

# EC 120 Final Cheat Sheet

work in progress: v0.3

## Optimization $\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$

Profit maximize: product (suppliers) / utility (consumers). Optimize marginal per dollar.

Accounting profit = economic profit minus economic costs, i.e., opp. costs incurred from not doing things. Specifically: cost of people's time, cost of money's time (interest/risk)

## Supply / Demand

$S \uparrow \rightarrow P \downarrow$   $Q \uparrow$  read as supply up  $\rightarrow$  price down/quantity up

$S \uparrow \rightarrow P \downarrow$   $Q \uparrow$   $S \downarrow \rightarrow P \uparrow$   $Q \downarrow$   
 $D \uparrow \rightarrow P \uparrow$   $Q \uparrow$   $D \downarrow \rightarrow P \downarrow$   $Q \downarrow$   
 $S \uparrow D \uparrow \rightarrow P ?$   $Q \uparrow$   $S \downarrow D \downarrow \rightarrow P ?$   $Q \downarrow$   
 $S > D \rightarrow P \uparrow$   $Q ?$   $D > S \rightarrow P \downarrow$   $Q ?$

Market is sum of individual curves. Individual curves from indifference / budget curves.

## Game Theory

20/20	25/5	30/30	25/5	30/30	25/5
5/25	0/0	5/25	0/0	5/25	8/8

Eq: 0/0 (cheat) Eq: 30/30 (coop) Eq: 8/8, 30/30

Firms can cooperate (tacitly or explicitly) to achieve the best outcome in **cooperative equilibria**.

Sometimes in non-cooperative games, one **dominant strategy** always finds the best outcome. These tend to a **Nash equilibrium**.

If  $\pi(\text{coop}) > \pi(\text{mixed})$ , there's coop equilibrium.

If  $\pi(\text{cheat}) > \pi(\text{mixed})$ , cheat equilibrium.

**CPFs/PPFs** Opportunity cost =  $dA/dB$ .

Unemployment moves point inwards, not PPF.

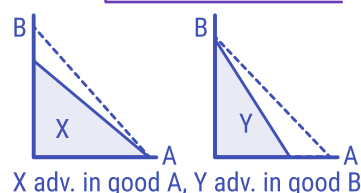
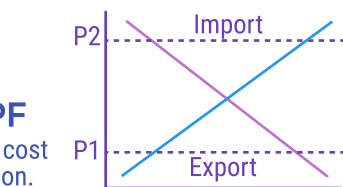
Feasible inside PPF, efficient on PPF If domestic  $S > D$ , export diff. If domestic  $D > S$ , import.

**Linear PPF**  
Perfectly efficient resource re-allocation.

**Bowed Out PPF**  
Inefficient. Opportunity cost increases with production.

**PPF Expands**  
Tech advancement, population increase.

**PPF Contracts**  
Resource loss, population decrease.



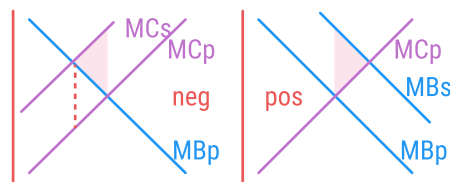
## Market Failure

$DWL > 0$ . When not allocatively efficient, requires intervention to fix. Negative surplus can exist on right of equilibrium.

Monopolies/oligopolies/monopolistic competition all cause failure. Non-rival or non-excludable goods always inefficient.

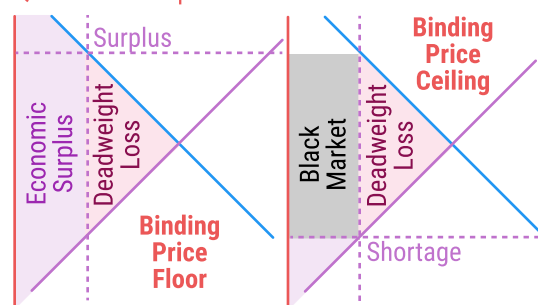
Hiding **asymmetric info** in a transaction: **Moral hazard** hiding afterwards (skydiving after buying insurance), **adverse selection** hiding before (insider trading).

Markets are efficient when  $\Sigma MC = \Sigma MB$  for all affected people. **Externalities** are differences between **private** (market forces) and **societal** (everyone else affected) costs or benefits.



**Intervention** Government functions: monopolizing the **use of force** and protecting **property rights**. Broader social goals of **reducing inequality**, **public provision**, **protection (paternalism)**, and **social responsibility** with public provision, redistribution, regulation. Consider indirect costs of **production**, **compliance**, and **rent-seeking** (corruption).

Floors bind above equilibrium, ceilings bind. Quotas act like price floors.



**Taxation** Aim for **equity** and **efficiency**.

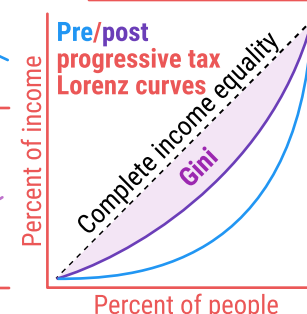
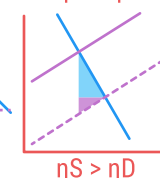
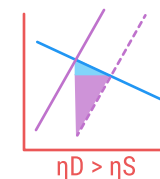
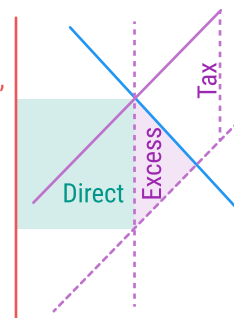
Less elastic pays more tax. Revenue = **direct burden** and  $DWL = \text{excess burden}$ . The **Laffer curve** between rates and revenues shows diminishing direct burden.

Inequality measured by **Lorenz curve** between people and income (area = **Gini coefficient**).

If marginal rate  $\neq$  avg rate, tax changes inequality.

**Progressive**  $MR > AR$   
**Proportional**  $MR = AR$   
**Regressive**  $MR < AR$

Worst is **poll tax**, a constant for everyone.



## Trade Markets

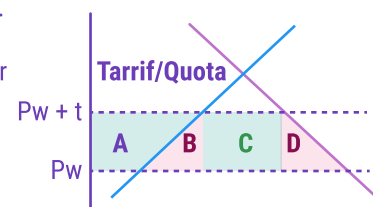
Terms of trade = exports  $\div$  imports. Changes to ToT = CPF rotates. The **law of one price** says world price is constant except for shipping costs. Countries engage in **protectionism** to promote diversification, protect interest groups (infant industries), improve ToT, or just make more money. No trade = **autarky**.

**Tariffs / import quotas** have same effect. Consumers lose  $A+B+C+D$ . **C** is revenue for tariffs but  $DWL$  for quotas. A **voluntary export restriction (VER)** is just another quota. **Countervailing duties** are tariffs specifically for going no u to foreign subsidies. **Dumping** is flooding of foreign market at low price.

Advantages: **comparative** (lower opp. cost) or **absolute** (lower absolute cost) given some other resource. **Specialization** in producing goods with advs creates gains from trade, economies of scale, and **learning by doing**.

Comparative advantage can come from **factor endowments** (forests, oil, ...), climate, human capital, acquired skill (*learning by doing*), etc.

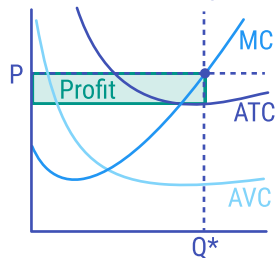
When trade opens between countries, CPF rotates away from origin around advantage point (since the other good is imported from the second country)



# Market Structures

**Perfect Competition** Firms small wrt market, sell infinite product at market price. This gives a horizontal/infinately elastic **firm demand curve** (while market remains downwards sloping).

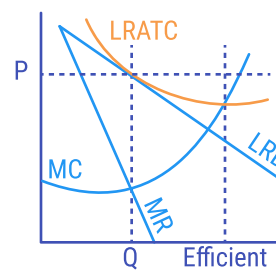
Products are homogenous. No big barriers to entry or exit.



Produce where  $MC = MR = P$ .  
In the long run, since firms can easily exit and enter, *supply always tends to the equilibrium price*.

$LRS = \min(LRATC)$ , exit if  $P < LRS$   
Market is allocatively and productively efficient.

**Monopolistic Competition** Monopolies on a differentiated product. Act like monopoly in short run, PC in long run since firms can enter/exit until zero profit.



Leads to long run equilibrium with  $P = LRATC$  tangent to demand

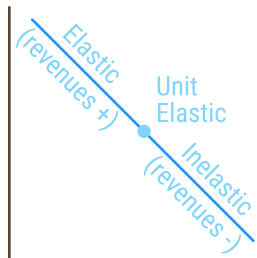
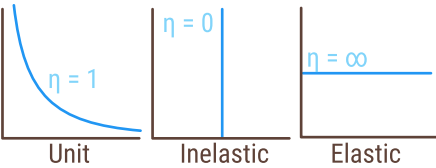
Always produce under "efficient" scale (i.e. excess capacity).  
Differentiation (through adverts) decreases elasticity, increasing profits. **Cannot know efficiency** because of differentiation

## Oligopoly/Cartel

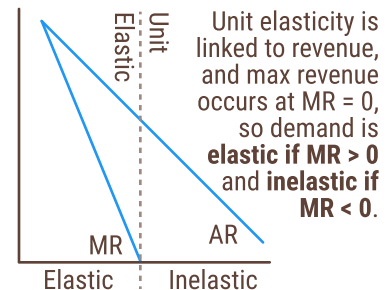
Monopoly in short term, perfect competition in long term.

Balance between firm production and market quantity.  
**Explicit collusion** is illegal, usually termed **cartels**. Cartels must prevent new entrants and restrict output. Implicit or **tacit collusion** is not. Usually **4-firm concentration > 40%**.

## Elasticity of demand $\eta = \frac{(\Delta Q/Q)}{(\Delta P/P)}$



Inelastic ( $\eta < 1$ ) means responsive to quantity, elastic ( $\eta > 1$ ) to price.  
**Unit elastic gives maximum revenue / total expenditure**, so moving closer to that point (e.g. inelastic + raised price or elastic + higher quantity) raises revenue. Lines have parabolic elasticity so one unit elastic "best" point.

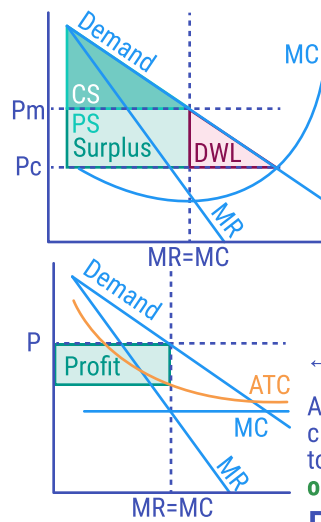


## Cross-Elasticity

0 1  
complements substitutes  $\eta$   
Good X's demand over good Y's price  
Complements are goods that are used together.  
Substitutes are goods that can replace each other.  
Same sign as term in demand equation.

## Income Elasticity

0 1  $\eta$   
inferior goods necessities luxuries  
normal goods  
Calculate the same but instead of price use income  
Inferior goods are those people buy less when rich  
Necessities are staples that everyone needs



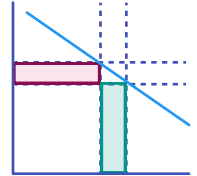
**Monopoly** Set price where  $MR = MC$ . Come about **naturally** with utilities / manufacturing / economies of scale / one firm supplies entire industry, or **created** by government / IP rights / trade groups.

Not **allocatively efficient** always productively efficient. Governments try to fix by setting  $P = MC$  but causes losses and firms exit the industry. Or set  $P = ATC$  but that is not allocatively efficient and halts investment.

**Two-part tariffs** = fixed price + marginal price.

← Recall profit =  $Q \times (P - ATC)$ .

Any change in quantity produced creates **price** and **output** effects: total revenue goes up when **output > price**.

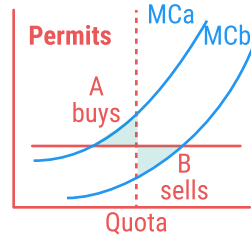


## Price Discrimination

Monopolies/oligopolies optimize with **perfect price discrimination** by selling to everyone at demand so entire area between D and ATC is profit.

Usually impossible (except for airlines etc.) so bucket customers with **imperfect price discrimination** - **more elastic demand gets lower price**. Allowing movement between buckets is **hurdle pricing** so more marginal utility = effort = discount.

## Pollution



Total pollution = size of economy (**GDP**)  $\times$  **energy use**  $\times$  **pollution from energy**. If small, estimate composition of percentages with addition.

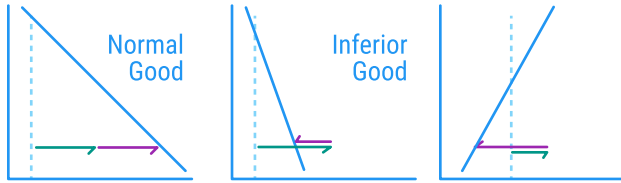
**Direct control** usually inefficient because firms have diff costs. Mostly useful for 100% removal of specific pollutant. Let market forces do the hard work instead.

Add tangible cost to pollution: **direct taxes** (know P, unknown Q) on units or distribute **permits** (unknown P, know Q) for sale. Graph as P/Q of **abatement** (reduction).

With fixed number of permits, firms trade until price of permit = MC of abatement for all firms.

# Consumer Behaviour

Two effects when price goes down: **substitution** (always up) **income** (depends on elasticity)



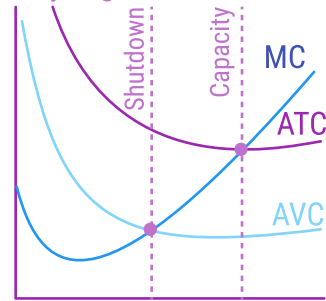
All goods can be **excludable** (limited by action) or **rival** (limited by use).

Inferior demand curve can slope up. **Giffen goods** are super essentials. **Conspicuous consumption** goods are super luxury goods.

	Non-Excludable	Excludable
Non-Rival	<b>Public</b> ex. health, empty highway. Pos externalities, typically provided by government.	<b>Club</b> ex. toll roads, museums. MCs = 0 so $P = 0$ , typically monopoly or government.
Rival	<b>Common</b> ex. fishing, busy highway. Positive externalities, no allocative eff. <b>Tragedy of the commons</b> from overexploiting until $MB = 0$ .	<b>Private</b> ex. food. Most goods/markets. Consider negative externalities.

## Supply

**Short run**, some variable  
**Long run**, all factors variable  
**Very long run**, tech variable



## Long Run

All possible short-run cost curves' respective minimum points create a **long-run average total cost curve**. Minimized where marginal products per dollar are equal. **Break even** at  $P = LRAC$ .

LRAC down  $\rightarrow$  MC down  $\rightarrow$  returns to scale up.

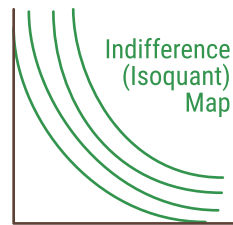
## Factor Markets

Human/physical capital (stock) which produces cash flow.  $MRP = MP \times MP$  acts as demand, do normal S/D.

**Equilibrium differentials** don't change. Intrinsic (features) vs acquired (invest) vs compensating (non-monetary diffs) e.g. hazard pay or wage discrimination. **Factor mobility** is ease in reuse in new industry, erodes **temporary differentials**.

Gains = **transfer earnings** (opp cost) + **economic rent** (extra). More elastic  $\rightarrow$  transfer earnings.

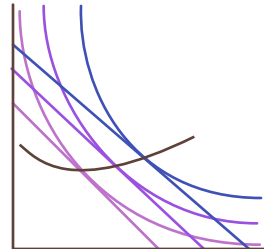
# Making a Supply/Demand Curve



The optimal isoquant is tangent to the budget line. As the **budget line changes**, different isoquants give different optimal points, creating the **demand and long-run supply curves**.

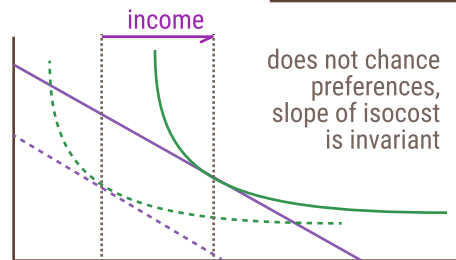
Budget (Isocost) Line

Imagine a curve of all points with equal benefit (utility or product) from two inputs: **indifference** or **isoquant** curves. Draw the PPF-style line for fixed cost of goods/inputs. This is the **budget** or **isocost** line.

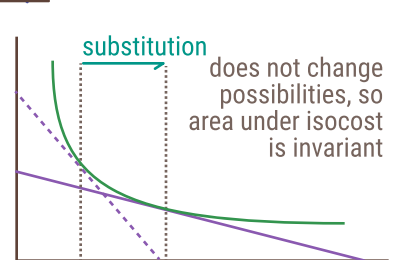


**Income effect** changes quantity by switching the **isoquant** line as real income (purchasing power) goes up.

**Substitution effect** is the change of the the **isocost** line sliding down isoquant when relative costs change.



does not change preferences, slope of isocost is invariant



does not change possibilities, so area under isocost is invariant

This gives the supply/demand curve of one individual in the market. Don't forget that the actual curve is a sum of everyone in the market.

## Short Run

A supplier's costs can be variable or fixed, so:  $TC = TFC + TVC$ .

Express wrt quantity:  $ATC = AFC + AVC$   
 Minimized when they cross the **marginal cost** curve ( $\Delta TC / \Delta Q$ ). Firms always pay FC, so if  $MC < AVC$ , no point in staying open and firm temporarily **shuts down** (distinct from exiting when long-term is unviable)

## Very Long Run

Changing the LRAC's shape is possible. Tech changes move the curve downwards, reducing costs for every possible production level.

## Productive Efficiency

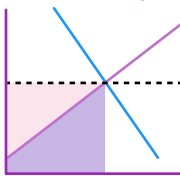
A **firm** is productively efficient if it is **producing at minimal cost** ( $P = SRATC = LRATC$ ).

A **market** is productively efficient if **all firms have the same MC** and is producing on the PPF.

## Allocative Efficiency

Economy/**market** is allocatively efficient if  $P = MC$  and **no DWL**. Measure failure by size of DWL:

Perfect competition > Oligopoly > Monopoly



Total production depends on tech of labour and capital:  $TP = f(K, L)$ .

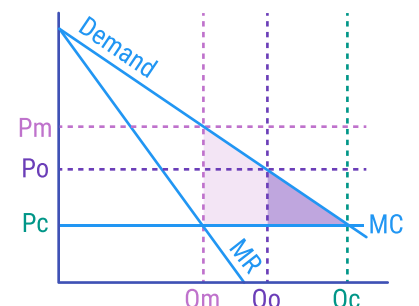
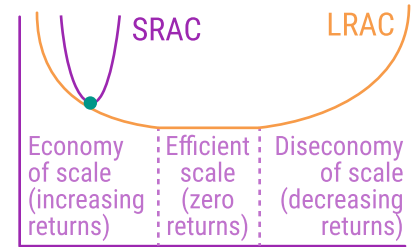
## Kapital Markets

**Interest** is the "price" of capital. Do supply and demand with interest rate and investment instead of price and quantity.

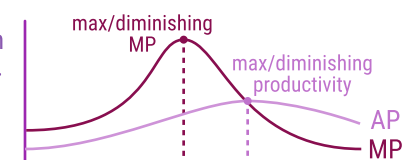
## Labour

**Monopsonies** are monopolies but upside-down, with one seller buyer. **Minimum wages**  $\rightarrow$  unemployment.

**Unions** collectively bargain for better wages. This creates a labour surplus, which is fixed by **featherbedding** (useless hiring) and **advertising**.



MP acts like the opposite of MC: **MP crosses AP at maximum**



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