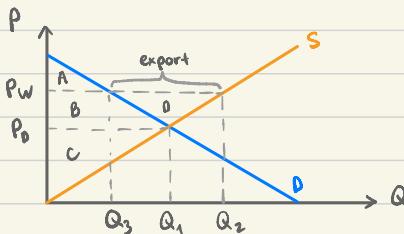


Discussion 7 - Wed Oct 11th

Review 1. Price vs Trade

$$P_w > P_d$$

(Domestic comparative advantage)



$$\circ \text{No trade: } P^* = P_d, Q^* = Q_1$$

$$CS = A + B, PS = C$$

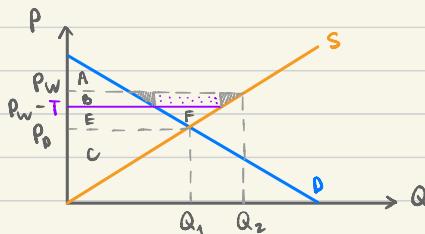
$$\circ \text{Free trade: } P^* = P_w$$

Domestic demand = Q_3

Export = $Q_2 - Q_3$

$$CS = A, PS = B + C + D$$

$$\circ \text{Trade with Export tax } T$$



$$P^* = P_w - T \quad (\text{if } P_w - T > P_d)$$

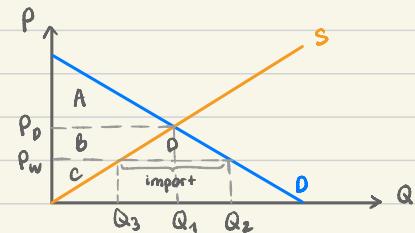
DWL = $\frac{1}{2} \Delta Q \cdot T$

Tax revenue = $\frac{1}{2} \Delta Q \cdot T$

$$CS = A + B, PS = E + C + F$$

$$P_w < P_d$$

(No domestic comparative advantage)



$$\circ \text{No trade: } P^* = P_d, Q^* = Q_1$$

$$CS = A, PS = B + C$$

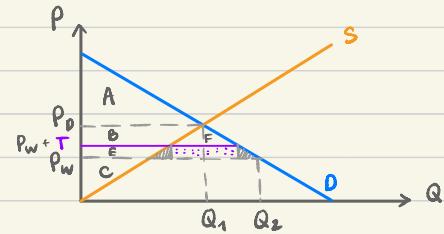
$$\circ \text{Free trade: } P^* = P_w$$

Domestic supply = Q_3

Import = $Q_2 - Q_3$

$$CS = A + B + D, PS = C$$

$$\circ \text{Trade with Import tax } T$$



$$P^* = P_w + T \quad (\text{if } P_w + T < P_d)$$

DWL = $\frac{1}{2} \Delta Q \cdot T$

Tax revenue = $\frac{1}{2} \Delta Q \cdot T$

$$CS = A + B + F, PS = C + E$$

+ Welfare loss: often refers to DWL

Discussion 9 - Wed Oct 24

Misc + Prelim: read email (name + correct link)

Review <Below is not a comprehensive list>

1. Chs 7:
 - + Consumer surplus
 - + Producer surplus
 - + DWL

} → how they look on graph?
2. Chs 22:
 - + Budget constraint
 - + Utility (utils): marginal vs total
graph
 - + Diminishing marginal utility
 - + Indifference curve - how it interacts with budget constraint (graph)
 - + Marginal rate of substitution (MRS) = Price_x / Price_y, at optimum
 - + Total, Substitution, vs Income effects (graph)
3. Chs 8:
 - + Tax: vertical gap on graph
 - + CS, PS, TR, DWL on graph
 - + DWL vs elasticity: More inelastic → smaller DWL
 - + Changing the size of tax (on graph)
4. Chs 9:
 - + P_d vs P_w (review previous discussion)
 - + Know when to import / export, at what price and what quantity
 - + CS, PS
 - + Tax on import / export : DWL? (graphs)
5. Chs 10:
 - + Negative / Positive externalities: comparing social optimum vs actual equilibrium on graphs
 - + Coase Theorem
 - + Government policy:
 - + Command & Control
 - + Market-based

} on table / graph

eg: Hard cut-off vs auction / permit

 - + Corrective tax vs subsidy

6. Chs 11. Public good table
7. Chs 13:
 - + Average vs Marginal tax rate
 - + Lump sum, proportional, progressive, regressive
 - + Equity vs Efficiency

Q&A 1. Marginal vs Total Utility.

Assume you are given a graph of **Total utility** and is asked to calculate **Marginal utility**.

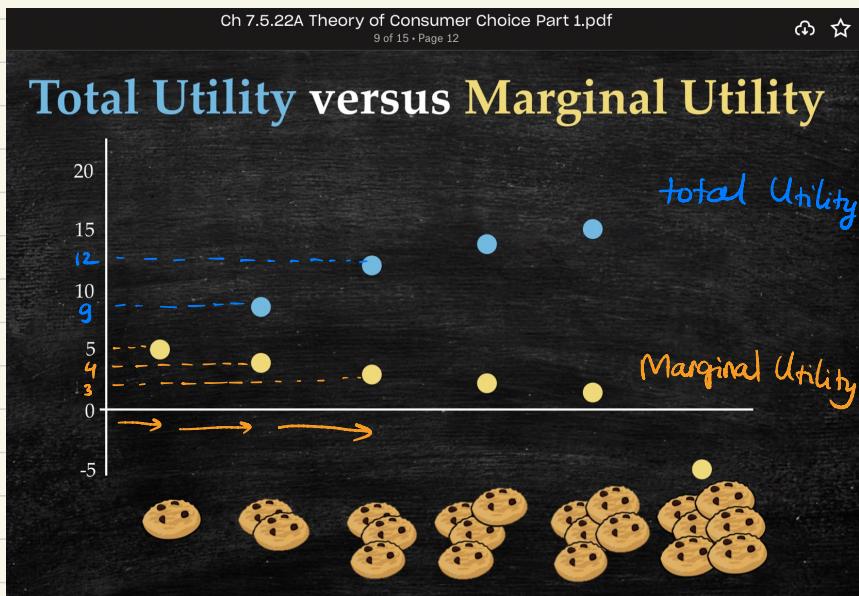
Example: You are given the below blue points which represents **total utility** (graph taken from class slide):

If you eat 1 cookie, your **total utility** is 5 utils ;

2 cookies \rightarrow **total utility** is 9 utils ;

3 cookies \rightarrow **total utility** is 12 utils ;

and so on



How to calculate **Marginal utility**? Take the difference

in **Total utility** as we move from $0 \rightarrow 1$ cookie ; $1 \rightarrow 2$ cookies, ...

In particular :

- + From $0 \rightarrow 1$ cookie , **total utility** moves from $0 \rightarrow 5$ utils. So
marginal utility at 1 cookie is $5 - 0 = 5$ (utils per cookie)
- + From $1 \rightarrow 2$ cookies , **total utility** moves from $5 \rightarrow 9$ utils. So
marginal utility at 2 cookies is $9 - 5 = 4$ (utils per cookie)
- + MU at 3 cookies = $12 - 9 = 3$ & so on ...

2. Why is Value-added tax on goods considered regressive ?

Read "Chapter 13: In the news : Value-Added tax".

It mentions tax on consumption as regressive tax . Why ?

" If you have barely enough money to get by, you
can't afford to save: Your entire income
is spent on essentials and, thus, taxed.
Richer people are taxed on a much
smaller share of their income. "

(from Chapter 13)

3. Tax types vs Average / Marginal Tax rate

In most cases as income increases and / or we move from 1 tax bracket to another :

Type	Average rate	Marginal rate
Lump sum	decreasing	depends
Proportional	constant	constant
Progressive	increasing	increasing
Regressive	decreasing	decreasing

Note that this table applies for simple cases. In actual tax system with deduction, federal vs state tax, etc., you'll need actual, careful calculation

Discussion 10 - Wed Nov 8

Review

In a perfectly competitive market

0. Cost: $AVC + AFC = ATC$; MC ; S } \rightarrow new concepts
Revenue: MR , AR , D

1. Production cost

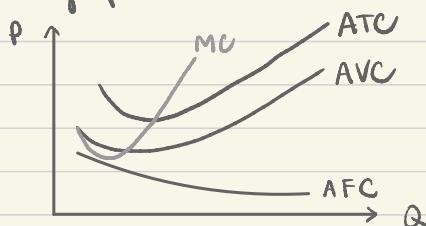
Fixed cost \rightarrow $AFC = FC/Q$ & $FC = AFC \times Q$

+ Variable cost \rightarrow $AVC = VC/Q$ & $VC = AVC \times Q$

Total cost \rightarrow $ATC = TC/Q$ & $TC = ATC \times Q$

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

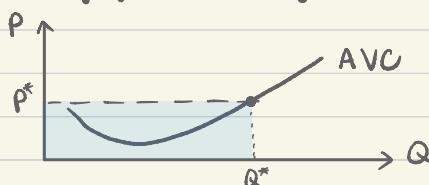
On graph:



$\rightarrow \begin{cases} AFC + AVC = ATC \\ AFC \text{ always decreasing} \\ MC \text{ cuts } AVC \text{ at } AVC's \text{ lowest point} \end{cases}$

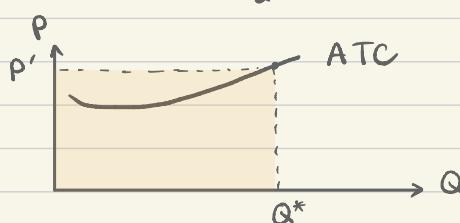
ATC — ATC's —

At any given quantity:



At quantity Q^* :

$$\begin{aligned} \text{Variable cost} &= (\text{AVC at } Q^*) \times Q^* \\ &= P^* \times Q^* \\ &= \quad \quad \quad \end{aligned}$$



$$\begin{aligned} \text{Total cost} &= (\text{ATC at } Q^*) \times Q^* \\ &= P' \times Q^* \\ &= \quad \quad \quad \end{aligned}$$

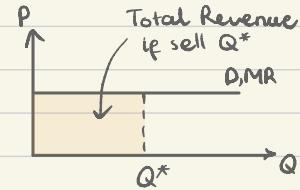
Why are we interested in Total cost and Variable cost?

- + In short-run, we produce if $\text{Variable cost} < \text{Total revenue}$
- + In long-run, $\text{Total cost} < \text{Total revenue}$

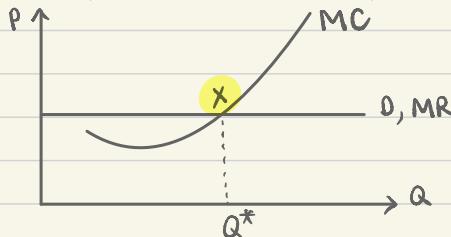
2. Given a graph of the costs, how do we know how much to produce / sell / or whether to produce at all?

The cost graph gives us information about Supply alone, but:
We need to know market Demand!

In a perfectly competitive market, price is given and is the same to everyone. In this case, $D = MR = \text{Average revenue}$



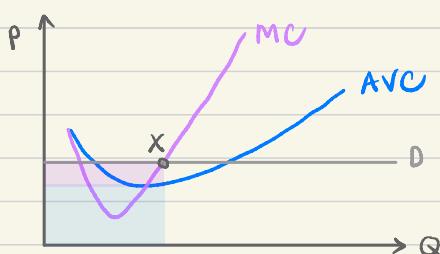
3. Now, given demand, our production candidate is where **MC** intersects with **MR**



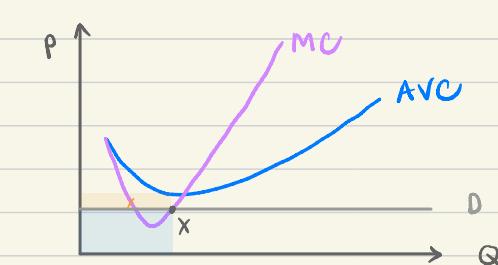
intersects with **MR**

④ But do we always produce at X? Need **AVC** to decide in short-run and **ATC** to decide in long-run

Short-run: X vs AVC (Fixed cost is already paid for)



④ When X is above AVC
→ Produce at X in the short run
($TR = \text{blue} + \text{pink}$)
 $VC = \text{blue}$



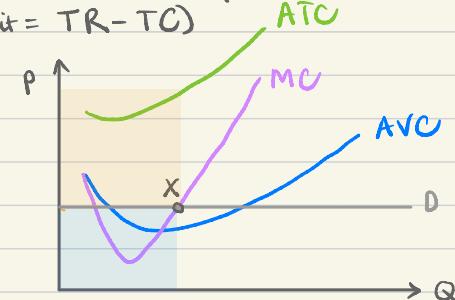
④ When X is below AVC:
→ Not produce in short-run
($TR = \text{blue}$)
 $VC = \text{blue} + \text{orange}$

Long run : X vs ATC (Decide to invest in fixed cost or not)

$$(\text{Profit} = \text{TR} - \text{TC})$$



- + X is above ATC
- Produce in the long run
 $(\text{TR} = \text{gray} + \text{green})$
 $(\text{TC} = \text{green})$



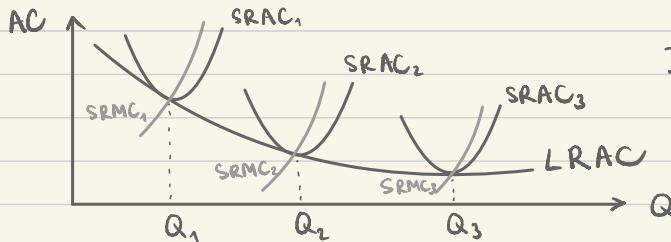
- + X is below ATC
- Not produce in long run
 $(\text{TR} = \text{blue})$
 $(\text{TC} = \text{blue} + \text{orange})$

4. Other notes

(a) MC vs Supply



(b) Return to scale (Scale vs Cost per unit)



Increasing return to scale:
 Produce more
 → Lower avg cost

Similar graph but flat LRAC : Constant return to scale

upward LRAC : Decreasing

(c) In the long run, firms sell at 0 profit with free entry/exit.

Discussion 11 - Wed Nov 15

Misc + No OTT during break

Review

- + Monopoly : Unlike competitive market, now there's 1 price maker
 $Demand \neq MR$
- + Monopolistic competition : Entry / Exit changes profit
- + Oligopoly : Dominant strategy
Nash equilibrium

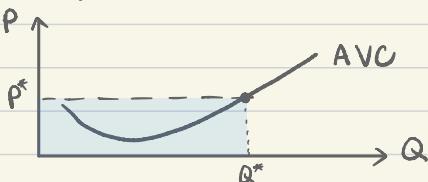
	Perfect Competition	Monopoly	Monopolistic Competition	Oligopoly
Number and Type of Firms	Many small firms	Single large firm	Many firms	Few large firms
Type of Product	Homogeneous	Homogeneous	Differentiated	Homogeneous or differentiated
Market power	“Price Taker”	“Price Maker”	“Price Maker”	“Price Maker”
Entry and Exit	Free entry and exit	Entry blocked	Free entry and exit	Significant barriers to entry

1. Monopoly

a) What doesn't change compared to Perfect Competition?

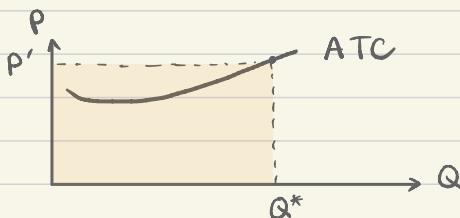
④ Interpretation of $ATC \rightarrow TC$, $AVC \rightarrow VC$

At any given quantity:



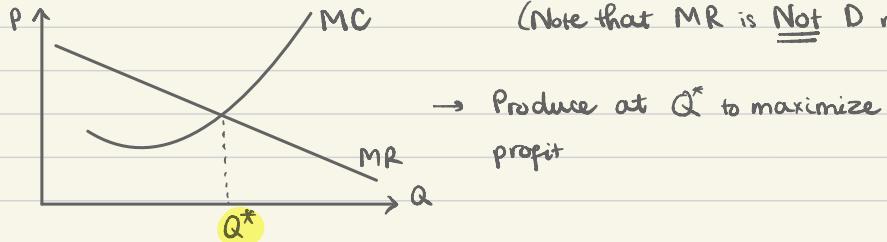
At quantity Q^* :

$$\text{Variable cost} = (\text{AVC at } Q^*) \times Q^* \\ = P^* \times Q^*$$



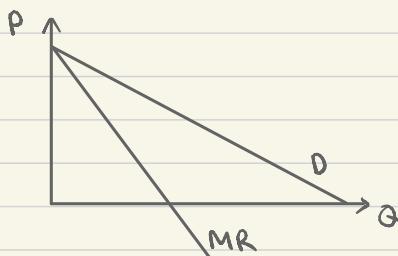
$$\begin{aligned}\text{Total cost} &= (\text{ATC at } Q^*) \times Q^* \\ &= P' \times Q^* \\ &= \boxed{\quad}\end{aligned}$$

④ Candidate for optimality: Quantity where MR crosses MC
 (Note that MR is Not D now)



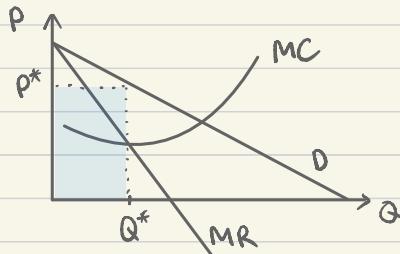
b) What changes?

④ $MR \neq D$



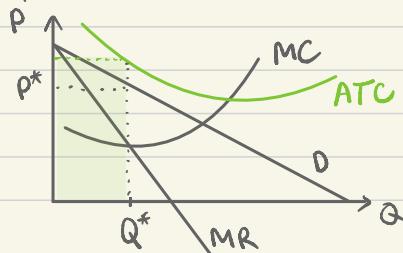
Q_0	P	$TR = Q_0 \times P$	$MR = \frac{\Delta TR}{\Delta Q_0}$
0	10	0	-
1	9	9	$\frac{9-0}{1-0} = 9$
2	8	16	$\frac{16-9}{2-1} = 7$

④ Price = Where Q^* crosses D vertically → P^* in graph below



$$\begin{aligned} \text{Total Revenue} &= \boxed{\quad} \\ &= P^* \times Q^* \end{aligned}$$

④ Profit? Need ATC to know Total Cost

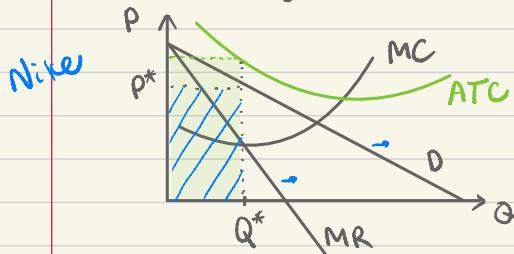


$$\begin{aligned} \text{Total cost} &= \boxed{\quad} \\ \text{Profit} &= TR - TC \end{aligned}$$

2. Monopolistic competition

In long-run, profit = 0

④ Case 1: Negative profit



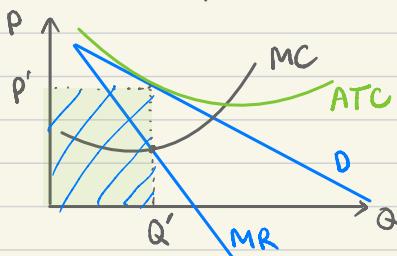
$$\text{Profit} = TR - TC$$

$$= \text{blue area} - \text{green area}$$

$$< 0$$

→ Some firms leave, shifting D of staying firms right

→ MR shifts right → New Q , P



$$\text{At } (Q', P'): TR = TC = \text{Profit} = 0$$

④ Case 2: Positive profit

Some firms enter, shifting D of current firms left, reducing profit to 0

3. Oligopoly

④ Dominant strategy: My best choice regardless of yours
Does not always exist

④ Nash equilibrium: $(A's \text{ choice}, B's \text{ choice})$ such that no one changes
Nash equilibrium might not exist

4. Consumer surplus: Above price, below demand

Discussion 12 - Wed Nov 29th

- Misc
- + Exam : name + correct Zoom link
 - + Mostly covering materials in 3rd part
But everything is fair game !

Review

I - Demand & Supply

- + PPF, comparative / absolute advantage
- + Shifting D/S or moving along the curve
- + Elasticity (vs how to calculate them)
- + Gov intervention:
price floor / ceiling, tax, quantity cap, etc

II - Consumer, producer, & welfare

- + Calculating surplus:
 - + by unit
 - + by area
- + DWL : when there's government intervention or externalities
- + Indifference curve vs Budget constraint:
Know total effect, income effect, & substitution effect for each good
- + International trade : P_w vs P_d
DWL when there's import / export tax
- + Externalities : No DWL when at socially optimal point
Understand permit table vs auction graph
- + Tax brackets vs tax types

III - Production & Labor

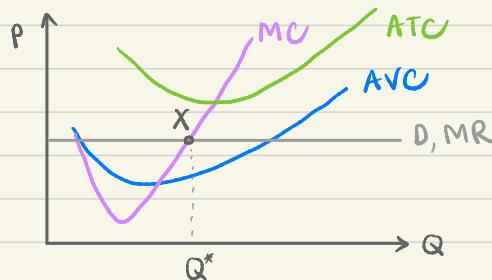
C14 - Cost of production

- + Cost vs average cost conversion on table / graph
 $(FC + VC = TC)$ vs $(AFC + AVC = ATC)$ vs MC

- Economy of scale : Unit cost as you increase production ?

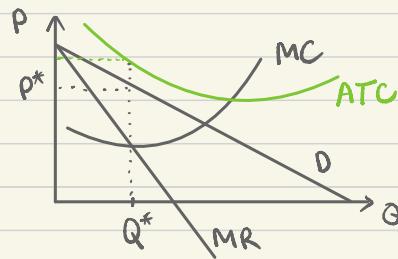
C15 - Perfect competition

- Candidate for optimal quantity to produce : Where MC cuts MR
- Long-run production : consider TC (from ATC) vs TR
Short-run production : consider VC (from AVC) vs TR



C16 - Monopoly

- Different graph now. Identify Q^* ($MC \cap MR$) then P^* (Q^* crosses D)



- Surplus when :
 - + Same price
 - + Price discrimination

(graph vs table, check previous sections' practices)

C17 - Monopolistic competition

- Same graph as in C16 but we'll shift D & MR for long-run changes
 - When Profit > 0 : firms enter, D & MR shifts left
 - When Profit < 0 : firms exit, D & MR shifts right

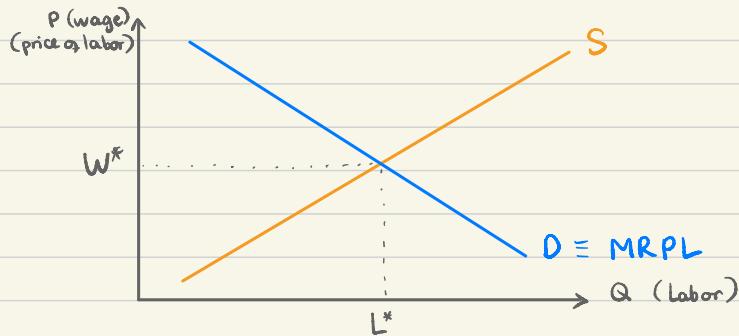
→ Profit = 0 in long-run

C18 - Oligopoly

- + Two-person game
- + Dominant strategy (for each person)
- + Nash equilibrium (for everyone)

C19 - Factors of production

- + Labor, cost of labor, vs demand for labor
- + Labor market



- + Marginal product of labor = $\frac{\Delta Q}{\Delta L}$ = how much additional output if hire 1 more labor unit

Marginal revenue product of labor = ... additional revenue
(MRPL)

Wage = Marginal cost of labor

C20 - Earnings vs discriminations

- + Terms: compensating differentials, human capital, monopsony, union, strike, efficiency wage, statistical discrimination, signaling, superstar phenomenon, etc.

C21 - Income inequality vs poverty

- + Terms: in-kind transfer, economic life cycle, transitory changes in income, permanent income, economic mobility, etc.
- + Perspectives:
 - Utilitarianism (total utility maximization)
 - Liberalism (veil of ignorance, maximin rule)
 - Libertarianism (outcome is just if process is just)
- + Policies:
 - Minimum wage law
 - Welfare program
 - Negative income tax (~progressive)
 - Universal basic income (UBI)
 - In-kind transfer
 - Work incentive