MONEY

Will detail how interest rates are determined and how monetary forces fit into macro model

Definition of money: any asset that serves the following functions:

Medium of Exchange - acceptable in transactions
Unit of Account - prices stated in terms of this
Store of Value - value can't fluctuate wildly
- in a **hyperinflation** - money stops serving as a store of value - revert to barter

If there were no money, would be **barter system** - where goods are traded for other goods
- very inefficient: (1) takes time to get into acceptable transactions; (2) very many prices (one for every good in terms of every other good)

For macroeconomics, we look at **monetary aggregates**, groups of assets that serve as money
- differ in terms of **liquidity** - the ease by which an asset can be converted into money without loss of value

currency - most liquid asset
stocks, bonds and real estate - far less liquid (lose some $ converting these to cash)

Major monetary aggregates:

M1: currency + demand deposits + traveler's checks + NOW accounts
- most liquid definition of money

M2: M1 + savings accounts (time deposits) + money market accounts (checking+savings)
- highly liquid, not as liquid as M1
- more tied to interest rates than M1

To see how M1 or M2 alter macroeconomic activity, *need to see how these affect interest rates*
- interest rates determine by supply & demand - for money

Money Demand: called "liquidity preference" in Keynesian model
- analyzed in terms of "motives" for holding money

Transactions Motive - since we don't get paid every day but engage in transactions every day, we hold money to bridge the gap between the expenditure and receipt of money
- this determined primarily by level of income (Y)

Precautionary Motive - money holdings related to unexpected events (ex: car breaks down)
- determined primarily by income

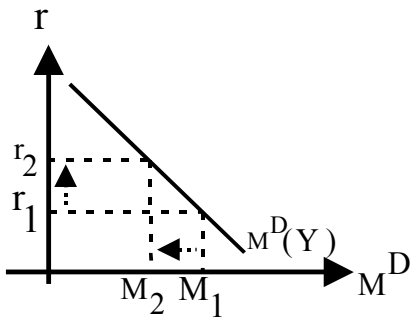
Speculative Motive - people decide how much money to hold *partly based on interest rates*
- interest rate = opportunity cost of holding money (in terms of interest income foregone)

If interest rates rise, cost of holding money rises => people hold less money in *non-interest bearing uses* and move some money into interest bearing places (ex: savings accounts)

Putting this together:
- real demand for money function M^D:

M^D = f(interest rate (r), real income (Y))

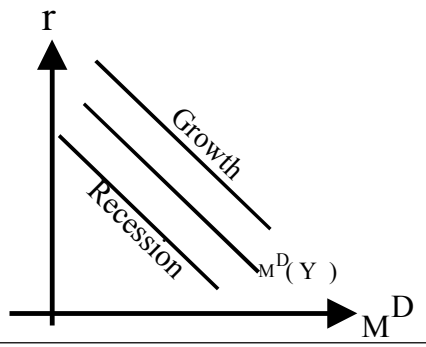
r = "price" of money (its opportunity cost)
M^D - downward sloping with respect to r



- if ↑r from r_1 to r_2, cost of holding $ rises, people hold less of $ as components of M1 or M2 (put into less liquid, interest-earning assets)

Location of M^D - depends on Y
- given r, if ↑Y, MD shifts *right* => ↑M^D

M^D is related to Y - the level of economic activity
=>*Another automatic linkage to economic growth*
↑Y (economic growth) → ↑M^D (automatically)



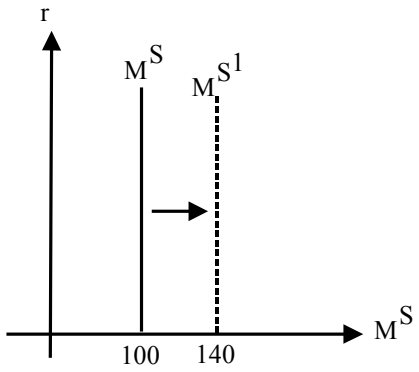
Money Demand automatically rises during recoveries (or when growth accelerates) and falls in recessions (or with slower growth)

Money Supply (M^S)
- the value of M1 or M2 in existence
- largely controlled by the Federal Reserve Bank (FED) thru monetary policy - alters bank reserves

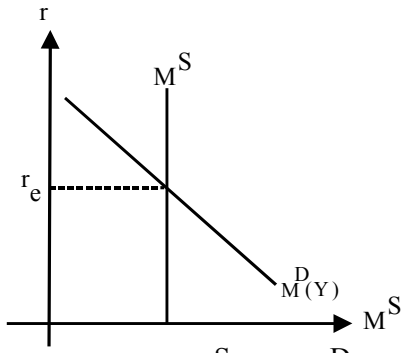
We assume that the M^S *not* related to Y or r

=> when graphed relative to r - is vertical (parallel to r axis, since $M^S \neq f(r)$)

- BUT - M^S curve *can* shift (ex: actions by FED)



<u>Money Market Equilibrium</u>
- requires market clearing: $M^D = M^S$

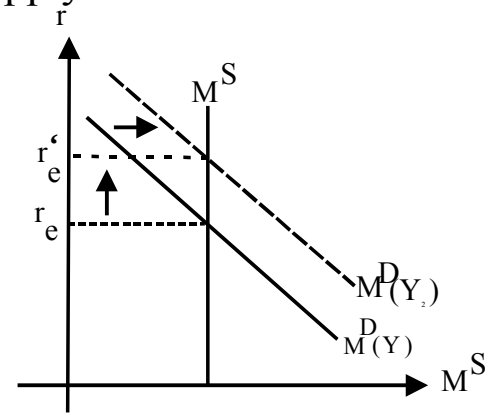


- r_e changes when either M^S or M^D changes

Using this simple model, we will illustrate how people often misjudge what the FED is doing
- use two different scenarios

(1) Economic growth occurs and the FED keeps the money supply constant

- economic growth => $\uparrow M^D$
- money supply curve - same



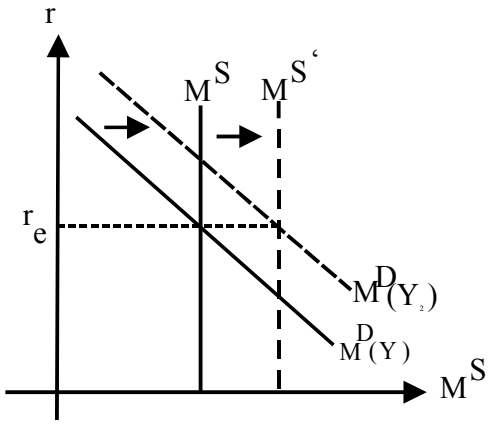
=> r_e rises *automatically*

People conclude - since r↑, FED *must be* tightening the money supply and restricting credit
- FALSE - FED has not touched the M^S
- *it is economic growth that has raised r*

Economic growth tends to result in higher interest rates (since M^D rises)

(2) Economic growth and FED acts to keep r constant

- economic growth raises M^D (same as before)
- to keep r constant, FED must $\uparrow M^S$



People conclude - since r is constant, FED has done nothing
- FALSE - FED had to $\uparrow M^S$
- with economic growth, must $\uparrow M^S$ as $M^D\uparrow$ to keep r constant

- as (1) and (2) show: FED can either stabilize the M^S or r, but *not* both

Summary:

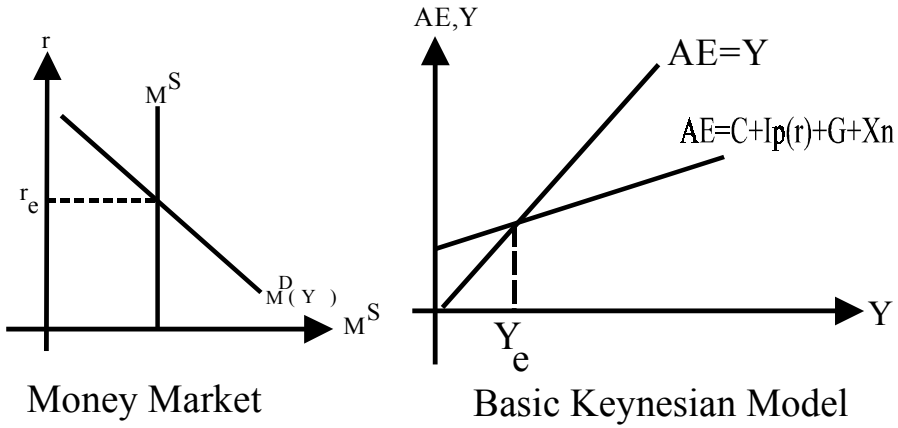
1. When the economy is growing, interest rates will tend to rise - a normal event
2. Interest rates can rise (or fall) *even if* the FED does nothing

FED Operating Procedure - today - control money supply growth rate to keep growth acceptable and not to risk inflation

Money Market and the Basic Keynesian Model

Money Market: thru the supply and demand for $, interest rates are determined
Product Market: aggregate expenditure (and AD) related to interest rates - given these, get Y_e

Recall: Ip = f(r, expected future profit, taxes)
- this links AE to r and the money market
=> AE = C + Ip(r) + G + X_n

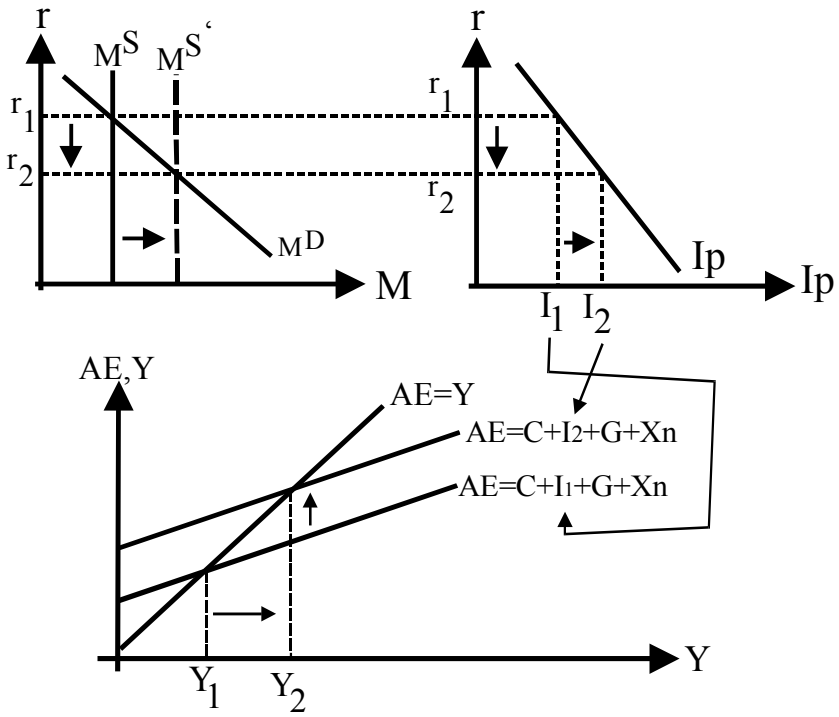


Money Market | Basic Keynesian Model

As r changes, interest-sensitive parts of AE change
- Consumer durables, Planned investment
=> new Y_e

Relationship Between Changes in MS and Y_e

- Keynesian Monetary Transmission Mechanism



Expansionary Monetary Policy => $\uparrow M^S$

$\uparrow M^S \rightarrow \downarrow r \rightarrow \uparrow Ip$ to $I_2 \rightarrow \uparrow Y_e$

$(\uparrow AE) \leftarrow$multiplier$\rightarrow \uparrow Y_e$

How does the M^S increase?

- FED, via monetary policy, alters bank reserves

- deals with how banks create money

US - has **fractional reserve** banking system

=> banks do not have to hold all their deposits on hand - must only hold a fraction of these

- the fraction set by FED - **reserve requirement**
- anything above this - **excess reserves** - available for investment

Banks - lend excess reserves and earn interest income or can buy stocks and bonds

To illustrate this, assume $1,000 deposit into Bank A, and a reserve requirement of 20%

<u>Bank A</u>

Deposits (reserves) +$1,000

- required reserves = .2(+$1,000) = + $200
- excess reserves = .8(+$1,000) = + $800

=> can lend these excess reserves

Assume all excess reserves lent => loan of $800

Loan can be given either: as cash, by check, or credited to one's bank account
- either way => $\uparrow M^S$ (these components of M1)

=> loan of $800 => $\uparrow M^S$ = $800

Any single bank can $\uparrow M^S$ by the amount of *its* excess reserves. For the *banking system*, the process continues => is a money multiplier

To see money multiplier, assume the $800 loan is deposited into Bank B:

Bank B

Deposits (reserves)	+$800
- required reserves = .2(+$800) =	+ $160
- excess reserves = .8(+$800) =	+ $640

Assuming that $640 of excess reserves lent, creates new excess reserves, more loans, etc.

Money Multiplier
- for the banking system, money supply expands by a *multiple* of the original change in excess reserves

$$\Delta M^S = m \bullet \Delta \text{reserves}$$

Money multiplier = m = 1/R (reserve requirement)

Here: R = 0.2, so m = 1/0.2 = 5
=> for every $1 ↑reserves, $\uparrow M^S$ = $5

- our initial change in reserves + $800

$$\Delta M^S = 5(+800)$$
$$= \underline{+\ \$4{,}000}$$

- in multiplier formula, reserve requirement works exactly as MPS did in the expenditure multiplier

Banks create money by loaning excess reserves

Q: How does the FED alter the M^S?
A: By altering excess reserves in banking system

Expansionary Monetary Policy
- FED $\uparrow M^S$ to stimulate demand and to raise Y_e

Q: How does the FED $\uparrow M^S$?
A: It increases excess reserves throughout the banking system using its policy instruments

Policy Measures to Expand Money Supply

(1) ↓Reserve Requirement
- instantly creates excess reserves (now fewer required reserves) and *raises* money multiplier

(2) ↓Discount Rate
Discount Rate - interest rate member banks pay the FED to borrow money they use for loans
- only FED can change this

↓Discount Rate => less expensive for member banks to get funds for loans => ↑loans => $\uparrow M^S$

Private sector equivalent: **Federal Funds Rate**
- rate paid by banks that borrow overnight from banks with excess reserves
- rate changes based on amount of excess reserves

FED targets this rate as its operating procedure
- if this rate goes *above* target => FED ↑reserves
- if rate goes below target => FED ↓reserves

(3) Open Market Operations
- FED buys and sells bonds to alter reserves and to attain its federal funds rate target

To $\uparrow M^S$ => FED buys bonds
- as gives $ for bonds, $ deposited into banks, creating more excess reserves, or FED credits reserve accounts of banks who sell them bonds

<u>Order of use for monetary instruments by FED:</u>
(1) Open Market Operations (every business day)
(2) Discount Rate
(3) Reserve Requirement

Monetary Policy Also Affects Exchange Rate

- as r↓ thru expansionary monetary policy
=> US investments *less* attractive to foreigners
(relatively lower yield here than other countries)

=> foreigners sell some US stocks/bonds/CD's
(CAPITAL OUTFLOW from US)
=> ↑S of $, ↓D for $ => ***$ depreciates***

<u>as $ depreciates</u>:
↑exports - US goods less expensive overseas
↓imports - foreign goods more expensive here
=> Xn improves - but with a lag
=> further stimulus to economy

$$\uparrow M^S \rightarrow \downarrow r \rightarrow \begin{matrix} \uparrow C \text{ (durables)} \\ \uparrow Ip \\ \uparrow Xn \text{ (\$ depreciation)} \end{matrix} \rightarrow \uparrow Y_e$$

Exercise: repeat this for ↓M^S by FED
(contractionary monetary policy)