

# The Instruments of Central Banking

# Monetary Policy objectives

- The official objectives of US monetary policy are, “economic growth in line with the economy's potential to expand, a high level of employment, stable prices (that is, stability in the purchasing power of the dollar), and moderate long-term interest rates.”
- Conceptually, the Fed will raise (the real) interest rate if GDP is greater than “Potential GDP” and vice-versa

## Economic Goals

Stable prices

Maximum  
employment

## Achieving Economic Goals

Availability and cost of money and credit



Consumer and business spending



Employment and prices

## Tools of Monetary Policy

Open Market  
Operations

Discount Rate

Reserve  
Requirements

## Aside: Real vs. Nominal Rates

- It is often said that the interest rate is the “*cost of money.*” Is this true?
- Ultimately, we use money to obtain consumption goods
- Think of the interest rate in terms of trading some *real* amount of consumption in one time period for some *real* amount of consumption in another time period
  - Note however, borrowing and lending contracts are stated in *nominal* terms.

## Aside: Real vs. Nominal Rates

- The real rate of interest ( $R^*$ ) can be defined as approximately,

**Real Interest Rate =**

**Nominal Interest Rate - Anticipated Inflation**

# Related concepts

- Potential GDP is the rate of economic activity that leads to stable prices and employment
- Intuitively it is the amount of output that is generated by utilizing all available resources at their highest sustainable level.
- Algebraically, we can think of it as

$$\text{PotGDP} = (\text{aggregate hours available for work}) \times (\text{average output per hour})$$



# Cont..

- Economists often discuss the *Potential GDP Growth Rate* which is approximately

$$\begin{aligned} \text{PotGDP Growth} &= \text{Labor Force Growth Rate} \\ &+ \text{Productivity Growth Rate} \end{aligned}$$

- We can calculate PotGDP Growth with this formula for the last 50 years

# NAIRU

- Another way of thinking about potential output is the equilibrium rate of unemployment or NAIRU (Non-accelerating Inflation Rate of Unemployment)
- NAIRU is the rate of unemployment below which there will be inflationary pressures
- The exact level of NAIRU is an issue of debate.
  - Most economists believe it is somewhere between 4% and 6% in the US and Japan. Probably higher in Europe (7-8%).

# Money's functions

- Medium of exchange
  - Allows transactions not based on barter
  - Avoids the need for a “double coincidence of wants”
- Unit of account
  - Common measure of value for goods, services, and contracts
- Store of value
  - Allows for transfer of wealth through time
  - Most *liquid* of all assets

# Types of Money

- Pure Commodity
  - Scarce commodity is agreed on as “money”
  - For example: gold, silver, cattle, cigarettes
- Commodity Standard
  - Certificates representing claims on a commodity are issued and used instead of the commodity itself
  - For example: the US was once on a “gold standard”
- **Fiat Money**
  - Money established by government decree
  - Fiat money has no intrinsic value

# US Measures of Money

- Currency = Bills and coins outside U.S. Treasury, Federal Reserve Banks and the vaults of depository institutions
- M1 = Currency plus travelers' checks, demand deposits, other checkable deposits
- M2 = M1 plus savings deposits, small-denomination time deposits, retail money market mutual funds, and overnight repurchase agreements
- M3 = M2 plus large-denomination time deposits, institutional money funds, and Eurodollars (discontinued in 2005)
- L = M3 plus other liquid securities such as savings bonds and short-term Treasury securities

# The US Federal Reserve

- Federal Reserve System is the US “central bank”
  - Foreign counterparts include the European Central Bank (ECB), The Bank of England, and the Bank of Japan
- Founded in 1913 by congress, “to provide the nation with a safer, more flexible, and more stable monetary and financial system.”
- Primary functions are
  - Monetary policy
  - Banking supervision and regulation
  - Providing certain services (e.g., check clearing)

## Tools of Monetary Policy

- Open market operations
- Discount rate → borrowed reserves
  - ***LENDER OF LAST RESORT***
- Reserve requirements
  - Affect the money multiplier

# The Bank Balance Sheet

- A bank's balance sheet lists *sources* of bank funds (liabilities) and *uses* to which they are put (assets)
- Banks invest these liabilities (sources) into assets (uses) in order to create value for their capital providers



# The Bank Balance Sheet

TABLE 17.1 Balance Sheet of All Commercial Banks (items as a percentage of the total, 2010)

Assets		Liabilities	
Reserves and cash items	2	Checkable deposits	4
Securities		Nontransaction deposits	
U.S. government and agency	9	Small-denomination time deposits (<\$100,000) + savings deposits	62
State and local government and other securities	8	Large-denomination time deposits	12
Loans		Other liabilities	4
Commercial and industrial	9	Borrowings	12
Real estate	25	Bank capital	6
Interbank	3		
Consumer	5		
Other	32		
Other assets (for example, physical capital)	7		
Total	100	Total	100

Pay no interest

Secondary reserves

74% of Assets

Lowest cost source of funds-- payable on demand

Deposit with no check writing

Discount loans Fed Funds,

Corporate Loans have grown by factor of 10 since 1960 as % of Liab

**Bank Equity = Assets - Liabilities,** listed as Liab because Bank owes this to owners. Also includes **Loan Loss Reserves**

Source: <http://www.federalreserve.gov/releases/h8/Current>

# Basics of Banking

**Asset transformation** is, for example, when a bank takes your savings deposits and uses the funds to make, say, a mortgage loan. Banks tend to “borrow short and lend long” (in terms of maturity).

# Basics of Banking

- T-account Analysis:
  - Deposit of \$100 cash into First National Bank

<b>First National Bank</b>			
<b>Assets</b>		<b>Liabilities</b>	
Vault cash	+\$100	Checkable deposits	+\$100

# Reserve Requirements

- **Reserves are vault cash and deposits at the Fed**
  - Do not earn interest
- **Percentage of required reserves** varies with type of account
  - **Demand Deposits**
    - Can range between 8% to 14%
    - 3% of the first \$42.1 million of **demand deposits**
    - Currently set at 10% on deposits above \$42.1 million
  - **Business-owned time and savings deposits**
    - Can range between zero to 9%
    - Currently set at 0%

# Transactions-Account Reserve Requirement

- Applied to deposits over a two-week period:
  - A bank's average reserves over the period ending every other Wednesday must equal the required percentage of its average deposits in the two-week period ending Monday, two days earlier.
- Banks failing to meet the requirement are subject to penalties

# Reserve Requirements

- The FED can influence the economy by changing the RRR
- Raising the RRR will reduce the money in circulation
- Lowering it will increase the money in circulation
- FED does not do this today as it can be very disruptive to the loan process
  - Loans may have to be recalled

# Basics of Banking

- Deposit of \$100 check

Assets		Liabilities	
Cash items in process of collection	+\$100	Checkable deposits	+\$100

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First National Bank				Second National Bank			
Assets		Liabilities		Assets		Liabilities	
Reserves	+\$100	Checkable deposits	+\$100	Reserves	-\$100	Checkable deposits	-\$100

# Basics of Banking– Required Reserves

- Deposit of \$100 cash into First National Bank assuming Required Reserve ratio of 10%

First National Bank			
Assets		Liabilities	
Required reserves	+\$10	Checkable deposits	+\$100
Excess reserves	+\$90		

- \$10 of the deposit must remain in reserves to meet federal regulations (10% reserve req.).
- Now, the bank is free to work with the \$90 in its asset transformation function. In this case, the bank loans the \$90 to its customers.



# Basics of Banking

- Loaning out excess reserves

<b>Assets</b>		<b>Liabilities</b>	
Required reserves	+\$10	Checkable deposits	+\$100
Loans	+\$90		

# Monetary Policy: Open Market Operations

- About every six weeks the FOMC meets to determine monetary policy for the US
- In practice, this means determining the target for the “Federal Funds Rate”
  - an inter-bank overnight interest rate
- Fed decreases (increases) the Fed Funds rate by buying (selling) government securities which increases (decreases) the available money supply
  - The Federal Reserve Bank of NY makes these purchases or sales on the open market--hence the name Federal *Open Market* Committee.

# Open Market Operations

- The most used monetary tool is open market operations
- The FED can purchase bonds to put money into circulation
- They sell government bonds to take money out of circulation

# Open Market Operations

- Buying and selling government securities to influence bank reserves
  - **Purchase securities**—expand reserves (money supply)
  - **Sell securities**—contract reserves (money supply)
  - Does not matter whether Fed sells/purchases government securities to/from a bank, other financial institution, or individual—same result, assuming the simple multiplier

# Conducting Open Market Operations

- The Federal Open Market Committee (FOMC) in Washington decides on general aims and objectives of monetary policy and sets monetary targets (bank reserves, money supply, and interest rates)
- Buying/selling of government securities takes place at Federal Reserve Bank of New York
- Located in the heart of the New York financial district

# A Day at the Trading Desk

- Open Market Account manager keeps close contact with securities dealers to get the “feel of the market” and what is needed to meet targets
- Uses the federal funds rate as a barometer of reserve supply relative to demand
- Tries to predict expected currency movements that can affect reserve position of the banking system
- Contacts the US Treasury to determine what is happening to Treasury balances in **tax and loan accounts** at commercial banks

## A Day at the Trading Desk

- Based on FOMC targets and projected changes in reserve position of the banking system, decides on appropriate sales/purchases of government securities
- If changes in bank reserves are considered to be temporary, the open market account manager will use **repurchase agreement** to offset these transitory reserve movement

# *BuyEaseSellTighten*

- Open market purchase → federal funds rate falls
- Open market sale → federal funds rate rises
- Impact of discount rate on federal funds rate
- Impact of reserve requirement on federal funds rate



# Other Mechanisms for Monetary Policy

- The Fed also has two other ways of controlling monetary policy
  - Reserve requirements
  - The discount rate
  
- Reserve requirements ( $rr$ ) directly affect the level of money via the “money multiplier” ( $1/rr$ )
  - Example, if the reserve requirement is 20% of deposits then the money multiplier is  $1/0.2 = 5$

# Effect of Lowering the Reserve Requirement

- Automatically increases all banks' excess reserves
- Increases demand deposit through multiple lending
- However, the ultimate impact depends on banks desire to make loans— **element of discretion**
- **Expands the money supply**

# Effect of Raising the Reserve Requirement

- Decrease banks' excess reserves and **may force** them to take steps to correct a deficit reserve position
- Restrains lending and deposit creation
- **Contracts the money supply**

# Reserve Requirements

- Even **without legal reserve requirements**, banks would still need to hold cash reserves as vault cash or on deposit with Federal Reserve
  - Cash to meet customer withdrawals
  - Balances at Fed to clear checks
  - Without legal reserve requirements, the multiplier relationship between reserves and money supply would fluctuate considerably

# Fractional Reserve Banking

- The Fed buys a \$1,000 (market value) treasury bond from a bond dealer
- The dealer deposits the \$1,000 proceeds into its bank, FirstBank
  - Money supply increases by \$1,000
- FirstBank only has to keep \$200 as reserves and loans the \$800 balance:

## FirstBanks Balance Sheet

Assets		Liabilities	
Reserves	\$200	Deposits	\$1,000
Loans	\$800		

## Fractional Reserve Banking (2)

- Assume FirstBank made an \$800 computer loan to a student. Money supply increases to \$1,800
- The student buys a computer at BestBuy which deposits the \$800 at its bank, SecondBank
- SecondBank also loans out all but 20%

### SecondBank Balance Sheet

Assets		Liabilities	
Reserves	\$160	Deposits	\$800
Loans	\$640		

- Now money supply = 1,000 + 800 + 640 = 2,440

## Fractional Reserve Banking (3)

- This practice of keeping 20% reserves and loaning out the rest continues indefinitely
- However, the ultimate increase in the money supply ( $\Delta M^S$ ) is finite and equal to

$$\Delta M^S = \Delta D / rr$$

$$\Delta M^S = \$1,000 / 0.2$$

$$\Delta M^S = \$5,000$$

where  $\Delta D$  is the original increase in money by the Fed

[ Mathgeeks note, its a converging geometric sequence:

$$1+x+x^2+x^3+\dots = 1/(1-x) \quad \text{where} \quad x = (1-rr) ]$$

# Fed Reserve Requirements

<b>Type of Deposit</b>	<b>Requirement</b>	
	<b>% of Deposits</b>	<b>Effective Date</b>
Net transaction accounts		
\$0 million-\$8.5 million	0	12/21/06
\$8.5 million-\$45.8 million	3	12/21/06
More than \$45.8 million	10	12/21/06
Nonpersonal time deposits	0	12/27/90
Eurocurrency liabilities	0	12/27/90

Required reserves must be held in the form of deposits with Federal Reserve Banks or vault cash. Nonmember institutions may maintain reserve balances with a Federal Reserve Bank indirectly, on a pass-through basis, with certain approved institutions. Under the Monetary Control Act of 1980, depository institutions include commercial banks, savings banks, savings and loan associations, credit unions, agencies and branches of foreign banks, and Edge Act corporations.

See also: <http://www.federalreserve.gov/monetarypolicy/0693lead.pdf>



# The Discount Rate

- Annual interest rate charged those institutions that borrow from the Fed.
- Discount window.
- Banking Act of 1980 expanded access to borrowing from the Federal Reserve to all depository institutions that have to hold reserves (included nonmember institutions).

# The Discount Rate

- Banks borrow from the FED and the interest charged is known as the discount rate.
- In turn, these banks loan to customers (you and me) and the interest rate charged is known as the **prime rate**.
- By changing the discount rate, the prime rate changes and affects our spending behaviors
  - Raising the discount rate will slow borrowing, spending and the economy
  - Lowering the discount rate will increase borrowing, spending, and increase the economy
- 2<sup>nd</sup> most used form of Monetary Policy

# Discounting and the Discount Rate

- Federal Reserve influences banks' desire to borrow reserves by changing discount rate
  - **Lower the rate**—more borrowing, increase money supply
  - **Raising the rate**—less borrowing, decrease money supply

# Quantity of Discount Lending

- Central bank is the ultimate source of liquidity in the economy
- **Lender of last resort**—Discount provision was originally established to permit banks to borrow from the Fed when threatened with cash drains=

## Quantity of Discount Lending

- Banks should manage affairs so they do not need to use discount facility very often
- Discounting is a **privilege, not a right**
- Banks are supposed to use discount facility because of **need, not to make profit**
- Prior to 2003, the Fed used extensive administrative and surveillance procedures to prevent “abuse”

## Quantity of Discount Lending

- However, under the new discount lending procedure, the Federal Reserve charges a **penalty rate** above short-term market rates
- In return, the Fed removes conditions and restrictions for banks that qualify for **primary credit**
- The intent of the new policy is to improve access to discount window borrowing by removing the negative connotation of borrowing from the Fed

# The Discount Rate and Market Interest Rates

- Discounting is discouraged when the rate is **above** other short-term rates, and encouraged when it is **below**
- In some countries, the discount rate is often kept above short-term market rates—a **penalty rate** as a means of restraining excessive borrowing
- In US, discount rate is usually **below** Treasury bill rate so Fed relies on surveillance to prevent “abuse of the privilege”

## Relationship Between the Discount Rate and Other Market Rates

- Discount rate is an “administered” rate, set by Fed
- Weak linkage between discount rate and reserves and money supply
- **Reactive rather than proactive tool**