



2025 Level 1 - Economics

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Topics in Demand and Supply Analysis

- a. calculate and interpret price, income, and cross-price elasticities of demand and describe factors that affect each measure
- b. compare substitution and income effects
- c. contrast normal goods with inferior goods
- d. describe the phenomenon of diminishing marginal returns
- e. determine and interpret breakeven and shutdown points of production

Elasticity

⇒ Demand analysis - the consumer

- Law of Demand ⇒ as $P_x \uparrow$, $Q_x^d \downarrow$
 $P_x \downarrow$, $Q_x^d \uparrow$

- but by how much?
- how sensitive is Q_x to changes in P_x

- other variables also influence Q_x^d

- incomes
- prices of substitutes & complements

- captured in the demand function

$$Q_x^d = f(P_x, I, P_y)$$

e.g./ $Q_x^d = 84.5 - 6.39P_x + 0.25I - 2P_y$

negative = complement

positive = substitute

or $Q_x^d = a - b_1P_x + b_2I - b_3P_y$

called sensitivities

Page 1

LOS a

- calculate
- interpret

$$Q_x^d = 84.5 - 6.39P_x + 0.25I - 2P_y$$

1) own price elasticity

$$E_{P_x}^d = \frac{\% \Delta Q_x^d}{\% \Delta P_x} = \frac{\frac{\Delta Q_x^d}{Q_x^d}}{\frac{\Delta P_x}{P_x}} = \left(\frac{\Delta Q_x^d}{\Delta P_x} \right) \left(\frac{P_x}{Q_x^d} \right)$$

↓
coefficient (-b₁)

e.g./ $P_x = \$1.48$ $I = \$50(000)$ $P_y = \$20(000)$

$$Q_x^d = 84.5 - 6.39(1.48) + 0.25(50) - 2(20)$$

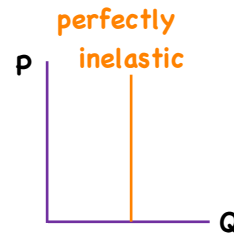
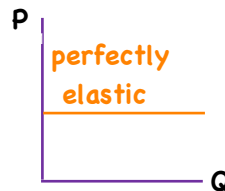
$$= 47.54 \quad \therefore E_{P_x}^d = -6.39 \left(\frac{1.48}{47.54} \right) = -.20$$

- at a price of \$1.48, a 1% rise in price would result in a drop in Q_x^d of 0.2%

$|E^d| < 1$ - inelastic

$|E^d| = 1$ - unit elastic

$|E^d| > 1$ - elastic



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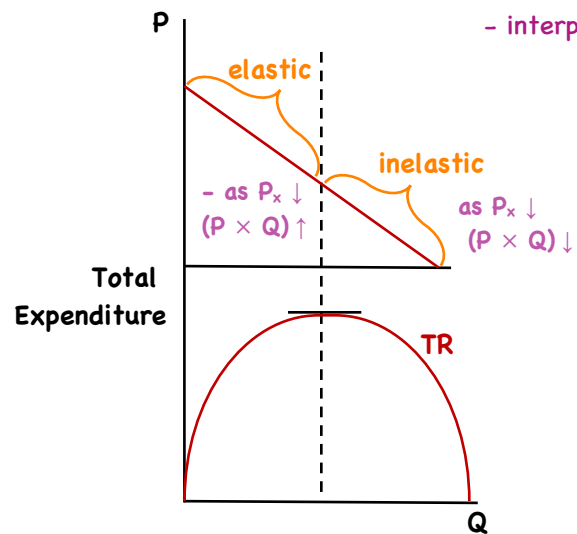
LOS a

- calculate
- interpret

$$Q_x^d = 84.5 - 6.39P_x + 0.25I - 2P_y$$

1) own price elasticity

- more elastic
 - close substitutes available
 - large %'age of household budget
 - long-term demand
 - optional/discretionary
- less elastic
 - no close substitutes
 - small %'age of household budget
 - short-term demand
 - necessity/non-discretionary



$$Q_x^d = 84.5 - 6.39P_x + 0.25I - 2P_y$$

2. Income elasticity of demand

$$E_I^d = \frac{\% \Delta Q_x^d}{\% \Delta I} = \left(\frac{\Delta Q_x^d}{\Delta I} \right) \left(\frac{I}{Q_x^d} \right)$$

$$.25 \left(\frac{50}{47.54} \right) = 0.26$$

- a 1% increase in Incomes results in a 0.26% increase in Q_x^d

$E_I^d > 0$ - normal good $E_I^d < 0$ - inferior good

3. Cross-price elasticity of demand

$$E_{P_y}^d = \frac{\% \Delta Q_x^d}{\% \Delta P_y} = \left(\frac{\Delta Q_x^d}{\Delta P_y} \right) \left(\frac{P_y}{Q_x^d} \right)$$

$$-2 \left(\frac{20}{47.54} \right) = -.84$$

- a 1% rise in P_y results in a 0.84% decrease in Q_x^d

$E_{P_y}^d < 0$ - complement

$E_{P_y}^d > 0$ - substitute

Substitution & Income Effects

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LOS b
- compare

• as $P_x \downarrow$, $Q_x \uparrow \Rightarrow$ substitution effect

- tends to always be positive (Law of Demand)

• as $P_x \downarrow$, purchasing power increases \Rightarrow Income effect

- if income effect is positive, then $Q_x^d \uparrow$ (normal good)

- if income effect is negative, then $Q_x^d \downarrow$ (inferior good)

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LOS b
- compare

	substitution effect	income effect	
Normal good	- buy more when $P_x \downarrow$	- buy more as $I \uparrow$	- reinforce one another ($Q_x^d \uparrow$)
Inferior good	- buy more when $P_x \downarrow$	- buy less as $I \uparrow$	- offsetting ($Q_x^d \uparrow$ but not as much)

• if income & substitution effect results in $Q_x^d \downarrow$

- Giffen good
- as the real price drops, $Q_x^d \downarrow$
- Veblen good
- as the nominal price \uparrow , $Q_x^d \uparrow$

(pos. sub. effect but much larger neg. Inc. effect)

Diminishing Marginal Returns

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LOS d
- describe

- **increasing marginal returns** - the productivity of each additional unit of a resource (L, K) increases as each additional unit of that input are employed
 - adding labour {
 - specialization
 - division of labour} $(Y/L \uparrow)$
- however, after a certain output, law of diminishing returns takes over
 - $(Y/L \downarrow)$ - K being used at 100% capacity - adding Labour will not increase output
- Let w = wage rate/hr. of labour
- Let r = rental rate/hr. of capital

$\therefore TC = wL + rK$

\therefore to lower TC, w must \downarrow , r must \downarrow , or productivity of L and/or K must \uparrow

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LOS d
- describe

- **benefits of increased productivity/**
 - lower TC = increased productivity
 - increase in MV_{equity}
 - increase in worker rewards, which motivates further productivity increases from labour
- companies that lag the industry in productivity will be less profitable and less competitive

- Total, Average & Marginal Product/	L	Q	Q/L	$\Delta Q / \Delta L$
<div style="display: flex; justify-content: space-around; font-size: 0.8em;"> \downarrow Q \downarrow Q/L \downarrow $\Delta Q / \Delta L$ </div>				
	0	0	0	-
	1	100	100	100
	2	210	105	110
	3	300	100	90
	4	360	90	60
	5	400	80	40
	6	420	70	20
	7	350	50	-70

- increasing returns $\Rightarrow MP_L \uparrow$
- decreasing returns $\Rightarrow MP_L \downarrow$
- negative returns $\Rightarrow MP_L < 0$

Breakeven/Shutdown Points

perfect competition
MR = AR

Economic Profit
 Total Revenue - economic costs
 accounting costs
 + an equity charge

$TR = P \times Q$
 $MR = \Delta TR / \Delta Q$

perfect competition imperfect competition

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 LOS e
 - determine

imperfect competition
 MR = 0
 increasing MR decreasing MR
 MR = 0 TR - max.

$MR = P$

- sell 1 more Q at P

$MR < P$

- sell 1 more Q at lower P

Costs

TVC TFC TC

TFC = all economic fixed costs
 (includes required rate of return)

$TC = TVC + TFC$

Marginal Cost = $\Delta TC / \Delta Q$

short-run SMC - additional cost of labour input/Q

$MC = w / MP_L$ - if $w \uparrow$, $MC \uparrow$
 - if $MP_L \uparrow$, $MC \downarrow$

long-run LMC - additional cost of all inputs/Q

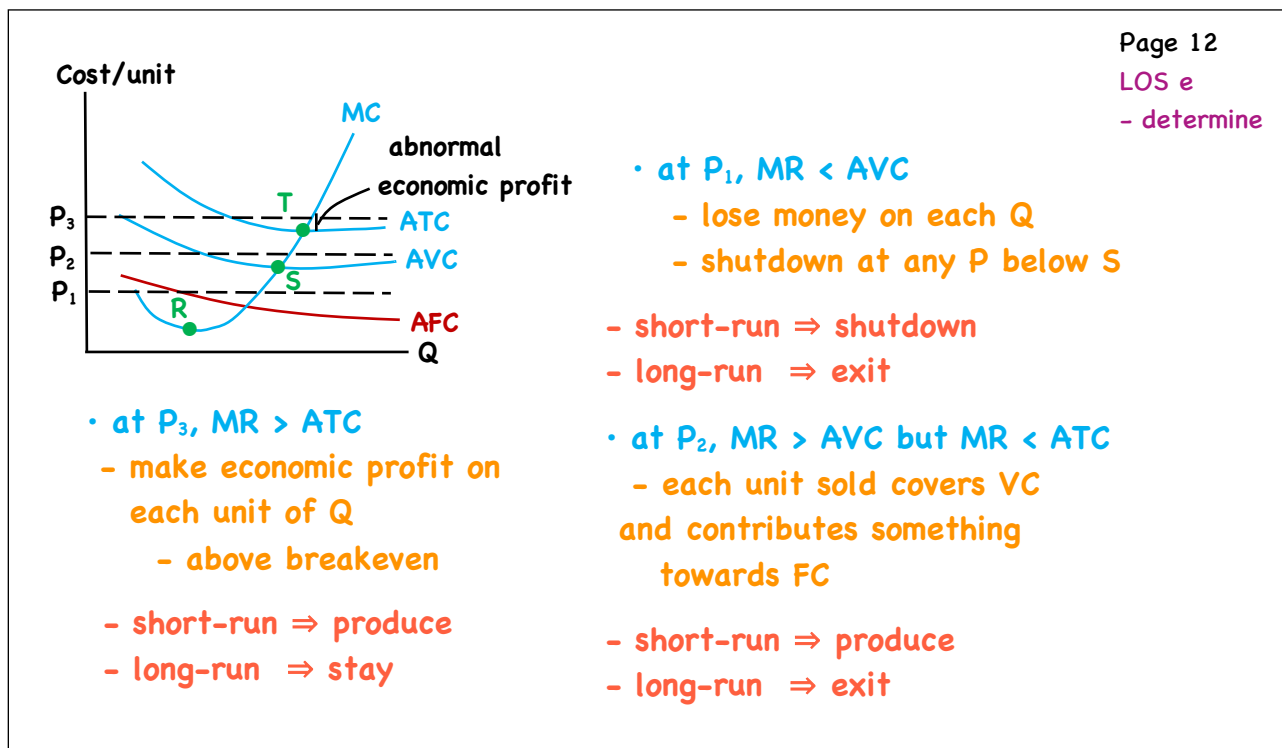
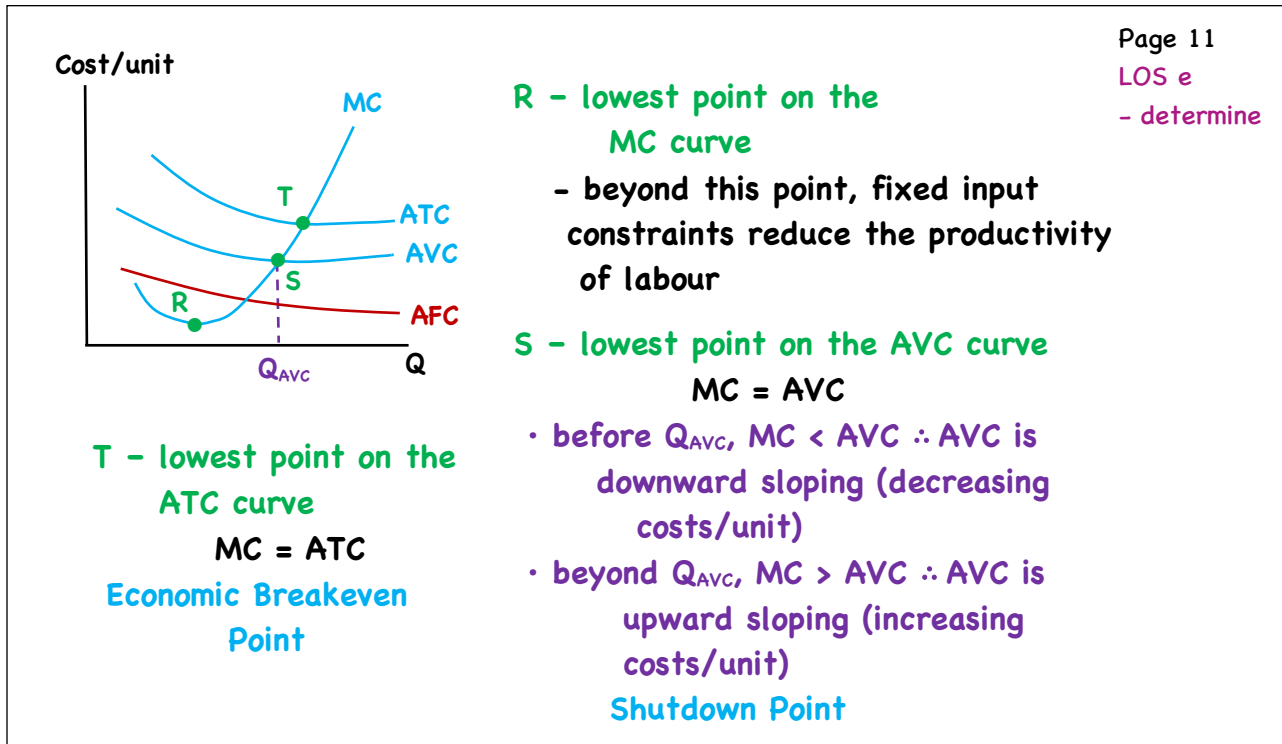
Average variable costs = TVC / Q

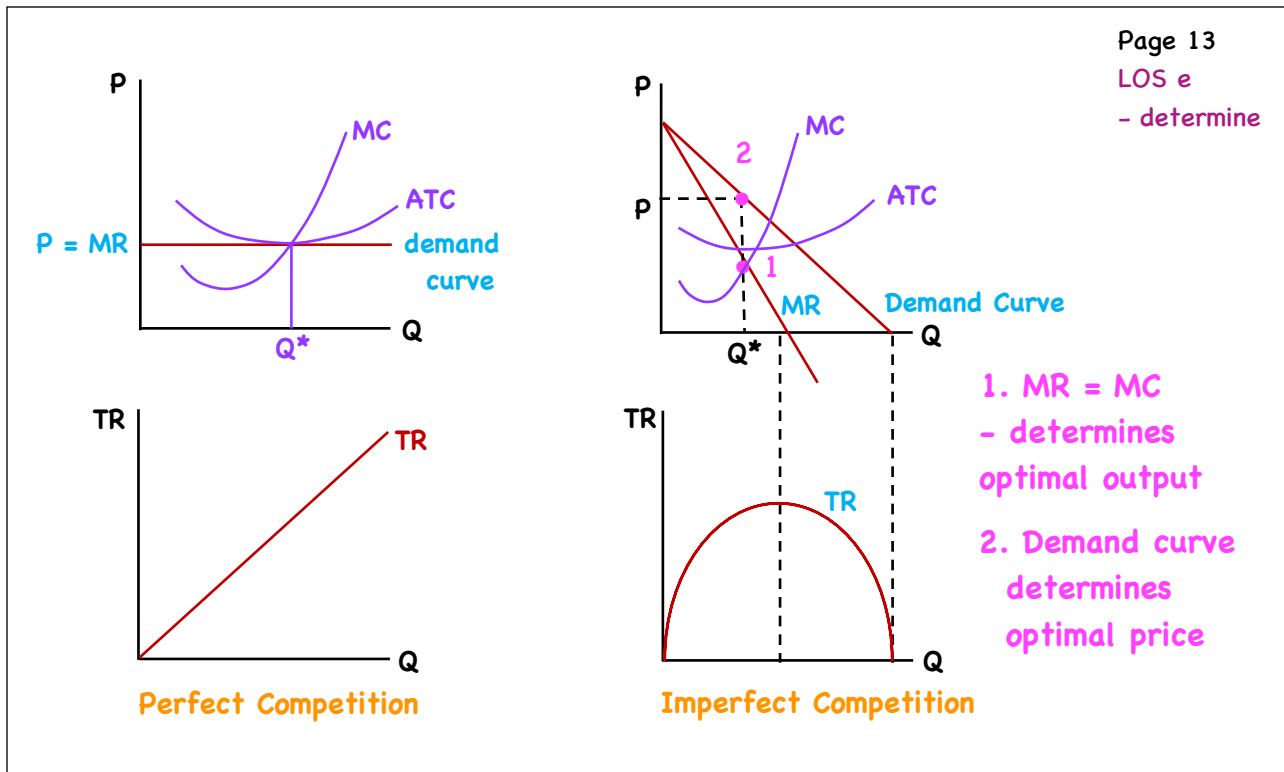
$AVC = w / AP_L$ - if $w \uparrow$, $AVC \uparrow$
 - if $AP_L \uparrow$, $AVC \downarrow$

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 LOS e
 - determine

Cost/unit

MC ATC AVC AFC





Introduction to the Firm and Market Organization

- a. describe characteristics of perfect competition, monopolistic competition, oligopoly, and pure monopoly
- b. explain relationships between price, marginal revenue, marginal cost, economic profit, and the elasticity of demand under each market structure
- c. describe a firm's supply function under each market structure
- d. describe and determine the optimal price and output for firms under each market structure
- e. explain factors affecting long-run equilibrium under each market structure
- f. describe pricing strategy under each market structure

Market Structure

	- significant determinant of long-term profitability			
- factors that determine market structure	Perfect Competition	Monopolistic Competition	Oligopoly	Monopoly
① number and relative size of firms	many	many	few	one
② degree of product differentiation	<ul style="list-style-type: none"> • homogeneous • standardized 	<ul style="list-style-type: none"> • differentiated 	<ul style="list-style-type: none"> • homogeneous • standardized 	<ul style="list-style-type: none"> • unique
③ seller power over pricing decisions	<ul style="list-style-type: none"> • none 	<ul style="list-style-type: none"> • some 	<ul style="list-style-type: none"> • some or considerable 	<ul style="list-style-type: none"> • considerable
④ Barriers to entry/exit	<ul style="list-style-type: none"> • very low 	<ul style="list-style-type: none"> • low 	<ul style="list-style-type: none"> • high 	<ul style="list-style-type: none"> • very high
⑤ Degree of non-price competition	<ul style="list-style-type: none"> • none 	<ul style="list-style-type: none"> • Advertising/ Product Differentiation 	<ul style="list-style-type: none"> Advertising/ Product Differentiation 	<ul style="list-style-type: none"> • Advertising

Page 1
LOS a
- describe

Perfect Competition

• Demand Analysis

- differentiated product + non-price competition = some pricing power

- price taker
- prices are industry determined

Monopolistic Competition

- downward sloping demand curve since prices are firm determined

Page 2
LOS b-f
- explain

Proof:

$$Q = a - bP$$

$$P = \frac{a}{b} - bQ$$

$$m = -b$$

$$TR = P \times Q$$

$$TR = \left(\frac{a}{b} - bQ\right)Q$$

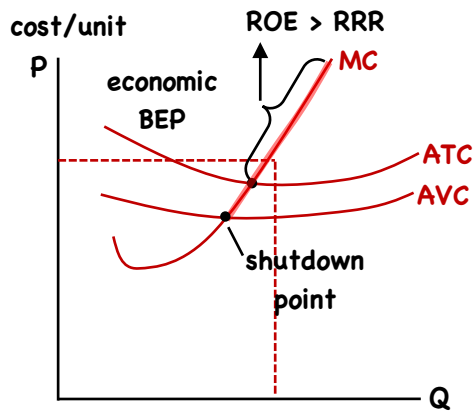
$$TR = \frac{a}{b} \cdot Q - bQ^2$$

$$MR = \frac{dTR}{dQ} = \frac{a}{b} - 2bQ$$

$$m = -2b$$

∴ slope of MR curve
= 2x slope of demand curve

Perfect Competition

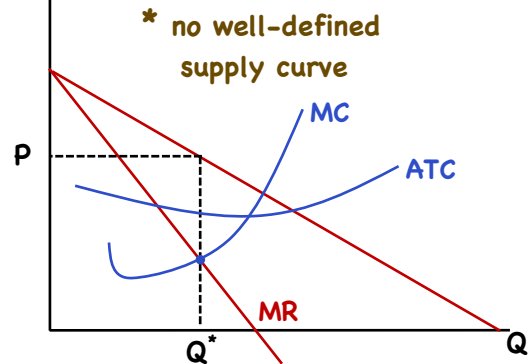


- level of output is determined by the MC schedule (MR = MC)

• Supply Analysis

- differentiated product + non-price competition = some pricing power

Monopolistic Competition



- level of output determined by MR = MC
- but price determined by demand curve

Perfect Competition

economic profit < 0

economic profit > 0

Q - optimal output

$\pi = TR - TC = \text{economic profit}$

• Optimal Price/Output

→

• differentiated product + non-price competition = some pricing power

→

Monopolistic Competition

optimal output

$TR = P \times Q$

$TC = C_1 \times Q$

$\pi = TR - TC = \text{economic profit} > 0$

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LOS b-f
- describe

Surplus

Q: Why is equilibrium desirable?

consumer surplus

Total expenditure = $P_1 \times Q_1$

e.g./ $Q_x^d = 180 - 2P_x$, what is consumer surplus if $P_x = 65$?

• demand curve can be interpreted as a 'marginal value curve' (diminishing marginal utility)

consumer surplus

$\frac{1}{2} bh$

$= \frac{1}{2} (50)(90 - 65)$

$= 625$

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LOS j
- calculate
- interpret

Market Structure

Perfect Competition

• Long-run Equilibrium

- differentiated product + non-price competition = some pricing power

- horizontal demand curve
- profit max when $MR = MC (= P = AC)$

Page 5
LOS b-f
- describe

Monopolistic Competition

- economic profit > 0 encourages firm entry
- drives down demand for all firms

1) $MR = MC \Rightarrow$ max profit
2) $P = AC \Rightarrow$ economic profit = 0

- downward sloping demand curve

Monopoly/ Demand analysis

• Single supplier + high barriers to entry = considerable pricing power

- patents, copyrights
- control over critical resources
- gov't. authorization (natural monopoly)
- network effects

- monopolist's demand schedule = AD curve in that relevant market

Supply analysis/ - no well-defined supply function

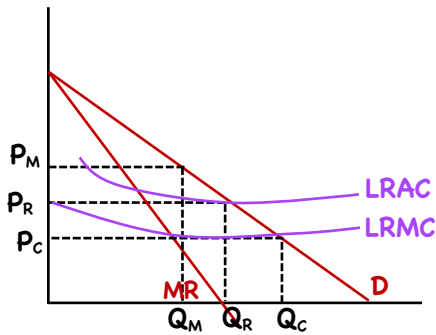
- profit-maximizing level of output $MR = MC$
- more like a supply point

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LOS b-f
- explain

**Monopoly/
Long-run equilibrium/**

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LOS b-f
- explain

P_R - regulated price
 Q_R - regulated output



• unregulated monopoly

$$E_L = (P_M, Q_M)$$

• regulated monopoly

1. $P = LRMC + \text{subsidy up to LRAC}$
2. $P = LRAC$ (authorized monopoly)
3. National ownership

Aggregate Output, Prices, and Economic Growth

- a. calculate and explain gross domestic product (GDP) using expenditure and income approaches
- b. compare the sum-of-value-added and value-of-final-output methods of calculating GDP
- c. compare nominal and real GDP and calculate and interpret the GDP deflator
- d. compare GDP, national income, personal income, and personal disposable income
- e. explain the fundamental relationship among saving, investment, the fiscal balance, and the trade balance
- f. explain how the aggregate demand curve is generated
- g. explain the aggregate supply curve in the short run and long run
- h. explain causes of movements along and shifts in aggregate demand and supply curves
- i. describe how fluctuations in aggregate demand and aggregate supply cause short-run changes in the economy and the business cycle
- j. distinguish among the following types of macroeconomic equilibria: long-run full employment, short-run recessionary gap, short-run inflationary gap, and short-run stagflation
- k. explain how a short-run macroeconomic equilibrium may occur at a level above or below full employment
- l. analyze the effect of combined changes in aggregate supply and demand on the economy
- m. describe sources, measurement, and sustainability of economic growth
- n. describe the production function approach to analyzing the sources of economic growth
- o. define and contrast input growth and growth of total factor productivity as components of economic growth

Aggregate Output, Prices, and Economic Growth

Aggregate output (AO)
- value of all g/s produced in a specified time period

Aggregate Income (AI)
- value of all payments earned by the suppliers of the factors of production

wages, rent, interest, profit

- since households are the ultimate owners of productive assets, plus the source of all labour, it is standard to attribute all income to the household sector

Page 1
LOS a
- calculate
- explain

Indirect Investment

Households
↓
Funds
↓
Companies
↓
Productive Assets

Direct Investment

→ **Aggregate Expenditure (AE)** → total amount spent on g/s produced in the domestic economy during a period

$AO = AI = AE = Y$

→ **GDP - gross domestic product** → measures:

a) the market value of all final g/s produced within an economy in a given period of time (**output definition**)

- all g/s must be produced during the measurement period
- excluded → previous period production, transfer pmts. from gov't. to households, capital gains
- only g/s whose value can be determined by being sold in a market
- only market value of final g/s are included

or/ b) the aggregate income earned by all households, all companies, and the government within the economy in a given period of time (**income definition**)

∴ **Income approach** → GDP = total amt. of income earned (over a period)

Expenditure approach → GDP = total amount spent (over a period)

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LOS a
- calculate
- explain

→ value of GDP based on expenditure → 2 measurement methods

- 1/ value of final output
- 2/ sum of value added

(Exhibit #2)
(example #1)

Page 3
LOS b
- compare

Note: g/s whose market price cannot be determined:

- use of imputed price
 - e.g. owner-occupied housing → purchase/sale of houses not included
 - estimate of 'rent' is included instead
 - government services → included at cost with no value-added

→ non-market transactions, barter and black market/illegal activities are excluded

→ Nominal vs. Real GDP/

- real GDP → removes the effect of changes in the general price level

- per capita real GDP → real GDP/population → measures the standard of living in an economy

· nominal GDP → value of g/s produced at current prices

e.g./

	output	Price	nominal GDP	
YR 1	300,000	18,750	5.625B	} 7% growth in nominal GDP
YR 2	300,000	20,062.50	6.01875B	

↓
 $P_t \times Q_t$

- real GDP → $P_B \times Q_t = 18,750 \times 300,000 = 5.625B$ → 0% growth in real GDP

↓
base year

- if YR 2 output = 309,000, real GDP_{YR2} = $18,750 \times 309,000 = 5.79375 B$
3% growth in GDP_r

Page 4
LOS c
- compare
- calculate
- interpret

→ GDP deflator (or implicit price deflator for GDP)

$$\text{GDP deflator} = \frac{\text{nominal GDP}}{\text{real GDP}} \times 100 \quad \left(\Rightarrow \text{GDP}_r = \frac{100 \times \text{GDP}_n}{\text{GDP deflator}} \right)$$

LOS c

- compare
- calculate
- interpret

- using YR2 data at 309,000 units, €20,062.50/unit

$$= \frac{(309,000 \times 20,062.50)}{(309,000 \times 18,750)} \times 100 = \frac{20,062.50}{18,750} \times 100 = 107$$

$$\frac{\text{GDP}_n}{1.07}$$

→ also: nominal GDP = [(1 + GDP_r)(1 + inflation)] - 1

(example #2)

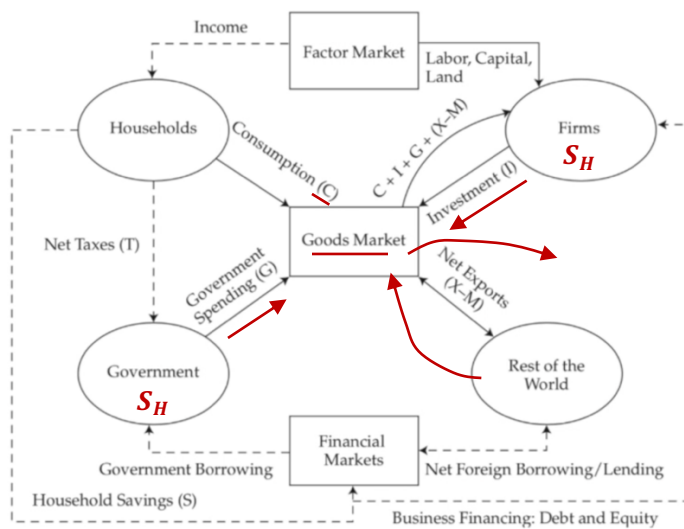
e.g. output ↑ 3%
prices ↑ 7%

$$\text{GDP}_n = [(1.03)(1.07)] - 1 = 10.2\%$$

→ Components of GDP/

LOS d

- compare



$$\text{GDP} = C + I + G + (X - M)$$

C = consumer spending

G = government spending

$$= G^C + G^I$$

I = private domestic investment

(capital goods + Inventory)

X = exports

M = imports

$$\text{GDP} = (C + G^C) + (I + G^I) + (X - M)$$

- household sector = $C + S$
- Investment (I) most volatile component of GDP
- Government (G), net Taxes (T) = gross taxes - transfer payments
if $G > T$ → fiscal deficit
included in C
- External Sector → $(X - M) < 0$ → trade deficit
 > 0 → trade surplus

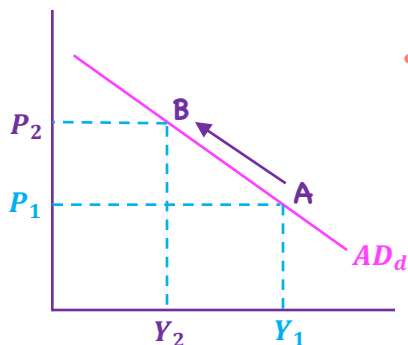
• $GDP = C + I + G + (X - M)$
 $= C + (\text{bus. Inv.} + \Delta\text{Inventories}) + (G^C + G^I) + (X - M) + \text{statistical discrepancy}$
data are more timely and reliable

• National Income = $Y = \text{net domestic Income} + \text{CFC} + \text{statistical discrepancy}$
 e.g./ $NI = \text{all income} + \left(\begin{array}{l} \text{what needs to be} \\ \text{reinvested to} \\ \text{maintain the capital} \\ \text{stock} \end{array} \right) + \text{consumption of fixed capital (i.e. depreciation)}$
↓
wages
return on capital
sales tax

- personal income = all income received by households
 = wages + net mixed income + net property income
 (whether earned or not)
- disposable income = personal income - net personal taxes
taxes paid transfers received
- personal savings = disposable income - C + Δ pension entitlements
some payroll taxes are for gov't. sponsored personal pensions

Aggregate Demand - quantity of g/s that households, businesses, government, and international customers want to buy at any given level of prices

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LOS f
- explain



• Downward slope of AD curve results from 3 effects:

1/ **Wealth effect:** a rise in the general price level (P_1 to P_2) decreases the quantity of g/s that can be purchased with a fixed quantity of nominal wealth

i.e. consumers are less wealthy and \therefore demand fewer g/s

• Downward slope of AD curve results from 3 effects:

Page 12
LOS f
- explain

2/ **Interest Rate Effect:** as P changes, demand for money changes

- as $P \uparrow$, demand for money increases

- since the money supply is fixed, the price of money \uparrow

- price of money = the interest rate

- as $P \downarrow$, less demand to hold money, more investment, bond prices \uparrow , interest rates \downarrow

- as $P \uparrow$, more demand to hold money, less investment, bond prices \downarrow , interest rates \uparrow

- as $r \uparrow$, businesses invest less since borrowing costs \uparrow , consumers finance fewer big-ticket items (durable goods)

• in total, as $P \uparrow$, demand for money \uparrow , $r \uparrow$, which leads to AD \downarrow
 $P \downarrow$ \downarrow , \downarrow \uparrow

- Downward slope of AD curve results from 3 effects:
3/ the real exchange rate

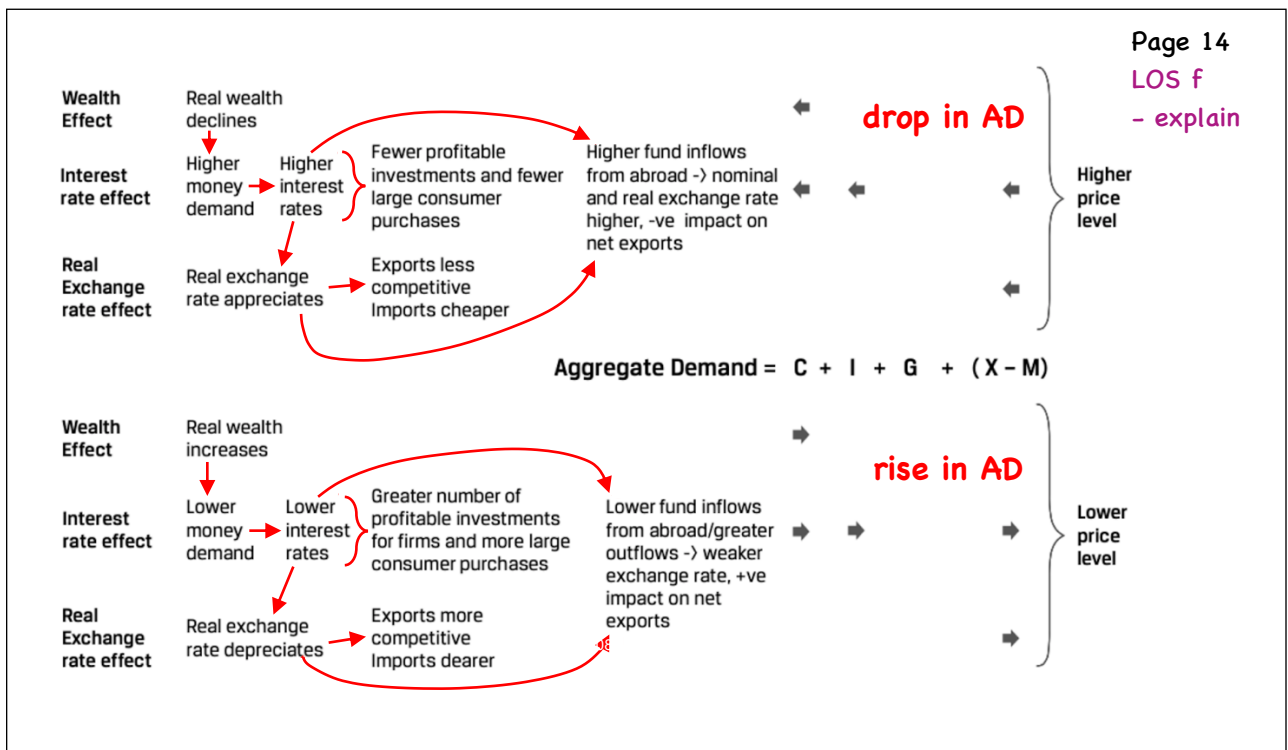
- as $P \uparrow$, real exchange rate \uparrow - makes domestic g/s more expensive in other countries
- reduces exports

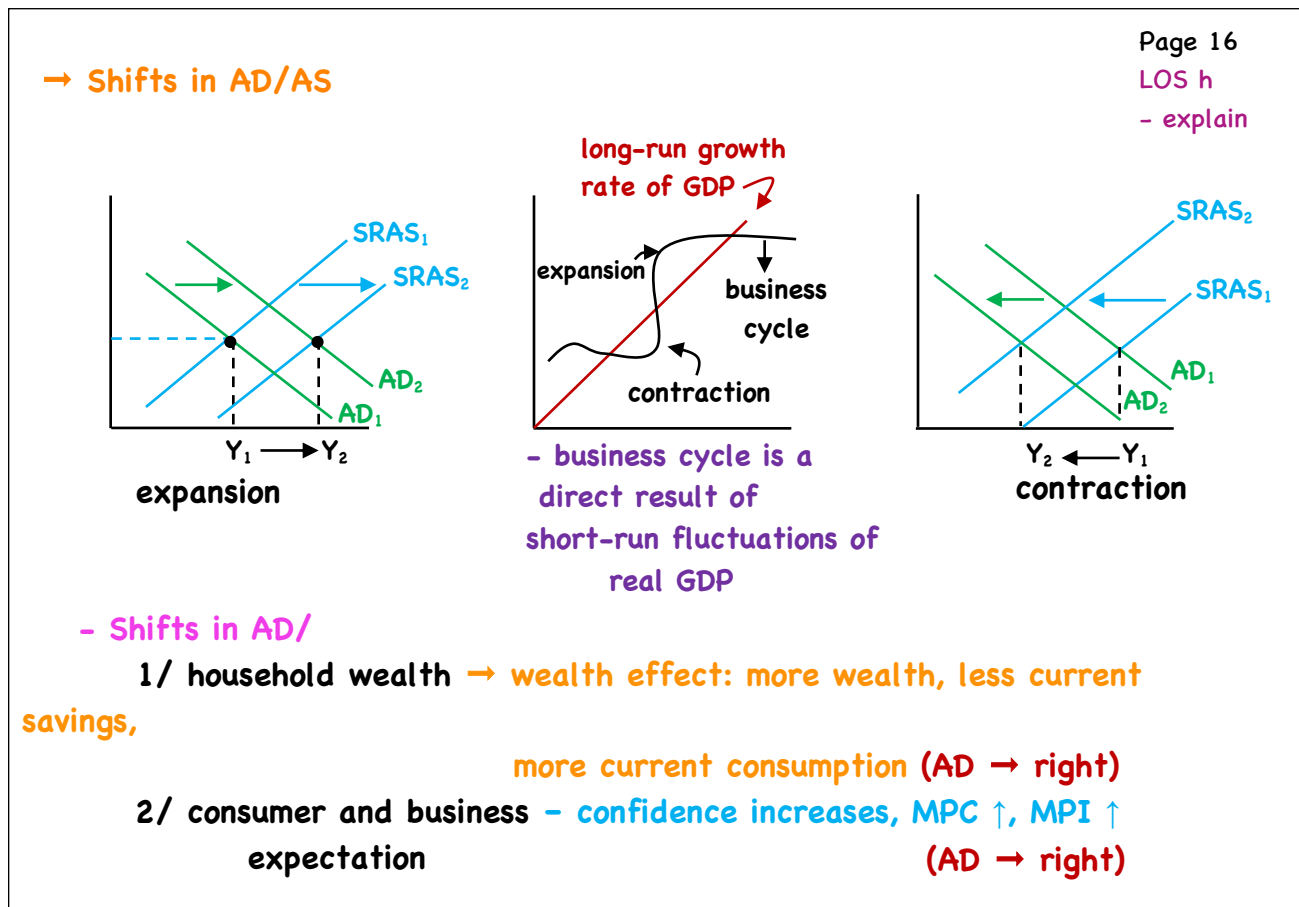
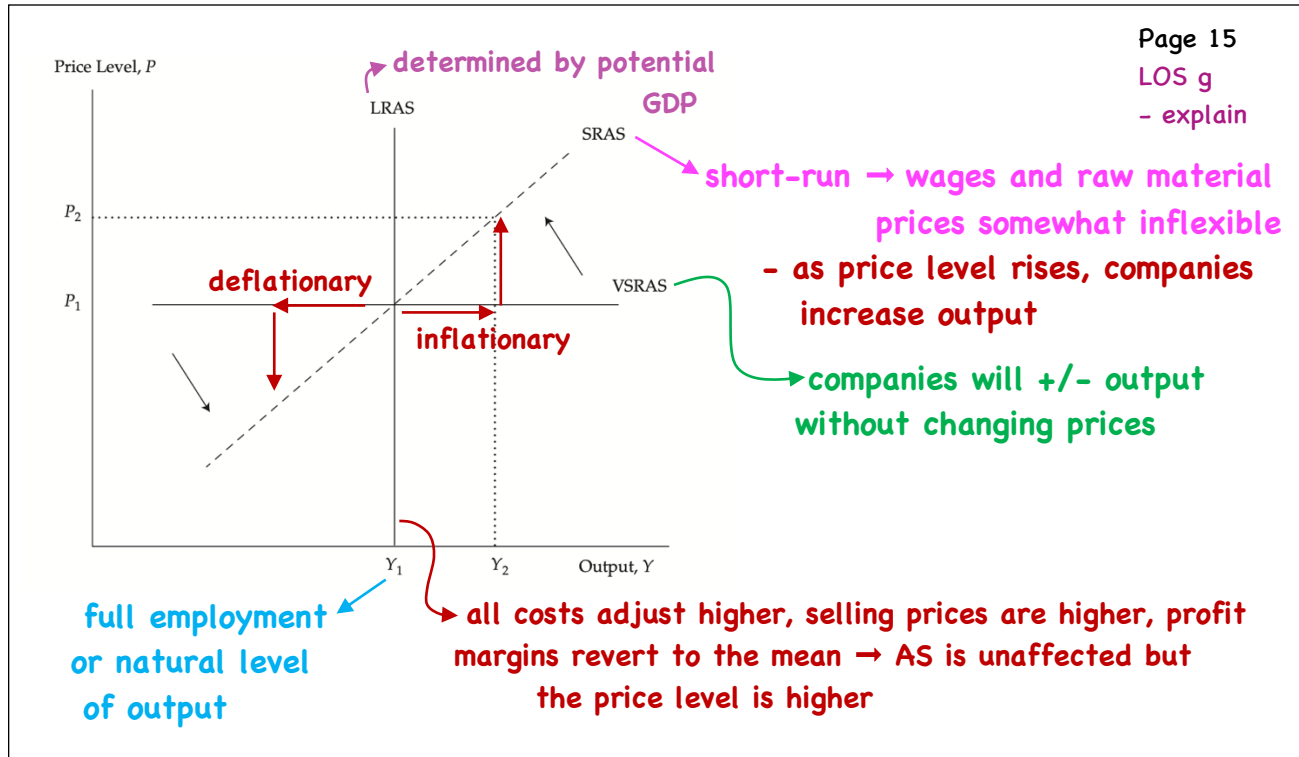
- also makes foreign goods less expensive \rightarrow raising imports

$$\therefore (x - m) \downarrow$$

- Recall: as $P \uparrow$, $r \uparrow$, capital inflows raise demand for the local currency and thus the real exchange rate increases

- reverse for $P \downarrow$





- Shifts in AD/

3/ Capacity utilization > 82% to 85%, $I \uparrow$ (AD → right)

4/ Fiscal policy → $G \uparrow$ or $T \downarrow$, $C \uparrow$ (AD → right)

5/ Monetary policy → increase money supply by:

a) buying securities from banks

b) lowering the required reserve ratio

c) reducing target interest rate

as $M \uparrow$, AD → right

6/ Exchange rate - affect the price of X and M

↓ fx-rate → $\uparrow X$, $\downarrow M$ AD → right

7/ Global growth → higher X, AD → right

(example #8)

• Shifts in SRAS/ - factors that change cost of

production or expected profit margins will cause SRAS to shift

plus: factors that shift LRAS will also shift SRAS in the same way

1/ changes in nominal wages $\uparrow W$ raises production costs → SRAS → left

$\uparrow W$ may be offset by \uparrow productivity

no impact on LRAS

$\% \Delta$ unit labour cost = $\% \Delta W - \% \Delta$ productivity

(example #9)

2/ changes in input prices $\uparrow RM$ prices raise cost of production SRAS → left

3/ change in expectations about future prices → expectations of being

able to increase prices in future

SRAS → right

- but temporary and small (difficult to predict impact)

4/ changes in business taxes and subsidies

$\uparrow T$ and $\downarrow S$ raise production costs/unit SRAS → left

5/ changes in fx-rate - higher fx-rate, $\downarrow M_p$ → if those are RM, lowers

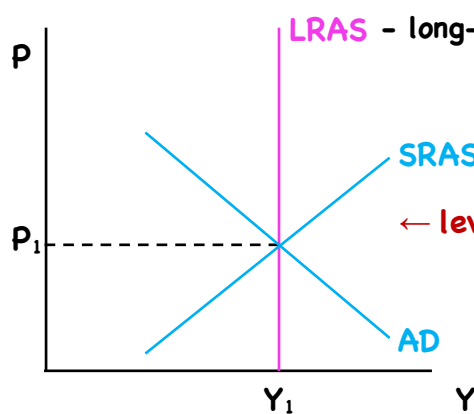
production costs

SRAS → right

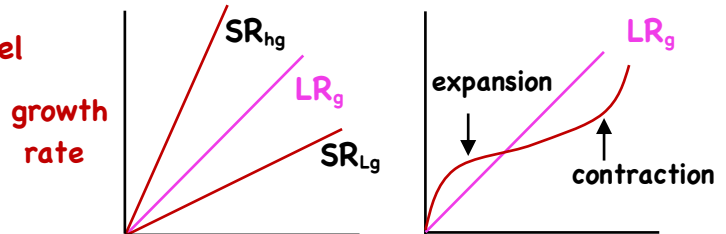
• Shifts in LRAS/

- 1/ Supply of Labour
 - population
 - participation rate
 - net immigration
 } ↑ workforce, ↑ potential GDP
LRAS → right
- 2/ supply of natural resources - increased availability LRAS → right
- 3/ supply of physical capital - increased capital stock, increase in productive capacity LRAS → right
- 4/ supply of human capital - higher quality of labour, ↑ potential GDP
 - training • education
 - skills
 LRAS → right
- 5/ Labour productivity and technology - more efficient workforce, higher output per hour worked, lower production costs/unit
 - typically obtained through technological advances
 LRAS → right

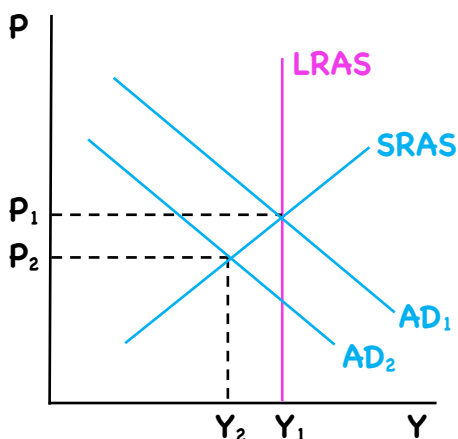
(example #10, #11)



LRAS - long-run full employment equilibrium
- AD intersects SRAS on the LRAS curve
- economy is at potential GDP



growth rate



Recessionary gap/

- AD → left = lower Y, lower P
- companies cut production, cut workforce (movement along SRAS)
- recessionary gap = $(Y_1 - Y_2)$
- equilibrium GDP < potential GDP

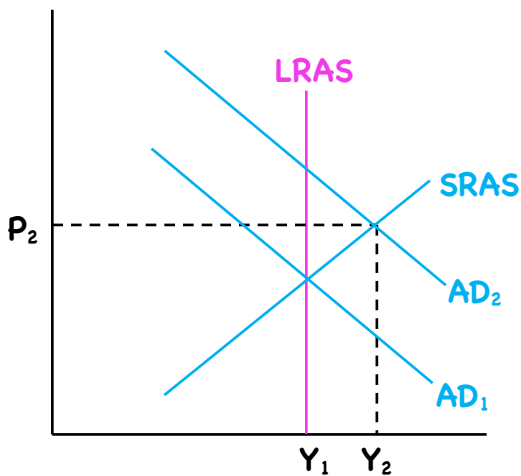
LOS j
- distinguish

- distinguish
- explain

- Recessionary gap → Investment Implications

- corporate profits decline
- commodity prices decline
- interest rates decline
- demand for credit declines

- reduce investments in cyclical companies, commodities, or commodity-oriented companies, and speculative equity companies
- increase investments in defensive stocks, IG/gov't. long-term bonds



Inflationary gap - economic expansion, real GDP and employment increase

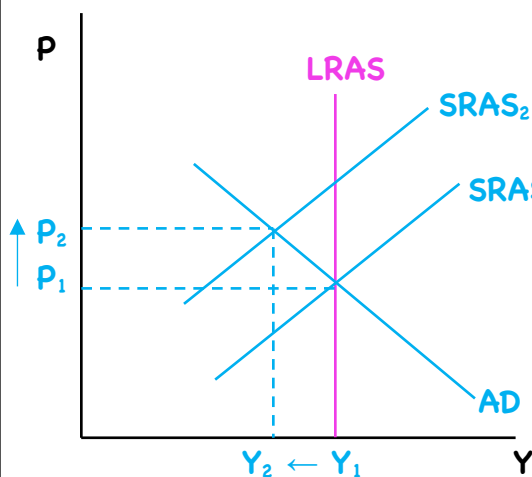
- higher output at higher prices
- companies increase production, may have to compete on wages to attract employees
- inflationary gap = $(Y_2 - Y_1)$
- equilibrium GDP > potential GDP

- distinguish
- explain

- Inflationary gap → Investment Implications

- corporate profits rise
- commodity prices increase
- interest rates rise
- inflationary pressure builds

- increase investments in cyclical companies, commodities, or commodity-oriented companies, and speculative fixed-income securities
- reduce investments in defensive stocks, IG/gov't. long-term bonds



Stagflation → SRAS shifts to the left

- lower output at higher prices
- higher unemployment, higher inflation
- reduce exposure to both equities and fixed income
- increase exposure to commodities

Change in AS	Change in AD	Effect on Real GDP	Effect on Aggregate Price Level
Increase	Increase	Increase	Indeterminate
Decrease	Decrease	Decrease	Indeterminate
Increase	Decrease	Indeterminate	Decrease
Decrease	Increase	Indeterminate	Increase

LOS L
- analyze

(example #13)

- economic growth is calculated as $\% \Delta$ in real GDP

LOS m
- describe

↓
has a limit → sustainable growth

rate of increase in the economy's productive capacity or potential GDP

LRAS - the factors that shift LRAS right also increase potential GDP

• $Y = AF(L, K)$ - output depends on inputs L and K and the level of technology (A)

LOS n
- describe

Y = output

L = labour

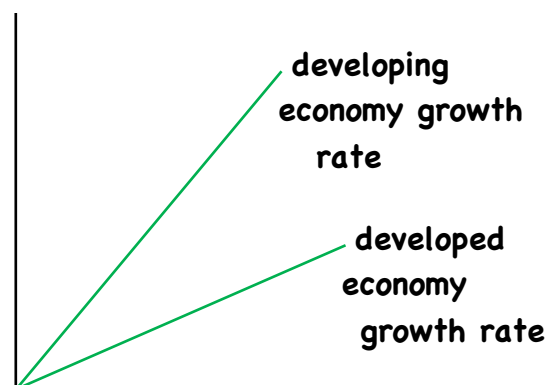
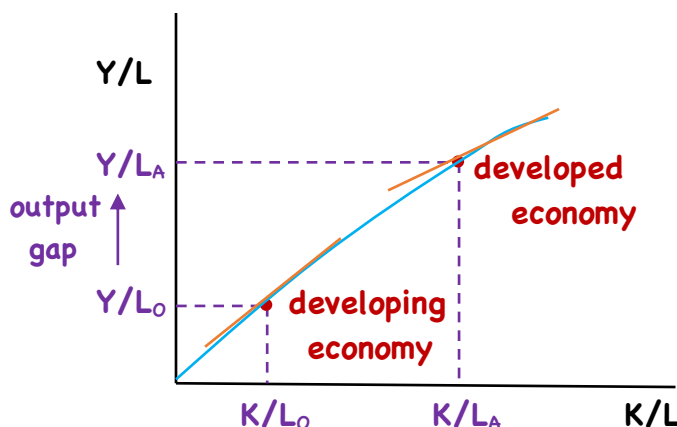
K = capital

A = total factor productivity

constant returns to scale → double the inputs, double the outputs

→ Diminishing returns to scale with respect to any individual input

• as K increases while holding L and A constant, output increases at a decreasing rate



→ Growth in potential GDP = growth in technology
+ W_L (growth in Labour)
+ W_C (growth in capital)

$$W_L = \frac{\text{Wages}}{\text{GDP}}$$

$$W_C = 1 - W_L$$

relative shares of capital and labour in national income → corporate profits, net interest income, net rental income, depreciation

GDP

e.g. U.S. → $W_L = .7$ } ∴ ↑ in L will have a larger effect
→ $W_C = .3$ } on GDP than an increase in K

→ Growth in per capita GDP = growth in technology + W_C (growth in K/L)

→ Sources of Economic Growth/

1/ Labour Supply (quantity variable)

→ labour force = participation rate × population

→ potential size (quantity) = labour force × Avg. hours worked per worker

• daycare
• child benefits

immigration

business cycle sensitive

2/ Human Capital (quality variable)

- education, training, experience

3/ Physical Capital Stock - increases from year to year as long as

net investment is positive

(gross Inv. - Dep.)

4/ Technology - most important factor

- allow economies to overcome the limits imposed by diminishing marginal returns

TFP growth = growth in potential GDP - [W_L (growth in labour) + W_C (growth in Capital)]

↓
residual

→ Sources of Economic Growth/

5/ Natural Resources $\left\{ \begin{array}{l} \text{renewable (forest)} \\ \text{non-renewable (oil)} \end{array} \right\}$ imports can overcome these deficits

→ Measures of sustainable growth/

- recall the growth accounting equation:

$$\begin{array}{ccccccc} \text{Growth in} & = & \text{growth in} & + & W_L (\text{growth in}) & + & W_C (\text{growth in}) \\ \text{potential GDP} & & \text{technology} & & \text{Labour} & & \text{capital} \\ \downarrow & & \downarrow & & \underbrace{\hspace{10em}} & & \\ \text{unobservable} & & \text{unobservable} & & \text{data may not be available} & & \end{array}$$

∴ focus on labour productivity = $\frac{\text{Real GDP}}{\text{Aggregate Hours}}$ → both observable

depends on

- K/L
- A

∴ growth in potential GDP = LT growth rate of labour force + LT labour productivity growth rate

Introduction to Business Cycles

- a. describe how resource use, consumer and business activity, housing sector activity, and external trade sector activity vary as an economy moves through the business cycle
- b. describe types of unemployment, and compare measures of unemployment
- c. explain inflation, hyperinflation, disinflation, and deflation
- d. explain the construction of indexes used to measure inflation
- e. compare inflation measures, including their uses and limitations
- f. contrast cost-push and demand-pull inflation

Understanding Business Cycles

Phase	Recovery	Expansion	Slowdown	Contraction
<p>Employment</p> <p>average hours worked →</p> <p>bullish</p>	<p>Layoffs slow. Businesses rely on overtime before moving to hiring. Unemployment remains higher than average.</p> <p>bullish</p>	<p>Businesses move from using overtime and temporary employees to hiring. Unemployment rate stabilizes and starts falling.</p> <p>(Levels of employment lag the cycle)</p>	<p>Businesses continue hiring but at a slower pace. Unemployment rate continues to fall but at slowly decreasing rates.</p> <p>bearish</p>	<p>Businesses first cut hours, eliminate overtime, and freeze hiring, followed by outright layoffs. Unemployment rate starts to rise.</p>
		big theme		
<p>Sales and production</p> <p>Inventory-sales ratio bullish ↓</p>	<p>Sales decline slows. Sales subsequently recover. Production upturn follows but lags behind sales growth. Over time, production approaches normal levels as excess inventories from the downturn are cleared.</p> <p>Begins to fall as sales recovery outpaces production.</p>	<p>Sales increase. Production rises fast to keep up with sales growth and to replenish inventories of finished products. This increases the demand for intermediate products. "Inventory rebuilding or restocking stage."</p> <p>Ratio stable.</p>	<p>Sales slow faster than production; inventories increase. Economic slowdown leads to production cutbacks and order cancellations.</p> <p>Ratio increases. Signals weakening economy.</p>	<p>Businesses produce at rates below the sales volumes necessary to dispose of unwanted inventories.</p> <p>Ratio begins to fall back to normal.</p>

Phase	Recovery	Expansion	Slowdown	Contraction
<p>Business conditions and expectations</p> <p>capacity utilization rates</p> <p>↓</p> <p>move into high operating leverage sectors</p>	<p>Excess capacity during trough, low utilization, little need for capacity expansion. Interest rates tend to be low—supporting investment.</p>	<p>Companies enjoy favorable conditions. Capacity utilization increases from low levels. Over time, productive capacity may begin to limit ability to respond to demand. Growth in earnings and cash flow gives businesses the financial ability to increase investment spending.</p> <p>- bullish for capital equipment</p>	<p>Business conditions at peak, with healthy cash flow. Interest rates tend to be higher—aimed at reducing overheating and encouraging investment slowdown.</p>	<p>Companies experience fall in demand, profits, and cash flows.</p>
<p>Capital spending</p> <p>keeps demand for employment low →</p>	<p>Low but increasing as companies start to enjoy better conditions. Capex focus on efficiency rather than capacity. Upturn most pronounced in orders for light producer equipment. Typically, the orders initially reinstated are for equipment with a high rate of obsolescence, such as software, systems, and technological hardware.</p>	<p>Customer orders and capacity utilization increase. Companies start to focus on capacity expansion. The composition of the economy's capacity may not be optimal for the current structure of demand, necessitating spending on new types of equipment. Orders precede actual shipments, so orders for capital equipment are a widely watched indicator of the future direction of capital spending.</p>	<p>New orders intended to increase capacity may be an early indicator of the late stage of the expansion phase. Companies continue to place new orders as they operate at or near capacity.</p>	<p>New orders halted, and some existing orders canceled (no need to expand). Initial cutbacks may be sharp and exaggerate the economy's downturn. As the general cyclical bust matures, cutbacks in spending on heavy equipment further intensify the contraction. Maintenance scaled back.</p> <p>preserve cash flow</p>

this determines

this

Phase of the Cycle	Recovery	Expansion	Slowdown	Contraction
Incomes, employment, and confidence	Unemployment remains above average. Layoffs slow. Businesses rely on overtime before moving to hiring. <i>(Consumer confidence starts improving.)</i>	Hiring restarts. Unemployment rate stabilizes and starts falling. Consumers experience rising incomes, healthy employment prospects, and greater confidence.	Businesses continue hiring but at a slower pace. Unemployment rate continues to fall. Incomes are still growing. Consumers remain confident.	Businesses first cut hours of overtime prior to freezing hiring and starting layoffs. Employment levels decline, and consumer confidence weakens.
Spending on consumer durables (autos, motorcycles, appliances, furniture)	Spending limited as households postpone spending. <i>→ outperforms →</i>	(Spending increases.) <i>result</i>	Spending above average. <i>(highly cyclical)</i>	Purchases postponed; spending decreasing.
Consumer non-durables (i.e., medicines, food, household products)	<i>- defensive sectors</i>	Spending shows little change through the cycle.		
Services (entertainment, outdoor eating, communications, personal services)	Spending below average. <i>- mixed cyclical</i>	Spending increases.	Spending above average. <i>→ outperforms →</i>	Spending declines.

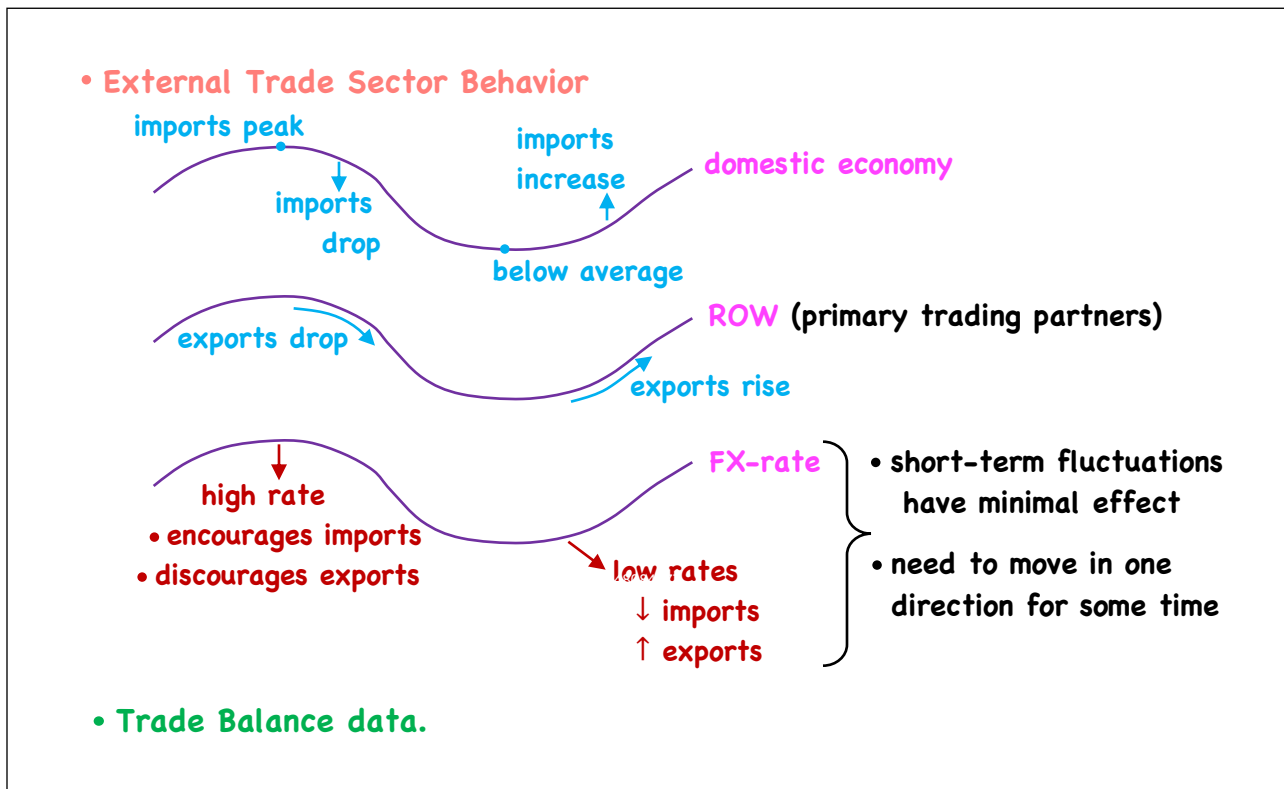
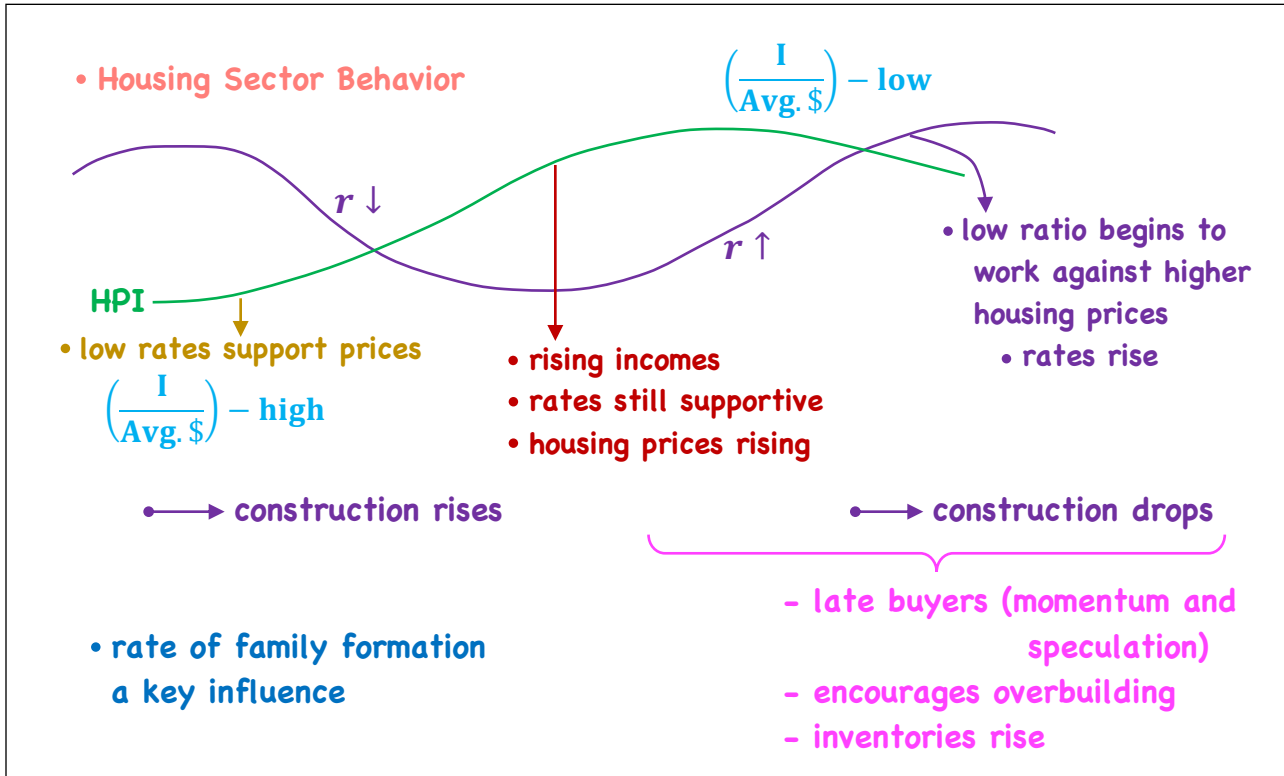
bullish (next to Recovery column)

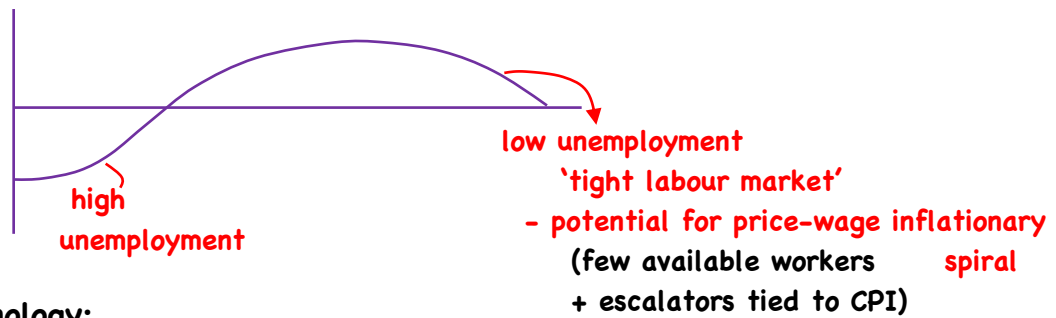
critical signal (arrow pointing from Expansion to Slowdown)

Consumer Spending
- less cyclical than investment spending

• economic data → Consumer confidence, ISM Services, Retail Sales

- **Household Incomes** → Y_d - disposable income positively related to spending on durable goods
 - permanent income: excludes temporary income and unsustainable losses and gains → correlates well with non-discretionary spending
- **Household Savings** → $\uparrow S$ may indicate future caution
 - stock of S may indicate future consumption potential without a need for \uparrow Incomes
- **Housing Sector Behavior**
 - **New/Existing Home Sales** (Demand)
 - **Building Permits** (Supply - construction activity)
 - **HPI - Housing Price Index** (median home prices)





Terminology:

Employed: those with a job

Labour force: those with a job + those looking for a job
(employed) (unemployed)

Unemployed: those without a job but looking

- long-term unemployed → 3-4 months but still looking
- frictionally unemployed → natural movement from job-to-job

Unemployment Rate: $\frac{\text{Unemployed}}{\text{Labour force}}$

Terminology:

Activity Ratio (Participation Rate): $\frac{\text{Labour force}}{\text{Population}}$ of working age (16 to 64)

Underemployed: has a job below qualifications or has PT but wants FT

Discouraged worker: person who has stopped looking for work - not counted as unemployed

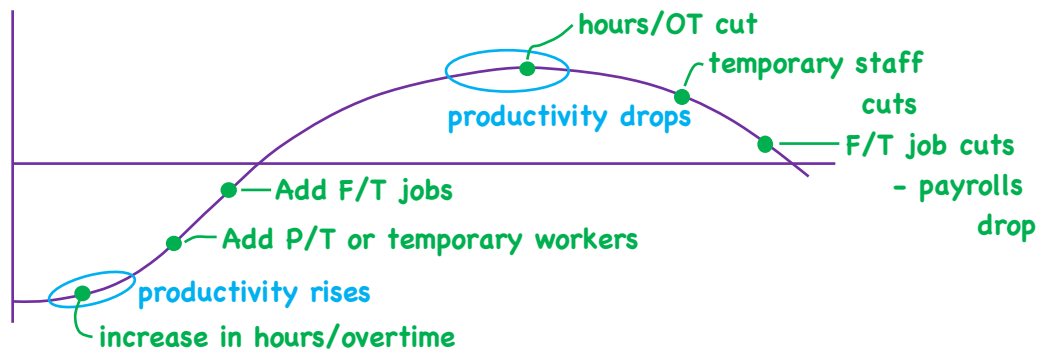
Voluntarily unemployed: person who could get a job but refuses the work

Unemployment Rate:

- surveys (US BLS)
- claims for UI
- all working age regardless of willingness

- lagging indicator - labour force responds to the economic environment
- changes in participation rate produce paradoxical results
- business response does not lead

- **Productivity = Output/Hours worked** (leading to coincident)



- **Economic Data: Payrolls (PT/FT)**
Hours worked
Temporary Workers

Inflation: a sustained rise in the overall level of prices
 - the same amount of money purchases fewer goods
 (erodes purchasing power and real incomes)
 - pro-cyclical with a lag (a year or more)

$$\text{Inflation Rate} = \frac{\text{Price Index}_1 - \text{Price Index}_0}{\text{Price Index}_0} \quad \text{- lagging indicator}$$

Inflation Expectations - leading indicator, especially for the direction of monetary policy

Terminology:

Deflation: a sustained decrease in the aggregate price level
 (value of money increases)

Hyperinflation: an extremely fast increase in the aggregate price level
 - typically as a result of a rapid increase in the money supply

Disinflation: a decline in the rate of increase

e.g. YR1 - 3% YR2 - 2.5% YR3 - 2% YR4 - 1.5%

Measuring Inflation:

Price Index → the average prices of a representative basket of goods/services

Laspeyres Index - composition of the representative basket held constant as of a base year (updated every 5 years)

e.g. $YR_0 \quad WQ_0 \times P_0$
 $YR_1 \quad WQ_0 \times P_1 \rightarrow \text{Index} = \left(\frac{WQ_0 \times P_1}{WQ_0 \times P_0} \right) \times 100$
 $YR_2 \quad WQ_0 \times P_2$

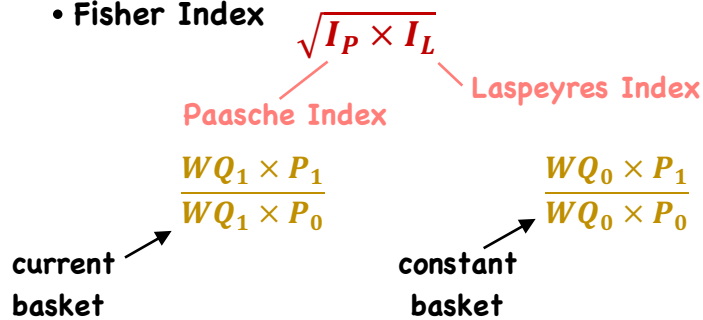
Inflation Rate = $\left(\frac{\text{Index}_1}{\text{Index}_0} \right) - 1$

Issues/

- substitution → if the basket is not adjusted, results in an upward bias
 - quality → if not adjusted for, results in an upward bias
 - new products → not included until update - results in an upward bias
- } can use hedonic pricing

• **chained Price Index** - solves substitution bias

• **Fisher Index**



- different names, weights, methodologies

CPI-U
HICP
PCE

reflecting domestic conditions and preferences or constraints

household survey - urban vs. rural
business survey

LOS i
- compare
CPI-U
PCE

Exhibit 20 Consumption Basket and Prices over Two Months

Time	January 2019		February 2019	
	Quantity	Price	Quantity	Price
Rice	50 kg	¥3/kg	70 kg	¥4/kg
Gasoline	70 liters	¥4.4/liter	60 liters	¥4.5/liter

$$I_L = \left(\frac{515}{458} \right) \times 100 = \underline{112.44}$$

$$I_P = \left(\frac{550}{474} \right) - 1 = 116.03$$

$$\text{Fisher} = \sqrt{112.44 \times 116.03} = 114.22$$

2019

$$\begin{array}{r} 50 \times 3 = 150 \\ 70 \times 4.4 = 308 \\ \hline 458 \end{array}$$

2019

$$\begin{array}{r} 70 \times 3 = 210 \\ 60 \times 4.4 = 264 \\ \hline 474 \end{array}$$

2020

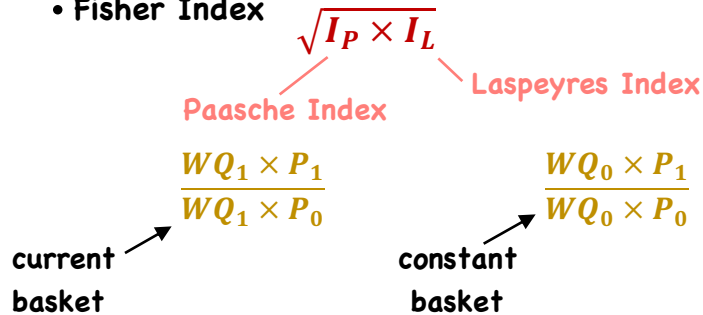
$$\begin{array}{r} 50 \times 4 = 200 \\ 70 \times 4.5 = 315 \\ \hline 515 \end{array}$$

2020

$$\begin{array}{r} 70 \times 4 = 280 \\ 60 \times 4.5 = 275 \\ \hline 550 \end{array}$$

- chained Price Index - solves substitution bias

- Fisher Index



- different names, weights, methodologies

CPI-U
HICP
PCE

reflecting domestic conditions and preferences or constraints

household survey

- urban vs. rural

CPI-U

business survey

PCE

Producer Price Index - measures price changes paid by domestic producers
 - may lead to changes in CPI

(fuels, farm products, machinery and equipment by raw materials, intermediate goods and finished goods)

- bonds, contracts, leases, pensions, labour contracts → may be indexed to some price index
- different central banks follow different measures
 ECB - HICP India - WPI US - PCE (Fisher Index)
- Nominal GDP adjusted to real GDP by a price index - called a price deflator
- headline vs. core → strips out volatile components (energy and food)

Cost-Push Inflation: rising costs (usually wages) compel business to raise prices

↓ largest input cost.

very little excess wage inflation pressure

rising excess wage inflation pressure

NAIRU
non-accelerating inflation rate of unemployment
(natural rate of unemployment)

Indicators: hourly wages, weekly earnings

- must consider productivity:
$$\text{Unit Labour Cost} = \frac{\text{Total w/hr}}{\text{Output/hr}}$$

↓
typically rise in tight labour markets

Demand-Pull Inflation: Capacity utilization
Actual output vs. potential } closer to
capacity,
greater pressure on
prices

Commodity Prices - input costs

Monetarists/

too much money (increases in the money supply in excess
of trend growth)

• Assessing inflationary potential/

$$\text{Velocity} = \frac{\text{Nominal GDP}}{\text{money supply}}$$

if velocity ↓ due to $M \uparrow$, may be inflationary

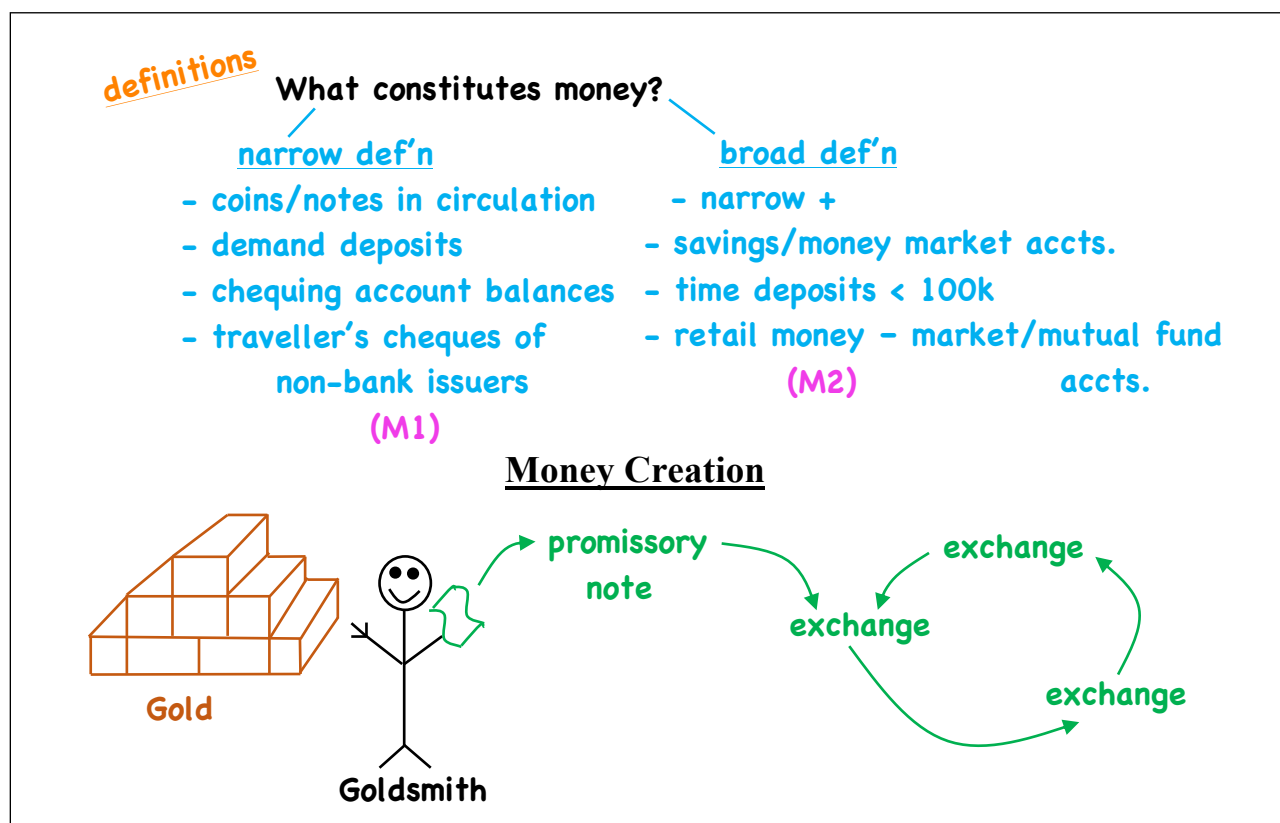
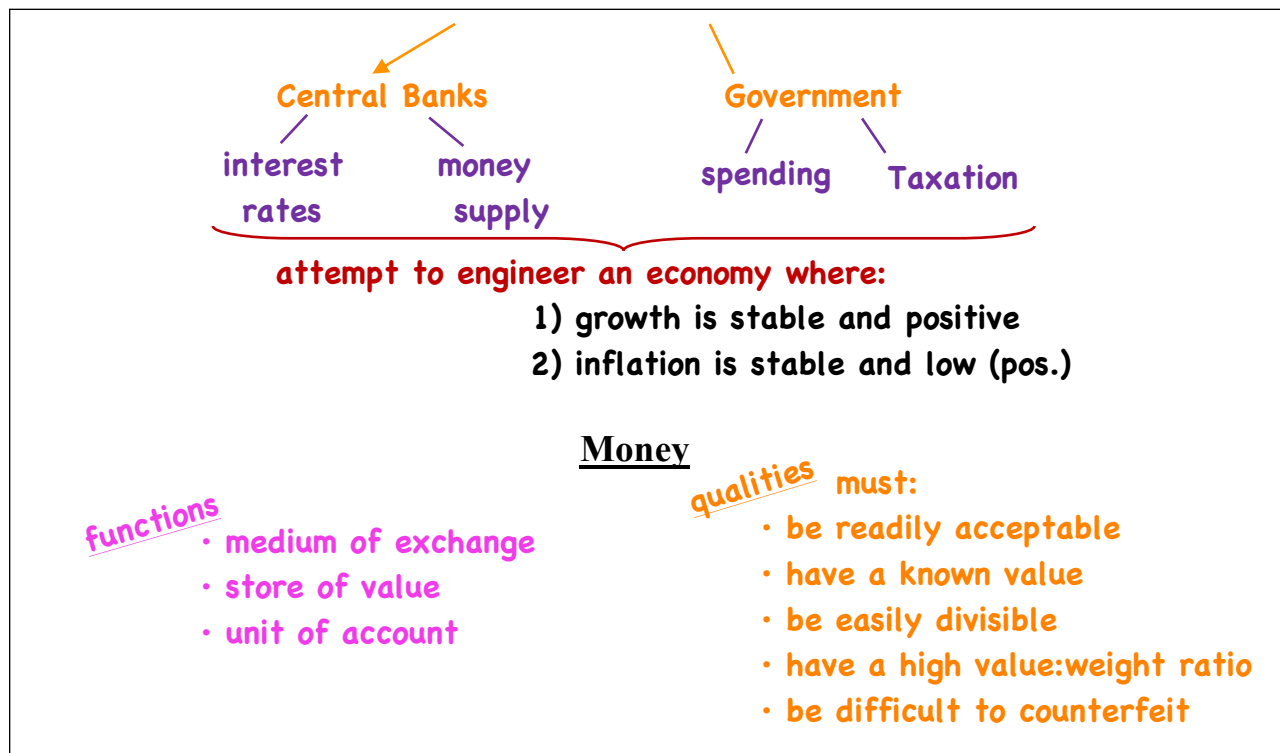
if velocity ↑ due to $nGDP \uparrow$, may be disinflationary or deflationary

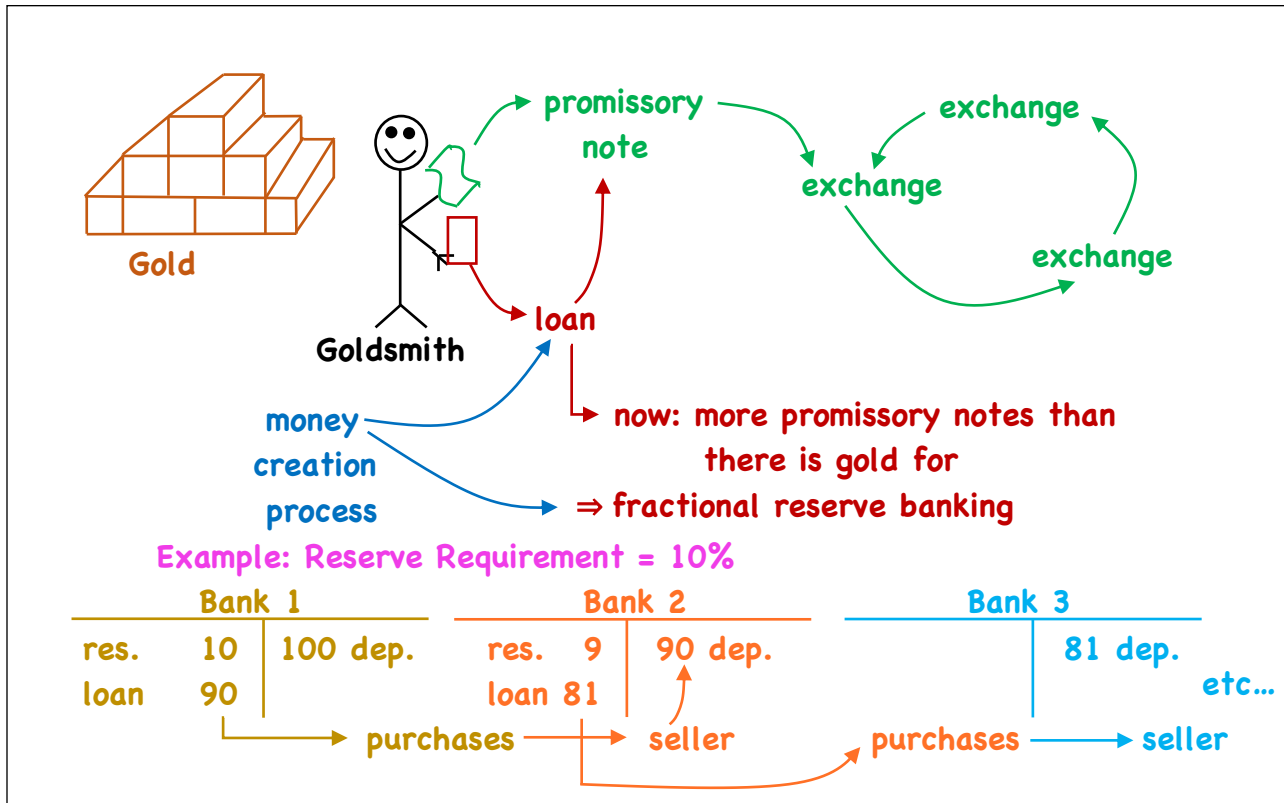
Inflation expectations → may become self-fulfilling

Monetary and Fiscal Policy

- a. compare monetary and fiscal policy
- b. describe functions and definitions of money
- c. explain the money creation process
- d. describe theories of the demand for and supply of money
- e. describe the Fisher effect
- f. contrast the costs of expected and unexpected inflation

Monetary & Fiscal Policy





$$\Sigma \text{ of money created} = \frac{\text{new deposit}}{\text{res. req.}} \quad \text{i.e. } \frac{100}{.1} = \$1000$$

$$\text{money multiplier} = \frac{1}{\text{res. req.}} \quad \frac{1}{.1} = 10$$

Set by central bank $\Rightarrow \therefore$ Monetary Policy tool

Quantity Theory of Money

$$M \times V = P \times Y$$

quantity of money

velocity of money

price level

real output

- in words: the amount of money used to buy stuff = the monetary value of output
- since we assume V is constant: then spending (P x Y) is proportional to M (money supply)

Money neutrality \Rightarrow is M \uparrow , only P \uparrow (Monetarist Theory)

Demand for Money

transactions

- pro-cyclical
- $\frac{\text{trans. bal.}}{\text{GDP}} \Rightarrow$ fairly stable

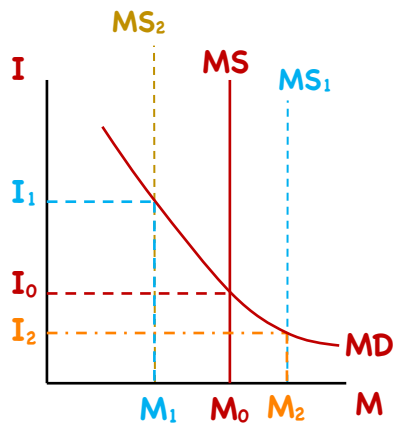
precautionary

- rainy day fund

speculative

- inversely related to asset yields (counter-cyclical)
- positively related to perceived risk

Supply & Demand



@ I_1 - excess MS ($M_0 - M_1$)

∴ less speculative demand

- demand for yield drives prices up and $I \downarrow$

@ I_2 - excess MD ($M_2 - M_1$)

∴ more speculative demand

- less demand for yielding assets drives $I \uparrow$

The Fisher Effect

⇒ in words first: the real rate of interest is stable over time

- ∴ changes in nominal rates are the result of changes in expected inflation

$$R_{\text{nom}} = R_{\text{real}} + \pi^e$$

But: who knows?

uncertainty = risk

- ∴ R_{nom}
 - a required real return
 - inflation expectation premium
 - risk premium

Costs of Inflation

High Inflation

Expected & Predictable

- ⇒ wages could increase by the expectation
- ⇒ nominal interest rates would be set to the expectation
- ⇒ prices would reflect the expectation

- Expectations would become reality

Unexpected

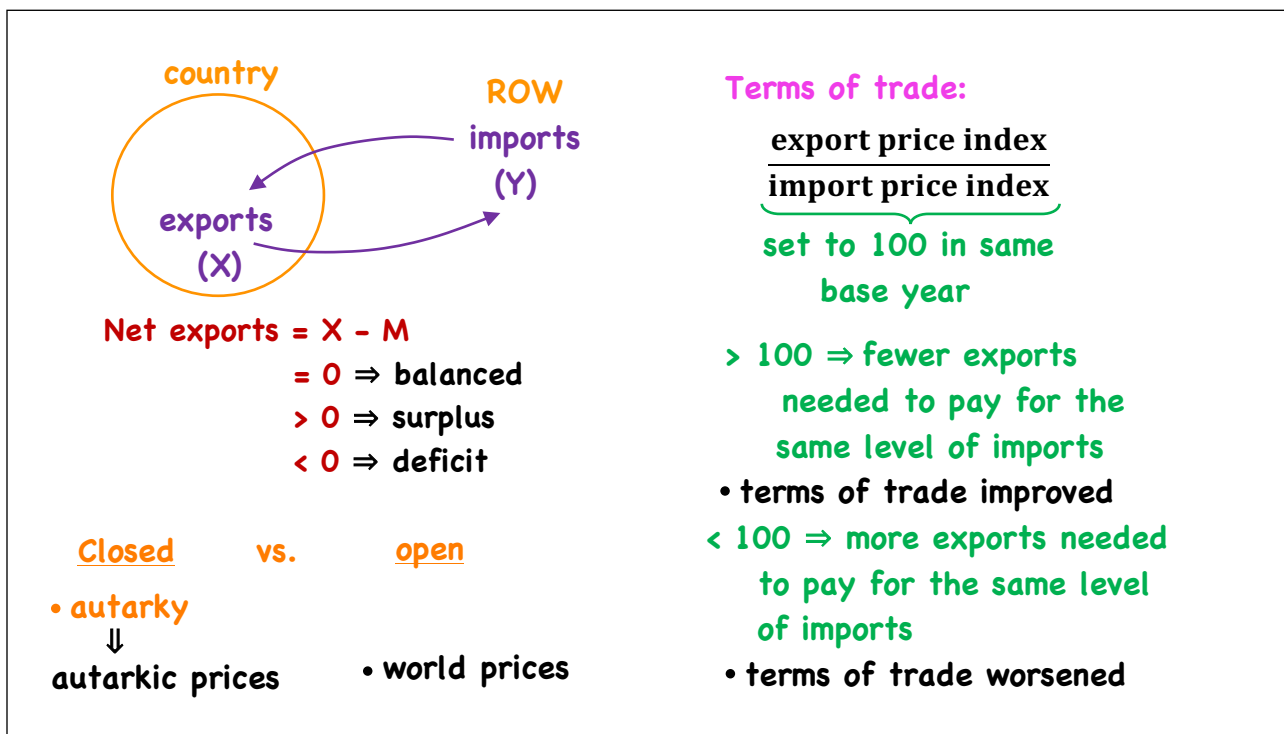
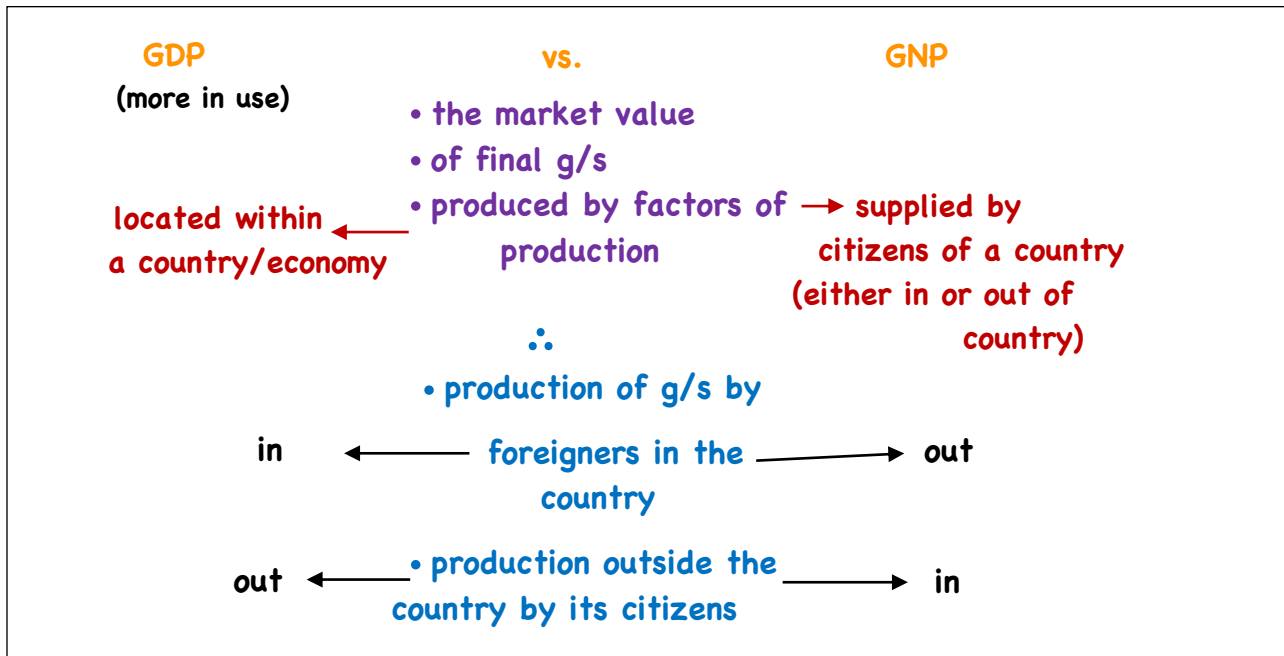
→ Unpredictable

- ⇒ lagging incomes
 - shoe leather costs (unwillingness to hold cash balances)
- ⇒ borrowers benefit at expense of lenders (too high) (so rates will include an uncertainty premium)
- ⇒ frequent price changes
 - menu costs
- ⇒ reduces the information content of prices

International Trade and Capital Flows

- a. compare gross domestic product and gross national product
- b. describe benefits and costs of international trade
- c. contrast comparative advantage and absolute advantage
- d. compare the Ricardian and Heckscher-Ohlin models of trade and the source(s) of comparative advantage in each model
- e. describe the balance of payments accounts including their components
- f. explain how decisions by consumers, firms, and governments affect the balance of payments

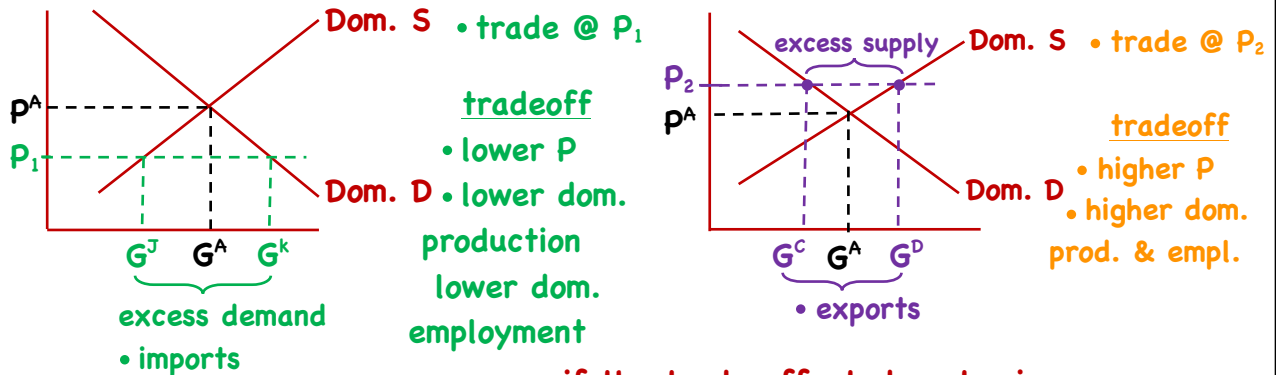
International Trade



Free trade ⇒ no gov't. restrictions on trade

vs. ⇒ global AD & AS determine E_q & E_p of X/M

Trade Protection ⇒ tariffs, quotas, etc...



• if the trade affected sector is labour intensive:
 exports - positive imports - negative

Benefits:

- countries gain from exchange & specialization
 - exports occur @ higher prices
 - imports occur @ lower prices
 - industries experience greater economies of scale
 - households/firms have greater product variety
 - competition is increased
 - resources allocated more efficiently
- reduces monopoly power of domestic firms
- trade → GDP
- efficient allocation
 - higher productivity
 - knowledge spillovers
 - pace of innovation
- comp. necessity incentives

Costs: • potential for greater income inequality

• loss of jobs in developed countries

= structural unemployment (most difficult to fix)

Gains from Trade

Absolute Advantage ⇒ make it cheaper than other trading partners

Comparative Advantage ⇒ opportunity cost of making output is lower than opportunity cost of trading partners

	Mach.	Cloth
U.K.	4	8
India	2	16

	Mach.	Cloth
U.K.	4	8
India	2	6

U.K.	2-cloth	$\frac{1}{2}$ mach.
India	8-cloth	$\frac{1}{8}$ mach.

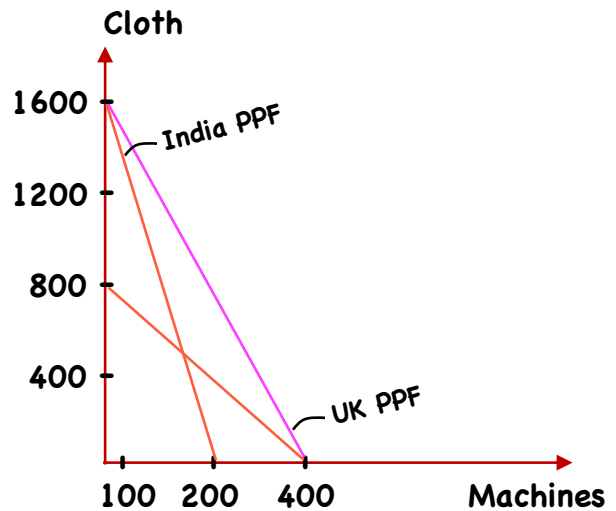
U.K.	2-cloth	$\frac{1}{2}$ mach.
India	3-cloth	$\frac{1}{3}$ mach.

• if U.K. could sell 1 mach. > 2 cloth
& India could buy 1 mach. < 8 cloth
win - win

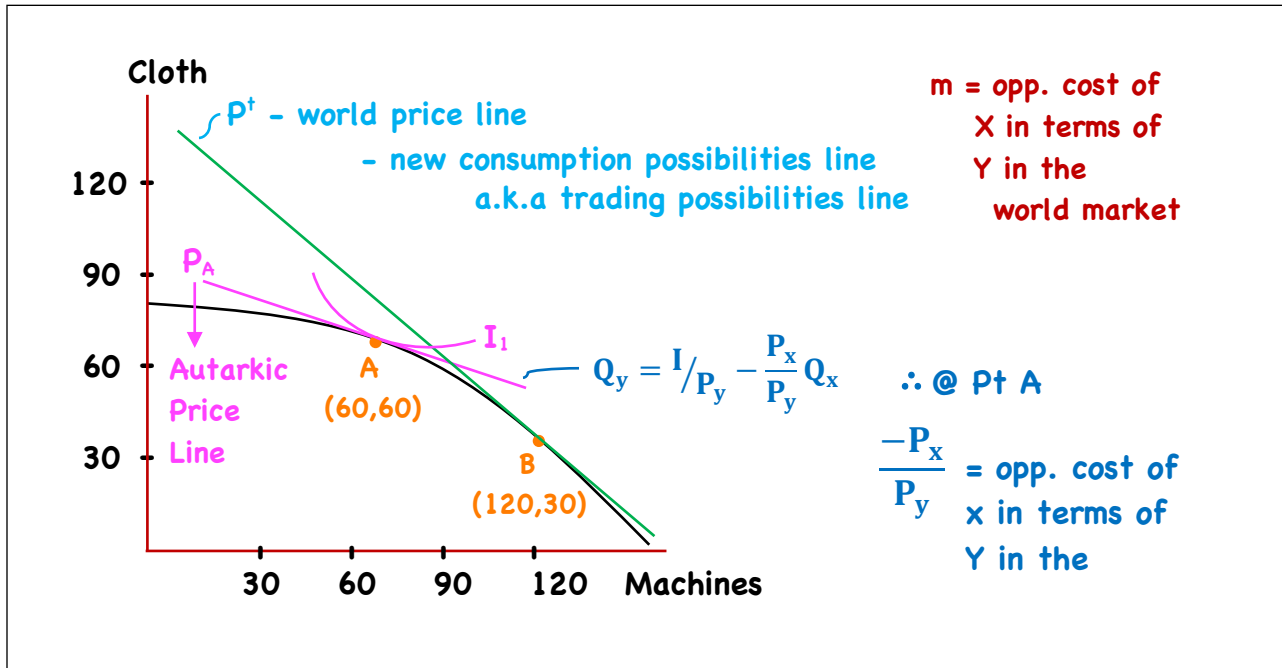
@3 U.K. wins a bit
India wins a lot

@7 U.K. wins a lot
India wins a bit

	P^A	P^G	C^A	C^G
U.K.				
Machines	200	400	200	240
Cloth	400	∅	400	640
India				
Machines	100	∅	100	160
Cloth	800	1600	800	960
World				
Machines	300	400	300	400
Cloth	1200	1600	1200	1600



U.K. (200, 400) 1 mach. = 2 cloth
India (100, 800) 1 mach. = 8 cloth



Comparative Advantage

1. Ricardian \Rightarrow trade is based on technological differences \Rightarrow results in differences in labour productivity (comp. adv.)

Assumptions:

- Labour is the only variable factor input
- Technology varies across countries

of hours to make X/Y

$a_{LX} \neq b_{LX}$ if $a_{LX} > b_{LX}$
b make X

$a_{LY} \neq b_{LY}$ if $a_{LY} < b_{LY}$
a makes Y

2. Heckscher-Ohlin \Rightarrow trade is based on endowment of factors of production \Rightarrow comp. adv. lies in goods produced with relatively abundant factor

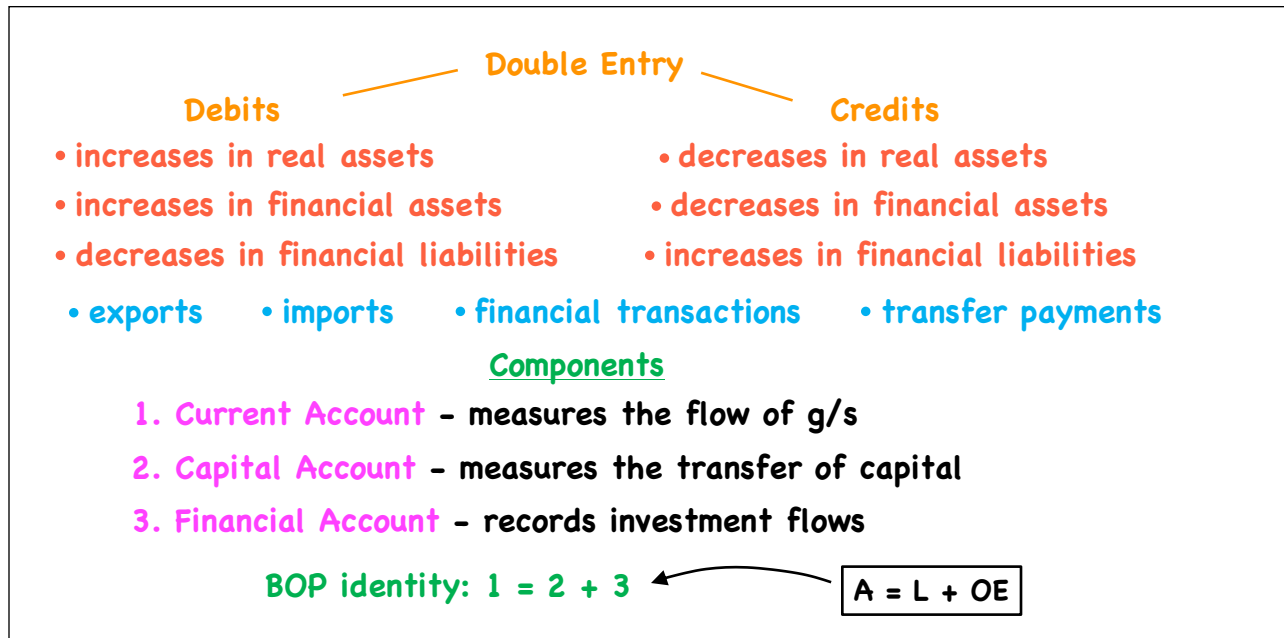
$\left(\frac{K}{L}\right)_A > \left(\frac{K}{L}\right)_B$
cap. abundant country (X) labour abundant country (Y)

X - cap. int.
Y - Lab. int.

Assumptions:

- Identical technologies within industries across countries
- Both L & K are variable factor inputs

Balance of Payments

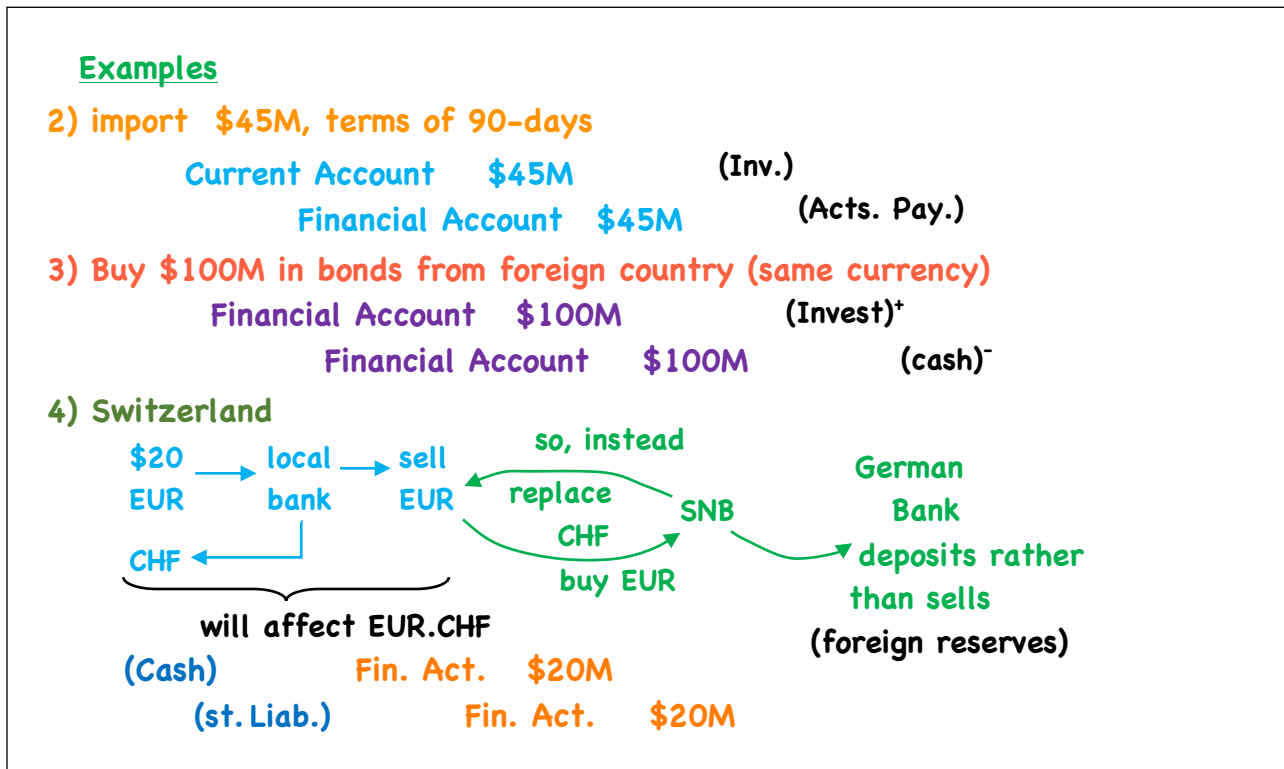
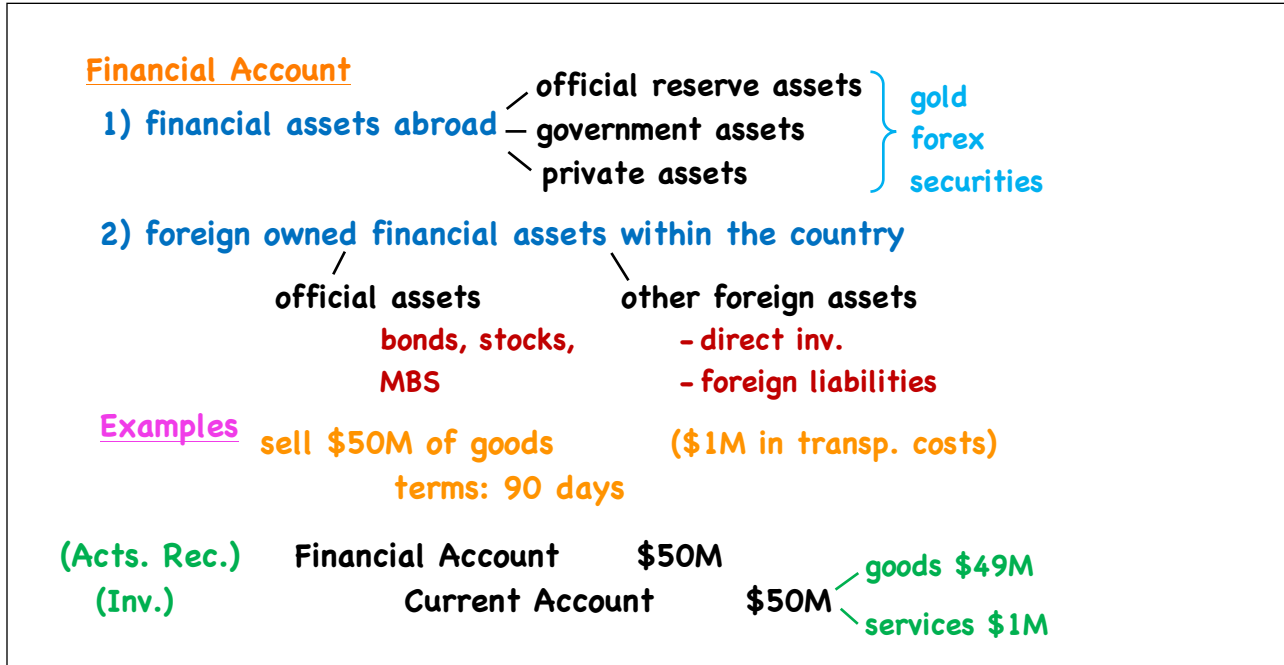


Current Account

1. **Merchandise trade** - all commodities and manufactured goods bought, sold, given away
2. **Services** e.g. - tourism, transportation, engineering, business services - fees on patents, copyrights
3. **Income Receipts** - dividends, interest (software, books, movies)
4. **Unilateral transfers** - one-way transfer of assets
 - foreign direct aid
 - income earned from abroad sent back home

Capital Account

- 1) **Capital transfers** ⇒ debt forgiveness, migrants transfers, gift/inheritance taxes, death duties, transfer of funds linked to the sale/purchase of fixed assets
- 2) **Sale and purchase of non-produced, non-financial assets**
 - rights to natural resources, sale/purchase of intangible assets



Recall: $Y = C + I + G + (X - M)$

equals the current account balance

- measures the size and direction of international borrowing (lending)

$$| \text{current account} | = | \text{capital + financial account} |$$

- hence the term 'balance' of payments

So, $Y = C + I + G + (X - M)$

$(X - M) = Y - C - I - G$

if $CA < 0$, then must borrow from abroad

or

$CA = Y - (C + I + G)$

if $CA > 0$, must be lending abroad

Recall:

$Y_d = Y - (T + R)$

and $Y_d = C + S_p$

or

$C = Y_d - S_p = Y - (T + R) - S_p$

$CA = Y - (C + I + G)$

$-10 \quad 20 \quad 10$
 $CA + I = S_p + S_g$

dom. I

if $CA < 0$, dom. I can be $> S_p + S_g$

$CA = Y - [(Y - (T + R) - S_p) + I + G]$

$= Y - (Y + R + T - S_p + I + G)$

$= Y - Y - R + T + S_p - I - G$

$= S_p + T - R - I - G$

$= S_p - I + (T - G - R)$

gov't. surplus S_g

$CA = S_p - I + S_g$

or $S_p = I + CA - S_g$

or $CA = S_p + S_g - I$

$CA < 0$ { if S_p too low
I is too high
 $S_g < 0$

Currency Exchange Rates

- a. define an exchange rate and distinguish between nominal and real exchange rates and spot and forward exchange rates
- b. calculate and interpret the percentage change in a currency relative to another currency
- c. describe functions of and participants in the foreign exchange market
- d. explain the effects of exchange rates on countries' international trade and capital flows

FX - Market

<p>USD AUD RVB EUR NZD SGD GBP NOK etc... JPY SEK CAD CHF</p> <p style="text-align: center; color: purple;">individual currencies</p>	<p>EUR.USD USD.CAD GBP.USD USD.JPY</p> <p style="text-align: center; color: purple;">exchange rates</p>	<p style="color: blue;">EUR.USD = 1.0950</p> <p style="color: blue;">USD.CAD = 1.3925</p> <p style="color: green;">in terms of A/B</p> <p style="color: purple;">price — $\frac{\text{USD}}{\text{EUR}} = 1.0950$ base — (1) — buys</p> <p style="color: purple;">CAD — need $\frac{\text{CAD}}{\text{USD}} = 1.3925$ (1) — to get</p>
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So... EUR.USD = $\frac{\text{USD}}{\text{EUR}}$

if $\frac{\text{USD}}{\text{EUR}}$ $e_{t_1} = 1.0950$
 $e_{t_2} = 1.0900$

USD appreciated
 or
 EUR depreciated

• **Nominal exchange rate**

EUR.USD or $\frac{\text{USD}}{\text{EUR}}$

spot rates

Now, let's assume

- 1) a world of homogenous g/s
- 2) no market frictions
- 3) no trade barriers (i.e. capital restrictions)

if an iPad cost £ 500 or \$750, we would expect

$\frac{\text{USD}}{\text{GBP}} = 1.5000$ [GBP.USD = 1.5000]

called Purchasing Power Parity (theory)

rarely satisfied (if ever) ↳ for \forall goods/baskets

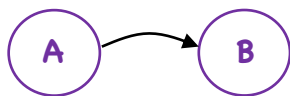
Reality Check: nominal exchange rates exhibit persistent deviations from PPP

$(S_{d/f})$

direct → d - domestic
 f - foreign

indirect → $S_{f/d}$

Real Exchange Rates



you live in
A-land... and want to buy
from B-land

if $A/B \uparrow$ (B.A)
or if $CPI_B \uparrow$

• A-lander will suffer a
loss of PP in terms of
B-land g/s

① foreign price

level in domestic = $S_{A/B} \times CPI_B$
currency

and if CPI_A = price level in
A - land

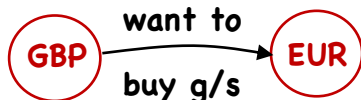
real exchange
rate = $S_{A/B} \times \frac{CPI_B}{CPI_A}$

But: if $CPI_A \uparrow$ (and I & CPI
move together)

• A-lander will gain PP
in terms of B-land g/s

Real Exchange Rates

Example/



real fx-rate = $S_{GBP/EUR} \times \frac{CPI_{EUR}}{CPI_{GBP}}$

so, if $S_{GBP/EUR} \uparrow 10\%$, $CPI_{EUR} \uparrow 5\%$, $CPI_{GBP} \uparrow 2\%$

- what is the change in the real fx-rate?

$$\left[\left(1 + \% \Delta S_{GBP/EUR} \right) \times \frac{1 + \% \Delta CPI_{EUR}}{1 + \% \Delta CPI_{GBP}} \right] - 1 = \left(1.10 \times \frac{1.05}{1.02} \right) - 1 = 13.23$$

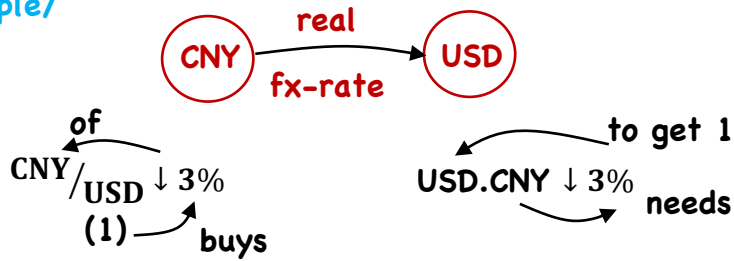
shortcut $\sim 10\% + 5\% - 2\%$
 $= 13\%$

\therefore real fx-rate is 13.23% higher

- means \Rightarrow need 13.23% more £ to buy same g/s in £

Real Exchange Rates

Example/



so, CNY appreciated against USD.

$$CPI_{USD} = 1.5\%$$

$$CPI_{CNY} = 4.5\%$$

$$\text{real fx. rate} \left[1 + (-.03) \times \frac{1.015}{1.045} \right] - 1 = \left(.97 \times \frac{1.015}{1.045} \right) - 1 = -5.78\%$$

$$\text{(shortcut } -3\% + 1.5\% - 4.5\% = -6\%)$$

means \Rightarrow need 6% less CNY to buy same g/s in USD

e.g./ Setup: hold bonds in HKD, live in AUD $(S_{AUD/HKD}) = (S_{d/f})$

1) if $S_{AUD/HKD} \uparrow$, HKD bonds \uparrow in AUD terms?

yes, if $S_{AUD/HKD} \uparrow$, HKD buys more AUD.

2) if $S_{AUD/HKD} \uparrow$, relative purchasing power in HKD \uparrow

no, HKD buy more AUD, but they do not buy more g/s denominated in HKD

3) if $CPI_{AUD} \uparrow$, then $real_{AUD/HKD} \uparrow \Rightarrow$ implies that relative purchasing power of AUD income is higher

$$\textcircled{1} \text{ no } S_{AUD/HKD} \times \frac{CPI_{HKD}}{CPI_{AUD}} \quad (\text{if } CPI \uparrow, \frac{CPI_{HKD}}{CPI_{AUD}} \downarrow, real_{AUD/HKD} \downarrow)$$

② no if $real_{AUD/HKD} \uparrow$, purchasing power of AUD \downarrow

e.g./ Setup: hold bonds in HKD, live in AUD

$$(S_{AUD/HKD}) = (S_{d/f})$$

4) if $S_{AUD/HKD} \downarrow$, then $real_{AUD/HKD} \downarrow$ & increase the relative purchasing power of AUD income

yes: $(S_{AUD/HKD} \times \frac{CPI_{HKD}}{CPI_{AUD}}) = real_{AUD/HKD}$ - implies AUD is strengthening against HKD

5) $S_{AUD/HKD} \uparrow 5\%$, $CPI_{HKD} \uparrow 5\%$, $CPI_{AUD} \uparrow 2\%$

(HKD bonds in AUD \uparrow or \downarrow ?) $\uparrow 5\%$

6) change in relative purchasing power of AUD income

$$real_{AUD/HKD} = \left[\left((1 + .05) \times \frac{1.05}{1.02} \right) \right] - 1 = 8.089\%$$

FX - Market Products

spot rates \Rightarrow for immediate delivery (i.e. on the spot)

(24 hours/day - on business days) (T + 2 settlement)

forward exchange rates \Rightarrow delivery at a future date agreed

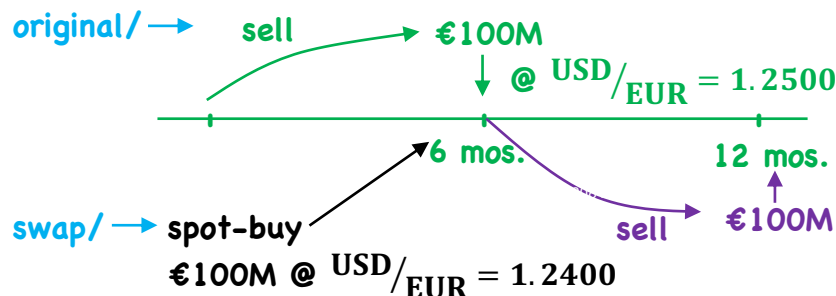
(OTC) upon today

futures \Rightarrow exchange-traded forwards

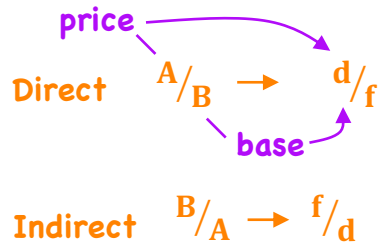
(standardized)

Fx-swap \cdot rolling an existing, but expiring forward, to a future date

- requires simultaneous spot transaction + new forward agreement



FX- Rate Calculations



e.g./

$$CAD/USD = 1.3300$$

$$USD/CAD = \frac{1}{1.3300} = 0.7519$$

Quote Conventions

EUR	euro
JPY	dollar-yen
GBP	sterling
CAD	loonie
AUD	aussie
NZD	kiwi
CHF	swissie

USD/EUR	EUR.USD
JPY/CAD	USD.JPY
USD/GBP	GBP.USD
CAD/USD	USD.CAD
USD/AUD	AUD.USD
USD/NZD	NZD.USD
CHF/USD	USD.CHF

Major Pairs

Quote Conventions

EURJPY	euro-yen
EURGBP	euro-sterling
EURCHF	euro-swiss
GBPJPY	sterling-yen
EURCAD	euro-cad
CADJPY	cad-yen

A/B	B.A.
JPY/EUR	EUR.JPY
GBP/EUR	EUR.GBP
CHF/EUR	EUR.CHF
JPY/GBP	GBP.JPY
CAD/EUR	EUR.CAD
JPY/CAD	CAD.JPY

cross pairs

USD.CAD	
Sell	Buy
1.39 ⁰²	1.39 ⁰⁶
16.8M	19.2M

Bid Offer
Sell USD Buy USD
(Buy CAD) (Sell CAD)

some quotes
1.3902⁵
dollar cents pips 100 pips = 1 cent
Yen 110.63

$t_0 \quad \text{USD}/\text{EUR} = 1.2500$

$t_1 \quad \text{USD}/\text{EUR} = 1.3000$

$$\frac{1.30 - 1.25}{1.25} = 4\%$$

⇒ interpreted from the point of view of the base
∴ the EUR has appreciated relative to the USD by 4%

Inverse/

$$\text{EUR}/\text{USD} = \frac{1}{1.2500} = 0.8000 \quad \text{EUR}/\text{USD} = \frac{1}{1.3000} = 0.7692$$

Identical Statements

$$\frac{.7692 - .8000}{.8000} = -3.85\%$$

∴ the USD has depreciated 3.85% relative to the EUR

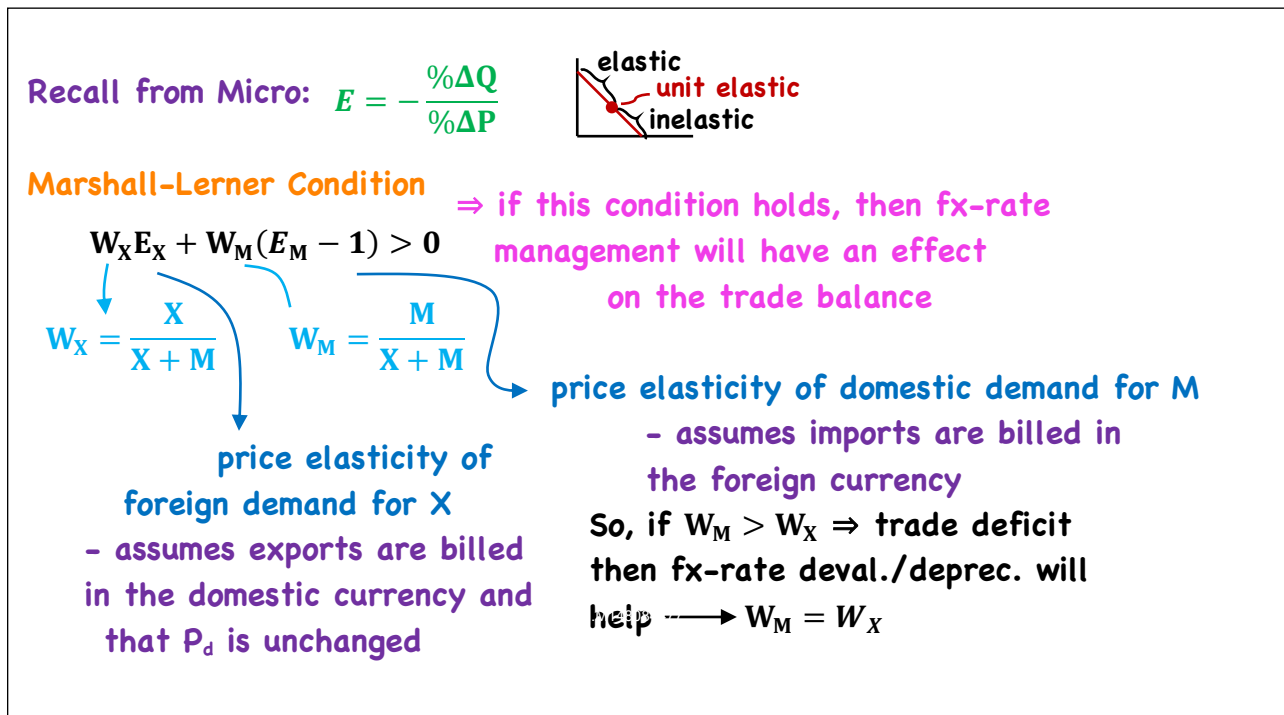
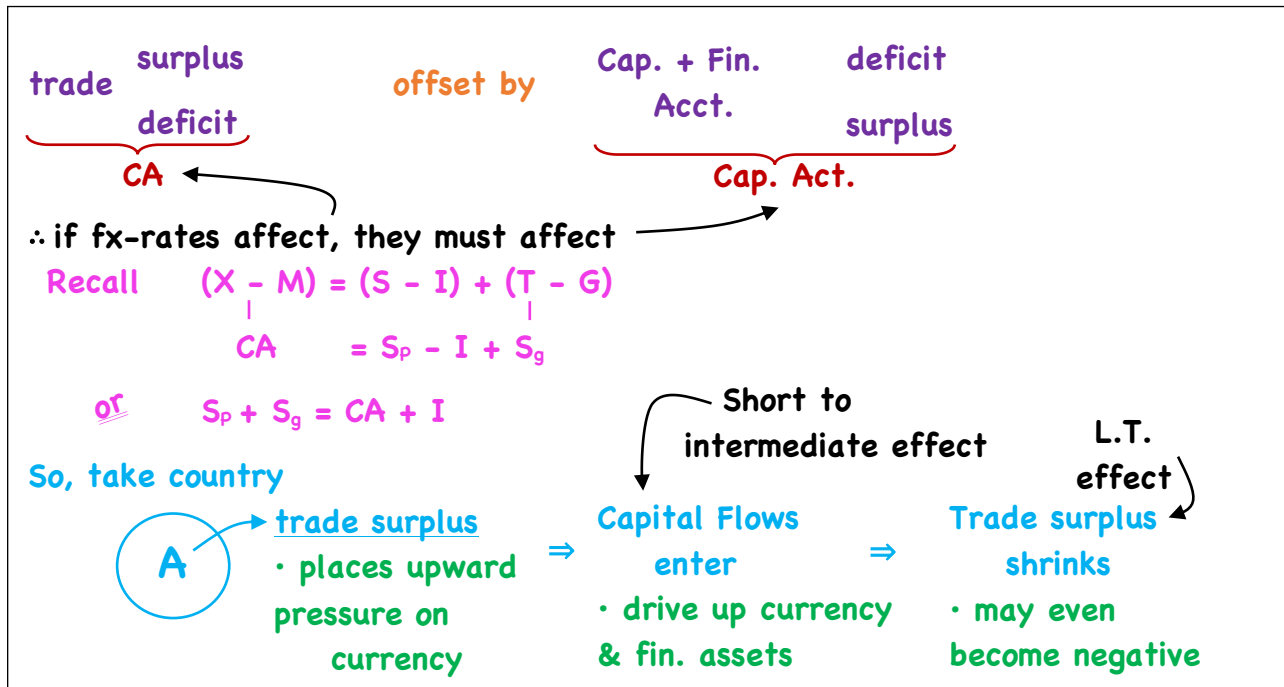
FX - Market Participants

- facilitate trade in g/s
- facilitate capital flows (FDI of indirect Inv.)
- hedge forex risk
- speculate

⇒ Participants

- Corporations ⇒ hedging, capital flows
- Funds ⇒ insurance, mutual, pension, endowments, ETFs
(a.k.a. non-leveraged institutional or real money funds)
- Leveraged Funds ⇒ hedge funds, prop. traders, leveraged ETFs, etc...
- Retail ⇒ Individual Account
- Government/Quasi-Gov't.
- Central Banks - manage foreign reserves, currency intervention
- Sovereign Wealth Funds (SWFs)

FX, International Trade, Capital Flows



$$W_X E_X + W_M (E_M - 1) > 0$$

larger as E_X increases if $E_M < 1$, this term negative

- the more elastic demand is for X and M, the more likely deval./deprec. will improve a trade balance

$$W_M > W_X \qquad \qquad \qquad W_X > W_M$$

E_M becomes more critical for success

$$W_M = W_X$$

Initial condition met?

$$W_X E_X + W_M (E_M - 1) > 0$$

$$.4(.75) + .6(.65 - 1)$$

$$.30 + (-.21) = .09 > 0$$

e.g.	X	M
E_d	.75	.65
dep. € 10%		
P_d	∅	10%
P_f	-10%	∅

$$X = 400M \quad M = 600M$$

new x 430M

y 621M

(191M)

U.S. (200M)

$(1 - E) \% \Delta P$

$(1 - .65) 10\%$

3.5%

$$W_X E_X + W_M (E_M - 1) > 0$$

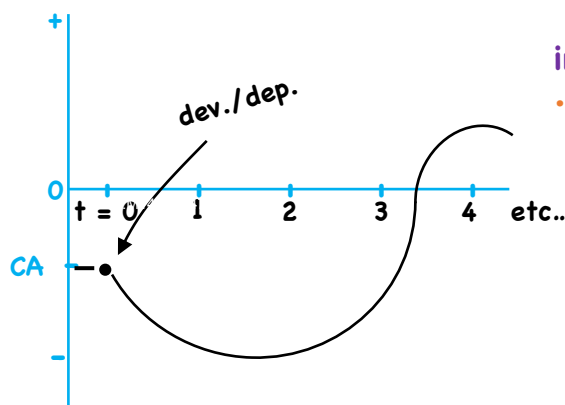
fx-rate changes will be more effective for trade adjustment if X & M

- have substitutes
- trade in competitive markets
- are luxury goods, rather than necessities
- are goods that represent a large portion of consumer expenditures

J-curve

- in the short run: fx-rate ↓, but $E_d < 1$
- consumers need time to change behavior

∴ deficit worsens



in the long run

- consumers respond to the change in relative prices

Absorption Approach $Y = \underbrace{C + I + G}_A + \underbrace{(X - M)}_B$

$\Rightarrow Y = A + B$

or $B = Y - A$ $\begin{cases} \rightarrow (Y - A) > 0 \text{ surplus} \\ \rightarrow (Y - A) < 0 = \text{deficit} \end{cases}$

A = total absorption
B = trade balance

\therefore to improve trade balance, increase incomes/output and/or reduce absorption

a lower fx-rate may cause a wealth effect
 \Rightarrow lower purchasing power of domestic currency denominated assets may boost MPS
(weak argument)

a lower fx-rate will shift demand to domestic g/s (if there is excess capacity)
• if $MPC < 1$, output rises faster than absorption
 \Rightarrow trade balance improves