

PROBLEM SET 7 WITH ANSWERS

Q.1

An economy experiences a rise in the unemployment rate from 4% to 6%. According to Okun's Law, every 1 percentage point increase in unemployment leads to a 2% decrease in real GDP compared to potential GDP.

The government introduces a fiscal stimulus package worth \$100 billion to offset the loss in output. If the potential GDP of the economy is \$5 trillion, and the government expenditure multiplier is 1.5,

- a) Estimate the total output loss due to the rise in unemployment.
- b) Calculate the expected increase in GDP from the stimulus.
- c) Will the stimulus fully offset the output loss? Justify your answer with calculations.

a) Estimate the total output loss due to the rise in unemployment.

Using Okun's Law:

$$\text{GDP Loss (\%)} = 2\% \times (\text{increase in unemployment in percentage points}) = 2\% \times 2 = 4\%$$

$$\text{Output Loss} = 4\% \times 5 \text{ trillion} = 0.04 \times 5,000 \text{ billion} = 200 \text{ billion USD}$$

b) Calculate the expected increase in GDP from the stimulus.

$$\text{Stimulus Impact} = \text{Multiplier} \times \text{Stimulus Spending}$$

$$= 1.5 \times 100 \text{ billion} = 150 \text{ billion USD}$$

c) Will the stimulus fully offset the output loss?

Output loss due to unemployment: \$200 billion

Stimulus-induced output gain: \$150 billion

Conclusion:

The stimulus does not fully offset the output loss. There remains a net GDP shortfall of:

$$200 \text{ billion} - 150 \text{ billion} = 50 \text{ billion USD}$$

This suggests that either:

A larger fiscal stimulus is needed, or the government should consider complementary policies (e.g., monetary easing, job creation programs) to further reduce the unemployment gap.

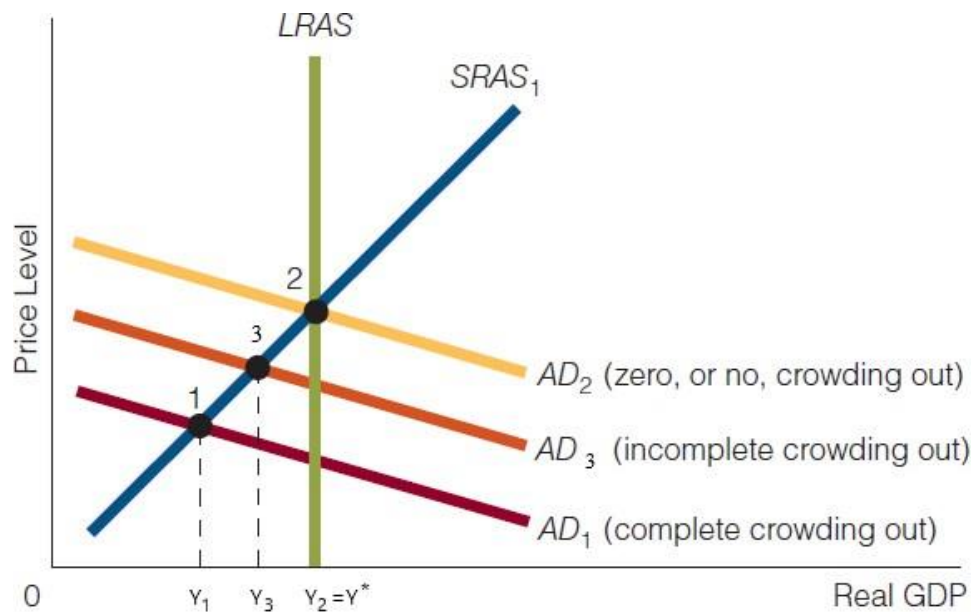
Q.2

Define the crowding-out effect. What factors can influence the size of the crowding-out effect? Demonstrate the effect of following on output and the price level in the AD/AS model:

- Complete crowding-out
- Incomplete crowding-out
- Zero or no crowding-out

Crowding out effect is the offsetting of a change in government expenditures by a change in private investment in the opposite direction. The factors that influence the size of the crowding-out effect are the sensitivity of investment, the change in the interest rate due to the drop in loanable funds and countries income relative to its potential. When the sensitivity of investment is higher, the crowding-out effect is larger. Since a little change in the interest rate creates bigger changes in private investment. Due to the drop in the loanable funds market, the interest rate must change. This change has an important role in the determination of private investment. Lastly, the closer to the potential income level the economy is, the more crowding out is likely to occur due to fact that factors (capital and labor) are used in their limits.

Types of Crowding Out	Examples
Complete crowding-out	Government spends \$2 billion more, and private sector spends \$2 billion less.
Incomplete crowding-out	Government spends \$2 billion more, and private sector spends \$1.2 billion less.
Zero crowding-out	Government spends \$2 billion more, and private sector spending stays constant.



The economy is initially at point 1, with Real GDP at Y_1 . Expansionary fiscal policy shifts the aggregate demand curve (AD_1) to AD_2 and moves the economy to point 2. Among other things, the implicit assumption is that there is zero crowding-out (no crowding out). Notice that Real GDP has increased from Y_1 to Y_3 or Y^* .

With incomplete crowding out, the expansionary fiscal policy shifts the AD curve to the right, increasing from Y_1 to Y_2 . However, financing the deficit increases interest rates and decreases private investment. This shifts the aggregate demand curve to the left to AD_3 . A fall in private expenditures partially offsets the initial stimulus in aggregate demand due to increased government spending. The economy moves to point 3. Notice that Real GDP has increased from Y_1 to Y_3 . Also, notice that the changes in Real GDP with incomplete crowding out is lower than the case with zero crowding out.

In the case of complete crowding out, the expansionary fiscal policy shifts the AD curve to the right, increasing from Y_1 to Y_2 . However, financing the deficit increases interest rates and decreases private investment. In this example, a fall in private expenditures completely offsets the initial stimulus in aggregate demand due to increased government spending, and the aggregate demand curve shifts back to AD_1 . Notice that Real GDP does not change.

Q.3

Assume a simple closed economy, with an mpc equal to 0.75. Assume that marginal tax rate is equal to zero. In other words, the tax function only consists of autonomous taxes. The government has passed a balanced budget amendment. The economy goes into a recession, so the government increases government spending by 40 million to try to expand the economy.

- a) Calculate the change in output (ΔY) from the increase in government spending (ΔG).

The spending multiplier = $1/(1-0.75) = 4$ $\Delta Y = \text{multiplier} * \Delta G$ $\Delta Y = 4 * 40 = 160$ million

- b) The balanced budget amendment requires the government to also raise taxes by 40 million. Calculate the change in output (ΔY) from the tax hike.

The tax multiplier = $\frac{-c1}{1-c1}$

$$= \frac{-0.75}{1-0.75} = -3$$

$$\Delta Y = \text{Tax multiplier} * \Delta T$$

$$\Delta Y = -3 * 40$$

$$\Delta Y = -120$$

- c) What is the net effect on output from these two policies? Was there any expansionary effect?

The net effect of the two policies is: $\Delta Y(a+b) = 160 \text{ million} - 120 \text{ million} = 40$ million. Yes, it expanded output by 40 million.

- d) Why is a balanced budget amendment problematic or undesirable?

A balanced budget rule means that one can't respond to severe emergencies, such as a natural disaster, war, or deal with a severe recession. Because the multiplier is only equal to one, it provides a fairly weak stimulus.

Q.4

a.) In each of the following cases, classify the person as cyclically, structurally or frictionally unemployed.

- i) Roberto lost his job as an assembly line worker due to the recession.

He is cyclically unemployed.

- ii) Daron lost his job as a welder due to the introduction of robotic welding machines.

He is structurally unemployed.

- iii) Joan quit her job to find a job better suited to her skills.

She is frictionally unemployed.

- iv) Carmen lost his job as a copywriter in a television channel since web-based advertising has drawn copywriters away from television advertising.

She is structurally unemployed.

- v) Flor is an interior architect. She is laid off during a recession until the demand for decoration picks up.

She is cyclically unemployed.

- vi) Aaron lost his job in the automotive industry as production in the region shifted to Asian countries.

He is structurally unemployed.

- vii) Paul quit his job to move to a different city for family reasons.

He is frictionally unemployed.

b.) Why is the distinction between cyclical and structural unemployment critically important for designing effective fiscal policy?

The distinction between cyclical and structural unemployment is critically important for designing effective fiscal policy, because the causes and remedies for each type differ significantly:

Cyclical Unemployment

- **Cause:** Insufficient aggregate demand during economic downturns (e.g., recessions).
- **Nature:** Temporary; rises and falls with the business cycle.
- **Fiscal Policy Response:**
 - **Effective:** Yes. Expansionary fiscal policy (like increased government spending or tax cuts) boosts demand and can reduce cyclical unemployment.
 - **Rationale:** If businesses face more demand, they'll hire more workers.

Structural Unemployment

- **Cause:** Mismatch between workers' skills/location and job requirements (e.g., due to automation, globalization, or long-term industry decline).
- **Nature:** Long-term; doesn't resolve with higher demand alone.
- **Fiscal Policy Response:**
 - **Direct fiscal stimulus is less effective.** Increasing demand won't help if the unemployed don't have the right skills.
 - **Better tools:** Government investment in:
 - Education and retraining programs
 - Labor mobility support
 - Industrial or regional development initiatives

Misidentifying structural unemployment as cyclical could lead to wasted fiscal spending with little impact on employment. Conversely, treating cyclical unemployment as structural may lead to insufficient stimulus, prolonging recessions unnecessarily. In budget-constrained settings, targeting the right problem ensures efficient use of public resources.

Q.5

For 2018, the following data for tiny island nation of *Carousel* is given : *money supply* = 600 million; *price level* = 2.5; *velocity of money* = 4. Use the quantity theory of money to answer the following questions

- a. What is the value of real output (income) in 2018?

The quantity theory of money says that:

$$MV = PY$$

***M*: money supply**

***V*: Velocity of money**

***P*: Price level**

***Y*: Real output (income)**

According to the information above we have:

$$600 * 4 = 2.5(Y)$$

$$Y = 960$$

- b. What is the value of nominal output (income) in 2018?

$$\text{Nominal output} = P * Y$$

$$\text{Nominal output} = 2.5 * 960 = 2400$$

- c. If real output doubled, by how much would the money supply need to change?

If real output doubles, we have this equation,

$$M * 4 = 2.5 * (2 * 960)$$

$$M' = 1200$$

It should be doubled.

- d. What happens if the money supply increases more rapidly than real output?

If the money supply increases faster than real output increases, the result is inflation.

- e. If the annual GDP (nominal) growth rate is 8 percent in *Carousel*, by how much will the money supply need to change in 2019?

If the annual GDP growth rate is 8 percent in *Carousel*, the nominal GDP will be:

$$NGDP_{2019} = 2400 + 2400(0.08) = 2592$$

$$M * 4 = 2592$$

$$M_{2019} = 648$$

Money supply should change by 8 percent.

OR

There is a different version of the quantity theory of money.

$$\% \Delta M + \% \Delta v = \% \Delta P + \% \Delta Y$$

In this example,

$$\% \Delta M + \% \Delta v = \% 8$$

Since velocity is constant;

$$\% \Delta M = \% 8$$

Q.6

- a. According to the quantity theory of money, if the money supply is growing at a rate of 6 percent per year, real GDP is growing at a rate of 3 percent per year, and velocity is constant, what will the inflation rate be? If velocity is increasing 1 percent per year instead of remaining constant, what will the inflation rate be?
- b. Suppose that during one period, the velocity of money is constant and during another period, it undergoes fluctuations. During which period will the quantity theory of money be more useful in explaining changes in inflation rate? Briefly explain.

The quantity theory of money starts from the quantity equation:

$$M \times V = P \times Y,$$

where M is the money supply, V is the velocity of money, P is the price level, and Y is real output. Because velocity is defined to equal $(P \times Y)/M$, the quantity equation must always hold true. Irving Fisher turned the quantity equation into the quantity theory of money by asserting that velocity was constant. With velocity constant, inflation occurs whenever the growth rate of the quantity of money exceeds the growth rate of real output.

- a. The inflation rate = Growth rate of the money supply + Growth rate of velocity – Growth rate of real output. So, the inflation rate = $6\% + 0\% - 3\% = 3\%$. If velocity grows at 1 percent, then the inflation rate equals $6\% + 1\% - 3\% = 4\%$.
- b. The relationship between the money supply and inflation is more stable when the velocity of money is constant or changes very little. When velocity undergoes large fluctuations, then a large increase in the money supply may not result in significant inflation, and significant inflation can occur even when the money supply does not increase. Therefore, the quantity theory of money will be more useful in explaining changes in the inflation rate if the velocity of money is constant.

Q.7

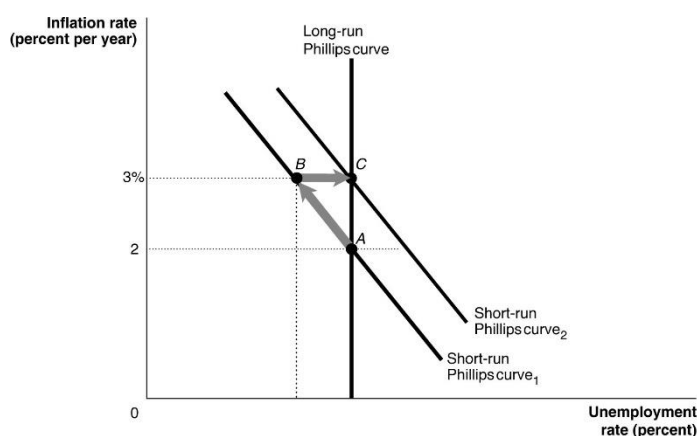
In explaining why monetary policy did not pull Japan out of a recession in the early 2000s, an official at the Bank of Japan was quoted as saying that despite “major increases in the money supply,” the money “stay[ed] in banks.” Explain what the official meant by saying that the money stayed in banks. Why would that be a problem? Where does the money go if an expansionary monetary policy is successful?

Apparently, banks in Japan were not lending out the new reserves being created by the Bank of Japan’s expansionary monetary policy. For an expansionary monetary policy to be successful, banks have to lend out the reserves created by the central bank. Banks in Japan were either reluctant to make loans to their existing customers—perhaps because they believed that the risk of borrowers defaulting on loans had increased—or the banks were having difficulty finding firms optimistic enough about the future to be willing to borrow in order to purchase new machinery, equipment, and buildings.

Q.8

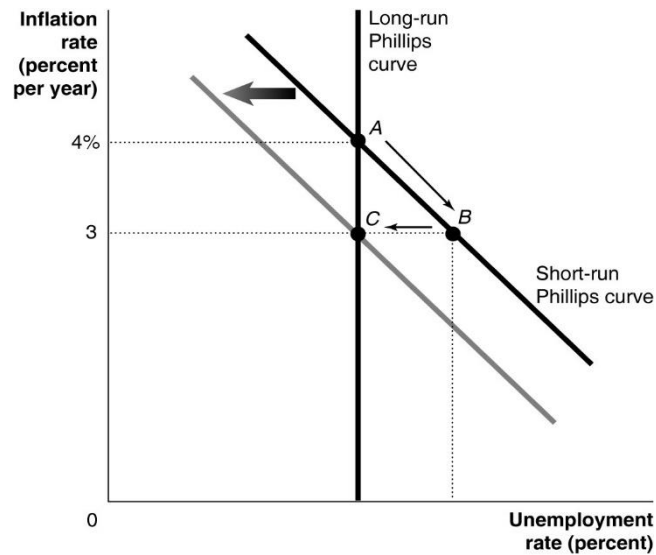
Assume that expectations are adaptive. How will the economy adjust to a new long-run equilibrium in response to the following policies? Support your answer with a graph of the Phillips Curve.

i) Expansionary monetary policy



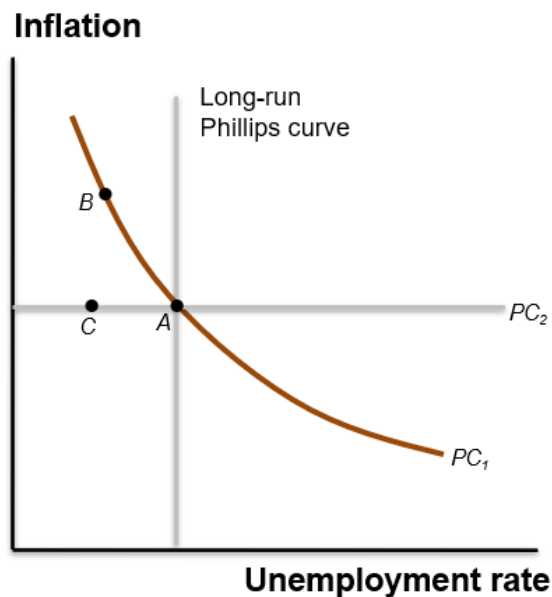
Expansionary monetary policy increases the inflation rate. With adaptive expectations, workers and firms will underestimate inflation, resulting in a decrease in the real wage and a decrease in the unemployment rate (move from A to B on the short-run Phillips curve above). Eventually, workers and firms will adjust to the fact that inflation is higher, shifting the short-run Phillips curve up and increasing the unemployment rate to its natural rate (move from B to C in the graph above).

ii) Contractionary monetary policy



Contractionary monetary policy reduces the inflation rate. With adaptive expectations, workers and firms will overestimate inflation, resulting in an increase in the real wage and an increase in the unemployment rate (move from A to B on the short-run Phillips curve above). Eventually, workers and firms will adjust to the fact that inflation is lower, shifting the short-run Phillips curve down and reducing the unemployment rate to its natural rate (move from B to C in the graph above).

Q.9



- a) What does the difference in slope between PC_1 and PC_2 imply about the relationship between unemployment and inflation over time?
- b) Discuss how globalization might contribute to the flattening of the Phillips Curve (or vice versa), referring to both product and labor markets.
- c) If the domestic unemployment rate falls below the natural rate while global goods prices remain low, what might happen to domestic inflation? Justify your answer.
- d) What implications does a flatter Phillips Curve have for fiscal or monetary policymakers aiming to reduce unemployment?

a) Economic meaning of the Phillips Curve and slope differences

PC_1 (steeper slope):

- Suggests that small changes in unemployment lead to larger changes in inflation.

PC_2 (flatter slope):

- Indicates a weaker trade-off — even with low unemployment, inflation may stay relatively stable.

b) How globalization flattens the Phillips Curve

In product markets:

- Consumers can buy cheaper imported goods, so domestic firms face pressure to keep prices low, even if demand increases.

- This weakens the pass-through from domestic wage growth to final prices.

In labor markets:

- Firms can offshore jobs or use temporary/contract labor from abroad.
- Workers in developed economies have less bargaining power, limiting wage increase even when unemployment is low.

c) Domestic unemployment below the natural rate while global prices remain low

Even if domestic unemployment falls below the natural rate (i.e., tight labor market):

- Traditional theory predicts rising inflation.
- However, low global prices mean domestic producers may struggle to raise prices without losing competitiveness.
- This can dampen inflation, or delay its rise, despite falling unemployment.

So, inflation may rise more slowly or stay stable — consistent with the flatter modern Phillips Curve.

d) Policy implications of a flatter Phillips Curve

For monetary and fiscal policymakers:

- A flatter curve means they can stimulate the economy more aggressively (e.g., to reduce unemployment) without triggering much inflation.
- It reduces the inflationary cost of achieving full employment.
- But it also makes inflation targeting harder, since inflation is less responsive to labor market tightening.

Implications:

- Policies must consider global price dynamics, not just domestic conditions.
- Structural tools (education, training, competitiveness) may be more effective than pure demand stimulus in reducing long-term unemployment.

MULTIPLE CHOICE QUESTION

Q1) Which of the following is an objective of fiscal policy?

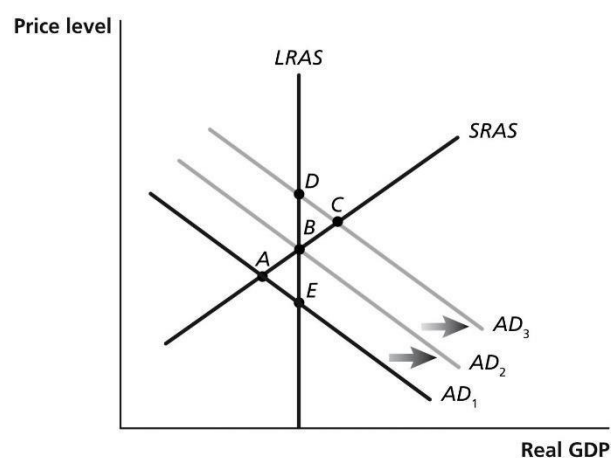
- A) energy independence from Middle East oil
- B) health care coverage for all Turkish people
- C) discovering a cure for Coronavirus
- D) high rates of economic growth

Q2) Automatic stabilizers refer to

- A) the money supply and interest rates that automatically increase or decrease along with the business cycle.
- B) government spending and taxes that automatically increase or decrease along with the business cycle.
- C) changes in the money supply and interest rates that are intended to achieve macroeconomic policy objectives.
- D) changes in federal taxes and purchases that are intended to achieve macroeconomic policy objectives.

Q3) Which of the following would not be considered an automatic stabilizer?

- A) legislation increasing funding for job retraining passed during a recession
- B) decreasing unemployment insurance payments due to decreased jobless during an expansion
- C) rising income tax collections due to rising incomes during an expansion
- D) declining welfare payments due to more persons finding jobs during an expansion



Q4) Refer to the figure above. Suppose the economy is in short-run equilibrium above potential GDP and automatic stabilizers move the economy back to long-run equilibrium. Using the static AD-AS model in the figure above, this would be depicted as a movement from

- A) D to C.
- B) A to E.
- C) C to B.
- D) B to A.
- E) E to A.

Q5) Crowding out refers to a decline in _____ as a result of an increase in _____.

- A) tax revenues; unemployment
- B) government purchases; tax rates
- C) government purchases; private expenditures
- D) private expenditures; government purchases

Q6) An increase in the sensitivity of private investment to changes in the interest rate _____ the government purchases multiplier.

- A) will decrease
- B) will increase
- C) will not change
- D) may increase or may decrease

Q7) If policy makers implement an expansionary fiscal policy but do not take into account the potential for crowding out, the new equilibrium level of GDP is likely to

- A) be at potential GDP.
- B) be above potential GDP.
- C) be below potential GDP.
- D) There is insufficient information given here to draw a conclusion.

Q8) Cyclical unemployment is the result of

- A) a persistent mismatch between the skills and characteristics of workers and the requirements of the jobs.
- B) the search process of matching workers with jobs.
- C) the ups and downs in inflation.
- D) a slowdown in the economy.

Q9) Structural unemployment is the result of

- A) a persistent mismatch between the skills and characteristics of workers and the requirements of the jobs.
- B) the search process of matching workers with jobs.
- C) the ups and downs in inflation.
- D) a slowdown in the economy.

Q10) Frictional unemployment is the result of

- A) a persistent mismatch between the skills and characteristics of workers and the requirements of the jobs.
- B) the search process of matching workers with jobs.
- C) the ups and downs in inflation.
- D) a slowdown in the economy.

Q11) Which of the following policies would reduce structural unemployment?

- A) an increase in the minimum wage
- B) a job retraining program
- C) implementing an unemployment insurance policy
- D) building an online job database that helps workers find jobs

Q12) If the negative GDP gap were equal to 4% of the potential GDP, Okun's law suggests that the actual unemployment rate would exceed the natural rate of unemployment by:

- A) One percentage point
- B) Two percentage points
- C) Three percentage points
- D) Four percentage points

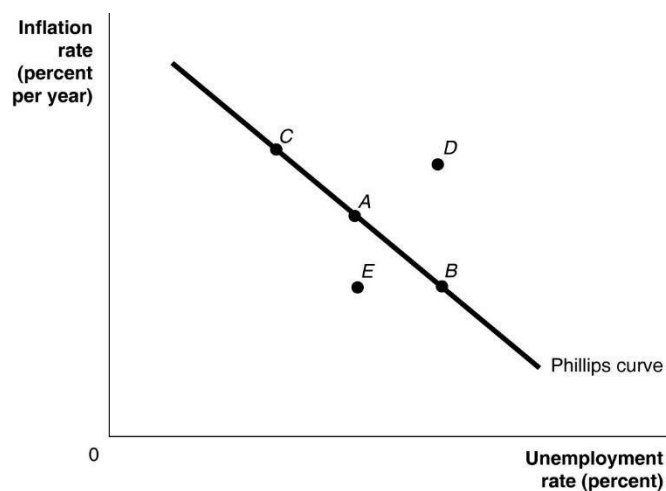
Q13) If the natural rate of unemployment was 6 percent, the current unemployment rate was 10 percent, and the potential GDP was \$4,000 billion, then according to Okun's law the economy would have sacrificed:

- A) \$160 billion in output not produced
- B) \$240 billion in output not produced
- C) \$320 billion in output not produced
- D) \$480 billion in output not produced

Q14) The curve showing the short-run relationship between the unemployment rate and the inflation rate is called

- A) the monetary policy curve.
- B) the Phillips curve.
- C) the Sargent curve.
- D) the unemployment curve.

Please answer the next four questions referring to the figure below.



Q15) What should the Central Bank do if it wants to move from point A to point B?

- A) buy treasury bills
- B) sell treasury bills
- C) lower the discount rate
- D) increase the money supply

Q16) Suppose that the economy is currently at point A. If the Central Bank engaged in contractionary monetary policy, where would the economy end up in the short run?

A) It would remain at point A.

B) point B

C) point C

D) point E

Q17) Suppose that the economy is currently at point A, and the unemployment rate at A is the natural rate. What policy would the Central Bank pursue if it wanted the economy to move to point B in the long run?

A) Buy treasury bills.

B) Sell treasury bills.

C) Raise the discount rate.

D) No policy will move the economy to point B in the long run.

Q18) Suppose that the economy is currently at point A. If the Central Bank engaged in expansionary monetary policy, where would the economy end up in the short run?

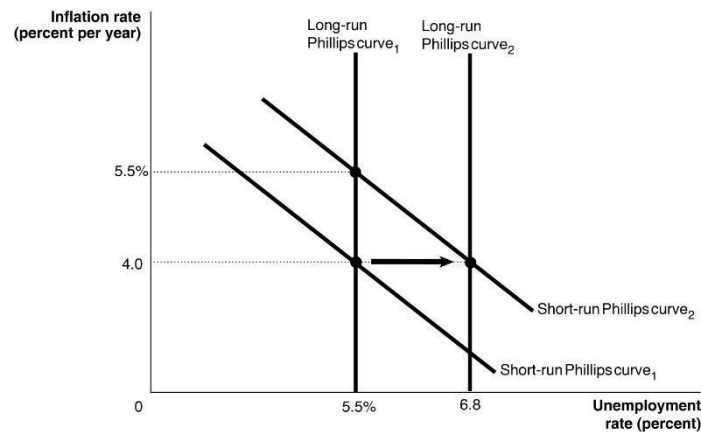
A) It would remain at point A.

B) point B

C) point C

D) point D

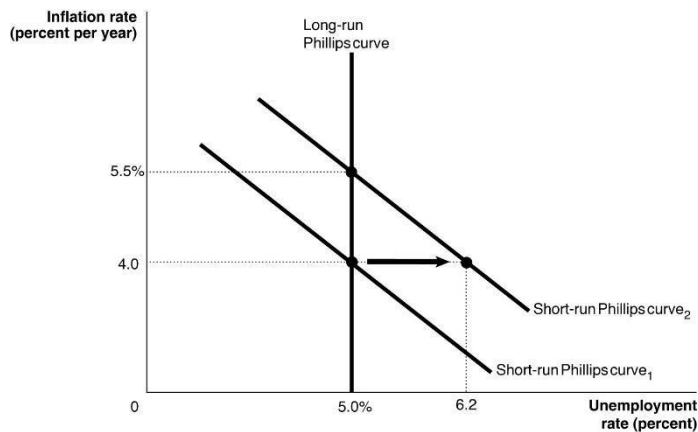
Q19)



Refer to the figure above. The shifts shown in the short-run and long-run Phillips curves between period 1 and period 2 could be explained by

- A) an increase in the expected inflation rate from 4.0 to 5.5 percent.
- B) an increase in the natural rate of unemployment from 5.5 to 6.8 percent.
- C) either an increase in expected inflation from 4.0 to 5.5 percent or an increase in the natural rate of unemployment from 5.5 to 6.8 percent.
- D) None of the above is correct.

Q20)



Refer to the figure above. Consider the shift in the short-run Phillips curves shown in the above graph. This shift may be explained by

- A) an increase in the natural rate of unemployment from 5.0 to 6.2 percent.
- B) an increase in the expected rate of inflation from 4.0 to 5.5 percent.
- C) either an increase in the natural rate of unemployment from 5.0 to 6.2 percent or an increase in the expected rate of inflation from 4.0 to 5.5 percent.
- D) None of the above is correct.

Q21) Employees at the university have negotiated a 5 percent increase in wages for the next year, based on their inflation expectations. If inflation is actually 6 percent over the next year, which of the following will occur?

- A) Unemployment of university employees will rise.
- B) Real wages for university employees will fall.
- C) Inflation will be 5 percent the following year.
- D) The increase in inflation is expected.

Q22) Matthew's real wage in 2014 is \$26.80. If the price level is 104, what is Matt's nominal wage?

- A) \$30.80
- B) \$27.87
- C) \$26.80
- D) \$25.77

Q23) The price level in the economy between 2024 and 2025 rose from 100 to 105. Between 2024 and 2025, the price level rose from 105 to 110.25. How does the short run Phillips curve predict the unemployment rate will change as a result?

- A) The unemployment rate will decrease since inflation decreased.
- B) The unemployment rate will decrease since inflation increased.
- C) The unemployment rate will increase since inflation increased.
- D) The unemployment rate would not change since there is no change in the rate of inflation.

Q24) If people assume that future rates of inflation will follow the pattern of inflation rates in the past, they are said to have

- A) rational expectations.
- B) adaptive expectations.
- C) unstable expectations.
- D) accommodative expectations.

Q25) Which of the following is not a consequence of hyperinflation?

- A) Money's function as a medium of exchange is enhanced.
- B) Money loses value so rapidly that firms and individuals stop holding it.
- C) It causes an economy to suffer slow growth.
- D) The price level grows in excess of hundreds of percentage points per year.

Q26) The quantity theory of money seeks to explain the connection between money and

- A) interest rates.
- B) unemployment.
- C) output.
- D) prices.

Q27) The quantity theory of money implies that the price level will be stable (no inflation or deflation) when the growth rate of the money supply equals

- A) 0.
- B) the growth rate of the price level.
- C) the growth rate of the velocity of money.
- D) the growth rate of real GDP.

Q28) According to the quantity theory of money, deflation will occur if the

- A) money supply is less than real GDP.
- B) money supply is more than real GDP.
- C) money supply grows at a slower rate than real GDP.
- D) money supply grows at a faster rate than real GDP.