Announcements

Online Later Today

- Midterm 2 guide & Problem Set 4 Key

Midterm 2

- lecture, section, problems set, past exam, text (see guide)Extra OH F 1-3

Problem Set 5

- Online later in week, New Due Date: 8/8 5P
- Coverage: Lecture 7 & Lecture 12 topics
- Make photocopy & submit to mail box of GSI (5th floor)

Practice Problems Lecture 11

From Section:

Chapter 23: Problems 1,3,6

Chapter 27: Problem 3, 5,6, 8

(Can try others in chapter 27)

Continuing Last Time Automatic Stabilizer

Chapter 26, 10 d

t=0.25, Cbar=500,Ip=1500,G=2000

NX=0, c=0.8

Multiplier = 1/1 - 0.8(1-0.25)=1/1-0.6=2.5

Set Y=PAE, Solve for Y

Y=2.5 x (4000)=10,000

Continuing Last Time Automatic Stabilizer

Past Midterm Question

- Assume the economy is characterized by the simple SR Keynesian model and that
- G=+ G_S, where is autonomous and automatic stabilizer $G_S = -k(Y-Y^*)$ with $0<k<1$.
- 1) What is the purpose of this automatic stabilizer?
- set level G_s, so G increases as Y decreases during rec gap

Continuing Last Time Automatic Stabilizer

Past Midterm Question

- If , and all other PAE components except C and G are autonomous, what is the income-expenditure multiplier? Is it lower or higher than if all of G were autonomous?
- 1/[1-(c-k)].
- So c-k < c so 1/1-c+k < 1/1-c .
- Multiplier with stabilizer smaller.

Money and Its Uses

Medium of Exchange

- An asset used in purchasing goods and services

Unit of Account

- A basic measure of economic value

Store of Value

- An asset that serves as a means of holding wealth

Components of M1 and M2, July 2002 (billions of dollars)

M1		**1,197.8**
Currency	615.1	
Demand deposits	303.8	
Other checkable deposits	270.3	
Travelers' checks	8.6	
M2		**5,641.2**
M1	1,197.8	
Savings deposits	2,552.8	
Small-denomination time deposits	920.8	
Money market mutual funds	969.8	

Money: M1 & M2

M1

currency outstanding and checking account balances

M2

M1 plus some additional assets that are usable in making payments but at greater cost

Econ 1: M1

Fractional Reserves System Creation of Money

Bank Reserves

Cash or similar assets held by banks

Use for depositor withdrawals and payments

Consolidated Balance Sheet of Gorgonzolan Commercial Banks

Initial Deposit: 1M Guilders

Assets		Liabilities	
Currency (= reserves)	1,000,000 guilders	Deposits	10,000,000 guilders
Loans to farmers	9,000,000 guilders		

Observations
Lending will continue until the reserve to deposit ratio = 10%
When loans = 9,000,000 guilders
- **Deposits = 10,000,000 guilders**
- **Reserves = 1,000,000 guilders**
- **Reserve to deposit ratio = 10%**
- **No excess reserves**

The money supply = 10,000,000 guilders

Fractional Reserve System:

Money supply grows as a multiple of the reserves

Gorgonzola: with a 10% reserve-deposit ratio, 1 guilder in reserve can support 10 guilders in deposit.

Commercial Banks and the Creation of Money

Bank deposits =
bank reserves / desired reserve-deposit ratio

eg. 100 / .10=1000

Money Supply
Both Currency and Deposits

Gorgonzola residents

- 500,000 guilders as currency
- Deposit 500,000 in the banks
- Reserve-deposit ratio = 10%
- Bank deposits = 500,000/.10 = 5,000,000

Money supply = currency + bank deposits
5,500,000 = 500,000 + 5,000,000

The Money Supply at Christmas

- Currency = 500
- Bank reserves = 500
- Reserve-deposit ratio = 0.20

- Money supply = 500 + 500/.20 = 500 + 2,500 = 3,000

The Money Supply at Christmas

- If Xmas shoppers withdraw 100
- Money supply = 600 + 400/.20 = 600 + 2,000 = 2,600

- $1 reduction in reserves reduces money supply by $5.
- With withdrawals, money supply contracts by a multiple of the withdrawal.

The Federal Reserve System

Responsibilities

- Monetary policy

- Oversight and regulation of financial markets

The Federal Reserve System

The History and Structure of the Federal Reserve System

- Founded by the Federal Reserve Act of 1913
- The primary mission of the Fed is to promote economic growth, low inflation, and stable financial markets.

The Federal Reserve System

The Structure

- 12 regional Federal Reserve banks
  - Assess economic conditions in their regions to assist in national policymaking
  - Provide service to the commercial banks in their districts

The Federal Reserve System

The Structure
- Board of Governors
  - Seven governors
    - Appointed by the president to 14 year staggered terms
  - Chairman of the Board of Governors
    - Selected by the president from the governors
    - Serves a four year term

The Federal Reserve System

The Structure
- Federal Open Market Committee (FOMC)
  - Members include:
    - The seven Fed governors
    - President of the New York Fed
    - Four presidents, chosen on a rotating basis, from the remaining Federal Reserve Banks
  - Determines monetary policy

The Federal Reserve System

Controlling the Money Supply:

The Fed controls the money supply by changing the supply of bank reserves.

The Federal Reserve System

Controlling the Money Supply: Open-Market Operations
- Open-market operations are the most important method of changing the supply of bank reserves.

The Federal Reserve System

Controlling the Money Supply: Discount Window Lending
- Banks can borrow reserves from the Fed.
- Discount window lending
  - The lending of reserves to commercial banks
- The discount rate
  - The interest rate charged on these loans

The Federal Reserve System

Controlling the Money Supply: Changing Reserve Requirements
- The Fed sets the reserve-deposit ratio
  - Called the reserve requirement
- Reduction: allow the money supply to increase.
- Increase: can reduce the money supply.

Open Market Operations

Increasing The Money Supply

- Fed purchases government bonds from the public.
- People deposit the funds they get from their sale of bonds to the Fed.
- Increase in deposits increase bank reserves.

The Federal Reserve System

Increasing The Money Supply

- The increase in reserves will lead to an expansion of the money supply as banks make more loans.

  The change in the money supply is a multiple of the change in reserves.

The Federal Reserve System

Reducing The Money Supply

- Fed sells government bonds to the public.
- Fed presents the checks from the sale of the bonds to the banks for payment.
- Bank's reserves will fall when checks clear
- Money supply will fall by a multiple of the decrease in reserves.

The Federal Reserve System

Open-Market Purchase

- Purchase of government bonds from the public by the Fed for the purpose of increasing the supply of bank reserves and the money supply

The Federal Reserve System

Open-Market Sale

- Sale by the Fed of government bonds to the public for the purpose of reducing bank reserves and the money supply

(Has a store of bonds on hand for this)

The Federal Reserve System

Example

- Increasing the money supply by open-market operations
  - Currency = 1,000 shekels
  - Reserves = 200
  - Reserve-deposit ratio = 0.2

  Fed does Open Market _____

The Federal Reserve System

Example

- Increasing the money supply by open-market operations
  - Money supply = 1,000 + 200/0.2 = 2,000 shekels

For Example: Open market purchase = 100

Reserves increase to 300

Money supply = 1,000 + 300/0.2 = 2,500 shekels

Summary

A fractional reserve banking system

enables creation of deposits that are a multiple of level of reserves. This enables creation of money supply.

The Federal Reserve Bank (central bank of the U.S.) influences the level of the money supply by influencing the level of reserves

primarily via open market operations.

Money Supply & Interest Rate

FOMC controls money supply

Supply of money determines the interest rate, given the demand for money.

Demand for Money

Money is an asset, used for transactions

.

Money is a store of value, used for holding wealth.

Demand for Money

Ways to hold wealth:

- Cash
- Checking accounts
- Bonds
- Stocks
- Collectables

Demand for Money= Amount of wealth an individual chooses to hold in the form of money (cash & checking accounts)

Example

- Louis' wealth = $10,000
  - Holds $10,000 in cash
  - His demand for money = $10,000

Example

Louis' wealth = $10,000

If he allocates his wealth to:

$1,000 cash
$2,000 checking account
$2,000 government bonds
$5,000 rare stamps

His demand for money = _____

Consuelo's Balance Sheet

Assets		Liabilities	
Cash	$80	Student loan	$3,000
Checking account	1,200	Credit card balance	250
Shares of stock	1,000		
Car (market value)	3,500		
Furniture	500		
Total	$6,280		$3,250
		Net Worth	$3,030

- Demand for money = $1,280
- To hold more money
  - Sell stocks
  - Credit card cash advance

- To hold less money
  - Buy stocks
  - Reduce her credit card balance

Money & Interest Rates

The Demand for Money

How much money to hold?

Benefit of holding money used to make transactions	vs.	Cost of holding money; the opportunity cost of foregone interest

Bonds, Interest Rate, Money

Buy bonds at face value to earn some yield coupon rate establishes coupon payments

Suppose, don't want to hold on to bond for full term. Sell. Then WTP of buyer determined by prevailing interest rates (yields)

r inc means P bonds falls.

Suppose Demand bonds inc. P bonds rise. Yields, interest rates fall.

Suppose interest rates high and expected to fall. Means expect bond prices to rise. Demand for bonds high, Demand for money low.

Suppose interest rateslow and expected to rise. Means expect bond prices to fall. Demand for money high, demand forbonds low.

Macroeconomic Factors that Affect the Demand for Money

Cost of holding money

nominal interest rate (*i*)

The quantity of money demanded is inversely related to the nominal interest rate

Macroeconomic Factors that Affect the Demand for Money

Benefit of holding money

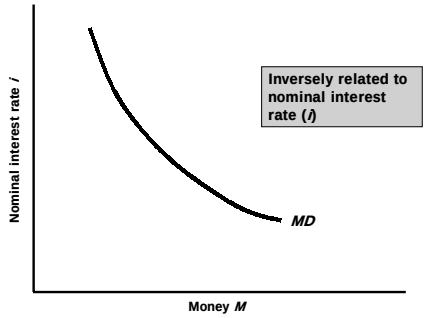
Real income or output (*Y*)

An increase in real income will increase the demand for money and vice versa

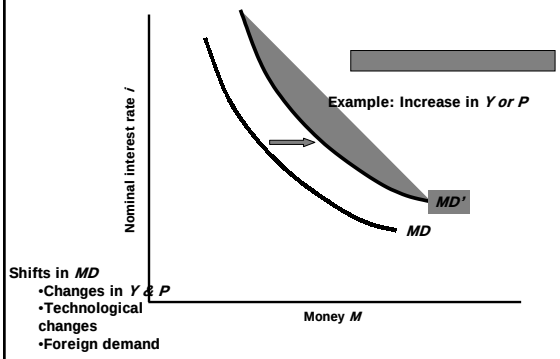
The price level (*P*)

The higher the price level, the greater the demand for money and vice versa

The Money Demand Curve



MD: Shifts



Shifts in *MD*
- Changes in *Y & P*
- Technological changes
- Foreign demand

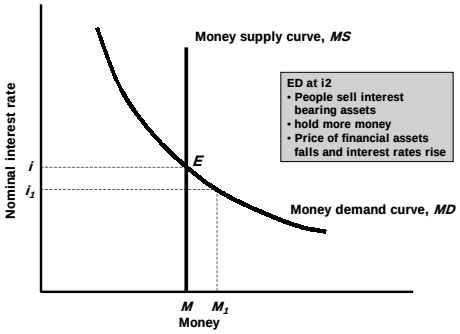
Supply of Money and Money Market Equilibrium

Fed controls the supply of money with open-market operations.

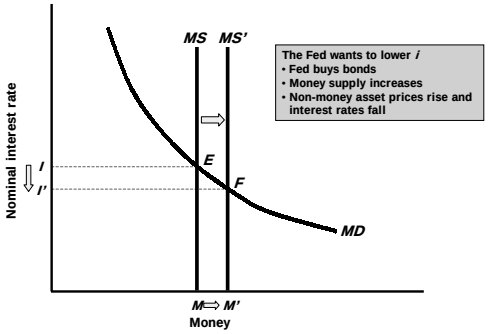
Open-market purchase of bonds increases the money supply.

Open-market sale of bonds decreases the money supply.

Money Market



The Fed Lowers the Nominal Interest Rate



Supply of Money and Money Market Equilibrium

Fed wants to raise *i*

Fed sells bonds
The money supply falls
Creates a shortage of money
People sell non-money assets
Non-money asset prices fall and the interest rate increases

The Federal Reserve and Interest Rates

How the Fed Controls the Nominal Interest Rate

The Fed cannot set the interest rate and the money supply independently.

Fed: Money Supply and Interest Rates

1) Set MS means set i. Set i means set MS.

2) Advantages of Targeting the Interest Rate

a. Effects of monetary policy work via interest rates

b. Public familiar with interest rates

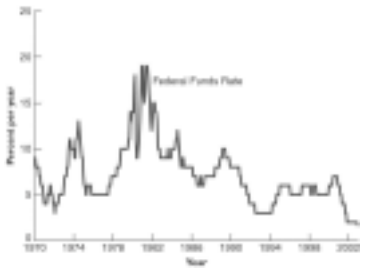
c. Interest rates can be monitored easily

Federal Funds Rate

Interest rate commercial banks charge each other for very short-term (usually overnight) loans (ED/ES reserves)

Fed often makes policy announcements using this rate. Rate is watched closely.

The Federal Funds Rate, 1970-2002



Current Federal Funds Rate = _____%

The Federal Reserve and Interest Rates

Can the Fed Control the Real Interest Rate?

The real interest rate = nominal interest - inflation

$$r = i - \pi$$

Can the Fed Control the Real Interest Rate?

The Fed controls the nominal interest rate.

Inflation adjust slowly to changing economic conditions.

So, changing nominal rate changes real rate by about same amount

Short-run impact of Fed policy

- Prices do not vary greatly in the short run, so inflation not likely to change much
- Real rate change determined by nominal rate change
- Real interest influences consumption and investment.
- Fed's ability to influence spending is strongest in the short run.

- Prices do adjust to changing economic conditions
- Real interest rate is determined by the balance of savings and investment.
- Fed has less effect on spending in the long run.

How much control does the Fed have over spending?

Federal funds rate may influence, but does not *control* other interest rates which influence spending.

Monetary policy effects not perfectly predictable

The Fed can control *i* and *r* in the short run.

PAE is influenced by *r*.

- Lower *r* increases *PAE*
- Higher *r* reduces *PAE*

Fed can stabilize output and employment.

PAE & r

Real interest rates and consumption

- High real interest rates increase the incentive to save.
- If savings increase, consumption decreases.
- **High real interest rates reduce consumption**.

PAE & r

Real interest rates and investment spending

- High real interest rates increase the cost of investment spending.
- The increased cost reduces profitability of investment spending and investment falls.
- **High real interest rates reduce investment spending**.

Example (Algebraic)

Assume:

$C = 640 + .8(Y - T) - 400r$

$-400r$ means % increase in r reduces C by 4 units

$I^P = 250 - 600r$

$-600r$ means 1% increase in r reduces I by 6 units

$G = 300$

$NX = 20$

$T = 250$

Example

$PAE = C + I^P + G + NX$

$$PAE = [640 + 0.8(Y - 250) - 400r] + [250 - 600r] + 300 + 20$$

$$PAE = \underbrace{[640 - 0.8 \times 250 - 400r) + (250 - 600r) + 300 + 20]}_{\text{Autonomous spending depends on } r} + \underbrace{0.8Y}_{\text{Induced spending depends on } Y}$$

$$PAE = [1{,}010 - 1{,}000r] + 0.8Y$$

Example

The real interest rate and short-run equilibrium output

Assume the Fed sets the r at 0.05 (5 percent)

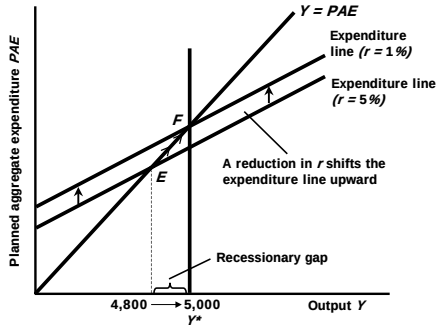
$$PAE = [1{,}010 - 1{,}000 \times (0.05)] + 0.8Y$$

$$PAE = [1{,}010 - 50] + 0.8Y$$

$$PAE = 960 + 0.8Y$$

The Fed Fights A Recession

- **Multiplier = 5**
- **Outpt gap = 200**
- **Fed wants to increase *PAE* by 200 / 5 = 40**
- **1,010 – 1,000*r***
- **1% change in *r* will change C by 10**
- **Reduce *r* to 0.01**



Economic Naturalist 27.4

How did the Fed respond to recession and the terror attacks in 2001?

Slowing economy in 2000

Terrorist attacks in 2001

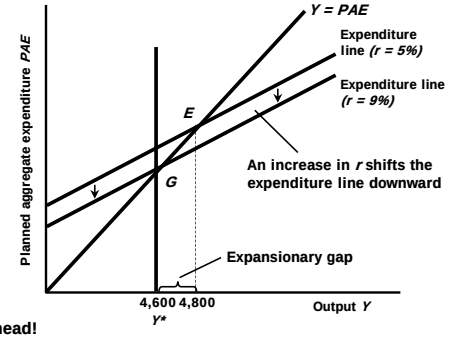
December 2000, federal funds rate = 6.5%

Fed cut fed funds rate 0.5 percentage points in January, 2001

(Week after September 11th, ***temporary*** reduction in the federal funds rate to 1.25%)

9 cuts in 2001 by Nov 2002 rate=1.25%

The Fed Fights Inflation



Do In head!

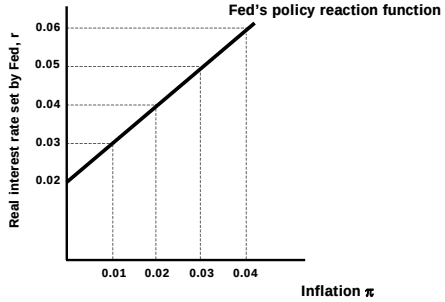
Policy Reaction Function: Taylor rule

$$r = 0.01 - 0.5\left(\frac{Y^* - Y}{Y^*}\right) + 0.5\,\pi$$

The Fed responds to output gaps and inflation:

- If the output gap = 1% of *Y* (0.01)*, the Fed will lower *r* by 0.005 or 0.5 percentage points.
- If inflation rises 1% (0.01), the Fed will raise *r* by 0.005 or 0.5 percentage points.

An Example of A Fed Policy Reaction Function



Policy Reaction Function

- A determinant of the Fed's policy reaction function is its objective for inflation.
- The slope of the reaction function indicates how aggressive the Fed will pursue its target.

Summary

Fed enacts monetary policy by changing MS (nominal interest rates)

In SR, real rates and nominal rate change about same, given inflation

Fed Fights Recession: Open market purchases of bonds increase MS, lower r. Lower r means C and I higher, so PAE rises to close output gap.