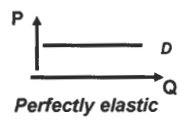
Elasticity

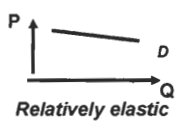
Price Elasticity of Demand

Measures how responsive consumers are to changes in the price of a product.

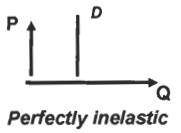
The shape of a demand curve gives you *some* idea of the good's *general* elasticity.



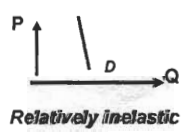
Perfectly elastic



Relatively elastic



Perfectly inelastic



Relatively inelastic

PRICE ELASTICITY OF DEMAND

Think About It...

THE LAW OF DEMAND SAYS...

Consumers will buy more when prices go down and less when prices go up

HOW MUCH MORE OR LESS?

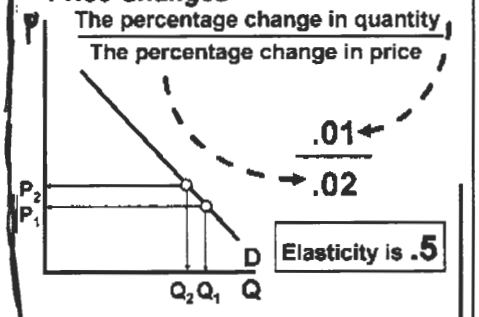
DOES IT MATTER?

to whom?

Price Elasticity Provides an Answer

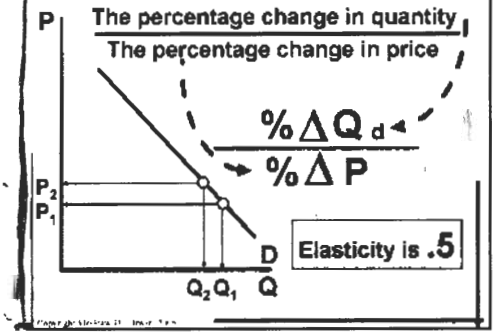
PRICE ELASTICITY OF DEMAND

Measures Responsiveness to Price Changes



PRICE ELASTICITY OF DEMAND

Commonly Expressed as...



PRICE ELASTICITY OF DEMAND

The Price-Elasticity Coefficient and Formula

$$E_d = \frac{\text{Percentage change in quantity demanded of product X}}{\text{Percentage change in price of product X}}$$

Or equivalently...

$$E_d = \frac{\text{Percentage change in quantity demanded of X}}{\text{Original quantity demanded of X}} \div \frac{\text{Change in price of X}}{\text{Original price of X}}$$

Elimination of the Minus Sign

PRICE ELASTICITY OF DEMAND

Interpretations of E_d

Elastic Demand

$$E_d = \frac{.04}{.02} = 2$$

Inelastic Demand

$$E_d = \frac{.01}{.02} = .5$$

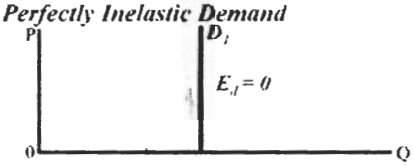
Unit Elasticity

$$E_d = \frac{.02}{.02} = 1$$

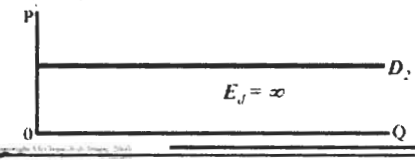
PRICE ELASTICITY OF DEMAND

Extreme Cases

Perfectly Inelastic Demand



Perfectly Elastic Demand



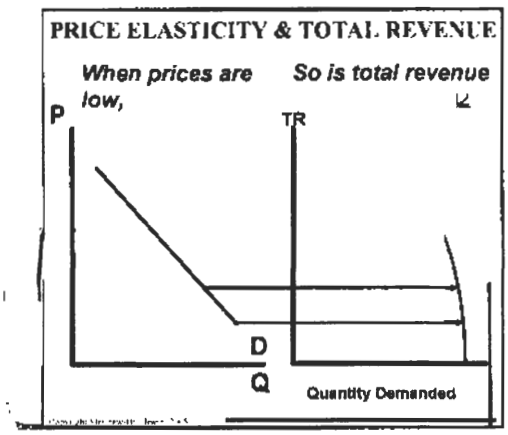
PRICE ELASTICITY OF DEMAND

Refinement –

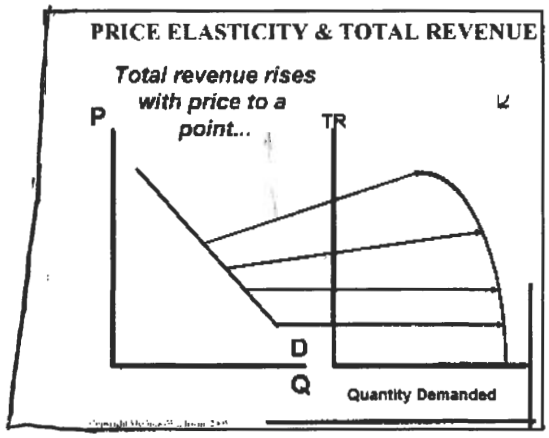
The Midpoint Formula

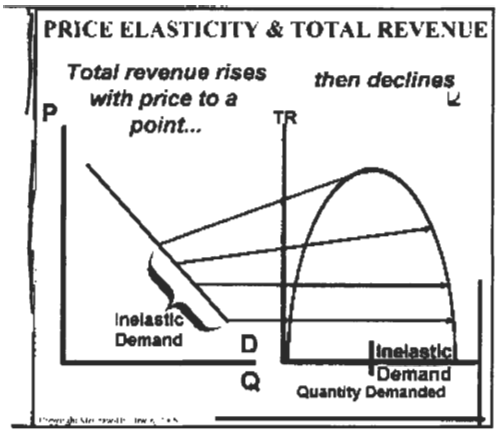
$$E_d = \frac{\text{Change in quantity}}{\text{Sum of Quantities/2}} \div \frac{\text{Change in price}}{\text{Sum of prices/2}}$$

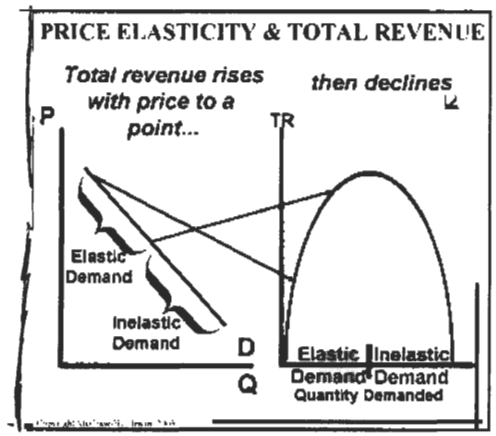
PRICE ELASTICITY & TOTAL REVENUE



PRICE ELASTICITY & TOTAL REVENUE




PRICE ELASTICITY & TOTAL REVENUE
Total revenue rises with price to a point...
then declines
P
TR
Inelastic Demand
D
Q
Inelastic Demand
Quantity Demanded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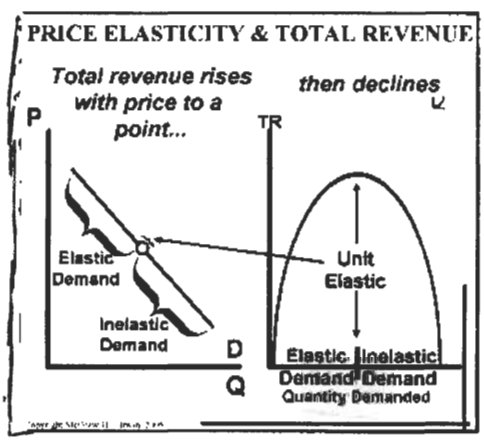
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Total revenue rises with price to a point...
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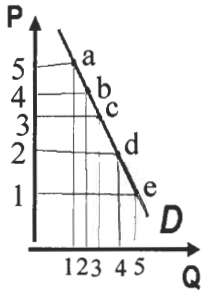
P
TR
Elastic Demand
Inelastic Demand
D
Q
Unit Elastic
Elastic Demand
Inelastic Demand
Quantity Demanded

PRICE ELASTICITY OF DEMAND: *Notes*



- **Price elasticity of demand is always negative.**
- **Elasticity is not the same as the slope of the demand curve.**
- **Ed = % change Qd / % change P**

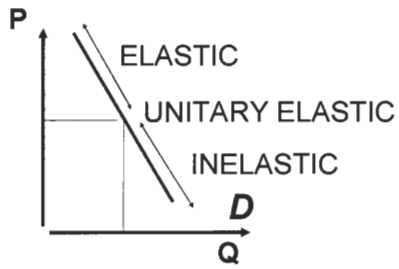
Price elasticity of demand

- $Ed = \dfrac{\dfrac{(Q_2-Q_1)}{(Q_2+Q_1)}}{\dfrac{(P_2-P_1)}{(P_2+P_1)}}$

The following categories help to describe consumer responsiveness:

- **If the elasticity coefficient is > *than 1-11* demand is *elastic*. Consumers are responsive to price changes.**
- **If the elasticity coefficient is *between 1-11 and 0* demand is *inelastic*. Consumers are not very responsive to price changes.**
- **If the elasticity coefficient is *equal to 1-11*, demand is *unitary elastic*.**

Most demand curves have elastic, unitary, and inelastic regions.



Elasticity and total revenue

- Total revenue= price x quantity
- In the elastic range of a demand curve

If you increase price, total revenue will fall.

If decrease price, total revenue will rise.

- In the inelastic range of a demand curve

If you increase price, total revenue will rise.

If decrease price, total revenue will fall.

- You maximize total revenue were demand is unit elastic

Other topics:

- Elasticity and total revenue
- Income elasticity
- Cross price elasticity

income elasticity

- $EI = \dfrac{\dfrac{(Q_2-Q_1)}{(Q_2+Q_1)}}{\dfrac{(I_2-I_1)}{(I_2+I_1)}}$

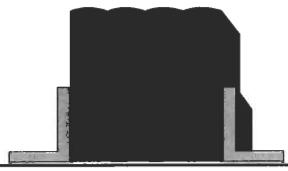
Cross price elasticity

- $Exy = \dfrac{\dfrac{(Q_{x2}-Q_{x1})}{(Q_{x2}+Q_{x1})}}{\dfrac{(P_{y2}-P_{y1})}{(P_{y2}+P_{y1})}}$

Income elasticity:
Positive implies normal
Negative implies inferior

Cross price elasticity:
Positive implies substitutes
Negative implies complements

Production Costs and Output Decisions



Costs in the Short Run

- **Short run: At least one input is fixed in supply**
- **Long run: All inputs are variable**

Marginal and Average Physical Product of Labor:

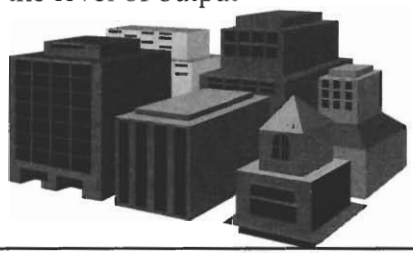
•MPPL- the additional output produced by an additional unit of labor.

•APPL- total output divided by labor

•Law of diminishing marginal returns- when equal increases of variable resources are successively added to some fixed resource; marginal physical products eventually decline

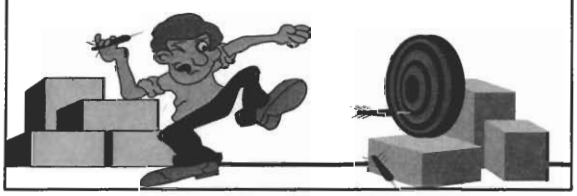
Fixed Costs (FC)

Any cost that that does not depend on the level of output



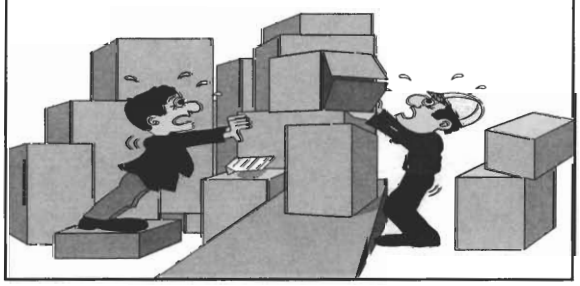
Variable Costs (VC)

Any cost that a firm bears that depends on the level of production chosen.



Total Costs:

Total Cost =Variable Cost + Fixed Cost



Average Costs

AFC = Total Fixed Costs / quantity of output

AVC = Total Variable Costs / quantity of output

ATC = Total Costs / quantity of output = AFC+AVC

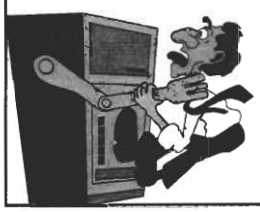
AC means ATC

Marginal Costs (MC)

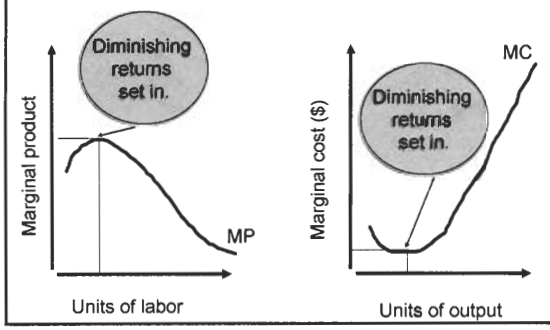
The increase in total cost that results from producing one more unit of output

Least Cost Production:

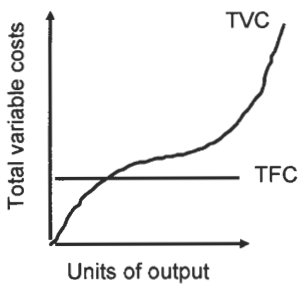
- In the long run entails adjustments until the principle of equal marginal productivity per dollar is met
  - MPPL/w = MPPK/i



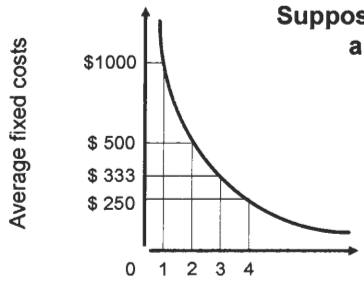
When marginal product begins to fall, marginal cost begins to rise.



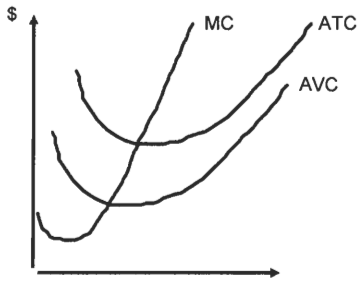
Total fixed costs are constant at every level of output.



Average fixed costs decline as output increases.



Marginal cost intersects average total and average variable cost at their minimum points



Consider this short-run cost data for a hypothetical firm.

q	TVC	MC	AVC	TFC	TC	AFC	ATC
0	$ 0			$1000			
1	10			1000			
2	18			1000			
3	24			1000			
4	32			1000			
5	42			1000			

Can you fill in the missing columns?

Consider this short-run cost data for a hypothetical firm.

q	TVC	MC	AVC	TFC	TC	AFC	ATC
0	$ 0	$--	$--	$1000	$1000	$--	$--
1	10	10	10	1000	1010	1000	1010
2	18	8	9	1000	1018	500	509
3	24	6	8	1000	1024	333	341
4	32	8	8	1000	1032	250	258
5	42	10	8.4	1000	1042	200	208

Production cost II

The Behavior of Profit-Maximizing Firms

Firms make three basic decisions:

- **How much output to supply**
- **How to produce that output**
- **How much of each input to demand**

Profit

The difference between total revenue and total costs

Profit = Total Revenue (TR)
- Total Cost (TC)

Accounting profit vs economic profit

•Accounting profit = total revenue - explicit(measurable cost)

•Economic profit = total revenue - explicit and implicit(opportunity) cost

Normal Rate of Profit

The rate of profit that is just sufficient to keep owners or investors satisfied

Economic Profit

- Profits over and above the normal rate of return on similar investments
- Includes opportunity cost
- If economic profits are negative you should find another business

Consider Sue and Ann, who opened a business selling turquoise belts in the Denver airport.

- Display pushcart costs $20,000.
- Belts cost $5.00 each from the supplier.
- Sales are estimated to be 3,000 belts per year.
- The price of the belts is $10.00.
- The cart clerk is paid $14,000.
- The opportunity cost of the pushcart funds is 10%.

QUESTION: Is this business going to make a profit?

Sue and Ann will earn an economic loss of $1,000.

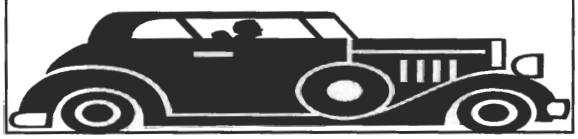
Total Revenues	$30,000
Total Costs	
Belts from supplier	$15,000
Labor costs	14,000
Opportunity cost of capital	2,000
	$31,000

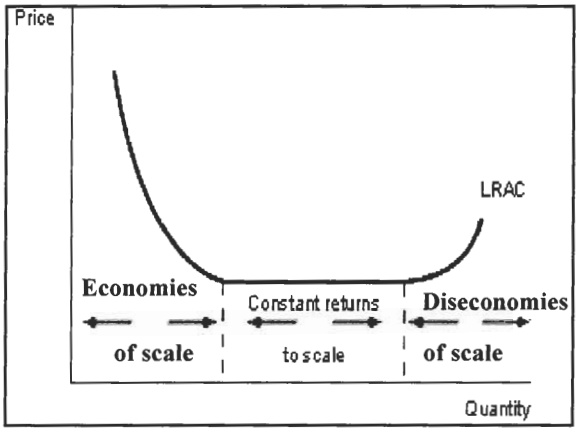
Profit = Total Revenue-Total Costs = -$1,000

Economies of scale:

•**Economies of scale**- long run average cost decline in the long run as a firm expands its capacity

•**Diseconomies of scale**- long run average cost rise as output increases




Price
LRAC
Economies
of scale
Constant returns
to scale
Diseconomies
of scale
Quantity