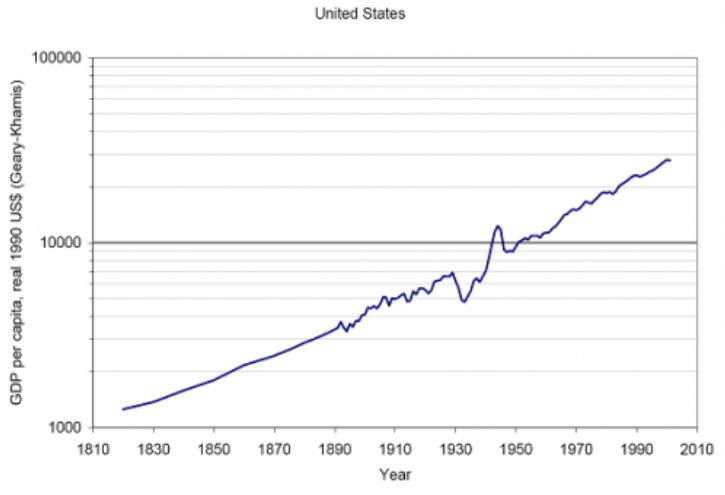
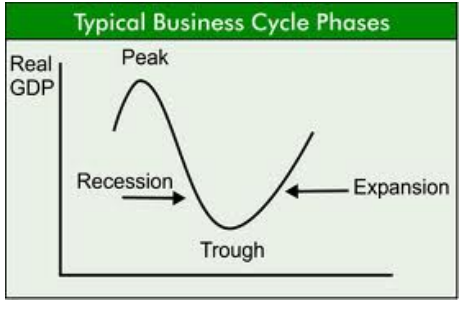
Part 4 - BUSINESS CYCLES: THE ECONOMY IN THE SHORT RUN

- Business Cycles are the fluctuations in the main macroeconomic variables of a country (GDP, consumption, employment rate, ...) that may have period of three months to a couple of years. If we are interested in analyzing economy in the short-run, we are interested in the Business Cycle Theory





- What do Economic Theories Say about Business Cycles?
- *Classical Theory:* This theory is based on the Say's Law and the belief that prices, wages, and interest rates are

flexible

- *Say's Law:* When an economy produces a certain level of real GDP, it also generates the income needed to purchase that level of real GDP. Hence, the economy is always capable of achieving the natural level of real GDP (the long-run level of GDP)
- *Flexible prices, wages, and interest rates:* It starts with Adam Smith's writing of the Wealth of Nations in 1776. It assumes these flexibilities ensures self-adjustment mechanisms to the economy so that the market system works to bring the economy back to the natural level of real GDP (so called invisible hand). For example, during

a recession, wages and prices would decline to restore full employment. Hence, there is no need for any policy measure to stabilize the economy

  * *Classical Theorists think that supply shocks (technology shocks, shocks to aggregate productivity) cause economic fluctuations, and the changes in GDP are just optimal responses of the economy to these shocks*

- *Keynesian Theory:*
  - Assumes that there are imperfections in the markets (e.g. markets for goods and services, for labor, and for capital). The market imperfections are non-flexibility

of prices, wages and interest rate; so that demand does not come into balance with supply in these markets immediately

- As prices are sticky, even changes in money supply, given prices, leads to changes in demand
- Fiscal policy (government purchases and taxes) or Monetary Policy can be used to confront the shocks.
  - This discussion also suggests that monetary policy should have real effects on the economy.
  - This is one of the fundamental distinction between the Classical and Keynesian view ; i.e. that Classical Economists tend to accept *dichotomy* between nom-

inal and real sectors (i.e. they are distinct), while Keynesian Economists believe that money can influence real sector through monetary intervention

- *(Early) Monetary Theory:* The distinction between Keynes and Monetarists (like Milton Friedman and Anna Schwartz) is that in the era of great Depression Keynes proposed government spending to stimulate aggregate demand, whereas Monetarist thought that the Great Depression was caused by a massive contraction of the money supply and remedy is steadily increase it. Keynes believed that especially during severe recession in which people stock money no matter how much the central bank tries to expand the

money supply

- *Neo Classical Synthesis:* It a "synthesis" of Neoclassical and Keynesian theory. The conclusions of the model in the "long or medium run" or in a "perfectly working" IS-LM system are Neoclassical, but in the "short-run" or "imperfectly working" IS-LM system, Keynesian conclusions held. This synthesis is what you are used to see in undergraduate macro textbooks

Summary of Part 4

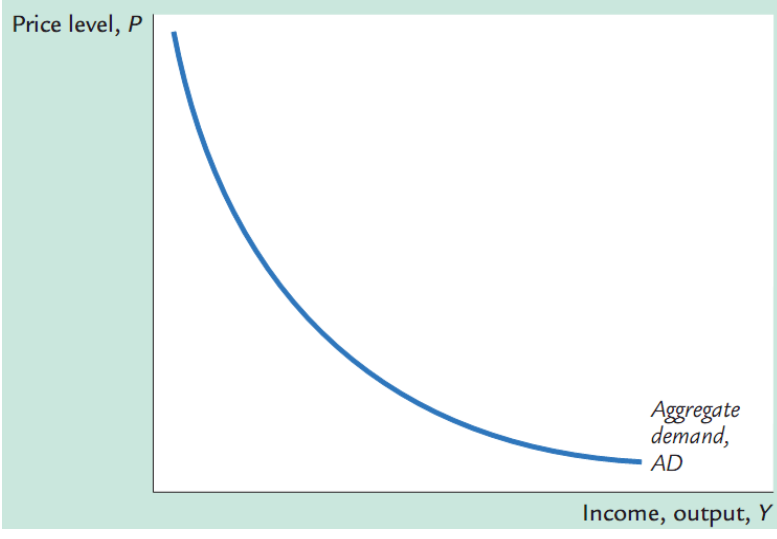
- *Chapter 9: Aggregate Demand and Aggregate Supply to Analyze Fluctuations*
  - *Chapter 10: IS-LM Model for Aggregate Demand*
  - *Chapter 11: Explaining Fluctuations with IS-LM Model*
  - *Chapter 12: IS-LM Model in the Open Economy (we skip this part)*
  - *Chapter 13: Three Models of Aggregate Supply*

Ch9 - Aggregate Demand and Aggregate Supply to Analyze Fluctuations

The Quantity Equation as Aggregate Demand

- Aggregate demand (AD) is the relationship between the quantity of output demanded and the aggregate price level
- Quantity theory says that: $MV = PY$. It can be rewritten in terms of the supply and demand for real money balances: $M/P = (M/P)^d = kY$
  - For any V and M , it implies a negative relationship

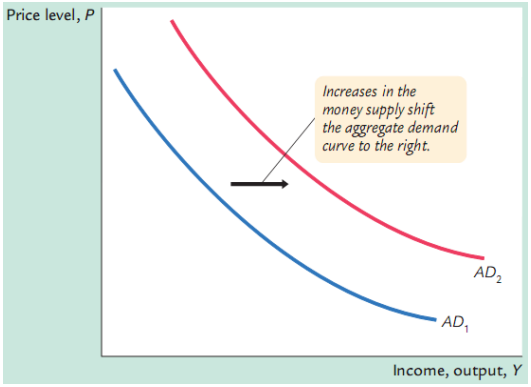
between P and Y



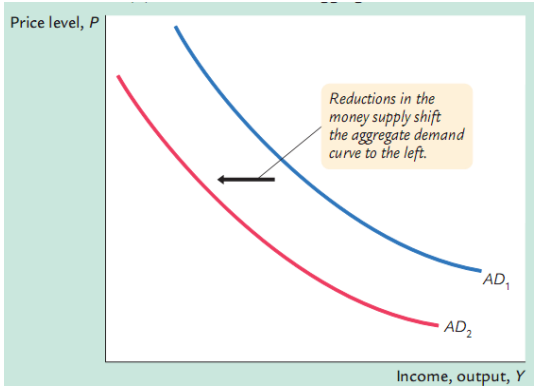
The Aggregate Demand Curve
The aggregate demand curve *AD* shows the relationship between the price level *P* and the quantity of goods and services demanded *Y*. It is drawn for a given value of the money supply *M*. The aggregate demand curve slopes downward: the higher the price level *P*, the lower the level of real balances *M*/*P*, and therefore the lower the quantity of goods and services demanded *Y*.

Shifts in the Aggregate Demand Curve due to changes in the Money Supply

Increase in the Money Supply



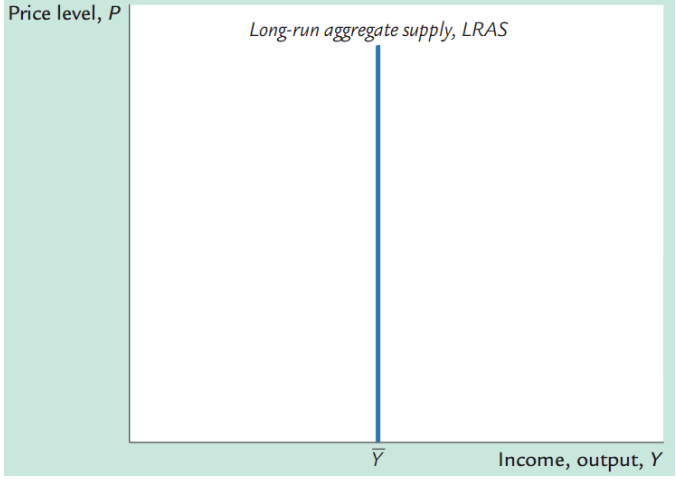
Decrease in the Money Supply



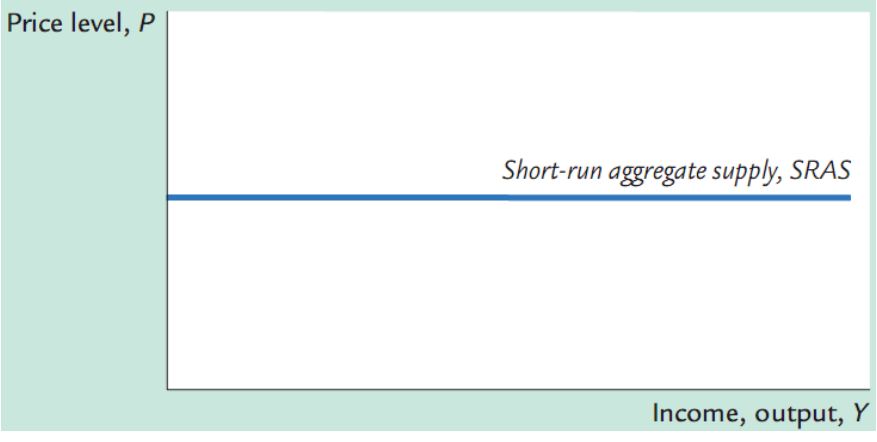
- The left figure indicates that for any price level, increase in money supply buys more goods and services. Other figure can be read similarly

Aggregate Supply (In the Long and the Short Runs)

- In the long run, the level of output (aggregate supply) is determined by the amounts of capital, labor and the available technology; it does not depend on the price level.



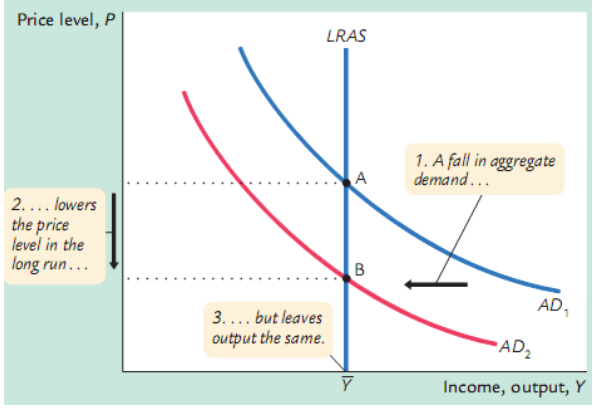
- However in the short run, output supply is very sensitive to price level



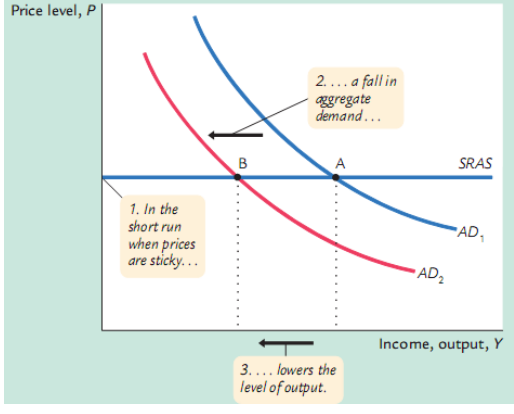
Shifts in Aggregate Demand

- A reduction in the money supply

In the Long Run



In the Short Run

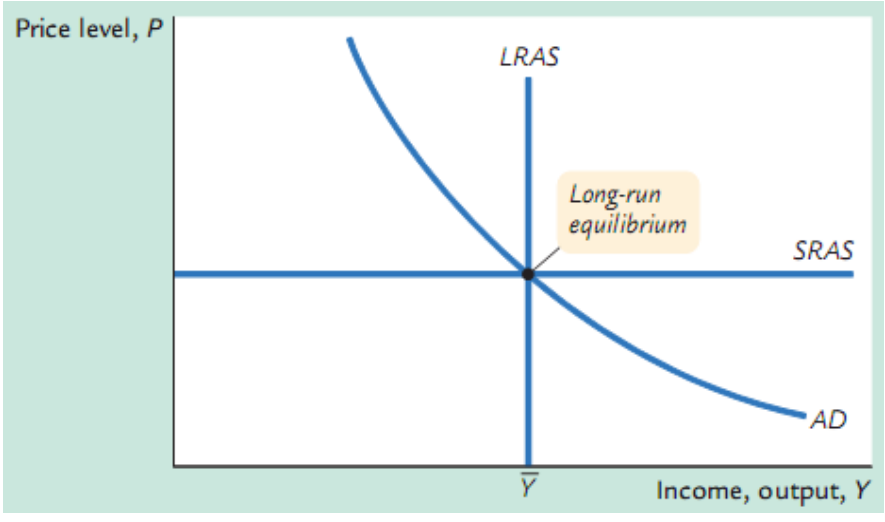


- In the long run a reduction in aggregate demand affects only the price level

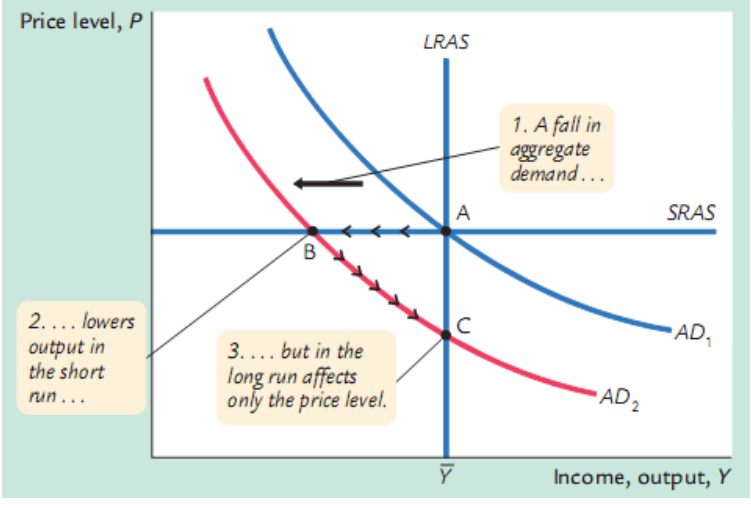
- In the short run the prices are fixed; hence, the level of output is reduced

The Long Run Equilibrium

- In the long run, the economy finds itself at the intersection of the long-run aggregate supply curve and the aggregate demand curve


Price level, P
LRAS
Long-run equilibrium
SRAS
AD
$\overline{Y}$
Income, output, Y

- A reduction in aggregate demand



- Following a decrease in the aggregate demand, first we move on SRAS curve. Given prices, demand falls, so does the equilibrium output. Then as prices fall, SRAS moves

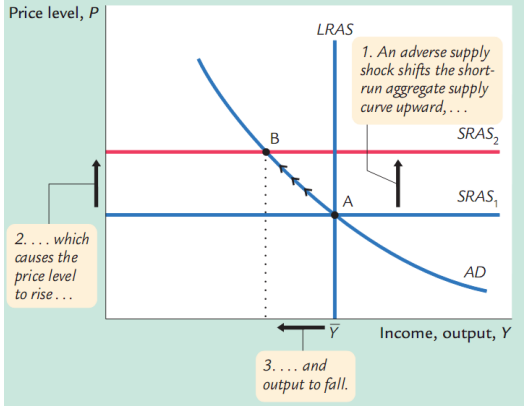
downwards. This continues until we came on the LRAS curve, the point C. In the long run, only price changes

Supply Shocks and Stabilization Policy

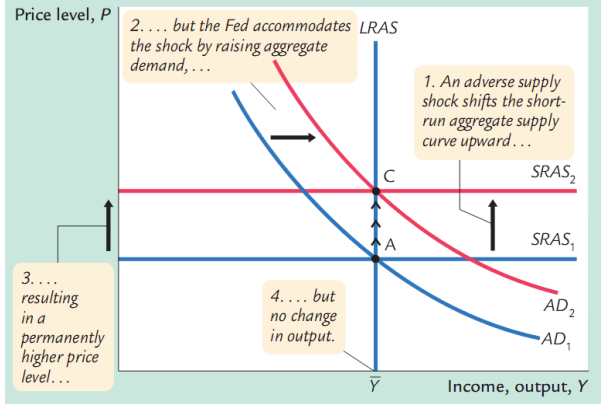
- *shocks* to the economy are modeled by economists as exogenous changes (shifts) in these curves . A shock that shifts the aggregate demand curve is called a demand shock, and a shock that shifts the aggregate supply curve is called a supply shock. Here are some examples of supply shocks
  - Adverse Supply Shocks: A drought that destroys the capital stock, an increase in union aggressiveness, a rise in the world oil prices
  - Favorable supply shocks: A fall in the world oil prices, technological innovations

Shocks to Aggregate Supply

An Adverse Supply Shock



Accommodating an Adverse Supply Sh



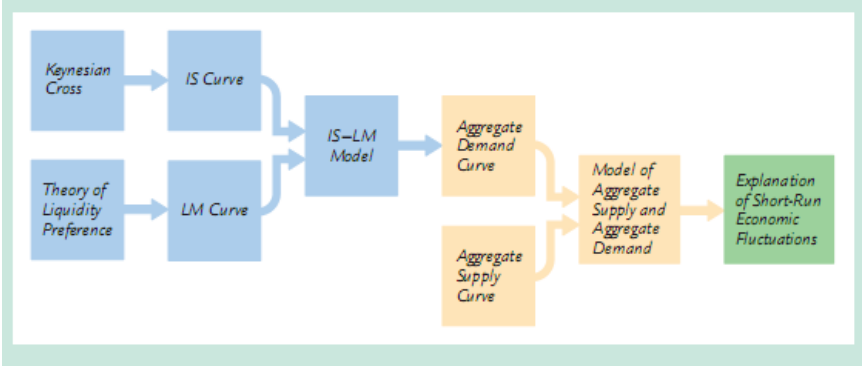
- On the left figure, an adverse supply shock leaves the economy with lower output and higher prices
- On the right figure, the adverse supply shock is confronted

by increasing the demand (either by fiscal or monetary policy that we will analyze). This brings output to its previous level, but the prices are permanently higher.

Ch10 - Aggregate Demand I

- We develop a model of aggregate demand, called the IS–LM model, the leading interpretation of Keynes's theory
- IS stands for "investment" and "saving " The IS curve represents equilibrium in the market for goods and services
- LM stands for "liquidity" and "money" The LM curve rep-

resents equilibrium of the supply and demand for money.



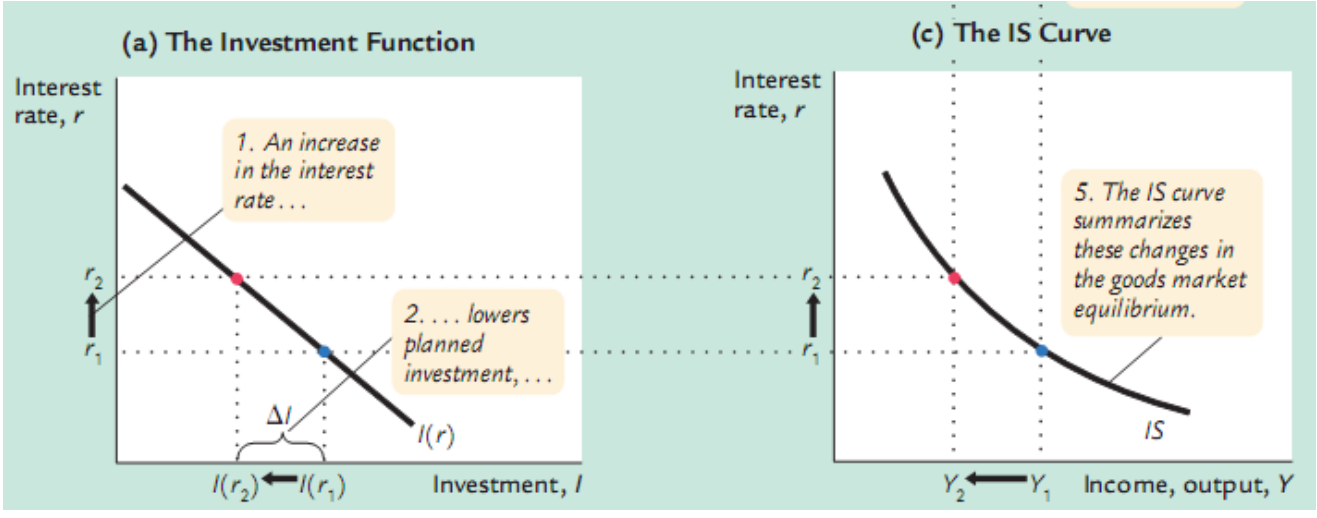
- Because the interest rate influences both investment (in IS) and money (in LM), it is the variable that links the two curves in the IS–LM model

The Goods Market and the IS Curve

$$Y = C(Y - T) + I(r) + G$$

- The higher the interest rate, the less demand for investment, which lowers Y. The IS curve plots this negative relationship between the interest rate
- Notice that the decline in investment lowers Y, which reduces consumption, which in turn reduces Y,... This is

what we call multiplier effect

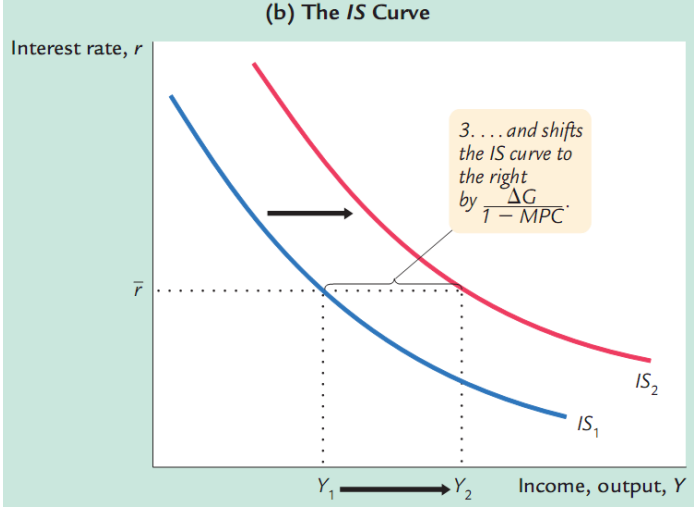


The Effect of an Increase in Government Purchases on Income

- The increase in income ΔY exceeds the increase in government purchases ΔG. Thus, fiscal policy has a multiplied effect on income. $\Delta Y/\Delta G$ is called the government-purchases multiplier. Quantitatively,

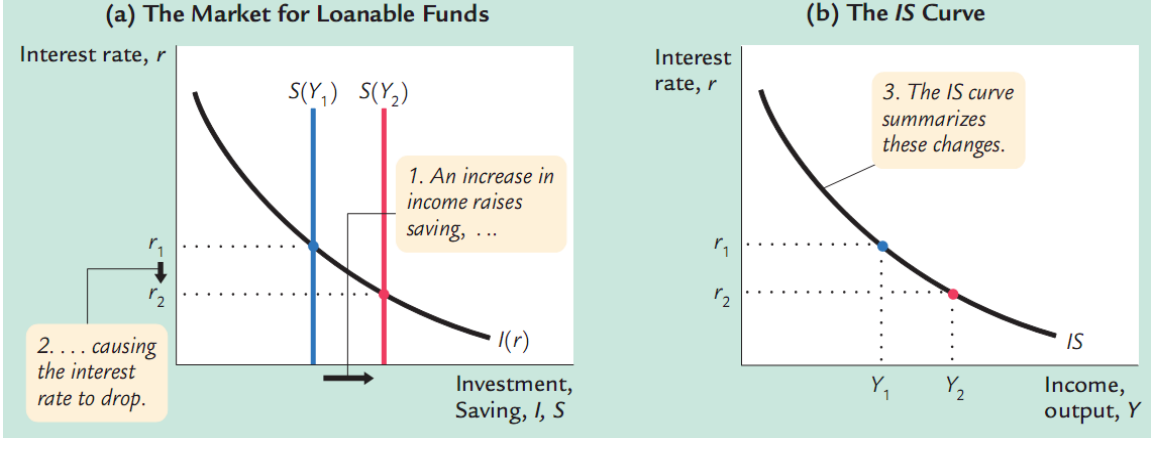
$$\Delta Y = \Delta G + MPC * \Delta G + MPC * \Delta G + ... = \Delta G * 1/(1 - MPC)$$

- Notice that IS curve is drawn for a combination of r and Y that satisfies $Y = C(Y-T)+G+I(r)$. Hence, changes in G and T shifts the IS curve



A Loanable-Funds Interpretation of the IS Curve

- Market for loanable funds produces the IS curve: $Y - C(Y - T) - G = S = I(r)$



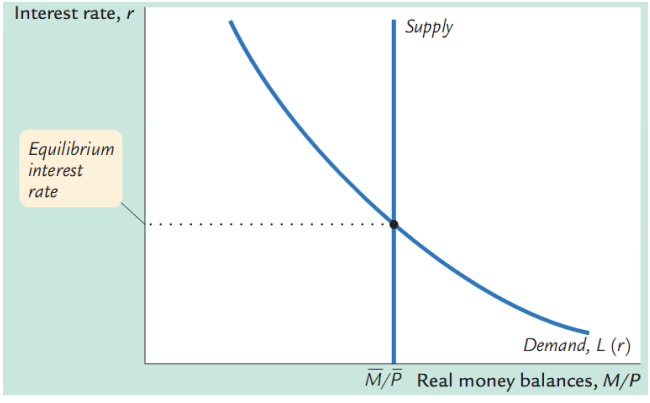
- As panel (a) shows, the increased supply of loanable funds drives down the interest rate from r_1 to r_2. The IS curve

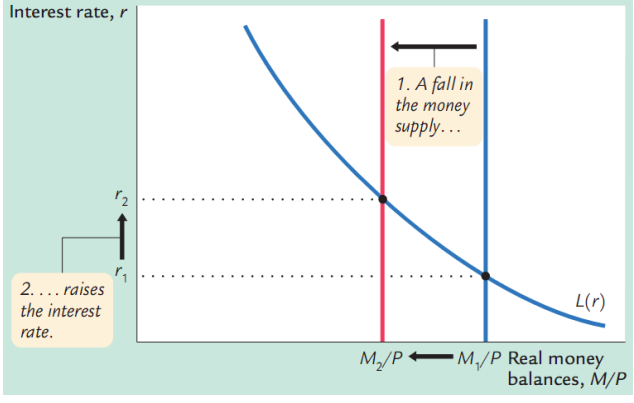
in panel (b) summarizes this relationship: higher income implies higher saving, which in turn implies a lower equilibrium interest rate

The Money Market and the LM Curve

- *Theory of liquidity preference:* Assume that there is a fixed supply of real money balances: $(M/P)^s = \bar{M}/\bar{P}$. For the demand side, when the interest rate rises, people want to hold less of their wealth in the form of money: $(M/P)^d = L(r)$. Interest rate adjusts to balance the sup-

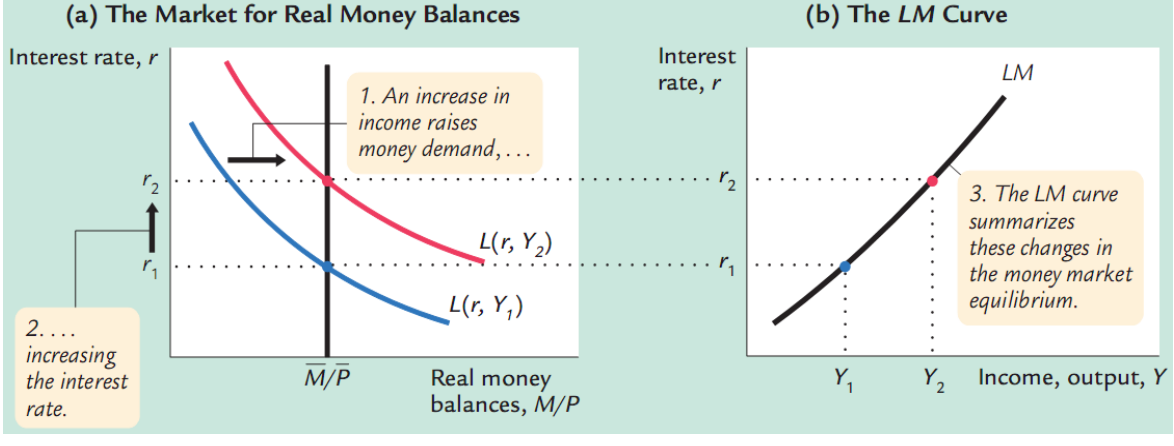
ply and demand for money.





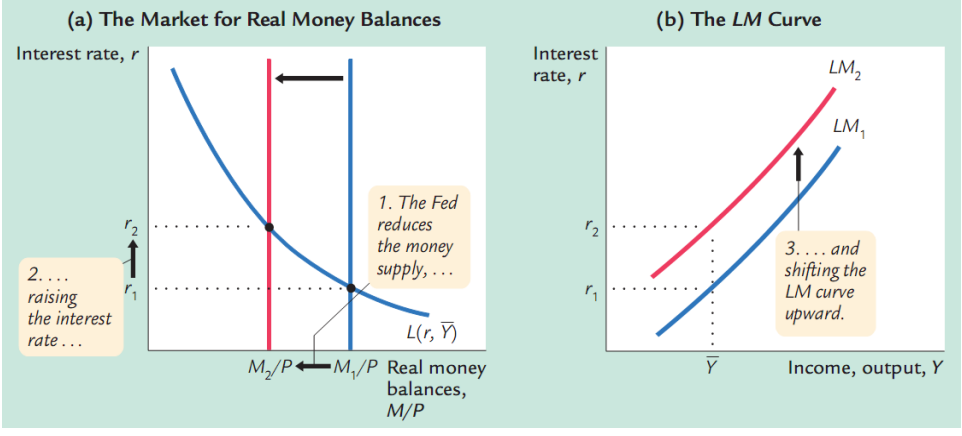
Income, Money Demand, and the LM Curve

- The money demand depends also on income: $(M/P)^d = L(r, Y)$
- If income increases from Y1 to Y2, it shifts the money demand curve to the right



How Monetary Policy Shifts the LM Curve

- A reduction in the money supply:

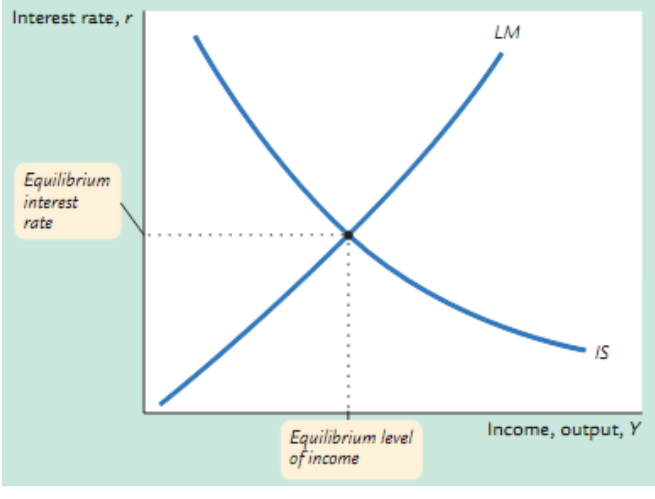


- Holding the amount of income constant, a reduction in the money supply raises the interest rate which lowers the

demand for real money balances. Hence, for any level of income the interest rate is higher.

Conclusion: The Short-Run Equilibrium

- The two equations: $Y = C(Y - T) + I(r) + G$ (IS) & $M/P = L(r, Y)$ (LM)

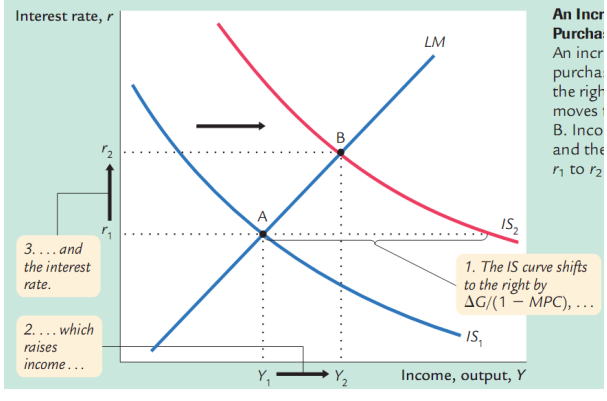


Interest rate, by influencing both investment and money demand, links the two halves of the IS-LM model

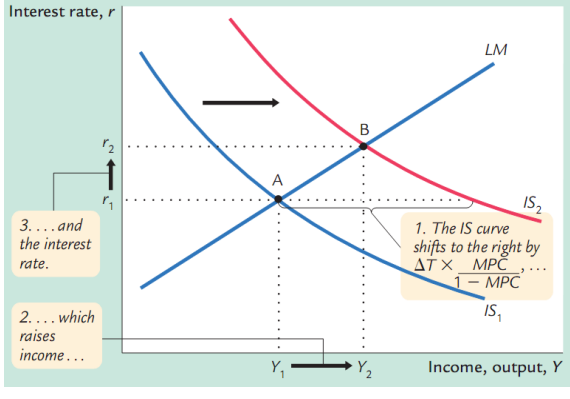
Ch11 - Aggregate Demand II: The IS-LM Model to Explain Fluctuations

How Fiscal Policy Shifts the IS Curve and Changes the Short-Run Equilibrium

An Increase in Government Purchases



A Decrease in Taxes

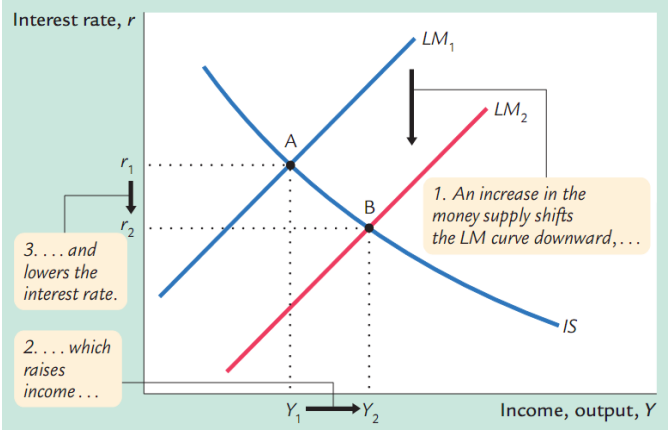


- The increase in government purchases shifts IS curve to the right. The rise in income (Y) increases the money de-

manded at every interest rate. Interest rate rises, reducing investment and Y. Eventually equilibrium is restored at point B. A decline in taxes has a similar effect

How Monetary Policy Shifts the LM Curve and Changes the Short-Run Equilibrium

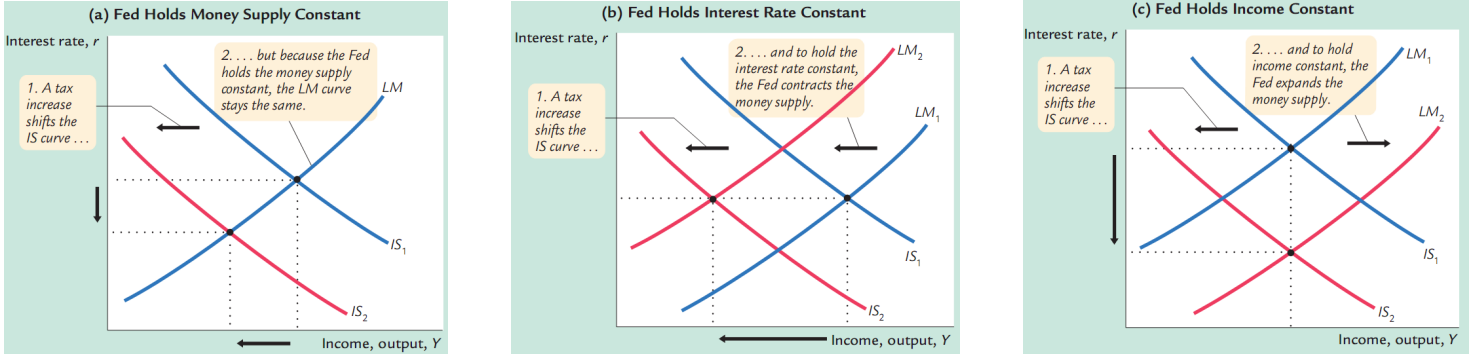
- An Increase in the Money Supply:



- Increase in the money supply lowers the interest rate,which stimulates investment and thereby expands the demand for

goods and services (a process called the monetary transmission mechanism)

The Interaction Between Monetary and Fiscal Policies, and Their Interaction



- If taxes are increased (graph a), the central banks may lower money supply (contractiory monetary policy) and

bring the interest rate to its previous level-causing a significant decline in output (graph b), or increase the money supply (expansionary monetary policy) and bring the output to its previous level-causing a significant decline in interest rates and (increase in inflation) (graph c).

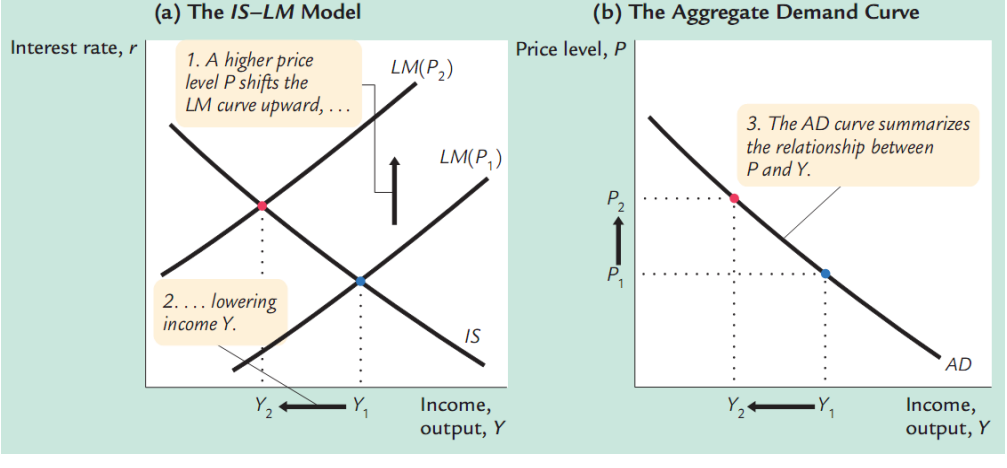
A Note on Monetary Policy Rules

- Monetary authorities (CBs if they are independent) control the money supply
- CBs, through open market operation (OMO), control the short term interest rate and the supply of base money in an economy

- In doing so, they either follow a rule, or use a discretionary policy.
- Under discretion, a monetary authority is free to act in accordance with its own judgment. A rule, on the other hand, is restriction on the monetary authority's discretion, such as fixed money supply or inflation targeting.

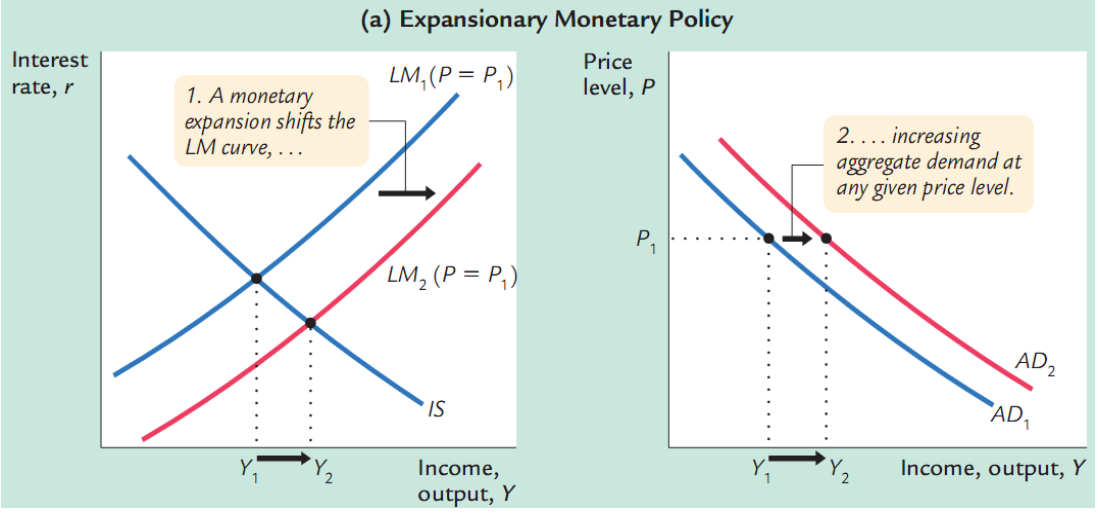
IS–LM as a Theory of Aggregate Demand

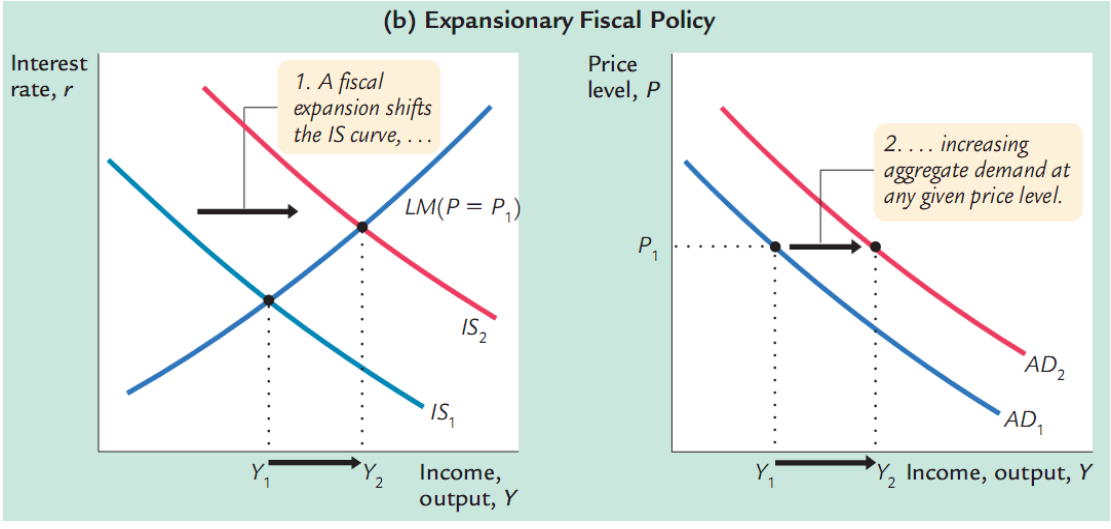
- For any given money supply M, a higher price level P reduces the supply of real money balances M/P and shifts the LM curve to the left, which reduces equilibrium income



- A change in income in the IS–LM model resulting from a change in the price level represents a movement along the aggregate demand curve

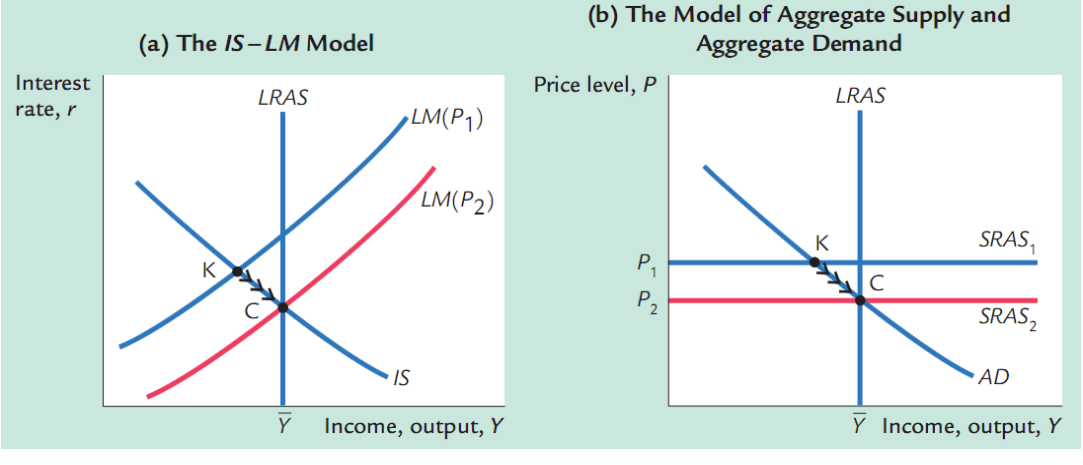
How Monetary and Fiscal Policies Shift the Aggregate Demand Curve in the SR




(b) Expansionary Fiscal Policy
Interest rate, r
1. A fiscal expansion shifts the IS curve, . . .
LM(P = P1)
IS2
IS1
Y1
Y2
Income, output, Y
Price level, P
2. . . . increasing aggregate demand at any given price level.
P1
AD2
AD1
Y1
Y2
Income, output, Y

The Short-Run and Long-Run Equilibria

- We can also use the IS–LM model to describe the economy in the long run when the price level adjusts to ensure that the economy produces at its natural rate.



- The vertical line represents the natural rate of output $\bar{Y}$.

In the short run, the price level is stuck at P_1. The short-run equilibrium of the economy is therefore point K, and, the economy's income is less than its natural rate. In the long run, the price level adjusts to P_2 so that the economy is at the natural rate (point C)

Ch13 - Aggregate Supply

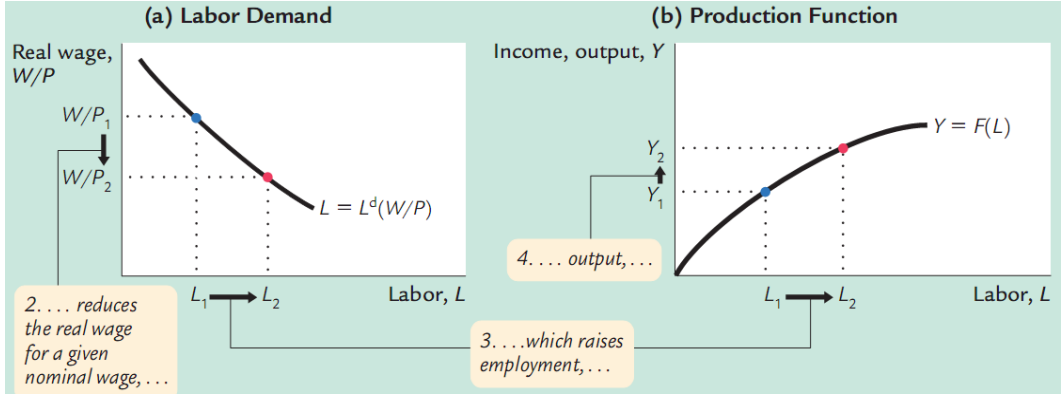
- Previously we assumed that the short-run aggregate supply curve is a horizontal one, representing the extreme situation in which all prices are fixed. Now we refine this understanding of short-run aggregate supply.
- We go over three models of the short-run aggregate supply curve; they share a common feature that the short-run aggregate supply curve is upward sloping.

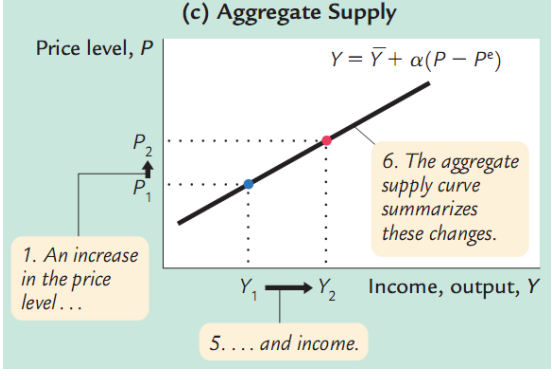
Three Models of Aggregate Supply

- We try to obtain a short-run aggregate supply equation of the form $Y = \bar{Y} + a(P - P^e),\ a > 0$ where Y is output, $\bar{Y}$ is the natural rate of output, P is the price level, and P^e is the expected price level

...The Sticky-Wage Model

- Model assumes that nominal wages are set by long-term contracts ($W = \omega * P^e$), so wages cannot adjust quickly when economic conditions change
  - When the nominal wage is stuck, a rise in the price level lowers the real wage, making labor cheaper.
  - The lower real wage induces firms to hire more labor
  - The additional labor hired produces more output
- This implies positive relationship between the price level and the amount of output


(a) Labor Demand
Real wage, W/P
W/P1
W/P2
L = Ld(W/P)
L1
L2
Labor, L
2. . . . reduces the real wage for a given nominal wage, . . .
(b) Production Function
Income, output, Y
Y = F(L)
Y2
Y1
4. . . . output, . . .
L1
L2
Labor, L
3. . . .which raises employment, . . .


(c) Aggregate Supply
Price level, P
Y = Ȳ + α(P − Pe)
P2
P1
6. The aggregate supply curve summarizes these changes.
1. An increase in the price level . . .
Y1
Y2
Income, output, Y
5. . . . and income.

- An alternative explanation to the sticky wage model is that the labor demand curve may shift because of shocks to technology (the theory of real business cycles)

...The Imperfect-Information Model

- When the price level rises unexpectedly, all suppliers in the economy observe increases in the prices of the goods they produce. They all infer, rationally but mistakenly, that the relative prices of the goods they produce have risen. They work harder and produce more, even though relative prices do not change.

...The Sticky-Price Model

- A higher level of income raises the demand for the firm's product. Because marginal cost increases at higher levels of production, the greater the demand, the higher the firm's desired price

$$p = P + a(Y - \bar{Y})$$

- This model also emphasizes that some prices are sticky because once a firm has printed and distributed its catalog, it is costly to alter prices
- Hence, firms expecting a high price level and with sticky

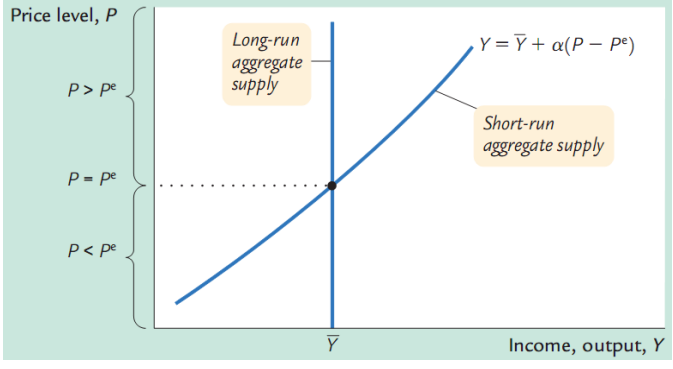
prices set high prices

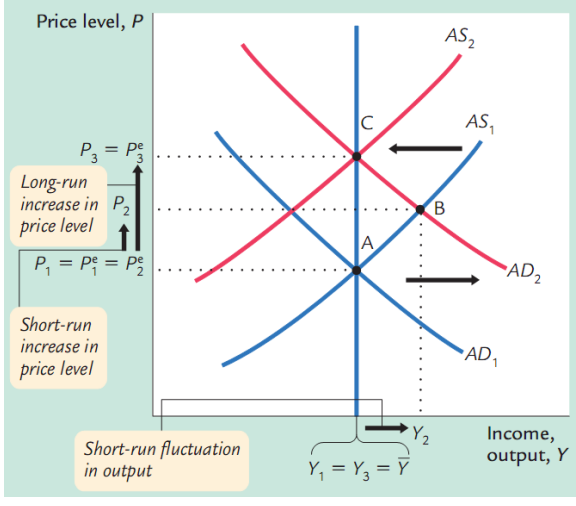
$$p^e = P^e + a(Y^e - \bar{Y}^e)$$

- At the end it obtains the following equation for the aggregate supply curve

$$Y = \bar{Y} + \alpha(P - P^e)$$

The Effect of a Shift in Aggregate Demand for Short-Run Fluctuations





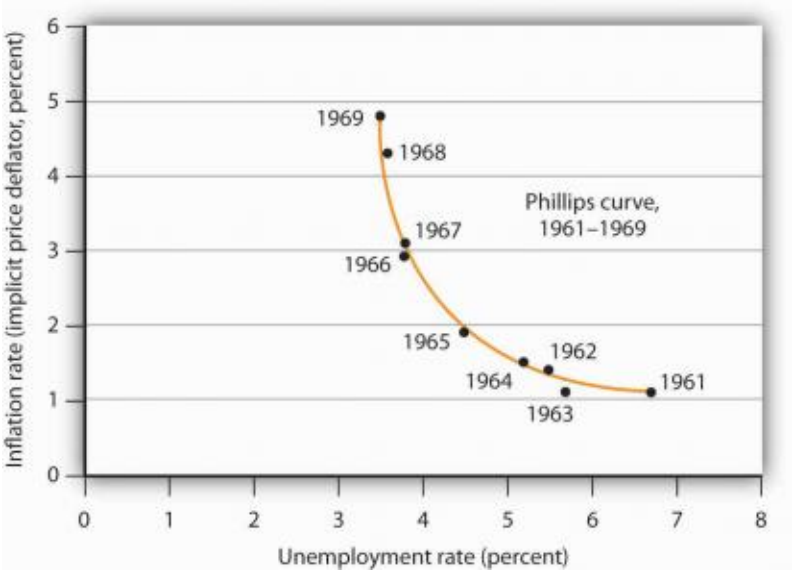
- Second figure shows that the economy begins in a long-run equilibrium, point A. When aggregate demand increases unexpectedly, the price level rises from P_1 to P_2. Because

the price level P_2 is above the expected price level P_2^e, output rises temporarily above the natural rate, as the economy moves along the short-run aggregate supply curve from point A to point B. In the long run, the expected price level rises to P_3^e, causing the short-run aggregate supply curve to shift upward. The economy returns to a new long-run equilibrium, point C, where output is back at its natural rate

The Phillips Curve

- The above analysis indicates that policymakers can use monetary or fiscal policy to expand aggregate demand. This policy would move the economy to a point of higher output and a higher price level. This *trade-off between inflation and unemployment,* called the Phillips curve, is a reflection of the short-run aggregate supply curve

The Phillips Curve in the 1960s



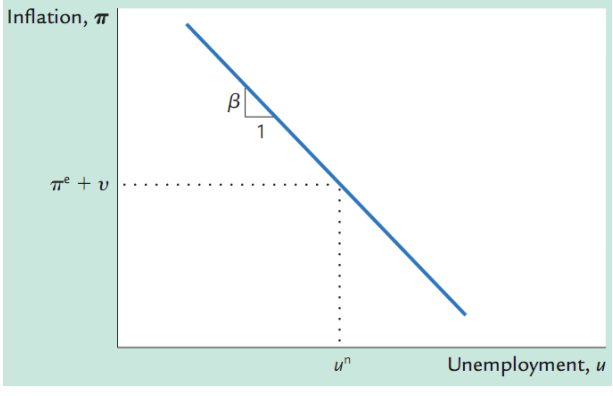
The Phillips Curve Equation

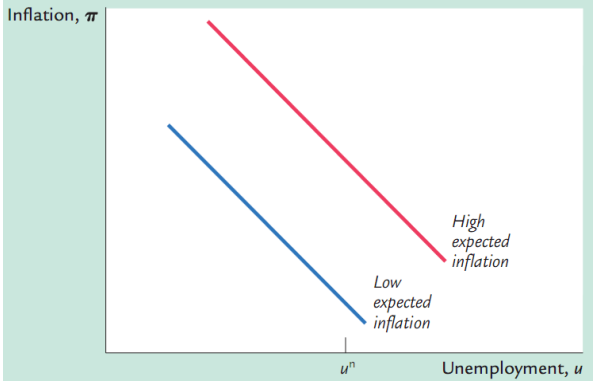
- Inflation =Expected Inflation $-\beta*$ Cyclical Unemployment + Supply Shock

$$\pi = \pi^e - \beta(u - u^n) + \upsilon$$

- The position of the short-run Phillips curve depends on the expected rate of inflation. If expected inflation rises, the curve shifts upward, and the policymakers' s trade-off becomes less favorable: inflation is higher for any level of unemployment. Right figure shows how the trade-off

depends on expected inflation





- Eventually, expectations adapt to whatever inflation rate the policymaker has chosen. In the long run, the classical dichotomy holds, unemployment returns to its natural rate, and there is no trade-off between inflation and unemployment

Adaptive Expectations and Inflation Inertia

- A simple and often plausible assumption is that people form their expectations of inflation based on recently observed inflation. This assumption is called adaptive expectations
- Then expected inflation equals last year' s inflation $\pi^e = \pi_{-1}$. When the Phillips curve is written in this form

$$\pi = \pi_{-1} - \beta(u - u^n) + \upsilon$$

- The first term in this form of the Phillips curve, π_{-1}, implies that inflation has inertia; inflation keeps going unless something acts to stop it

- In the model of aggregate supply and aggregate demand, inflation inertia is interpreted as persistent upward shifts in both the aggregate supply curve and the aggregate demand curve
  - The aggregate demand curve must also shift upward to confirm the expectations of inflation. This occurs by persistent growth in the money supply. If the Fed suddenly halted money growth, aggregate demand would stabilize, and the upward shift in aggregate supply would cause a recession. The high unemployment in the recession would reduce inflation and expected inflation, causing inflation inertia to subside

Two Causes of Rising and Falling Inflation

- The second term, $\beta(u - u^n)$, shows that cyclical unemployment. High demand (low unemployment) pulls the inflation rate up. This is called demand-pull inflation
- The third term, u, shows that inflation also rises and falls because of supply shocks. This is called cost-push inflation

Disinflation and the Sacrifice Ratio

- Sacrifice ratio, the percentage of a year' s real GDP that must be forgone to reduce inflation by 1 percentage point

- For example, a rapid disinflation would lower output by 10 percent for 2 years

Rational Expectations and the Possibility of Painless Disinflation

- So far, we have been assuming that expected inflation depends on recently observed inflation
- An alternative approach is to assume that people have rational expectations. Assume that people optimally use all the available information, including information about current government policies, to forecast the future
- Prominent advocate of rational expectations believe that if

policymakers are credibly committed to reducing inflation, rational people will understand the commitment and will quickly lower their expectations of inflation. Inflation can then come down without a rise in unemployment and fall in output