We have seen that there are two ways to determine the competitive equilibrium of an economy:

A: Solve for an allocation c^* and l^* and a wage "w", given all exogenous variables, which satisfy conditions 1) – 5) of the definition of a competitive equilibrium

trial and error method

B: Use the production possibility frontier (PPF) to determine c^* and l^*

Method B is much easier than method A

Note: Method B does not rely on the notion of market [ie: p and w are absent from this solution]

↳ This solution is often referred to as the Social Planner's solution

Think of this social planner as some leader that chooses c and l for the consumer that maximize its welfare.

→ The Planner's Solution is Pareto Optimal

Pareto optimality (Pareto efficiency)

→ a change from one allocation to another allocation is a <u>Pareto improvement</u> if this change makes at least one consumer better off without making any other consumer worse off.

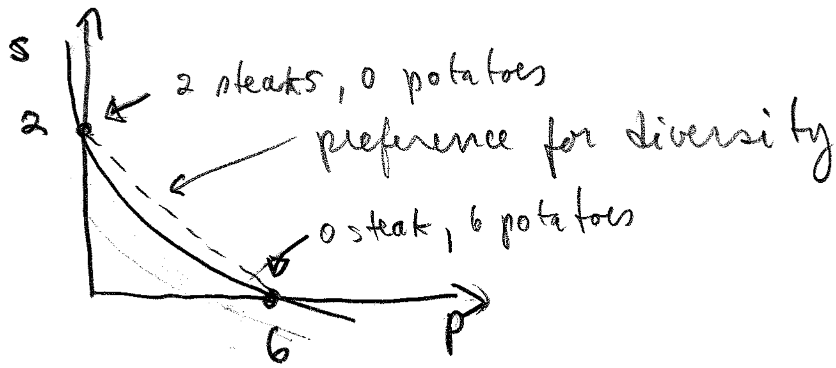
ex: • consumers A and B consume steak (s) and potatoes (p) with utility function $u(s,p)$

initial allocation →

• endowment

	A	B
p	6	0
s	0	2

• Assume that $u(0,6) = u(2,0)$



Pareto improvement

$u^A \uparrow$
$u^B \uparrow$

→ consider another allocation

new allocation →

	A	B
p	3	3
s	1	1

preference for diversity $\Rightarrow$ $u(1,3) > u(2,0)$

$u(1,3) > u(0,6)$

$\therefore$ Both consumers have an ↑ in utility → this allocation is <u>Pareto superior</u>

→ An allocation is Pareto Optimal if no further Pareto improvement are feasible

ex: allocation

	A	B	total
P	3	3	6
S	1	1	2

is Pareto optimal

↳ consider the allocation:

	A	B	total
P	4	2	6
S	1.5	0.5	2

← feasible

↑ consumer A is better off (P and S ↑)

but consumer B is worse off (P and S ↓)

∴ This is not a Pareto improvement

⇒ there are no other allocations which improve (in the Pareto sense) upon the allocation P=3 and S=1 for both consumers

note: Pareto optimality has nothing to do with Equity

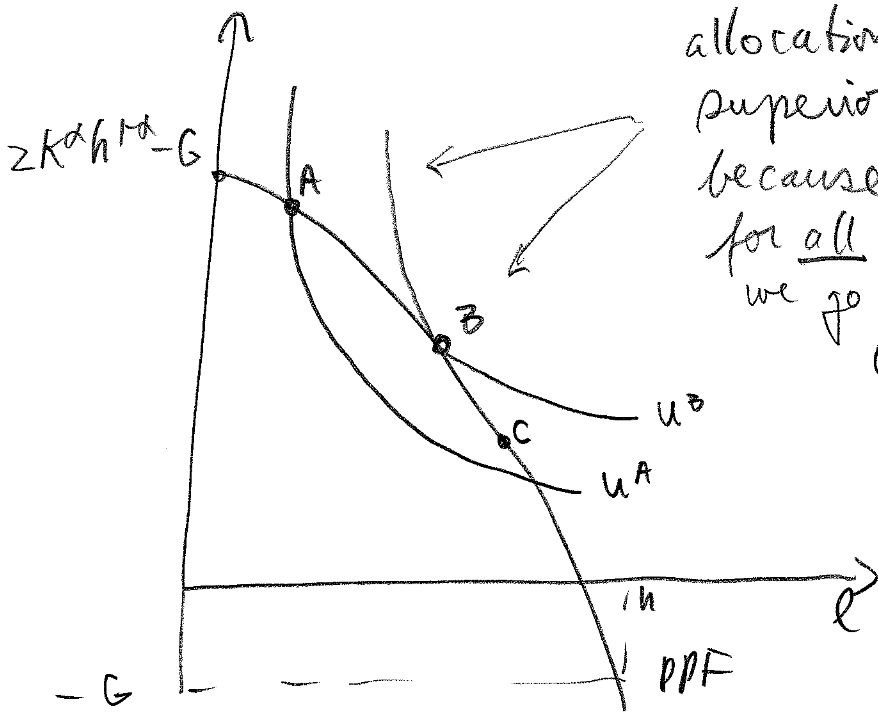
ex:

	A	B	total
P	6	0	6
S	2	0	2

is Pareto optimal but unfair

↳ not possible to ↑ u^B without ↓ u^A

Why is the Planner's Solution Pareto optimal?



allocation B is Pareto superior to allocation A because utility increases for all consumers when we go from A to B (i.e: no body loses utility)

→ allocation B is Pareto optimal because there are no other allocations (that are feasible) which ↑ utility.
(ie: going from B to A or B to C would reduce utility for everybody in the economy)

Note: Since the Competitive Equilibrium solution corresponds to the Social Planner's solution we can conclude the following:

First and second theorem of Welfare economics

1) A competitive equilibrium is Pareto Optimal

2) A pareto optimal allocation is a competitive equilibrium

1) actually means that a Planner who can control c and l <u>cannot</u> do better (cannot achieve a Pareto improvement) with respect to a market economy

↳ ie: There is no role for government. A government that intervenes to change c and l can only do worse than the market (or at least as well)

2) actually says that there exists a set of prices (here, w and p) so that a Pareto optimal allocation can be <u>supported</u> as a competitive equilibrium

↳ can always use the planner's solution to find the competitive equilibrium solution.

note: These two results only work in the idealized economy we have been using

↳ ie: there are no problems in this economy

→ in the real world, this is probably not so

Ex: A competitive equilibrium may not be optimal if there are:

1) externalities: pollution for ex.

when the decisions of one economic agent affect the welfare of other agents but does not take it into account

ex:

$$Y = N^{2/3} E^{1/3}$$

↳ pollution: emission $E \leq \bar{E}$ max level of emission

$$U = C^{1/2} - E^{1/2}$$

→ there are no cost to the firm to ↑E
∴ to max profits, the firm will choose $E^* = \bar{E}$

↳ but the cost of emission for consumers will be maximum

→ The Pareto optimal allocation is

$E < \bar{E}$

but the market would not achieve it because firms do not take into account the cost of polluting (to society) when it makes its decisions.

2) distortions: anything that affect the market prices with respect to the cost paid by agents

eg: income taxes (taxes proportional to income)

↳ say the government sets the tax rate τ on income. Then, after tax income is

$$\underbrace{wN + \pi}_{\text{gross income}} - \tau[wN + \pi]$$

$$= \underbrace{(1-\tau)[wN + \pi]}_{\text{net income}}$$

in this case, the cost of leisure is $(1-\tau)w$, no longer w

∴ consumer decision's is based on

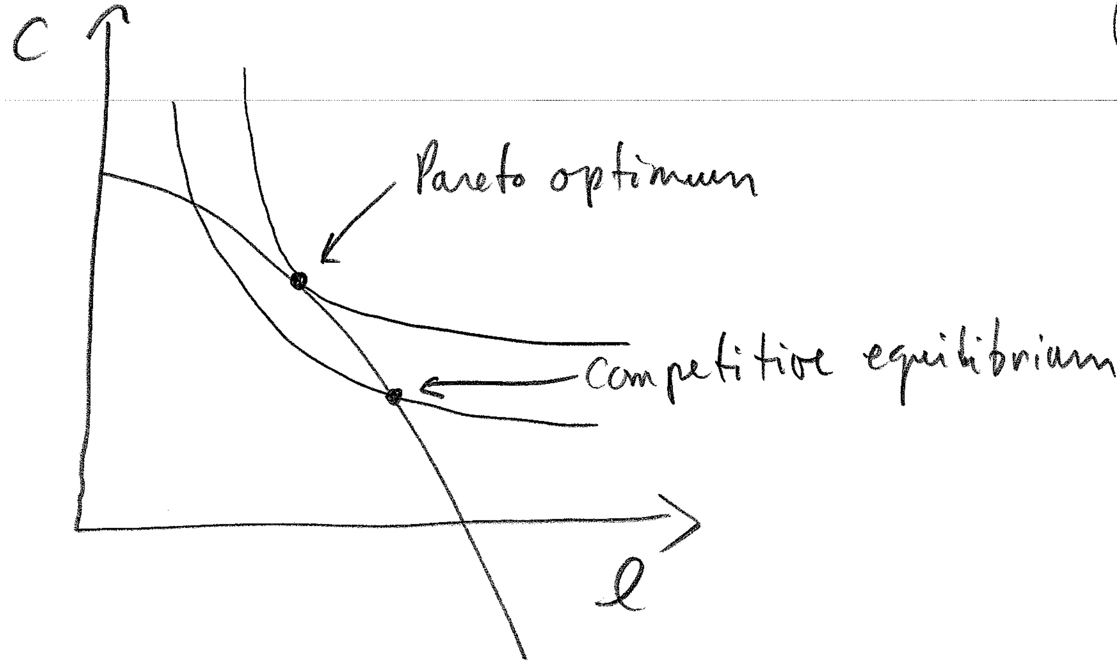
$$\underbrace{MRS_{lc}}_{\substack{\text{value of}\\ \text{leisure}}} = \underbrace{w(1-\tau)}_{\substack{\text{actual cost}\\ \text{of leisure}\\ \text{("paid" by}\\ \text{the consumer)}}} < \underbrace{w}_{\substack{\text{market}\\ \text{price}\\ \text{of leisure}}}$$

but firms still set $w = MPN$ (they do not pay the tax)

$$\Rightarrow \quad MRS_{lc} = \underbrace{MPN}_{w}(1-\tau) < MPN$$

$$MRS_{lc} < MPN$$

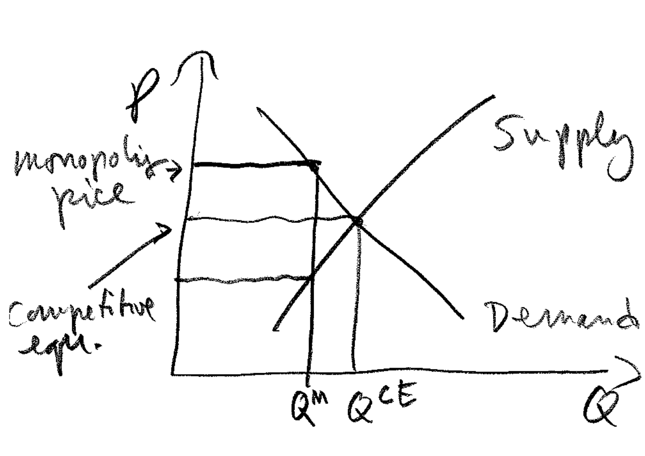
will happen in a competitive equ.



⇒ the competitive equilibrium has <u>too much</u> leisure because the real cost of leisure is distorted by the tax. [leisure is perceived to be cheaper than its real cost for the economy as a whole]
↳ social cost

3) Market power: Firms may not be price takers

∴ to raise prices, firms may produce less [to make their product rare)



⇒ production is less than the Pareto optimum

← $Q^M < Q^{CE}$

→ for the rest of the course, we will assume that these problem do not exist

→ much simpler

→ does not make a lot of difference for macro models.

→ if these problems exist, there is a role for the government

↳ the government can act to fix the problems linked to externalities for example (to reach the Pareto optimum)

↳ it can make firms pay for the "true" social cost of their emissions so that they choose a lower level