

# Chapter 15: Monetary Policy

Yulei Luo

SEF of HKU

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## Learning Objectives

1. Define monetary policy and describe the Federal Reserve's monetary policy goals.
2. Describe the Federal Reserve's monetary policy targets and explain how expansionary and contractionary monetary policies affect the interest rate.
3. Use aggregate demand and aggregate supply graphs to show the effects of monetary policy on real GDP and the price level.
4. Discuss the Fed's setting of monetary policy targets.
5. Discuss the policies the Federal Reserve used during the 2007 – 2009 recession.

# What Is Monetary Policy?

- ▶ *Monetary policy*: The actions *the Federal Reserve* takes to manage *the money supply* and *interest rates* to pursue its *economic objectives*.
- ▶ The Goals of Monetary Policy:
  1. Price stability
  2. High employment
  3. Stability of financial markets and institutions
  4. Economic growth

1. *Price stability*: Rising prices erode the value of money as a medium of exchange and a store of value. Three Fed chairmen, Volcker, Greenspan, and Bernanke, argued that if inflation is low over the long-run, the Fed will have the flexibility it needs to lessen the impact of recessions.
2. *High unemployment*: Unemployed workers and underused factories and buildings reduce GDP below its potential level. Unemployment causes financial distress as well as some social problems. The goal of high employment extends beyond the Fed to other branches of the federal government.

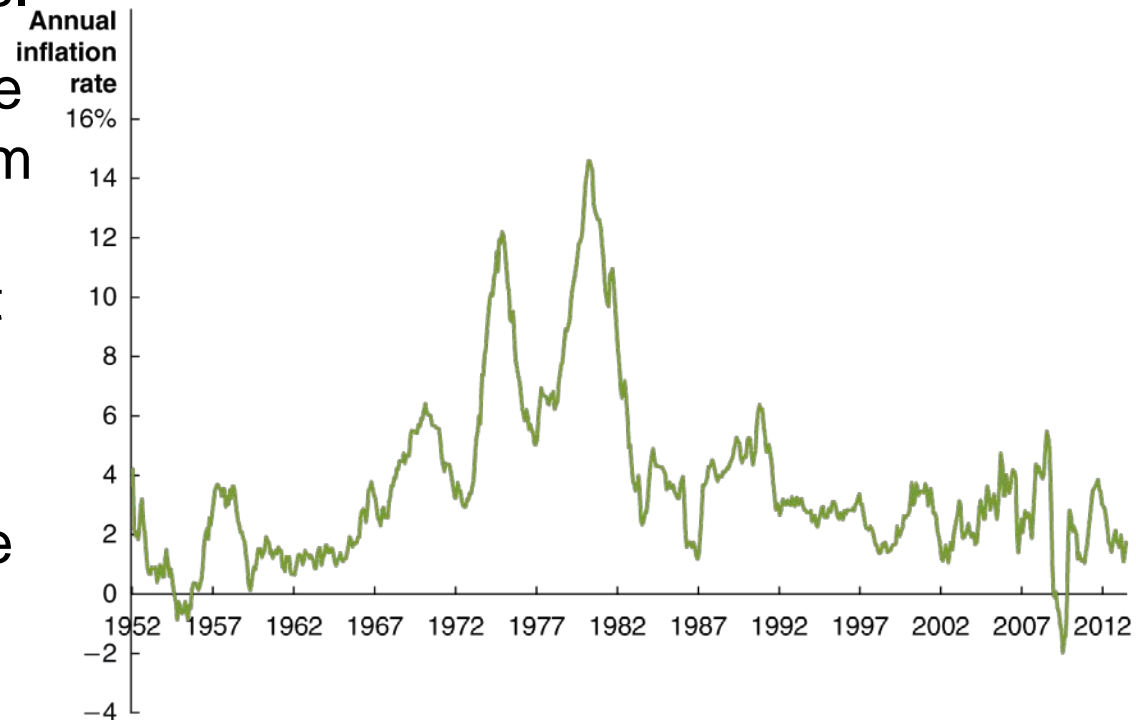
# Fed Goal #1: Price Stability

The figure shows CPI inflation in the United States.

Since rising prices erode the value of money as a medium of exchange and a store of value, policymakers in most countries pursue price stability as a primary goal.

After the high inflation of the 1970s, then Fed chairman Paul Volcker made fighting inflation his top policy goal.

To this day, price stability remains a key policy goal of the Fed.



**Figure 15.1**

The inflation rate, January 1952-June 2013

1. (Conti.) *Stability of financial markets and institutions*: When financial markets and institutions are not efficient in matching savers and borrowers, resources are lost. The 2007 – 2009 financial crisis brought this issue to the forefront. To ease liquidity problems facing investment banks unable to obtain short-term loans in 2008, the Fed temporarily allowed them to receive discount loans.
2. *Economic growth*: Policymakers aim to encourage stable EG because stable growth allows HHs and firms to plan accurately and encourages the long-run investment that is needed to sustain growth. EG is key to raising standard of living. Policy can spur EG by providing incentives for savings and investment.

# Monetary Policy Targets

- ▶ MP targets can be achieved by using its policy tools (three tools).
- ▶ Sometimes, the Fed can achieve multiple goals successfully: it can take actions that increase both employment and economic growth because both are closely related.
- ▶ At other times, the Fed encounters conflicts bw its policy goals. E.g., increasing interest rates can reduce the inflation rate but reduce EG (by reducing HHs and firms' spending). In this case, many economists support that the Fed should focus mainly on *achieving price stability*.

- ▶ (Conti.) The Fed can't affect both the unemployment and inflation rates *directly*. Instead, it uses *monetary policy targets*, that it can affect *directly* and that, in turn, affect variables that are closely related to the Fed's policy *goals* (e.g. real GDP and the PL).
- ▶ The two *monetary policy targets* are:
  1. the money supply
  2. the interest rate.
- ▶ During normal times, the Fed typically uses the interest rate as its policy target.
- ▶ The Fed was forced to develop new policy tools during the recession of 2007 – 2009.



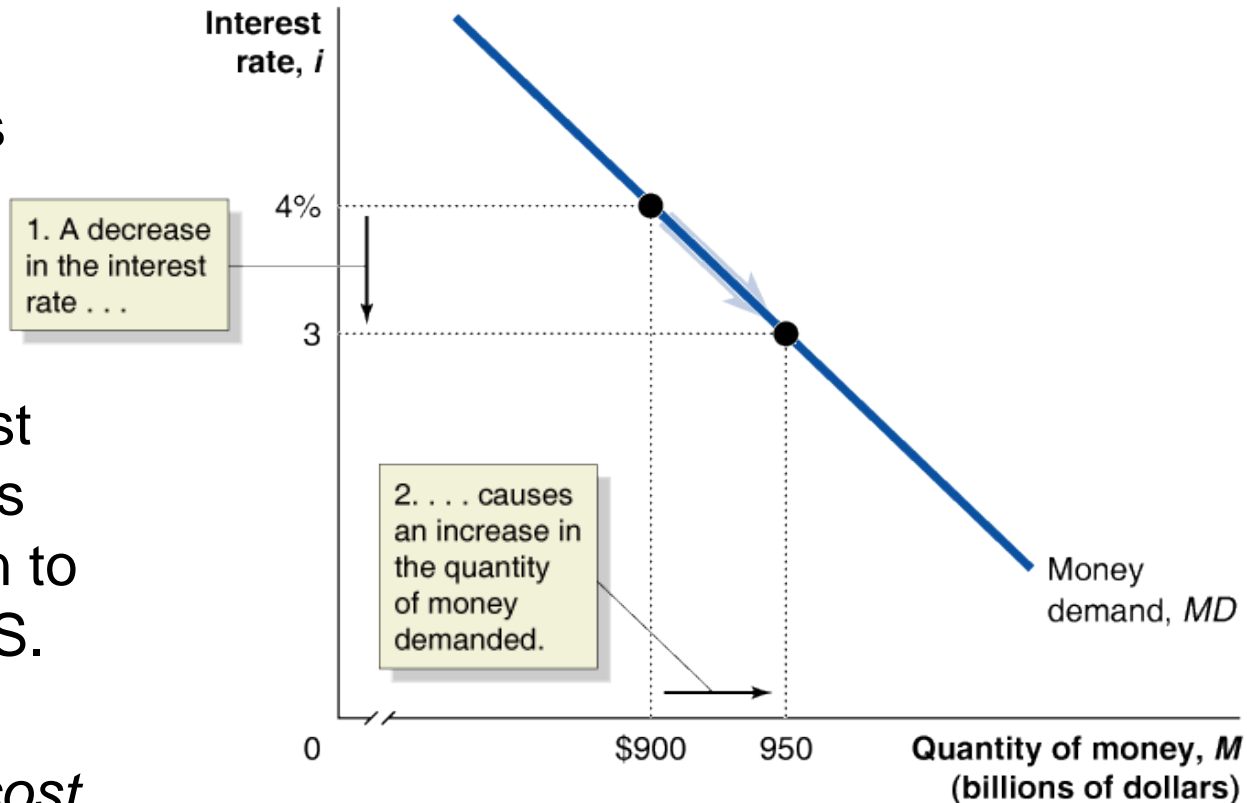
# The Demand for Money

The Fed's two monetary policy targets are related in an important way:

- Higher interest rates result in a lower quantity of money demanded.

Why? When the interest rate is high, alternatives to holding money begin to look attractive—like U.S. Treasury bills.

- So the *opportunity cost* of holding money is higher when the interest rate is high.



**Figure 15.2** The demand for money

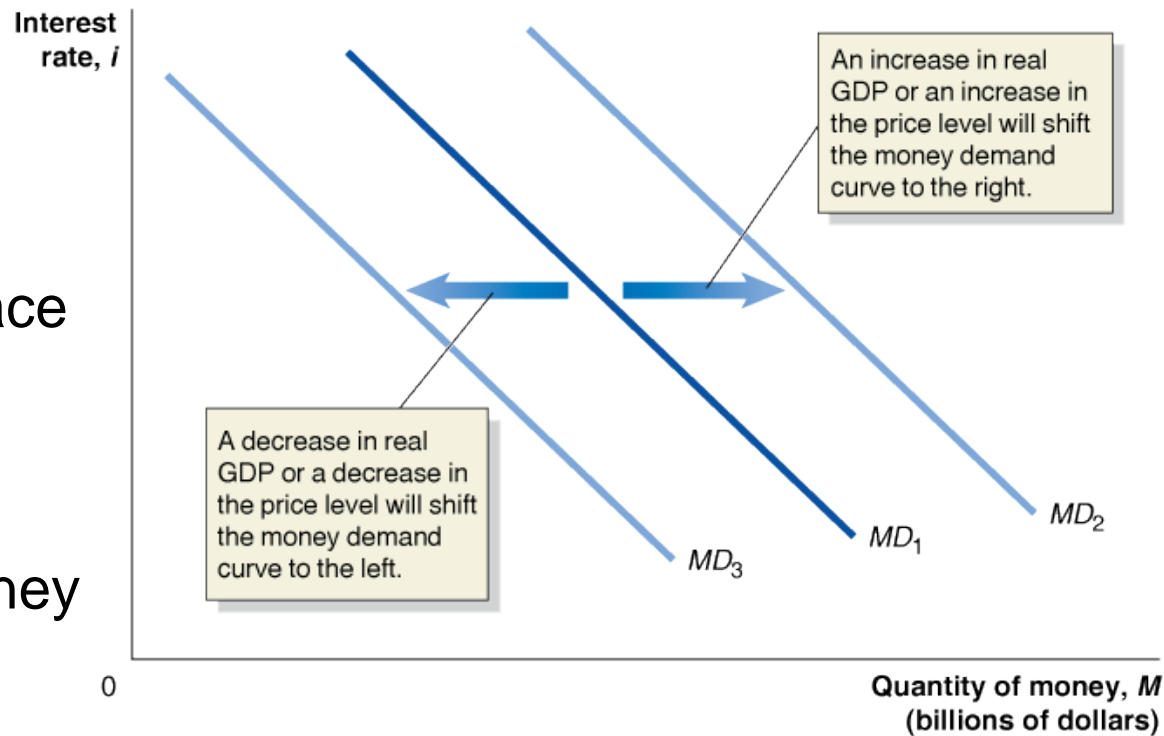
# Shifts in the Money Demand Curve

What could cause the money demand curve to shift?

- A change in the *need* to hold money, to engage in transactions.

For example, if more transactions are taking place (higher real GDP) or more money is needed for each transaction (higher price level), the demand for money will be higher.

Decreases in real GDP or the price level decrease money demand.



**Figure 15.3**

Shifts in the money demand curve

# Equilibrium in the Money Market

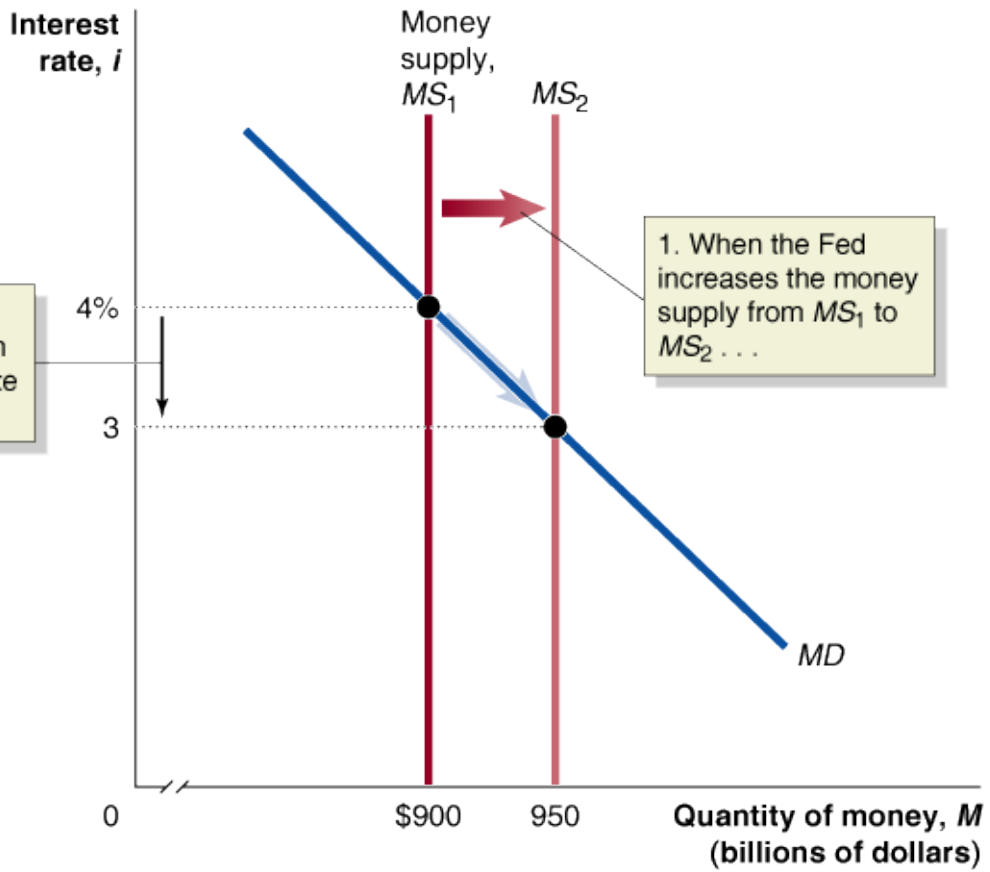
For simplicity, we assume the Fed can completely control the money supply.

- Then the money supply curve is a vertical line—it does not depend on the interest rate.

Equilibrium occurs in the money market where the two curves cross.

*When the Fed increases the money supply, the short-term interest rate must fall until it reaches a level at which households and firms are willing to hold the additional money.*

2. . . . the equilibrium interest rate falls.

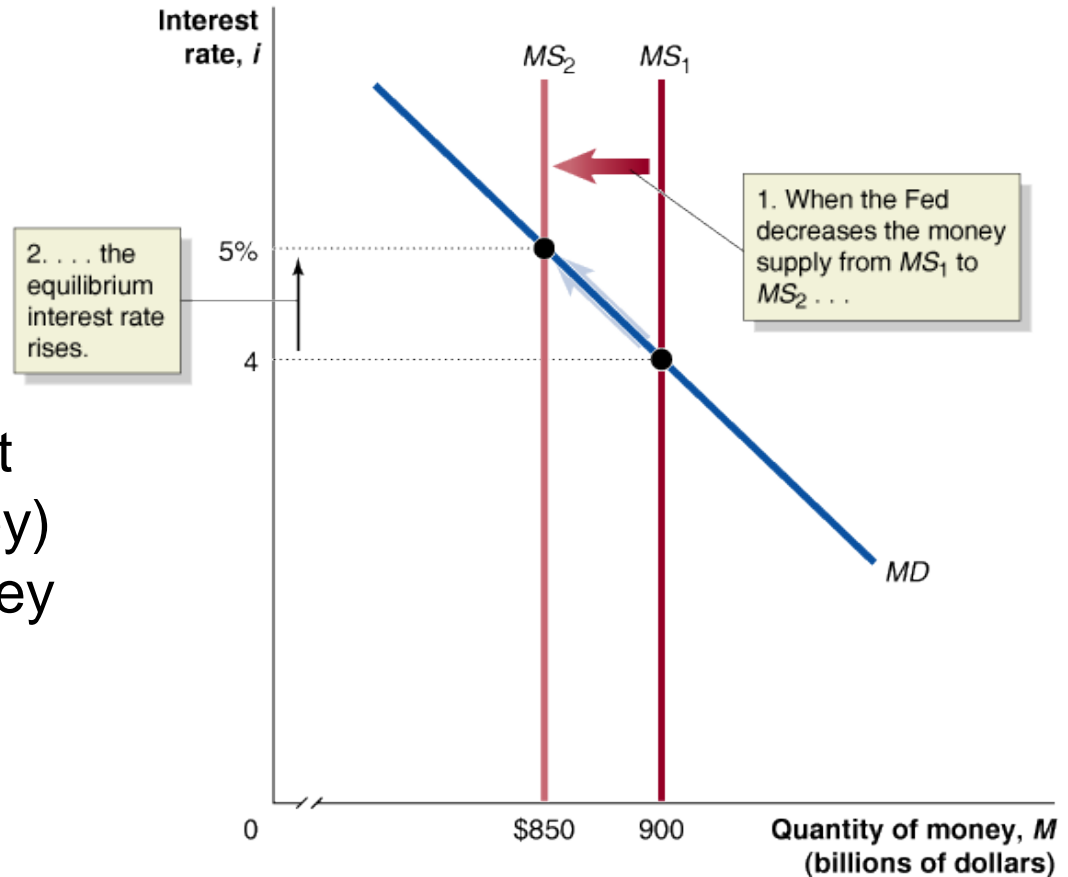


**Figure 15.4** The effect on the interest rate when the Fed increases the money supply

# Equilibrium in the Money Market

Alternatively, the Fed may decide to lower the money supply, by selling Treasury securities.

- Now firms and households (who bought the securities with money) hold less money than they want, relative to other financial assets.
- In order to retain depositors, banks are forced to offer a higher interest rate on interest-bearing accounts.



**Figure 15.5**

The effect on the interest rate when the Fed decreases the money supply

# The Relationship between Treasury Bill Prices and Their Interest Rates

- ▶ What is the price of a Treasury bill that pays \$1,000 in one year, if its interest rate is 4%? What is the price of the Treasury bill if its interest rate is 5%?

$$\frac{1000 - p}{p} = 4\%$$

# A Tale of Two Interest Rates

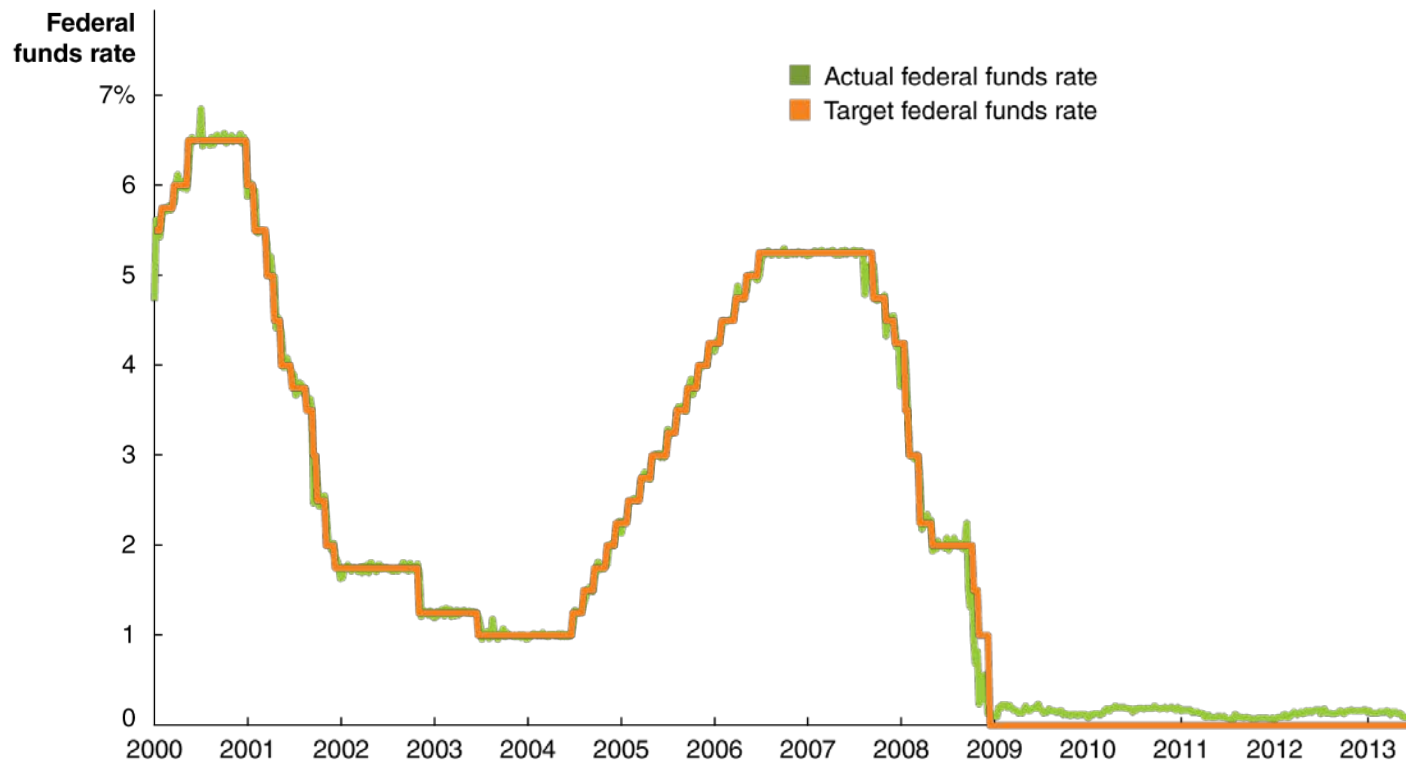
- ▶ Why do we need two models of the interest rate (the *loanable funds* model and the *money market* model)?
  - ▶ The loanable funds model is concerned with *the long-term real rate of interest*,
  - ▶ The money-market model is concerned with *the short-term nominal rate of interest*.
- ▶ The long-term real rate of interest is the interest rate that is most relevant when:
  - ▶ Savers consider purchasing a long-term financial investment.
  - ▶ Firms borrow to finance long-term investment projects.
  - ▶ Households take out mortgage loans
- ▶ Choosing a Monetary Policy Target
  - ▶ There are many different interest rates in the economy.
  - ▶ For purposes of monetary policy, the Fed has targeted the interest rate known as *the federal funds rate*.

- ▶ Choosing a Monetary Policy Target
  - ▶ There are many different IRs in the economy.
  - ▶ For purposes of MP, the Fed has targeted the interest rate known as *the federal funds rate*.
- ▶ *Federal funds rate*: The interest rate banks charge each other for overnight loans. It is NOT set by the Fed. Instead, it is determined by the supply of reserves relative to the demand for them.
- ▶ The money market model determines *the short-term nominal IR*. The rate is most relevant when conducting MP because it is the rate most affected by increases and decreases in the MS.
- ▶ These two rates are closely related: When the Fed takes actions to increase the short-term nominal IR, the long-term real rate will also increase.
- ▶ The Fed chooses *the MS or the IR* as its MP target.

- ▶ (Conti.) The Fed has generally focused more on the IR than on the MS. In 1993, Greenspan informed the U.S. congress that the Fed would cease using M1 or M2 targets to guide the conduct of MP.
- ▶ Banks receive no interest on their reserves, so they have an incentive to invest reserves above the RR. Banks that need additional reserves can borrow in *the federal funds market* from banks that have reserves available.
- ▶ The Fed can increase or decrease bank reserve by OMOs, and then can come very close to hitting the target rate.
- ▶ Note that the FFR is NOT directly relevant for HHs and firms.



# Federal Funds Rate Targeting



**Figure 15.6**  
Federal funds rate targeting, January 2000- July 2013

Although it does not directly set the federal funds rate, through open market operations the Fed can control it quite well.

From December 2008, the target federal funds rate was 0-0.25%.

- The low federal funds rate was designed to encourage banks to make loans instead of holding excess reserves, which banks were holding at unusually high levels.

## How Interest Rates Affect Aggregate Demand

- ▶ The FFR is a short-term nominal IR, the Fed sometimes has difficulty affecting long-term real IR. Nevertheless, we just *assume* that the Fed is able to use OMOs to affect the long-term real IR.
- ▶ Changes in IRs will not affect Gov. purchases, but they will affect the other three components of AD:
  1. Consumption: Lower IRs lower the cost of durable goods and reduce the return to saving, leading HHs to save less and spend more. Higher interest rates raise the cost of consumer durables and increase the return to saving, leading HHs to save more and spend less.



1. (Conti.) Investment: New houses and investment goods; in addition, lower IRs can increase investment through their impact on stock prices. As IRs decline, stocks become more attractive and the increase in demand raises their prices. Firms then have incentives to issue more shares of equity and acquire more funds to increase investment.
2. Net exports: If the IRs in the U.S. rise relative to IRs in other countries, investing in US financial assets become more desirable, which increases the demand for the dollar and then increases the value of the dollar. Consequently, NEs reduce.

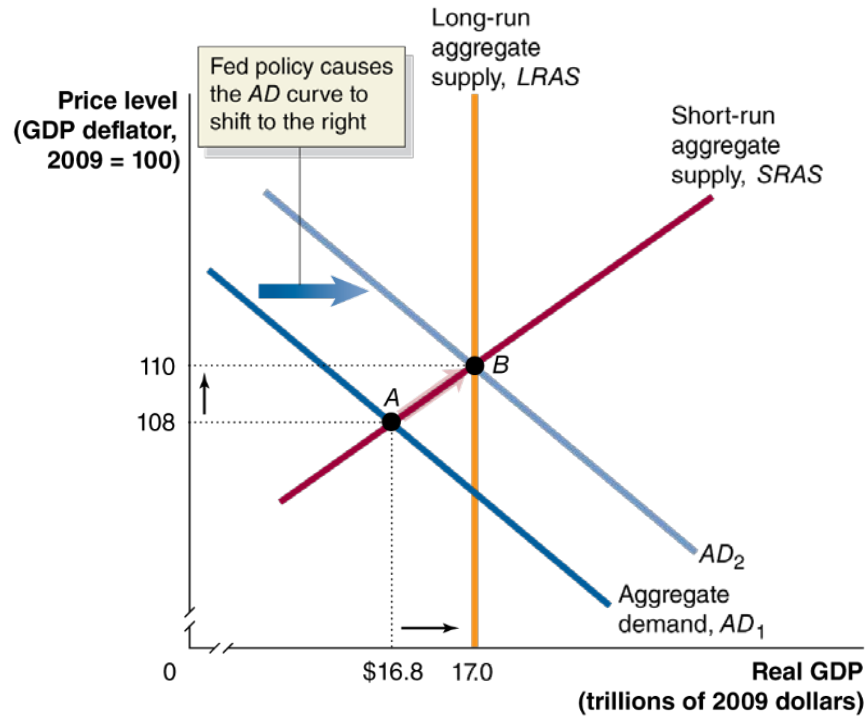
# The Effects of MP on Real GDP and the PL: An Initial Look

- ▶ *Expansionary monetary policy*: The Federal Reserve's increasing the money supply and decreasing interest rates to increase real GDP.
- ▶ *Contractionary monetary policy*: The Federal Reserve's adjusting the money supply to increase interest rates to reduce inflation.
- ▶ Contractionary MP is also known as a *tight* MP. An expansionary MP is also known as a *loose* MP.

# Expansionary Monetary Policy in the AD-AS Model

The Fed conducts **expansionary monetary policy** when it takes actions to decrease interest rates to increase real GDP.

- This works because decreases in interest rates raise consumption, investment, *and* net exports.



(a) Expansionary monetary policy

**Figure 15.7a** Monetary policy

The Fed would take this action when short-run equilibrium real GDP was below potential real GDP.

- The increase in aggregate demand encourages increased employment, one of the Fed's primary goals.

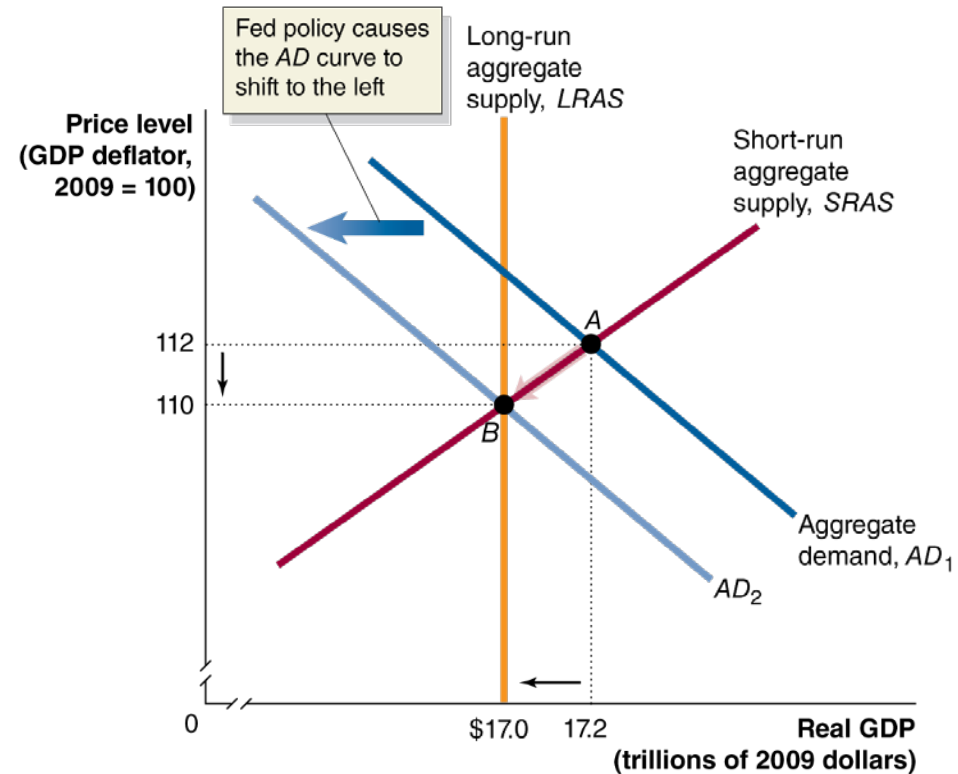
# Contractionary Monetary Policy in the AD-AS Model

Sometimes the economy may be producing *above* potential GDP.

- In that case, the Fed may perform **contractionary monetary policy**: increasing interest rates to reduce inflation.

Why would the Fed intentionally reduce real GDP?

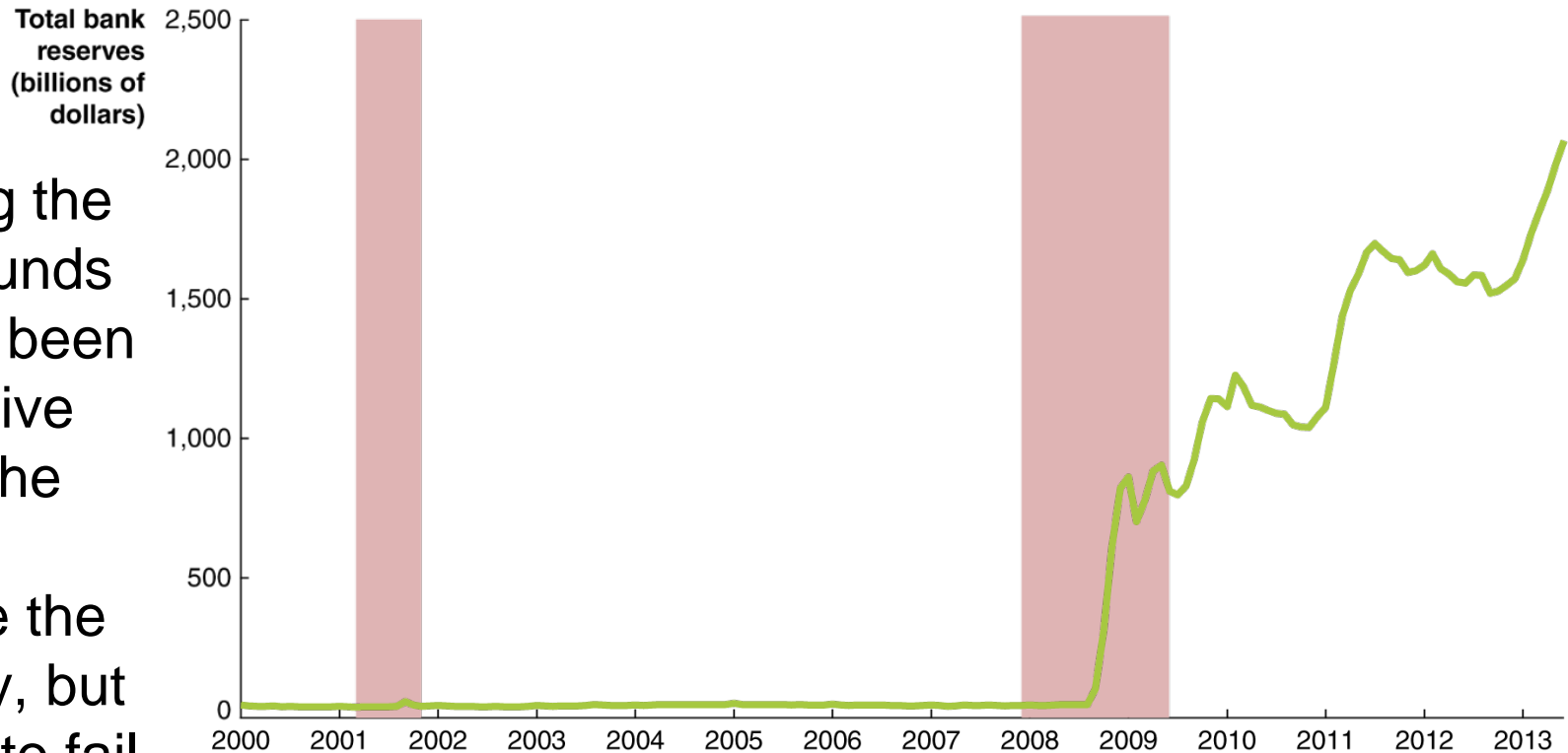
- The Fed is mostly concerned with *long-run* growth. If it determines that inflation is a danger to long-run growth, it can contract the money supply in order to discourage inflation, i.e. encouraging *price stability*.



(b) Contractionary monetary policy

**Figure 15.7b** Monetary policy

Adjusting the federal funds rate had been an effective way for the Fed to stimulate the economy, but it began to fail in 2008.



Banks did not believe there were good loans to be made, so they refused to lend out reserves, despite the federal funds rate being maintained at zero. This is known as a *liquidity trap*: the Fed was unable to push rates any lower to encourage investment.

But the Fed was certain the economy was below potential GDP, so it wanted to stimulate demand. It performed:

- Quantitative easing: buying securities *beyond* the normal short-term Treasury securities, including 10-year Treasury notes and mortgage-backed securities. Ended June 2010.
- More quantitative easing (QE2 and QE3): started November 2010; similar actions, planned to continue “at least through 2015”.
- “Operation Twist”: purchasing long-term Treasury securities, and selling an equal amount of shorter-term securities, designed to decrease long-term interest rates, stimulating aggregate demand. Performed September 2011 onward.



## The Expansionary Monetary Policy

- ▶ *The LR AS curve* shifts to the right because over time capital and labor increase. Technological progress also occurs.
- ▶ These factors also result in firms supply more G&S at any given PL in the SR. *The SR AS curve* also shifts to the right.
- ▶ *The AD curve* will also shift the right: As population grows and income rise, C, I, and G all increase over time. However, sometimes AD doesn't increase enough to keep the economy at potential GDP (E.g., reduction in C and I due to pessimism; reduction in G due to reducing the budget deficit).
- ▶ When the Fed economists anticipate that AD is not growing fast enough to allow the economy to remain at full employment, they present their findings to the FOMC, which decides whether a change in MP is needed.

## Can the Fed Eliminate Recessions?

- ▶ The Fed can manage to shift the AD curve to keep the economy continually at potential GDP. In reality, this objective is difficult for the Fed to achieve, as the length and severity of the 2007-2009 recession indicates.
- ▶ Instead, keeping recessions shorter and milder than they would otherwise be is usually the best the Fed can do.
- ▶ An example: Consider the 2001 recession and the Fed's actions. From Jan 2001 to Dec 2001, the FOMC continued to reduce the FFR from 6.5% to 1.75%. Consequently, the Fed reduced the severity of the 2001 recession successfully:
  - ▶ Real GDP declined only during two quarters in 2001; GDP was actually higher for 2001 than 2000;
  - ▶ HH purchases of consumer durables and new homes remained strong during 2001, etc.

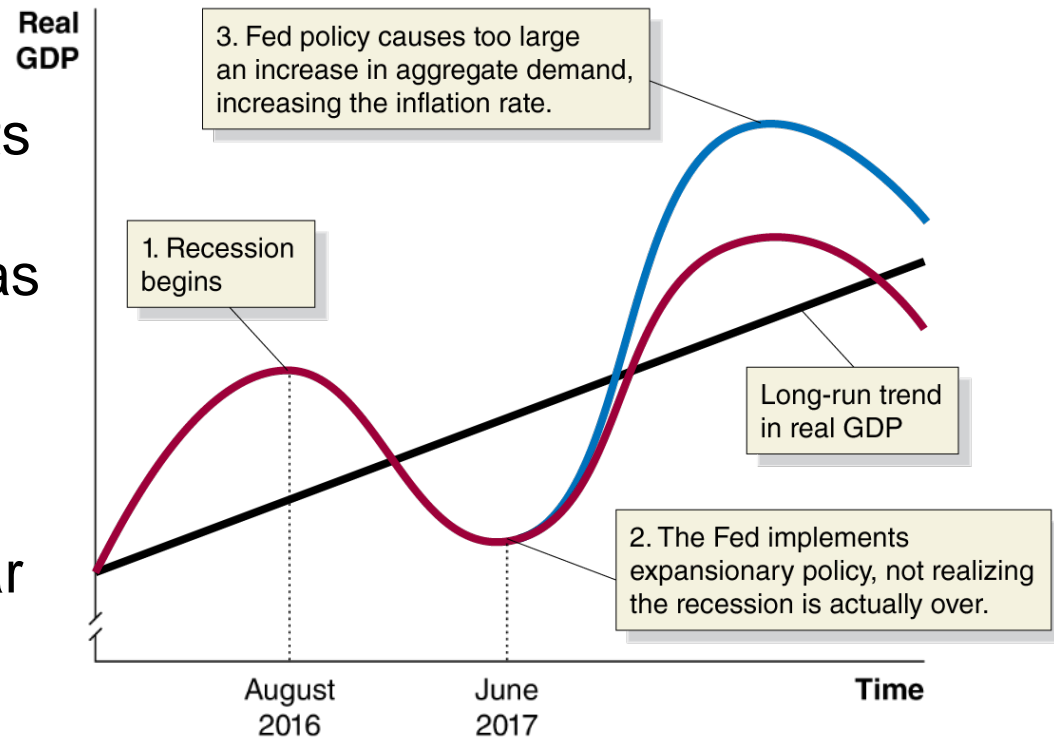
# Poorly-Timed Monetary Policy

Suppose a recession begins in August 2016.

- The Fed finds out about the recession with a lag.
- In June 2017, the Fed starts expansionary monetary policy, but the recession has already ended.

By keeping interest rates low for too long, the Fed encourages real GDP to go far beyond potential GDP. The result:

- High inflation
- The next recession will be more severe



**Figure 15.8**

The effect of a poorly timed monetary policy on the economy

# Fed Forecasts

The Fed tries to set policy according to what it *forecasts* the state of the economy will be in the future.

- Good policy requires accurate forecasts.

The forecasts of most economists in 2006/2007 did not anticipate the severity of the coming recession.

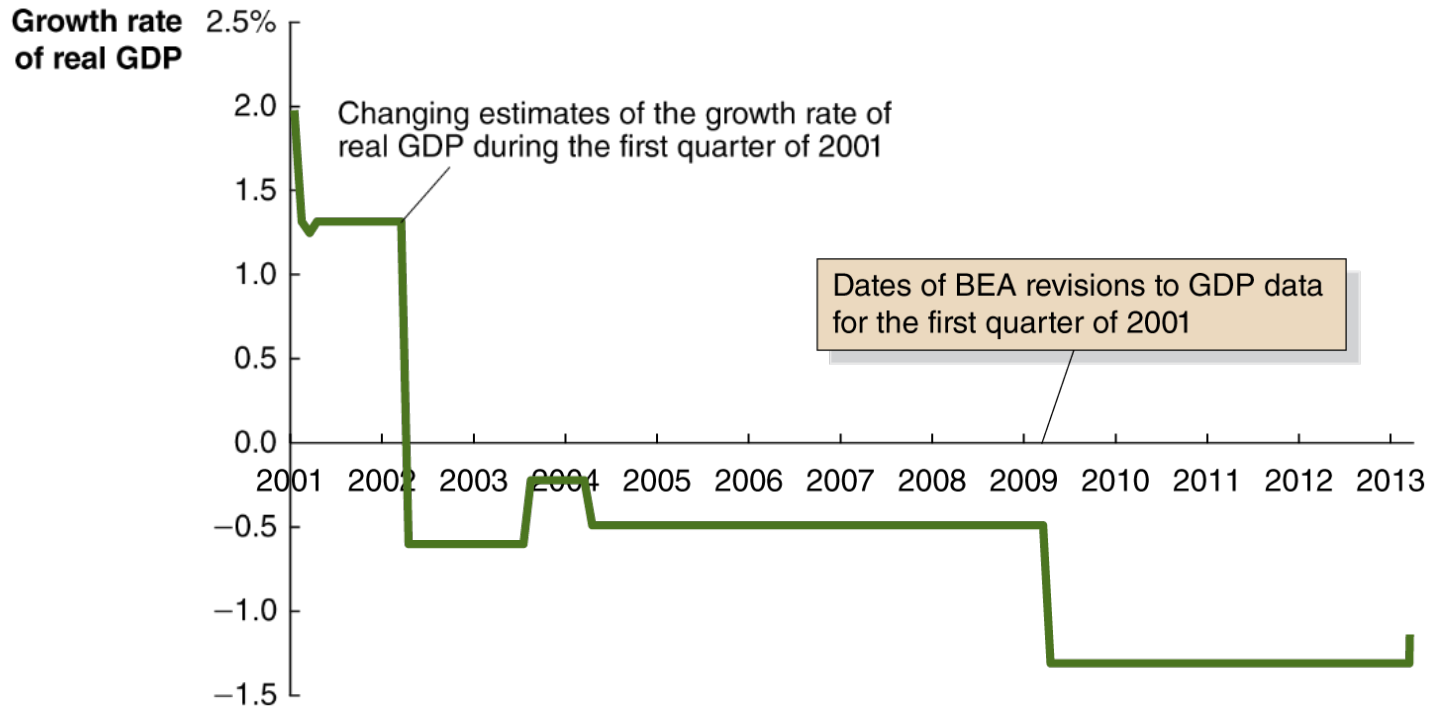
- So the Fed missed the opportunity to dampen the effects of the recession.

Date Forecast Was Made	Forecast Growth Rate		Actual Growth Rate	
	For 2007	For 2008	2007	2008
February 2006	3% to 4%	No forecast	1.8%	-0.3%
May 2006	2.5% to 3.25%	No forecast		
February 2007	2.25% to 3.25%	2.5% to 3.25%		
July 2007	No forecast	2.5% to 3.0%		

**Table 15.1**

Fed forecasts of real GDP growth during 2007 and 2008

# Trying to Hit a Moving Target



As if the Fed's job wasn't hard enough, it also has to deal with *changing estimates* of important economic variables.

- GDP from the first quarter of 2001 was initially estimated to have increased by 2.0%. But the estimate changed over time.
- Not only was it revised later in 2001, it was revised in 2002, 2003, 2004...and again in 2009... and in 2013!

# A Summary of How Monetary Policy Works

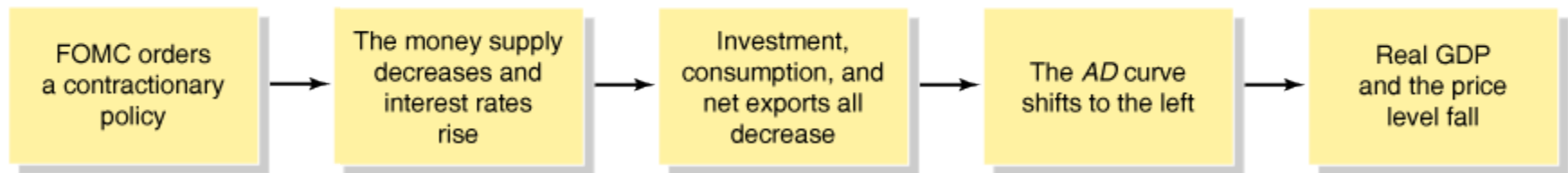


(a) An expansionary policy

a.k.a. “loose” or “easy”  
monetary policy

In each of these steps, the changes are relative to what would have happened without the monetary policy.

a.k.a. “tight”  
monetary policy



(b) A contractionary policy

**Table 15.2**

Expansionary and contractionary  
monetary policies

# Monetary Policy in the Dynamic AD-AS Model

We used the static AD-AS model initially for simplicity.

- But in reality, potential GDP increases every year (long-run growth), and the economy generally experiences inflation every year.

We can account for these in the *dynamic aggregate demand and aggregate supply model*. Recall that this features:

- Annual increases in long-run aggregate supply (potential GDP)
- Typically, larger annual increases in aggregate demand
- Typically, smaller annual increases in short-run aggregate supply
- Typically, therefore, annual increases in the price level

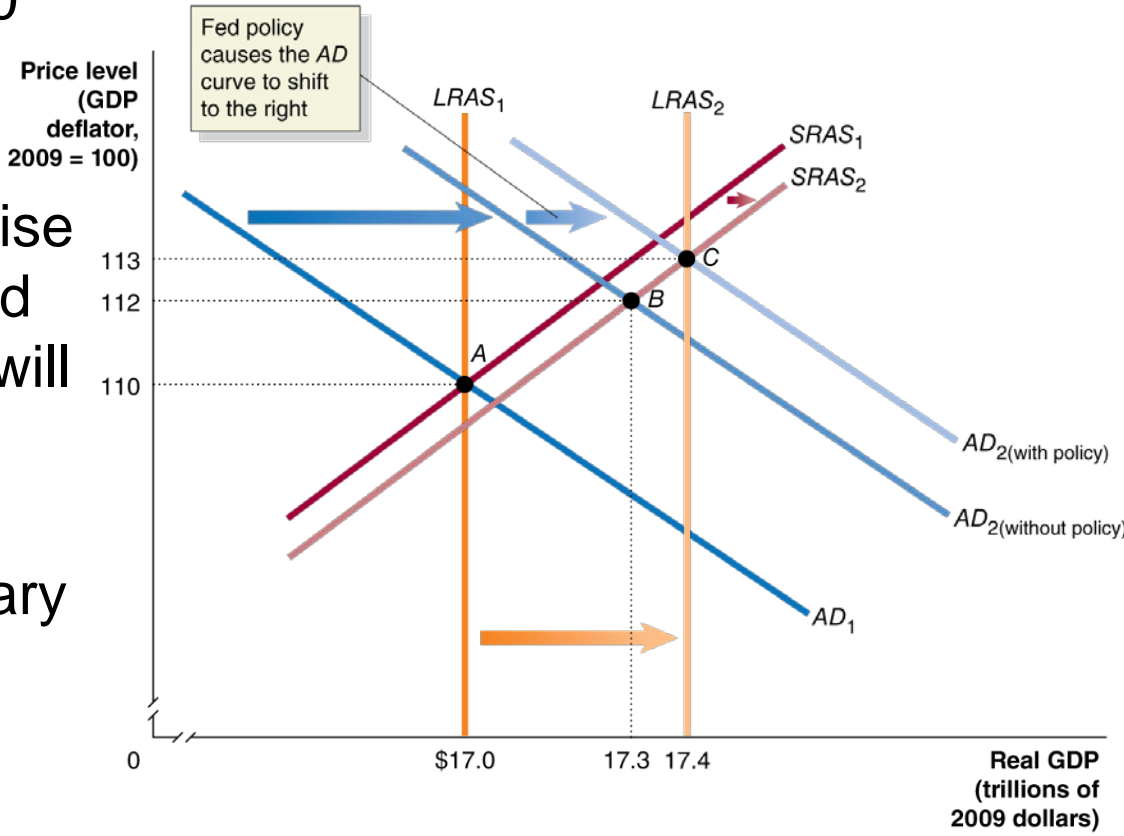
# Expansionary Monetary Policy in the Dynamic Model

In period 1, the economy is in long-run equilibrium at \$17.0 trillion.

The Fed forecasts that aggregate demand will not rise fast enough, so that in period 2, the short-run equilibrium will fall below potential GDP, at \$17.3 trillion.

So the Fed uses expansionary monetary policy to increase aggregate demand.

The result: real GDP at its potential; and a higher level of inflation than would otherwise have occurred.



**Figure 15.9** An expansionary monetary policy

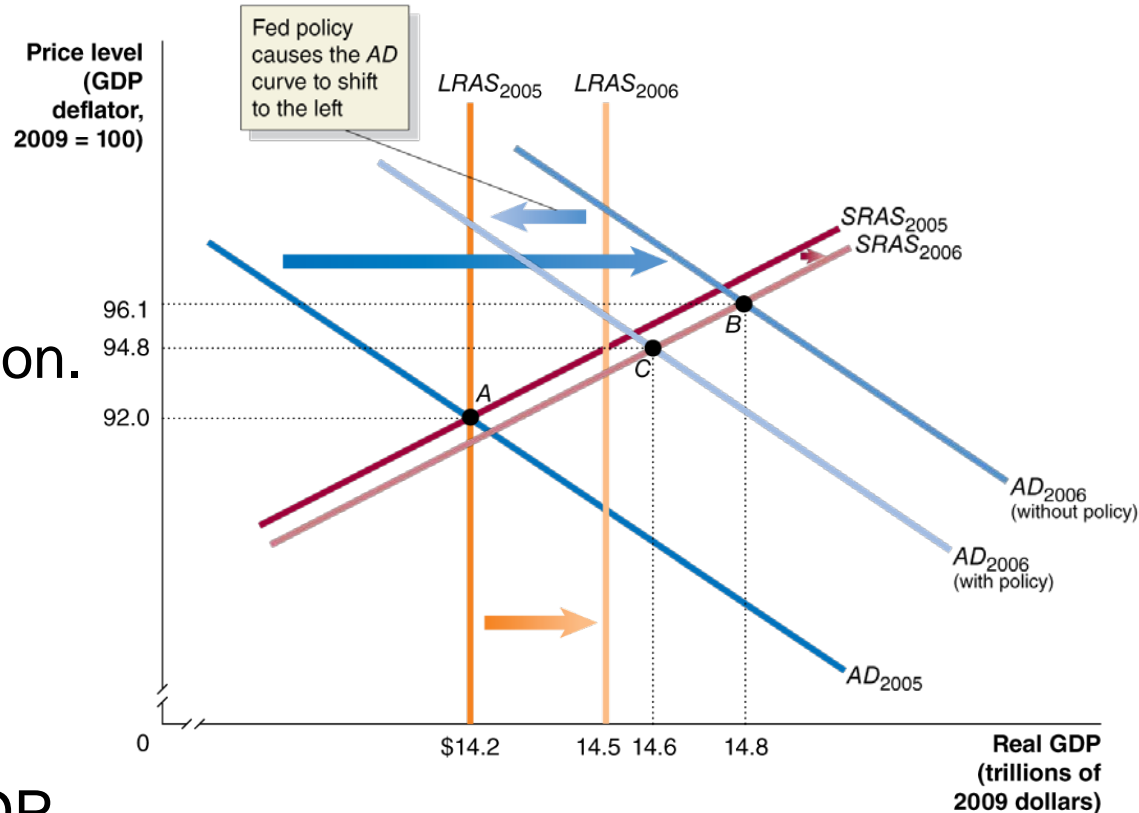


# Contractionary Monetary Policy in the Dynamic Model

In 2005, the Fed believed the economy was in long-run equilibrium.

In 2006, the Fed believed aggregate demand growth was going to be “too high”, resulting in excessive inflation.

- So the Fed raised the federal funds rate—a contractionary monetary policy, designed to decrease inflation.
- The result: lower real GDP and less inflation in 2006, than would otherwise have occurred.



**Figure 15.10** A contractionary monetary policy in 2006

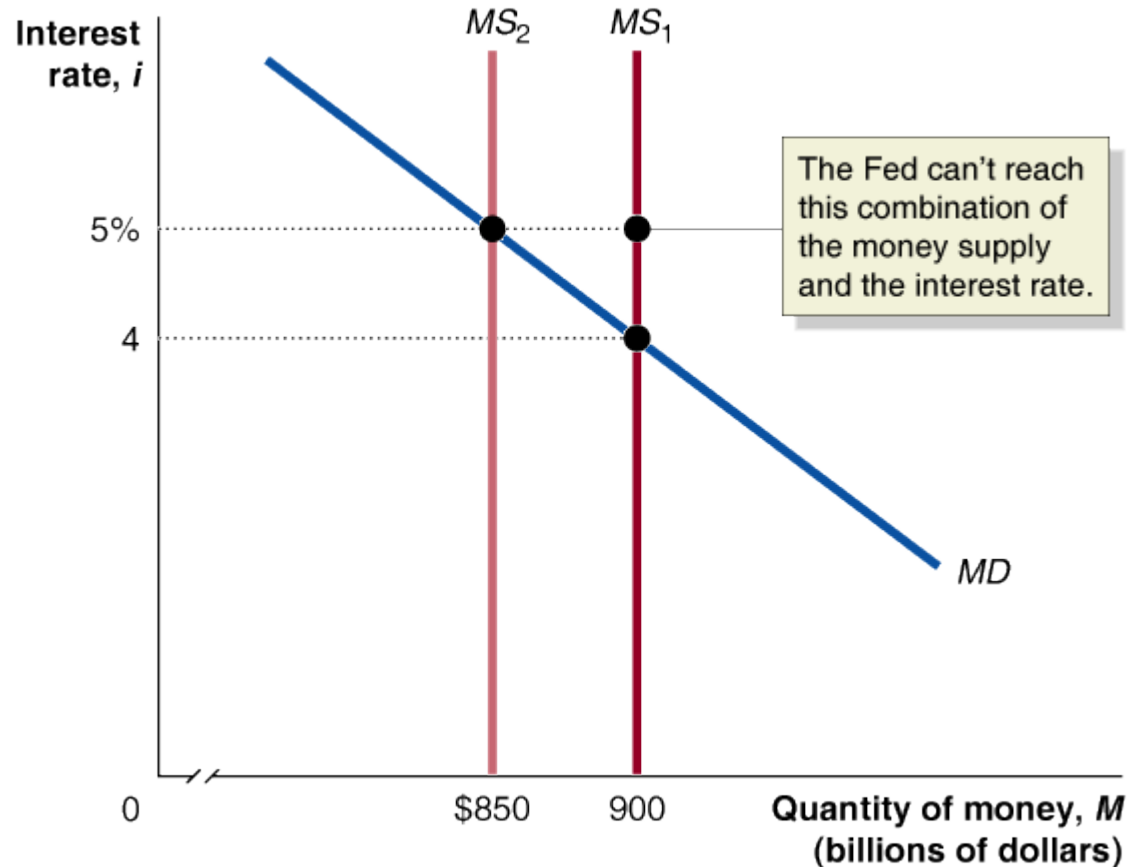
## Should the Fed Target the Money Supply?

- ▶ Some economists have argued that rather than use an IR as its monetary policy target, the Fed should use *the money supply*.
- ▶ Many of the economists who make this argument belong to *the monetarism school* (Milton Friedman). They favor a *monetary growth rule (MGR)*:
  - ▶ A plan for increasing the money supply at a constant rate that doesn't change i.r.t. economic conditions (recessions or expansions).
  - ▶ They have proposed a MGR of increasing MS at a rate equal to the long-run growth rate of real GDP, 3.5%.
- ▶ They believe that active MP destabilizes the economy, increasing the number of recessions and their severity.
- ▶ The relationship bw movements in MS and movements in real GDP and PL becomes weaker. The MGR is less attractive today.

# Why Not Do Both?

It might seem that the Fed could “get the best of both worlds” by targeting *both* interest rates and the money supply.

- But this is impossible: the two are linked through the money demand curve.
- So a decrease in the money supply will increase interest rates; an increase in the money supply will increase interest rates.

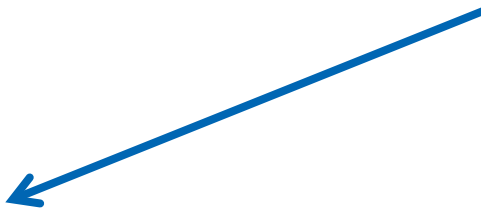


**Figure 15.11** The Fed can't target both the money supply and the interest rate

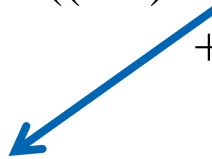
# The Taylor Rule

The **Taylor rule** is a rule developed by John Taylor of Stanford University, that links the Fed's target for the federal funds rate to economic variables. Taylor estimates that:


$$\begin{aligned} \text{Federal funds target rate} = & \text{Current inflation rate} \\ & + \text{Real equilibrium federal funds rate} \\ & + ((1/2) \times \text{Inflation gap}) \\ & + ((1/2) \times \text{Output gap}) \end{aligned}$$



Estimate of the inflation-adjusted federal funds rate that would be consistent with maintaining real GDP at its potential level in the long run.



Difference between current inflation and the Fed's target rate of inflation; could be positive or negative.



Difference between current real GDP and the potential GDP; could be positive or negative.

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The *weights* of (1/2) would be different if the Fed was more or less concerned about the inflation gap or the output gap.

The Taylor rule was a good predictor of the federal funds target rate during Alan Greenspan's tenure as Fed chairman (1987-2006); however during the mid-2000s, the actual federal funds rate was lower than the Taylor rule predicts.

- Some economists argue this led to excessive increases in spending on housing.

## How does the Fed choose a target for the FFR?

- ▶ *The Taylor rule:* A rule developed by John Taylor that links the Fed's target for the federal funds rate to macroeconomic variables.
- ▶ It begins with an estimate of the value of the equilibrium real FFR, which is the FFR-adjusted for inflation—that would be consistent with real GDP being equal to potential GDP in the LR.
- ▶ Federal funds target rate = Current inflation rate + Real equilibrium federal funds rate +  $\frac{1}{2} \times$  Inflation gap +  $\frac{1}{2} \times$  Output gap

- ▶ (Conti.) *Inflation gap* (the diff. bw current inflation rate and a target inflation rate) and output gap (the diff. bw real GDP and the potential GDP) appear there because the Fed is concerned about both inflation and fluctuation in real GDP.
- ▶ Taylor demonstrated that when the equilibrium real FFR is 2% and the target rate of inflation is 2%, the expression does a good job of explaining changes in the Fed's target for the FFRs.
- ▶ Note that the Taylor rule doesn't account for changes in the target inflation rate or the equilibrium IR.

# Arguments for and against Inflation Targeting

## *For inflation targeting:*

- Makes it clear that the Fed cannot affect real GDP in the long run.
- Easier for firms and households to form expectations about future inflation, improving their planning.
- Reduces chance of abrupt changes in monetary policy (for example, when members of the FOMC change).
- Promotes Fed accountability.

## *Against inflation targeting:*

- Reduces the Fed's flexibility to address other policy goals.
- Assumes the Fed can correctly forecast inflation rates, which may not be true.
- Increased focus on inflation rate may result in Fed being less likely to address other beneficial goals.



Which inflation rate does the Fed actually pay attention to?

- Not the CPI: it is too volatile.
- It used to use the PCE (*personal consumption expenditures*) index, a price index based on the GDP deflator.



But since 2004, it has used the “core PCE”: the PCE without food and energy prices. The core PCE is more stable; the Fed believes it estimates true long-run inflation better.

## How Does the Fed Measure Inflation?

- ▶ CPI overstates the true underlying rate of inflation; GDP deflator includes prices of goods, such as industrial equipment, that are not widely purchased by the typical consumer and worker. The *personal consumption expenditures price index* (PCE) is a measure of the PL that is similar to the GDP deflator, except that it includes only the prices of goods from the consumption category of GDP.
- ▶ In 2000, the Fed announced that it would rely more on the PCE than on the CPI in tracking inflation. Three advantages of PCE:
  1. The PCE is so-called chain-type price index, as opposed to the market-basket approach used in constructing the CPI. As consumers shift the mix of products they buy each year, the market-basket approach causes CPI to overstate actual inflation. A chain-type price index allow the mix of products to change over year.
  2. PCE includes the prices of more goods and services than CPI.



3 (Conti.) Past value of PCE can be recalculated as better ways of computing price index are developed and as new data become available. This allows the Fed to better track historical trends in inflation.

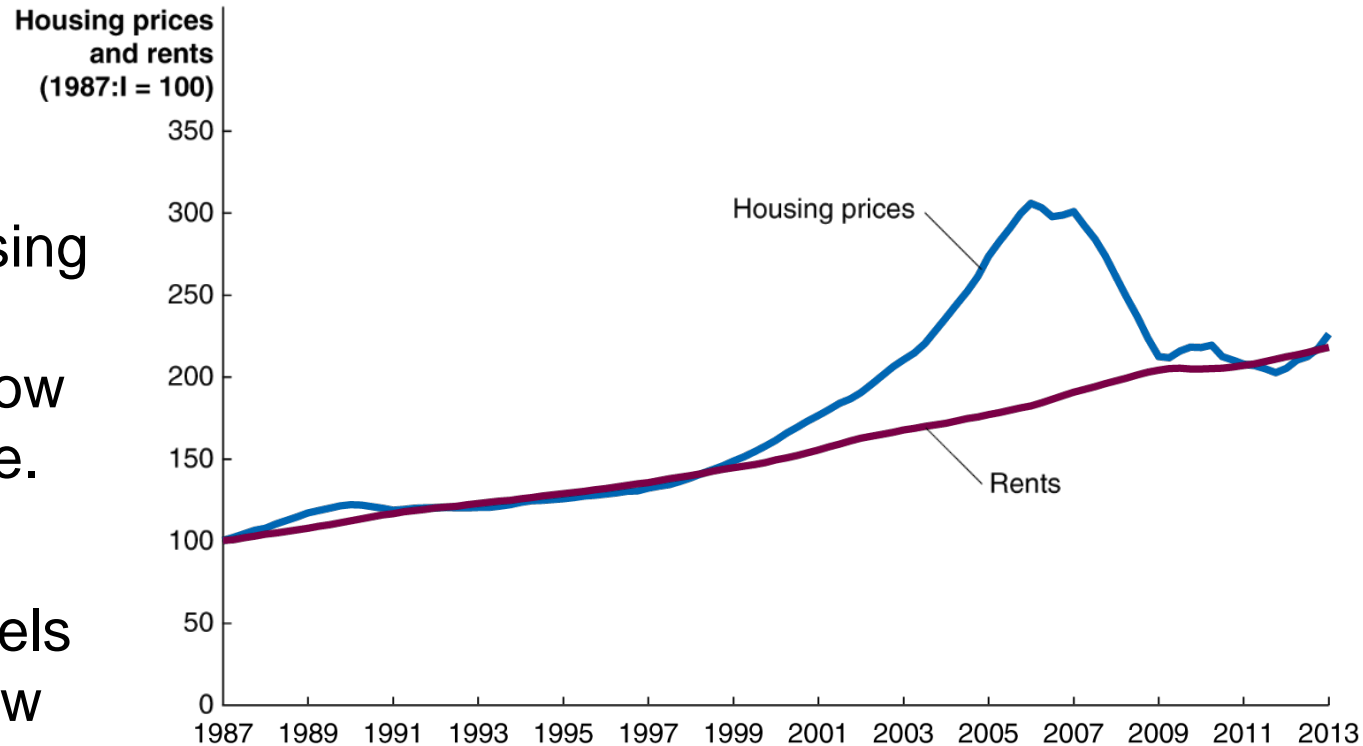
- ▶ In 2004, the Fed announced that it would begin to rely on a subcategory of the PCE: the so-called core PCE, which excludes food and energy prices. Prices of food and energy tend to fluctuate up and down for reasons that may not be related to the causes of general inflation and that can not be easily controlled by MP.
- ▶ Although the three measures (CPI, PCE, core PCE) of inflation move roughly together, the core PCE has been more stable than the others.

# The Housing Market Bubble of the 2000s

By 2005, many economists argued that a bubble had formed in the U.S. housing market.

- Comparing housing prices and rents makes it clear now that this was true.

The high prices resulted in high levels of investment in new home construction, along with optimistic *sub-prime loans*.



**Figure 15.12** Housing prices and housing rents

# The Bursting of the Housing Market Bubble

During 2006 and 2007, house prices started to fall, in part because of mortgage defaults, and new home construction fell considerably.

Banks became less willing to lend, and the resulting *credit crunch* further depressed the housing market.



**Figure 15.13** The housing bubble

# The Changing Mortgage Market

Until the 1970s, when a commercial bank granted a mortgage, it would “keep” the loan until it was paid off.

- This limited the number of mortgages banks were willing to provide.

A *secondary market* in mortgages was made possible by the formation of the Federal National Mortgage Association (“Fannie Mae”) and the Federal Home Loan Mortgage Corporation (“Freddie Mac”).

- These *government-sponsored enterprises (GSEs)* sell bonds to investors and use the funds to purchase mortgages from banks.
- This allowed more funds to flow into mortgage markets.

# The Role of Investment Banks

By the 2000s, investment banks had started buying mortgages also, packaging them as *mortgage-backed securities*, and reselling them to investors.

- These securities were appealing to investors because they paid high interest rates with apparently low default risk.

But with more money flowing into mortgage markets, “worse” loans started to be made, to people

- With worse credit histories (*sub-prime loans*)
- Without evidence of income (“Alt-A” loans)
- With lower down-payments
- Who couldn’t initially afford traditional mortgages (*adjustable-rate mortgages* start with low interest rates)

# Initial Fed and Treasury Actions

1. (March 2008) The Fed made discount loans available to *primary dealers* including investment banks.
2. (March 2008) The Fed announced that it would loan up to \$200 billion of Treasury securities in exchange for mortgage-backed securities.
3. (March 2008) The Fed aided JPMorgan Chase's acquisition of failing investment bank Bear Stearns, guaranteeing a portion of Bear Stearns' potential losses.
4. (September 2008) Federal government took control of Fannie Mae and Freddie Mac, providing an injection of cash (\$100 billion) for 80% ownership, further supporting the housing market.



# Responses to the Failure of Lehman Brothers

Many economists were critical of the Fed underwriting Bear Stearns, as managers would now have less incentive to avoid risk: a *moral hazard* problem.

So in September 2008, the Fed did not step in to save Lehman Brothers, another investment bank experiencing heavy losses. This was supposed to signal to firms not to expect the Fed to save them from their own mistakes.

- Lehman Brothers declared bankruptcy on September 15.
- Financial markets reacted adversely—more strongly than expected.
- When AIG began to fail a few days later, the Fed reversed course, providing them with a \$87 billion loan.

# More Consequences of Lehman Brothers

Reserve Primary Fund was a money market mutual fund that was heavily invested in Lehman Brothers.

- Many investors withdrew money from Reserve and other money market funds, fearing losing their investments.

This prompted the Treasury to offer insurance for money market mutual funds, similar to FDIC insurance.

- Finally, in October 2008, Congress passed the *Troubled Asset Relief Program (TARP)*, providing funds to banks in exchange for stock—another unprecedented action.

Although these interventions took new forms, they were all designed to achieve traditional macroeconomic goals: high employment, price stability, and financial market stability.