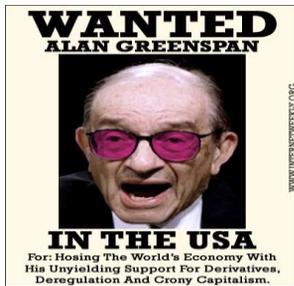


Chapter 14 Lecture - Monetary Policy and the Federal Reserve System

Chapter 14 Lecture - Monetary Policy and the Federal Reserve System



14-1

Principles of Money Supply Determination

Three groups affect the money supply

- The central bank is responsible for monetary policy
- Depository institutions (banks) accept deposits and make loans
- The public (people and firms) holds money as currency and coin or as bank deposits



14-2

Principles of Money Supply Determination

- The central bank (the Federal Reserve Bank in the United States) has a balance sheet showing its assets (what it owns or is owed) and liabilities (what it owes to others)
 - The sum of reserve deposits and currency (held by the nonbank public and by banks) is called the *monetary base* or *high-powered money*.

14-3

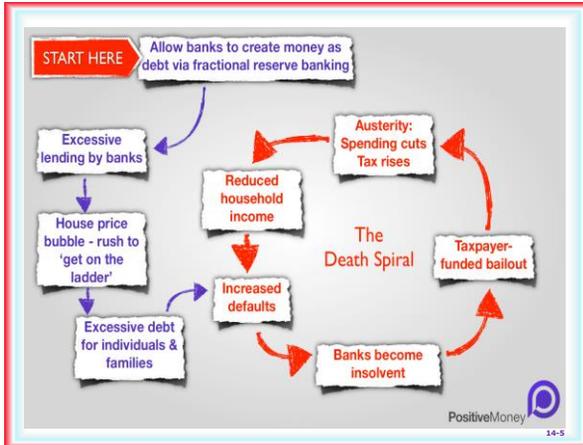
Principles of Money Supply Determination

Banks hold liquid assets called *bank reserves*

- When bank reserves are equal to deposits, the system is called *100% reserve banking*
- But banks lend out some of their deposits, as only a fraction of reserves are needed to meet the need for outflows
- If the bank needs to keep only 25% of the amount of its deposits on reserve to meet the demand for funds, it can lend the other 75%
- The *reserve-deposit ratio* would be 25%
- When the reserve-deposit ratio is less than 100%, the system is called *fractional reserve banking*

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Chapter 14 Lecture - Monetary Policy and the Federal Reserve System



Principles of Money Supply Determination

Open-market operations

- The most direct and frequently used way of changing the money supply is by raising or lowering the monetary base through open-market operations
- To increase the monetary base, the central bank prints money and uses it to buy assets in the market; this is an *open-market purchase*
 - Banks then find that their reserve-deposit ratio is higher than desired; this leads to a *multiple expansion of loans and deposits*
 - Banks then increase their loans until the reserve-deposit ratio returns to the desired level.
- If the central bank wants to decrease the monetary base, it uses an *open-market sale*

Principles of Money Supply Determination

The money multiplier

- The relationship between the monetary base and the money supply can be shown algebraically
- M = money supply
- $BASE$ = monetary base
- DEP = bank deposits
- RES = bank reserves
- CU = currency held by nonbank public
- res = banks' desired reserve-deposit ratio (RES/DEP)
- cu = public's desired currency-deposit ratio (CU/DEP)

Principles of Money Supply Determination

The money supply consists of currency held by the public and deposits, so

$$M = CU + DEP$$

The monetary base is held as currency by the public and as reserves by banks, so

$$BASE = CU + RES$$

Taking the ratio of these two equations gives

$$M/BASE = (CU + DEP)/(CU + RES)$$

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Principles of Money Supply Determination

- This can be written as

$$\frac{M}{BASE} = \frac{(CU/DEP)+1}{\left(\frac{CU}{DEP}\right)+\left(\frac{RES}{DEP}\right)} \quad (14.4)$$

- The *currency-deposit ratio* (CU/DEP , or cu) is determined by the public
- The *reserve-deposit ratio* (RES/DEP , or res) is determined by banks

We can rewrite as $M = \frac{cu+1}{cu+res} \times BASE$

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Principles of Money Supply Determination

- The term $(cu + 1)/(cu + res)$ is the *money multiplier*

- The money multiplier is greater than 1 for res less than 1 (that is, with fractional reserve banking)
- If $cu = 0$, the multiplier is $1/res$, as when all money is held as deposits
- The multiplier decreases when either cu or res rises

14-10

Table 14.1 The Monetary Base, the Money Multiplier, and the Money Supply in the United States

The monetary base is called high-powered money because each unit of the base that is issued leads to the creation of more money

Currency, CU	\$1045.2 billion
Bank reserves, RES	\$1556.5 billion
Monetary base, $BASE (=CU + RES)$	\$2601.7 billion
Deposits, DEP	\$8898.5 billion
Money supply, $M (=CU + DEP)$	\$9943.7 billion
Reserve-deposit ratio, $res (=RES/DEP)$	0.1749
Currency-deposit ratio, $cu (=CU/DEP)$	0.1175
Money multiplier $(cu + 1)/(cu + res)$	3.82
Ratio of money supply to base, $M/BASE$	3.82

Source: Federal Reserve Statistical Releases H.3 and H.6, July 12, 2012. In these calculations, we use a broad measure of deposits, including all deposit categories included in M2, as well as retail money market mutual funds, and the money supply is M2. Data are for June 2012. For recent data and historical series, see www.federalreserve.gov/releases.

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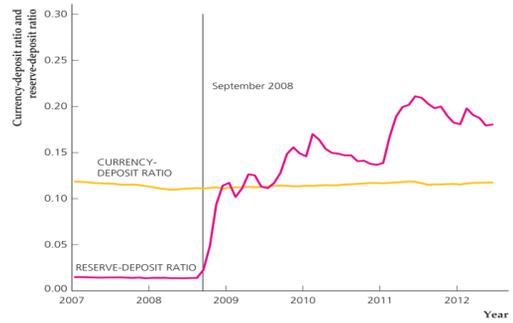
Principles of Money Supply Determination

The money multiplier during the financial crisis of 2008

- The worldwide financial panic in fall 2008 caused the money multiplier to decline sharply, especially because of a sharp rise in the reserve-deposit ratio
- Banks wanted to hold more reserves because the Fed began paying interest on reserves and because the Fed increased the monetary base significantly and banks had few good lending opportunities
- Despite the sharp decline in the money multiplier, the money supply increased because the Fed significantly increased the monetary base by more than the decline in the money multiplier
- The Fed has continued to increase the monetary base, ensuring that the money supply keeps growing

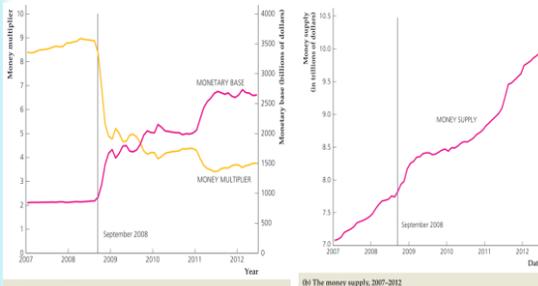
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Figure 14.3 The currency–deposit ratio and the reserve–deposit ratio, 2007–2012



14-14

Figure 14.4 Monetary variables in the financial crisis of 2008



(a) The money multiplier and the monetary base, 2007–2012

(b) The money supply, 2007–2012

http://www.federalreserve.gov/faqs/money_12845.htm

14-15

Monetary Control in the United States

- The Federal Reserve System
 - The Fed began operation in 1914 for the purpose of eliminating severe financial crises
 - There are twelve regional Federal Reserve Banks (Boston, New York, Philadelphia, Cleveland, Richmond, Atlanta, Chicago, St. Louis, Minneapolis, Kansas City, Dallas, and San Francisco), which are owned by private banks within each district



*Hawaii and Alaska are included in the San Francisco district.

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Chapter 14 Lecture - Monetary Policy and the Federal Reserve System

Monetary Control in the United States

- The Federal Reserve System
 - The leadership of the Fed is provided by the Board of Governors in Washington, D.C.
 - There are seven governors, who are appointed by the president of the United States, and have fourteen-year terms
 - The chairman of the Board of Governors has considerable power, and has a term of four years
 - Monetary policy decisions are made by the Federal Open Market Committee (FOMC), which consists of the seven governors plus five presidents of the Federal Reserve Banks on a rotating basis (with the New York president always on the committee)
 - The FOMC meets eight times a year
 - It may meet more frequently if economic developments warrant

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Table 14.2 The Balance Sheet of the Federal Reserve System (Billions of Dollars)

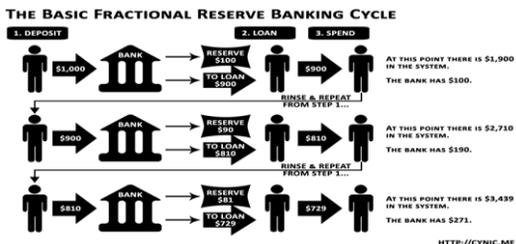
Assets		Liabilities	
Gold	\$ 11.0	Currency	\$ 1117.2
Loans to depository institutions	88.0	Vault cash	58.1
U.S. Treasury securities	1663.9	Held by nonbank public	1059.1
Federal agency debt	91.5	Deposits of depository institutions	1514.0
Mortgage-backed securities	855.0	Other liabilities and net worth	278.7
Other assets	200.5		
Total	\$2909.9	Total	\$2909.9

Addenda
 Reserves = deposits of depository institutions + vault cash = \$1572.1 billion.
 Monetary base = currency held by the nonbank public + reserves = \$2631.2 billion.
Note: Numbers may not add to totals shown owing to rounding.
 Source: Federal Reserve Statistical Releases H.4.1 and H.3. Data are for the week ending July 11, 2012.

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Monetary Control in the United States

- Reserve requirements
 - The Fed sets the minimum fraction of each type of deposit that a bank must hold as reserves
 - An increase in reserve requirements forces banks to hold more reserves, thus reducing the money multiplier



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Monetary Control in the United States

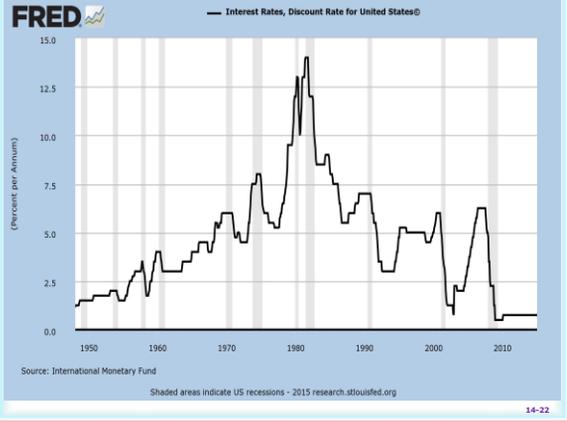
- Discount window lending
 - Discount window lending is lending reserves to banks so they can meet depositors' demands or reserve requirements
 - The interest rate on such borrowing is called the discount rate
 - The Fed was set up to halt financial panics by acting as a lender of last resort through the discount window
 - A discount loan increases the monetary base
 - Increases in the discount rate discourage borrowing and reduce the monetary base

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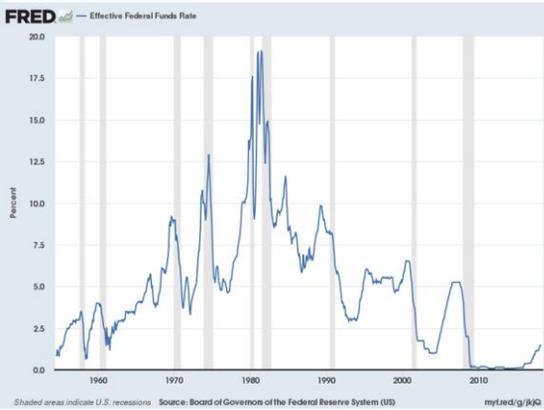
Monetary Control in the United States

- The Fed modified the discount window in 2003
 - Previously, the Fed discouraged banks from borrowing from the Fed and encouraged them to borrow from each other in the Federal funds market
 - The interest rate in the Federal funds market is the Fed funds rate
 - The Fed funds rate is a market rate of interest, determined by supply and demand
 - By contrast, the discount rate is set by the Fed
 - Under the new procedure, the Fed sets the discount rate above the Fed funds rate
 - The change in policy was intended to improve the operation of the discount loan procedure and to reduce the volatility of the Federal funds rate

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Monetary Control in the United States

- Interest rate on reserves
 - In the financial crisis that began in 2008, the Fed began paying interest to banks on their reserves held on deposit at the Fed
 - The interest rate paid on reserves is now a tool that the Fed can use to affect the amount of reserves that banks hold and the money supply



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Chapter 14 Lecture - Monetary Policy and the Federal Reserve System

Factors Affecting the Monetary Base, the Money Multiplier, and the Money Supply

Factor	Effect on monetary base, <i>BASE</i>	Effect on money multiplier, $(cu + 1)/(cu + res)$	Effect on money supply, <i>M</i>
An increase in the reserve-deposit ratio, <i>res</i>	Unchanged	Decrease	Decrease
An increase in the currency-deposit ratio, <i>cu</i>	Unchanged	Decrease	Decrease
An open-market purchase	Increase	Unchanged	Increase
An open-market sale	Decrease	Unchanged	Decrease
An increase in reserve requirements	Unchanged	Decrease	Decrease
An increase in discount window borrowing	Increase	Unchanged	Increase
An increase in the discount rate	Decrease	Unchanged	Decrease
An increase in the interest rate paid on reserves	Unchanged	Decrease	Decrease

Note: The relationship among the money supply, the money multiplier, and the monetary base is $M = [(cu + 1)/(cu + res)]BASE$.

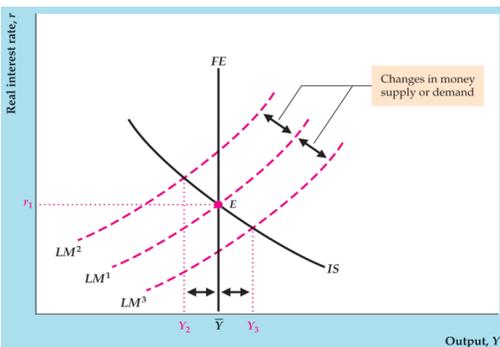
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Setting Monetary Policy Targets

- **Targeting the federal funds rate**
 - The Fed uses intermediate targets to guide policy as a step between its tools or instruments (such as open-market purchases) and its goals or ultimate targets of price stability and stable economic growth
 - Intermediate targets are variables the Fed can't directly control but can influence predictably, and they are related to the Fed's goals
 - Most frequently used are monetary aggregates such as M1 and M2, and short-term interest rates, such as the Fed funds rate
 - The Fed cannot target both the money supply and the Fed funds rate simultaneously
 - Suppose both the money supply and the Fed funds rate were above target, so the Fed needs to lower them
 - Since a decrease in the money supply shifts the *LM* curve up, it will increase the Fed funds rate

14-26

Interest Rate Targeting



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Setting Monetary Policy Targets

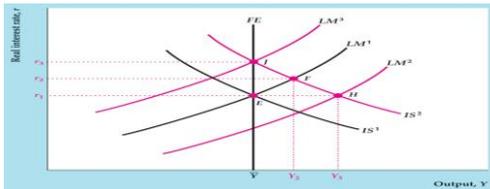
- **Targeting the federal funds rate**
 - This strategy (targeting the Fed funds rate) works well if the main shocks to the economy are to the *LM* curve (shocks to money supply or money demand)
 - The strategy stabilizes output, the real interest rate, and the price level, as it offsets the shocks to the *LM* curve completely
 - But if other shocks to the economy (such as *IS* shocks) are more important than nominal shocks, the policy may be destabilizing, unless the Fed changes the target for the Fed funds rate

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Chapter 14 Lecture - Monetary Policy and the Federal Reserve System

Targeting the Federal Funds Rate

- Suppose a shock shifts the *IS* curve to the right
 - If the Fed were to maintain the real interest rate, it would increase the money supply, thus making output rise even more, which would be destabilizing
 - Instead, the Fed needs to raise the real interest rate to stabilize output
 - Research suggests that the optimal Fed funds rate varies substantially over time
 - But there is substantial uncertainty about what the level of the optimal Fed funds rate is on any given date



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Setting Monetary Policy Targets

- The Fed uses open-market operations to hit its target for the real interest rate; it allows the money supply to be whatever is necessary to hit that target
- The key to good policymaking now becomes shifting the target for the real interest rate in response to shocks to the *IS* curve.
- The advantage to targeting a real interest rate is that shocks to money demand or money supply are offset automatically
- The *IS-LM* model makes monetary policy look easy—just change the money supply to move the economy to the best point possible
- In fact, it isn't so easy because of lags in the effect of policy and uncertainty about the state of the economy, economic models, and expectations

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Making Monetary Policy in Practice

- Lags in the effects of monetary policy
 - It takes a fairly long time for changes in monetary policy to have an impact on the economy
 - Interest rates change quickly, but output and inflation barely respond in the first four months after the change in money growth
 - Monetary policy causes real GDP to decline sharply after about four months, with the full effect being felt about 16 to 20 months after the change in policy
 - Inflation responds even more slowly, remaining essentially unchanged for the first year, then declining somewhat
 - These long lags make it very difficult to use monetary policy to control the economy very precisely
 - Because of the lags, policy must be made based on forecasts of the future, but forecasts are often inaccurate
 - The Fed has made preemptive strikes against inflation based on forecasts of higher future inflation

14-31

Making Monetary Policy in Practice

- Monetary Policy in the Great Recession
 - The housing crisis, which began in 2007, led to losses at financial institutions, but no one thought it would lead to a major financial crisis
 - In the Great Recession, the economy deteriorated rapidly in late 2008 and early 2009; the recession rivaled those of 1973-1975 and 1981-1982, and the recovery from the recession was weak

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Chapter 14 Lecture - Monetary Policy and the Federal Reserve System

Making Monetary Policy in Practice

Monetary Policy in the Great Recession

- The Zero Lower Bound
 - The Fed cut interest rates to near zero by the end of 2008, hitting the zero lower bound
 - In such a liquidity trap, increases in the money supply are held by banks or the public, and have no effect on spending
- The Zero Lower Bound
 - To escape the problems caused by the zero lower bound, the Fed took unusual policy measures from 2009 to 2012
 - It affected interest-rate expectations by using forward guidance
 - The Fed signaled how long it expected interest rates to remain low
 - It hoped to reduce long-term interest rates to stimulate spending
 - The Fed implemented forward guidance first in 2009, again in 2011, and again in 2012

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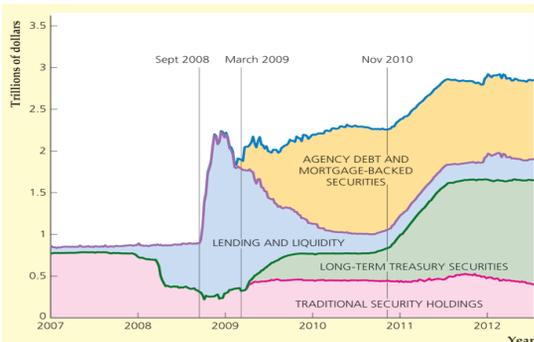
Making Monetary Policy in Practice

Monetary Policy in the Great Recession

- The Zero Lower Bound
 - The Fed altered the composition of its assets through credit easing
 - The Fed bought long-term Treasury securities and debt and mortgage-backed securities issued by Fannie Mae and Freddie Mac
 - Buying long-term Treasury securities was designed to reduce long-term interest rates
 - The Fed altered the composition of its assets through credit easing
 - Buying securities from Fannie Mae and Freddie Mac was designed to support the housing market
 - In 2011, the Fed engaged in Operation Twist (Maturity Extension Program), selling short-term Treasury securities and buying long-term Treasury securities to reduce long-term interest rates to stimulate spending

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The Asset Side of the Fed's Balance Sheet, 2007-2012 Quantitative Easing



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Making Monetary Policy in Practice

- Application: The financial crisis of 2008
 - Financial institution troubles, which began in 2007, represented a shock, shifting the *IS* curve down and to the left as housing investment declined
 - Banks began to reduce credit availability because of worries that some financial institutions were no longer viable because of losses on mortgage-backed securities; in response, the Fed made credit available through special lending facilities
 - The panic led to a sharp decline in investment, shifting the *IS* curve further down and to the left, so the Fed cut its interest rate target sharply, trying to shift the *LM* curve down and to the right and the *LR* curve down. The Federal government introduced the TARP program to inject capital into banks and the FDIC raised its insurance coverage to prevent bank runs

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Chapter 14 Lecture - Monetary Policy and the Federal Reserve System

The Conduct of Monetary Policy: Rules Versus Discretion

- Monetarists and classical macroeconomists advocate the use of rules
 - Rules make monetary policy automatic, as they require the central bank to set policy based on a set of simple, prespecified, and publicly announced rules
 - Examples of rules
 - Increase the monetary base by 1% each quarter
 - Maintain the price of gold at a fixed level

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The Conduct of Monetary Policy: Rules Versus Discretion

- Monetarists and classical macroeconomists advocate the use of rules
 - The rule should be simple; there shouldn't be much leeway for exceptions
 - The rule should specify something under the Fed's control, like growth of the monetary base, not something like fixing the unemployment rate at 4%, over which the Fed has little control
 - The rule may also permit the Fed to respond to the state of the economy

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The Conduct of Monetary Policy: Rules Versus Discretion

- Most Keynesian economists support discretion
 - Discretion means the central bank looks at all the information about the economy and uses its judgment as to the best course of policy
 - Discretion gives the central bank the freedom to stimulate or contract the economy when needed; it is thus called *activist*
 - Since discretion gives the central bank leeway to act, while rules constrain its behavior, why would anyone suggest that the central bank follow rules?

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The Conduct of Monetary Policy: Rules Versus Discretion

- The monetarist case for rules
 - *Monetarism* is an economic theory emphasizing the importance of monetary factors in the economy
 - The leading monetarist is Milton Friedman, who has argued for many years (since 1959) that the central bank should follow rules for setting policy

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Chapter 14 Lecture - Monetary Policy and the Federal Reserve System

The Conduct of Monetary Policy: Rules Versus Discretion

- The monetarist case for rules
 - Friedman’s argument for rules comes from four main propositions
 - Proposition 1: Monetary policy has powerful short-run effects on the real economy. In the longer run, however, changes in the money supply have their primary effect on the price level
 - This proposition comes from Friedman’s research with Anna Schwartz on monetary history
 - Friedman and other monetarists think monetary policy is a main source of business cycles

14-41

The Conduct of Monetary Policy: Rules Versus Discretion

- The monetarist case for rules
 - Proposition 2: Despite the powerful short-run effect of money on the economy, there is little scope for using monetary policy actively to try to smooth business cycles
 - First, the information lag makes it difficult to know the current state of the economy
 - Second, monetary policy works with a long and variable lag, so it isn’t clear how to set policy quantitatively
 - Third, wage and price adjustment is fast enough that by the time a change in policy begins to affect the economy, it may be moving the economy in the wrong direction, thus destabilizing the economy

14-42

The Conduct of Monetary Policy: Rules Versus Discretion

- The monetarist case for rules
 - Proposition 3: Even if there is some scope for using monetary policy to smooth business cycles, the Fed cannot be relied on to do so effectively
 - Friedman believes the Fed responds to political pressure and tends to stimulate the economy in election years
 - Historically, monetary policy has tended to destabilize, rather than stabilize, the economy; so eliminating monetary policy as a source of instability would improve macroeconomic performance

14-43

The Conduct of Monetary Policy: Rules Versus Discretion

- The monetarist case for rules
 - Proposition 4: The Fed should choose a specific monetary aggregate (such as M1 or M2) and commit itself to making that aggregate grow at a fixed percentage rate every year
 - The Fed needs to give up activist, or discretionary, policy completely and follow a simple rule
 - Friedman prefers a constant money growth rule, since the money supply is controllable by the Fed and the Fed would not follow destabilizing monetary policies
 - To reduce inflation to zero, the money growth target should be gradually lowered over time

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Chapter 14 Lecture - Monetary Policy and the Federal Reserve System

The Conduct of Monetary Policy: Rules Versus Discretion

- Rules and central bank credibility
 - New arguments for rules suggest that rules are valuable even if the central bank has a lot of information and forms policy wisely
 - The new arguments suggest that rules improve the credibility of the central bank
 - The credibility of the central bank influences how well monetary policy works
 - How does a central bank gain credibility?
 - One way to get credibility is by building a reputation for following through on its promises, even if it's costly in the short run
 - Another, less costly, way is to follow a rule that is enforced by some outside agency

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The Conduct of Monetary Policy: Rules Versus Discretion

- Keynesians argue that there may be a trade-off between credibility and flexibility
 - To be credible, a rule must be nearly impossible to change
 - But if a rule can't be changed, what happens in a crisis situation?
 - For example, if a rule is based on economic relationships that change suddenly, then the lack of flexibility may be very costly
 - So a rule may create unacceptable risks

14-46

The Conduct of Monetary Policy: Rules Versus Discretion

- The Taylor rule
 - John Taylor of Stanford University introduced a rule that allows the Fed to take economic conditions into account
 - The rule is
$$i = \pi + 0.02 + 0.5y + 0.5(\pi - 0.02), \quad (14.6)$$
where i is the nominal Fed funds rate, π is the inflation rate over the last 4 quarters, y = the percentage deviation of output from full-employment output
 - The rule works by having the real Fed funds rate ($i - \pi$) respond to:
 - y , the difference between output and full-employment output
 - $\pi - 0.02$, the difference between inflation and its target of 2 percent
 - If either y or π increase, the real Fed funds rate is increased, causing monetary policy to tighten (and vice-versa)

14-47

The Conduct of Monetary Policy: Rules Versus Discretion

Other ways to achieve central bank credibility besides targeting money growth or inflation

- Appointing a "tough" central banker
- Changing central bankers' incentives
- Increasing central bank independence

What is Happening in the World?

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