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A P P U N T I

STUDENTE: Pieretto Letizia

MATERIA: Economics - Prof. D'Ambrosio, Prof. Benfratello

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EXCHANGE

- **markets** → collection of buyers and sellers who, through their actual or potential interaction, determine the prices of products

- **buyers** → consumers purchase goods, companies purchase labor and inputs

- **sellers** → consumers sell labor, resource owners sell inputs, firms sell goods

- Exchange is **VOLUNTARY**
  - → none of the parties will be harmed by the exchange
  - → increase welfare of participants

FONDUMENTAL THEOREM OF THE EXCHANGE

- if all transactions are voluntary
- if all stakholders are involved in the transaction
- if the terms of the transaction are know to all parties

- **opportunity cost** → the opportunity cost of a particular alternative is the value associated with the best of the alternatives that are not chosen → differ because there are different opportunity costs for different decision under different circumstances

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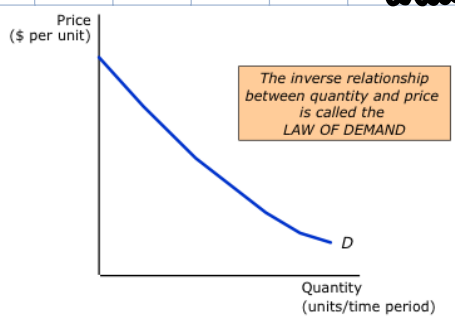
- non-competitive markets: individual can influence the price
  - → monopoly: only one producer
  - → monopolistic competition: many firms competing in the market for a differentiated good
  - → oligopoly: only few producers in the market

FIRM and PRODUCERS are PRICE MAKERS

THE DEMAND CURVE → market demand that represents the aggregate demand from all the purchasers → quantity of goods that consumers are willing to buy at difference prices



- The demand curve shows the highest price that the market "will bear" for a given quantity of output, *holding non-price factors constant*

quantity demanded $Q_D = Q_D(P)$

inverse demand function $P = P(Q_D)$

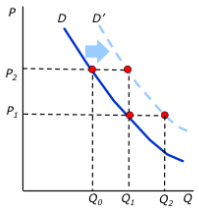
D: demand curve → quantity of corn that buyers are willing to purchase at different prices

- D focuses only on the relationship between the price of the good and the quantity demanded

- Income Increases
  - At P_1, demand Q_2
  - At P_2, demand Q_1
  - Demand Curve shifts right
  - More purchased at any price on D' than on D

DEMAND SHIFTS →

shift to the right



non-prices determinant

- income
- consumer's tastes
- prices of substitutes

Law of demand → inverse relationship between the price of a good and the quantity demanded

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PRICE ELASTICITY OF DEMAND

- The **price elasticity of demand** measures the ratio of the relative change in quantity to the relative change in price

- If $|\epsilon_P| > 1$, the percent change in quantity is greater than the percent change in price. We say the *demand is price elastic.*
- If $|\epsilon_P| = 1$, the percent change in quantity is equal to the percent change in price. We say the *demand is unitary inelastic.*
- If $|\epsilon_P| < 1$, the percent change in quantity is less than the percent change in price. We say the *demand is price inelastic.*

$$\boxed{\varepsilon_P = \frac{P}{Q} \frac{\Delta Q}{\Delta P}}$$

(is negative)

Large expenditure
many substitutes
product not a necessity
→ demand is price elastic

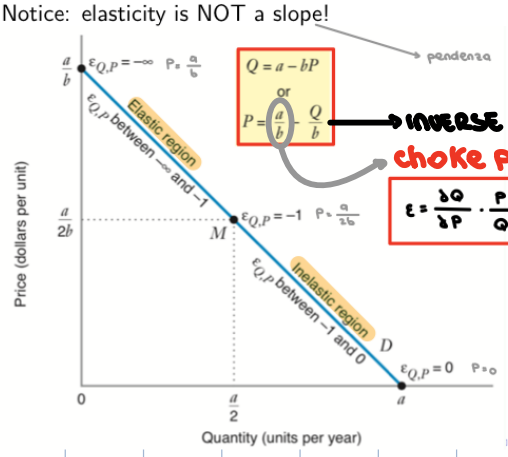
The flatter the curve, the more elastic the demand

TYPES OF DEMAND CURVES

① Linear demand curves

Expressing demand as $Q^D = a - bP$, elasticity becomes $\epsilon_P = -bP/Q$
Notice: elasticity is NOT a slope!

pendenza



$Q = a - bP$
or
$P = \frac{a}{b} - \frac{Q}{b}$ → inverse demand curve

choke price: price at which the Q demand falls to 0

$$\varepsilon = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = b \frac{P}{a - bP}$$

$-\infty < \varepsilon < 0$

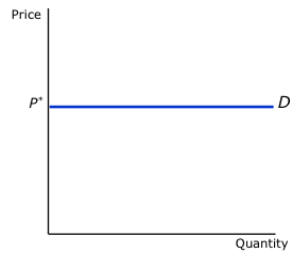
a: embodies the effects of all the factors other than price

b: reflects how the price of the good affects the Q demanded

② Infinitely elastic demand

$\epsilon = -\infty$

P* is the max price that market could propose, if $P > P^*$ → $Q = 0$ → no ΔP



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CONSUMER THEORY

PREFERENCES

- **consumer preferences** → understand how a consumer ranks the desirability of different sets of goods

  ↓

  the consumer choiche is the **market basket (or bundle)**, a collection of one or more commodities that the individual might consume

- **preferences are** (assumption about consumer preferences)
  1. **complete**: consumers can rank market baskets [$A > B$; $B > A$; $A \approx B$]
  2. **transitive**: if $A > B$ and $B > C$ then $A > C$
  3. **non satiation**: "more is better", consumers always prefer more of any goods to less

- **ordinal ranking**: information about the order in which a consumer ranks baskets
- **cardinal ranking**: information about the intensity of a consumer's preferences

- **utility of a good**: the ability of a good to satisfy needs
  - → different market bundles can satisfy different needs
  - → the increase in utility that follows from increasing consumption is gradually decreasing

- **marginal utility**: by how much does the level of satisfaction change (ΔU) in response to a change in the level of consumption (Δy)

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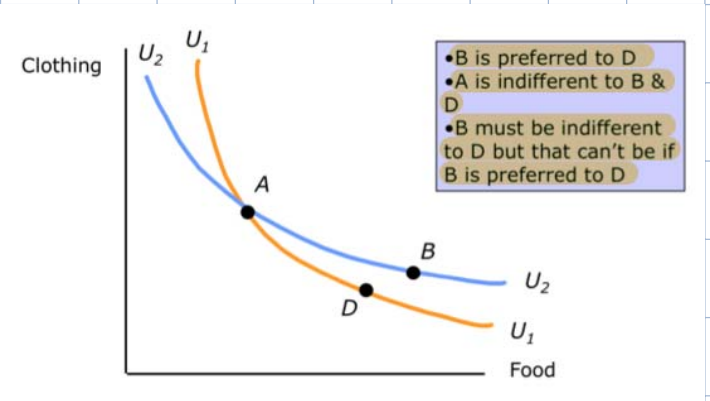
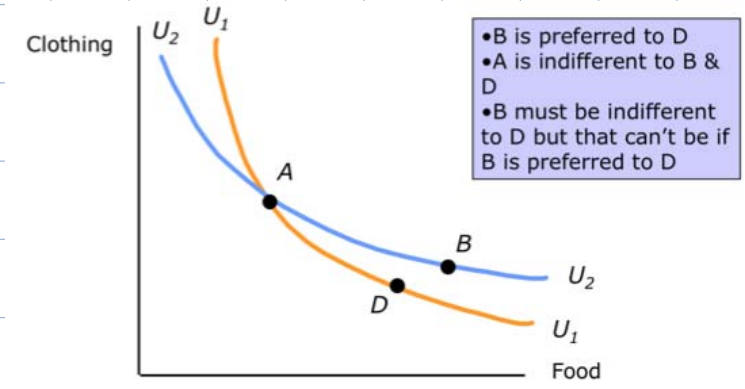
② indiff. curves do not intersect

- if we assumed they can cross, we would violate the assumption that more is better



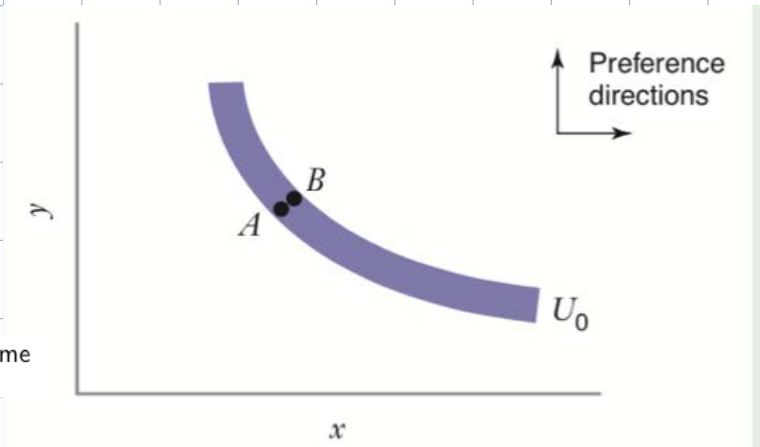
③ every bundle lies on one and only indifference curve

- if one basket could lie on two indiff. curves, this would imply that indiff. curves can cross



④ indiff curves are not thick

- a thick indiff curves contains baskets A and B. But B lies to the northeast of A, so B>A



If $B \succ A$, $U(B) > U(A)$, hence they cannot be on the same indifference curve

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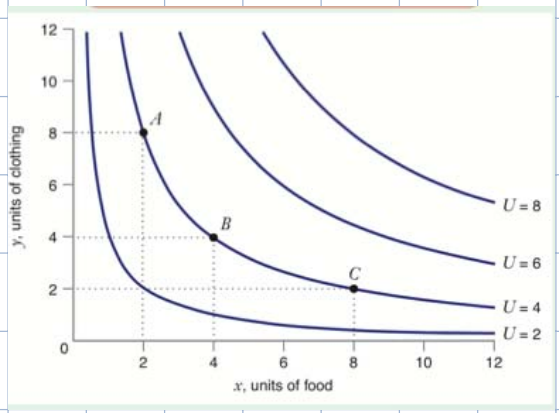
TYPES OF INDIFFERENCES CURVES

① COBB-DOUGLAS UTILITY



function $\boxed{U = A x^{\alpha} y^{\beta}}$ $A, \alpha, \beta > 0$

3 PROPERTIES:

- positive marginal utilities $MU_x = \alpha A x^{\alpha-1} y^{\beta}$ $MU_y = \beta A x^{\alpha} y^{\beta-1}$
- indifference curves will be downward sloping
- curves are convex $MRS_x = \alpha y / \beta x$

② PERFECT SUBSTITUTES

Two goods are perfect substitutes when the marginal rate of substitution of one good for the other is constant

function $\boxed{U = ax + by}$

$MU_x = a$ $MU_y = b$ $MRS_x = a/b$

compute $\boxed{\frac{a}{b} - \frac{p_x}{p_y}}$ ⟶ $\boxed{\text{If} < 0 \rightarrow q_1 = 0 \; ; \; q_2 = I/p_2}$

③ PERFECT COMPLEMENTS

Two goods are perfect complements when their are consumed in fixed proportions

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CONSUMER THEORY

CHOICE

- **the budget line** → defines the set of baskets that a consumer can purchase with a limited amount of income

↓

indicates all combinations of two commodities for which total money spent equals total income $\boxed{P_x x + P_y y = I}$ only 2 goods

Baskets located above the budget line are not affordable

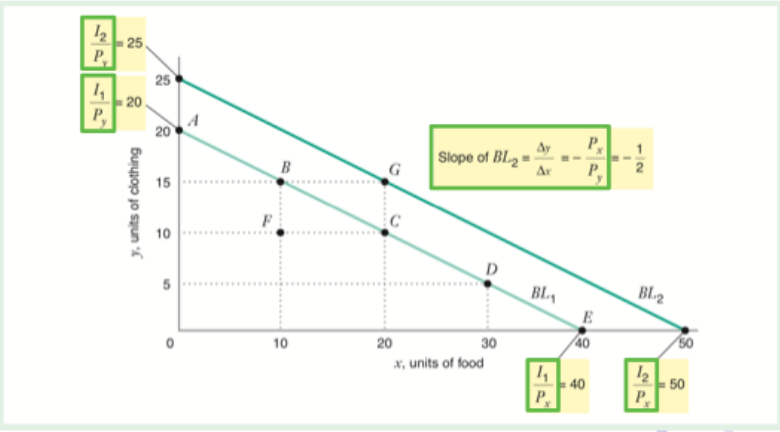
Baskets located below the budget line do not exhaust the budget

- **slope** $= -P_x / P_y$
  - ↳ how many units of the good on vertical axis a consumer must give up to obtain an additional unit of the good on the horizontal axis

- **budget constraint** permits a consumer to buy baskets both on and inside the budget line $\boxed{P_x x + P_y y \leq I}$

CHANGE IN INCOME

- An increase in income causes the budget line to shift outward, parallel to the original line (holding prices constant).
  - Can buy more of both goods with more income



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OPTIMAL CHOICE

$$\max U(x,y)$$
$$\text{s.t } P_x x + P_y y \leq I$$

→ the expenditures on x and y must not exceeded the consumer's income

MRS_x : $$\frac{MU_x}{MU_y} = \frac{P_x}{P_y}$$

the amount of y I am willing to give up to get one more x is equal to the amount of y I have to give up to get one more x

→ slope BL = slope indiff. curve

- the optimal basket is when the budget line is tangent to the indifference curve, because they have the same slope

INTERIOR OPTIMUM

- an interior optimum is an optimal bundle at which the consumer will be purchasing both commodities

If $MRS_x > \frac{P_x}{P_y}$, will increase x and decrease y until $MRS_x = \frac{P_x}{P_y}$
If $MRS_x < \frac{P_x}{P_y}$, will increase y and decrease x until $MRS_x = \frac{P_x}{P_y}$

- optimal consumption point is where marginal benefits equal marginal costs

- if consumers cannot find an interior basket at which the budget line is tangent to an indifference curve, then the consumer might find an optimal basket at a corner point

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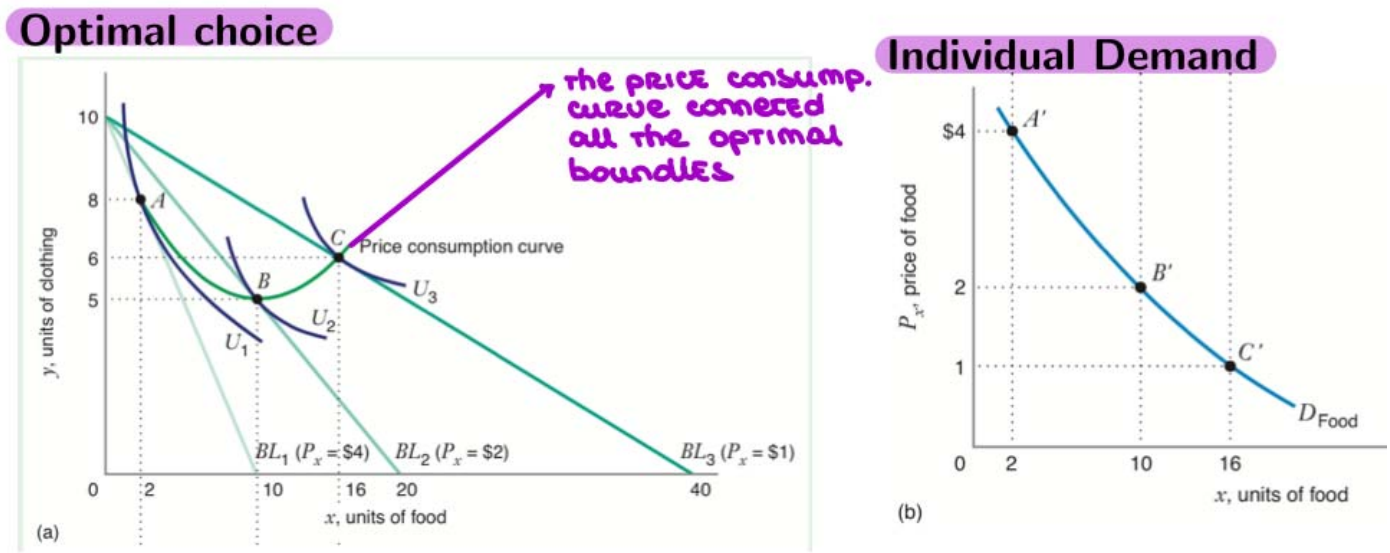
DEMAND THEORY

PRICE CHANGE & INDIVIDUAL DEMAND



3 different prices of food, we have 3 BL, 3 indifferences curves and 3 optimal boundle

- price consumption curve ⟶ describe how changes in price of food affected the consumer's purchases of both goods and connect all of optimal baskets
(consumer is better of as the price of food falls)

- demand curve ⟶ Representation of a consumer's willingness to pay for an additional unit of the good

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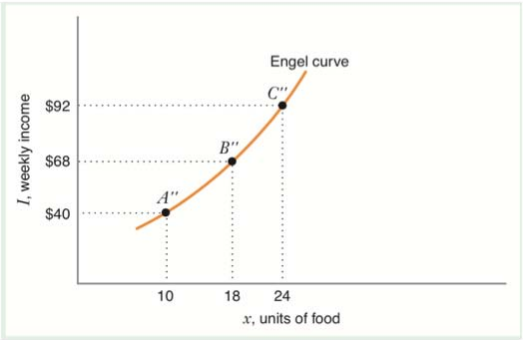
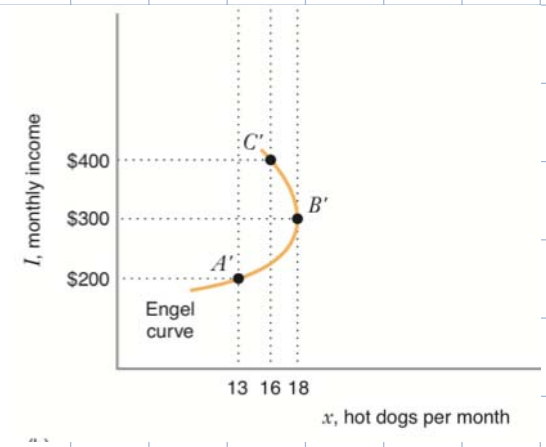


normal good → the quantity demanded increases with income

- → a good that a consumer purchases more of as income rises
- → positive slope

positive income elasticity $\varepsilon_{x,I} = \frac{\partial x}{\partial I} \frac{I}{x}$



interior good → the quantity demanded decreases with income

elasticity of demand is negative

INCOME & SUBSTITUTION EFFECTS

when the price of good changes

- substitution effect → change in demand due to the change in the rate of exchange between the two goods, holding constant all other prices and the level of utility

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② INCOME EFFECT $\boxed{x_c - x_B}$

- The income effect is the change in an item's consumption brought about by the change in purchasing power, with the price of the item held constant

interior goods → income effect is positive
normal goods → income effect is negative
} IF PRICE INCREASES

normal goods → income effect is positive
interior goods → income effect is negative
} IF PRICE DECREASES

CONSUMER SURPLUS

- consumer surplus → is the difference between the maximum amount a consumer is willing to pay for a good and the amount he must actually pay to purchase the good in the marketplace
  → how much better off they are when they purchase a good

FROM DEMAND CURVE to measure the impact of a price change on the consumer

- Suppose you have to pay 10$ per hour to rent the court.
- At this price, you will play tennis for 8 hours: your WTP for 8 hours is 11$, your WTP for 9 hours is only 9$

consumer surpluses for each of 8 hours: 15$ + 13$ + $11 + $9 + $7 + $5 + $3 + $1

Consumer surplus is the area **below the demand curve and above the price that the consumer must pay for the good.**

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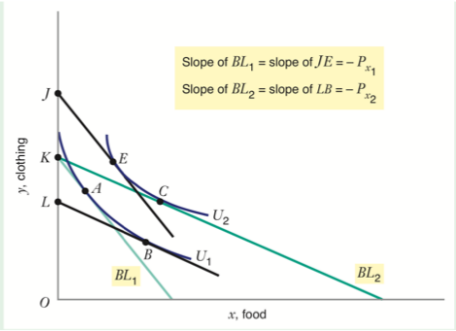
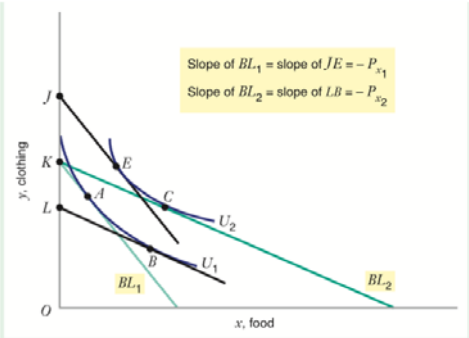
a) compensating variation with a positive income effect

The compensating variation is the difference between the income necessary to buy basket A at the initial price P_{x_1} and the income necessary to buy the decomposition basket B at the new price P_{x_2}. Basket B lies at the point where a line parallel to the final budget line BL_2 is tangent to the initial indifference curve U_1.



b) equivalent variation with a positive income effect

The equivalent variation is the difference between the income necessary to buy basket E at the initial price P_{x_1} and the income necessary to buy basket A at the initial price P_{x_1}. Basket E lies at the point where a line parallel to the initial budget line BL_1 is tangent to the final indifference curve U_2.



MARKET DEMAND

- market demand curve ⟶ horizontal sum of the demands of the individual consumers

(demand curve is for each consumer)

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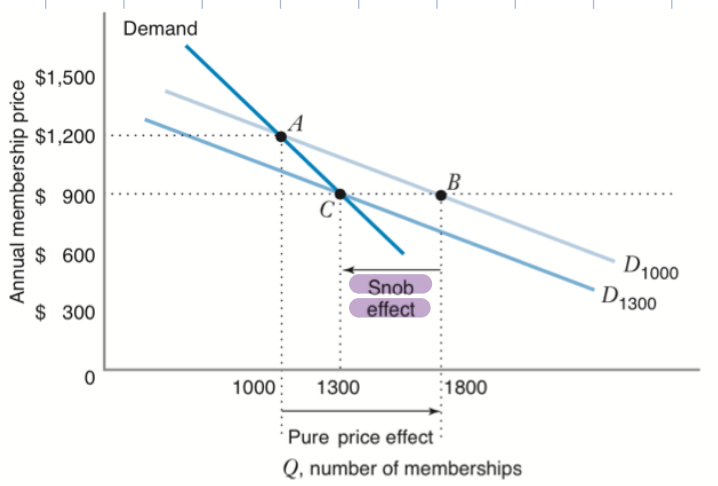


→ negative network ext.

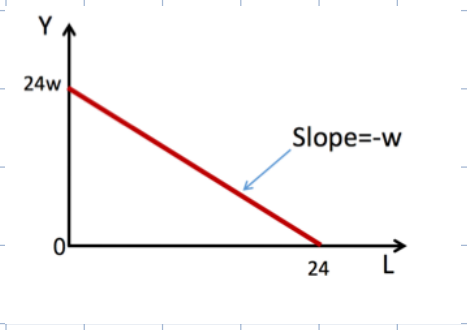
Consider the market demand for membership in a health and fitness club. What happens if the membership price decreases to $900?

- If consumers believed that the number of members would stay at 1,000, demand would increase from point A to point B.
- However, consumers know that the fitness club will become more congested as more members join, and this will shift the demand curve inward.
- The total number of memberships actually demanded at a price of $900 per month will grow only to point C.
- The total effect of the price decrease is the pure price effect of moving from point A to point B plus a negative snob effect of moving from point B to point C.
- A demand curve with negative network externalities is less elastic than a demand curve without network externalities

LABOUR - LEISURE TRADEOFF

L = LEISURE TIME

Y = INCOME



consumer must choose how much of her total time endowment to allocate to labour and leisure

TIME CONSTRAINT = 24 = $L + L^S$ = TOT TIME ENDOWMENT

L^S = WORK TIME

w = hourly wage, expressed in terms of real wage

$$\boxed{24w = wL + wL^S}$$ TIME CONSTRAINT

$$\boxed{Y = L^S w = (24 - L)w}$$ INCOME CONSTRAINT → I'm working to be able to consume

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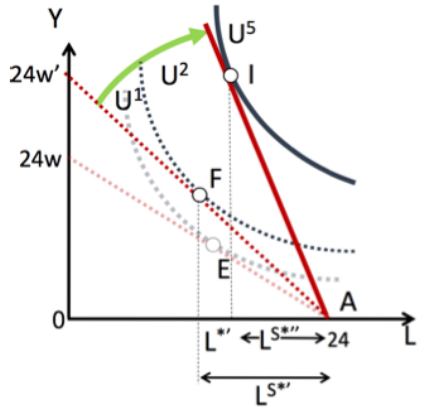
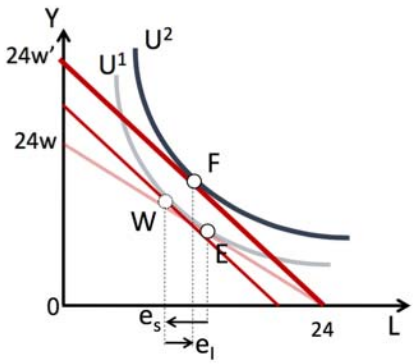
If the wage becomes very high (w''), with $w'' > w'$.



- The wage now is so high that the worker does not consider increasing his working time worth the trouble: he is wealthy enough with the current wage to consider giving up some working time and spare some free time for himself. In other words, there is no point in earning more money if you don't have time to spend it.
- $\frac{\partial L^S}{\partial w} < 0$: Here the income effect outweighs the substitution effect

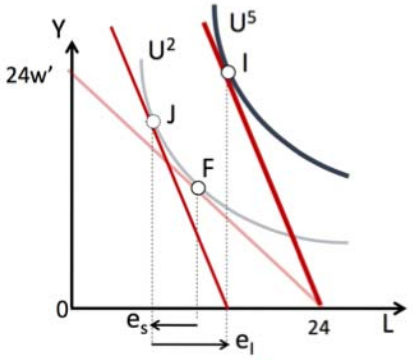
INCOME AND SUBSTITUTION EFFECT BY A WAGE CHANGE

For $w' < w_T$: The net wage effect on leisure time is negative: by higher wages people increase working time. The substitution effect is dominant over the income effect.



HARD WORKING

For $w'' > w_T$: The net wage effect on leisure time is positive: by higher wages people decrease working time. The income effect is dominant over the substitution effect.



LAZY WORKING

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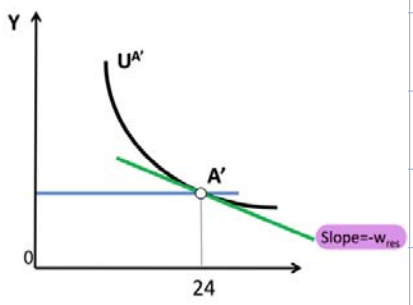
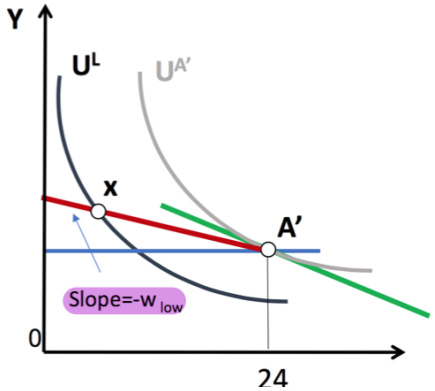
TO WORK OR NOT TO WORK?

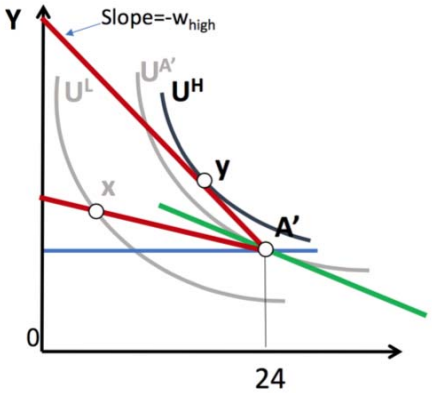
- Suppose a person who does not work receives an endowment $y_{A'}$. → SOVVENZIONAMENTO
- At the endowment point A', the person receives utility $U_{A'}$ (higher than she would get by no endowment).
- If she decides to work, she sells off some of her leisure time
- The slope of the indifference curve at the endowment point is the **reservation wage**: at such wage she is indifferent between working and not working



- Working for any wages $w_{low} < w_{res}$ always yields lower utility than not working at all.
- The person will not work at all if the market wage is less than her reservation wage;



- A wage offer $w_{high} > w_{res}$ would be worth the effort as it yields higher utility
- The decision to work is based on a comparison of the market wage with the reservation wage



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SHORT VS LONG RUN

NOT TIME-SPECIFIC

- **SHORT RUN**: period of time in which quantities of one or more production factors cannot be changed ⟶ fixed inputs; K fixed & L variable

- **LONG RUN**: amount of time needed to make all production inputs variable

EFFICIENCY

- points on or below the production function make up the firm's **production set**, the feasible combinations of inputs and outputs

- output points below the production function are technically inefficient

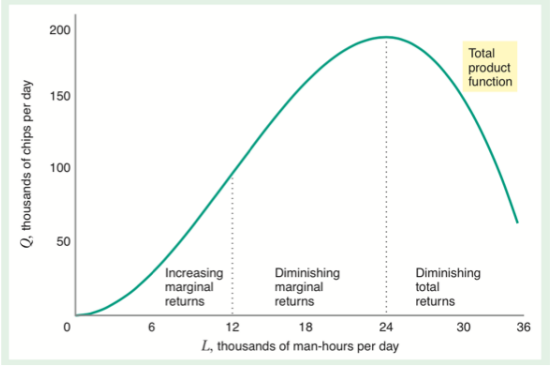
$\boxed{L = g(q)}$ **labour requirements function**: the minimum amount of labour required to produce a given amount of output q

ONE INPUT

$\boxed{q = f(L)}$

Consider a single-input production function:

- e.g. the quantity of semiconductors q a firm can produce in a year when it employs various quantities L of labour within a fab of a given size with a given set of machines.



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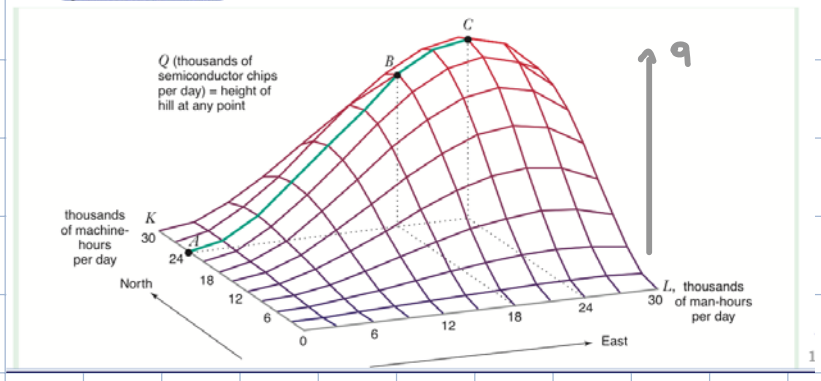
TWO INPUTS

$q = f(L, K)$

- Firm can produce output by combining different amounts of labor and capital
- In the long run, capital and labor are both variable
- The information can be represented graphically by the **total product hill**



slope of the function:

how much each input contributes to output

marginal product of labour

$$MP_L = \frac{\partial q(K,L)}{\partial L}$$

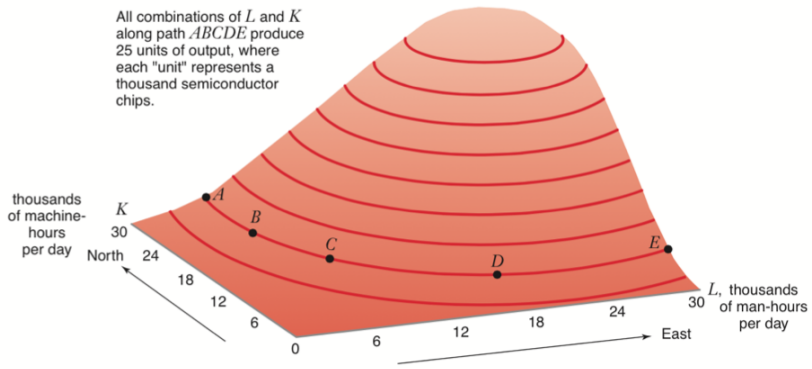
hold capital fixed

marginal product of capital

$$MP_K = \frac{\partial q(K,L)}{\partial K}$$

hold labour fixed

- Firm can produce output by combining different amounts of labor and capital
- In the long run, capital and labor are both variable
- The information can be represented graphically by the **total product hill**



The horizontal slide, tell us what are the different combinations of inputs that produce this specific target quantity of q

$$MRTS = \frac{MP_L}{MP_K} = \frac{w}{r}$$

optimal capital-labor ratio $\longrightarrow \frac{MP_L}{w} ; \frac{MP_K}{r}$

per dollar

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- marginal rate of technical substitution

$$\boxed{MRTS = -\frac{\Delta K}{\Delta L}}$$

for a fixed level of q

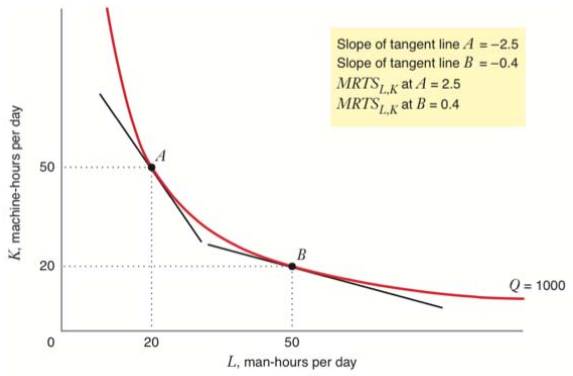
↳ negative of the slope

- The rate at which the quantity of capital can be *decreased* for every one-unit *increase* in the quantity of labor, holding the quantity of output constant, or
- The rate at which the quantity of capital must be *increased* for every one-unit *decrease* in the quantity of labor, holding the quantity of output constant.

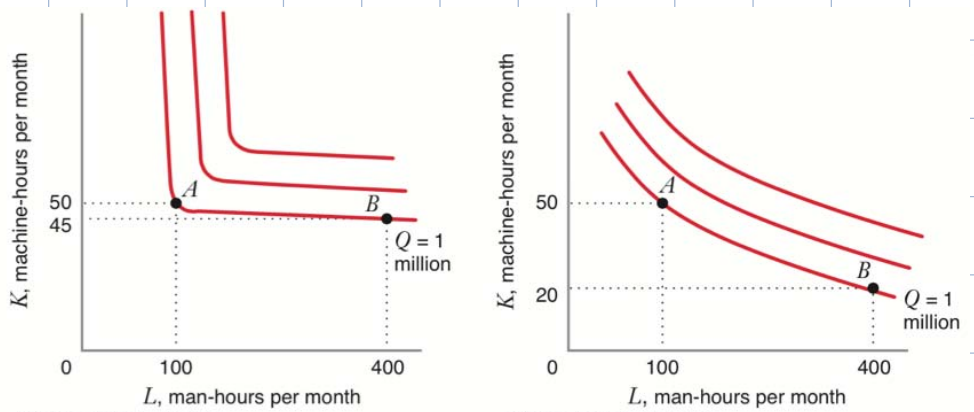
the rate at which the quantity of capital can be reduced for every one-unit increase in the quantity of labor, holding quantity of output cost.

As labor increases to replace capital

- Labor becomes relatively less productive
- Capital becomes relatively more productive
- Need less capital to keep output constant
- Isoquant becomes flatter



SUBSTITUTABILITY



(a) Production Function with Limited Input Substitution Opportunities

(b) Production Function with Abundant Input Substitution Opportunities

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RETURNS TO SCALE

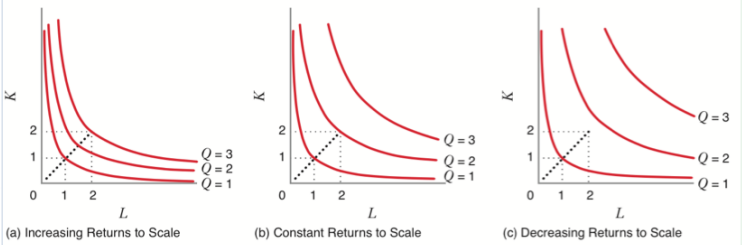
- **RETURNS TO SCALE**: rate at which output increases as inputs are increased proportionately

$$\text{RETURNS TO SCALE} = \frac{\%\,\Delta\,(\text{quantity of output})}{\%\,\Delta\,(\text{quantity of all inputs})}$$

By a production function $q = f(K, L)$, if all inputs are multiplied by the same positive constant ($\lambda > 1$), we have that:

Effect on Output	Returns to Scale
$f(\lambda K, \lambda L) = \lambda f(K, L)$	Constant returns to scale
$f(\lambda K, \lambda L) < \lambda f(K, L)$	Decreasing returns to scale
$f(\lambda K, \lambda L) > \lambda f(K, L)$	Increasing returns to scale

- By increasing returns to scale, there are cost advantages from large-scale operations
- A single large unit will be able to produce a given amount of output at a lower cost per unit than could two equally-sized small firms
- Such cost advantages determine the optimal size of firms



(a) Increasing Returns to Scale (b) Constant Returns to Scale (c) Decreasing Returns to Scale

ex. cobb - douglas

Suppose that the production function is

$$q = f(K, L) = AK^{\alpha}L^{\beta} \text{ with } A, \alpha, \beta > 0$$

This production function can exhibit any returns to scale
$f(\lambda K, \lambda L) = A(\lambda K)^{\alpha}(\lambda L)^{\beta} = A\lambda^{\alpha+\beta}K^{\alpha}L^{\beta} = \lambda^{\alpha+\beta}f(K, L)$

- if $\alpha + \beta = 1 \implies$ constant returns to scale
- if $\alpha + \beta > 1 \implies$ increasing returns to scale
- if $\alpha + \beta < 1 \implies$ decreasing returns to scale

The Cobb-Douglas production function is linear in logarithms

$$ln(q) = ln(A) + \alpha * ln(K) + \beta * ln(L)$$

- α is the elasticity of output with respect to K
- β is the elasticity of output with respect to L

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- to an economics, the cost is the value of sacrificed opportunities

- **opportunity cost** → the value of the next best alternative that is forgone when another alternative is chosen

Two ways a firm can "not use" the services of an input:

- Refrain from buying the input (i.e. saving an amount equal to the market price of the input)
- Resell unused services of the input in the open market (gaining an amount equal to the market price of the input)
  - In both cases, the opportunity cost of the input services is the current market price of those services

the notion is forward looking
- → different opportunity costs for different decisions
- → alternative uses priced at the time of decision

- **accounting costs**: the total of explicit costs that have been incurred in the past (fixed)
  - → actual expenses + depreciation charges for capital equipment

- **economic costs**: cost to a firm of utilizing economic resources in production, including opportunity cost (depending on the moment of the specific decision)

- **sunk costs**: costs that have already been incurred and cannot be avoided if production stops, they cannot be recovered
  - → ignored by the decision maker, as they do not vary by alternative

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LONG-RUN MINIMISATION

- COST MINIMIZATION ⟶ problem of finding the input combination that minimizes a firm's total cost of producing a particular level of output

Firms can typically produce the same amount of output using many different input combinations.
Among these, a firm that wants to make its owners as wealthy as possible should choose the input combination that minimises the costs of production

- **Long time horizon**: many costs become variable — they can be adjusted to reverse previous decisions

TOTAL COST

$$\boxed{TC = wL + rK}$$

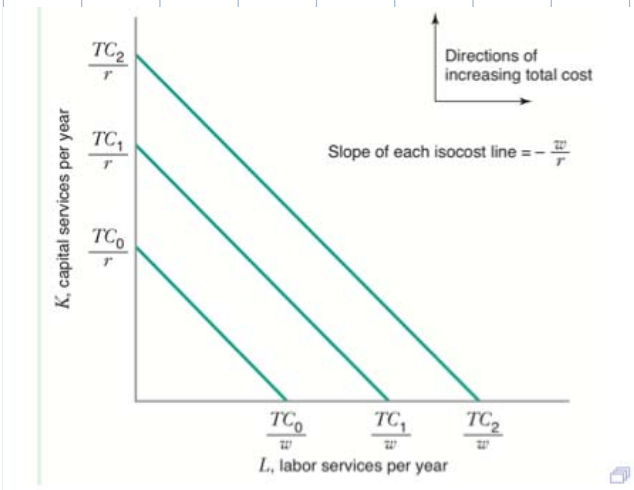
L = labour
K = capital

w = price of a unit of L
r = price of a unit of K

} implicit or explicit costs

The manager must choose the quantity of K and L that minimize total (economic) costs in producing q_0 units of output

- ISOCOST lines ⟶ set of combinations of inputs that will entail the same total costs for the firm



$$\boxed{K = (TC/r) - (w/r)L}$$

slope = $-w/r$

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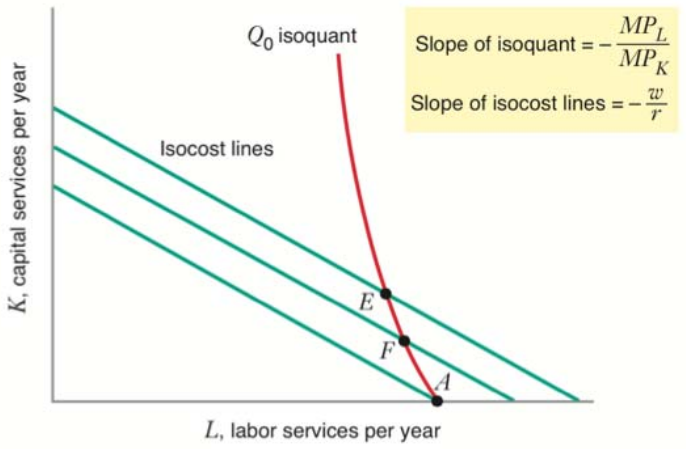
- corner point solutions ⟶ when the optimum is not interior

At point A, $(MP_L/MP_K) > (w/r)$, or $(MP_L/w) > (MP_K/r)$.
At any points on the isoquant, the marginal product per dollar spent on labor exceeds the marginal product spent on capital: hence it is better to give up capital in favour of labour.
At point A, there is no more capital to give up.



COMPARATIVE STATICS

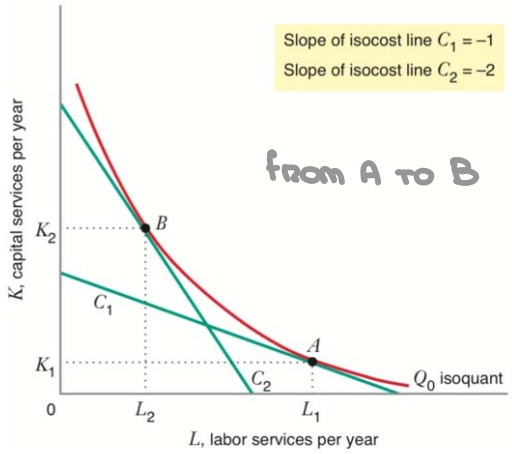
1 changes in input prices

w changes, r and q are constant

↑w ⟶ isocost steeper

L↓, K↑ labour has become more expensive

cost-minimizing



(The change in total costs can be measured as the change in the vertical intercept)

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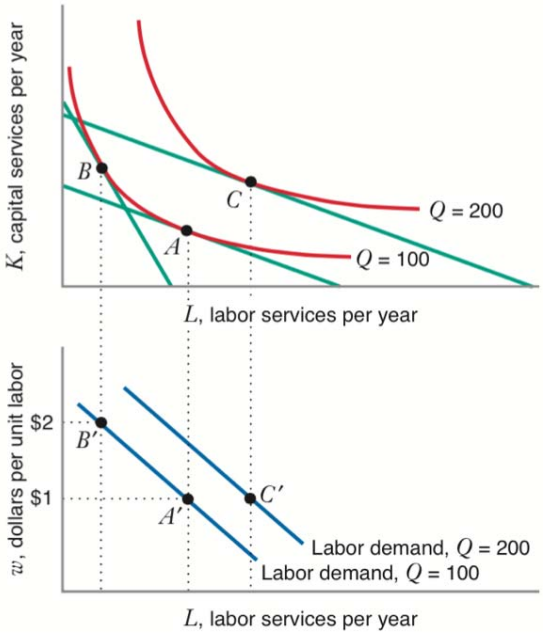
4 input demand curves

different level of w ⟶ derive labour demand function

changes in the output cause shift in the curve



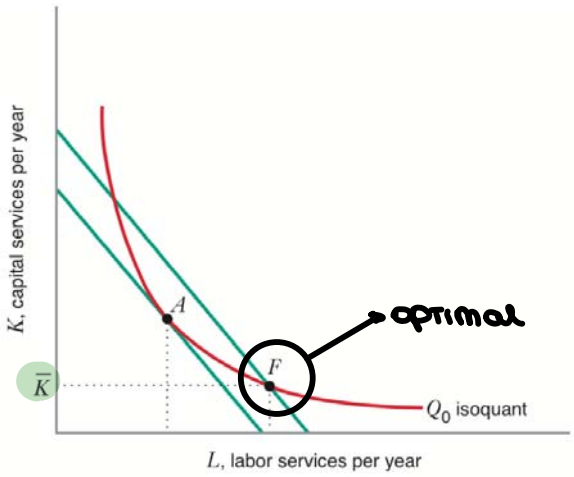
SHORT-RUN COST MINIMIZATION

In the short run, the firm faces the constraint that one or more of the firm's inputs cannot be changed. ⟶

$$\boxed{TC = wL + r\bar{K}}$$

variable costs

fixed costs



optimal

because the firm cannot substitute capital and labour, the determination of the optimal amount does not involve a tangency condition

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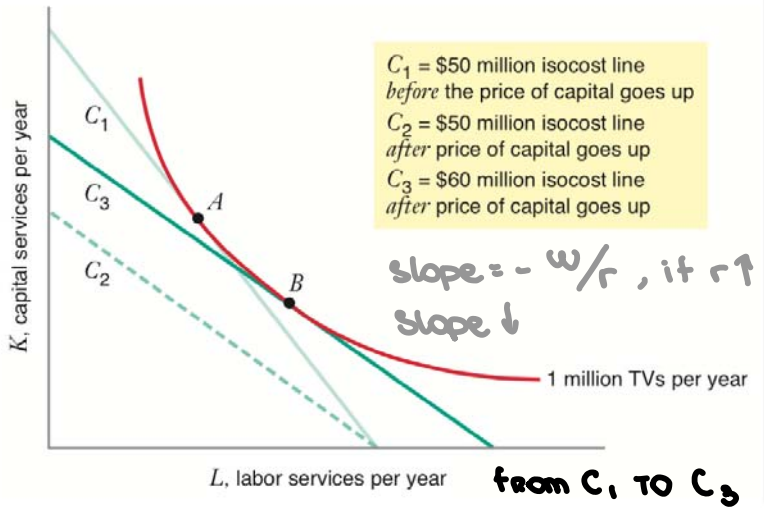
- how does a change in a single input price affect total costs?



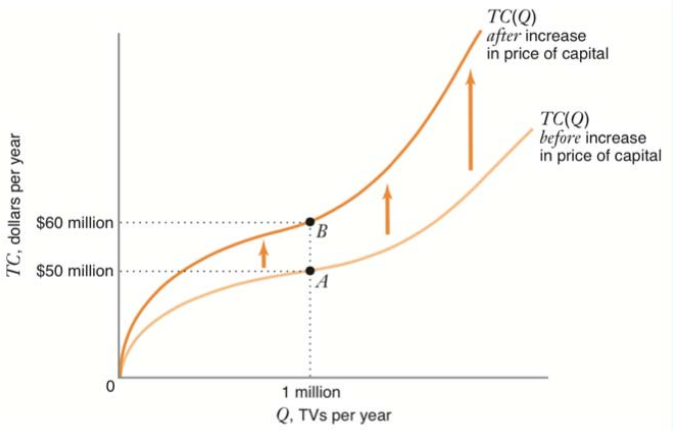
slope = $-w/r$, if $r\uparrow$ slope $\downarrow$

from C_1 to C_3

K increases, output and labour constant

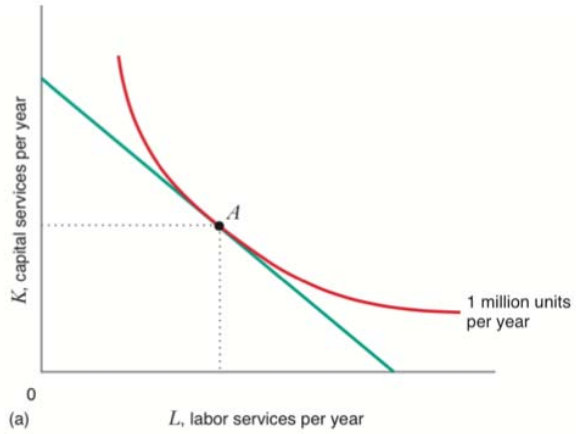
As we know, the isocost will roll around the isoquant changing the cost-minimising input combination from A to B.

The new input combination will correspond to higher total costs, holding output fixed.



For any positive amounts of inputs employed in production, an increase in the price of K will result in a new TC curve that lies **above** the original one at every $q > 0$

- how does a change in a all input price affect total costs?



A given percentage increase in both input prices leaves the cost-minimizing input combination unchanged, while the total cost curve shifts up by exactly the same percentage

↓

tangency is unaffected $A = -\frac{\partial w}{\partial r}$

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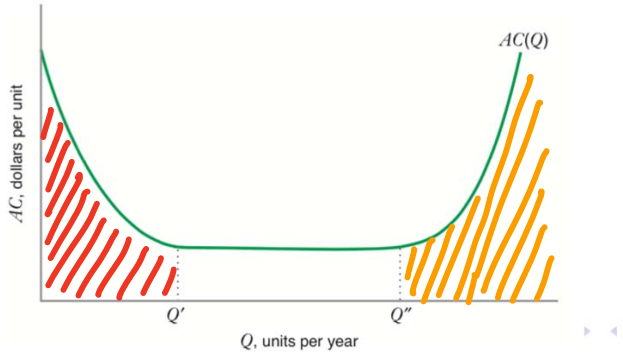
- If average cost is decreasing as quantity is increasing, then average cost is greater than marginal cost: $AC(q) > MC(q)$
  adding one unit of output decreases average costs
- If average cost is increasing as quantity is increasing, then average cost is less than marginal cost: $AC(q) < MC(q)$:
  adding one unit of output increases average costs
- If average cost is neither increasing nor decreasing as quantity is increasing, then average cost is equal to marginal cost: $AC(q) = MC(q)$

- a firm enjoy economies of scale in a situation where average cost goes down when output goes up (1)
- a firm suffers diseconomies of scale in a situation where average cost goes up when output goes up (2)



The greater the MES in comparison to overall market sales, the greater the magnitude of the economies of scale.

- minimum efficient scale (MES) is the smallest quantity at which the long run average cost curve attains its minimum point

- increasing returns to scale: output more than doubles when the quantities of all inputs are doubled

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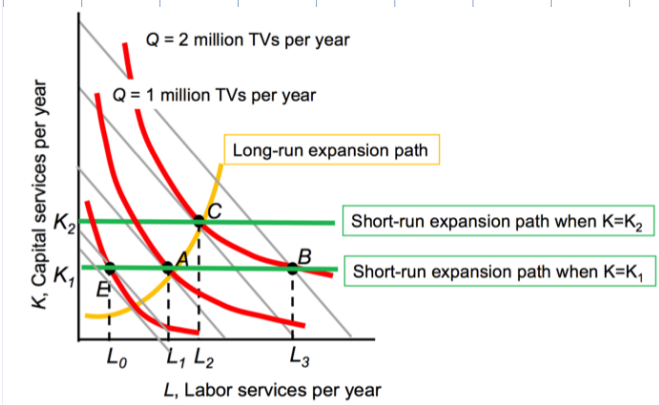
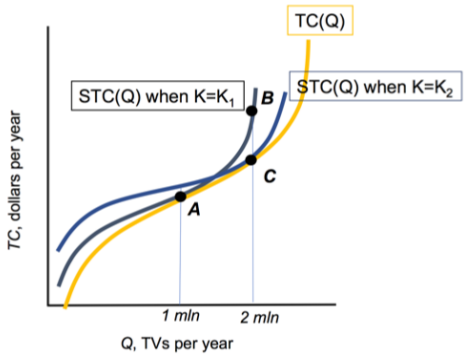
TVC : TOTAL VARIABLE COST CURVE

$TFC = r\bar{K}$: TOTAL FIXED COST CURVE

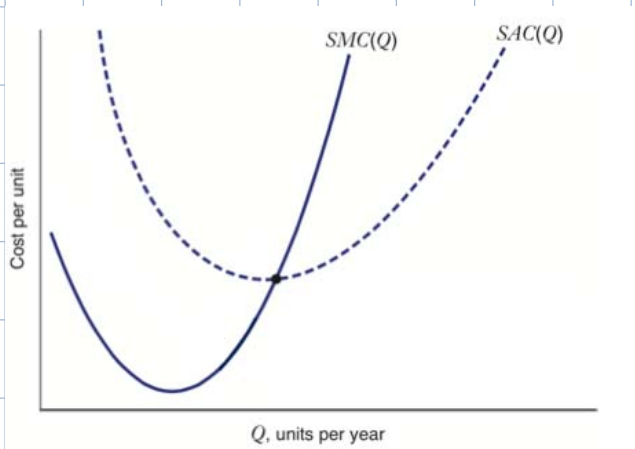
$$\boxed{TVC + TFC = TVC + r\bar{K}}$$





costs will in general be higher in the long run

- short run average costs $\boxed{SAC = STC/q}$
- short run marginal costs $\boxed{SMC = \partial STC/\partial q}$



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① price taking

- the individual firm sells a very small share of the total market output and cannot influence market price

② law of one price

- products of all firms are homogeneous and perfect substitutes

③ free entry and exit

- no substantial costs hinder a new firm's entrance into an industry
- buyers can easily switch from one supplier to another
- suppliers can easily enter or exit a market

PROFIT MAXIMIZATION

$\boxed{\text{economic profit} \neq \text{accounting profit}}$

economic profit = sale revenue - economic costs

accounting profit = sales revenue - accounting costs

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- **When the quantity is such that $P > MC$, producing more increases profit**
- Increasing the quantity in this range increases total revenue faster than total cost: $\partial TR/\partial q > \partial TC/\partial q$
- When $P > MC$, any additional unit increases its profit by $P - MC$, the difference between the marginal revenue and the marginal cost of that extra unit.

- **When the quantity is such that $P < MC$, producing LESS increases profit**
- Decreasing quantity in this range decreases total cost faster than it decreases total revenue
- When $P < MC$, reducing output by one unit increases profit by $MC - P$, the difference between the marginal cost and the marginal revenue of that extra unit.

- the relationship between price and quantity supplied is described by the supply function

- whenever the price will fall below the level of average cost, this means that we have a negative total profit because of a negative average cost

SHORT RUN

- firm's short run supply curve: shows how the short-run profit-maximizing output decisions changes as the market price changes

- short-run MC curve as long as $P \geq SAC$

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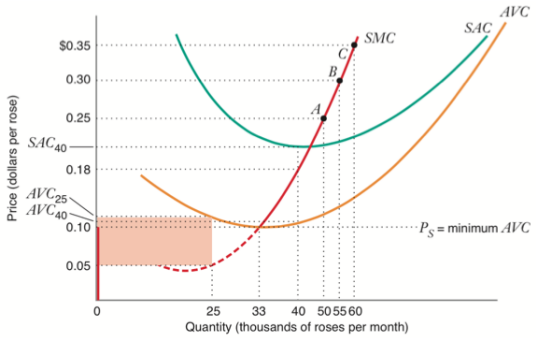
② ALL FIXED COSTS ARE SUNK

NSFC = 0, hence TFC = SFC

If market price falls below the shutdown price P_s, the firm is better off NOT producing:

- If it produces, the loss is: loss $= SFC + (AVC - P) \times q$
- If it closes down: loss = SFC



- A profit-maximizing price-taking firm with all fixed costs sunk finds it uneconomic to produce where $P < AVC$, i.e. on the portion of the SMC curve where $SMC < AVC$. This is the portion below the minimum level of the AVC curve.
- Hence, the supply curve has two parts:
  - If $P < min(AVC)$, the firm will supply zero output (i.e., q=0).
  - If $P >= min(AVC)$, the supply function will be equal to P=SMC.

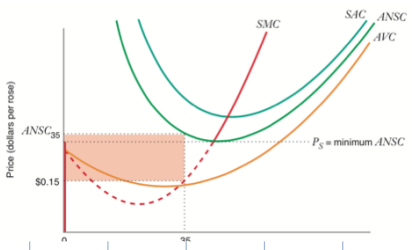
$$\begin{cases} P = MC & \text{if } P \geq min(AVC) \\ q = 0 & \text{if } P < min(AVC) \end{cases}$$

③ SOME FIXED COSTS ARE SUNK, SOME ARE NONSUNK

- **Average nonsunk cost ANSC** =AVC+NSFC/q
- If market price falls below $min(ANSC)$, the firm is better off NOT producing:
  - If it produces, the loss is: loss$= SFC + (ANSC - P) * q$
  - If it closes down: loss = SFC

NSFC, SFC > 0 hence

TFC = SFC + NSFC



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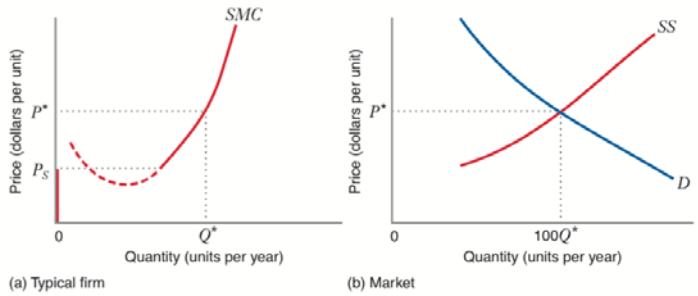
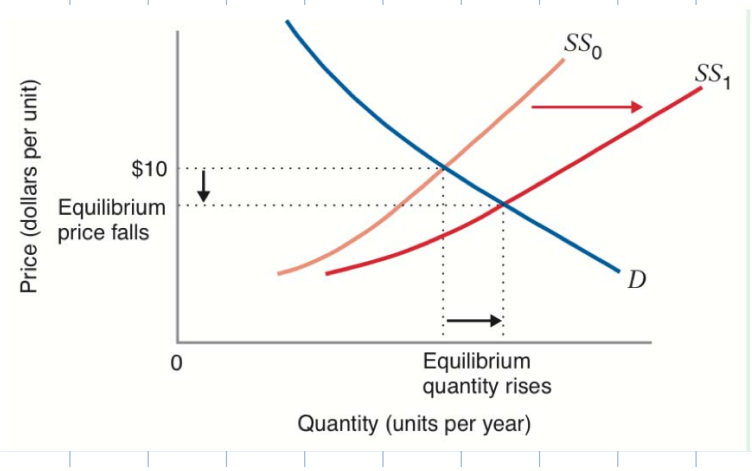
- a short-run perfectly competitive equilibrium occurs when the quantity demanded equals the total quantity supplied

Consider an industry with 100 identical firms: each will be supplying the same quantity q^* (which is where $MC = P^*$)

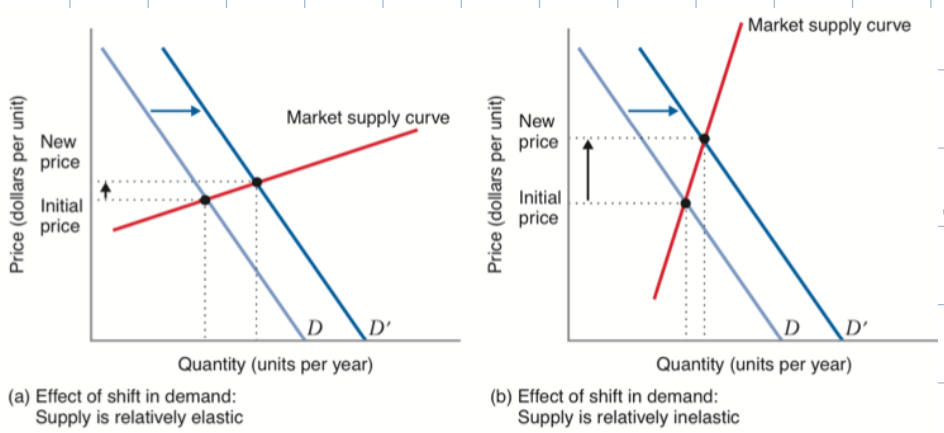
Market supply will be $100q^*$



- comparative statics analysis of the short run equilibrium can help understanding the factors that determine the market equilibrium price



increase in the number of firms



increase in the market demand

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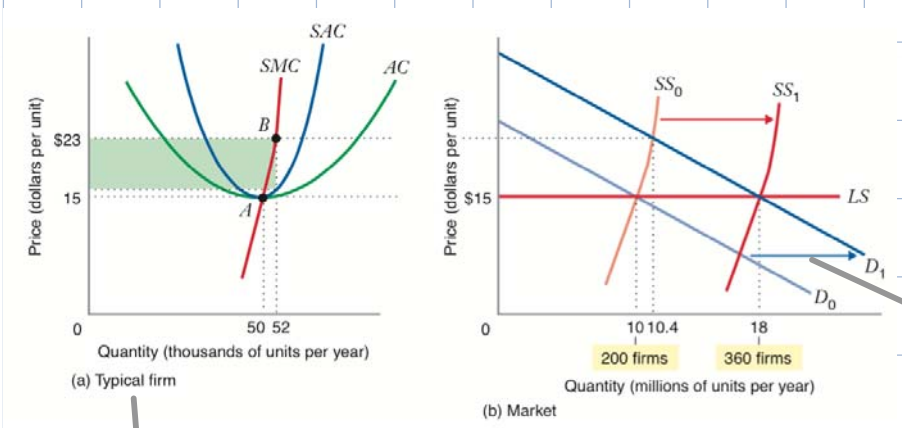
More specifically, three conditions must hold in long-run perfect equilibrium:

1. Given the price P^*, each active firm chooses a level of output that maximizes its profit and selects a plant size that minimizes the cost of producing that output. Hence, $\boxed{P^* = MC(q^*)}$
2. Each firm's economic profit is zero. This condition implies that a firm's long-run average cost equals the market price, $\boxed{P^* = AC(q^*)}$
3. At price P^*, market demand equals market supply, given the number of firms n^* and individual firm supply decisions q^*. This implies that $\boxed{D(P^*) = n^* q^*}$, or equivalently, $\boxed{n^* = D(P^*)/q^* = Q^*/q^*}$

- 3 TYPES OF INDUSTRIES

① CONSTANT-COST

input are available in unlimited supply



shock of demand

all firms are identical

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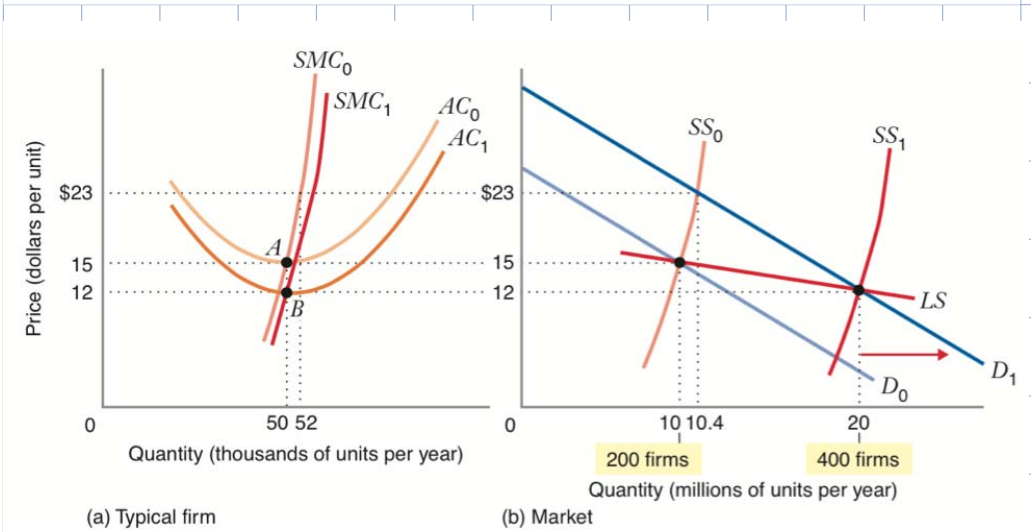
③ decreasing-cost

- Industry whose long-run supply curve is downward sloping
- Increase in demand causes production to increase
  - Increase in size allows firm to take advantage of size to get inputs cheaper
  - Increased production may lead to better efficiencies or quantity discounts
  - Costs shift down and market price falls



FREE ENTRY WILL EVENTUALLY DRIVE ECONOMIC PROFIT TO ZERO

When profit opportunities are freely available to all firms, economic profits will not last.

"If anyone can do it, you can't make money at it."

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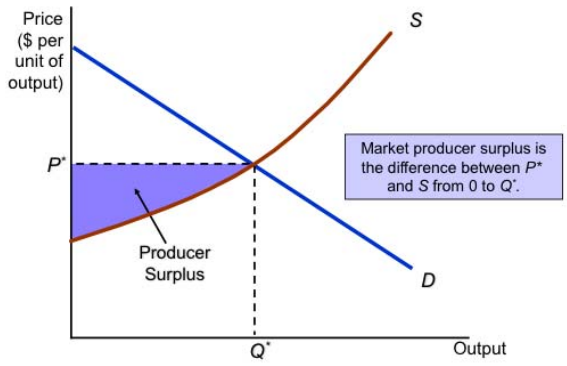
- In an increasing-cost industry, the long-run industry supply curve is upward sloping. Again, the area between the price and the long-run supply curve measures the producer surplus.



WELFARE

Welfare is measured by:

1. Consumers' surplus
2. Producers' surplus,
3. Any benefits accruing to the government

The **impact** of a policy is estimated as the **net change in welfare** (some will gain, some will loose)

consumers' surplus → total benefit that consumers receive beyond what they pay for the good

producer surplus → is the benefit from selling these units: difference between the market price the producer receives and the marginal cost from producing these units

$$PS = Pq - NSTC$$

$$PS = \frac{1}{2}(P^* - P_0^s)\,Q^*$$

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- If a policy is not welfare-maximizing, it is imposing an **efficiency cost** (but the intentions of the policy may be other than efficiency)
- But there are cases where the market by itself does not lead to the most efficient outcomes: the **market failures**:
- if prices fail to provide proper signals to consumers and producers, the unregulated competitive market is inefficient.

- **Externalities**: the actions of consumers or producers result in costs or benefits that do not show up as part of the market price (e.g. pollution, knowledge spillovers)
  - Government regulation about emissions is the only way to provide the right incentives to consider the social costs of pollution
- **Lack of information**: consumers lack information about the quality or nature of a product and so cannot make utility maximizing purchasing decisions

EXCISE TAXES

Consider a **specific tax**, i.e. a tax t on each unit sold of a specific commodity (e.g. gasoline or cigarettes), collected by suppliers

- The government must receive t cents for every unit sold
- The price the buyer pays must exceed the net price the seller receives by t: $P_b = P_s + t$
- Buyers consider the price they pay, i.e. P_b
- Sellers consider the net price they receive, i.e. P_s
- The quantity sold must equal the quantity bought.

$$\boxed{\begin{aligned} Q^D &= Q^D(P_b) \\ Q^S &= Q^S(P_s) \\ Q^D &= Q^S \end{aligned}}$$

$P_b - P_s = t$

$$\boxed{CS = \frac{1}{2}(P_0^D - P_b^*)Q^*}$$

$$\boxed{PS = \frac{1}{2}(P_s^* - P_0^S)Q^*}$$

$$\boxed{W = PS + CS + \underbrace{(t \cdot Q^*)}_{\text{TAX REVENUE}}}$$

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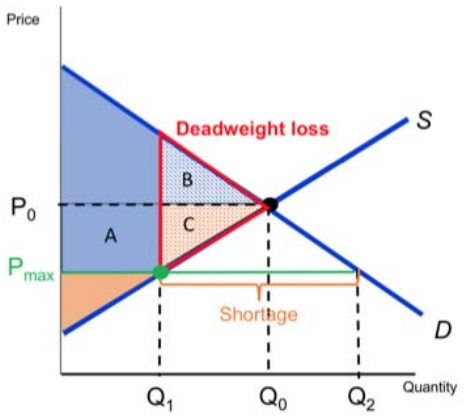
PRICE CEILINGS

With price ceilings and floors, **markets do not clear**: the government specifies a maximum or minimum price to specific goods.

- With a price ceiling policy, the government makes it illegal for producers to charge more than a **ceiling price** set *below* the market-clearing level.
- Such a policy decreases production and increases quantity demanded, hence creates a **shortage**
- e.g. rent controls

- Max consumer surplus: net change $A - B$
  - Some consumers are worse-off as they are rationed out of the market: triangle B
  - Some consumers are better-off as they can buy the good at a lower price: rectangle A
- Producer surplus: net change $\boxed{-A - C}$



- More efficient suppliers stay in market and sell lower quantity Q_1 at a lower price P_{max}, loosing A
- Less efficient suppliers are rationed out of the market, loosing C

Net effect:a **deadweight loss**
$A - B - A - C = \boxed{-B - C}$

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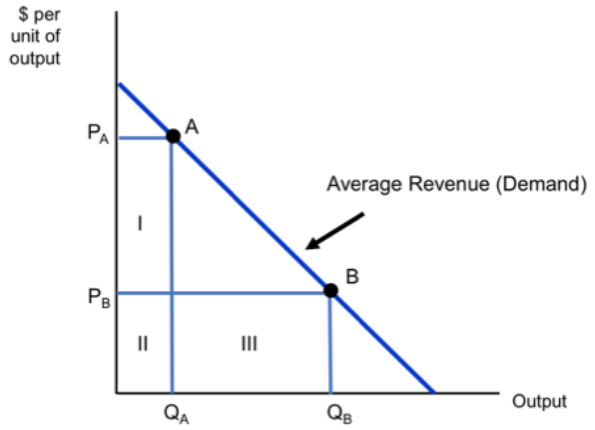
- marginal revenue is the change in revenue resulting from a unit change in output



to increase sale, the price must fall

↑ $TR = (Q_B - Q_A) \cdot P_B$ increasing output

↓ $TR = (P_A - P_B) Q_A$ decreasing price

$$\boxed{\frac{\Delta TR}{\Delta Q} = P + Q \underbrace{\frac{\Delta P}{\Delta Q}}_{<0}}$$

marginal revenue

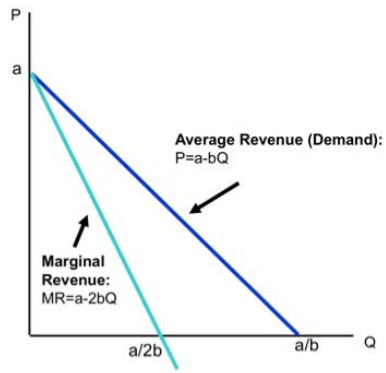
MR < P

can be negative

- Hence, we can view MR as made up of two components:
  - The additional revenue P obtained by adding the price of one unit of output;
  - The reduction in revenue associated with selling all units at a lower price $Q\frac{\partial P}{\partial Q}$ ($\frac{\partial P}{\partial Q}$ is always negative)
  - MR can be negative

FOR A LINEAR DEMAND CURVE

- Suppose market demand is $P = a - bQ$.
- Average revenue coincides with the demand curve. Thus, $AR = a - bQ$.
- Marginal revenue is $MR(Q) = P + Q\frac{\partial P}{\partial Q}$;
- Noting that $\frac{\partial P}{\partial Q} = -b$, $MR(Q) = a - bQ + Q(-b) = a - 2bQ$
- MR intersects the x axis halfway between the origin and the horizontal intercept of the demand curve at Q=a/(2b).
- For $Q > a/(2b)$, MR is negative.



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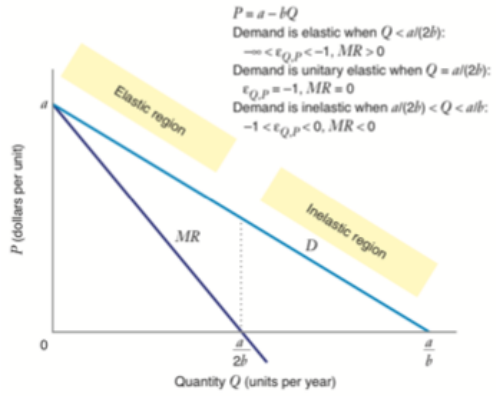
Region of Demand Curve	Relationship between: Marginal Revenue and $\epsilon_{Q,P}$	Relationship between: Total Revenue and Price
Elastic $(-\infty < \epsilon_{Q,P} < -1)$	$MR > 0$ [because $1 + (1/\epsilon_{Q,P}) > 0$]	The monopolist can increase total revenue by decreasing price (and thereby increasing quantity) by a small amount.
Unitary elastic $(\epsilon_{Q,P} = -1)$	$MR = 0$ [because $1 + (1/\epsilon_{Q,P}) = 0$]	The monopolist's total revenue will not change when price (or quantity) is changed by a small amount.
Inelastic $(-1 < \epsilon_{Q,P} < 0)$	$MR < 0$ [because $1 + (1/\epsilon_{Q,P}) < 0$]	The monopolist can increase total revenue by increasing price (and thereby decreasing quantity) by a small amount.

- Notice a monopolist will never produce a quantity in the inelastic portion of demand curve
  - In inelastic portion, can increase revenue by decreasing quantity and increasing price



- PRICE FOR a monopolist $\boxed{P = MC / 1 + (1/\varepsilon_d)}$

Monopoly pricing compared to perfect competition pricing:

- Monopoly
  - $P > MC$
  - Price is larger than MC by an amount that depends inversely on the elasticity of demand
- Perfect Competition
  - $P = MC$
  - Demand is perfectly elastic, so $P = MC$

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MACROECONOMICS

GDP: SET all FINAL goods and SERVICES produced within an economics system during a certain time period

↓

HOW TO COMPUTE

① income approach (VALUE OF FINAL GOODS)

income earned from the production of goods and SERVICES

GDP = Σ amount produces − intermediate goods

NET INCOME NATIONAL = WAGES + RENT + INTEREST + PROFITS

② VALUE ADDED

different between cost of inputs to production and the price of output

GDP = Σ amount produces − import

ADDED VALUE = net revenues − initial inventory − material

③ EXPENDITURE APPROACH

national income account identity

$$Y = \underbrace{C + I + G}_{DI} + \underbrace{E - Z}_{EN}$$

E = export

Z = import

Y = GDP

C = consumption

I = investment

G = Public expenditure

· 3 main macroeconomic variable → GDP, inflation, unemploym.

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INFLATION INDEX $\boxed{\pi = \frac{\Delta P}{P_{-1}} = \frac{P - P_{-1}}{P_{-1}}}$

NOMINAL GROWTH INDEX $\boxed{g_N = \frac{\Delta Y_N}{Y_{N,-1}} = \frac{Y_N - Y_{N-1}}{Y_{N,-1}}}$

$1 + g_N = (1 + \pi)(1 + g)$

$g_N = \pi + g + \pi \cdot g$

UNEMPLOYMENT RATE $\boxed{u = \frac{Y^* - Y}{Y}}$

$\boxed{v = \frac{L^S - L}{L^S} = \frac{U}{L^S}}$

L = employed workers

L^S = labour force

$L^S = L + U$

U = unemployed workers looking for a job

PRODUCTIVITY GROWTH $\boxed{\lambda = \frac{\text{real GDP}}{\text{employment}} = \frac{Y}{P}}$

PARTECIPATION RATE $\boxed{g_L = \frac{\text{labour force}}{\text{population of working age}} = \frac{L^S}{N}}$

KANESIAN CONSUMPTION

- SOCIETY → interaction of individuals and not classes, without labelling individual belong to one social class → interaction among economic operators
- short-run perspective → optimal allocation of resources
- national account identity

$$Y = \overbrace{C + I + G}^{\text{internal}} + \overbrace{E - Z}^{\text{external}}$$

C: firms, I: house hold, G: firms, E: PA, Z: rest of the world

because is always verified

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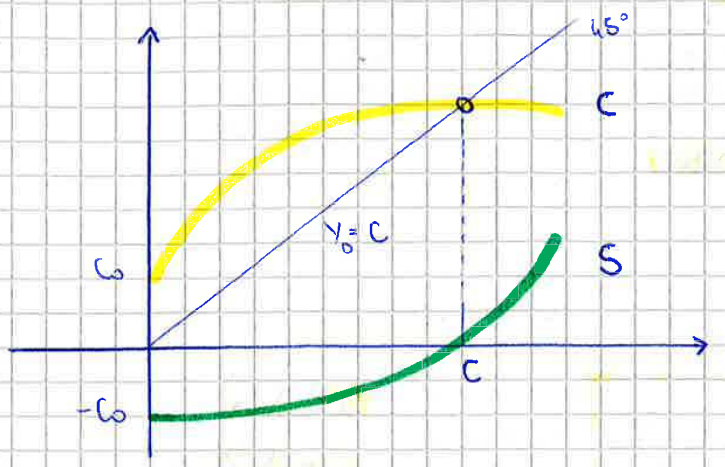
- savings $\boxed{S = Y_D - C(Y_D)}$

Y_D = disposable income

$C(Y_D)$ = consumption



Until point C people pay for basic needs that are C_0 and they do not save money. After C, saving begin to be positive

$\boxed{C = C_0 + cY_D}$

$\boxed{S = -C_0 + sY_D}$

c = marginal propensity to consume

$0 < c < 1$

s = marginal propensity to save

$0 < s = (c-1) < 1$

or MPS: varies by income level → the higher the income the higher the MPS, because the wealth increases and the ability to satisfy needs increase

- marginal and average consumption on a long perspective tend to coincide → C_L
- consumption function is not stable in the long run since consumption patterns change as income rises

LIFE CYCLE THEORY OF CONSUMPTION

- assumption → individuals aim to keep constant their consumption
- they plan their current consumption taking into account not only their current income, but also their current wealth which is the result of saving decisions
- individual based the decision of consumption and saving not only look at current situation but also looking at future wealth

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POSTKEYNESIAN THEORY

$$Y_D = (1-\tau)W + (1-\tau)\pi$$

W = wages τ = taxation rate

π = profit

$$C = C_0 + (c_\pi + (c_w - c_\pi)\theta)Y_D$$

c_w = workers' propensity to consume

c_π = entrepreneurs' propensity to consume

$\pi = Y - W$

$Y_D = (1-\tau)Y$ $\longrightarrow$ $\theta = \frac{W}{Y} = \frac{(1-\tau)W}{Y_D}$ shares of salaries on tot national income

If θ = cost → short run function does not move,
If θ increases → marginal propensity to consume increases

INVESTMENT

NEOCLASSICAL THEORY

- investment → denotes the ex-ante choice of acquiring new capital goods and of defining a new production technique in order to produce a specific level of output

- optimisation problem

$$\max \quad \pi = P \times q(K,L) - wL - rK$$
$$\text{s.t.} \quad q_0 = q(K,L)$$

profit is maximised $MRTS = \frac{MP_L}{MP_K} = \frac{w}{r}$

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- demand function for K $\boxed{K^d = K^d(q_0, i)}$

$$\frac{\partial K^d}{\partial q_0} > 0 \qquad \frac{\partial K^d}{\partial i} < 0$$

- I^* = potential investment $\boxed{I^* = K^d - K}$

↓

difference between the stock of demand and the stock of existing capital K

- actual investment $\boxed{I = I^* / T}$ investment in the current period in relation to T periods

- neoclassical function of investment

$$\boxed{I = \frac{1}{T}[K^d(q_0, i) - K]}$$

I always invest to maximize my profit

↳ critics:
- assumption of a wide n° of technologies differing for K/L and available to the firm is not realistic
- the relevant problem is not which technique to choose but rather whether to make the investment

KANESIAN THEORY

- investment demand function at the macro-economic level → aggregating quantities demanded of capital goods

- present value: income earned in the future → value of having this future income today

- expected returns $\boxed{\Delta \pi_e = \Delta R^e - \Delta TC^e}$

buying PB today, yields $C = PB(1+i)$

→ price of bond today $PB = C/(1+i)$ $(C = \pi_e)$

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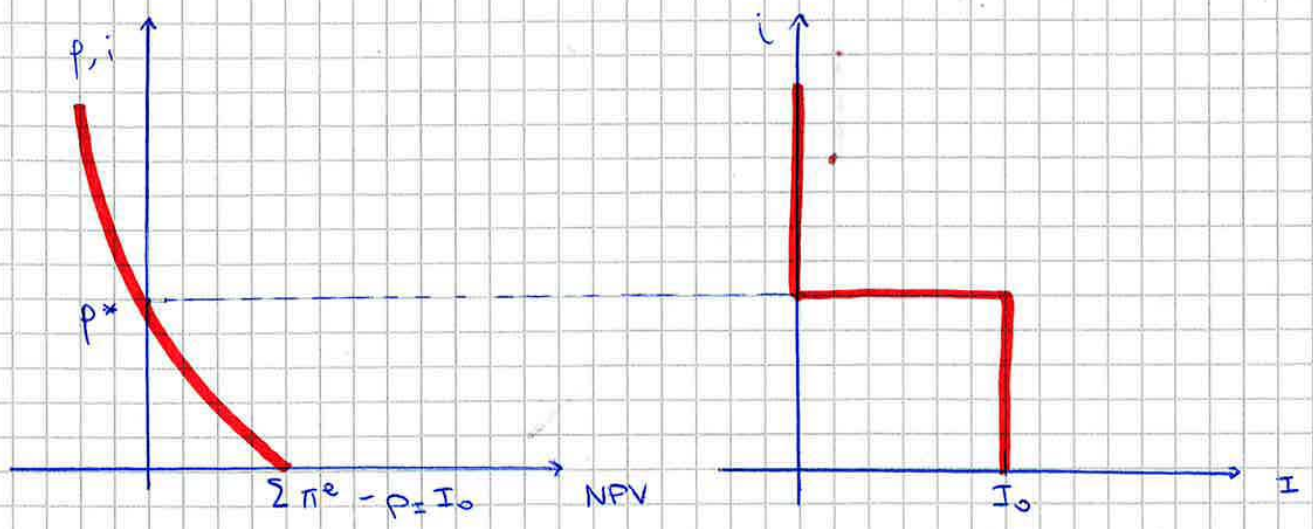
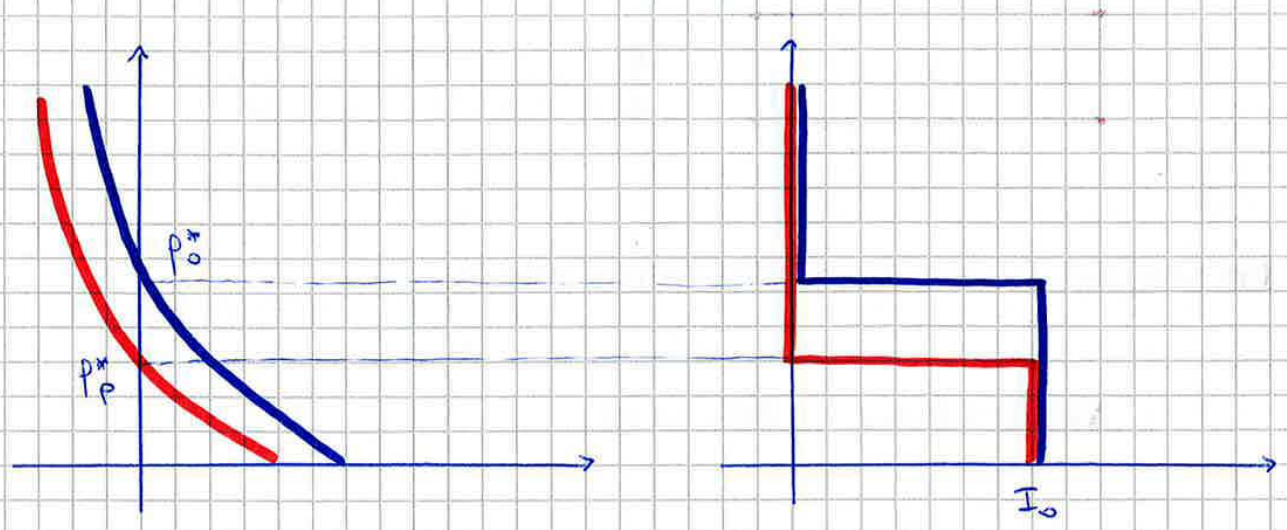


when $\rho = 0 \rightarrow NPV = FV$



with optimistic and pessimistic investors

$$\begin{cases} 0 & i > \rho^*_0 \\ I_0 & \rho^*_P < i < \rho^*_0 \\ 2I_0 & \rho^*_P > i \end{cases}$$

- because $\rho^* = i \rightarrow$ the curve of marginal efficiency of capital is also the demand curve for investment

- min level of investment $\rightarrow I_m \rightarrow$ implement the investment irrispective of the return it will yield
- max level of investment $\rightarrow I_M \rightarrow$ max amount of realizable investment

$\longrightarrow$ declining slope $\rightarrow$ we cumulated the firms' investment project

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$$\boxed{Y_D + APC = C + FFI + DPA + BPC}$$

FFI = I − AU → firms' demand of resources

DPA = G − TN → demand for resources from public sector

BPC = EN + APC → net demand for resources from the rest of the world

$$\boxed{\underbrace{Y_D + APC - C}_{SN = savings = S + APC} = FFI + DPA + BPC}$$

identity but does not guarantee equilibrium in financial market

HOUSEHOLDS' PORTFOLIO COMPOSITION

KINDS OF FINANCIAL ASSETS → assets where you can invest your money

- HC = CURRENCY → coins and notes issued by central bank → debt of central bank toward the economy.
  notes: I can extinguish a debt with the credit I have with another person
- DC = checkable deposits → are all the current accounts at central bank so that owners can deliver payments through cheques (assegni)
- M1 = money in the narrow sense → $\boxed{M1 = HC + DC}$
  ↳ money using in transaction → most liquid and less risky money aggregate
- DR = savings deposits (conto corrente) → all the banking and postal deposit. Their availability relies on the need of going and carry out operation
- M2 = liquidity → $\boxed{M2 = DR + M1}$
  ↳ money which is either immediatly available as cash or after an operation. Not only transactional role but also precautional role and speculative role

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② INSTRUMENT TO EVALUATE = "numeraire good"

money acts as a standard of values, a unit of account (measure)

- demand for money is how large is the stock of money people want

  depend on
  - → income: higher is the income, higher is stock of money I want
  - → synchronization of payments and takings
    - =0 perfect synchro (I receive, I spend)
    - >0 not perfect synchro

- for neoclassical MONEY IS NOT NECESSARY → it only eases transactions but any other good could be used as a standard of value
- MONEY IS USEFUL when payments and takings are not well synchronized, because money can be stocked
- takings and payments depend on disposable income → demand for money is a function of income and of the ways the system organizes its payments

| the more frequently income is received and the faster are the outlays, the lower is the demand for money

↓

demand for money is stable share of the income

- propensity to detain money

$$\boxed{K = \frac{M}{Y_N}}$$

↓

measure of how money is necessary to make a transaction

M = average stock of money
Y_N = nominal GDP

- velocity of circulation of money

$$\boxed{V = \frac{1}{K} = \frac{Y_N}{M}}$$

↑ V → low propensity to detain money

CAMBRIDGE

$$\boxed{M = K \cdot Y_N}$$

FISHER

$$\boxed{Y_N = M \cdot V}$$

$Y_N = Y \cdot p$

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- movements of inflation are only determined by change in M

↓

an increase in the rate of growth of money causes in short run a one to one increases in the rate of inflation with no effect at all on the level of potential income Y^*

IN THE LONG RUN (full employment)

$$\pi = \mu - g^* = \begin{cases} = 0 & \mu = g^* \\ > 0 & \mu > g^* \end{cases}$$

inflation increases in the long run only if money increases more than the level of potential real output g^*

THOREM NEUTRALITY OF MONEY

money has effect only on the general level of prices. NOT on the real GDP

real GDP is solely determined by the real forces of the market

- ↳ money is a veil: useful only to overcome barter
- ↳ money is a commodity: price is the reciprocal of the general level of prices

$$p_M = 1/p$$

MONEY AS BUFFER OF STOCK

(FOR PIGOU)

- money is needed to ease transaction and to face emergencies
- marginal utility of money (decreasing, as any commodity)

$$M^d = M^d(Y_N) = K^* p Y$$

$K^* > \bar{K}$ (propensity to retain money for transaction)

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INTEREST AND PRICE OF SECURITIES

- endless revenue $\boxed{p_b = \frac{d^e}{i}}$

  p_b = price of bond

  i = interest

  $d^e = \frac{\text{expected coupon interest}}{\text{nominal value at maturity}}$

- bond $\boxed{p_b = \frac{1}{1+i}}$

ALLOCATION OF WEALTH

- $\boxed{\bar{R} = M + B}$ market of bonds is the mirror image of the market of money

- demand for money
  - transactional purpose } income
  - precautional purpose
  - speculative purpose → stock of funds

- speculator's strategy
  - comparison between i and i^e
  - $p_b^e \neq p_b^*$ → comparison between p_b^e expected and the intrinsic fundamental value of the bond p_b^*

- speculator's gain
  - ≥ 0 : he buys bond and sells money
  - < 0 : he sells bond and retains money

$$\boxed{\underbrace{i + \underbrace{\frac{p_b^e - p_b}{p_b}}_{\text{capital gain}}}_{\text{profit}} = i + \frac{p_b^e}{p_b} - 1 = i + \frac{i}{i^e} - 1 \lessgtr 0}$$

i^e = interest rate in the future

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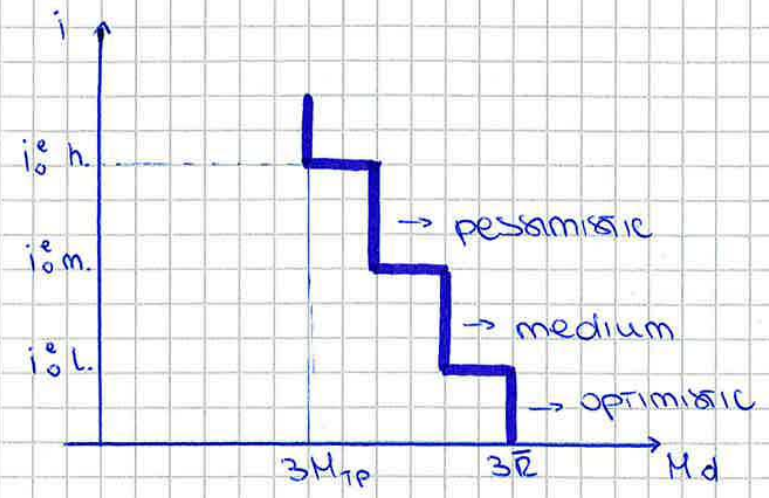
- The pessimistic individual has a strong preference for the liquidity → willing to invest in bonds only in the case the interest rate is very high

aggregating individual demand

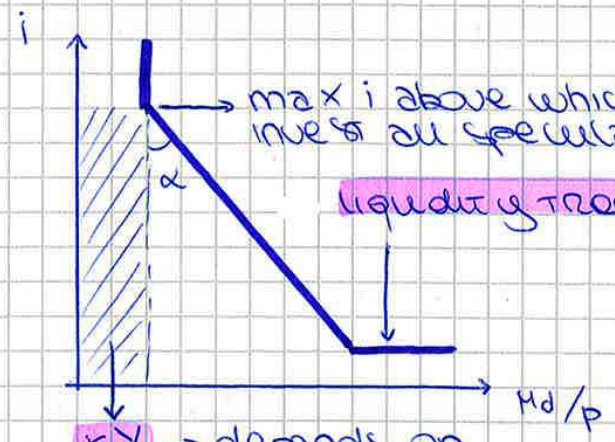


an increase in i leads to a decrease in demand for money

MACRO DEMAND FOR MONEY

- at macroeconomic level → aggregated curve may be considered continuous

$$\boxed{M^d = M^d(\underbrace{Y_N}_{M_{TP}}, \underbrace{i, i^e}_{M_S}) = \phi(Y, i, \psi) \times P}$$



→ max i above which everybody wishes to invest all speculative money in bonds

liquidity trap = min interest rate, so low that below it expectations are so pessimistic that everybody reject purchasing bonds

kY → depends on income, not on interest

$$\boxed{\frac{M^d}{P} = kY - h(\psi)i}$$

→ expected i linked to confidence state ψ

demand for money in real terms (no monetary illusion)

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