

AP Microeconomics Notes

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Basic Economic Concepts

Scarcity

Economics is the study of how people, firms, and societies use their scarce productive resources to best satisfy their unlimited material wants.

- Most factors of production (land, labor, capital) are scarce, but some factors of production (established knowledge) may not be scarce due to their non-rival nature
- Use of resources involves constraints and trade-offs

Factors of Production:

- 1) Labor: human effort and talent, physical and mental
- 2) Land/Natural Resources: any resource created by nature
- 3) Physical Capital: human-made equipment
- 4) Entrepreneurial Talent: the effort and know-how to put the other resources together in a productive venture

Resource Allocation and Economic Systems

Resource allocation involves answering three basic questions:

- 1) What goods and services to produce?
- 2) How to produce these goods and services?
- 3) Who consumes these goods and services?

Resource allocation is significantly influenced by the economic system adopted by society, such as command economy, market economy, or mixed economy. Each system involves a particular set of institutional arrangements and a coordinating mechanism for allocating scarce resources and distributing output.

Production Possibilities Curve

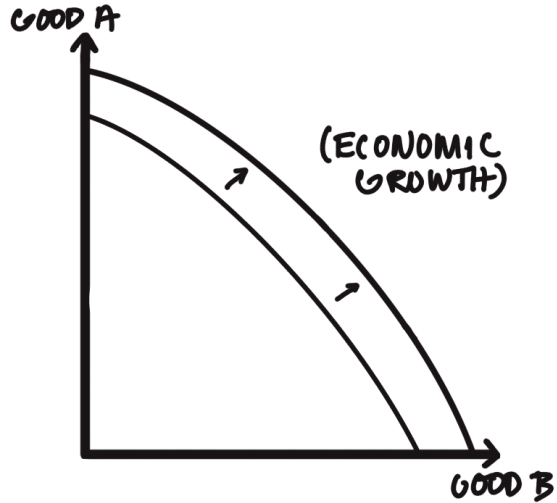
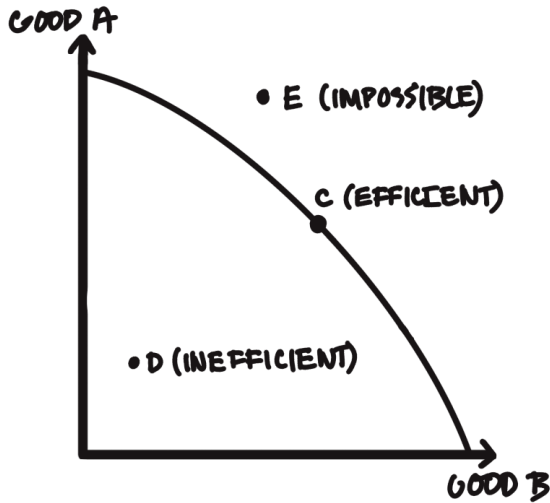
Opportunity Cost: the value of the next best alternative to any decision you make

$$\text{Opportunity Cost} = (Y_1 - Y_2) / (X_1 - X_2)$$

Productions Possibilities Curve (PPC): a graphical model used to show the tradeoffs associated with allocating resources between the production of two goods

- Contains all the possible combinations of two goods that could be produced

Economic Situation	Graphical Representation
Increasing Opportunity Costs: when the OC of a good increases as the output of the good increases	PPC curve that is bowed out from the origin
Constant Opportunity Cost: when the OC of a good remains constant as the output of the good increases	PPC curve that is a straight line
Decreasing Opportunity Costs: when the OC of a good decreases as the output of the good increases	PPC curve that is bowed in from the origin
Efficiency: full employment of resources in production	Point on the PPC
Inefficiency: underemployment of any of the factors of production	Point on the interior of the PPC
Growth: increase in an economy's ability to produce goods and services (caused by an increase in quantity or quality of resources or technological advancements)	PPC shift outward
Contraction: decrease in output due to the under-utilization of resources	Place on PPC shifts to a point inside of PPC



Comparative Advantage and Trade

Product specialization according to comparative advantage, not absolute advantage, results in exchange opportunities that would lead to consumption opportunities beyond the PPC.

Absolute Advantage: when an agent can produce more of a good than another given the same resources

Comparative Advantage: when an agent can produce a good at a lower opportunity cost than another

Comparative advantage and opportunity costs determine the terms of trade for exchange under which mutually beneficial trade can occur.

Cost-Benefit Analysis

Rational agents consider opportunity costs, whether implicit or explicit, when calculating the total economic costs of any decision.

Explicit Costs: direct, purchased, out-of-pocket costs

Implicit Costs: indirect, non-purchased, opportunity costs

Total benefits form the metric “utility” for consumers and total revenue for firms.

Total net benefits (total benefits–total costs) are maximized at the optimal choice.

NOTE: Some decisions permit rational agents to look at only marginal benefit and marginal cost. Other decisions cannot be broken down into increments in this way and must be evaluated by looking at total benefits and total costs.

Marginal Analysis and Consumer Choice

Marginal Analysis is a decision-making tool for maximizing profits.

- Marginal Cost (MC): the additional cost incurred from the consumption of the next unit of a good or service
- Marginal Benefit (MB): the additional benefit received from the consumption of the next unit of a good or service

Utility: value that is qualified in terms of the amount of money one would be willing to spend

Total Utility (TU): the total amount of happiness received from the consumption of a good

Marginal Utility (MU): the additional utility received (or sometimes lost) from the consumption of the next unit of a good

$$MU = \Delta TU / \Delta Q$$

Law of Diminishing Marginal Utility: in a given time period, the marginal utility from consumption of one more of that item falls

To determine the optimal level at which to pursue an activity whose total benefits exceed total cost, rational economic agents compare marginal benefits and marginal costs.

- Individuals/firms increase their consumption/production levels until $MB = MC$
- When buying combinations of good X and Y, consumers allocate limited income to purchase the combination of goods that maximizes utility by equating/comparing the marginal utility of the last dollar spent on each good.

Utility Maximizing Rule: $(MU_x / P_x) = (MU_y / P_y)$ or $(MU_x / MU_y) = (P_x / P_y)$

The optimal quantity is achieved (1) when total utility is maximized or (2) when marginal benefit equals marginal cost (price) because of the law of diminishing marginal utility.

- Does not depend on fixed costs (sunk costs) or fixed benefits that have already been determined by past choices

NOTE: In a model of rational consumer choice, consumers are assumed to make choices so as to maximize their total utility.

Supply and Demand

Demand

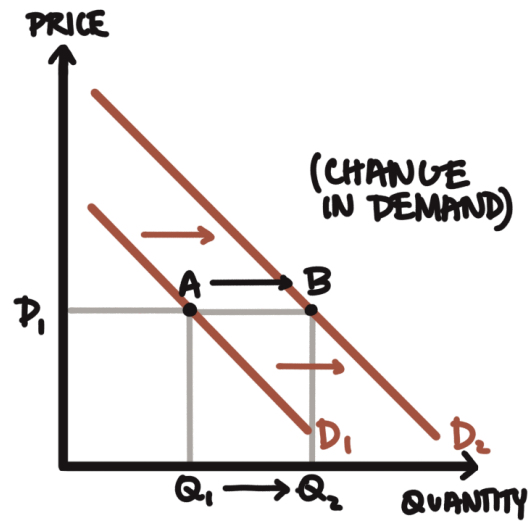
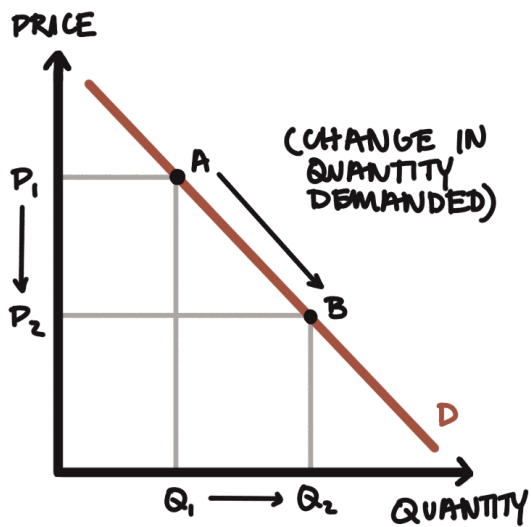
Individuals often respond to incentives, such as those presented by prices, but also face constraints, such as income, time, and legal and regulatory frameworks.

Law of Demand: there is an inverse relationship between price and quantity demanded, leading to a downward-sloping demand curve

The law of demand is explained by the...

- 1) Substitution Effect: the change in quantity demanded resulting from a change in the price of one good relative to the price of other goods
- 2) Income Effect: the change in quantity demanded resulting from a change in the consumer's purchasing power
- 3) Diminishing marginal utility

Economic Situation	Graphical Representation
Demand: all of the quantities of goods and services that buyers would be willing to pay at all possible prices	Demand Curve: a graph that shows the relationship between price and quantity demanded
Change in Demand: when buyers are willing to pay a different quantity at all given price points	Shift of the entire demand curve
Quantity Demanded: the specific amount that buyers are willing to purchase at a given price	X-axis value in a demand curve, given the y-axis value (price)
Change in Quantity Demanded: a movement among the demand curve caused by a change in price	Shift to another point on the demand curve



Determinants of Demand: external factors that cause the demand curve to shift (TONIE)

- 1) Tastes and preferences
- 2) Other related goods (substitute and complementary)
- 3) Number of buyers
- 4) (Consumer) Income (normal and inferior goods)
- 5) (Future) Expectations

Substitute Goods: goods that can replace each other

- When the price of a good increases, demand for its substitute increases

Complement Goods: goods that tend to be consumed together

- When the price of a good increases, demand for its complement decreases

Normal Goods: increased income results in increase in the demand curve

Inferior Goods: higher levels of income produce a decrease in the demand curve

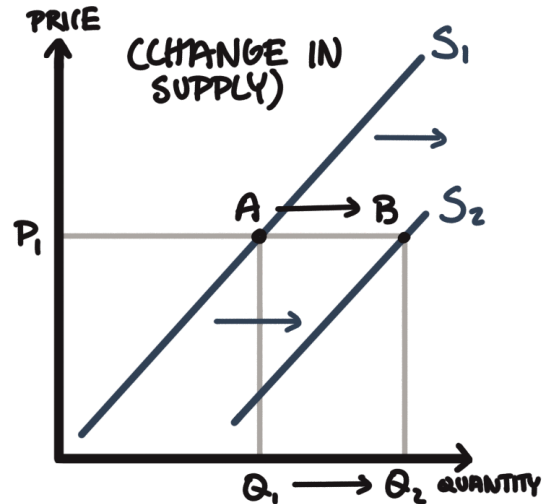
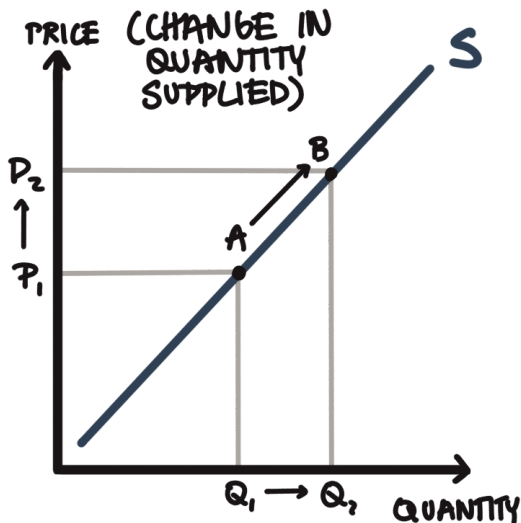
The market demand curve/schedule is derived from the summation of individual demand curves/schedules.

NOTE: The market system functions well because there is a defined system of property rights.

Supply

Law of Supply: there is a positive relationship between price and quantity supplied, leading to an upward-sloping supply curve

Economic Situation	Graphical Representation
Supply: all of the quantities of goods and services that sellers would be able to produce and sell at all possible prices	Supply Curve: a graph that shows the relationship between price and quantity supplied
Change in Supply: when sellers are willing to produce and sell a different quantity at all given price points	Shift of the entire supply curve
Quantity Supplied: the specific amount that sellers are willing to produce and sell at a given price	X-axis value in a supply curve, given the y-axis value (price)
Change in Quantity Supplied: a movement among the supply curve caused by a change in price	Shift to another point on the supply curve



Determinants of Supply: external factors that affect supply

- 1) Cost of inputs used to produce good
- 2) Technology or productivity level
- 3) Taxes, subsidies, and government regulation

- 4) Price expectations among producers
- 5) Price of other goods sellers can supply
- 6) Number of sellers in the market

NOTE: The market supply curve/schedule is derived from the summation of individual supply curves/schedules

Price Elasticity of Demand

Economists use the concept of elasticity to measure the magnitude of percentage changes in quantity owing to any given changes in the own-price, income, and prices of related goods.

Elasticity: measures the sensitivity of consumption to external change

- Varies along a linear demand curve, so slope doesn't equal elasticity

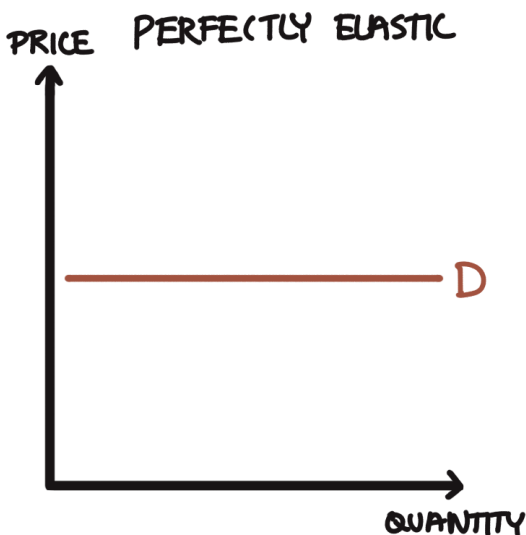


Perfectly Elastic: when any decrease in the price causes the quantity demanded to increase without limits

- $E_d = \infty$
- Demand curve is a horizontal line

Perfectly Inelastic: when any increase in the price results in no decrease in the quantity demanded

- $E_d = 0$
- Demand curve is a vertical line



Price Elasticity of Demand: describes how much the quantity demanded of a good changes when the price of that good changes

$$E_d = \% \Delta \text{ in quantity demanded} / \% \Delta \text{ in price}$$

- E_d will be negative, so use absolute value
- As the price rises, E_d rises because consumers are more price sensitive at higher prices than they are at lower prices
- The greater E_d is, the more sensitive consumers are to a change in the price of good X

Midpoint Formula: calculates the price elasticity of demand between two points by using the average price (P_{avg}) and the average quantity (Q_{avg}) between them.

$$E_d = (\Delta \text{ in quantity demanded} / \Delta \text{ in price}) \times P_{avg} / Q_{avg}$$

$$\text{Total revenue} = \text{Price} \times \text{Quantity demanded}$$

$$\text{Price } (\uparrow) \times \text{Quantity demanded } (\downarrow) = \text{Total revenue } (\uparrow)$$

Value of E_d	Elasticity of good	Impact when P(↑)	Impact when P(↓)
$E_d > 1$	Demand is price elastic	TR(↓)	TR(↑)
$E_d = 1$	Demand is unit elastic	No change	No change
$E_d < 1$	Demand is price inelastic	TR(↑)	TR(↓)

Determinants of the Price Elasticity of Demand: factors that show why E_d differs across consumer goods (PAID):

- 1) Proportion of income: as the good takes up a larger proportion of income, consumers feel the pinch more harshly and the price elasticity of demand for that good increases
- 2) Availability of good substitutes: as the number of good substitutes of a good increases, consumers can switch to more goods and the price elasticity of demand for this good increases
- 3) Importance of good: the less essential a good is, the more likely customers are to forgo the good when it becomes more expensive
- 4) Delay (time): as more time passes since the change in price, consumers find more substitutes and the price elasticity of demand for that good increases

NOTE: The price elasticity of demand formula is known as the "basic" formula because movement from point A to point B has a different elasticity than movement from point B to point A, even though it is over the same range. The midpoint formula, or the "advanced" formula, produces the same elasticity measure between two points on a demand curve.

Price Elasticity of Supply

Price Elasticity of Supply: describes how much the quantity supplied of a good changes when the price of that good changes

$$E_s = \% \Delta \text{ in quantity supplied} / \% \Delta \text{ in price}$$

- E_s is positive due to the law of supply
- The greater E_s is, the more sensitive suppliers are to a change in the price of good X

Value of E_s	Elasticity of Good
$E_s > 1$	Supply is price elastic
$E_s = 1$	Supply is unit elastic
$E_s < 1$	Supply is price inelastic

Determinants of Price Elasticity of Supply: factors that show why E_s differs across producer goods:

- 1) Number of good alternative outputs: as the number of good alternative outputs increase, producers can produce other goods and the price elasticity of supply for this good increases
- 2) Time: because suppliers, once the price of the good has changed, usually cannot quickly change the quantity supplied, economists predict that the price elasticity of supply increases as time passes
- 3) Number of goods: some goods are perfectly inelastic because there is only one of that good to supply

Other Elasticities

Elasticity can be measured for any determinant of demand or supply, not just the price.

Income Elasticity of Demand: measures how sensitive consumption of good X is to a change in consumer's income

$$E_i = \% \Delta \text{ in quantity demanded} / \% \Delta \text{ in income}$$

Value of E_i	Elasticity of Good	Type of Good
$E_i > 1$	Demand is income elastic	Normal (luxury)
$0 < E_i < 1$	Demand is income inelastic	Normal (necessity)
$E_i < 0$	Demand is income elastic	Inferior

Cross-Price Elasticity of Demand: measures the sensitivity of consumption of good X to a change in the price of good Y

$$E_{x,y} = \% \Delta \text{ in quantity demanded of good X} / \% \Delta \text{ in price of good Y}$$

Value of $E_{x,y}$	Elasticity of Good	Relationship of Goods
$E_{x,y} > 0$	Demand is cross-price elastic	Substitute
$E_{x,y} = 0$	Demand is cross-price inelastic	Independent (not related)
$E_{x,y} < 0$	Demand is cross-price elastic	Complementary

Market Equilibrium and Consumer and Producer Surplus

The supply-demand model is a tool for understanding what factors influence prices and quantities and why prices and quantities might differ across markets or change over time.

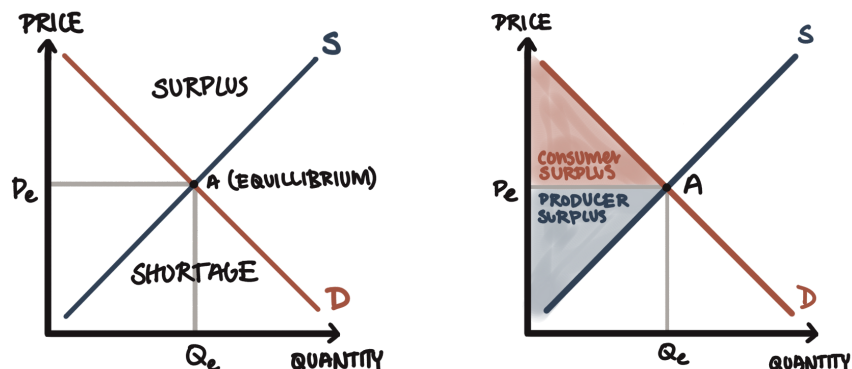
- Although equilibria are stable, an economy can move from one equilibrium to another if market conditions change
- In a perfectly competitive market, equilibrium is achieved (and markets clear with no shortages or surpluses) when the price of a good or service brings the quantity supplied and quantity demanded into balance

Welfare analysis is used to measure the benefits markets create to buyers and sellers and to understand market efficiency.

- Market equilibrium maximizes total economic surplus
- Perfectly competitive markets are allocatively efficient

Total Welfare: the sum of two measures of gain (consumer surplus and producer surplus)

- Consumer Surplus: the difference between willingness to pay and the price actually paid (area below the demand curve and above the price line)
- Producer Surplus: the difference between the price received and the marginal cost of producing the good (area above the supply curve and below the price line)



Market Disequilibrium and Changes in Equilibrium

Whenever markets experience imbalances— creating disequilibrium prices and quantities, surpluses, and shortages—market forces drive price and quantity toward equilibrium.

- Also cause price, quantity, consumer surplus, producer surplus, and total economic surplus (within that market) to change
- Impact of the change depends on the price elasticities of demand and supply

Shortage: when the quantity demanded exceeds the quantity supplied

Surplus: when the quantity supplied exceeds the quantity demanded

The Effects of Government Intervention in Markets

Government policies influence consumer and producer behavior and therefore affect market outcomes.

- Create price floors, price ceilings, and other forms of price and quantity regulation that affect incentives and outcomes in all market structures
- Use taxes and subsidies to change incentives in ways that influence consumer and producer behavior, shifting the supply and demand curves accordingly
- Taxes and subsidies affect government revenues or costs

Price Floor: a legal minimum price below which the product cannot be sold

- Installed when producers feel the market equilibrium is too low
- Creates a permanent surplus at a price above the equilibrium
- If the government purchases the surplus, taxpayers eventually pay the bill
- The more price elastic the demand and supply curves, the greater the surplus and the greater the government spending to purchase the surplus
- The price floor reduces net benefit by over allocating resources to the production of the good

Price Ceiling: a legal maximum price above which the product cannot be bought and sold

- Installed when consumers feel the market equilibrium price is too high
- Creates a permanent shortage at a price below equilibrium
- The more price elastic the demand and supply curves, the greater the shortage
- The price ceiling reduces net benefit by under allocating resources to production

Excise Tax: a per-unit tax on production that 1) increases revenue collected by the government and/or 2) decreases consumption of a good that may be harmful to some members of society

- Firms respond as if the marginal cost of producing each unit has risen by the amount of the tax

Subsidy: a sum of money granted by the government to support producers of a good or service that has significant benefit to society so that it can be produced in greater quantities and at lower prices to consumers

- Has the opposite effect of an excise tax (firms respond as if the marginal cost of production has decreased)

Government Intervention in a market producing the efficient quantity can only decrease allocative efficiency, leading to deadweight loss

Deadweight Loss (DWL): the net benefit sacrificed by society when a per unit tax is imposed

- Taxes create lost efficiency by moving away from the equilibrium market quantity where $MB = MC$ to society
- The area of deadweight loss to society increases as the quantity moves further from the competitive market equilibrium quantity

The incidence (where the burden rests) of taxes and subsidies imposed on goods traded in perfectly competitive markets depends on the elasticity of supply and demand.

- As the price elasticity of demand falls and the price elasticity of supply rises, the consumer's share of a per unit excise tax rises
- As the price elasticity of demand rises and the price elasticity of supply falls, the producer's share of a per unit excise tax rises
- The group that has the best ability to respond to the higher post-tax price is going to make out better

Price Elasticity of Demand	Government Revenue	Decrease in Consumption	Incidence of Tax Paid by Consumers	Incidence of Tax Paid by Suppliers
$E_d = \infty$	Least	Most	0%	100%
$E_d > 1$	Falling	Sizable	Less than 50%	More than 50%
$E_d < 1$	Rising	Minimal	More than 50%	Less than 50%
$E_d = 0$	Most	Zero	100%	0%

Price Elasticity of Supply	Government Revenue	Decrease in Consumption	Incidence of Tax Paid by Consumers	Incidence of Tax Paid by Suppliers
$E_s = \infty$	Least	Most	100%	0%
$E_s > 1$	Falling	Sizable	More than 50%	Less than 50%

$E_s < 1$	Rising	Minimal	Less than 50%	More than 50%
$E_s = 0$	Most	Zero	0%	100%

International Trade and Public Policy

Equilibria in competitive markets may be altered by the decision to open an economy to trade with other countries.

- Equilibrium price can be higher or lower than under autarky
- Gap between domestic supply and demand is filled by trade
- Affects consumer surplus, producer surplus, and total economic surplus

Proponents of free trade argue that free trade raises the standard of living in both countries, while detractors argue that free trade costs domestic jobs in higher-wage nations. To protect domestic jobs, nations can impose trade barriers.

Tariffs: excise tax on imported goods

- Used to influence international trade
- Affects domestic price, quantity, government revenue, and consumer surplus and total economic surplus

Revenue Tariff: imposed for the primary purpose of raising revenue

- Levied on goods that are not produced in the domestic market

Protective Tariff: imposed for the purpose of reducing imports

- Levied on goods that are produced in the domestic market

Import Quota: the maximum amount of a good that can be imported into the domestic market

- Used to alter quantities produced and therefore affect price, consumer surplus, and total economic surplus
- Impact is similar to a tariffs', except that the government doesn't collect revenue

Economic Effects of Tariffs and Quotas:

- Both hurt consumers with artificially high prices and lower consumer surplus
- Both protect inefficient domestic producers at the expense of efficient foreign firms
- Both reallocate economic resources toward inefficient producers
- Tariffs collect revenue for the government, while quotas do not

Production, Cost, and the Perfect Competition Model

The Production Function

Firms' production and cost constraints over different input and output levels shape optimal decisions in the short run and long run.

Short Run: a time span when at least one production input is fixed and cannot be changed to respond to a change in product demand

Long Run: a time span when all factors of production are variable

	Plant Size (Capital)	Fixed Costs	Variable Costs	Entry / Exit of Firms
Short Run	Fixed	Some	Some	No
Long Run	Variable	None	All	Yes

Production Function: the mechanism for combining production resources, with existing technology, into finished goods and services

- Explains the relationship between inputs and outputs both in the short run and the long run

Marginal product and average product change as input usage changes (hence, total product changes). Diminishing marginal returns occur as the firm employs more than one input, holding other inputs constant, to produce a product (output) in the short run.

Short-Run Production Measures:

- Total Product of Labor (TP_L): the total output of a good produced at each quantity of labor employed
- Marginal Product of Labor (MP_L): the change in total product resulting from a change in the labor input
 $MP_L = \Delta TP_L / \Delta L$
- Average product of labor (AP_L): another measure of productivity
 $AP_L = TP_L / L$

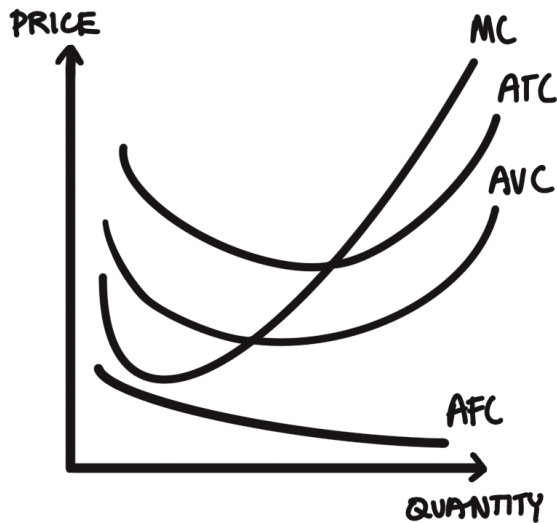
Law of Diminishing Marginal Returns: as successive units of a variable resource are added to a fixed resource, beyond some point the marginal product falls

- Increasing Marginal Returns: MP_L increases as L increases
- Diminishing Marginal Returns: MP_L decreases as L increases
- Negative Marginal Returns: MP_L becomes negative as L increases

Situation	Graph of AP_L	Graph of AVC
$MP_L > AP_L$	Rising	Falling
$MP_L = AP_L$	Peak	Trough
$MP_L < AP_L$	Falling	Rising

Graph of MP_L	Graph of MC
Rising (increasing marginal returns)	Falling
Peak	Trough
Falling (diminishing marginal returns)	Rising

Short-Run Production Costs



How to draw a clean graph:

1. Draw the upward sloping curve and label it MC.
2. Draw a downward sloping curve that stops at the MC curve. Lift your pen from the paper. If you try to draw the U in one smooth movement, you are more likely to lose this point.
3. Beginning at the point where your downward sloping curve intersects MC, draw an upward sloping curve to complete the U-shaped ATC curve. You can repeat these steps to draw the AVC curve that lies below the ATC curve.

Law of Diminishing Marginal Returns: as successive units of a variable resource are added to a fixed resource, beyond some point the marginal product falls

- Specialization and the division of labor reduce marginal costs for firms
- Production functions with diminishing marginal returns yield an upward-sloping marginal cost curve

Marginal cost, average (fixed, variable, and total) cost, total cost, and total variable cost change as total output changes, but total fixed cost remains constant at all output levels, including zero output. Cost curves can shift in response to changes in input costs and productivity.

Marginal and Average Cost	Equation	Graph
Marginal Cost (MC): the additional cost of producing one more unit of output	$MC = \Delta TC / \Delta Q$ $MC = \Delta TVC / \Delta Q$	Begins downward sloping but becomes an upward sloping curve
Average fixed cost (AFC): the total fixed cost divided by output	$AFC = TFC / Q$	Continuously downward sloping

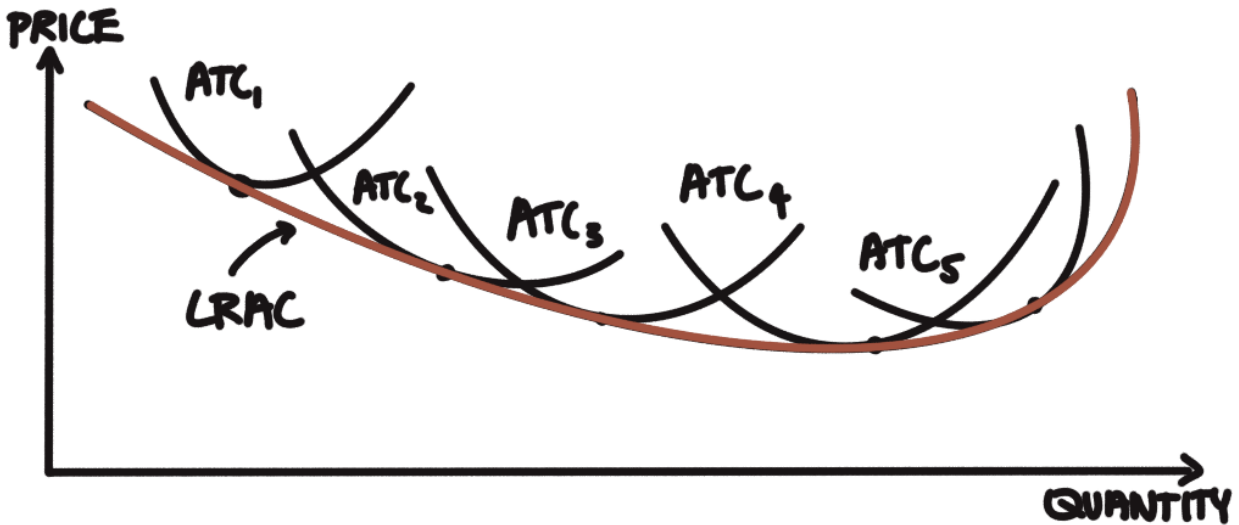
Average variable cost (AVC): the total variable cost divided by output	$AVC = TVC/Q$	Begins downward sloping but starts upward sloping after intersecting with MC curve
Average total cost (ATC): the total cost divided by output	$ATC = TC/Q$ $ATC = AFC + AVC$	Sum of the costs of the AFC and the AVC curves at every quantity

Total Cost	Equation	Graph
Total Fixed Costs (TFC): costs that do not vary with changes in short-run output		Remains a constant, horizontal line below TFC
Total Variable Costs (TVC): costs that change with the level of output		Upward sloping below TFC
Total Cost (TC): the sum of TFC and TVC at each level of output	$TC = TVC + TFC$	Sum of the costs of the TFC and the TVC curves at every quantity

NOTE: Marginal cost is the slope of total variable cost and total cost.

Long-Run Production Costs

In the long run, firms can adjust all their inputs, and as a result, all costs become variable. The relationship between inputs and outputs in the long run is described by the scale of production—increasing, decreasing, or constant returns to scale.



The long-run average total cost is characterized by economies of scale, diseconomies of scale, or constant returns to scale (efficient scale).

1. Economies of Scale: seen on the downward part of the LRAC curve
2. Constant Returns to Scale: represented by the horizontal part of the LRAC curve
3. Diseconomies of Scale: illustrated by the rising part of the LRAC curve

The minimum efficient scale plays a role in determining the concentration of firms in a market and the market structure.

When all inputs are doubled and...	Output increases by...	We call this...	At the same time, LRAC is...	And we call this...
	More than double	Increasing returns to scale	Falling	Economies of scale
	Exactly double	Constant returns to scale	Horizontal	Constant returns to scale
	Less than double	Decreasing returns to scale	Rising	Diseconomies of scale

NOTE: Returns to scale involves increasing all inputs in the long-run. Marginal returns are only concerned with a change in one input in the short-run.

Types of Profit

Firms respond to economic profit rather than accounting profit because accounting profit fails to account for implicit costs (cost of financial capital, compensation for risk, entrepreneur's time).

Accounting Profit: profit after explicit costs are deducted from total revenue

Economic Profit: profit after both explicit and implicit (opportunity) costs are deducted from total revenue

Profit Maximization

When firms maximize economic profit, that means they are not going to settle for anything less than the highest possible difference between total revenue and total economic cost

- 1) Method of Totals: to maximize profit, the firm selects the output to maximize economic profit (π), or (Total revenue–Total economic cost)
- 2) Method of Marginal: the firm chooses the level of output where $MR = MC$ and MC is rising

$$\text{Profit } (\pi) = Q_e \times (P - ATC)$$

Situation	Profit
$P > ATC$	$\pi > 0$
$P = ATC$	$\pi = 0$
$P < ATC$	$\pi < 0$

When finding the profit/loss rectangle, remember the following:

- 1) Find Q_e where $P = MR = MC$. Once you have found Q_e , never leave it.
- 2) Find ATC vertically at Q_e . If you move downward, $\pi > 0$. If you move upward, $\pi < 0$.
- 3) Move horizontally from ATC to the y axis to complete the rectangle, and clearly label it as positive or negative.

Firms' Short-Run Decisions to Produce and Long-Run Decisions to Enter or Exit a Market

Firms' short-run decisions to produce output, and long-run decisions to enter or exit a market, are based on profitability.

When a perfectly competitive firm decides to produce any level of output greater than zero, two things happen:

- 1) It collects total revenue ($TR = P \times Q_e$)
- 2) It incurs variable costs (the firm also incurs fixed costs, but it incurs those costs anyway, regardless of the level of output)

In the short run, firms decide to operate (produce positive output) or shut down (produce zero output) by comparing total revenue to total variable cost or price to average variable cost (AVC).

- If $TR > TVC$ or $P > AVC$, the firm produces Q_e where $MR = MC$
- If $TR < TVC$ or $P < AVC$, the firm shuts down and $Q = 0$

In the absence of barriers to entry or exit, in the long run, firms enter a market in which there are profit-making opportunities and exit a market when they anticipate economic losses. As new firms enter the industry, the market share of all existing firms begin to fall. As the price begins to fall, the profit rectangle begins to shrink

- Graphically seen as a leftward shift in the demand curve
- Entry stops when profits are zero and $P = ATC$, or when the demand curve is just tangent to ATC

Long-run adjustment to short-run profits:

1. Entry of new firms attracted by economic $\pi > 0$
2. Increase in market supply
3. A decrease in the market price to P_{LR}
4. Profits fall to the breakeven point, $P_{LR} = MR = MC = ATC$ and economic $\pi = 0$
5. Market quantity increases
6. Individual producer output falls

Long-run adjustment to short-run losses:

1. Exit of existing firms prompted by economic $\pi < 0$
2. Decrease in market supply
3. An increase in the market price to P_{LR}
4. Profits increase to the breakeven point, $P_{LR} = MR = MC = ATC$ and economic $\pi = 0$
5. Market quantity decreases
6. Individual producer output rise

Even when profits are negative, the firm will still keep producing as long as profit is above AVC because it will help pay off the fixed cost.

When in the short-run...	The firm produces where...	Short-run economic profits are...	In the long run...	The long run outcome is...
$P_{SR} > AVC$	$MR = MC$	Positive	Firms enter	$P_{LR} = MR = MC = ATC$ and $\pi = 0$
$P_{SR} = ATC$	$MR = MC$	Zero, break even	No entry or exit	$P_{LR} = MR = MC = ATC$ and $\pi = 0$
$ATC > P_{SR} > AVC$	$MR = MC$	Negative ($0 > \pi > -TFC$)	Firms exit	$P_{LR} = MR = MC < ATC$ and $\pi = 0$
$P_{SR} < AVC$	Zero (shut down)	Negative ($-TFC$)	Firms exit	$P_{LR} = MR = MC = ATC$ and $\pi = 0$

NOTE: The MC curve above the shutdown point serves as the supply curve for each perfectly competitive firm. The market supply curve is therefore the sum of all of the MC curves:
 $S = \Sigma MC$.

Perfect Competition

Even with a common goal of profit-maximization, market structure constraints and influences prices, output, and efficiency.

Characteristics of Perfect Competition:

- Many small independent producers and consumers: each firm is too small to have market power
- Standardized product: there exists no real differences between one firm's output and the next
- No barriers to entry or exit: there exists no significant obstacles to the entry of new firms into, or the exit of existing firms out of this industry
- Price-takers: because all firms are too small to affect the price, they must accept the market price and produce as much as they wish at that price; even if they *could* change the price, they would not do so

Demand for each firm's output is perfectly elastic because each firm's output is such a small share of the total market supply

- Horizontal firm demand curve, even though market curve demand is not horizontal
- Able to sell all their outputs at a constant price determined by the market
- Select output to maximize profit by producing the level of output where the marginal cost equals marginal revenue (at the price)



Prices communicate to consumers and producers the magnitude of others' marginal costs of production and marginal benefits of consumption and provide incentives to act on that information. The price of a product equals both the private marginal benefit received by the last unit consumed and the private marginal cost incurred to produce the last unit.

- Price = MC = MB and is thus allocatively efficient

In a short-run competitive equilibrium, price can either be above or below its long-run competitive level resulting in profits or losses

- Motivates entry or exit of firms
- Moves prices and quantities toward long-run equilibrium

In a long-run perfectly competitive equilibrium, the market is both allocatively and productively efficient.

- Implies all operating firms produce at an efficient scale
- Price = MC = ATC

- Zero economic profit

Firms may be in a constant cost, increasing cost, or decreasing cost industry. Long-run prices depend on the portion of the long-run cost curves on which firms operate.

Increasing Cost Industry: an industry where increased demand for resources increases the cost of employing those resources and the cost curves shift upward

- When output increases, AVC increases
- Entry of new firms drives down the price of output and increases the cost curve
- Profit is eliminated more quickly than with a constant cost industry
- New long-run price is higher than it is in a constant cost industry

Constant Cost Industry: an industry where the cost of the factors of production don't change when the market size changes

- When output increases, AVC is the same

Decreasing Cost Industry: an industry where increased demand for resources decreases the cost of employing those resources and the cost curves shift upward

- When output increases, AVC decreases
- Entry of new firms drives down the price of output and decreases the cost curve
- Profit is eliminated less quickly than with a constant cost industry
- New long-run price is lower than it is in a constant cost industry

NOTE: Zero economic profits is not necessarily a bad thing because economic profits also include opportunity cost. Because economic profits are not negative, there are no better things for firms to be doing.

Imperfect Competition

Introduction to Imperfectly Competitive Markets

Imperfectly competitive markets include monopoly, oligopoly, and monopolistic competition in product markets and monopsony in factor markets.

Characteristics of Imperfectly Competitive Markets:

- Firm must lower the price to sell additional units (demand is downward sloping, not perfectly elastic)
- Prices > MC of production and/or MB of consumption (not allocatively or productively efficient)
- Barriers to entry (high fixed/start-up costs, legal barriers to entry, exclusive ownership of key resources)

	Perfect Competition	Monopolistic Competition	Oligopoly	Monopoly
Firms	Very many	Many	Few	One
Barriers	None	Low	High	Prohibitive
Market Power	None	Some	Substantial	Complete
Product	Homogenous	Differentiated	Homogeneous or Differentiated	Unique
Long-Run Economic Profits	Zero	Zero	Positive or Zero	Positive or Zero

Monopoly

Characteristics of Monopoly:

- Single producer: a strict definition of monopoly requires that there are no other firms in the industry
- Market power: with no competition and barriers to entry, the unregulated monopolist has market power, or monopoly price-setting ability
- No close substitutes: consumers cannot find a similar product in other markets
- Barriers to entry: there exists something that prevents rival firms from entering the market to provide competition to the monopolist and choice to consumers

Barriers to entry:

- Legal barriers: patents, trademarks, and copyright laws are in place to protect inventions and intellectual property
- Economies of scale: as a firm grows larger in the long run, average total costs fall, providing the larger firm a cost advantage over smaller firms
- Control of key resources: if a firm controlled most of the available resources in the production of a good, it would be very difficult for a competitor to enter the market

The monopolist is the only provider of that good, making the demand for the product the market demand for that product

- Demand is downward sloping
- Decreasing the price increases sales
- $P > MR$

Price exceeds marginal revenue because the monopolist must lower price to boost sales

- Demand is elastic above the midpoint of a linear demand curve, so cuts in price increases total revenue

- At the midpoint, total revenue is maximized and demand is unit elastic
- Demand is inelastic below the midpoint; further cuts in price decrease total revenue
- The monopolist operates in the elastic (or upper) range of demand

Equilibrium (profit-maximizing) quantity is determined by equating marginal revenue to marginal cost. Because $MR = MC$ and $P > MR$, $P > MC$.

Natural Monopoly: exists because of long-run economies of scale

- Start-up costs are too high and create barrier of entry
- Impossible for a particular service area to support more than one firm
- Only one large firm can be profitable due to increasing returns to scale

Price Discrimination

A firm with market power can engage in price discrimination to increase its profits or capture additional consumer surplus under certain conditions.

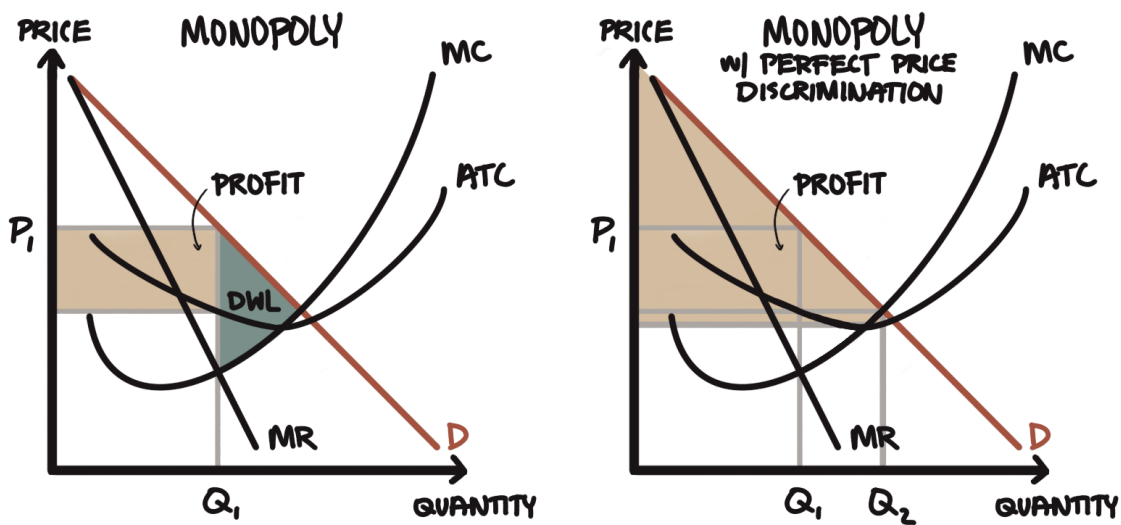
Monopolist produces the quantity where price equals marginal cost (just as a competitive market would) but also extracts all economic surplus associated with its product and eliminates all deadweight loss.

Price Discrimination: the selling of the same good at different prices to different consumers

Requirements for Price Discrimination (MSP or Many Sneaky Prices):

- 1) Monopoly pricing power (*market power*)
- 2) Separatable groups of consumers
- 3) Prevent resale between consumers

Perfect Price Discrimination: when a firm charges the maximum price that each customer is willing to pay for each unit



Monopolistic Competition

Characteristics of Monopolistic Competition:

- Relatively large number of firms: rather than the thousands of perfectly competitive firms, in a monopolistic competition there are perhaps dozens, each with a fairly small share of the total market
- Differentiated products: gives firms the ability to set the price above the competitive level and earn positive, negative, or zero economic profit in the short run
- Easy entry and exit: because of the very few barriers to entry, profits are zero in the long run

Demand in a monopolistic competition is downward-sloping and relatively elastic.

The firm's profit maximizing output is less than the output associated with minimum average cost. All firms, regardless of the type of market it operates in, will produce to a point where demand or price equals average cost.

- Productively inefficient
- Output level is smaller than the output level needed to minimize average total costs
- Creates excess capacity (the difference between the monopolistic competition output Q_{mc} and the output at minimum ATC)

A monopolistic competition market maximizes profits where $MR = MC$. The demand curve is downward sloping, which means it will charge a price that exceeds marginal costs ($P > MC$). It is allocatively inefficient.

NOTE: Firms typically use advertising as a means of differentiating their product.

Oligopoly and Game Theory

Characteristics of Oligopolies:

- A few large producers: distribution of market share in an industry is top-heavy with a few large firms
- Differentiated or standardized products
- Entry barriers: if these industries were fairly easy to enter, they would not be dominated by a few huge producers.
- Mutual Interdependence: because a few large producers control these industries, the action of one firm (price setting or advertising) is likely to affect the others and prompt a response

Measures of Market Power:

Herfindahl-Hirschman Index (HHI): takes the market share of each firm in the industry (in percents) and adds them all up

- Scores range from 0 to 10,000; which is where a monopoly sits

N-Firm Concentration Ratio: sum of the market shares of the largest n firms in an industry

Firms in an oligopoly have an incentive to collude and form cartels.

Collusive Behavior: a non-competitive, secret, and sometimes illegal agreement between rivals which attempts to disrupt the market's equilibrium

Cartels: more organized forms of collusive oligopoly behavior

Game: situation in which a number of individuals take actions

Payoff Matrix: shows the possible outcome of a two-person zero-sum game

- Payoff for each individual depends directly on both the individual's own choice and the choices of other

Strategy: a complete plan of actions for playing a game.

Dominant strategy: when one strategy is better than another strategy for one player, no matter how that player's opponents may play

		FIRM A	
		HIGH	LOW
FIRM B	HIGH	\$100 / \$100	\$50 / \$160
	LOW	\$50 / \$160	\$120 / \$120

Dominant Strategy Equilibrium: the equilibrium when both players follow their dominant strategy

- Always also Nash equilibrium, but the reverse is not true

Nash Equilibrium: condition describing the set of actions in which no player can increase his or her payoff by unilaterally taking another action, given the other players' actions

Prisoner's Dilemma: a paradox in decision analysis in which two individuals acting in their own self-interests do not produce the optimal outcome

Oligopolists have difficulty achieving the monopoly outcome for reasons similar to those that prevent players from achieving a cooperative outcome in the Prisoner's Dilemma; nevertheless, prices are generally higher and quantities lower with oligopoly (or duopoly) than with perfect competition.

Factor Markets

Introduction to Factor Markets

Factors of production (labor, capital, and land) respond to factor prices (wages, interest, and rent), and firms' decision to hire is based on the productivity of the factors, output price, and cost of the factor.

Labor Market:

- Quantity of labor demanded is negatively related to the wage rate
- Quantity of labor supplied is positively related to the wage rate
- Competitive (equilibrium) wage is found at the intersection of labor demand and labor supply

Changes in Factor Demand and Factor Supply

Demand for Labor: function of the marginal productivity of the next unit of labor and the marginal revenue that the firm receives for the production

Determinants of Labor Demand: cause the labor demand curve to shift when changed

- 1) Product demand where $D(\uparrow)$ for product \rightarrow Price(\uparrow) \rightarrow $MRP_L(\uparrow)$ \rightarrow $D(\uparrow)$ for labor
- 2) Output price
- 3) Productivity (output per resource unit): if the productivity of the resource increases, the firm has a profit motive to take advantage of that heightened productivity and the demand for the resource should increase
- 4) Factors of productivity:
 - Quantity of other resources: give workers more equipment to help production and labor's productivity can be increased
 - Technical progress: better technology can increase labor's productivity
 - Quality of variable resources: better quality resources are more productive
- 5) Prices of other resources: employers hire several different resources, so the demand for labor often depends upon the prices of the others
- 6) Substitute resources: if the price of a substitute resource falls, it has two competing effects on the demand for labor:
 - Substitution Effect (SE): because the resource is now relatively less expensive, the firm uses more of that resource and decreases demand for labor
 - Output Effect (OE): lower resource costs lower production costs (a downward shift in MC), which increases output for the firm and prompts an increased demand for labor
 - The net effect of a lower price of capital depends upon the magnitude of each effect. If the $SE > OE$, demand for labor falls, and vice versa.

- 7) Complementary resources: when labor and another resource work together, a lower price of the resource makes it more affordable to purchase more machinery but also increases the demand for labor

Labor Demand Increases If...	Labor Demand Decreases If...
Demand for the product increases, increasing the price	Demand for the product decreases, decreasing the price
The labor becomes more productive, either with more resources available, better technology, or a higher quality workforce	The labor becomes less productive, either with fewer resources available, lessened technology, or a lower quality workforce
The price of a substitute resource falls and the $SE < OE$	The price of a substitute resource falls and the $SE > OE$
The price of a substitute resource rises and the $SE > OE$	The price of a substitute resource rises and the $SE < OE$
The price of a complementary resource falls	The price of a complementary resource rises

Determinants of Labor Supply: cause the labor supply curve to shift when changed

- 1) Immigration
- 2) Education
- 3) Working conditions
- 4) Age distribution
- 5) Availability of alternative options
- 6) Preferences for leisure
- 7) Cultural expectations

Profit-Maximizing Behavior in Perfectly Competitive Factor Markets

Factor prices provide incentives and convey information to firms and factors of production.

- In a perfectly competitive labor market, the wage is set by the market
- Supply of labor to the individual firm is perfectly elastic and equal to the wage
- All else equal, as the price of labor increases, the employment falls and vice versa
- Firms may be a perfect competitor in the labor market even if it is an imperfect competitor in its output market

Firms hire labor in a perfectly competitive labor market as long as the marginal revenue product of labor is greater than the market wage.

- Hires the quantity of workers where the marginal factor cost (wage) equals the marginal revenue product of labor ($MRP_L = MFC = Wage$)

Marginal Revenue Product of Labor (MRP_L): a measure of what the next unit of a resource, such as labor, brings to the firm

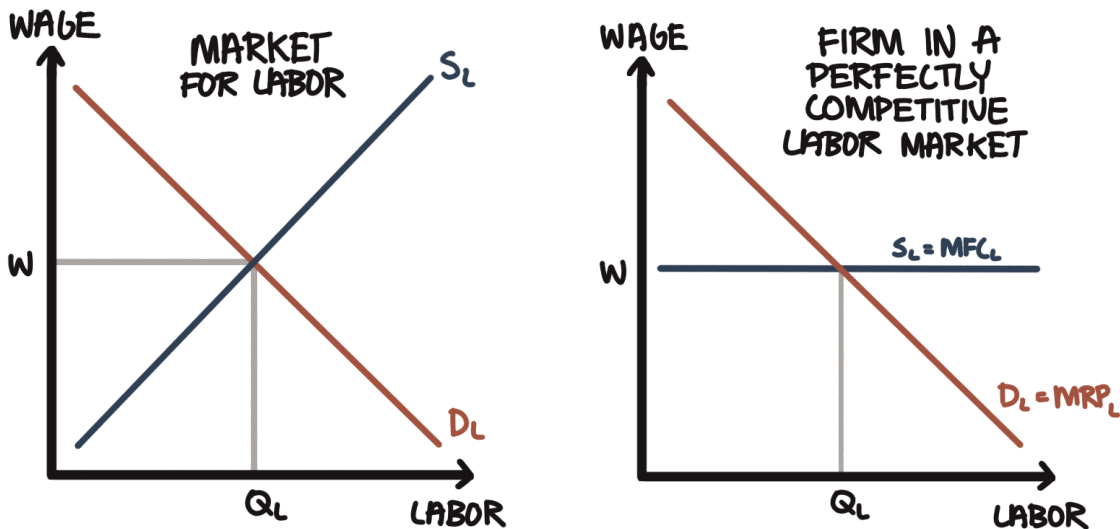
$$MRP_L = (\text{Change in total revenue} / \text{Change in resource quantity}) = MR \times MP_L = P \times MP_L$$

- Represents the demand for labor
- Overall market demand for labor is the sum of all of the individual firms' MRP_L curves (ΣMRP_L)

Marginal Factor Cost (MFC): a measure of how much cost a firm incurs from using an additional unit of an input

$$MFC = (\text{Change in total factor cost} / \text{Change in factor quantity})$$

- Represents the firm's horizontal labor supply curve
- Equal to wages for perfectly competition markets
- Higher than wages for imperfect competition markets because firms must increase wages in attract labor



To minimize costs or maximize profits, firms allocate inputs such that the last dollar spent on each input yields the same amount of marginal product.

$$(MP_L / P_L) = (MP_K / P_K) \text{ or } (MP_L / MP_K) = (P_L / P_K)$$

Constraint (expressed in two equivalent ways):

- 1) Must produce Q units of output. Find the least-cost (TC) way of doing so.
- 2) Can only spend \$TC. Find the highest level of output (Q).

Least-Cost Rule: finds the one combination of labor (L) and capital (K) that satisfies either of these two constraints

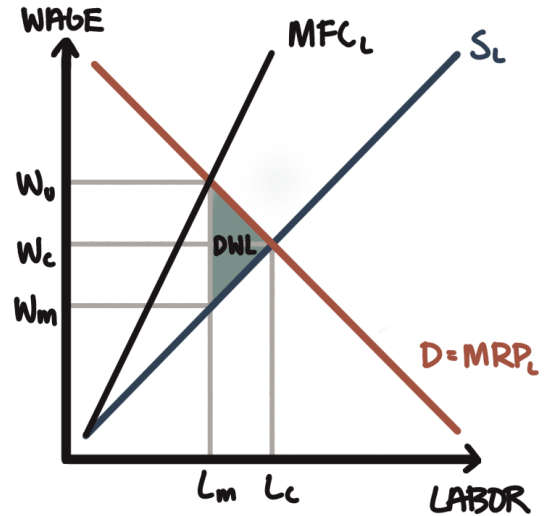
Situation	Firm will...	Which causes...	And...	Until...
$MP_L / P_L > MP_K / P_K$	L(↑) and K(↓)	$MP_L(\downarrow)$	$MP_K(\uparrow)$	$MP_L / P_L = MP_K / P_K$
$MP_L / P_L < MP_K / P_K$	K(↑) and L(↓)	$MP_K(\downarrow)$	$MP_L(\uparrow)$	$MP_L / P_L = MP_K / P_K$

NOTE: Firms in a perfectly competitive output market will have a marginal revenue product of labor that is equal to the value of the marginal product of labor (Value of MPL = $MPL \times P$) because marginal revenue for each unit of output is equal to price.

Monopsonistic Markets

Monopsony: a market condition in which there is only one buyer or employer

- Firm hires additional labor as long as the marginal revenue product is greater than the marginal factor cost (the wage of a new unit of labor plus the wage increase given to all existing labor)
- Marginal factor cost is greater than the supply price of labor
- Hires less and pays less for labor than a perfectly competitive labor market.
- Wages are determined by the MRP_L



Bilateral Monopoly: where there is both a monopoly and a monopsony

- Can occur with a firm that acts as a monopsony and a union that acts as a monopoly

Unions: help workers increase their collective bargaining and lobbying power

- Tries to increase demand for labor, decrease supply of labor, and negotiate higher wages
- Featherbedding Agreements: require employers to hire union members for particular tasks whether they are need or not

Exclusive Unions: skilled workers attempt to increase wages by restricting the supply of workers with their skills

Inclusive/Industrial Unions: unskilled and semiskilled workers encourage more workers to join to increase bargaining power

Market Failure and the Role of Government

Socially Efficient and Inefficient Market Outcomes

Perfectly competitive markets allocate resources efficiently, but imperfect competition often results in market inefficiencies.

Allocative Efficiency: the economy is producing the optimal mix of goods and services where the marginal benefit of consuming the last unit equals the marginal cost of producing that last unit

- $MB = MC$
- Total economic surplus is maximized

Rational agents make optimal decisions by equating private marginal benefits and private marginal costs, which may result in social inefficiencies. Policymakers use cost-benefit analysis to create policies designed to equate marginal social benefit with marginal social cost.

Social Efficiency: market equilibrium quantity is equal to the socially optimal quantity

- All social benefits and costs are internalized by individuals in the market

Productive Efficiency: the economy is producing the maximum output for a given level of technology and resources

- No deadweight loss
- On the PPF
- Lowest point on SRAC curve ($MC = SRAC$)

Technical Efficiency: using the optimum combination of inputs (labor and capital) to produce a certain number of goods

Equilibrium allocations can deviate from efficient allocations due to...

- Imperfect competition markets (monopoly, oligopoly, monopolistic competition)
- Negative and positive externalities in production or consumption
- Asymmetric (imperfect) information
- Insufficient production of public goods

Externalities

Private incentives can fail to account for all socially relevant considerations.

- Rational agents respond to private costs and benefits and not to external costs and benefits
- Socially Efficiency: $MSC = MSB$ and there is no deadweight loss

Externalities arise from lack of well-defined property rights and/or high transaction costs

Positive Externality: when consumption/production of a good causes a benefit to a third party

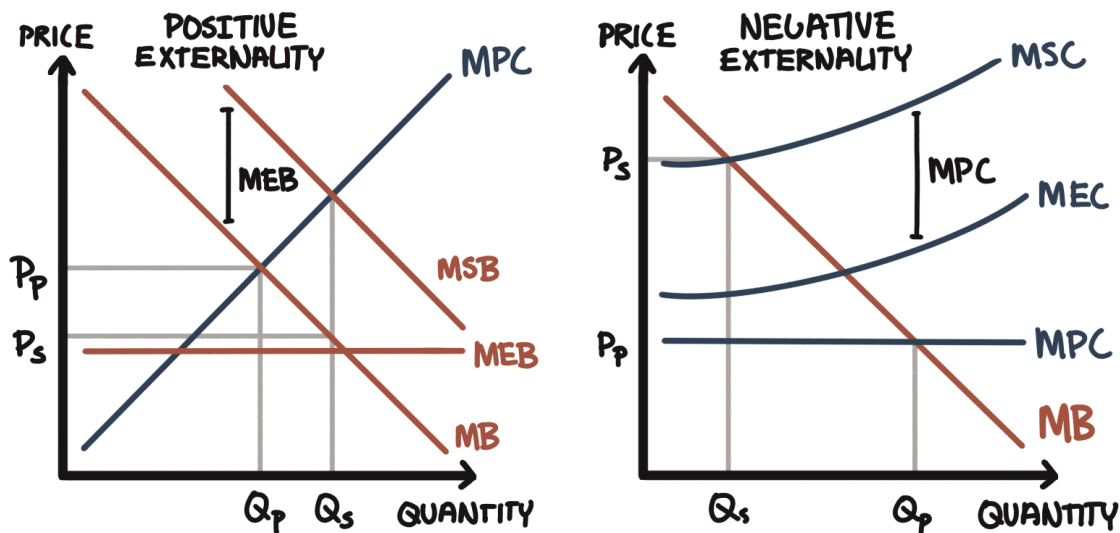
Spillover Benefits: free benefits that third parties or society receive from the actions of others

- Results in an underallocation of resources in that market (too little of a good thing)
- At Q_{mkt} , $MSB > MPB$ and $MSC < MSB$
- Deadweight loss exists (area between MSB and MPB and between Q_{social} and Q_{mkt})

Negative Externality: a situation in which polluters impose costs upon third parties

Spillover Costs: costs of consumption or trade that spill over onto other parties

- Results in an overallocation of resources in that market (too much of a bad thing)
- At Q_{mkt} , $MSC > MPC$ and $MSC > MSB$
- Deadweight loss exists (area between MSC and MSB and between Q_{social} and Q_{mkt})



Policies that address externalities:

- 1) Taxes/subsidies
- 2) Environmental regulation
- 3) Public provision
- 4) Assignment of property rights
- 5) Reassignment of property rights through private transactions

Free Rider Problem: the burden on a shared and non-excludable resource caused by its use by people who aren't paying their fair share for it or aren't paying anything at all

Public and Private Goods

Private Goods: goods that are both rival and excludable

Public Goods: goods that both nonrival and nonexcludable

Nonexcludable: cannot be held back from those who desire access

Nonrival: consumption of that good doesn't affect its consumption by others

Due to the free rider problem, private individuals usually lack the incentive to produce public goods, leaving the government as the only producer.

- Governments sometimes choose to produce private goods (educational services) and to allow free access to them

Some natural resources are, by their nature, non-excludable and rival and therefore open access.

- Private individuals inefficiently overconsume such resources

The Effects of Government Intervention in Different Market Structures

In imperfect markets, well-designed government policy can reduce waste and increase efficiency.

- Policy needs to correctly address the incentives that led to the market failure

Per-unit taxes and subsidies:

- Affect the total price consumers pay, net price firms receive, equilibrium quantity, consumer and producer surpluses, deadweight loss, and government revenue or cost
- Impact of change depends on the price elasticity of demand and supply

Lump-sum taxes and lump-sum subsidies:

- Affect fixed costs
- Do not change either marginal cost or marginal benefit
- Can help a natural monopoly produce at the allocatively efficient quantity

Binding price ceilings and floors (price regulation):

- Affect prices and quantities differently depending on the market structures and the price elasticities of supply and demand
- Used to address inefficiency due to a monopoly

Governments use antitrust policy in an attempt to make markets more competitive.

Sherman Act (1890): declared attempts to monopolize commerce or restrain trade among states illegal

Clayton Act (1914): strengthened the Sherman Act by specifying that monopolistic behavior (price discrimination, tying contracts, unlimited mergers) is illegal

Robinson-Patman Act (1936): prohibits price discrimination except when it is based on differences in cost, differences in marketability of product, or a good faith effort to meet competition

Celler-Kefauver Act (1950): authorized by the government to ban vertical mergers (mergers of firms at various steps in the production process from raw materials to finished products) and conglomerate mergers (combinations of firms from unrelated industries) in addition to horizontal mergers (mergers of direct competitors)

Inequality

Market outcomes can result in income inequality. Income levels and poverty rates vary greatly both across and within groups (age, gender, race) and countries. The Lorenz curve and Gini coefficient are used to represent the degree of inequality in distributions and to compare distributions across different countries, policies, or time periods.

Lorenz Curve: graphically illustrates the quintile distribution

- The farther the Lorenz curve lies below the hypothetical line of perfect equality, the more unequal the distribution of income

Gini Ratio: calculates the distance of the actual distribution of income from the line of perfect equality

$Gini\ ratio = \frac{Area\ A}{Area\ A + Area\ B}$

- As the Gini ratio gets closer to zero, the distribution of income becomes more equal
- As the Gini ratio gets closer to one, the distribution of income becomes more unequal

Quintiles: any of the five equal groups that households can be divided into according to their incomes

- Every quintile has 20% of all households
- If income was perfectly distributed, each 20% of the households should have 20% of the wealth

Each factor of production receives the value of its marginal product, which can contribute to income inequality.

Marginal Productivity Theory: states that wage is a function of marginal revenue product

- Flawed in that not all citizens are given a fair shake at demonstrating to the labor market their true marginal revenue product

Factors for Income Inequality:

- 1) Ability: because natural ability is not distributed equally, income is not distributed equally
- 2) Human capital: not everyone attains the same level of human capital (education, training) so income is not equally distributed
- 3) Discrimination: despite social progress, discrimination is a hurdle that might not be surmountable even with high levels of ability and human capital
- 4) Preferences: some individuals, even with high ability and human capital, prefer to maximize utility with more leisure and less labor
- 5) Market power: as market power increases for a select group, the distribution of income becomes more unequal
- 6) Bargaining power: being within economic and social units (firms, labor unions, and families) create advantages
- 7) Social capital (connections): some are lucky enough to stumble upon the right connections, which leads to social mobility

8) Luck (inheritance): some are born into prosperity

Egalitarianism: believes that economic resources should be equally divided amongst all members of society

- Suffers from an issue of compensation that fails to match productivity
- Incentives to work hard, take risks, and seek a competitive advantage are greatly reduced

Redistribution of Income: where the government collects taxes from one segment of society and transfers it to another in the form of social programs

Tax Bracket: a range of income on which is applied a given marginal tax rate

Tax Structures:

- 1) Progressive Tax: as income increases, the average tax rates increase
- 2) Regressive Tax: the average tax rate falls as income rises
- 3) Proportional Tax: a constant tax is applied regardless of income

Marginal Tax Rate: the rate paid on the last dollar earned

Marginal tax rate = $(\Delta \text{ taxes due}) / (\Delta \text{ taxable income})$

Average Tax Rate: the proportion of total income paid to taxes

Average tax rate = $(\text{Total taxes due}) / (\text{Total taxable income})$

d

Poverty Line: three times the minimum food budget established by the Department of Agriculture

Social Programs:

- 1) Social Security: cash benefits and health insurance (Medicare) to retired or disabled workers and their families
- 2) Public Assistance (Welfare): temporary assistance to the very poor
- 3) Supplemental Security Income (SSI): assists very poor elderly individuals without asset or Social Security
- 4) Unemployment Compensation: temporary assistance to the unemployed
- 5) Medicaid: health/hospitalization benefits to the poor
- 6) Food Stamps/Public Housing: provide food and shelter to the poor

: