# Central banking and monetary policy
# Chapter 15 - 17

# Learning Objectives

1. Monetary policy operating process: how central bank controls interest rate

2. International aspects of monetary policy

# CONTROLLING INTEREST RATE AND TOOLS OF MONETARY POLICY

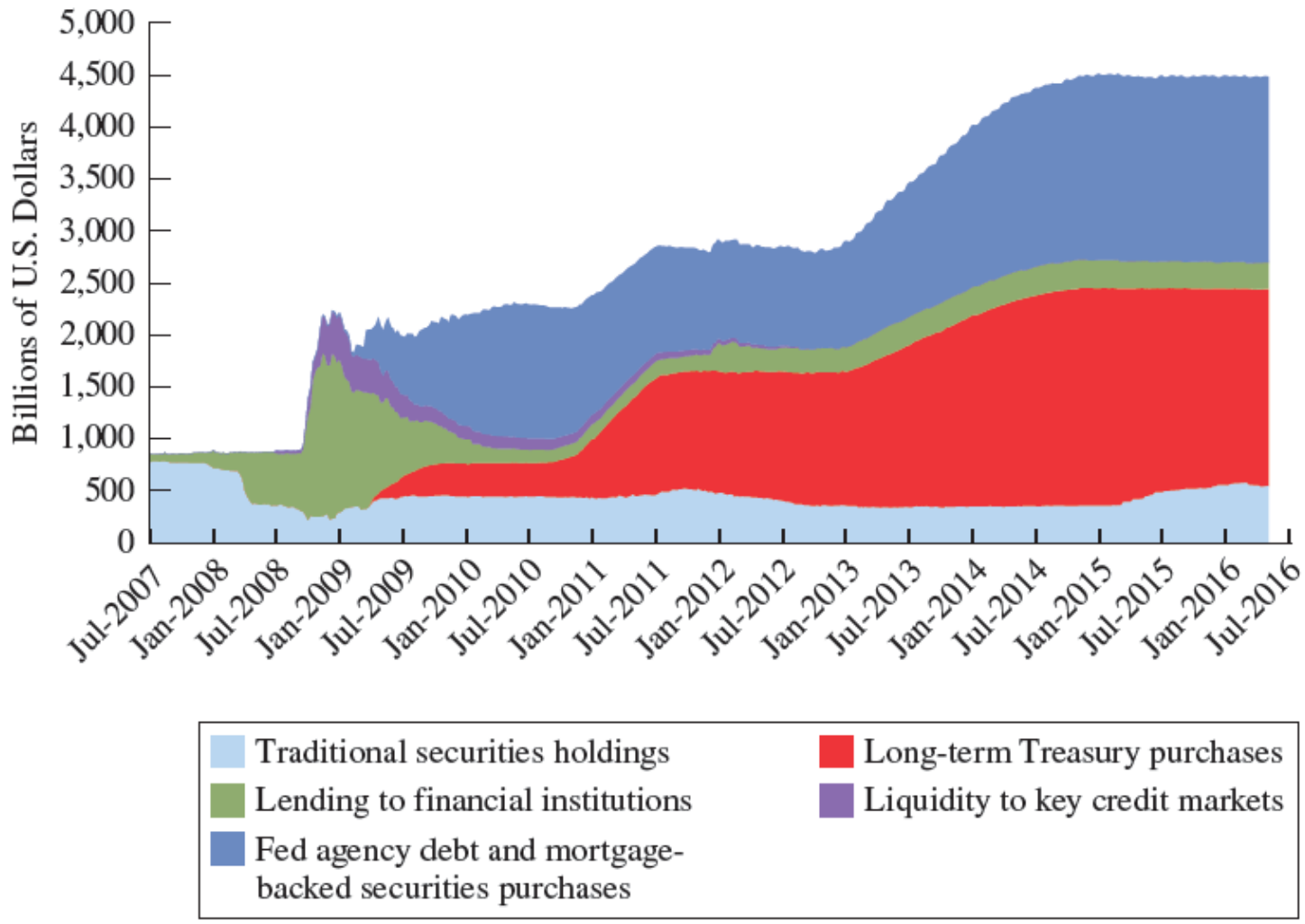
# Introduction

- Between September 2007 and December 2008, the FOMC lowered its target for the federal funds rate 10 times.
- This was the first time since the 1930s that the nominal federal funds rate hit zero.
  - Zero lower bound: the idea that a nominal interest rate cannot fall below zero
    - Due to transaction costs, they can fall below zero
  - Effective lower bound: the nominal interest rate level below which intermediaries and their customers will switch from bank deposits to holding cash.

# Introduction

- To steady the financial system and the economy after the crisis, the Fed utilized its three of its conventional policy tools:
  - The target range for the federal funds rate
  - The interest rate on excess reserves (IOER rate)
  - The rate for discount window lending
- Policymakers then proceeded to develop and use a variety of unconventional policy tools including:
  - Massive purchases of risky assets in fragile markets
  - Communicating its intent to keep interest rates low over an extended period

**Figure 18.1** U.S. Federal Reserve Assets (billions of U.S. dollars), July 2007–March 2016



# The Central bank's Conventional Policy Toolbox

Almost all CBs have four leading conventional monetary policy tools, also known as *policy instruments*:

1. The target federal funds rate range
2. The interest rate on excess reserves (IOER rate)
3. The discount rate
4. The reserve requirement

- An important supplementary tool for monetary policy used by the Fed: overnight reverse repo (ON RRP) rate.
  - Serves to keep the market federal funds rate close to the IOER rate
  - Can be used to set a floor under the market federal funds rate

# The Federal Reserve's Conventional Policy Toolbox

**Table 18.1** The Conventional Tools of the Federal Reserve

| | What Is It? | How Is It Controlled? | What Is Its Impact? |
|---|---|---|---|
| **Target Federal Funds Rate Range** | Range for the interest rate charged by financial intermediaries on overnight, uncollateralized loans to banks | Announced by the FOMC as the target range for the market federal funds rate | Influences interest rates throughout the economy |
| **Interest Rate on Excess Reserves (IOER Rate)** | Interest rate paid by the Federal Reserve on excess reserves held by banks | Announced by the FOMC as a rate to be paid on all excess reserves | Changes interest rates at which banks will lend and borrow |
| **Discount Rate** | Interest rate charged by the Federal Reserve on its loans to banks | Set by Reserve Banks, subject to approval by the Federal Reserve Board, at a premium over the interest rate on excess reserves (IOER rate) | Provides liquidity to banks in times of crisis; not used to alter day-to-day monetary policy |
| **Reserve Requirement** | Fraction of deposits that banks must keep either on deposit at the Federal Reserve or as cash in their vaults | Set by the Federal Reserve Board within a legally imposed range | Influences the demand for reserves; not used to alter monetary policy |

# The Target Federal Fund Rate and the Interest on Excess Reserves

- Prior to the financial crisis, the target federal fund rate was the FOMC's primary policy instrument.
- The federal funds rate is the rate at which banks lend reserves to each other overnight.
  - It is determined in the market and not controlled by the Fed.
- The *target* federal funds rate are set by the FOMC and the market federal funds rate, at which transactions between banks take place.

# The Target Federal Fund Rate and the Interest on Excess Reserves

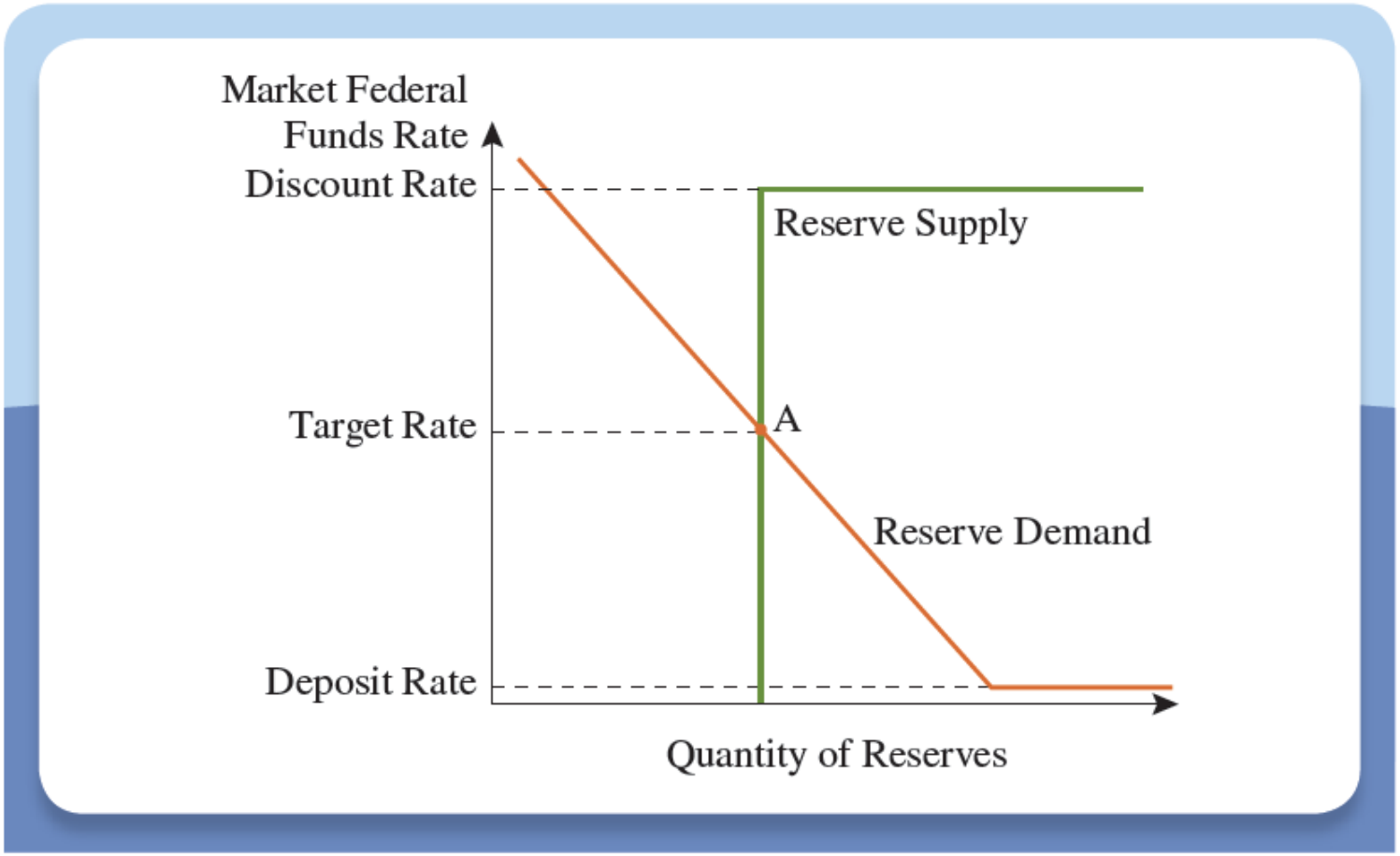
- Discrepancies between actual and desired reserves gave rise to a market for reserves.
  - Some banks can lend out excess reserves.
  - Some banks will borrow to cover a shortfall.
- Without this market, banks would need to hold substantial quantities of excess reserves as insurance against shortfalls.
- Loans are unsecured.

# The Target Federal Fund Rate and the Interest on Excess Reserves

- Banks demand fewer reserves as the market federal funds rate rises.
- The Fed continues to be the monopoly supplier of aggregate bank reserves.
- By buying or selling securities in the market through an *open market operation (OMO),* the Fed could increase or decrease the supply of reserves in order to lower or raise the market federal funds rate.

# The Target Federal Fund Rate and the Interest on Excess Reserves

**Figure 18.2** The Market for Bank Reserves prior to September 2008

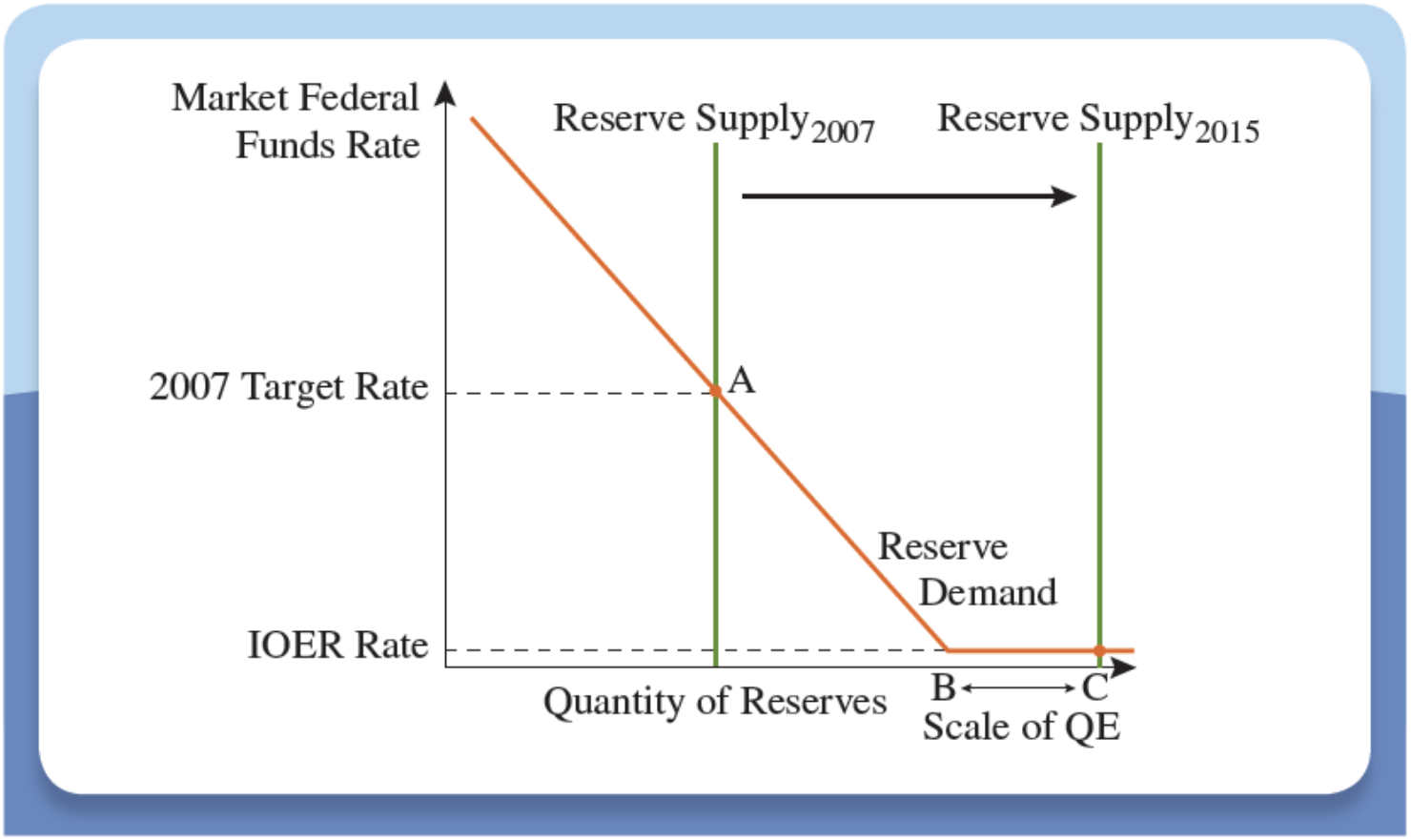


# The Target Federal Fund Rate and the Interest on Excess Reserves

- During the financial crisis, the Fed lowered its policy target close to zero, and engaged in quantitative easing making *large-scale asset purchases* to increase the supply of reserves far beyond the level needed to keep the federal funds rate near zero.
  - Policymakers began specifying a target range, instead, of a target level for the federal funds rate
  - The IOER rate forms the upper limit of the target of the target range

# The Target Federal Fund Rate and the Interest on Excess Reserves

**Figure 18.3** The Market for Reserves with Quantitative Easing (QE) after September 2008

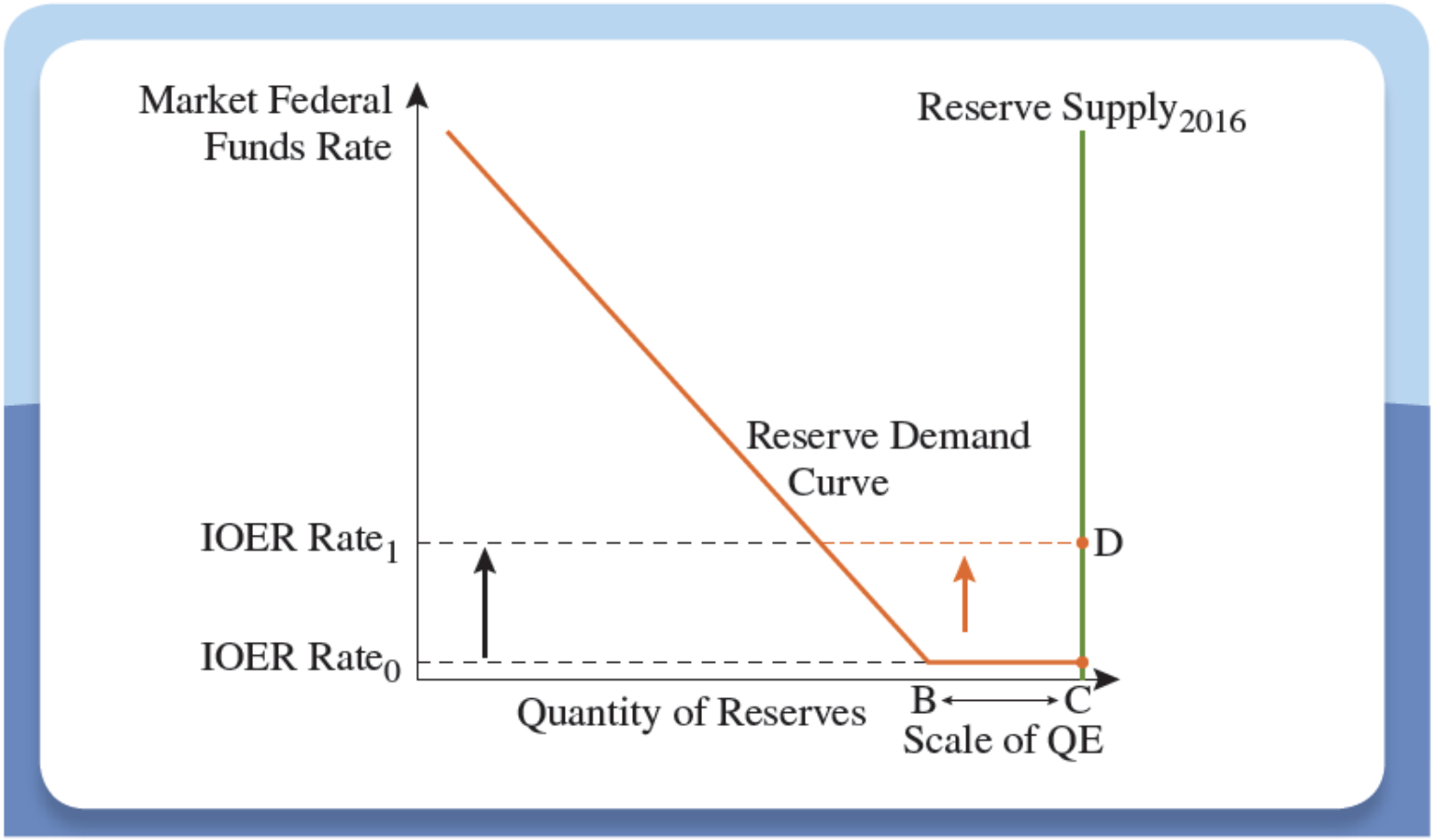


# The Target Federal Fund Rate and the Interest on Excess Reserves

- Tightening monetary policy through the IOER rate
  - If there is an increase in the target range for the federal funds rate, the Fed will raise the IOER rate; raising the minimum rate at which banks are willing to lend
  - Allows the FOMC to raise interest rates, tightening financial conditions, without altering the supply of reserves

# The Target Federal Fund Rate and the Interest on Excess Reserves

**Figure 18.4** Tightening Monetary Policy by Increasing the IOER Rate



# YOUR FINANCIAL WORLD

## How the Federal Funds Rate Changes Your Budget

- The Federal Funds Rate is the overnight lending rate.
- Long-term interest rates = average of expected short-term interest rates + the risk premium.
- When the expected future path of the federal funds rate changes, long-term interest rates we all care about change.

# Discount Lending, the Lender of Last Resort, and Crisis Management

- By controlling the quantity of loans it makes, a central bank can control:
  - The size of reserves
  - The size of the monetary base
  - Interest rates
- Today, lending by the Federal Reserve Banks to commercial banks, called discount lending, is usually small aside from crisis periods.

# Discount Lending, the Lender of Last Resort, and Crisis Management

- Discount lending is the Fed's primary tool for:
  - Ensuring short-term financial stability
  - Eliminating bank panics
  - Preventing the sudden collapse of institutions that are experiencing financial difficulties
- The central bank is the lender of last resort:
  - Making loans to banks when no none else will or can.

# Discount Lending, the Lender of Last Resort, and Crisis Management

The Fed makes three types of loans:

1. Primary credit
2. Secondary credit
3. Seasonal credit

- The Fed controls the interest rate on these loans, not the quantity of credit extended.
- The banks decide how much to borrow.

# Primary Credit

- Primary credit is extended on a very short-term basis, usually overnight, to institutions that the Fed's bank supervisors deem to be sound.
- Banks seeking to borrow much post acceptable collateral.
- The interest rate on primary credit is set at a spread *above* the IOER rate called the primary discount rate.
  - The term discount rate usually refers to this primary discount rate

# Primary Credit

- Primary credit adds to the Fed's supply of reserves to the banks
- When reserves were scarce, providing a facility through which banks could borrow at a penalty rate above the target kept the market federal funds rate from rising above the discount rate.

# Secondary Credit

- Secondary credit is available to institutions that are not sufficiently sound to qualify for primary credit.
- The secondary discount rate is set above the primary discount rate.
- There are two reason a bank might seek secondary credit:
  - A temporary shortfall of reserves.
  - They cannot borrow from anyone else.

# Secondary Credit

- By borrowing in the secondary credit market, a bank signals that it is in trouble.
- Secondary credit is for banks that are experiencing longer-term problems that they need some time to work out.
- Before the Fed makes the loan, it has to believe that there is a good chance the bank will be able to survive.

# Seasonal Credit

- Seasonal credit is used primarily by small agricultural banks in the Midwest to help in managing the cyclical nature of farmers' loans and deposits.
- Historically, these banks had poor access to national money markets.
- In recent years there has been a move to eliminate seasonal credit.
  - They now have easy access to longer-term loans from large commercial banks.

# Reserve Requirements

- Since 1935, the Federal Reserve Board has had the authority to set the *reserve requirements*.
  - These are the minimum level of reserves banks must hold either as vault cash or on deposit at the Fed.
- Changes in the reserve requirement affect the money multiplier and the quantity of money and credit circulating in the economy.
- In the U.S., the reserve requirement turns out not to be very useful.

# Operational Policy at the European Central Bank

- Like the Fed's, the ECB's monetary policy toolbox contains:
  - An overnight interbank rate (equivalent to the federal funds rate)
  - A rate at which the central banks lends to commercial banks (equivalent to the discount rate)
  - A reserve deposit rate (equivalent to the IOER)
  - A reserve requirement

# The ECB's Target Interest Rate and Open Market Operations

- The ECB now frequently uses outright purchases of securities to inject reserves into the banking system
- Prior to 2012, it provided reserves through collateralized loans in what are called *refinancing operations*:
  - The main operation was a weekly auction of repurchase agreements (repo) in which ECB, through the National Central Banks, provided reserves to banks in exchange for securities, and then reversed the transaction up to three weeks later.
  - When reserves were scarce, the ECB's policy instrument was the minimum bid rate, set by the Governing Council as the minimum interest rate accepted at these refinancing auctions
    - *Target refinancing rate*

# The ECB's Target Interest Rate and Open Market Operations

- Beginning in 2007, to steady financial markets, the ECB increased the supply of reserves through *longer-term refinancing operations (LTROs)* at maturities ranging from one month to one year.
- To stabilize bank funding in late 2011 and early 2012, the ECB extended maturities to three years.
- Financial turmoil led the ECB to boost open market purchases of securities.

# The ECB's Target Interest Rate and Open Market Operations

Differences between the ECB's refinancing operations and the Fed's daily open market operations:

1. The operations are done at all the National Central Banks (NCBs) simultaneously.
2. Hundreds of European banks participate in the ECB's weekly auctions.
3. Because of the differences in financial structure in different countries, the collateral that is accepted in refinancing operations differs from country to country.
   - The ECB and the NCBs accept tens of thousands of different marketable assets as collateral, including not only government-issued bonds but also privately issued bonds and bank loans.

# The Marginal Lending Facility

- The ECB's marginal lending facility is the analog to the Fed's primary credit facility.
- Through this the ECB provides overnight loans to banks at a rate that is normally well *above* the target-refinancing rate.
- The spread between the marginal lending rate and the target refinancing rate is set by the Governing Council.
- Commercial banks initiate these borrowing transactions when they face a reserve deficiency that they cannot satisfy more cheaply in the marketplace.

# The Deposit Facility

- Banks with excess reserves at the end of the day can deposit them overnight in the ECB's Deposit Facility at a interest rate substantially below the target-refinancing rate.
- The rate paid by the deposit facility is set by the ECB Governing Council.
- The deposit facility places a floor under the market interest rate charged on loans made by banks

# Reserve Requirements

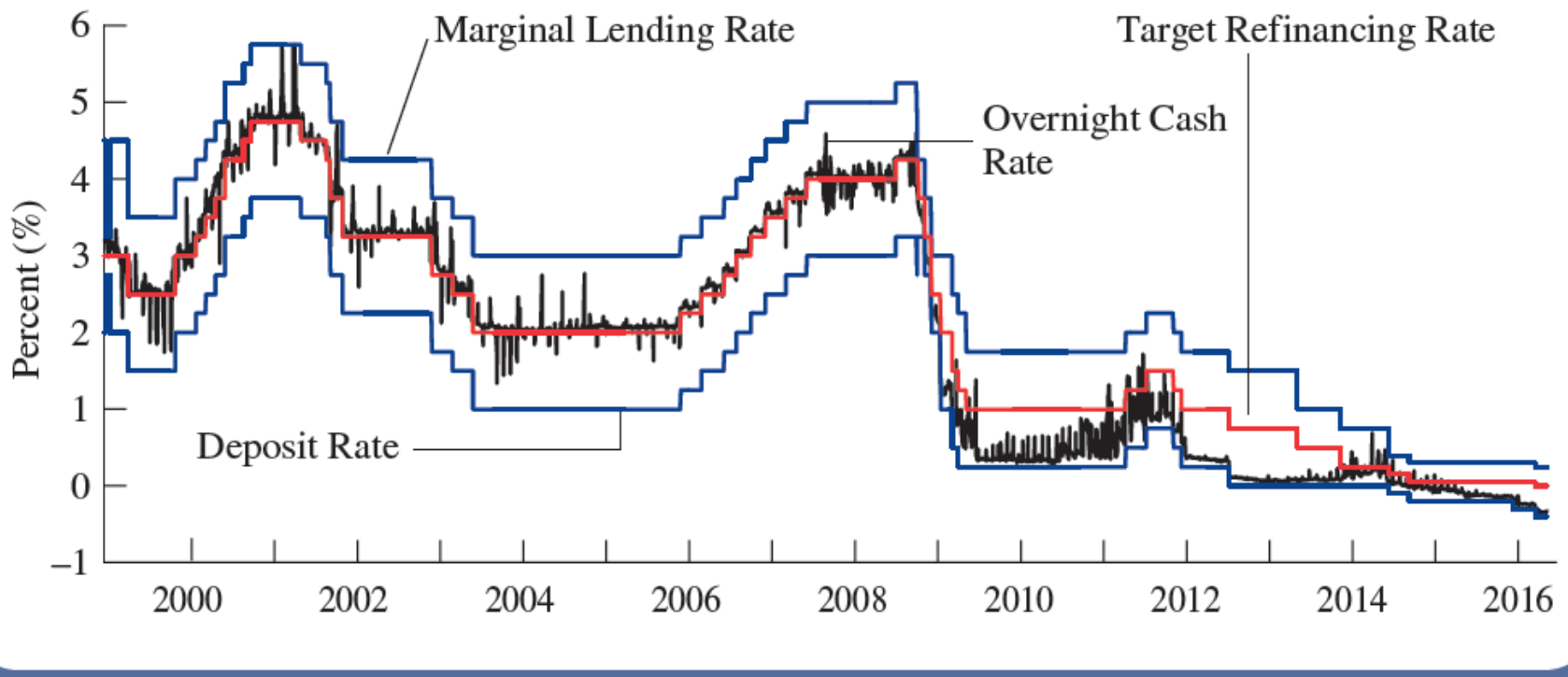
- The ECB requires that banks hold minimum reserves based on the level of their liabilities.
- The reserve requirement of 1% is applied to deposits and debt securities with maturities up to two years.
- The level of these liabilities is averaged over a month, and reserve levels must be held over the following month.

# Reserve Requirements

- The European system is designed to give the ECB tight control over the short-term money market in the euro area.
  - And it usually works well.
- The overnight cash rate is the European analog to the market federal funds rate.
- After the Lehman failure in 2008, the overnight cash rate remained within the band formed by the marginal lending rate and the deposit rate.

# Reserve Requirements

**Figure 18.5** Euro-Area Overnight Cash Rate and ECB Interest Rates, 1999–2016



# Linking Tools to Objectives: Making Choices

- Monetary policymakers' goals are:
  - Low and stable inflation
  - High and stable growth
  - A stable financial system
  - Stable interest and exchange rates

# Linking Tools to Objectives: Making Choices

A consensus has developed among monetary policy experts that:

1. The reserve requirement is not useful as an operational instrument,
2. Central bank lending is necessary to ensure financial stability, and
3. Short-term interest rates are the conventional tool to use to stabilize short-term fluctuations in prices and output.

# Desirable Features of a Policy Instrument

A good monetary policy instrument has three features:

1. It is easily *observable* by everyone.
   - Ensures transparency in policymaking, which enhances accountability.
2. It is *controllable* and quickly changed.
   - An instrument that can be adjusted quickly in the face of a sudden change in economic conditions is clearly more useful
3. It is tightly *linked* to the policymakers' objectives.
   - The more predictable the impact of an instrument, the easier it will be for policymakers to meet their objectives

# Desirable Features of a Policy Instrument

- The reserve requirement won't work because the effect of changes in the requirement is difficult to anticipate.
- The Fed's strategy of targeting reserves rather than interest rates from 1979-1982 was a way of driving interest rates to levels that would not have been politically acceptable if they had been announced as targets.
  - Since they said they were targeting reserves, the Fed escaped responsibility for the high interest rates.
  - When inflation had fallen and interest rates came back down, the FOMC reverted to targeting the federal funds rate.

# Inflation Targeting

- Inflation targeting focuses on the objective of low and stable inflation
- It is a monetary policy strategy that involves public announcement of a numerical inflation target and underscores the central bank's commitment to price stability.
- When the target is credible, inflation will be low

# Inflation Targeting

- Long-term expectations of low inflation act to anchor low long-term interest rates and promote economic growth.
- Hier*archical mandate* in which price stability comes first and everything else comes second
  - The ECB, Australia, Chile, South Africa, United Kingdom, and dozens of other countries
- *Dual mandate* in which the goal of price stability and maximum employment are equal
  - The Fed

# Inflation Targeting

- Increases policymakers accountability and helps establish their credibility
  - Helps overcome the time-consistency problem
- The result is not just lower and more stable inflation, but usually higher and more stable economic growth

## APPLYING THE CONCEPT

### ALTERNATIVE MONETARY POLICY TARGETS: INFLATION, PRICE LEVEL, AND NOMINAL GDP

- Should central banks aim to control inflation, the price level, or nominal GDP?
- Proponents of price-level, or nominal GDP targeting argue that policymakers gain the ability to raise expected inflation by more than inflation targeting would
  - This would drive the real interest rate further down and stimulate economic expansion
  - Advocates view this approach as more effective than quantitative easing at the effective lower bound

## APPLYING THE CONCEPT

### ALTERNATIVE MONETARY POLICY TARGETS: INFLATION, PRICE LEVEL, AND NOMINAL GDP

- Skeptics point to the uncertainty about the inflation rate under price-level and nominal GDP targeting
  - Inflation uncertainty rises when the economy's trend rate of real economic growth unexpectedly changes.
- Two-thirds of global GDP is now produced under an inflation-targeting regime resulting in lower, more stable inflation around the world

# A Guide to Central Bank Interest Rates: The Taylor Rule

- The FOMC sets a target range for the federal funds rate and the day on which to make the changes.
- The Taylor Rule tracks the actual behavior of the target federal funds rate and relates it to the real interest rate, inflation, and output.

**Target fed funds rate =**

**Natural rate of interest + Current inflation + ½ (Inflation gap) + ½ (Output gap)**

# A Guide to Central Bank Interest Rates: The Taylor Rule

- The natural rate of interest is the real short-term interest rate that prevails when the economy is using resources normally.
  - Taylor originally used 2 percent, which is close to the average real short-term rate
- The inflation gap is current inflation minus an inflation target (both measured as percentages)
  - When inflation exceeds the target level, the inflation gap is positive
- The output gap is the percentage deviation of current output (real GDP) from potential output
  - When current output is above potential output, the output gap is positive

# A Guide to Central Bank Interest Rates: The Taylor Rule

- When inflation rises above its target level,
  - The response is to raise interest rates.
- When output falls below the target level,
  - The response is to lower interest rates.
- If inflation is currently on target and there is no output gap,
  - The target federal funds rate should be set at the natural rate of interest plus target inflation.

# A Guide to Central Bank Interest Rates: The Taylor Rule

- The Taylor rule has some interesting properties.
  - The increase in current inflation feeds one for one into the target federal funds rate; however,
  - The increase in the inflation cap is halved.
- *A 1 percentage point increase in the inflation rate raises the target federal funds rate 1½ percentage points.*

# A Guide to Central Bank Interest Rates: The Taylor Rule

- The Taylor rule tells us that for each percentage point increase in inflation,
  - The real interest rate, equal to the nominal interest rate minus expected inflation, goes up half a percentage point.
- This means that higher inflation leads policymakers to raise the inflation-adjusted cost of borrowing.
  - This then slows the economy and ultimately reduces inflation.

# A Guide to Central Bank Interest Rates: The Taylor Rule

- The Taylor rule also states that for each percentage point output is above potential:
  - Interest rates will go up half a percentage point
- The halves in the equation depend on both:
  - How sensitive the economy is to interest-rate changes and the preferences of central bankers.
- The more bankers care about inflation:
  - The bigger the multiplier for the inflation gap, and the lower the multiplier for the output gap.

# A Guide to Central Bank Interest Rates: The Taylor Rule

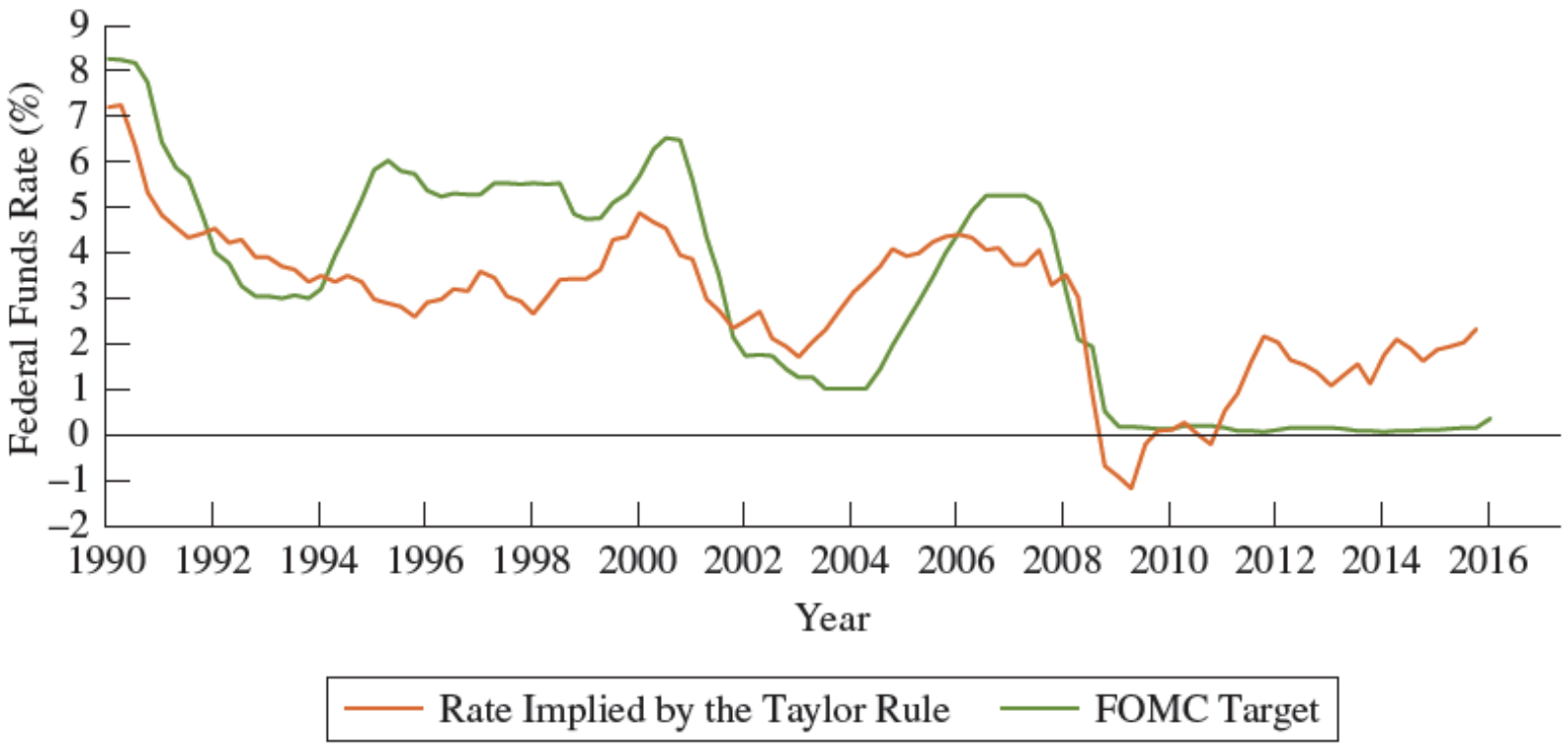
- The implementation of the Taylor rule requires four inputs:
  - The natural rate of interest
  - A measure of inflation
  - A measure of the inflation gap
  - A measure of the output gap

# A Guide to Central Bank Interest Rates: The Taylor Rule

- Economists and central bankers believe that the personal consumption expenditure (PCE) index is a more accurate measure of inflation.
- Using the Fed's inflation target of 2% and assuming the natural rate of interest is 2%, the neutral target federal funds rate is 4 percent = (2 + 2).
- For the output gap, the usual choice is the percentage by which GDP deviates from a measure of its trend, or potential.

# A Guide to Central Bank Interest Rates: The Taylor Rule

**Figure 18.7** The Taylor Rule, 1990–2016



# A Guide to Central Bank Interest Rates: The Taylor Rule

We should recognize some caveats.

- At times the target rate does deviate from the Taylor rule.
  - It is too simple to take account of sudden threats to financial stability.
  - The federal funds rate will be below the Taylor rule in periods characterized by at least one of two factors:
    1. Unusually stringent conditions across an array of financial markets
    2. Deflationary worries that arose as nominal interest rates approached zero

# A Guide to Central Bank Interest Rates: The Taylor Rule

- When financial conditions are much stronger, or weaker than usual policymakers seeking to stabilize the economy may set an interest-rate target that differs substantially from the Taylor rule
  - Alter prospects for private spending and inflation
- Uncertainty about the natural rate of interest
- There is a lack of real time data.

# YOUR FINANCIAL WORLD

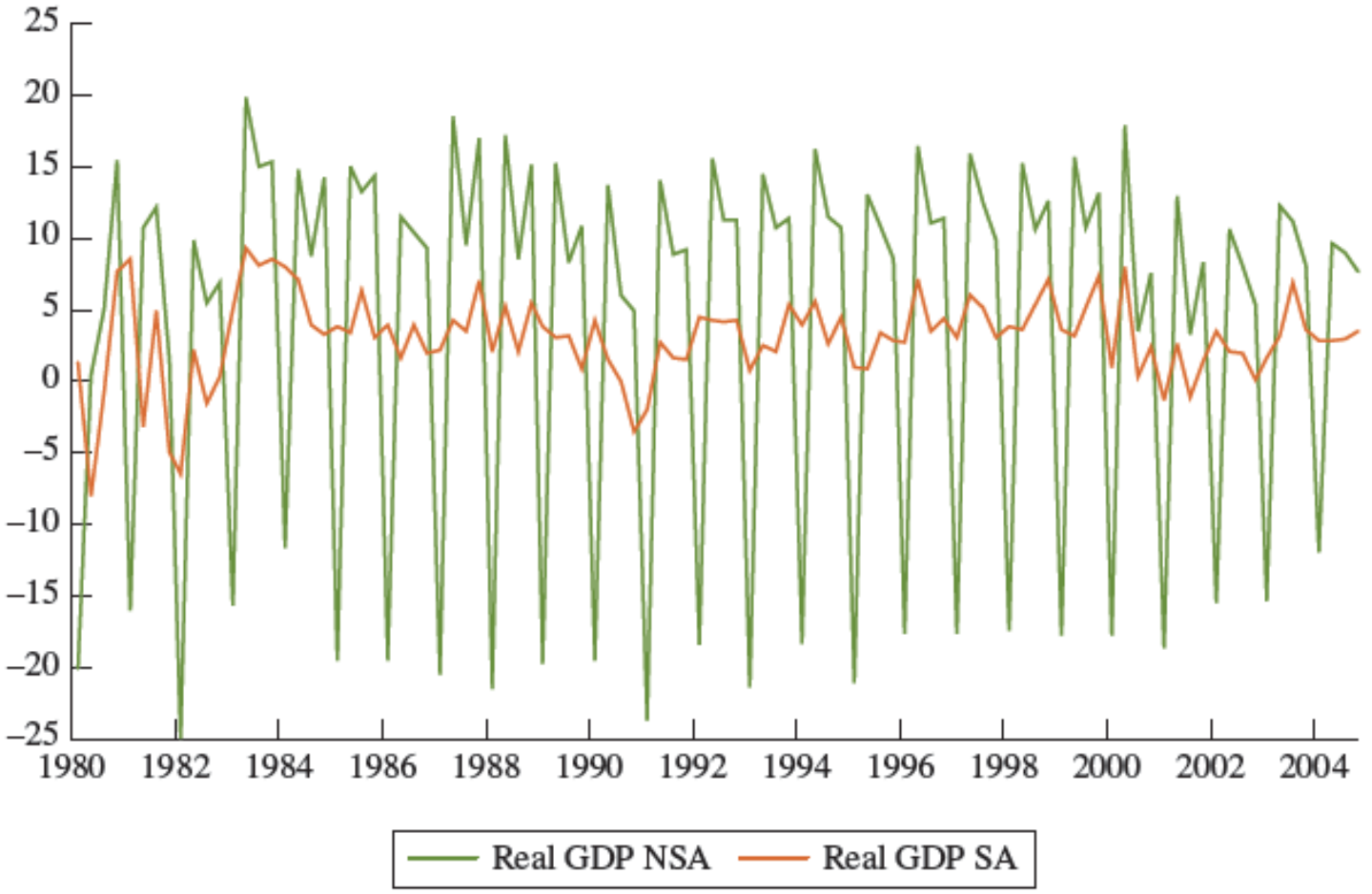
## GDP: Seasons and Revisions

- Early estimates of real GDP growth don't contain much accurate information for real-time business analysis
  - Statistical noise created by seasonality
  - Delayed availability of relevant data that leads to revisions years after the period being measured
- Households, businesses, and policymakers must make decisions based on how quickly the economy is likely to expand or contract
  - Measured GDP growth is not a reliable, real-time indicator

# YOUR FINANCIAL WORLD

## GDP: Seasons and Revisions

Figure 18.8 U.S. Real GDP Growth, SA and NSA (quarter-to-quarter percent changes at annual rates)



# Unconventional Policy Tools

- Most central banks set a target for the overnight interbank lending rate.
- However there are two circumstances when additional policy tools can play a useful stabilization role:
  1. When lowering the target interest-rate to zero is not sufficient to stimulate the economy
  2. When an impaired financial system prevents conventional interest-rate policy from supporting economic growth

# Unconventional Policy Tools

There are three categories of unconventional policy approaches:

1. Forward guidance
   - This is when the central bank communicates intentions regarding the future path of monetary policy.
2. Quantitative easing (QE)
   - When the central bank supplies aggregate reserves beyond the quantity needed to lower the policy rate to its target (usually zero or lower).

# Unconventional Policy Tools

3. Targeted asset purchases (TAP)
   - When the central bank alters the mix of assets it holds on its balance sheet in order to change their relative prices in a way that stimulates economic activity.

- When the Fed refers to its unconventional policy of large-scale asset purchases, the purchases are QE, TAP, or both

# TOOLS OF THE TRADE

## Some Unconventional Policy Tools

- The Fed officially recognizes several other unconventional tools, or facilities, which are described in Table 18.2.
- Note that Table 18.2 leaves out several important mechanisms that the Fed used extensively in the crisis, and thereafter.
  - For example, it purchased more than $1 trillion of mortgage-backed securities.
  - The Fed also expressed its intent to keep the federal funds rate low for an extended period in order to influence long-term interest rate expectations.

# TOOLS OF THE TRADE

## Some Unconventional Policy Tools

**Table 18.2** Some Unconventional Policy Tools

| Policy Tool | Description |
|---|---|
| Term Auction Facility (TAF) (expired 2010) | The Fed auctions a fixed volume of funds at maturities less than three months against collateral to depository institutions. |
| Primary Dealer Credit Facility (PDCF) (expired 2010) | The Fed lends overnight to primary dealers (including nonbanks) against a broad range of collateral. |
| Term Securities Lending Facility (TSLF) (expired 2010) | The Fed provides Treasury securities in exchange for a broad range of collateral in order to promote market liquidity. |
| Asset-backed Commercial Paper (ABCP) Money-Market Mutual Fund (MMMF) Liquidity Facility (expired 2009) | The Fed lends to depositories and bank holding companies to finance purchases of ABCP from MMMFs. |
| Commercial Paper Funding Facility (CPFF) (expired 2010) | The Federal Reserve Bank (FRB) of New York finances the purchase of commercial paper from eligible issuers via primary dealers. |
| Money-Market Investor Funding Facility (MMIFF) (expired 2009) | The FRB New York funds investment vehicles that purchase assets from MMMFs. |
| Term Asset-Backed Securities Loan Facility (TALF) (expired 2010) | The FRB New York lends to holders of high-rated newly issued asset-backed securities (ABS), using the ABS as collateral. |

# Forward Guidance

- The simplest unconventional approach is for the central bank to provide *forward guidance*-guidance today about policy target rates in the future
- They might express the intent to keep the policy target low for an extended period of time.
  - This could have a specific termination date, or duration could be dependent on some future change in economic conditions.

# Forward Guidance

- To stimulate economic activity, forward guidance aims at lowering the long-term interest rates that affect private spending.
- To be effective, forward guidance needs to be credible and time consistent
- The Fed has used forward guidance with increasing frequency and refinement

# Forward Guidance

- Although forward guidance can be effective, it is difficult to anticipate and reach consensus on the desirable policy path and to communicate these policy intentions simply
- The potential for disturbing side effects, including asset price bubbles

# Quantitative Easing

- QE occurs when the central bank expands the supply of aggregate reserves beyond the level that would be needed to maintain its policy rate target.
  - The central bank buys assets, thereby expanding its overall balance sheet.
- At a market federal funds rate equal to the interest on excess reserves, an addition to aggregate reserves no longer reduces the funds rate
  - The Fed can add limitlessly to reserves without affecting the market federal funds rate.

# Quantitative Easing

- It is difficult to predict the effects of QE.
- Fed policymakers argue their balance sheet expansion helped to lower long-term interest rates, but there is disagreement on the impacts.
- The mechanism by which QE affects economic prospects is not clear.
- An increase in the supply of reserves (QE) may simply lead banks to hold more of them rather than provide additional loans.

# Quantitative Easing

- One mechanism is that QE can add credibility to a policymaker's promise to keep interest rates low.
- Announcements of an expansion of aggregate reserves (QE) could lower bond yields by extending the time horizon over which bondholders expect a zero policy rate.
  - QE may reinforce the impact of forward guidance

# Quantitative Easing

- A problem with QE is that central banks do not know now much is needed to be effective.
- QE can be  powerful tool for central bankers to prevent a sustained deflation, especially when conventional policy tools have been exhausted.
- The first and largest application since the Great Depression occurred immediately after the Lehman failure in September 2008 (QE1).

# Targeted Asset Purchases

- *Targeted asset purchases (TAP)* shift the *composition* of the balance sheet toward selected assets in order to boost their relative price and stimulate economic activity.
- The central bank's actions can influence both the cost and availability of credit.
- In the absence of private demand for the risky asset, the central bank's purchase makes credit available where none existed.

# Targeted Asset Purchases

- The impact of TAP is likely
  - To be greater in thin, illiquid markets.
  - To be larger the bigger the difference between the yield on the asset that the central bank buys and the yield on the asset that the central bank sells.
- By altering the relative supply of such assets to private investors, TAP narrows their interest rate differences.

# Targeted Asset Purchases

- In buying more than $1.8 trillion in MBS and more than $2 trillion in long-term Treasury debt, the central bank's goal was to lower yields on mortgages and other long term bonds.
- A central bank cannot reliably anticipate the impact of TAP on the cost of credit.
- In normal time a central bank typically avoids such direct allocation of credit.
  - They promote competition rather than picking winners.

# Targeted Asset Purchases

- TAP purposely deviates from such *asset neutrality* in order to influence relative prices.
- Exiting from TAP is probably also more difficult than unwinding QE.
- TAP assets are generally harder to sell than short-term Treasuries.
  - The central bank may not be able to get rid of them exactly when it wants.
  - Political influences can become important if the Fed is hindered from selling specific assets for fear of raising the costs of a particular class of borrowers.


- Emerging market economies (EMEs) central bank balance sheets tend to be larger than those in advanced economies
  - Bank-based, high reserve requirements, rely more on paper currency as means of payment, target exchange-rate stability, and they are less independent
- Factors that drove enormous and widespread balance-sheet increases
  - Foreign exchange operations, acting as a lender of last resort or preserving market functioning, stabilizing aggregate demand at very low interest rates, and forced government financing


- Benefits of a larger balance sheet.
  - Influences the prices of a variety of securities and it supplies a large volume of high-quality liquid assets
- Costs of holding a larger balance sheet
  - Exposes the central bank to interest-rate and credit risk
  - May displace private intermediaries and make the allocation of capital less efficient
  - Threat to central bank independence

# Making an Effective Exit

- When central banks pursue conventional interest-rate targets, officials think about the policy choices they face every six to eight weeks.
- The introduction of and exit from unconventional policies also require looking in to the future.

# Making an Effective Exit

- What happens when QE and TAP have vastly expanded the amount of reserves and assets on the central bank's balance sheet?
  - The central bank may need to sell a large volume of assets to reduce reserve supply sufficiently to raise the policy rate target.
- But, QE and TAP assets are typically more difficult to sell.
- A central bank may be unable to sell assets and withdraw reserves from the banking system rapidly enough to hike the policy interest rate when it desires.

# Making an Effective Exit

- Central banks have several policy options that allow them to raise interest rates without reducing the level of reserve supply or changing the composition of the balance sheet.
  - To tighten policy, the Fed raises the IOER rate
- Paying interest on reserves allows a central bank to control both price and quantity:
  1. Price: It can adjust the target range for the federal funds rate and IOER rate without changing the size or composition of its balance sheet
  2. Quantity: It can adjust the size and composition of its balance sheet without changing the target range for the federal funds rate or IOER rate
- This means the central bank can change its balance sheet in a fashion consistent with financial stability while keeping inflation under control.

## LESSONS FROM THE CRISIS
### THE FINANCIAL STABILITY–MONETARY POLICY NEXUS

- Prudential tools, both micro and macro (including stress tests) should remain the first line of defenses against financial stability
- Monetary policy can create financial stability risks, changing the path of policy in specific cases to reduce these risks is difficult to justify