Intro to Money and Banking

Outline

- Inflation and interest rates
- US banking system. . .
- And its interaction with the Federal Reserve System.

Intro to Money and Banking—Economics of Global Business, Revised: April 17, 2018

Inflation and Interest Rates I

- Nominal interest rate i
  - Not adjusted for inflation
- Real interest rate r
  - Adjusted for inflation $r = i - \pi$
- This implies the Fisher equation $i = r + \pi$
  - Real forces determine r, i.e. savings = investment in Chapter 3. (again the classical dichotomy here)
  - Hence, inflation increases the nominal interest rate, one for one.

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Inflation and Interest Rates II

- In reality, interest rates agreed to between borrowers and lenders are based on future inflation.
- Some notation
  - π = actual inflation rate (not known until after realized)
  - $E\pi$ = expected inflation rate. What savings and borrowing decisions are based on.
- Two real interest rates:
  - $i - E\pi =$ **ex ante** real interest rate. What people expect to earn in real terms.
  - $i - \pi =$ **ex post** real interest rate. What people actually earn after inflation is realized
- Question: Who wins/loses from unexpected inflation?

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US Banking System and Money

- United States banking system in a nut-shell:
  - All banks must hold reserves at the FED
  - The quantity of reserves required to be held at the FED is only a fraction of deposits. This is called "fractional reserve banking."
- Fractional reserve banking gives rise to a money multiplier.
  - The money supply (say M1) is a multiple of the monetary base (reserves at the FED).

$$M = m \times B \tag{1}$$

    where M is the money supply, B is the monetary base, m is the money multiplier.
  - Multiplier m relates to the ratio of reserves held to deposits. If more reservers are held relative to deposits (this implies less lending), multiplier goes down, money supply will go down.

How is the Money Multiplier Determined

- Depends on the amount of reserves that a bank holds.
- Some defninitions. . .
  - Reserves: the portion of deposits that banks have not lent.
  - 100-percent-reserve banking: a system in which banks hold all deposits as reserves.
  - Fractional-reserve banking: a system in which banks hold a fraction of their deposits as reserves
- Next couple of slides: how the amount of money depends on the banking system.

100 percent Reserve Banking

- Initially, currency = 1000, demand deposits = 0, money = 1000.
- In this example (and the others) assume the households deposit all currency at the bank.

First Bank Balance Sheet

Assets	Liabilities
Reserves 1,000	Deposits 1,000

- After deposit, currency = 0; deposits = 1000, money = 1000.
- 100%-reserve banking has no impact on size of money supply.

Fractional Reserve Bank #1

- Suppose banks only hold 20% of deposits in reserves; loan out the rest.

First Bank Balance Sheet

Assets	Liabilities
Reserves 200	Deposits 1,000
Loans 800	

- After deposit, currency = 800; deposits = 1000, money = 1800.
- The bank "created" money!

Fractional Reserve Bank #2

- Suppose the borrower deposits the 800 in Secondbank.

Secondbank Balance Sheet	
Assets	Liabilities
Reserves 160	Deposits 800
Loans 640	

- After deposit, currency = 640; deposits = 1800, money = 2440.
- More money is "created"

Fractional Reserve Bank #3

- Suppose the borrower deposits the 800 in Thirdbank.

Thirdbank Balance Sheet	
Assets	Liabilities
Reserves 128	Deposits 640
Loans 512	

- After deposit, currency = 512; deposits = 2440, money = 2952.
- Even more money is "created"

Total Amount of Money

- Continuing this process gives us...

$$\text{Money Supply} = \frac{1}{\text{fraction of reserves held}} \times \text{Monetary Base}$$

- In this example, fraction of reserves held equals 0.20.
- Monetary base corresponds with
  - Initial amount of money created, 1000
  - Total amount of reserves held in the system, 1000.
- Total money supply is $5000 = \frac{1}{0.20} \times 1000$

Money Multiplier

- The money multiplier is

$$\frac{1}{\text{fraction of reserves held}}$$

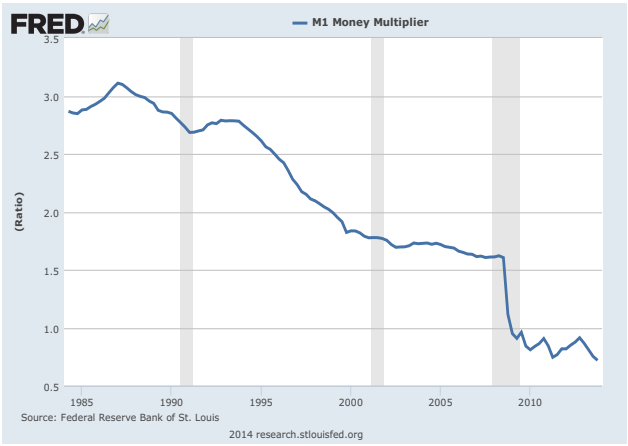
- It tells us how much money is "created" by the banking system.
- A couple of things ...
  - If we have 100 percent reserve banking, the multiplier = one.
  - Can be easily modified for how often people hold cash versus deposits. Book goes into depth about this. We won't.
  - Note new wealth is not created from this process. Why not?

Case Study: Great Depression

- From 1929 to 1933:
  - over 9,000 banks closed,
  - money supply fell by 28%
  - Why? Banks became very cautions and increased fraction of reserves held, this reduced the money multiplier.

	August 1929	March 1933	% Change
Money Supply (M)	26.5	19.0	-28.3 %
Monetary Base (B)	7.1	8.4	18.3 %
Money multiplier (m)	3.7	2.3	-37.8 %

Money Multiplier



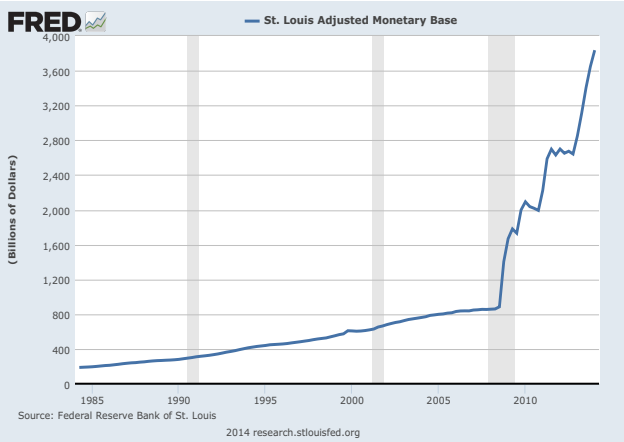
Tools of Monetary Policy

- Open market operations
  - To increase the base, the Fed buys short-term government bonds, paying with reserves/dollars.
  - This reduces short-term nominal interest rates. The policy target is the FED's desired interest rate.
  - Traditional open market operations are constrained by the "zero lower bound" (nominal interest rates must be greater than zero).
- The discount rate
  - The interest rate the Fed charges on loans to banks
- Reserve requirements
  - Regulations that impose a minimum reserve-deposit ratio.

NEW Tools of Monetary Policy

- Quantitative Easing
  - FED buys long-term govt bonds and mortgage-backed securities.
  - Several ideas here
    1. Lower long-term interest rates and mortgage rates
    2. Path to improve banks balance sheets through asset exchange
    3. Signal commitment to action.
- Interest on reserves
  - The FED pays interest on bank reserves deposited with the FED. To increase reserves, the FED could pay a higher interest rate on reserves.
  - Escape path for the FED from QE.
  - They have no idea how this thing will actually work.
- Negative nominal interest rates.

Monetary Base in the US



Open Market Operations

- The treasury issues debt: bills, bonds, etc
- Central bank manages the money supply via reserves (i.e. the monetary base, B)
- Balance sheets for
  - Treasury
  - Central bank
  - Private banks

Open Market Operations

Treasury

Assets		Liabilities	
		T-Bills	200

Central bank

Assets		Liabilities	
T-Bills	20	Reserves	20

Banks

Assets		Liabilities	
Reserves	20		
T-Bills	180		

Open Market Operations

Treasury

Assets		Liabilities	
		T-Bills	200

Central bank

Assets		Liabilities	
T-Bills	20	Reserves	20
	+40		+40

Banks

Assets		Liabilities	
Reserves	20		
T-Bills	180		
Reserves	+40		
T-Bills	-40		

Open Market Operations Summary

- Central bank buys bonds in return gives money/reserves (i.e. an increase in the monetary base).
- Increases in the monetary base leads to an increase in the money supply as banks lend out their reserves.
- Implications for nominal interest rates:
  - Fact: Bond prices move opposite of bond yields/interest rates. Ask your Foundations of Finance professor why.
  - As the FED buys bonds, it bids up the price, pushes down interest rates.
  - This is an example of a loosening of monetary policy.
  - How would it work if the FED sold bonds?