

UNIT 5

Long-Run Consequences of Stabilization Policies



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LONG-RUN CONSEQUENCES OF STABILIZATION POLICIES

M1: Money Growth and Inflation

I. The Classical Theory of Inflation

A. The Level of Prices and the Value of Money

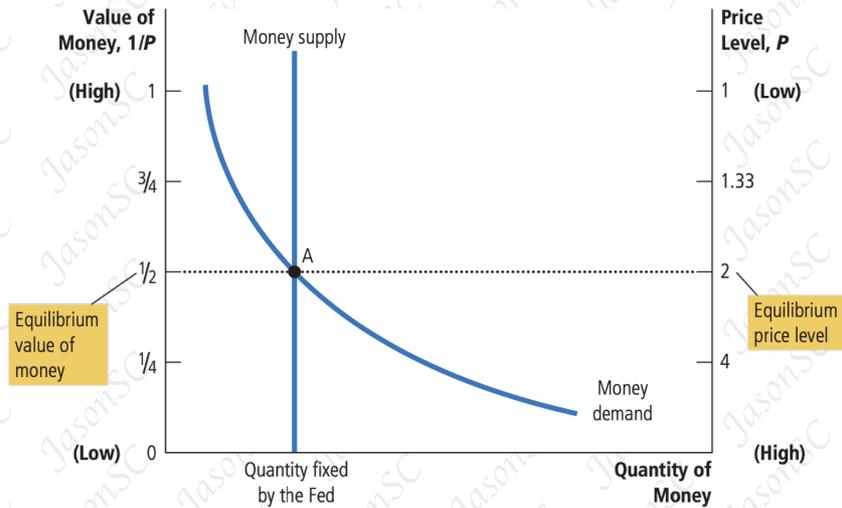
1. When the price level rises, people have to pay more for the goods and services they buy.
2. A rise in the price level also means that the value of money is now lower because each dollar now buys a smaller quantity of goods and services.
3. If P is the price level, then the quantity of goods and services that can be purchased with \$1 is equal to $1/P$.
4. Suppose you live in a country with one good (ice cream cones).
 - a. When the price of an ice cream cone is \$2, the value of a dollar is $1/2$ cone.
 - b. When the price of an ice cream cone rises to \$3, the value of a dollar is $1/3$ cone.

B. Money Supply, Money Demand, and Monetary Equilibrium

1. The value of money is determined by the supply and demand for money.
2. For the most part, the supply of money is determined by the Fed.
3. The demand for money reflects how much wealth people want to hold in liquid form.
 - a. One variable that is very important in determining the demand for money is the price level.
 - b. The higher prices are, the more money that is needed to perform transactions.
 - c. Thus, a higher price level (and a lower value of money) leads to a higher quantity of money demanded.
4. In the long run, money supply and money demand are brought into equilibrium by the overall level of prices.
 - a. If the price level is above the equilibrium level, people will want to hold more money than is available and prices will have to decline.

b. If the price level is below equilibrium, people will want to hold less money than that available and the price level will rise.

Figure 1 How the Supply and Demand for Money Determine the Equilibrium Price Level

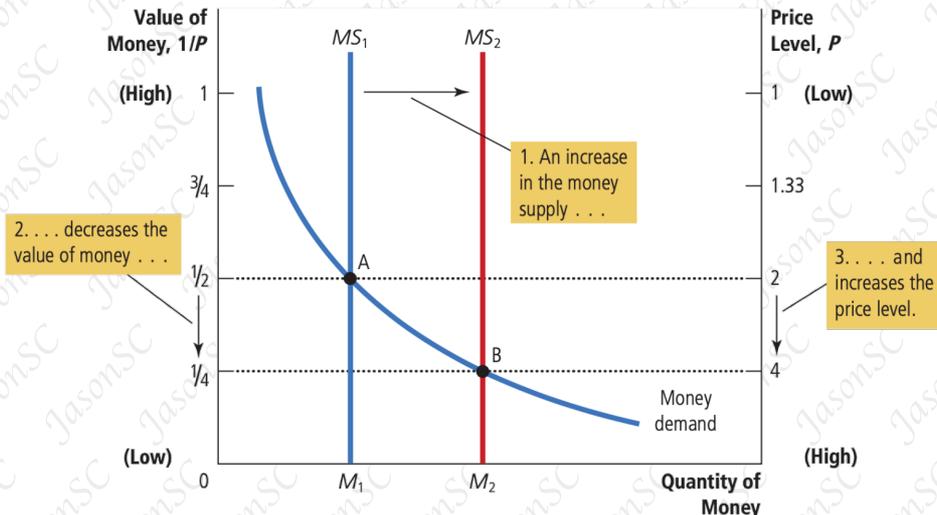


5. We can show the supply and demand for money using a graph.

- a. The horizontal axis shows the quantity of money.
- b. The left-hand vertical axis is the value of money, measured by $1/P$.
- c. The right-hand vertical axis is the price level (P). Note that it is inverted—a high value of money means a low price level and vice versa.
- d. The supply curve is vertical because the Fed has fixed the quantity of money available.
- e. The demand curve for money is downward sloping. When the value of money is low, people demand a larger quantity of it to buy goods and services.
- f. At the equilibrium, the quantity of money demanded is equal to the quantity of money supplied.

C. The Effects of a Monetary Injection

Figure 2 An Increase in the Money Supply



1. Assume that the economy is currently in equilibrium and the Fed suddenly increases the supply of money.
2. The supply of money shifts to the right.
3. The equilibrium value of money falls and the price level rises.
4. When an increase in the money supply makes dollars more plentiful, the result is an increase in the price level that makes each dollar less valuable.
5. Definition of **quantity theory of money**: a theory asserting that the quantity of money available determines the price level and that the growth rate in the quantity of money available determines the inflation rate.

D. A Brief Look at the Adjustment Process

1. The immediate effect of an increase in the money supply is to create an excess supply of money.
2. People try to get rid of this excess supply in a variety of ways.
 - a. They may buy goods and services with the excess funds.
 - b. They may use these excess funds to make loans to others by buying bonds or depositing the money in a bank account. These loans will then be used by others to buy goods and services.
 - c. In either case, the increase in the money supply leads to an increase in the demand for goods and services.
 - d. Because the supply of goods and services has not changed, the result of an increase in the demand for goods and services will be higher prices.

E. The Classical Dichotomy and Monetary Neutrality

1. In the 18th century, David Hume and other economists wrote about the relationship between monetary changes and important macroeconomic variables such as production, employment, real wages, and real interest rates.
2. They suggested that economic variables should be divided into two groups: nominal variables and real variables.
 - a. Definition of **nominal variables**: variables measured in monetary units.
 - b. Definition of **real variables**: variables measured in physical units.
3. Definition of **classical dichotomy**: the theoretical separation of nominal and real variables.
4. Prices in the economy are nominal (because they are quoted in units of money), but relative prices are real (because they are not measured in money terms).
5. Classical analysis suggested that different forces influence real and nominal variables.
 - a. Changes in the money supply affect nominal variables but not real variables.
 - b. Definition of **monetary neutrality**: the proposition that changes in the money supply do not affect real variables.

F. Velocity and the Quantity Equation

1. Definition of **velocity of money**: the rate at which money changes hands.

2. To calculate velocity, we divide nominal GDP by the quantity of money.

$$\text{velocity} = \frac{\text{nominal GDP}}{\text{money supply}}$$

3. If P is the price level (the GDP deflator), Y is real GDP, and M is the quantity of money:

$$\text{velocity} = \frac{P \times Y}{M}$$

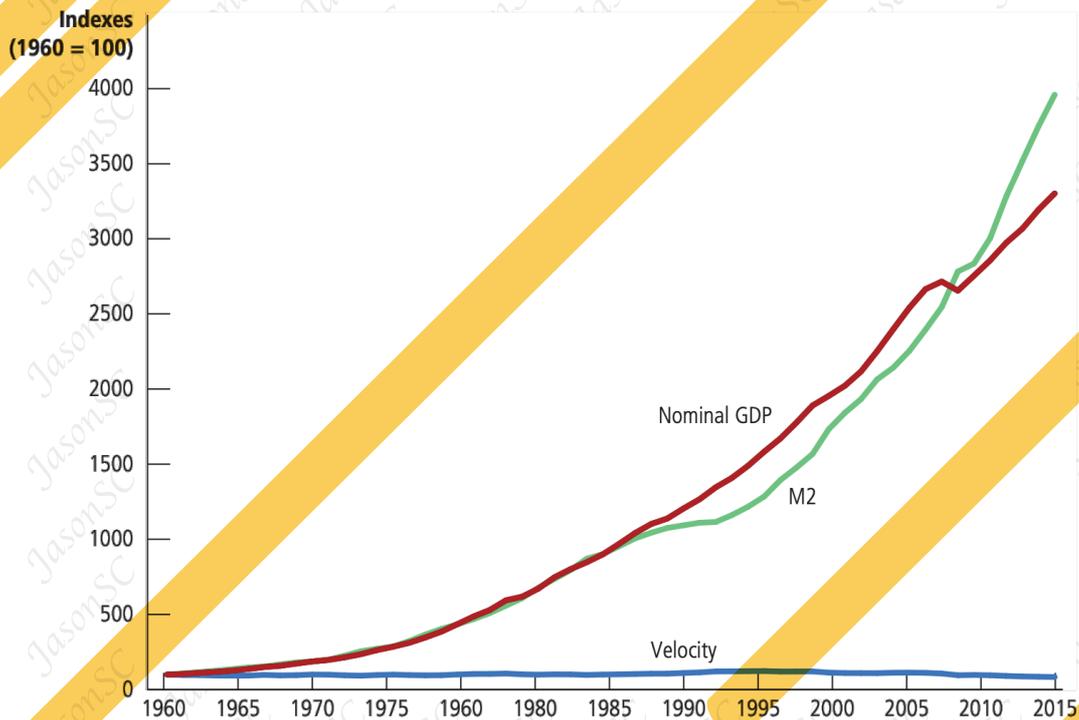
4. Rearranging, we get the quantity equation:

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

5. Definition of **quantity equation**: the equation $M \times V = P \times Y$, which relates the quantity of money, the velocity of money, and the dollar value of the economy's output of goods and services.

- a. The quantity equation shows that an increase in the quantity of money must be reflected in one of the other three variables.
- b. Specifically, the price level must rise, output must rise, or velocity must fall.

Figure 3 Nominal GDP, the Quantity of Money, and the Velocity of Money



c. Figure 3 shows nominal GDP, the quantity of money (as measured by M2) and the velocity of money for the United States since 1960. It appears that velocity is fairly stable, while nominal GDP and the money supply have grown dramatically.

6. We can now explain how an increase in the quantity of money affects the price level using the quantity equation.

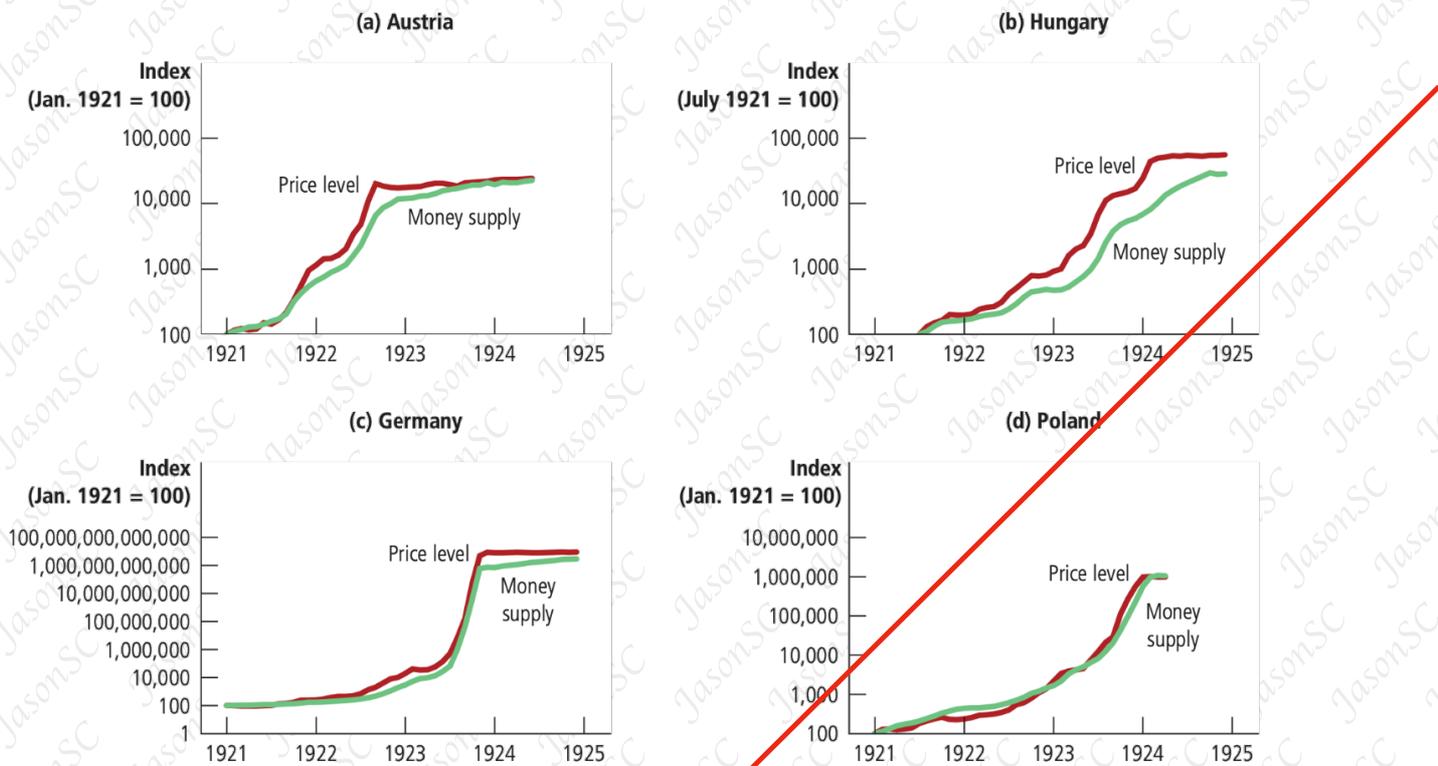
- a. The velocity of money is relatively stable over time.

- b. When the central bank changes the quantity of money (M), it will proportionately change the nominal value of output ($P \times Y$).
- c. The economy's output of goods and services (Y) is determined primarily by available resources and technology. Because money is neutral, changes in the money supply do not affect output.
- d. This must mean that P increases proportionately with the change in M.
- e. Thus, when the central bank increases the money supply rapidly, the result is a high rate of inflation.

G. Money and Prices during Four Hyperinflations

1. Hyperinflation is generally defined as inflation that exceeds 50% per month.

Figure 4 Money and Prices during Four Hyperinflations



- 2. Figure 4 shows data from four classic periods of hyperinflation during the 1920s in Austria, Hungary, Germany, and Poland.
- 3. We can see that, in each graph, the quantity of money and the price level are almost parallel.
- 4. These episodes illustrate Principle #9: Prices rise when the government prints too much money.

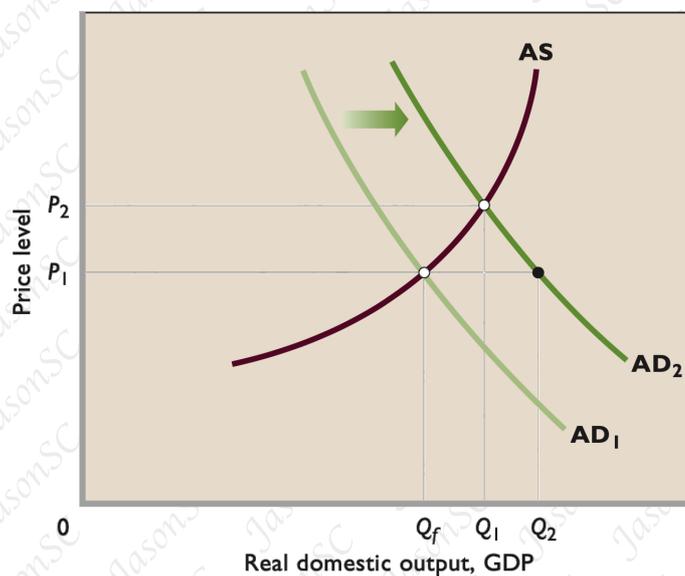
II. Types of Inflation

A. Economists sometimes distinguish between two types of inflation: **demand-pull inflation** and **cost-push inflation**.

B. Demand-Pull Inflation

1. Usually, changes in the price level are caused by an excess of total spending beyond the economy's capacity to produce. Where inflation is rapid and sustained, the cause invariably is an overissuance of money by the central bank (the Federal Reserve in the United States). When resources are already fully employed, the business sector cannot respond to excess demand by expanding output.
2. So the excess demand bids up the prices of the limited output, producing demand-pull inflation. The essence of this type of inflation is "too much spending chasing too few goods."

Figure 5 An Increase in Aggregate Demand that Causes Demand-Pull Inflation



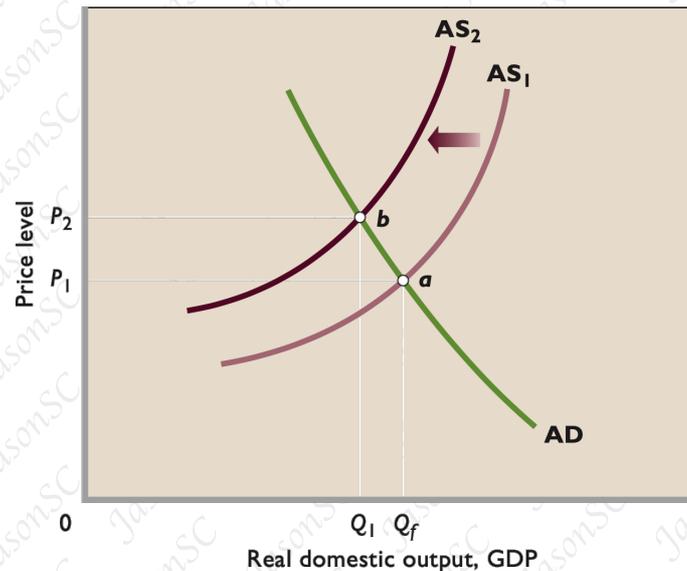
3. Methods for Reducing Demand-Pull Inflation.

- a. Contractionary Fiscal Policies.
- b. Contractionary Monetary Policies.

C. Cost-Push Inflation

1. Inflation may also arise on the supply, or cost, side of the economy. During some periods in U.S. economic history, including the mid-1970s, the price level increased even though total spending was not excessive. These were periods when output and employment were both declining (evidence that total spending was not excessive) while the general price level was rising.
2. The **theory of cost-push inflation** explains rising prices in terms of factors that raise per-unit production costs at each level of spending.
3. The major source of cost-push inflation has been so-called **supply shocks**.
4. Definition of **supply shock**: an event that directly alters firms' costs and prices, shifting the economy's aggregate-supply curve.

Figure 6 A Decrease in Aggregate Supply that Causes Cost-Push Inflation



5. If any of the determinants of aggregate supply change, the AS curve can decrease (or shift leftward, graphically), causing an increase in the price level and an increase in unemployment, a phenomenon known as **stagflation**.

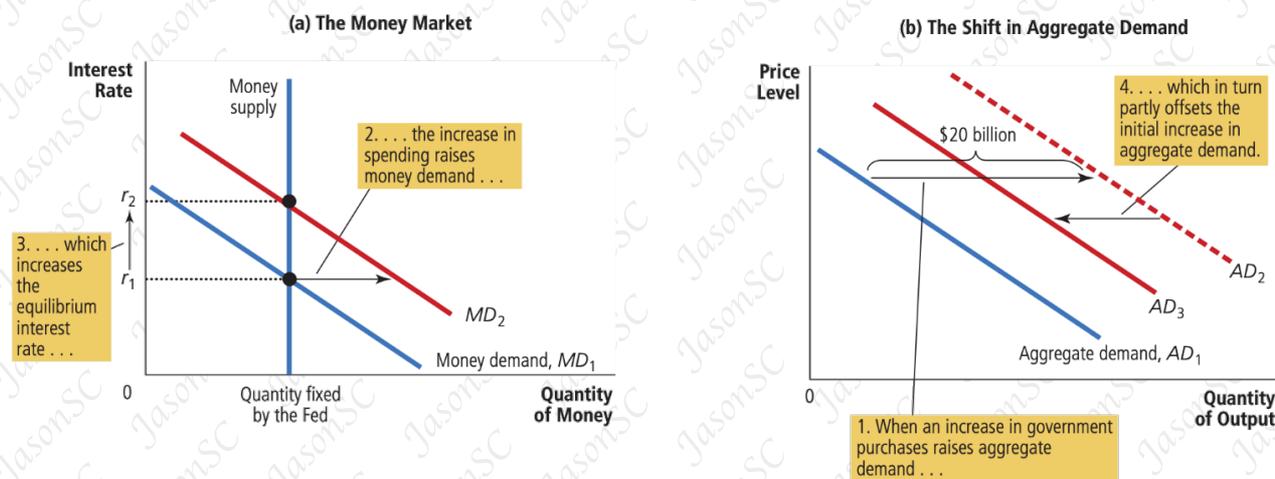
6. Methods for Reducing Cost-Push Inflation.

- a. **Contractionary Demand-Side Policies.** Higher interest rates, higher taxes, or reduced government spending can be effective at bringing down inflation caused by rising prices.
- b. **Expansionary demand-side policies** may fix the unemployment problem, but will worsen the inflation problem.
- c. **Expansionary supply-side policies**, if effective, can correct both the unemployment and the inflation problem resulting from cost-push inflation.

M2: Fiscal Policy and Crowding-Out Effect

1. Definition of **crowding-out effect**: the offset in aggregate demand that results when expansionary fiscal policy raises the interest rate and thereby reduces investment spending.
3. As we discussed earlier, when the government buys a product from a company, the immediate impact of the purchase is to raise profits and employment at that firm. As a result, owners and workers at this firm will see an increase in income, and will therefore likely increase their own consumption.
4. If consumers want to purchase more goods and services, they will need to increase their holdings of money. This shifts the demand for money to the right, pushing up the interest rate.

Figure 7 The Crowding-Out Effect



5. The higher interest rate raises the cost of borrowing and the return to saving. This discourages households from spending their incomes for new consumption or investing in new housing. Firms will also decrease investment, choosing not to build new factories or purchase new equipment.
6. Thus, even though the increase in government purchases shifts the aggregate-demand curve to the right, this fall in consumption and investment will pull aggregate demand back toward the left. Thus, aggregate demand increases by less than the increase in government purchases.
7. Therefore, when the government increases its purchases by $\$X$, the aggregate demand for goods and services could rise by more or less than $\$X$, depending on the sizes of the multiplier and crowding-out effects.
 - a. If the multiplier effect is greater than the crowding-out effect, aggregate demand will rise by more than $\$X$.
 - b. If the multiplier effect is less than the crowding-out effect, aggregate demand will rise by less than $\$X$.

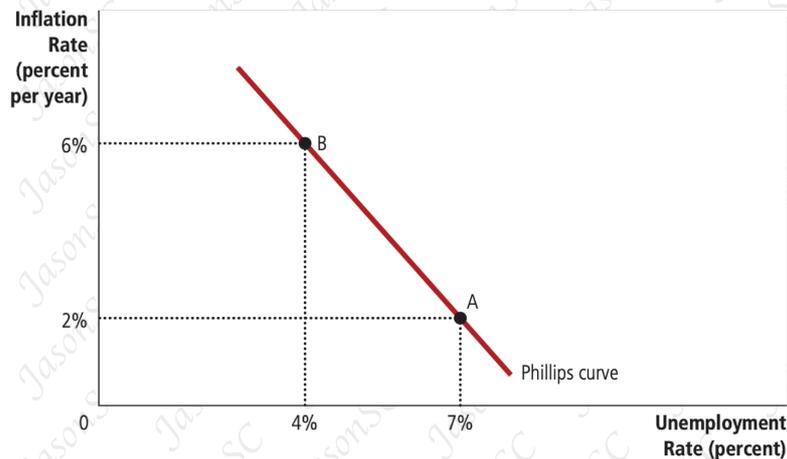
M3: The Short-Run Trade-Off Between Inflation and Unemployment

I. The Phillips Curve

A. Origins of the Phillips Curve

1. In 1958, economist A. W. Phillips published an article discussing the negative correlation between inflation rates and unemployment rates in the United Kingdom.
2. American economists Paul Samuelson and Robert Solow showed a similar relationship between inflation and unemployment for the United States two years later.
3. The belief was that low unemployment is related to high aggregate demand, and high aggregate demand puts upward pressure on prices. Likewise, high unemployment is related to low aggregate demand, and low aggregate demand pulls price levels down.
4. Definition of **Phillips curve**: a curve that shows the short-run trade-off between inflation and unemployment.

Figure 8 The Phillips Curve



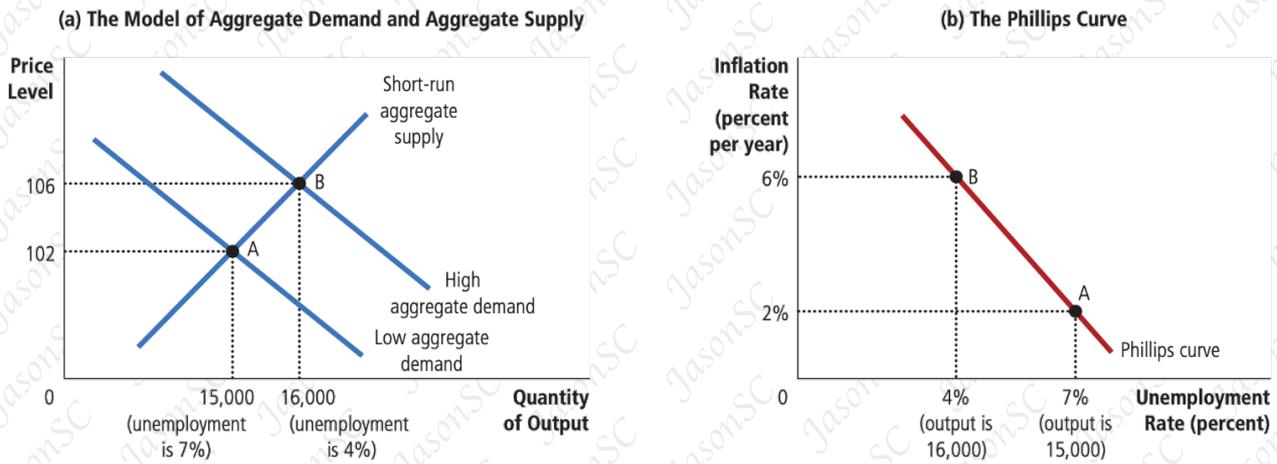
5. Samuelson and Solow believed that the Phillips curve offered policymakers a menu of possible economic outcomes. Policymakers could use monetary and fiscal policy to choose any point on the curve.

B. Aggregate Demand, Aggregate Supply, and the Phillips Curve

1. The Phillips curve shows the combinations of inflation and unemployment that arise in the short run as shifts in the aggregate-demand curve move the economy along the short-run aggregate-supply curve.
2. The greater the aggregate demand for goods and services, the greater the economy's output and the higher the price level. Greater output means lower unemployment. The higher the price level in the current year, the higher the rate of inflation.
3. Example: The price level is 100 (measured by the Consumer Price Index) in the year 2020. There are two possible changes in the economy for the year 2021: a low level of aggregate demand or a high level of aggregate demand.
 - a. If the economy experiences a low level of aggregate demand, we would be at a short-run equilibrium like point A. This point also corresponds with point A on the Phillips curve. Note that when aggregate demand is low, the inflation rate is relatively low and the unemployment rate is relatively high.

b. If the economy experiences a high level of aggregate demand, we would be at a short-run equilibrium like point B. This point also corresponds with point B on the Phillips curve. Note that when aggregate demand is high, the inflation rate is relatively high and the unemployment rate is relatively low.

Figure 9 How the Phillips Curve Is Related to the Model of Aggregate Demand and Aggregate Supply



4. Because monetary and fiscal policies both shift the aggregate-demand curve, these policies can move the economy along the Phillips curve.

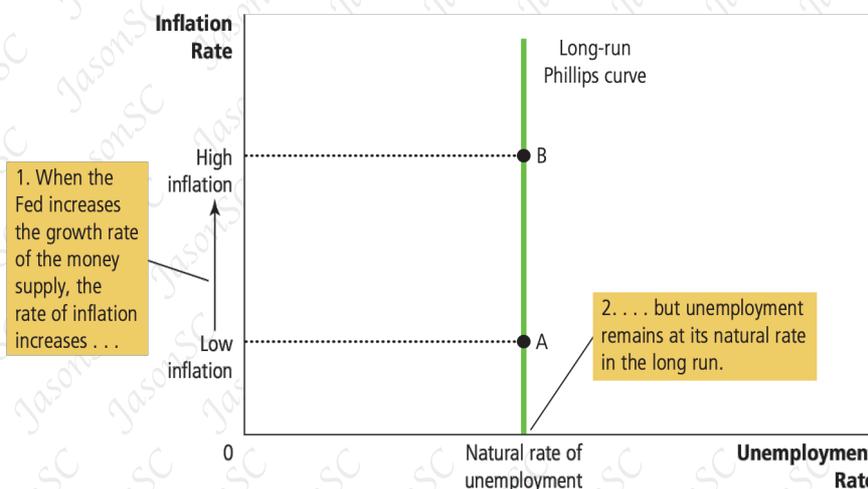
- a. Increases in the money supply, increases in government spending, or decreases in taxes all increase aggregate demand and move the economy to a point on the Phillips curve with lower unemployment and higher inflation.
- b. Decreases in the money supply, decreases in government spending, or increases in taxes all lower aggregate demand and move the economy to a point on the Phillips curve with higher unemployment and lower inflation.

II. Shifts in the Phillips Curve: The Role of Expectations

A. The Long-Run Phillips Curve

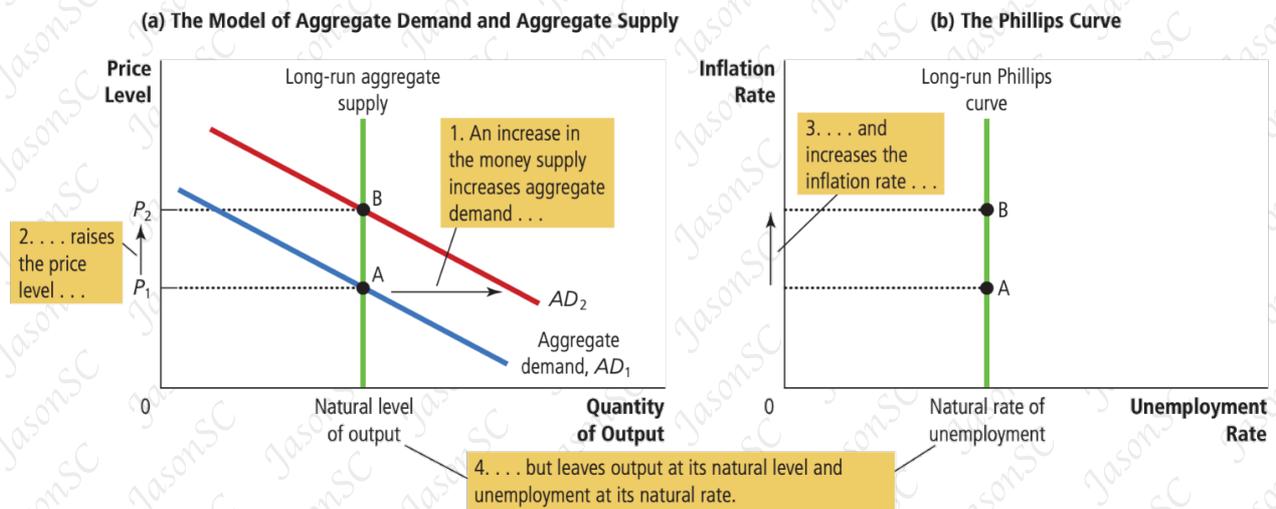
1. In the long run, monetary growth has no real effects. This implies that it cannot affect the factors that determine the economy's long-run unemployment rate.

Figure 10 The Long-Run Phillips Curve



2. Thus, in the long run, we would not expect there to be a relationship between unemployment and inflation. This must mean that, in the long run, the Phillips curve is vertical.

Figure 11 How the Long-Run Phillips Curve Is Related to the Model of Aggregate Demand and Aggregate Supply

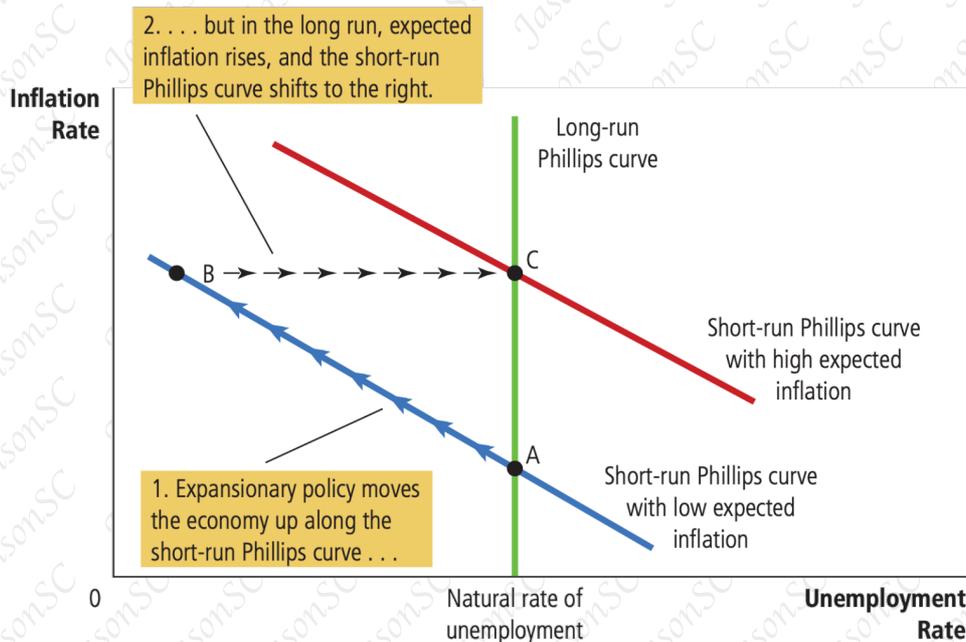


3. The vertical Phillips curve occurs because, in the long run, the aggregate supply curve is vertical as well. Thus, increases in aggregate demand lead only to changes in the price level and have no effect on the economy's level of output. Thus, in the long run, unemployment will not change when aggregate demand changes, but inflation will.

4. The long-run aggregate-supply curve occurs at the economy's natural level of output. This means that the long-run Phillips curve occurs at the natural rate of unemployment.

B. The Short-Run Phillips Curve

Figure 12 How Expected Inflation Shifts the Short-Run Phillips Curve



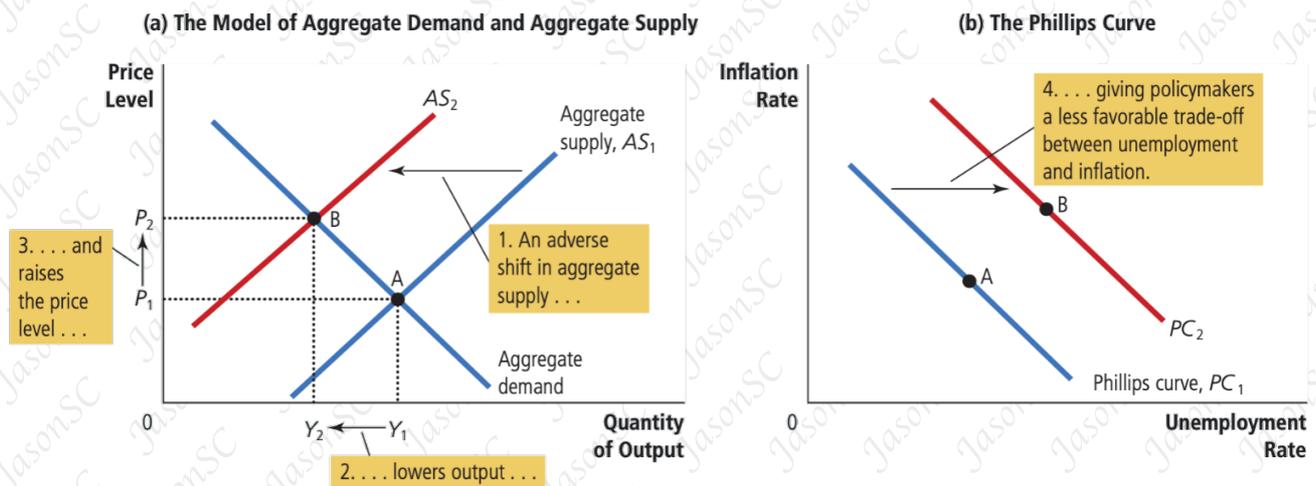
1. If policymakers want to take advantage of the short-run trade-off between unemployment and inflation, it may lead to negative consequences.

- Suppose the economy is at point A and policymakers wish to lower the unemployment rate. Expansionary monetary policy or fiscal policy is used to shift aggregate demand to the right. The economy moves to point B, with a lower unemployment rate and a higher rate of inflation.
- Over time, people get used to this new level of inflation and raise their expectations of inflation. This leads to an upward shift of the short-run Phillips curve. The economy ends up at point C, with a higher inflation rate than at point A, but the same level of unemployment.

III. Shifts in the Phillips Curve: The Role of Supply Shocks

- In 1974, OPEC increased the price of oil sharply. This increased the cost of producing many goods and services and therefore resulted in higher prices.
 - Definition of **supply shock**: an event that directly alters firms' costs and prices, shifting the economy's aggregate-supply curve and thus the Phillips curve.
 - Graphically, we could represent this supply shock as a shift in the short-run aggregate-supply curve to the left.
 - The decrease in equilibrium output and the increase in the price level left the economy with stagflation.

Figure 13 An Adverse Shock to Aggregate Supply



- Given this turn of events, policymakers are left with a less favorable short-run trade-off between unemployment and inflation.
 - If they increase aggregate demand to fight unemployment, they will raise inflation further.
 - If they lower aggregate demand to fight inflation, they will raise unemployment further.
- This less favorable trade-off between unemployment and inflation can be shown by a shift of the short-run Phillips curve. The shift may be permanent or temporary, depending on how people adjust their expectations of inflation.

M5: Economic Growth

I. Productivity: Its Role and Determinants

A. Why Productivity Is So Important

1. Example: Robinson Crusoe

- a. Because he is stranded alone, he must catch his own fish, grow his own vegetables, and make his own clothes.
- b. His standard of living depends on his ability to produce goods and services.

2. Definition of **productivity**: the quantity of goods and services produced from each unit of labor input.

3. Review of Principle #8: A Country's Standard of Living Depends on Its Ability to Produce Goods and Services.

B. How Productivity Is Determined

1. Physical Capital per Worker

- a. Definition of **physical capital**: the stock of equipment and structures used to produce goods and services.
- b. Example: Crusoe will catch more fish if he has more fishing poles.

2. Human Capital per Worker

- a. Definition of **human capital**: the knowledge and skills that workers acquire through education, training, and experience.
- b. Example: Crusoe will catch more fish if he has been trained in the best fishing techniques or as he gains experience fishing.

3. Natural Resources per Worker

- a. Definition of **natural resources**: the inputs into production that are provided by nature, such as land, rivers, and mineral deposits.
- b. Example: Crusoe will have better luck catching fish if there is a plentiful supply around his island.

4. Technological Knowledge

- a. Definition of **technological knowledge**: society's understanding of the best ways to produce goods and services.
- b. Example: Crusoe will catch more fish if he has invented a better fishing lure.

C. The Production Function

1. A **production function** describes the relationship between the quantity of inputs used in production and the quantity of output from production.

2. The production function generally is written like this:

$$Y = A F(L, K, H, N)$$

where Y = output, L = quantity of labor, K = quantity of physical capital, H = quantity of human capital, N = quantity of natural resources, A reflects the available production technology, and $F()$ is a function that shows how inputs are combined to produce output.

3. Many production functions have a property called constant returns to scale.

- a. This property implies that as all inputs are doubled, output will exactly double.
- b. This implies that the following must be true:

$$xY = A F(xL, xK, xH, xN)$$

where $x = 2$ if inputs are doubled.

- c. This also means that if we want to examine output per worker we could set $x = 1/L$ and we would get the following:

$$Y/L = A F(1, K/L, H/L, N/L)$$

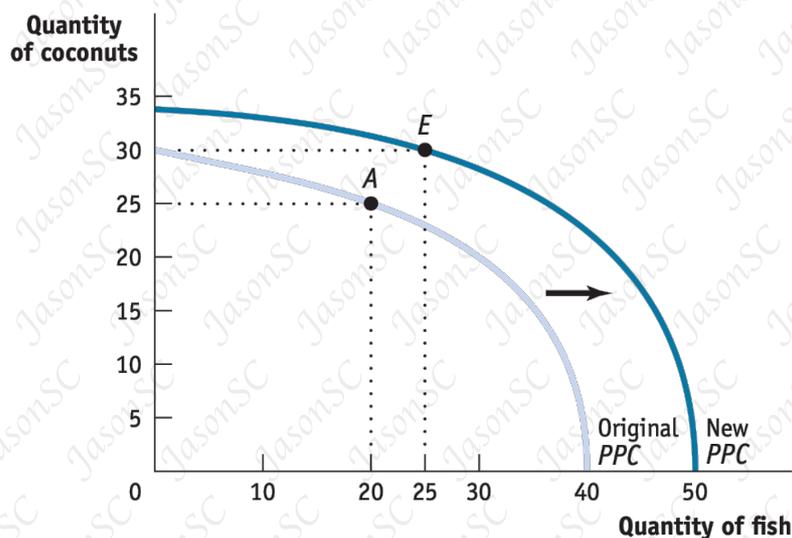
This shows that output per worker depends on the amount of physical capital per worker (K/L), the amount of human capital per worker (H/L), and the amount of natural resources per worker (N/L).

II. Economic Growth in Macroeconomic Models

A. Long-Run Economic Growth and the Production Possibilities Curve

- 1. Recall from Unit 1 that we defined the production possibilities curve as a graph that illustrates the trade-offs facing an economy that produces only two goods.
- 2. Economic growth results in an outward shift of the production possibilities curve because production possibilities are expanded. The economy can now produce more of everything.

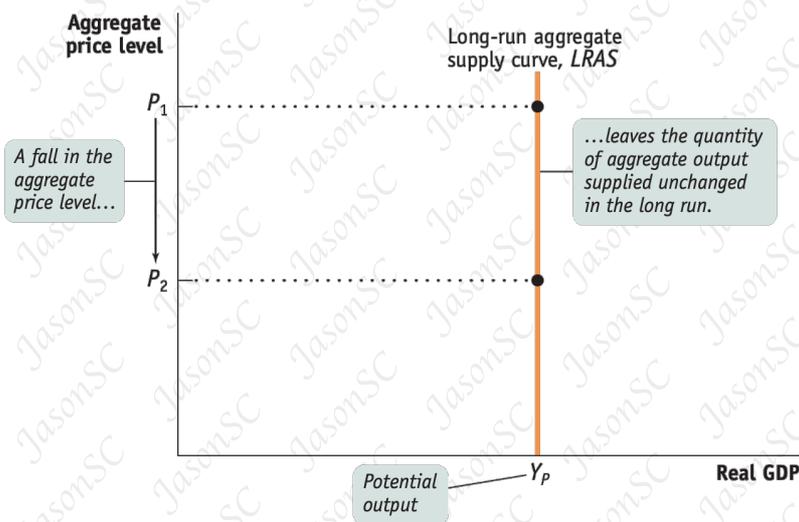
Figure 14 Economic Growth



B. Long-Run Economic Growth and the Aggregate Demand-Aggregate Supply Model

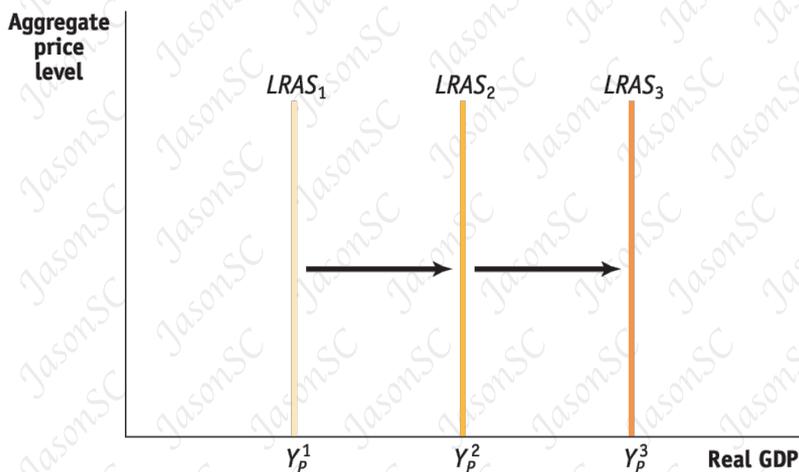
1. The aggregate demand and supply model we developed in Unit 4 is another useful tool for understanding long-run economic growth.
2. Recall that in the aggregate demand-aggregate supply model, the long-run aggregate supply curve shows the relationship between the aggregate price level and the quantity of aggregate output supplied when all prices, including nominal wages, are flexible.

Figure 15 The Long-run Aggregate Supply Curve



3. The long run aggregate supply curve shows the quantity of aggregate output supplied when all prices, including nominal wages, are flexible. It is vertical at potential output, Y_P , because in the long run a change in the aggregate price level has no effect on the quantity of aggregate supplied.

Figure 16 Long-Run Growth and the LRAS Curve



C. Distinguishing Between Long-Run Growth and Short-Run Fluctuations

1. When considering changes in real GDP, it is important to distinguish long-run growth from short-run fluctuations due to the business cycle.
2. Both the production possibilities curve model and the aggregate demand-aggregate supply model can help us do this.

- The points along a production possibilities curve are achievable if there is efficient use of the economy's resources. If the economy experiences a macroeconomic fluctuation due to the business cycle, such as unemployment due to a recession, production falls to a point inside the production possibilities curve.
- On the other hand, long-run growth will appear as an outward shift of the production possibilities curve.
- In the aggregate demand-aggregate supply model, fluctuations of actual aggregate output around potential output are illustrated by shifts of aggregate demand or short-run aggregate supply that result in a short-run macroeconomic equilibrium above or below potential output.
- In both panels of Figure 17, E_1 indicates a short-run equilibrium that differs from long-run equilibrium due to the business cycle. In the case of short-run fluctuations like these, adjustments in nominal wages will eventually bring the equilibrium level of real GDP back to the potential level.
- By contrast, we saw in Figure 16 that long-run economic growth is represented by a rightward shift of the long-run aggregate supply curve and corresponds to an increase in the economy's level of potential output.

Figure 17 From the Short Run to the Long Run

