

# CONDENSED MACRO NOTES

## - For Money & Banking

To understand (and review) basic Macro and apply it to this course, must discuss:

1. Overview of Macro Perspective
2. Measurement Issues
3. Basic Keynesian Model
4. Money/Monetary Policy
5. Inflation Modeling (AD-AS)

### 1. OVERVIEW OF MACRO PERSPECTIVE

#### **Macroeconomics:**

Perspective: the overall economy (aggregate economic activity) - and its behavior

- Measurement AND behavior

Through time, economy exhibits:

#### **Long-Term Upward (Secular) Trend**

- result of increases in labor/capital/technology

#### **Cyclical Behavior** (fluctuations around long-term

trend): THE BUSINESS CYCLE

**BUSINESS CYCLE** - has stages

Recovery (upturn): real GDP is rising

- employment and income *rise*

- unemployment rate falls

- tax revenue *automatically* rises (smaller deficits)

Recession (downturn): *usually*, real GDP falls for at least six consecutive months

- employment and real income *fall*

- unemployment rate rises

- tax revenue *automatically* falls (larger deficits)

NBER definition of recession:

*“A recession is a significant decline in activity spread across the economy, lasting more than a few months, visible in industrial production, employment, real income, and trade. A recession begins just after the economy reaches a peak of output and employment and ends as the economy reaches its trough.”*

Depression: not really defined - "long and deep recession"

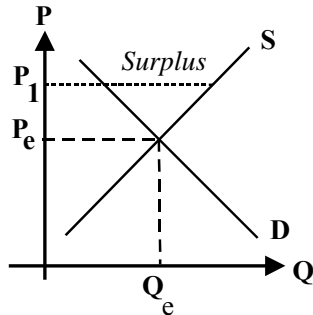
- you'll know it when you see it

- haven't had one since the 1930s - due to existence of "automatic stabilizers"

**Recoveries** - average duration has increased  
**Recessions** - shorter duration, less frequent, smaller decline in real GDP than pre-World War II  
 - since 1950s - have not exceeded 18 months

### *Microeconomic Basis of Macro Problems*

Assume current price ( $P_1$ ) exceeds equilibrium



- Price Adjustment Mechanism: competition among sellers forces  $P \downarrow$  until return to  $P_e$   
 $\Rightarrow$  *Markets Stable and Self Correcting - perfect price flexibility exists*  
 $\Rightarrow$  *No need for government intervention, so Laissez-Faire is appropriate*

- At macro level, economy is always at or moving toward full employment (onto PPC)
- No role for monetary or fiscal policy

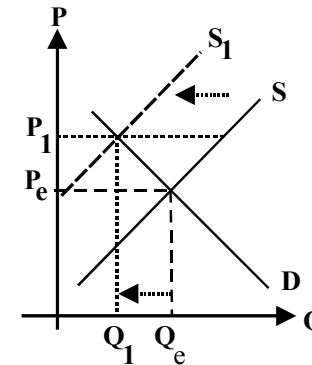
### **CLASSICAL ECONOMICS**

- Could not explain depression in 1929

A new "paradigm" that could explain depression emerged: **KEYNESIAN ECONOMICS**

- Agreed with Classical Economics (about price flexibility) in long-run
- Provided a short-run model: "*Demand-Side Economics*" that gave a rationale to federal deficits

If  $P > P_e$  (such as  $P_1$ ) - short-run: prices do *not* fall  
 - *Quantity Adjustment Mechanism* -



at  $P_1$ :  $Q^S > Q^D$  - firms have too much inventory  
 - decrease production, attempt to sell off excess  
 $\Rightarrow \downarrow S \Rightarrow \downarrow Q_e$

As production falls:

Less employment/income, more unemployment - AND  
 - *this is an equilibrium*

- As income falls - demand falls too

## EFFECTIVE DEMAND FAILURE

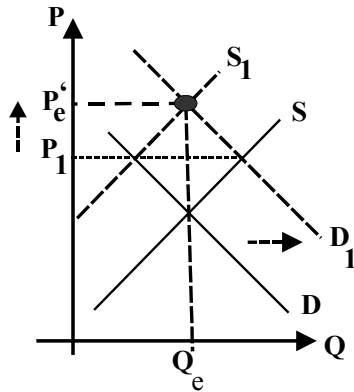
- Firms want people to spend more so can  $\uparrow Q$  and hire workers back, BUT
  - Consumers don't have enough \$ - if firms first hire us back - as income  $\uparrow$ , then we spend more
- => Role for Government: "Pump Priming"

Classical Economics: leave the economy alone, it will correct itself

- True in long-run, but in short-term, are political *and* social costs of higher unemployment
- Society often finds these unacceptable

Keynes: in short-run have *government* stimulate demand through FISCAL POLICY

- this is not laissez faire
- government deficit (macro) raises demand (micro)



With higher  $D$ , restores old  $Q_e$  - eliminates the unemployment

**Rationale for Deficits:** stimulate demand, can boost the economy/rate of economic growth

**Problem:** easier to raise deficit than to lower it

## 2. MEASUREMENT IN MACROECONOMICS

### Gross Domestic Product (GDP)

- Measure of aggregate "output"
- To combine outputs of goods and services, uses dollar values => nominal value

**GDP:** dollar value of *final* goods and services produced in a country for a given year

- Includes foreign-owned capital that produces goods in the US (vs. Gross National Product (GNP) which includes only US-owned capital)
- Can be calculated using either the:

**Expenditure Approach:** track \$ of output by measuring value of spending to purchase it

**Income Approach:** track \$ of output in terms of income created producing the goods & services

Basis for income approach: \$ value of output creates an *equal* \$ value of income - since profit defined as "balancing item"

Since output creates an equal amount of income, the potential to buy *all* of what is produced *always* exists  
=> Potentially capable of being *on* PPC always

## EXPENDITURE APPROACH

- based on four spending categories
- Forecasters generate values for each category

### **Personal Consumption Expenditure (C)**

- generally, spending by households
- most stable component of GDP (=2/3 of GDP)

Durable Goods: goods lasting 3+ years

Ex: autos, appliances, etc.

*Cyclical variable* - spending on these rises in recoveries and falls in recessions (income elastic)  
=> Durable goods spending fluctuates more than the overall economy. Why?

These are **postponable** - can put off purchase and patch up existing durable goods when times bad  
- depends on interest rates, wealth, cons. confid.

### Non-Durable Goods

Services - secular (long-term) upward trend as we become ore of a service-oriented economy

### **Gross Private Domestic Investment (Ig)**

- generally, business spending
- most volatile component of GDP

Equipment and Software (equipment)

Business Structures (factory)

Together = **Non-residential Fixed Investment**

- very cyclical - depends on interest rates and expected future profit
- most volatile component of GDP

Residential Construction - new home construction

- is investment since treated as giving benefits over many years (opportunity cost basis)
  - cyclical - depends on income & household debt
- Q: What about goods produced but not bought in a given year? (i.e., inventories)

A: Account for these - only part made *that* year  
Change in Business Inventories

**Government Purchases of Goods & Services (G)**  
- Approximate value of government "production"  
by value of inputs used to generate it (mostly labor)

Federal  
State/Local - largest part

Government Purchases (G) - NOT the same as total government spending (Tot G):  
Tot G: = G + Transfer Payments (entitlements)

**Transfer Payments:** transfers of income  
Ex: welfare, Social Security, Unemploy Insurance  
- called **Entitlement Programs** since government only sets terms for entitlement NOT \$ amount

**Net Exports (Balance of Trade) Xn**  
- didn't limit C and Ig to domestically-produced  
=> need to make adjustments:  
1. some goods made in US not purchased here, but in foreign countries - **EXPORTS** => ADD

2. some of what we buy not made in US -  
**IMPORTS** => SUBTRACT  
 $X_n = (\text{Exports} - \text{Imports})$  (\$ values only)

Add all this together to get GDP:  
**GDP = C + I<sub>g</sub> + G + X<sub>n</sub>**

- Correct for inflation get **Real GDP** - basis for economic growth calculations, define recessions  
**Rate of Growth** = % change in Real GDP

### Inflation

**Inflation**: continued (sustained) increase in the general level of prices

**Deflation**: continued fall in general price level versus

**Inflationary**: one-time/non-continual rise in prices  
Ex: oil price "shock," wage increases above productivity growth, or rising raw material prices  
- one time shift in supply for these:  $P_e$  rises to new level then remains there

**Disinflation**: slowing rate of overall inflation

### Measurement of Inflation/Deflation

- percent change in a price index
- **Core Inflation**: inflation when food and energy prices are excluded. This is *less* volatile than overall inflation

**CPI**: Consumer Price Index - released monthly  
To get average price level - *doesn't* use simple average

Ex: if two goods with prices  $P_1$  and  $P_2$ , CPI is not  $(P_1 + P_2)/2$  - this assumes equal "weights"  
- if Good 1 more important than Good 2, to give greater weight to Good 1, use *Quantity* as weight

- when weight price with quantity get expenditure:

$P_1Q_1$  = expenditure on Good 1

$P_2Q_2$  = expenditure on Good 2

Total Expenditure:  $P_1Q_1 + P_2Q_2$

Solve problem by using Q's as weights, but:

- whose spending patterns do these reflect?
- which time period for Q's, current or base period?

Who? All urban persons (CPI-U) or urban wage earners and clerical workers (CPI-W)

When? Base period quantities only

⇒ **Fixed Weight Index** (a serious problem for it)

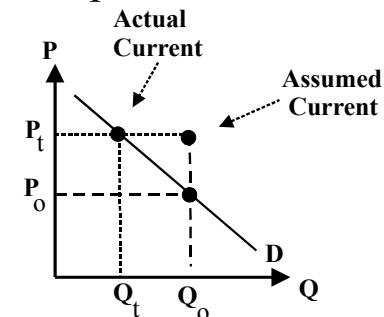
What is the base period? Until recently, 1982-1984

Now, updated to **1993-1995** (dated, though!)

- as spending patterns have changed, this has *not* entirely been reflected in the CPI

What does the CPI assume about demand?

- using constant (fixed) weights, assumes Q's don't change, even when prices do



$D_{cpi}$  - vertical (i.e., perfectly inelastic)

- does not allow for commodity substitution (this is called **substitution bias**)

### Interpretation of CPI Values

If CPI = 105  $\Rightarrow$  what cost \$100 in base period now costs \$105 (Value is always 100 in base period)

Media: this indicates a 5% inflation rate

- true, BUT *for base year Q's only*

### CPI - problematic measure of inflation

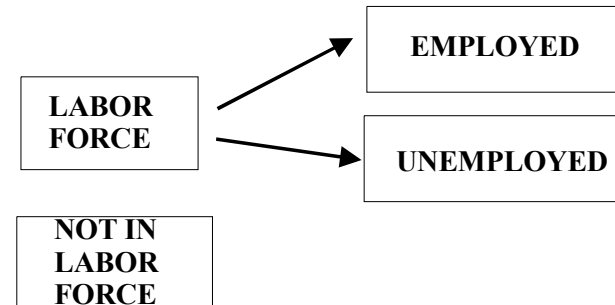
- (1) When inflation is rising, the CPI tends to *OVER*state inflation
- (2) Is not able to control adequately for quality improvements
- (3) It does *not* handle the introduction of *new* products (ex: prescription drugs) since old Q's
- (4) CPI - does not accurately measure inflation for population sub-groups (ex: elderly, poor, non-urban)

## UNEMPLOYMENT

People believe the unemployment rate counts all able-bodied persons who are not currently employed - FALSE

Calculated by *monthly phone survey* of 60,000 households by the Bureau of Labor Statistics ( [www.bls.gov](http://www.bls.gov) )

Persons categorized as either:



**Not in Labor Force:** < 16 yrs old or full-time student or not physically able to work OR:

***Not Actively Seeking Employment: Discouraged Workers***  
- their number changes along with state of the economy

**Unemployment Rate** =  $(\# \text{Unemployed} / \text{Labor Force}) \times 100$

$\Rightarrow$  unemployed as % of labor force

**Labor Force Participation Rate** =  $(\text{Labor Force} / \text{Population}) \times 100$   
(LFPR)

Labor Force has both secular trend *and* cyclical behavior

**Secular trend:** based on population and age composition

⇒ LFPR rising thru time if no cyclical forces

**Cyclical Behavior:** labor force changes in direction of overall economy (and economic growth)

⇒ LFPR **pro-cyclical** ⇒ rises in recoveries and falls during recessions

In recession: more difficult to find jobs, so some unemployed persons *STOP LOOKING* for work

⇒ # discouraged workers *rises* ⇒ Labor Force *FALLS* also:

some persons enter the labor force to help family income (added worker effect) ⇒ *higher* labor force

Discouraged worker effect dominates added worker effect

1. *Labor force falls in recessions*

2. Measured unemployment rate *UNDER*states actual unemployment when unemployment is rising

3. **Underemployment** also occurs: some able to work fewer than desired hours or take jobs overqualified for Underemployment and # discouraged workers increase

⇒ measured unemployment rate *UNDER*states extent of unemployment during recessions

## TYPES OF UNEMPLOYMENT

### **FRictional UNEMPLOYMENT**

Persons moving between jobs (for better match job with skills), first-time entrants into labor force (ex: just turned 16), persons re-entering the labor force

- this type always exists in dynamic economy

### **STRUCTURAL UNEMPLOYMENT**

As local industries change, the skills "in demand" change

⇒ structure of labor demand, both for products and labor changes

⇒ demand for some skills rises, falls for other skills

- persons whose skills no longer demanded - as much or at all (if skills obsolete) - structurally unemployed

- long-term unemployed

### **CYCLICAL UNEMPLOYMENT**

Results from unfavorable economic conditions related to the business cycle (RECESSIONS)

- too little demand for as many persons to be employed

Since some frictional & structural unemployment always exists, full employment does *NOT* mean zero unemployment. There is a:

***Full Employment Rate of Unemployment***

(where is no cyclical unemployment). For the US, this is presently 5% - 5.5%

## BASIC KEYNESIAN MODEL

- short-run, demand-driven model
- assumes fixed price level  $\Rightarrow$  firms operating in their "normal" production range (where don't need to raise price as Q expands)

To model demand at macro level:

### Aggregate Expenditure (AE)

- has same categories as Expenditure GDP:

$$AE = C + I_g + G + X_n$$

- initially assume  $G = 0$  and  $X_n = 0$  so

$$AE = C + I_g$$

$\Rightarrow$  we model both C and  $I_g$  (outline their determinants), then put these together, get AE

### Consumption Function

Model of Personal Consumption Expenditure:

- Durable Goods
- Non-Durable Goods
- Services

Major factors determining these:

- income
- prices
- interest rates
- wealth (*owned* assets) – **WEALTH EFFECT**
- consumer confidence

To model this, separate income (Y) from others:

$$C = \text{factors other than income} + \text{part tied to income}$$

(autonomous cons)                      + (induced cons)

Since part of consumption *directly* related to income, when the state of the economy changes, C *automatically* changes in *same* direction

- use a linear function to model this:

$$C = a + bY \quad \mathbf{a} = \text{intercept (value of C when } Y = 0)$$
$$\mathbf{b} = \text{slope} = \Delta C / \Delta Y$$

= rate of change in C when  $\uparrow Y = \$1$

$\mathbf{a}$  = autonomous consumption

- positive: when  $Y = 0$ ,  $C > 0$  (people use savings)

**b** = marginal propensity to consume (MPC)

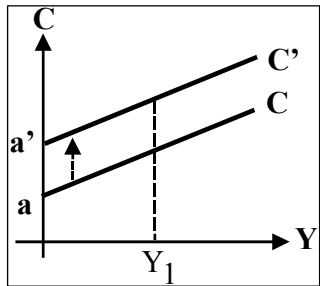
- positive: as  $Y \uparrow$ ,  $C \uparrow$
- fraction: if  $\uparrow Y = \$1$ ,  $\uparrow C < \$1$

Q: How does the consumption function shift?

A: Anything that changes autonomous consumption (intercept) shifts the curve

Ex: Interest rates fall

- $\Rightarrow$  durable goods spending (part of  $C$ ) rises
- $\Rightarrow$  *autonomous C rises*  $\Rightarrow$  *larger intercept*
- $\Rightarrow$  **parallel upward shift of C**



Technically: when  $Y = 0$ , autonomous  $C$  is greater  
 $C$  can change *even if*  $Y$  does not ( $\Delta$  autonomous  $C$ ), so for a given  $Y (=Y_1)$ , is greater  $C$

### Savings

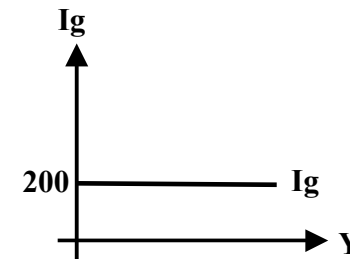
- derived from **income identity**:  $Y = C + S$
- $\Rightarrow S = Y - C \Rightarrow$  Non spending

To complete AE (demand), must model investment  
Investment = Gross Private Domestic Investment

- Equipment & Software
- Business (non-residential) construction
- Residential construction
- $\Delta$  Business Inventories

$I_g = f(\text{interest rates, expected } \underline{\text{future}} \text{ profit, taxes})$

- since  $I_g \neq f(Y) \Rightarrow I_g$  is *autonomous*
- there is no induced investment (no slope term)
- value changes from different interest rates, etc.
- when graph this - get horizontal line



Since modeling *equilibrium* (sustainable)  $Y$ , need to re-consider  $I_g$  since part of it is inventories

Equilibrium  $\Rightarrow$  inventories *at* desired levels

$$I_{\text{tot}} = I_p + I_u$$

Total investment = planned I (when inventories at desired levels) + unintended I (difference between actual and expected inventories)

If  $I_u > 0$  is inventory *accumulation*

⇒ sales below expectations

When  $I_u < 0$ , inventory *decumulation*

⇒ sales greater than expected

When  $I_u \neq 0$ , firms will either sell off ( $>0$ ) or build up ( $<0$ ) inventories ⇒ *not at equilibrium*

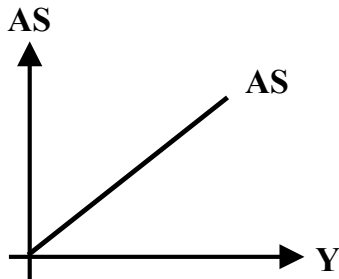
**AE = C + I<sub>p</sub>** - *planned* aggregate expenditures

To model Aggregate Supply (AS):

In this model:

$$\mathbf{AS = real\ GDP = Y}$$

To draw a curve where  $AS = Y$ , use  $45^\circ$  line



**NOTE: IS NO THEORY OF AS!!**

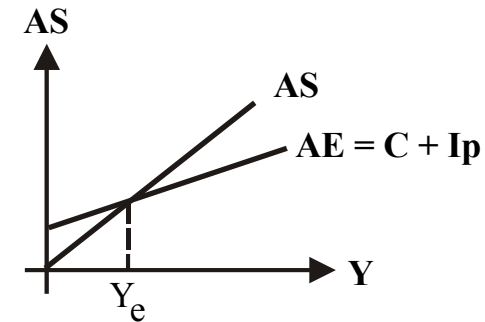
- major limitation of this model

Equilibrium: Supply/Demand Equilibrium

⇒ Need **AS = AE**

⇒ **production = planned expenditure**

⇒ **no unintended inventory ( $I_u = 0$ )**



$Y_e = \mathbf{equilibrium\ real\ GDP}$  ⇒ sustainable output

This determines:

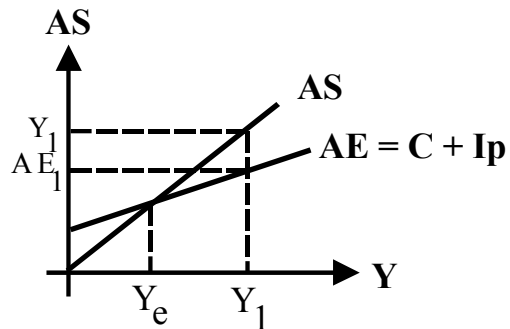
- Output and Income
- Employment and the unemployment rate
- Capacity utilization in manufacturing
- Hours per week

***THERE IS NO GUARANTEE THAT  $Y_e$  OCCURS AT FULL EMPLOYMENT***

- Less than full-employment equilibrium

Why is this an equilibrium (and sustainable)?

Assume that actual  $Y$  ( $Y_1$ )  $>$   $Y_e$



At  $Y_1$ : production exceeds *planned* expenditure  
 - too little spending to buy what is produced  
 - inventories accumulate ( $I_u > 0$ ) – start of an *inventory cycle*

*Firms respond by cutting production.* As they do:

- Employment falls (layoffs)
- Unemployment rises
- $Y$  declines from  $Y_1$

Output falls until inventories back to desired levels

$\Rightarrow Y \downarrow$  back to  $Y_e$

$\Rightarrow Y_1$  too high to be sustained

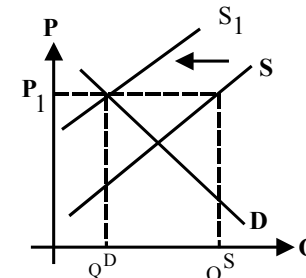
$Y_1$  could possibly be full employment  $Y$

Since inventory accumulation NOW signals declining output in the FUTURE, it is called a **LEADING ECONOMIC INDICATOR**  
 - track these to forecast the economy

Rising inventories, or a higher inventory-to-sales ratio, signals *future* cutbacks in production and employment (possibly a recession)

**MICRO BASIS OF THIS:**

Inventory accumulation  $\Rightarrow Q^S > Q^D$



Occurs when  $P > P_e$  at  $Y_1$

$\Rightarrow$  price level is too high to support  $Y_1$

Short-run response:  $\downarrow S$  to  $S_1$

- this causes less employment, more unemployment

## Cause and Effect of Equilibrium

Alternative equilibrium condition:

$$Y = AE \Rightarrow C + S = C + I_p, \text{ so}$$

**In equilibrium:  $S = I_p$**

$\Rightarrow$  amount of non-spending by households ( $S$ ) exactly offset by spending added by business ( $I_p$ )

If  $AE < Y \Rightarrow S > I_p$

Inadequate expenditure *caused* by too little business spending to offset non-spending by households - causes  $Y$  to fall

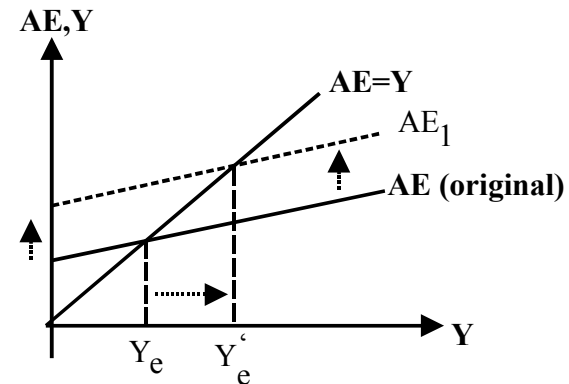
Equilibrium changes when  $AE$  changes

$\Rightarrow$  changes in "other things" of  $C$  and/or  $I_p$

**Application:** Decline in interest rates as FED  $\uparrow$  money supply

As interest rates fall:  $\uparrow C$  (durable goods),  $\uparrow I_p$  (factory, equipment, housing)

$\Rightarrow \uparrow AE$  as *autonomous*  $C$  and  $I$  rise



$\uparrow$  autonomous spending  $\Rightarrow \uparrow AE \Rightarrow \uparrow Y_e$

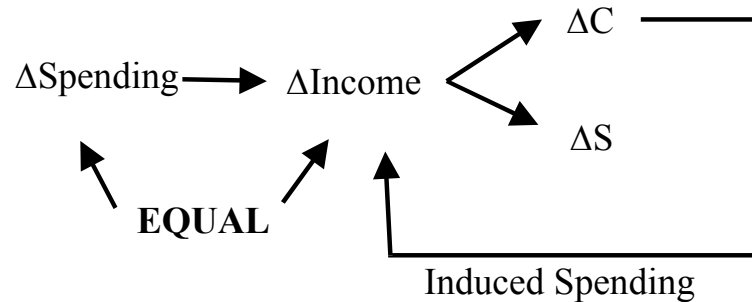
This is called **Expansionary Monetary Policy**  
 $\Rightarrow$  FED stimulates economy by raising interest-sensitive spending  $\Rightarrow \uparrow Y_e$

## The Multiplier

Idea: when *autonomous* spending changes, income changes in the same direction

Intuition: ultimately, the change in income will *equal* the change in autonomous spending  
- Generally *false!*

When spending changes, a *process of adjustment* occurs - not a one-time adjustment (with intuition)



$\Delta$ Spending  $\rightarrow$  equal  $\Delta Y$  *initially*

As  $Y$  rises, spending *automatically* rises-as does  $S$

Q: How much will  $Y$  ultimately rise?

A: Use equilibrium condition:  $S = I_p$

Assume that  $I_p$  rises by \$200

New equilibrium  $\Rightarrow$  need  $\uparrow S = 200$  (so  $S=I_p$  again)

How do we generate  $\uparrow S = 200$ ? Thru  $\uparrow Y$

If  $MPS = 1/5$ , then for every  $\uparrow Y = \$5$ ,  $\uparrow S = \$1$

$\Rightarrow$  to get  $\uparrow S = \$200$  when  $MPS = 1/5$ ,

need  $Y$  to rise by *5 times* that amount

$\Rightarrow$  need  $\uparrow Y = \$1,000$

$$\begin{aligned} \Delta Y_e &= \text{multiplier} \cdot \Delta I_p \quad (\text{original } \Delta \text{spending}) \\ &= \text{multiplier} \cdot \$200 \quad (\text{the } \Delta I_p) \\ &= \$1,000 \end{aligned}$$

$$\Rightarrow \text{multiplier } (k) = 5 \text{ with an MPS of } 1/5$$

$k = 1/MPS = 1/(1 - MPC)$  since  $MPC + MPS = 1$   
 The multiplier quantifies the multiple by which *equilibrium*  $Y$  changes as spending changes

### A More Concrete View

Assume the  $MPC = 4/5$ ,  $\Delta I_p = +200$

$\Delta$ income	$\Delta C = MPC \cdot \Delta Y$	$\Delta S = MPS \cdot \Delta Y$
+200	+160	+40
+160	+128	+32
+128	+102.4	+25.6
...	...	...
~ \$500 after only 3 rounds		
...	...	...
<b>+ \$1,000</b>	<b>+ \$800</b>	<b>+ \$200</b>

Note: induced spending ( $\uparrow C$ ) gets *smaller*

## Another Way to View Multiplier

Micro: When demand for a single good changes, it alters the demand for *all* of its compliments

If X = durable good ("big ticket item")

↓ Demand for X has large ripple effects throughout the entire economy

Macro: this is the multiplier effect

DURABLE GOODS SPENDING IS A LEADING INDICATOR OF THE ECONOMY (thru ripple effects that occur in future time periods)

### ADDING FOREIGN TRADE

When we include foreign trade in the model (an *open economy*), demand and the multiplier change. This provides another means by which  $Y_e$  in the US can change

#### Demand:

Since Aggregate Expenditure includes the expenditure categories for GDP, it becomes:

$$AE = C + I_p + \underline{NX}$$

where: NX is net exports, equal to exports (X) minus imports (M)

In the Flexible Exchange Rate notes we saw:

$$X = f(\text{exchange rate}, Y_{\text{FOR}})$$

$$M = f(\text{exchange rate}, Y)$$

where:  $Y_{\text{FOR}}$  is *foreign* income and Y is US income (these are demand functions, which depend on price and income)

#### **From this:**

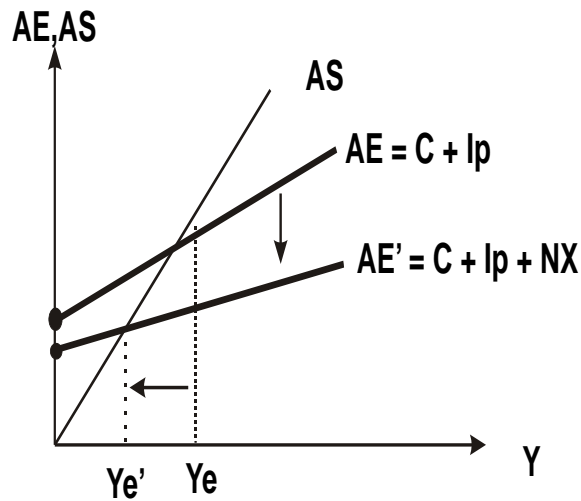
- Since both the exchange rate and foreign income are autonomous, exports are autonomous (equal to a single value)
- Since imports depend on US income, this is a type of induced spending. Since M is a function of Y, *the slope of AE changes* when this is included in the model
- Money spent on imports flows out of the US economy, so it has a negative sign in NX:

higher imports lower NX, decreasing AE as well. Imports are thus an induced leakage.

**Slope Change:**

As Y rises, although more \$ is spent, the part going to imports “leaks” out of the US economy. It is the Marginal Propensity to Import (MPM).

**Leakage amounts: MPS + MPM (higher total)**  
**Induced spending: MPC (less than before)**



In the graph:  
- **lower intercept** with  $X_A < M_A$   
- **lower slope** since with imports, as  $Y \uparrow$  AE for *US goods* is now less than before

**MULTIPLIER:**

Since the slope of AE changes with imports, the multiplier in an open economy is lower than that in a closed economy.

**CLOSED ECONOMY MULTIPLIER:**

$$k = 1/MPS = 1/(1 - MPC)$$

**OPEN ECONOMY MULTIPLIER:**

$$k = 1/(MPS + MPM)$$

# MONEY

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

**Medium of Exchange/Unit of Account/Store of Value**

For macroeconomics, we look at **monetary aggregates**, groups of assets that serve as money

**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)

- not as liquid as M1, more tied to interest rates

To see how M1 or M2 alter macroeconomic activity, *need to see how these affect interest rates*

- 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

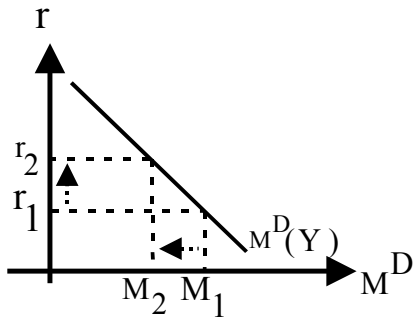
⇒ people hold less money in *non-interest bearing uses*

Putting this together:

- real demand for money function  $M^D$ :

$M^D = f(\text{interest rate } (r), \text{ real income } (Y))$

$M^D$  - downward sloping with respect to  $r$

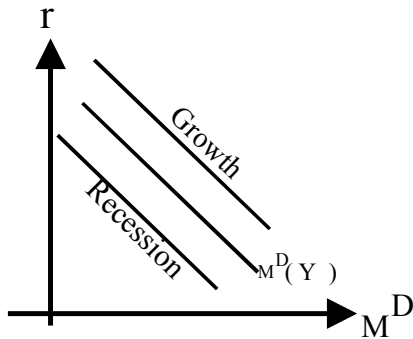


- if  $\uparrow r$  from  $r_1$  to  $r_2$ , cost of holding \$ rises, people hold less of \$ as components of  $M_1$  or  $M_2$  (put into less liquid, interest-earning assets)

Location of  $M^D$  - depends on  $Y$

- given  $r$ , if  $\uparrow Y$ ,  $M^D$  shifts *right*  $\Rightarrow \uparrow M^D$

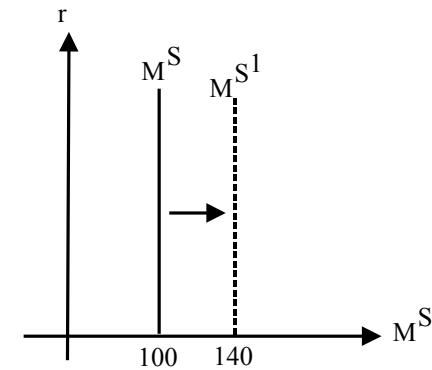
$M^D$  is related to  $Y$  - the level of economic activity  
 $\Rightarrow$  Another automatic linkage to economic growth  
 $\uparrow Y$  (economic growth)  $\rightarrow \uparrow M^D$  (automatically)



## Money Supply ( $M^S$ )

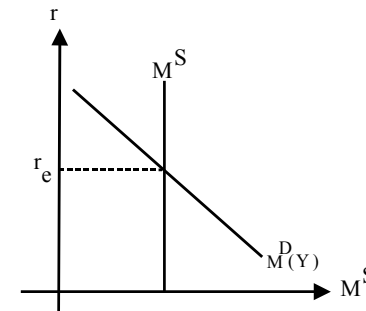
- the value of  $M_1$  or  $M_2$  in existence
- largely controlled by the Fed thru monetary policy - alters bank reserves

We assume that the  $M^S$  *not* related to  $Y$  or  $r$  (when graphed relative to  $r$  - is vertical) BUT the  $M^S$  curve *can* shift (ex: actions by FED)



## Money Market Equilibrium

- requires market clearing:  $M^D = M^S$
- $r_e$  changes when either  $M^S$  or  $M^D$  changes

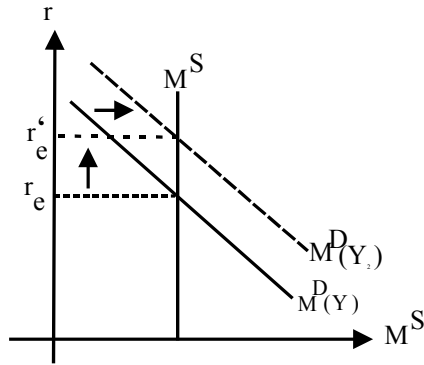


Using this simple model, we will illustrate how people often misjudge what the FED is doing

- use two different scenarios

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

- economic growth  $\Rightarrow \uparrow M^D$



- money supply curve - same  
 $\Rightarrow r_e$  rises *automatically*

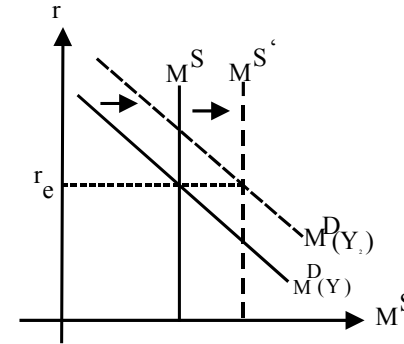
People conclude - since  $r \uparrow$ , FED *must be* tightening the money supply and restricting credit

- 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 did nothing

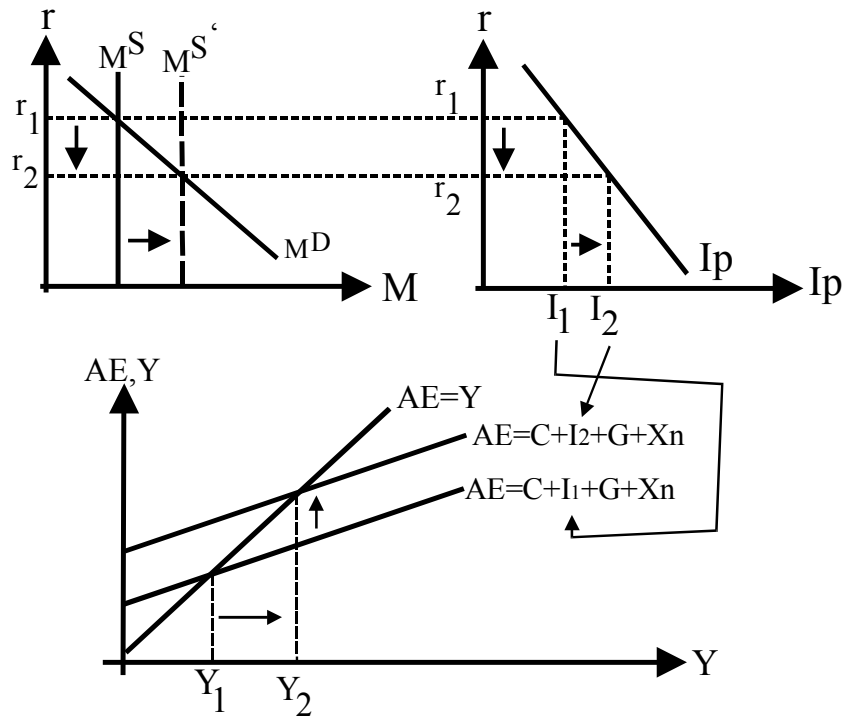
- FALSE - FED had to  $\uparrow M^S$

- with economic growth, must  $\uparrow M^S$  as  $M^D \uparrow$  to keep  $r$  constant

**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

## Money Market and the Basic Keynesian Model - Keynesian Monetary Transmission Mechanism



Expansionary Monetary Policy  $\Rightarrow \uparrow M^S$   
 $\uparrow M^S \rightarrow \downarrow r \rightarrow \uparrow I_p \text{ to } I_2 \rightarrow \uparrow Y_e$   
 $(\uparrow AE) \leftarrow \text{multiplier} \rightarrow \uparrow Y_e$

How does the  $M^S$  increase?

- FED, via monetary policy, alters bank reserves
- US - has **fractional reserve** banking system
- 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%

### Bank A

Deposits (reserves) +\$1,000

- required reserves =  $.2(+\$1,000) = +\$200$

- excess reserves =  $.8(+\$1,000) = +\$800$

$\Rightarrow$  can lend these excess reserves

Assume all excess reserves lent  $\Rightarrow$  loan of \$800

Loan can be given either: as cash, by check, or credited to one's bank account

- either way  $\Rightarrow \uparrow M^S$  (these components of M1)

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

Any single bank can  $\uparrow M^S$  by the amount of *its* excess reserves. For the *banking system*, the process continues  $\Rightarrow$  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

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

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

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

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

- 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 ↑M<sup>S</sup> => 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

### Order of use for monetary instruments by FED:

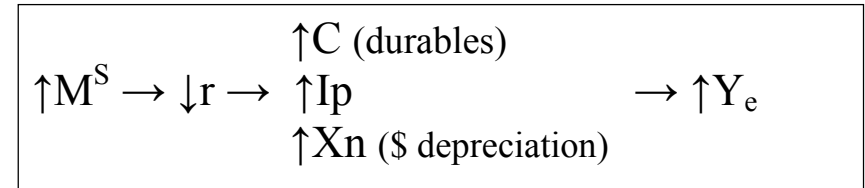
- (1) Open Market Operations (every business day)
- (2) Discount Rate
- (3) Reserve Requirement

### *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*

### as \$ depreciates:

↑exports - US goods less expensive overseas  
 ↓imports - foreign goods more expensive here  
 => Xn improves - but with a lag  
 => further stimulus to economy



### **Aggregate Demand - Aggregate Supply**

This extends the simple model, allowing us to explicitly examine the price level (and inflation)

**Aggregate Demand (AD)** - amount of *real* output demanded by households, firms and government at different price levels

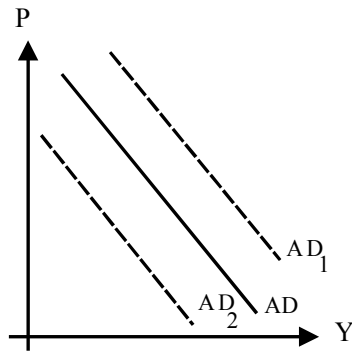
- looks like micro demand curve, but reasons for downward slope very different

As P↑, get smaller aggregate quantity demanded:

**-Wealth Effect:** real wealth  $\downarrow$  as  $P \uparrow$  (value of money holdings and some financial assets)  $\Rightarrow C \downarrow$  (also called the **real balance effect**)

**-Interest Rate Effect:** as  $P \uparrow$ , expected inflation  $\uparrow$ ,  $\Rightarrow$  higher *nominal* interest rates  $\Rightarrow C \downarrow$   $I_p \downarrow$  (also  $\uparrow$  money demand, given money supply)

**-Net Export Effect:** as  $P_{us} \uparrow$  *relative* to rest of world, US exports - less competitive, US imports - more competitive  $\Rightarrow X \downarrow$   $M \uparrow$   $X_n \downarrow$



AD shifts whenever AE shifts - for changes in its "other things"  $\Rightarrow$  *altered autonomous spending*  
- interest rates, profit expectations, real wealth, exchange rates - these alter AE and thus AD

Ex 1: A rise in interest rates  
 $\downarrow C$  (durable goods),  $\downarrow I_p$   
 $\downarrow X_n$  - as interest rates  $\uparrow$ , \$ *appreciates*  
 $\Rightarrow \downarrow AD$  to  $AD_2$

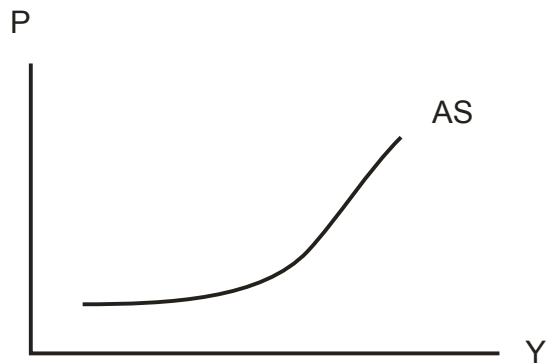
Ex 2: Expansionary Monetary Policy  
As money supply  $\uparrow$ , stimulate demand,  
 $\Rightarrow \uparrow AD$  to  $AD_1$

*Monetary and fiscal policy alter both AE and AD*

**Short-Run Aggregate Supply (AS)** - real domestic output supplied at different price levels  
- upward sloping in short-run, but its steepness depends on how close we are to full employment ( $Y_f$ ) (potential output)

- when far below  $Y_f$ , as production rises, there is little effect on  $P$  due to substantial unemployment and unused capital  
- firms are operating in their "normal range" and don't need to raise price as they expand output  
AND, since prices/wages are downwardly *inflexible*, if output falls, firms will *not* lower prices (get layoffs and  $\downarrow S$  - not  $\downarrow$  *nominal* wages)  
 $\Rightarrow$  flat or horizontal portion of AS

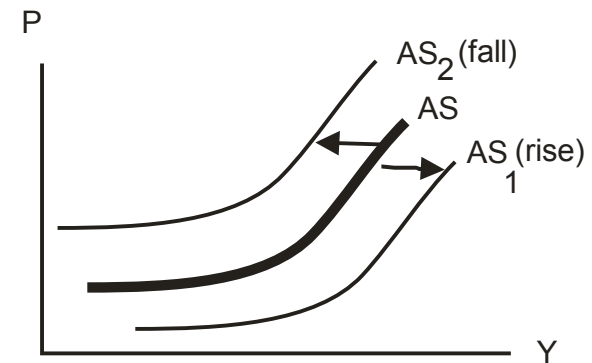
- as the economy continues to approach  $Y_f$ , some industries get closer to or reach *their* capacity  
 => wages and resource prices rise  
 => price level rises as output expands then, so AS is upward sloping, becoming steeper  
 => *the closer to  $Y_f$ , the steeper is AS, as price as wage and resource price pressures intensify*



**NOTE: An economy can produce *beyond* full employment (potential output), but firms experience escalating cost pressures (both wages and commodity prices) which translate into greater and greater price momentum**

Changes in the "other things" shift AS

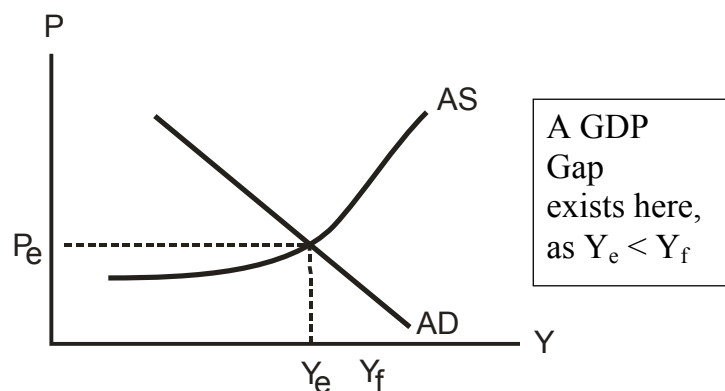
1. Input prices growing *faster* than productivity (Ex: rising Unit Labor Cost)
2. Taxes
3. Regulations
4. Amounts of Inputs
5. Expected Inflation



Ex: (1) Supply shock (such as oil  $P \uparrow$ ) - get  $AS_2$   
 (2) Economic growth =>  $\uparrow Y_f$  - get  $AS_1$  (new PPC)

## Short-Run Equilibrium

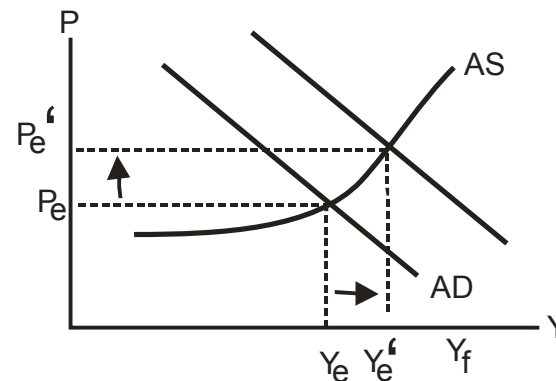
In a *short-run* equilibrium, where  $AD = AS$ , we get both  $Y_e$  and the price level ( $P_e$ )



- **no** guarantee that  $Y_e$  occurs at full employment

When a GDP Gap exists, fiscal policy or monetary policy can be used to close the Gap

- Both raise AD (a Budget Deficit or Expansionary Monetary Policy)



Besides increasing  $Y$ , *both policies also raise the price level*  $\Rightarrow$  get inflation along with growth

- **Inflationary Bias of Keynesian Economics**

*The amount of inflationary pressure depends on how close to full employment the economy moves*

## Can use AD-AS Model to Explore Inflation

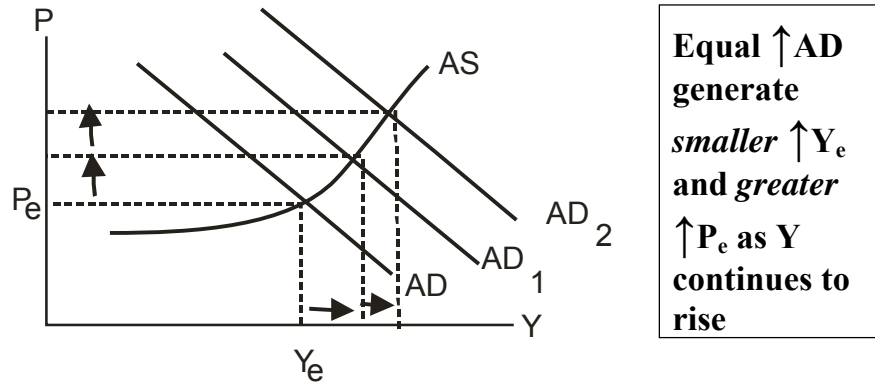
**Inflation:** *continuously* rising general price level

**Inflationary:** one-time increase in price level

There are two types of inflation:

### Demand-Pull Inflation

- continuously rising AD causes inflation  
(caused by excessive monetary growth)



**Demand-Pull Inflation:** Inflation + *Rising Y*  
=> employment ↑ and unemployment rate ↓

This type of inflation is beneficial *for a time*, then problems emerge:

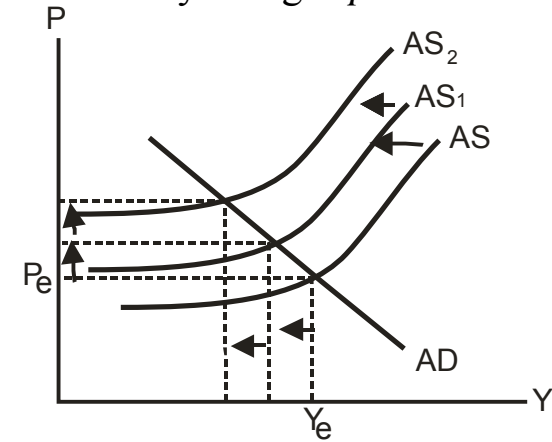
Nominal wages don't keep up with inflation

=> wage demands increase => expected inflation rises

Monetary and Fiscal Policy are only effective in fighting inflation when it is demand pull

### Cost-Push (Supply-Side) Inflation

- short-term inflation caused by either supply shocks (ex: OPEC price rise), "excessive" wage demands, crop failures, or continually rising *expected* inflation

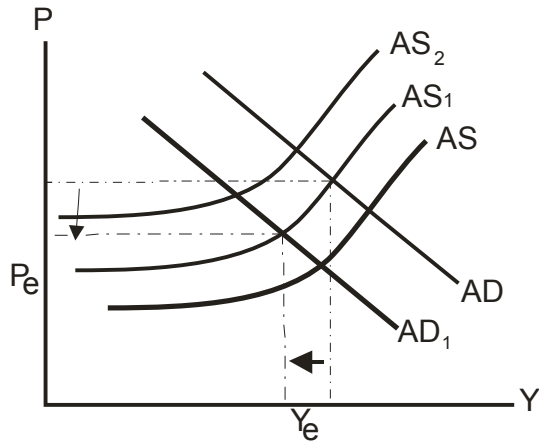


**Cost-Push Inflation:** Inflation + *Falling Y*  
=> employment ↓ and unemployment rate ↑  
- **STAGFLATION** (stagnation + inflation)  
=> can have recession + inflation

In reality, if start with demand-pull inflation, often get cost-push as well, as wages fail to keep pace with inflation and expected inflation rises => ↓AS, etc.

## Monetary Policy and Cost-Push Inflation

Monetary policy *only alters AD* in the short-run, so it cannot cure both of the problems associated with cost-push inflation (Stagflation)



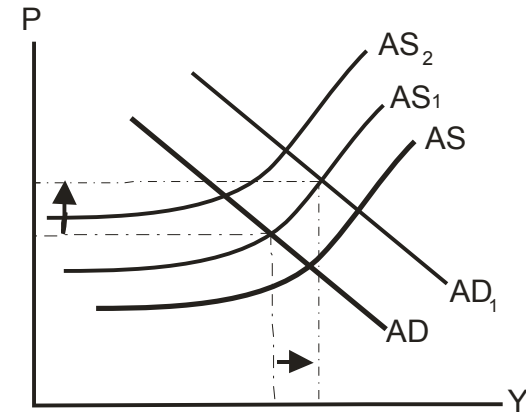
If the Fed fights cost-push inflation with contractionary monetary (Bernanke did this through early 2008), as  $AD \downarrow$ , there is good and bad news.

**Good news:** the price level falls (less inflation)

**Bad news:**  $Y$  falls as well, so the economy weakens

If the Fed attempts to moderate inflation when there is cost-push inflation, inflation will improve but the economy will weaken, producing slower growth

Confronted with a weakening economy, if the Fed then decides to improve economic growth when there is cost-push inflation, there is good and bad news.



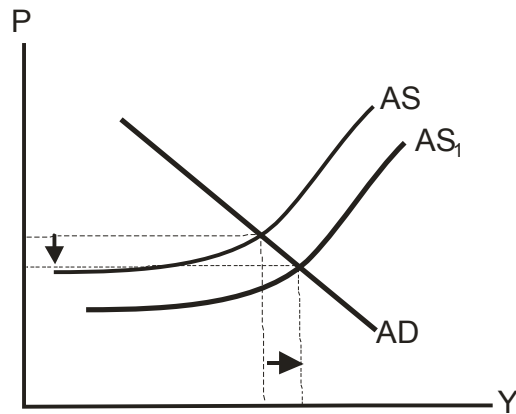
**Good news:**  $Y \uparrow$ , so growth improves

**Bad news:** the higher AD fuels price and wage pressures, making inflation worse

If the Fed attempts to improve the level of economic activity when there is cost-push inflation, economic activity will improve but inflation will tend to worsen

## Supply-Side Economics

- popular in 1980s and today
- stimulate the economy by giving incentives, usually tax cuts, to firms and workers that bring about increases in production and hours worked (supply)



**Supply-Side Economics:** Higher  $Y_e$ , Lower  $P_e$   
=> higher output, lower inflation  
=> greater employment, lower unemployment

**Problem:** in the short-run, supply-side measures (ex: tax cuts) stimulate AD and tend to produce budget deficits – demand responds faster than does supply (which takes time)

## Application

### Questions About Growth

#### When is Economic Growth Inflationary?

When the economy close to or at full employment (on the steep part of AS)

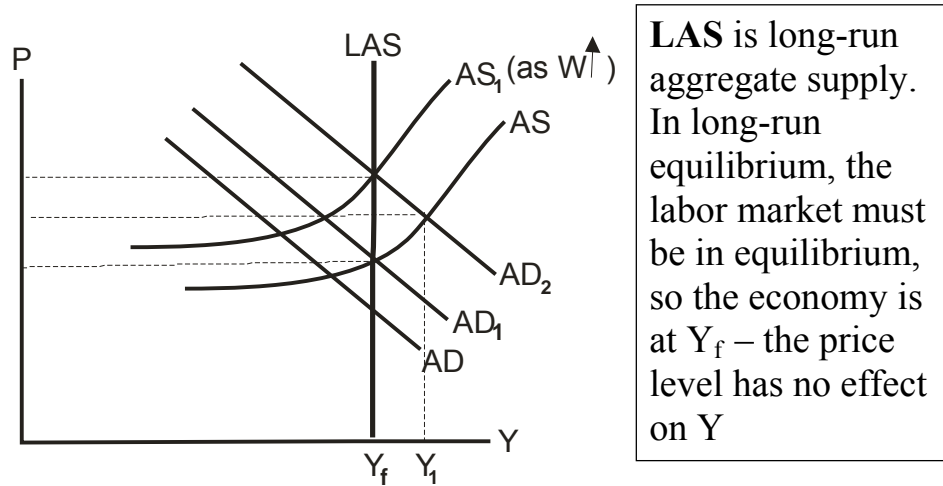
#### How do we actually know we are close to or at full employment?

Watch the unemployment rate - the full employment rate of unemployment is 4-4½%  
- Strong growth with low (4-4½%) unemployment signals the likelihood that inflation will accelerate *in the future*

- To head this off, the FED must act *now*, since lags are involved

At the macro level, unlike micro, supply can shift as a result of a change in demand

Starting with a level of economic activity that is close to or at full employment, if aggregate demand rises, or continues to rise, eventually wage pressures will increase (along with inflationary expectations), causing AS to shift left



As AD rises, the economy eventually moves above its full employment level to  $Y_1$  in the short-term. *This is attainable but not sustainable.* High demand and rising prices create increasing wage demands (and OT wages) along with rising commodity prices. Here, **higher AD CAUSES AS to shift left**, returning the economy to a long-run equilibrium at  $Y_f$ .

Related to this: the **Phillips Curve**

-Empirical work in the 1950s showed a short-run tradeoff between inflation and unemployment, so that when unemployment was low, inflation tended to be high, and unemployment tended to be high when inflation was low

- ⇒ presupposes *demand-pull inflation* is dominant
- ⇒ believers of this – many on Wall Street - are convinced that economic growth *is* necessarily inflationary. *They have been wrong for years now!!*

Q: Why has inflation not been much higher in light of our rapid growth over the past years?

A: A technological revolution => supply has generally kept pace with demand – moderating price increases – often referred to as “**the new economy**”

In the 1950s, economists thought they could use the Phillips Curve to pick an acceptable rate of

unemployment and know the inflation rate they would have to live with

- once they used it, Murphy's Law struck – the curve shifted since they had failed to include expected inflation as a fundamental determinant of the unemployment rate

⇒ cost-push inflation invalidates the short-term tradeoff between inflation and unemployment (it causes higher levels of both inflation *and* unemployment)

⇒ But, old notions die hard. Many on Wall Street still take this relationship as “gospel”

⇒ Yet another illustration of why “good” economic news is usually “bad” news for stocks