.
 - B) 85.7.
 - C) 131.67.
 - D) 159.1.
 - E) 100.

- 5) Jodie's Bakery generates a yearly revenue of \$6000. Throughout the year Jodie spends \$1500 on flour, \$1000 on fruit, \$500 on sugar & spices, \$1500 on butter, and employs an assistant whom she pays \$1000. Calculate the value of the annual output produced by Jodie's Bakery using the value added method.
 - A) \$4500
 - B) \$6000
 - C) \$2500
 - D) \$500
 - E) \$1500

The table below includes data for a one-year period required to calculate GDP for this economy. All figures are in billions of dollars.

Wages and salaries	3029
GST remittances	107
Exports	32
Gross investment	537
Depreciation	82
Consumption expenditure	2808
Government subsidies to firms	51
Business profit	423
Imports	35
Interest and investment income	276
Government purchases	524

TABLE 20-2

6) Refer to Table 20-2. What is the value of GDP, as calculated from the expenditure side?

- A) \$3904 B) \$3936 C) \$3784 D) \$3708 E) \$3866

The table below includes data for a one-year period required to calculate GDP for this economy. All figures are in billions of dollars.

Wages and salaries	6423
GST remittances	613
Exports	954
Gross investment	1850
Consumption expenditure	5107
Depreciation	425
Government subsidies to firms	125
Business profits	1256
Imports	982
Interest and investment income	652
Government purchases	2315

TABLE 20-3

7) Refer to Table 20-3. What is the value of net domestic income at factor cost?

- A) \$8167 B) \$9244 C) \$8331 D) \$8292 E) \$9494

8) Consider a simple macro model with a constant price level and demand-determined output. The equations of the model are: $C = 60 + 0.43Y$, $I = 150$, $G = 260$, $T = 0$, $X = 90$, $IM = 0.06Y$. The trade balance at equilibrium national income is

- A) a deficit of 36.67.
 B) a deficit of 21.43.
 C) zero.
 D) a surplus of 21.43.
 E) a surplus of 36.67.

- 9) Consider the following news headline: "Finance minister announces that the federal income-tax rate will rise by three percentage points." Assuming that aggregate output is demand-determined, what will be the effect of this action, all other things equal, on the AE function and equilibrium national income?
- A) The AE function will shift down parallel to itself and equilibrium national income will fall.
 - B) The AE function will rotate upward (become steeper) and equilibrium national income will rise.
 - C) The AE function will rotate downward (become flatter) and national income will fall.
 - D) The AE function will shift up parallel to itself and equilibrium national income will rise.
 - E) There will be no change in the AE function or in equilibrium national income.
- 10) In an open economy with government and demand-determined output, a decrease in the equilibrium level of national income could be caused by
- A) a decrease in the desired level of imports at all levels of income.
 - B) a decrease in the desired level of saving at all levels of income.
 - C) a decrease in taxes at all levels of income.
 - D) a decrease in desired consumption at all levels of income.
 - E) an increase in government purchases.

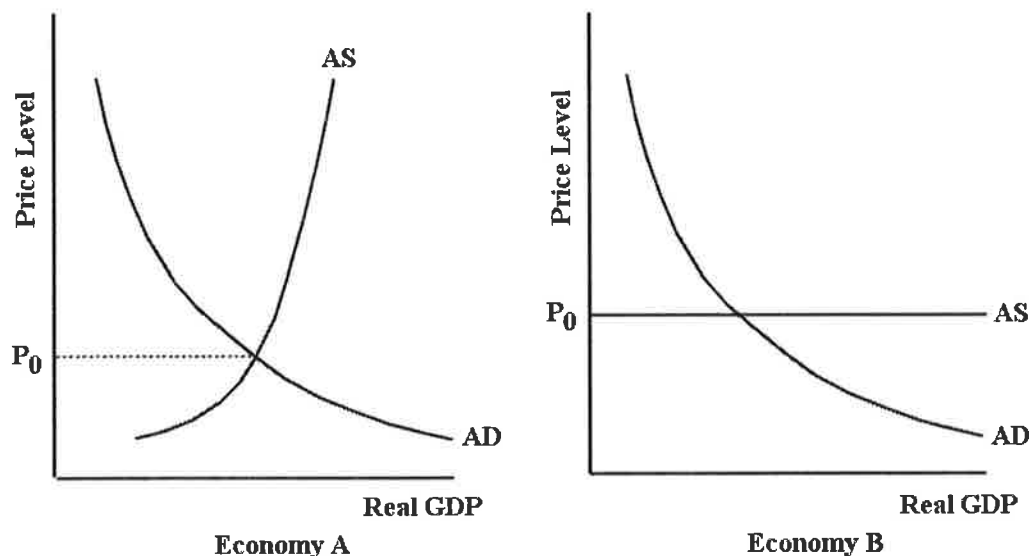


FIGURE 23-3

- 11) Refer to Figure 23-3. Which of the following statements correctly describes the difference between the multipliers (in response to an increase in autonomous expenditure) in Economy A and Economy B? The multiplier in Economy A is _____ while the multiplier in Economy B is _____.
- A) very small; equal to one
 - B) equal to one; equal to the simple multiplier
 - C) equal to one; very small
 - D) very small; equal to the simple multiplier
 - E) equal to the simple multiplier; very small

- 12) Which of the following would cause a positive aggregate demand shock, but leave the aggregate supply curve unaffected?
- A) A medical report confirming that improved health for Canadian workers caused fewer lost days of production.
 - B) A substantial increase in world oil prices.
 - C) A severe drought lasting for six months that destroys agricultural and forestry production.
 - D) An improvement in the computer literacy of workers.
 - E) A free trade agreement between Canada and Europe that leads Canadian businesses to increase investment expenditures.
- 13) Consider the following news headline: "Governments plan massive hospital construction programs across the country." Choose the statement below that best describes the likely macroeconomic effects.
- A) the AD curve shifts to the right and the AS curve shifts to the left; the price level rises and the effect on real GDP is indeterminate
 - B) the AD curve shifts to the right; the price level rises and real GDP rises
 - C) the AD and AS curves both shift to the right; the effect on the price level is indeterminate and real GDP rises
 - D) the AD curve shifts to the left; the price level falls and real GDP falls
 - E) the AD curve shifts to the left and the AS curve shifts to the right; the price level falls and the effect on real GDP is indeterminate
- 14) Suppose Canada's economy is in a long-run equilibrium with real GDP equal to potential output. Now suppose there is a decrease in the Canadian price of all imported raw materials. In the short run, _____. In the long run, _____.
- A) real GDP rises and the price level falls; real GDP and the price level return to their original levels
 - B) real GDP falls and the price level rises; real GDP is below its original level with a higher price level
 - C) real GDP and the price level both fall; real GDP is below its original level with a lower price level
 - D) real GDP and the price level both rise; real GDP returns to its original level with a higher price level
 - E) real GDP and the price level both rise; real GDP is above its original level with a higher price level

The diagram below shows an AD/AS model for a hypothetical economy. The economy begins in long-run equilibrium at point A.

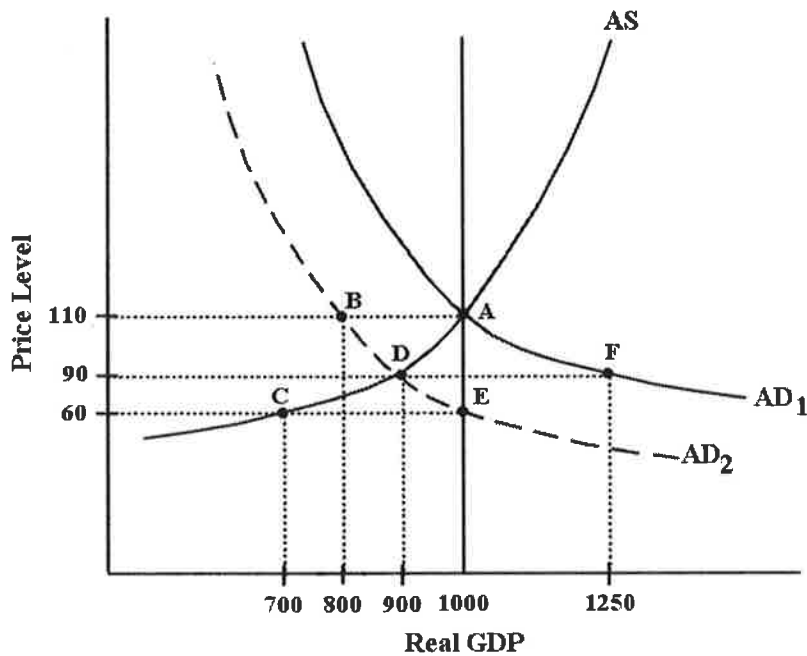


FIGURE 24-3

- 15) Refer to Figure 24-3. After the negative aggregate demand shock shown in the diagram (from AD₁ to AD₂), which of the following describes the adjustment process that would return the economy to its long-run equilibrium?
- A) Wages would increase, causing the AS curve to shift to the right, reaching a new equilibrium at point E.
 - B) Wages would increase, causing the AD curve to shift to the right, returning to the original equilibrium at point A.
 - C) Potential output would decrease from 1000 to 900 and a new long-run equilibrium would be established at point D.
 - D) Wages would eventually fall, causing the AD curve to shift to the right, returning to the original equilibrium at point A.
 - E) Wages would eventually fall, causing the AS curve to shift slowly to the right, reaching a new equilibrium at point E.
- 16) Refer to Figure 24-3. Which of the following events could have shifted the AD curve from AD₁ to AD₂?
- A) an increase in autonomous household saving
 - B) an increase in government purchases
 - C) an increase in desired investment
 - D) an increase in net exports
 - E) an increase in autonomous consumption

- 17) Consider a simple macro model with demand-determined output. Which of the following parameters will produce the largest fluctuations in real GDP from autonomous expenditure shocks?
- A) $MPC = 0.8, t = 0.1, m = 0.2$
 - B) $MPC = 0.8, t = 0.2, m = 0.3$
 - C) $MPC = 0.7, t = 0.3, m = 0.2$
 - D) $MPC = 0.9, t = 0.2, m = 0.4$
 - E) $MPC = 0.7, t = 0.1, m = 0.4$
- 18) Suppose that the demand and supply curves in the market for apples have the following functional forms: $Q_D = 250 - 4p$ and $Q_S = 10 + p$. The equilibrium quantity and price would then be
- A) $Q = 58, p = 48$.
 - B) $Q = 48, p = 58$.
 - C) $Q = 68, p = 98$.
 - D) $Q = 92, p = 48$.
 - E) $Q = 68, p = 108$.
- 19) In the Neoclassical growth model, decreases in the population, other things being equal, would eventually result in
- A) increasing GDP and increasing living standards.
 - B) increasing savings and increasing living standards.
 - C) decreasing GDP and increasing living standards.
 - D) increasing GDP and falling living standards.
 - E) decreasing GDP and falling living standards.
- 20) "Solow residual" is equal to the growth in real GDP
- A) that cannot be accounted for by changes in the quantities of labour and capital.
 - B) that cannot be accounted for by changes in technology.
 - C) that cannot be accounted for by changes in the labour force.
 - D) accounted for by changes in all factors of production but excluding technological changes.
 - E) accounted for by changes in all factors of production and including technological changes.
- 21) New theories of economic growth based on the idea that growth is endogenous
- A) incorporate factors such as central-bank behaviour.
 - B) ignore the role of technology.
 - C) assume that the rate of growth of the economy is equal to the rate of population growth.
 - D) stress the role of knowledge and learning in the economy's rate of growth.
 - E) assume that the growth rate of technology is exogenous.
- 22) Which of the following is an example of the use of money as a medium of exchange?
- A) Barry pays \$275 with his bank debit card for tickets for an NHL play-off game.
 - B) ABC Investments Inc. enters in its account books that it owes Nallai \$20 for his last month's investment income.
 - C) Mike gets a friend to give him a beer today in return for promising to give the friend two beer when Mike gets paid at the end of the month.
 - D) Dave keeps \$250 in his drawer for a "rainy day."
 - E) Judy lends her car to a friend who signs a promissory note that she will pay Judy \$10 a day for the use of the car after she returns the car to Judy.

23) Which of the following is consistent with the predictions of Gresham's law?

- A) The disappearance of U.S. coins circulating in Canada during periods when the Canadian dollar is worth less than the U.S. dollar.
- B) Increases in the money supply led to the hyperinflation of the 1920s in Germany.
- C) The increased circulation of U.S. coins in Canada during periods when the Canadian dollar is worth significantly less than the U.S. dollar.
- D) Debasing of a metallic money will be followed by inflation.
- E) An increase in the money supply will be followed by inflation.

Consider the following list of entries that might appear on the balance sheet of a commercial bank. All figures are millions of dollars.

Shareholders' equity	200
Demand deposits	1500
Foreign-currency reserves	2000
Deposits at the Bank of Canada	50
Mortgage loans	700
Notice (term) deposits	1200
Government deposits	60
Cash reserves	210

TABLE 26-1

24) Refer to Table 26-1. What are the total liabilities on the balance sheet of this commercial bank?

- A) 2960
- B) 2410
- C) 2520
- D) 3160
- E) 2810

25) Why is the possibility of a bank run extremely small in Canada today?

- A) The Canadian Deposit Insurance Corporation provides deposit insurance on eligible deposits, so most depositors would not feel the need to withdraw all of their money in a panic.
- B) The Department of Finance guarantees the deposits at all commercial banks in Canada, eliminating the danger of a rush of withdrawals.
- C) Industry Canada guarantees the deposits at all commercial banks in Canada, eliminating the danger of a rush of withdrawals.
- D) The Office of the Superintendent of Financial Institutions provides deposit insurance on eligible deposits, so most depositors would not feel the need to withdraw all of their money in a panic.
- E) The Bank of Canada guarantees the deposits at all commercial banks in Canada, eliminating the danger of a rush of withdrawals.

Northern Bank: Balance Sheet

<u>Assets</u>		<u>Liabilities</u>	
Reserves	\$800	Deposits	\$10 000
Loans	<u>\$11 200</u>	Capital	<u>\$2000</u>
	\$12 000		\$12 000

TABLE 26-6

- 26) Refer to Table 26-6. Assume that Northern Bank's target reserve ratio is 10%. In order to achieve its target reserve ratio, Northern Bank must _____ and _____.
- A) increase its reserves by \$400; increase its loans by \$800
 - B) increase its reserves by \$200; decrease its deposits by \$200
 - C) increase its reserves by \$400; decrease its deposits by \$400
 - D) increase its reserves by \$200; decrease its loans by \$200
 - E) not change its reserves; not change its deposits
- 27) The "precautionary demand" for money arises from the
- A) need to make predictable purchases of goods and services.
 - B) fear that interest rates will fall.
 - C) fear that interest rates will rise.
 - D) desire to avoid paying interest on credit purchases.
 - E) uncertainty about when some expenditures will be necessary.
- 28) Consider a bond that promises to make coupon payments of \$100 each year for three years (beginning in one year's time) and also repays the face value of \$2000 at the end of the third year. If the market interest rate is 4%, what is the present value of this bond?
- A) \$2055.50
 - B) \$2325.76
 - C) \$2044.69
 - D) \$6097.95
 - E) \$2066.89
- 29) Consider the statement "Inflation is everywhere and always a monetary phenomenon." This statement does not hold true
- A) if the economy's adjustment process is working effectively.
 - B) in industrialized economies.
 - C) as long as demand and supply shocks are validated by expansionary monetary policy.
 - D) as long as the AD curve is shifting to the right at the same rate as the AS curve is shifting to the left.
 - E) for temporary bursts of inflation that are not accompanied by a monetary expansion.

The three figures below show the phases of a disinflation. In part (i), the economy is experiencing a sustained inflation at E_1 .

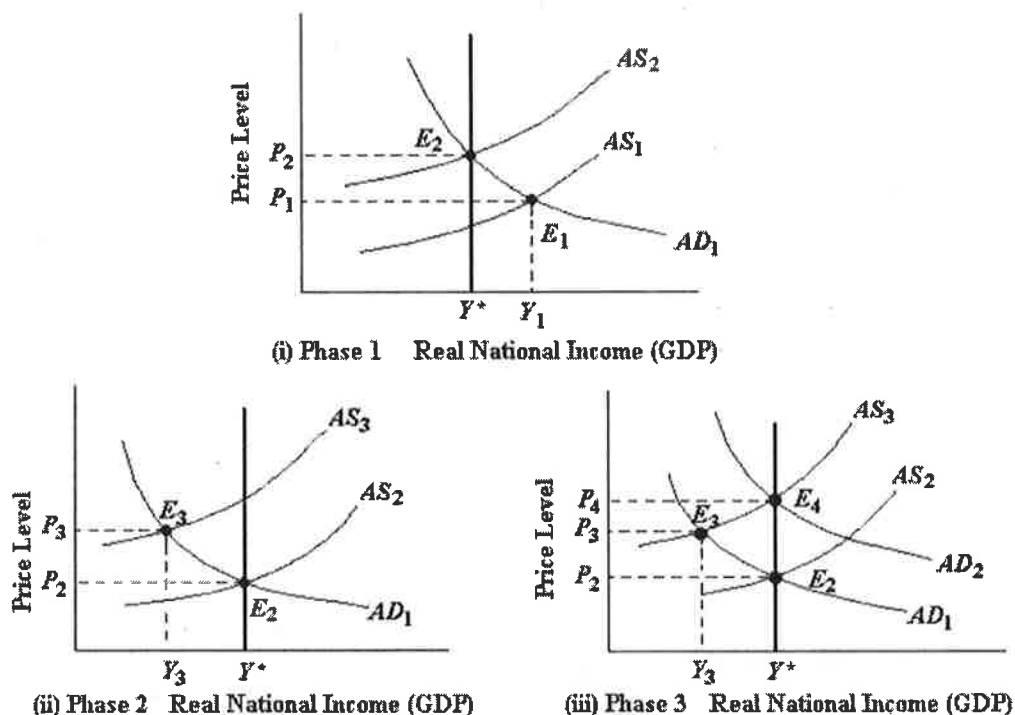


FIGURE 29-4

- 30) Refer to Figure 29-4, part (ii). If the AS curve continues to drift upward during Phase 2 of the disinflation process, the economy will experience
- a falling price level and falling output.
 - rising real wages and factor prices and rising employment.
 - rising unemployment and falling output.
 - falling unemployment and rising output.
 - falling real wages and factor prices and falling unemployment.
- 31) Suppose the official rate of unemployment reported by Statistics Canada declines from one month to the next from 7.5% to 7.2%, but we also know that the *stock* of unemployed workers has not changed. How is this possible?
- The labour force has declined due to out-migration of working-age people.
 - We have gone from a month with high seasonal unemployment to a month with low seasonal unemployment.
 - The labour force has grown as previously discouraged workers re-start their job-search process as unemployed individuals.
 - We have gone from a month with low seasonal unemployment to a month with high seasonal unemployment.
 - Some individuals who were previously outside the labour force have joined the labour force and immediately found jobs.

- 32) The idea that, in the long run, the Phillips curve is vertical, implying no trade-off between inflation and unemployment, is based on the premise that
- A) inflationary expectations do not influence inflation.
 - B) expectations do not adjust to reflect actual inflation.
 - C) inflation and unemployment are unrelated.
 - D) changes in unemployment do not influence real GDP.
 - E) inflationary expectations fully adjust to actual inflation.

The economy in the diagram below begins in long-run equilibrium at E_0 .

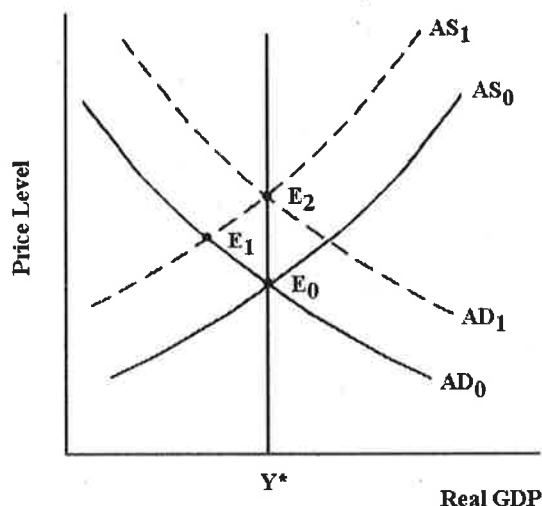


FIGURE 30-2

- 33) Refer to Figure 30-2. Suppose the economy is in a short-run equilibrium at E_1 after a negative supply shock. Cyclical unemployment at E_1 can be reduced by
- A) reducing government purchases to cause the AD curve to shift to AD_1 and a new equilibrium at E_2 .
 - B) expanding education and training programs for unemployed workers.
 - C) a contractionary monetary policy that shifts the AS curve back to AS_0 , returning the economy to equilibrium at E_0 .
 - D) an expansionary monetary policy that shifts the AD curve to AD_1 and a new equilibrium at E_2 .
 - E) increasing taxes to cause the AD curve to shift to AD_1 and a new equilibrium at E_2 .
- 34) The ongoing process of globalization of the world economy has an effect on the NAIRU in Canada. Choose the statement that best describes the likely effect.
- A) Because Canada is experiencing greater trade with the rest of the world, the increasing demand for exports puts upward pressure on the demand for labour in Canada and thus tends to decrease the NAIRU.
 - B) Globalization has meant that Canadian labour markets are less exposed to economic fluctuations elsewhere in the world, which has decreased the NAIRU.
 - C) Since globalization has brought net economic benefits to Canada, it follows that the NAIRU must be decreasing.
 - D) Canadian labour markets increasingly need to adjust to changing supply and demand conditions around the world. These ongoing adjustments tend to increase the NAIRU.
 - E) Canada's labour market is increasingly connected to labour markets in other parts of the world and the NAIRU in Canada tends to adjust to the same levels as those of our trading partners.

The diagram below is for a closed economy which begins in long-run equilibrium at Y^* and P_0 .

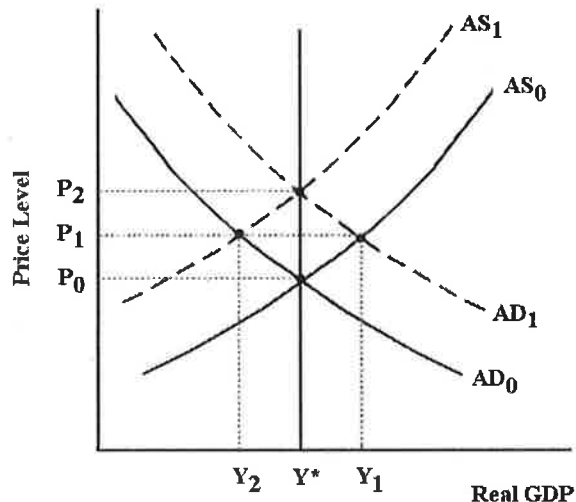


FIGURE 31-3

- 35) Refer to Figure 31-3. Suppose the government implements an expansionary fiscal policy, which increases the budget deficit. The economy's adjustment process returns real GDP to Y^* in the long run. Since real GDP is not affected in the long run, how are future generations likely to be harmed by this government policy?
- A) Investment in public infrastructure has been crowded out, which will harm future generations.
 - B) The budget deficit causes a depreciation in the domestic currency which reduces the income of future generations.
 - C) Private investment has been crowded out, which may lead to a lower future growth rate of potential GDP.
 - D) The budget deficit causes an appreciation in the domestic currency which reduces the income of future generations.
 - E) The inflationary gap is harmful to the economy and reduces real GDP in the future.
- 36) The 2008–2009 global recession had an effect on Canadian federal and provincial budgets. In general, government debt-to-GDP ratios rose in Canada because of
- A) the necessity to balance the cyclically adjusted budget at the same time that the interest rate on government debt was rising.
 - B) contractionary monetary policy and expansionary fiscal policy.
 - C) the necessity to balance the primary budget at the same time that the interest rate on government debt was rising.
 - D) an increased burden of debt-service payments due to the necessary reduction in the target overnight interest rate by the central bank.
 - E) the decline in net tax revenues due to the recession, as well an expansionary fiscal policy.

Ireland and Japan are assumed to produce only wool and steel, to have full employment and complete mobility of resources between industries. Their production possibilities boundaries before trade are drawn in solid lines. It is assumed that the two countries have the same amount of resources. Their consumption possibilities after trade are shown by the dotted lines. The outputs of wool and steel are given in physical units.

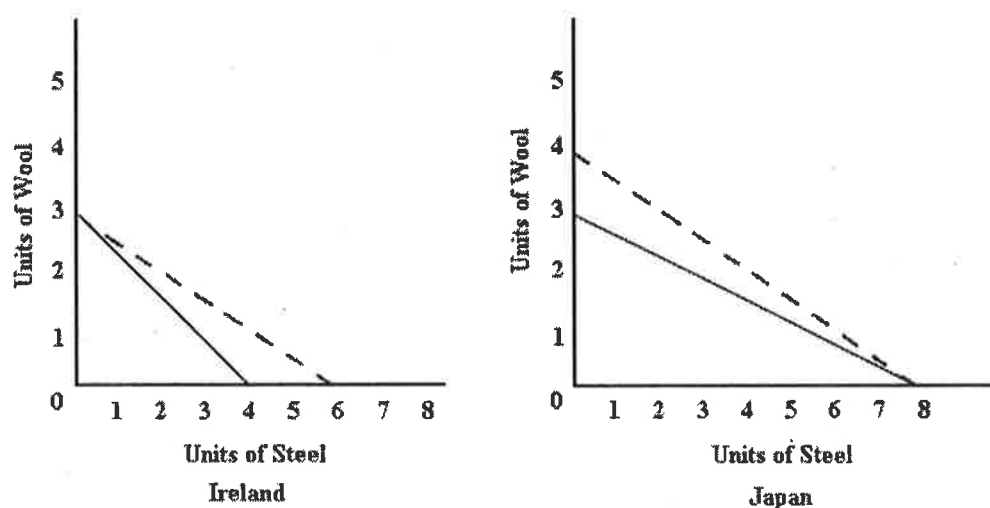


FIGURE 32-1

- 37) Refer to Figure 32-1. The comparative advantage is held by
- Ireland in wool, Japan in steel.
 - Ireland in steel, Japan in wool.
 - neither country in either good.
 - Japan in both goods.
 - Ireland in both goods.
- 38) Suppose there is a rise in the world price of Canada's imports. If the Canadian demand for imports has a price elasticity less than 1 (inelastic), the demand for foreign exchange will _____ and the Canadian dollar will _____.
- rise; depreciate
 - fall; depreciate
 - fall; and remain constant
 - fall; appreciate
 - rise; appreciate

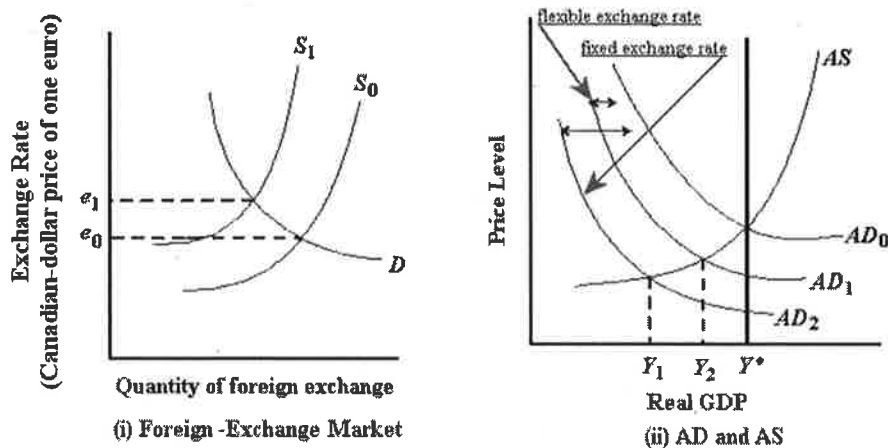


FIGURE 34-5

- 39) Refer to Figure 34-5. If the supply curve of foreign exchange shifts from S_0 to S_1 , the Bank of Canada could maintain a fixed exchange rate at e_0 by
- A) holding foreign reserves constant.
 - B) selling foreign currency reserves.
 - C) lowering the overnight interest rate.
 - D) selling Canadian currency.
 - E) buying foreign currency reserves.
- 40) Refer to Figure 34-5. Assume Canada has flexible exchange rates. The leftward shift in the supply curve from S_0 to S_1 may be due to a
- A) fall in the world's demand for Canadian exports.
 - B) fall in the Canadian demand for foreign imports.
 - C) rise in the Canadian demand for foreign assets.
 - D) rise in the Canadian demand for foreign imports.
 - E) rise in the world's demand for Canadian exports.

Part B: TRUE/FALSE/UNCERTAIN QUESTIONS

Choose **FOUR** of the following **SIX** statements. For each chosen statement, explain why the statement is True, False or Uncertain. A diagram and(or) a few lines of explanation should be sufficient.

Unsupported answers will receive no marks.

B1. Under the New Keynesian theory of long-run employment relationships, wage rates adjust instantaneously in excess labor demand or supply situations.

B2. Monetary validation of a positive demand shock causes the price level to increase and GDP return to the original potential level. (Diagram Required)

B3. In an economy subject to random aggregate demand shocks, a fixed exchange rate absorbs some of the shock and reduces the impact on output and employment. (Diagram Required)

B4. A decrease in the share of the labor force that is unionized may decrease the degree of wage flexibility, which would put upward pressure on NAIRU.

B5. Balanced growth of labor and capital in the Neoclassical growth model will not increase the level of per capita GDP.

B6. In an open economy like Canada's, a policy-induced increase in the government's budget deficit tends to crowd out foreign capital investments and increase net exports.

Part C: Problem-solving Questions (20 marks)

Answer ONE of the following TWO questions.

Read each part of the question very carefully. Answer all parts and show all the steps of your calculations to get full credit. Use diagrams when required.

C1

Consider the following aggregate expenditure model of an economy:

$$C = 50 + 0.8Y_D$$

$$I = 150$$

$$G = 250$$

$$T = 0.25Y$$

$$X = 350$$

$$IM = 0.4Y$$

where C is consumption (the 0.8 term represents the marginal propensity to consume) Y_D is disposable income, I is investment, G is government spending on goods and services, T is the total value of taxes net of transfers (the 0.25 term represents the net tax rate on national income), X is exports, and IM is imports (the 0.4 term represents the marginal propensity to import).

(A) Solve for aggregate expenditures (AE) as a function of Y , and calculate the equilibrium level of national income. Illustrate your equilibrium in a diagram with AE on the vertical axis and Y on the horizontal axis. (5%)

(B) What is the value of the multiplier? Explain the economic intuition of the multiplier. (2%)

(C) Calculate the value of net exports and private saving at the equilibrium level of national income. Is the government running a surplus, a deficit, or a balanced budget? (3%)

(D) Suppose the government increases spending by 40 (from 250 to 290). What is the new level of national income? What is the effect on the government's budget? (4%)

(E) Suppose that the economy was already at its potential output level (Y^*) before the policy change. Using appropriate diagrams, predict the effects of the policy change on real GDP, the unemployment rate, and the price level in the short-run and in the long-run. (6%)

C2

(A) Suppose there is a decrease in money supply in a closed economy. Explain how this change will affect bond prices, interest rates, desired investment expenditure, aggregate expenditures, and aggregate demand. (Diagrams Required) (6%)

(B) Explain how the steepness or flatness of money demand and investment demand affects the ability of this monetary policy change to induce short-run changes in real GDP in this closed economy. (4%)

(C) Now suppose that this economy is an open one. What effect will the reduction in the money supply have on capital flows, the exchange rate, and net exports? (4%)

(D) When is this monetary policy appropriate for a central bank with an inflation targeting mandate? (2%)

(E) Explain why central banks usually target the interest rates instead of the money supply when implementing monetary policies. Is it possible to independently target both? (4%)