WHAT YOU WILL LEARN IN THIS CHAPTER

- What the **money demand curve** is
- Why the **liquidity preference model** determines the interest rate in the short run
- How the Federal Reserve can implement monetary policy moving the interest rate to affect aggregate output
- Why monetary policy is the main tool for stabilizing the economy
WHAT YOU WILL LEARN IN THIS CHAPTER

- How the behavior of the Federal Reserve compares to that of other central banks
- Why economists believe in monetary neutrality — that monetary policy affects only the price level, not aggregate output, in the long run
The Demand for Money

The Opportunity Cost of Holding Money

- **Short-term interest rates** are the interest rates on financial assets that mature within six months or less.

- **Long-term interest rates** are interest rates on financial assets that mature a number of years in the future.
## The Demand for Money

### Interest Rates and the Opportunity Cost of Holding Money

<table>
<thead>
<tr>
<th></th>
<th>June 2007</th>
<th>June 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal funds rate</td>
<td>5.25%</td>
<td>2.00%</td>
</tr>
<tr>
<td>One-month certificates of deposit (CD)</td>
<td>5.30</td>
<td>2.50</td>
</tr>
<tr>
<td>Interest-bearing demand deposits</td>
<td>2.773</td>
<td>1.353</td>
</tr>
<tr>
<td>Currency</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>CDs minus interest-bearing demand deposits</strong></td>
<td><strong>2.527</strong></td>
<td><strong>1.147</strong></td>
</tr>
<tr>
<td><strong>CDs minus currency</strong></td>
<td><strong>5.30</strong></td>
<td><strong>2.50</strong></td>
</tr>
</tbody>
</table>
Fear and Interest Rates

- Treasury bills generally pay a slightly lower interest rate than other short-term assets in normal times.
- In the third week of October 2008, one-month CDs were paying 4.04% interest, but one-month Treasury bills were paying only 0.26%.
- The reason: fear. A sharp plunge in housing prices had led to big losses at a number of financial institutions, leaving investors nervous about the safety of many non-government assets.
- On December 10, 2008, in fact, three-month Treasury bills paid 0% interest for a brief period.
The Money Demand Curve

- The money demand curve shows the relationship between the quantity of money demanded and the interest rate.
The Money Demand Curve

Interest rate, $r$

Quantity of money

Money demand curve, $MD$
Shifts of the Real Money Demand Curve

- Changes in Aggregate Price Level
- Changes in Real GDP
- Changes in Technology
- Changes in Institutions
Increases and Decreases in the Demand for Money

A fall in money demand shifts the money demand curve to the left.

A rise in money demand shifts the money demand curve to the right.
A Yen for Cash

- Japan, say financial experts, is still a “cash society.” Why?
- One reason the Japanese use cash so much is that their institutions never made the switch to heavy reliance on plastic. For complex reasons, Japan's retail sector is still dominated by small mom-and-pop stores, which are reluctant to invest in credit card technology.
- Japan’s banks have also been slow about pushing transaction technology.
- But there’s another reason the Japanese hold so much cash: there’s little opportunity cost to doing so. Short-term interest rates in Japan have been below 1% since the mid-1990s. It also helps that the Japanese crime rate is quite low, so you are unlikely to have your wallet full of cash stolen.
Money and Interest Rates

- According to the **liquidity preference model** of the interest rate, the interest rate is determined by the supply and demand for money.

- The **money supply curve** shows how the nominal quantity of money supplied varies with the interest rate.
Equilibrium in the Money Market

Interest rate, $r$

Money supply curve, $MS$

Equilibrium interest rate

Equilibrium

Money supply chosen by the Fed

Quantity of money
The Effect of an Increase in the Money Supply on the Interest Rate

An increase in the money supply . . .

. . . leads to a fall in the interest rate.

Quantity of money

Interest rate, $r$

$M_1$ $M_2$

$E_1$ $E_2$

$MS_1$ $MS_2$

$MD$

$r_1$ $r_2$
PITFALLS

The Target Versus the Market

- A common mistake is to imagine that these changes in the way the Federal Reserve operates alter the way the money market works.
- You’ll sometimes hear people say that the interest rate no longer reflects the supply and demand for money because the Fed sets the interest rate.
- In fact, the money market works the same way as always: the interest rate is determined by the supply and demand for money. The only difference is that now the Fed adjusts the supply of money to achieve its target interest rate.
- It’s important not to confuse a change in the Fed’s operating procedure with a change in the way the economy works.
Setting the Federal Funds Rate

Pushing the Interest Rate Down to the Target Rate

The target federal funds rate is the Federal Reserve's desired federal funds rate.

An open-market purchase ... drives the interest rate down.

Interest rate, $r$

Quantity of money

$M_1 \rightarrow M_2$

$E_1 \rightarrow E_2$

$T$
Setting the Federal Funds Rate

Pushing the Interest Rate Up to the Target Rate

... drives the interest rate up.

An open-market sale ...

Interest rate, $r$

Quantity of money

$E_2$  $E_1$

$M_1$  $M_2$
Long-Term Interest Rates

- Long-term interest rates don’t necessarily move with short-term interest rates.
- If investors expect short-term interest rates to rise, investors may buy short-term bonds.
- In practice, long-term interest rates reflect the average expectation in the market about what’s going to happen to short-term rates in the future.
The Fed Reverses Course

- On August 7, 2007, the Federal Open Market Committee decided to stand pat, making no change in its interest rate policy.
- On September 18, the Fed cut the target federal funds rate “to help forestall some of the adverse effects on the broader economy that might otherwise arise from the disruptions in financial markets.”
- This was only the first of several cuts. Given the increases in interest rates prior to 2007, this was a reversal of previous policy: previously the Fed had generally been raising rates, not reducing them, out of concern that inflation might become a problem (more on that later in this chapter).
- Starting in September 2007, fighting the financial crisis took priority.
The Fed Reverses Course

Effective federal funds rate

Target federal funds rate

Year
Monetary Policy and Aggregate Demand

- **Expansionary monetary policy** is monetary policy that increases aggregate demand.
- **Contractionary monetary policy** is monetary policy that reduces aggregate demand.
Monetary Policy and Aggregate Demand

(a) Expansionary Monetary Policy

(b) Contractionary Monetary Policy
Expansionary and Contractionary Monetary Policy in the Income-Expenditure Model

(a) Expansionary Monetary Policy

(b) Contractionary Monetary Policy

Planned aggregate spending

45-degree line

Real GDP

\[ Y_1 \rightarrow Y_2 \]

\[ AE_1 \]

\[ AE_2 \]

\[ Y_1 \rightarrow Y_2 \]

\[ AE_1 \]

\[ AE_2 \]
Tracking Monetary Policy

(a) Output Gap vs. Federal Funds Rate

- Output gap
- Federal funds rate

Year:
- 1985
- 1990
- 1995
- 2000
- 2005
- 2008

Federal funds rate:
- 12%
- 10%
- 8%
- 6%
- 4%
- 2%
- 0%
- -2%
- -4%
- -6%
- -8%
- -10%
- -12%

Output gap:
- 4%
Tracking Monetary Policy

(c) The Taylor Rule

Federal funds rate

Federal funds rate (Taylor rule)

Year


12%  10%  8%  6%  4%  2%
Inflation Targeting

- **Inflation targeting** occurs when the central bank sets an explicit target for the inflation rate and sets monetary policy in order to hit that target.
Inflation Targets

The diagram illustrates the target inflation rates for different countries, including New Zealand, Canada, Sweden, Britain, and Norway.
What the Fed Wants, the Fed Gets

- Contractionary monetary policy is sometimes used to eliminate inflation that has become *embedded* in the economy.

- In this case, the Fed needs to create a recessionary gap—not just eliminate an inflationary gap—to wring embedded inflation out of the economy.

- In four out of the five cases that Christina Romer and David Romer examined, the decision to contract the economy was followed, after a modest lag, by a rise in the unemployment rate.

- On average, they found that the unemployment rate rises by 2 percentage points after the Fed decides that unemployment needs to go up.

- So, the Fed gets what it wants.
When the Fed Wants a Recession

![Graph showing unemployment rate from 1952 to 1984 with vertical lines indicating recession periods.](image-url)
An increase in the money supply reduces the interest rate and increases aggregate demand.

... but the eventual rise in nominal wages leads to a fall in short-run aggregate supply and aggregate output falls back to potential output.
Monetary Neutrality

- In the long run, changes in the money supply affect the aggregate price level but not real GDP or the interest rate.

- In fact, there is monetary neutrality: changes in the money supply have no real effect on the economy. So monetary policy is ineffectual in the long run.
An increase in the money supply lowers the interest rate in the short run . . .

. . . but in the long run higher prices lead to greater money demand, raising the interest rate to its original level.
International Evidence of Monetary Neutrality

- All of the major central banks try to keep the aggregate price level roughly stable.

- However, if we look at a longer period and a wider group of countries, we see large differences in the growth of the money supply. Between 1970 and the present, the money supply rose only a few percent per year in some countries.

- The figure on the next slide shows the annual percentage increases in the money supply and average annual increases in the aggregate price.

- The scatter of points clearly lies close to a 45-degree line, showing a more or less proportional relationship between money and the aggregate price level.

- The data support the concept of monetary neutrality in the long run.
ECONOMICS IN ACTION

The Long-Run Relationship Between Money and Inflation

Average annual increase in price level

Average annual increase in money supply

United States
Canada
Switzerland
Japan
Europe
South Africa
Korea
India
Iceland
1. The **money demand curve** arises from a trade-off between the opportunity cost of holding money and the liquidity that money provides. The opportunity cost of holding money depends on **short-term interest rates**, not **long-term interest rates**. Changes in the aggregate price level, real GDP, technology, and institutions shift the money demand curve.

2. According to the **liquidity preference model of the interest rate**, the interest rate is determined in the money market by the money demand curve and the **money supply curve**. The Federal Reserve can change the interest rate in the short run by shifting the money supply curve. In practice, the Fed uses open-market operations to achieve a **target federal funds rate**, which other short-term interest rates generally track.
3. **Expansionary monetary policy** reduces the interest rate by increasing the money supply. This increases investment spending and consumer spending, which in turn increases aggregate demand and real GDP in the short run. **Contractionary monetary policy** raises the interest rate by reducing the money supply. This reduces investment spending and consumer spending, which in turn reduces aggregate demand and real GDP in the short run.
4. The Federal Reserve and other central banks try to stabilize the economy, limiting fluctuations of actual output around potential output, while also keeping inflation low but positive. Under the **Taylor rule for monetary policy**, the target interest rate rises when there is inflation, or a positive output gap, or both; the target interest rate falls when inflation is low or negative, or when the output gap is negative, or both. Some central banks engage in **inflation targeting**, which is a forward-looking policy rule, whereas the Taylor rule is a backward-looking policy rule. In practice, the Fed appears to operate on a loosely defined version of the Taylor rule. Because monetary policy is subject to fewer implementation lags than fiscal policy, it is the preferred policy tool for stabilizing the economy.
5. In the long run, changes in the money supply affect the aggregate price level but not real GDP or the interest rate. Data show that the concept of monetary neutrality holds: changes in the money supply have no real effect on the economy in the long run.
The End of Chapter 15

coming attraction:  
Chapter 16:  
Inflation, Disinflation and Deflation