Chapter 14 - Expectations: The Basic Tools

- Interest rates expressed in terms of the national currency (basket of goods) are called nominal (real) interest rates
- Their relation is given as

$$1 + r_t = \frac{1 + i_t}{1 + \pi^e_{t+1}}$$

- If the nominal interest rate and the expected rate of inflation are not too large, a simpler expression is:

$$r_t \approx i_t - \pi^e_{t+1}$$

Nominal and Real Interest Rates and the IS–LM Model

- When deciding how much investment to undertake, firms care about real interest rates. Then, the IS relation must read:

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

- The interest rate directly affected by monetary policy—the one that enters the LM relation—is the nominal interest rate, then:

$$\frac{M}{P} = YL(i)$$

- The real interest rate is:

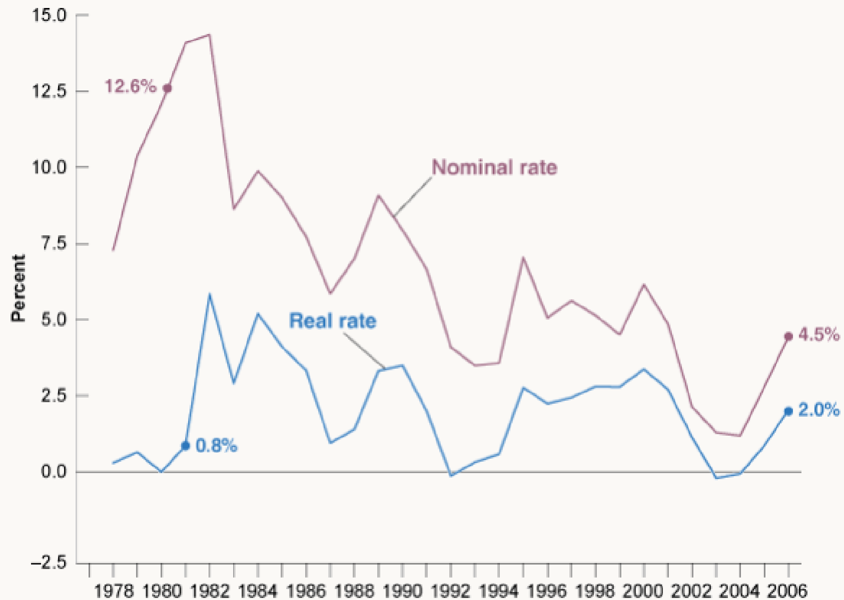
$$i = r + \pi^e$$

- Note an immediate implication of these three relations:
  - In the medium run, the difference between the nominal interest rate and the real interest rate reflects expected inflation
  - In the short-run, price level is fixed. Hence, movements in the nominal interest rate directly translate into movements in the real interest rate.

Figure 14 - 2

Nominal and Real One-Year T-bill Rates in the United States since 1978

Although the nominal interest rate has declined considerably since the early 1980s, the real interest rate was actually higher in 2006 than in 1981.

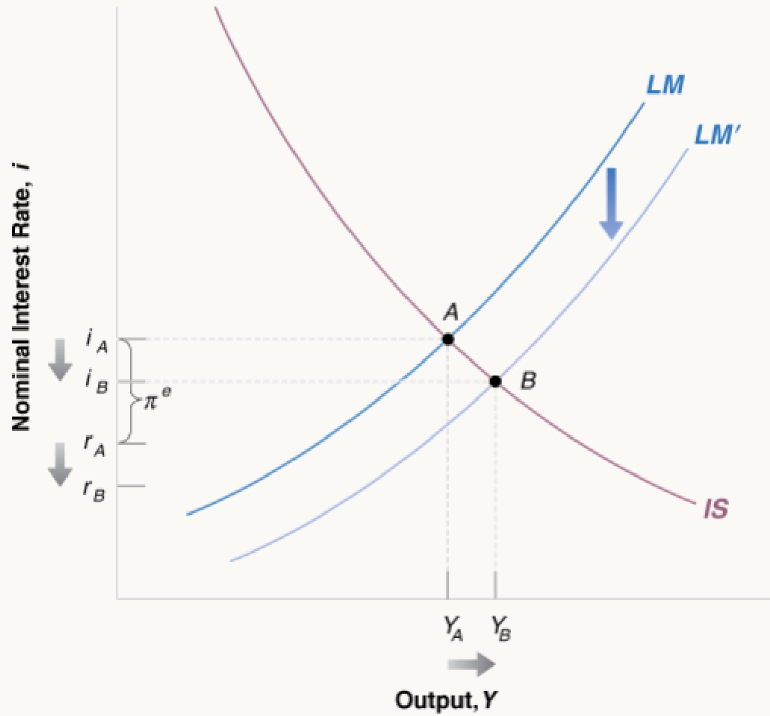


Money Growth, Inflation, and Nominal and Real Interest Rates in the Short Run

Figure 14 - 4

The Short-Run Effects of an Increase in Money Growth

An increase in money growth increases the real money stock in the short run. This increase in real money leads to an increase in output and decreases in both the nominal and real interest rates.

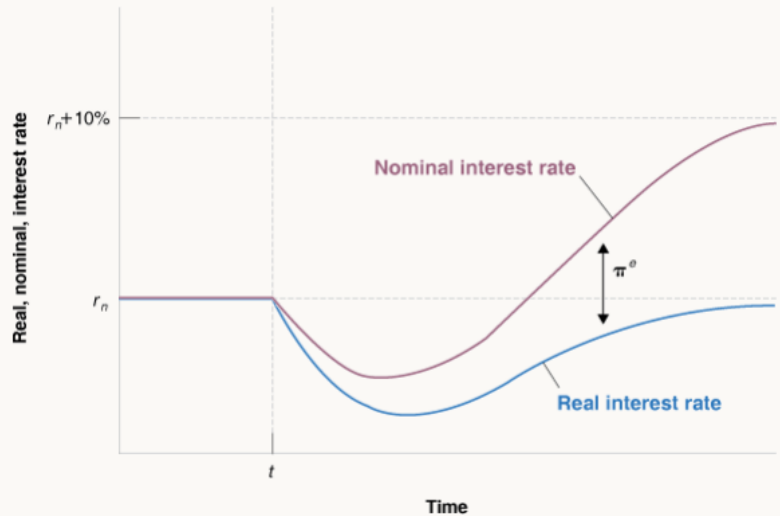


From the Short Run to the Medium Run

Figure 14 - 5

The Adjustment of the Real and the Nominal Interest Rates to an Increase in Money Growth

An increase in money growth leads initially to decreases in both the real and the nominal interest rates. Over time, however, the real interest rate returns to its initial value, and the nominal interest rate converges to a new higher value, equal to the initial value plus the increase in money growth.

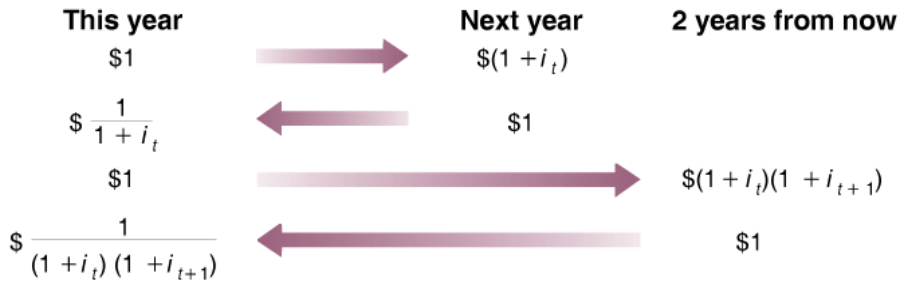


Nominal and Real Interest Rates in the Medium Run

- In the medium run, output returns to its natural level
- In the medium run, the nominal interest rate increases one for one with inflation
- Money growth has no effect on real interest rates in the medium run.
- For example, an increase in nominal money growth of 10% is eventually reflected by a 10% increase in the rate of inflation, a 10% increase in the nominal interest rate, and no change in the real interest rate.

$$i = r_n + g_m$$

Expected Present Discounted Values Interest Rates



(a) One dollar this year is worth $1 + i_t$ dollars next year.

(b) The present discounted value of a 1 dollar next year is $1/(1 + i_t)$ dollars this year.

(c) One dollar is worth $(1+i_t)(1+i_{t+1})$ dollars two years from today

The General Formula

- The present discounted value of a sequence of payments equals:

$$\$V_t = \$z_t + \frac{1}{(1+i_t)}\$z_{t+1} + \frac{1}{(1+i_t)(1+i_{t+1})}\$z_{t+2} + ...$$

- When future payments or interest rates are uncertain, then:

$$\$V_t = \$z_t + \frac{1}{(1+i_t)}\$z^e_{t+1} + \frac{1}{(1+i_t)(1+i^e_{t+1})}\$z^e_{t+2} + ...$$

- Present discounted value, or present value are another way of saying "expected present discounted value."

Chapter 15 - Financial Markets and Expectations

Bond Prices and Bond Yields

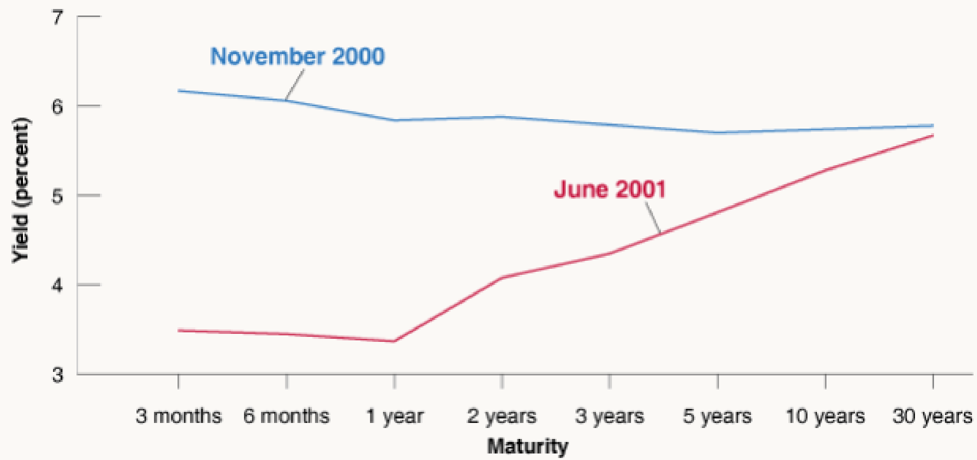
- Bond maturity is the length of time over which the bond promises to make payments to the holder of the bond.
- Bonds of different maturities each have a price and an associated interest rate called the yield to maturity, or simply the yield.
- The relation between maturity and yield is called the yield

curve, or the term structure of interest rates

Figure 15 - 1

U.S. Yield Curves: November 1, 2000, and June 1, 2001

The yield curve, which was slightly downward sloping in November 2000, was sharply upward sloping seven months later.



Interpreting the Yield Curve

- An upward sloping yield curve means that long-term interest rates are higher than short-term interest rates. Financial markets expect short-term rates to be higher in the future.

- A downward sloping yield curve means that long-term interest rates are lower than short-term interest rates. Financial markets expect short-term rates to be lower in the future.

The Vocabulary of Bond Markets

- Government bonds are bonds issued by government agencies.Corporate bonds are bonds issued by firms.
- The risk premium is the difference between the interest rate paid on a given bond and the interest rate paid on the bond with the highest rating
- Bonds that promise a single payment at maturity are called discount bonds. The single payment is called the face value of the bond.
- Bonds typically promise to pay a sequence of fixed nominal payments. The payments are called coupon payments.

Bond Prices as Present Values

- Consider two types of bonds:
  - A one-year bond—a bond that promises one payment of \$100 in one year. Price of the one-year bond:

$$\$P_{1t} = \frac{\$100}{1 + i_{1t}}$$

  - A two-year bond—a bond that promises one payment of \$100 in two years. Price of the two-year bond:

$$\$P_{2t} = \frac{\$100}{(1 + i_{1t})(1 + i^e_{1t+1})}$$

From Bond Prices to Bond Yields

- The yield to maturity on an n-year bond is the constant annual interest rate that makes the bond price today equal to the present value of future payments of the bond.

$$\$P_{2t} = \frac{\$100}{(1+i_{2t})^2}$$

- then:

$$\frac{\$100}{(1+i_{2t})^2} = \frac{\$100}{(1+i_{1t})(1+i^e_{1t+1})}$$

- therefore:

$$(1+i_{2t})^2 = (1+i_{1t})(1+i^e_{1t+1})$$

- From here, we can solve for i_{2t}. The yield to maturity on a two-year bond, is closely approximated by:

$$i_{2t} \approx \frac{1}{2}(i_{1t} + i^e_{1t+1})$$

- Long-term interest rates reflect current and future expected short-term interest rates.

Chapter 16 - Expectations, Consumption and Investment

Consumption

- The theory of consumption was developed by Milton Friedman in the 1950s, who called it the permanent income theory of consumption, and by Franco Modigliani, who called it the life cycle theory of consumption.

A Foresighted Consumer

- A foresighted consumer who decides how much to consume based on the value of his total wealth
- The total wealth is equal to the sum of his nonhuman

wealth (the sum of financial wealth and housing wealth) and human wealth

$$C_t = C(Total\ wealth_t)$$

Toward a More Realistic Description

- The constant level of consumption that a consumer can afford equals his total wealth divided by his expected remaining life.

- Consumption depends not only on total wealth but also on current income and expected future income.

$$C_t = C(Financial\ wealth_t, \sum_{k=0}^{\infty}(\frac{1}{1+r^e_{kt}})^k E_t(Y^e_{t+k} - T^e_{t+k}))$$

- Y_{Lt} =real labor income in year t.
- T_t =real taxes in year t.
- Consumption is an increasing function of total wealth, and also an increasing function after-tax labor income. Total wealth is the sum of nonhuman wealth – financial wealth plus housing wealth – and human wealth – the present value of expected after-tax income.

Putting Things Together: Current Income, Expectations, and Consumption

- Expectations affect consumption in two ways:

– Directly through human wealth, or expectations of future labor income, real interest rates, and taxes.

– Indirectly through nonhuman wealth - stocks, bonds, and housing. Expectations of the value of nonhuman wealth is computed by financial markets.

- This dependence of consumption on expectations has two main implications for the relation between consumption and income:

  1. Consumption is likely to respond less than one for one to fluctuations in current income
  2. Consumption may move even if current income does not change.(for instance, due to changes in consumer confidence)

Investment

- Investment decisions depend on current sales, the current real interest rate, and on expectations of the future
- The decision to buy a machine depends on the present value of the profits the firm can expect from having this machine versus the cost of buying it.
- The depreciation rate, δ, measures how much usefulness of the machine reduces from one year to the next

The Present Value of Expected Profits

- V(π^e_t): The present value, in year t, of expected profit in year t+1 equals:

$$\frac{1}{(1+r_t)}\pi^e_{t+1}$$

- In year t+2,

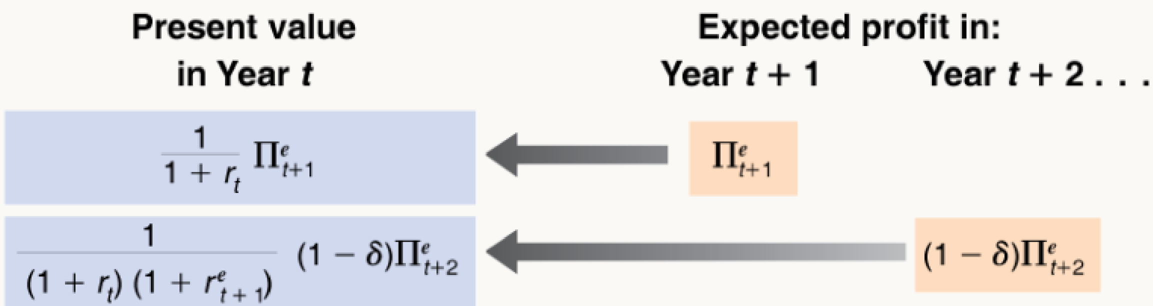
$$\frac{1}{(1+r_t)(1+r^e_{t+1})}(1-\delta)\pi^e_{t+2}$$

- In year t,

$$V(\Pi^e_t) = \frac{1}{(1+r_t)}\pi^e_{t+1} + \frac{1}{(1+r_t)(1+r^e_{t+1})}(1-\delta)\pi^e_{t+2} + ...$$

Figure 16 - 1

Computing the Present Value of Expected Profits



The Investment Decision

- Denote I_t as aggregate investment, and $V(\pi_t^e)$ as the expected present value of profit per unit of capital. This yields the investment function:

$$I_t = I[V(\pi_t^e), \pi_t]$$
$$(+, +)$$

- Investment depends positively on the expected present value of future profits (per unit of capital) and on the current level of profit.

- The higher the current or expected real interest rates, the lower the expected present value, and thus the lower the level of investment.

The Volatility of Consumption and Investment

- There are additional similarities between consumption and of investment behavior:
  - Whether consumers perceive current movements in income to be transitory or permanent affects their consumption decisions.
  - In the same way, whether firms perceive current movements in sales to be transitory or permanent affects their investment decisions.

- But there are also important differences between consumption decisions and investment decisions:
  - When faced with an increase in income that consumers perceive as permanent, they respond with at most an equal increase in consumption.
  - When firms are faced with an increase in sales they believe to be permanent, their present value of expected profits increases, leading to a subtantial increase in in-

vestment.

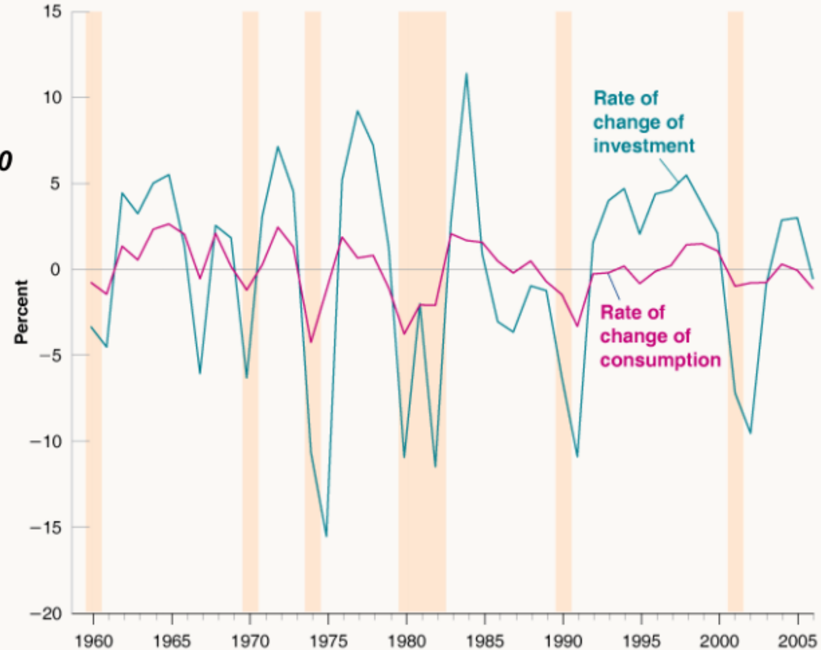


Figure 16 - 4

Rates of Change of Consumption and Investment since 1960

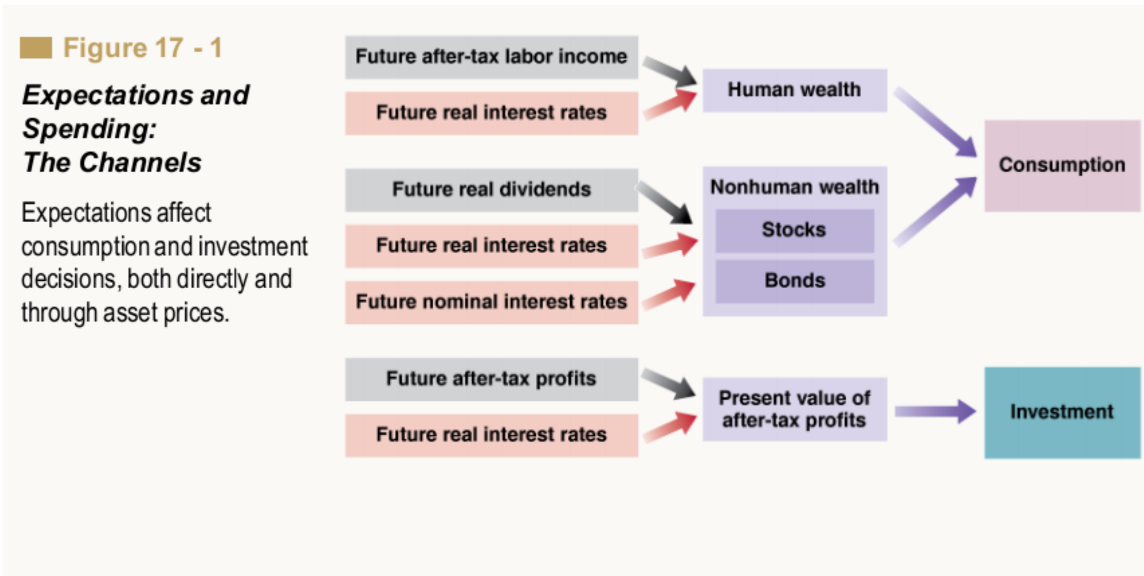
Relative movements in investment are much larger than relative movements in consumption.

- The figure yields three conclusions:
  - Consumption and investment usually move together.
  - Investment is much more volatile than consumption.
  - Because, however, the level of investment is much smaller than the level of consumption, changes in investment from one year to the next end up being of the same overall magnitude as changes in consumption.

Chapter 17 - Expectations, Output and Policy

Expectations and Decisions: Taking Stock

Expectations, Consumption, and Investment Decisions



Expectations and the IS Relation

- Consumption and investment depend on expectations of the future. To take into account the effect of expectations, we do the following: Earlier, the IS relation was (let's assume investment depends on current income as well):

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

- Rewrite the IS relation as:

$$\begin{aligned} Y \;=\; & A(\underset{(+,-,-)}{Y, T, r}) + G \end{aligned}$$

- incorporating the role of expectations, then:

$$Y = A(Y, T, r, Y'^e, T'^e, r'^e) + G$$
$$(+, -, -, +, -, -)$$

$'$ Primes denote future values, and ^{e} denotes expected values.

- Now there is a smaller role for the current interest rate

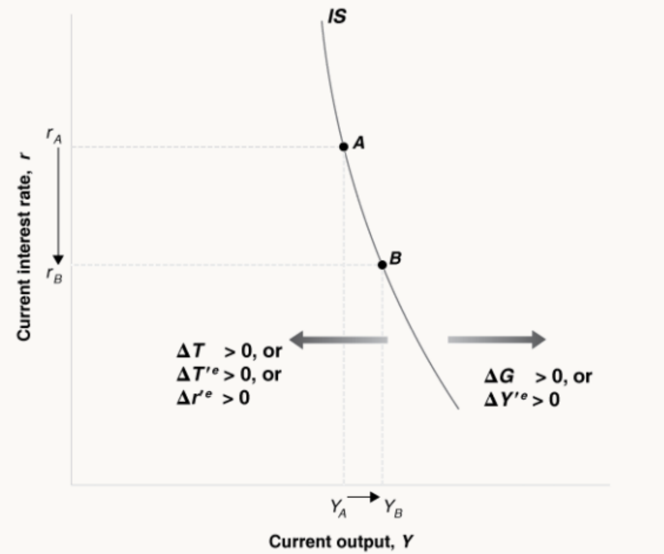


Figure 17 - 2

The New IS Curve

Given expectations, a decrease in the real interest rate leads to a small increase in output: The *IS* curve is steeply downward sloping. Increases in government spending or in expected future output shift the *IS* curve to the right. Increases in taxes, in expected future taxes, or in the expected future real interest rate shift the *IS* curve to the left.

- The new IS curve is steep, which means that a large decrease in the current interest rate is likely to have only a small effect on equilibrium income, for two reasons:
  - A decrease in the current real interest rate does not have much effect on spending if future expected rates are not likely to be lower as well.
  - The multiplier is likely to be small. If changes in income are not expected to last, they will have a limited effect on consumption and investment.

The LM Relation Revisited

- The LM relation is not modified because the opportunity cost of holding money today depends on the current nominal interest rate, not on the expected nominal interest rate one year from now.

$$\frac{M}{P} = Y L(i)$$

- The interest rate that enters the LM relation is the current nominal interest rate.

From the Short Nominal Rate to Current and Expected Real Rates

- Decreasing the current nominal interest rate i effects the current and expected future real interest rates depending on two factors:
  - Whether the increase in the money supply leads financial markets to revise their expectations of the future nominal interest rate, i'^{e}.
  - Whether the increase in the money supply leads financial markets to revise their expectations of both current

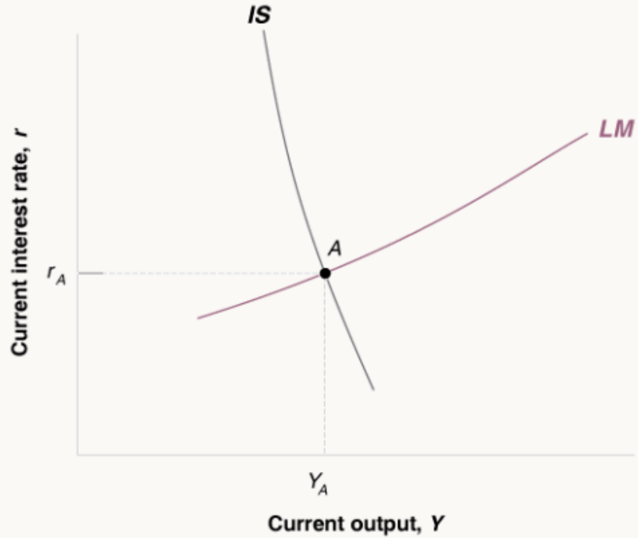
and future inflation π^e and π'^e.

From the Short Nominal Rate to Current and Expected Real Rates

Figure 17 - 3

The New IS–LM

The *IS* curve is steeply downward sloping. Other things equal, a change in the current interest rate has a small effect on output. The *LM* curve is upward sloping. The equilibrium is at the intersection of the *IS* and *LM* curves.



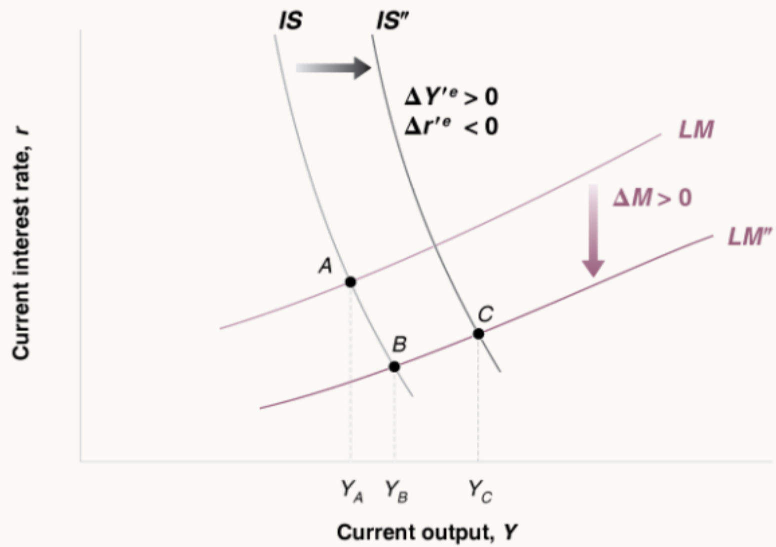
$$IS: \quad Y = A(Y, T, r, Y'^e, T'^e, r'^e) + G \qquad LM: \quad \frac{M}{P} = YL(r)$$

Monetary Policy Revisited

Figure 17 - 4

The Effects of an Expansionary Monetary Policy

The effects of monetary policy on output depend very much on whether and how monetary policy affects expectations.



- The effects of monetary policy depend crucially on its effect on expectations:
  - If a monetary expansion leads financial investors, firms, and consumers to revise their expectations of future interest rates and output, then the effects of the monetary expansion on output may be very large.
  - But if expectations remain unchanged, the effects of the monetary expansion on output will be small.

Deficit Reduction, Expectations, and Output

- In the medium run, a lower budget deficit implies higher saving and higher investment. In the long run, higher investment translates into higher capital and thus higher output.

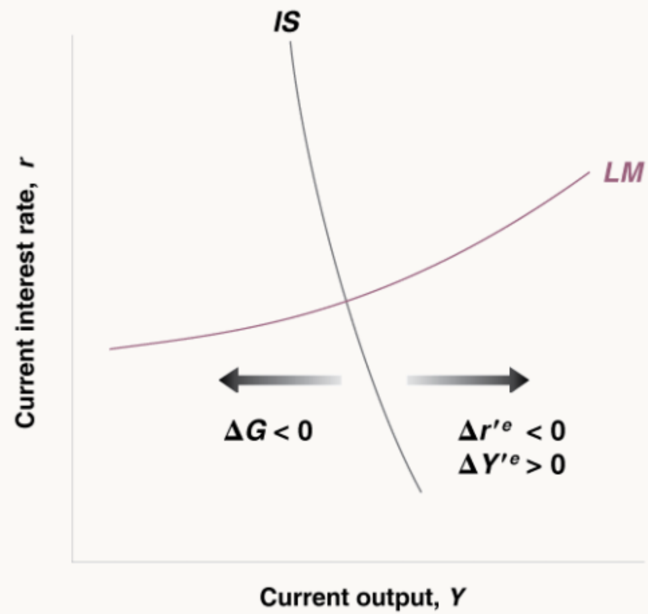
- In the short run, however, a reduction in the budget deficit, unless it is offset by a monetary expansion, leads to lower spending and to a contraction in output.

The Role of Expectations about the Future

Figure 17 - 5

The Effects of a Deficit Reduction on Current Output

When account is taken of its effect on expectations, the decrease in government spending need not lead to a decrease in output.



- Deficit reduction may actually increase spending and output, even in the short run, if people take into account the future beneficial effects of deficit reduction (expansionary fiscal contraction).In response to the announcement of deficit reduction,
  - Current spending goes down—the IS curve shifts to the left.
  - Expected future output goes up—the IS curve shifts to the right.
  - And the interest rate goes down—the IS curve shifts to the right.

– Small cuts in government spending and large expected cuts in the future will cause output to increase more in the current period—a concept known as backloading.
– Backloading, however, may lead to a problem with the credibility of the deficit reduction program—leaving most of the reduction for the future, not the present.
– The government must play a delicate balancing act: enough cuts in the current period to show a commitment to deficit reduction and enough cuts left to the future to reduce the adverse effects on the economy in the short run.

- To summarize, the change in output as a result of deficit reduction depends on:
  - The credibility of the program
  - The timing of the program
  - The composition of the program
  - The state of government finances in the first place.