Lecture 1
Consumer Demand

15.011/0111 Economic Analysis for Business Decisions
Oz Shy

Competitive markets

Competitive markets

Characteristics of perfectly competitive markets:

- Firms and consumers are price takers
- One interpretation: small relative to size of market
- Homogenous products
- Free entry and exit
- Perfect information

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Motivation: Explaining weekly changes in U.S. retail gas prices

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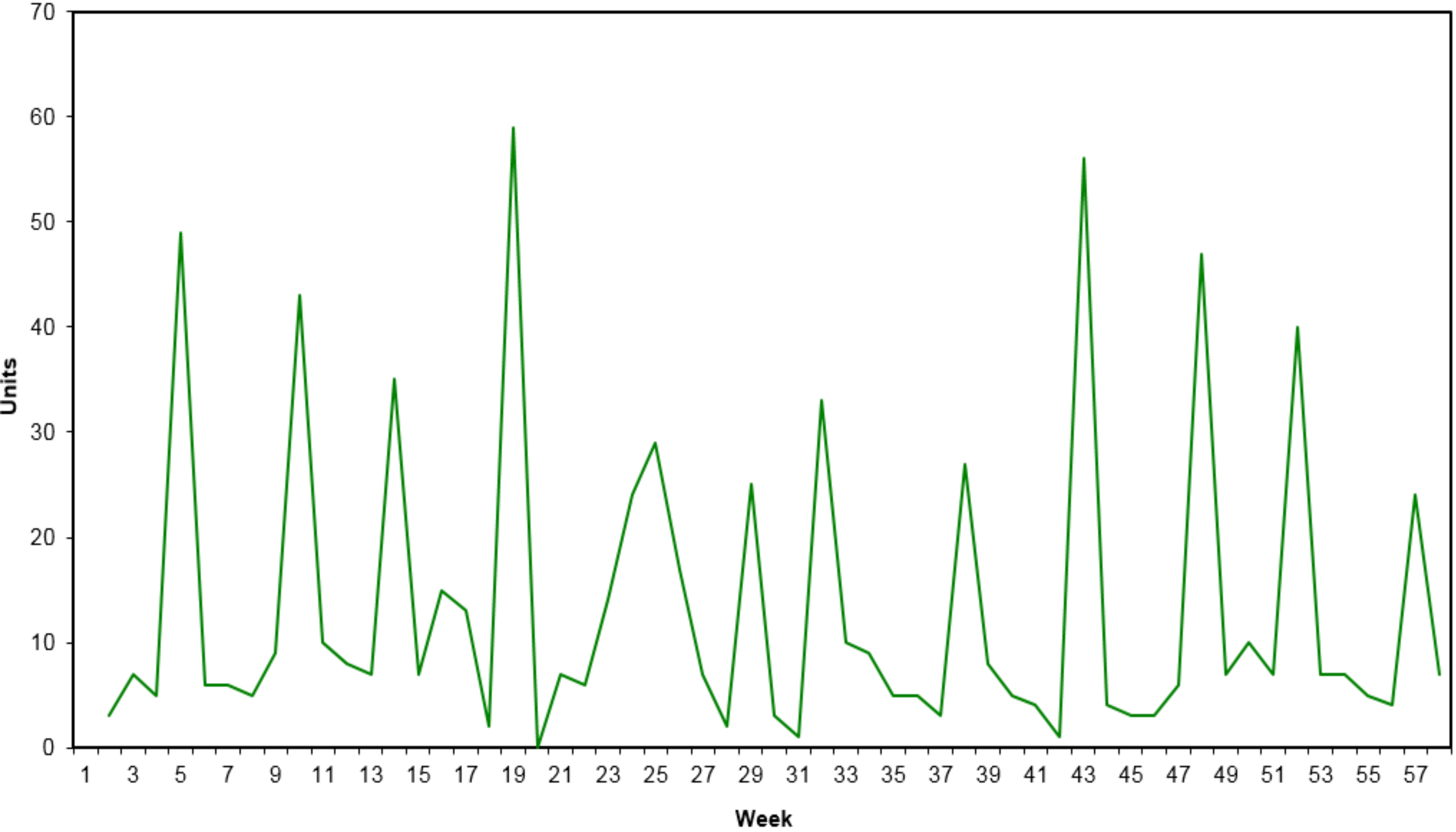
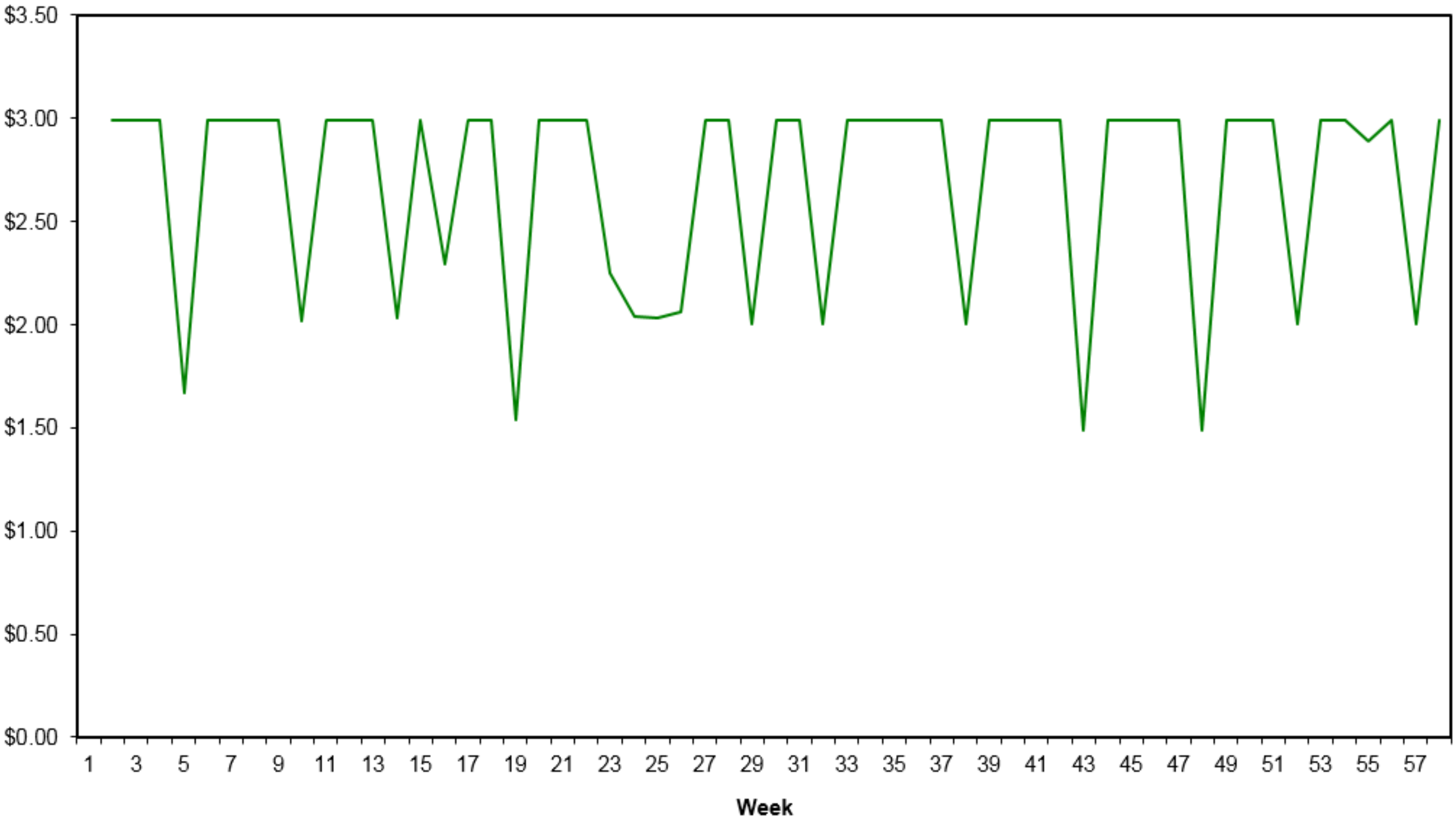
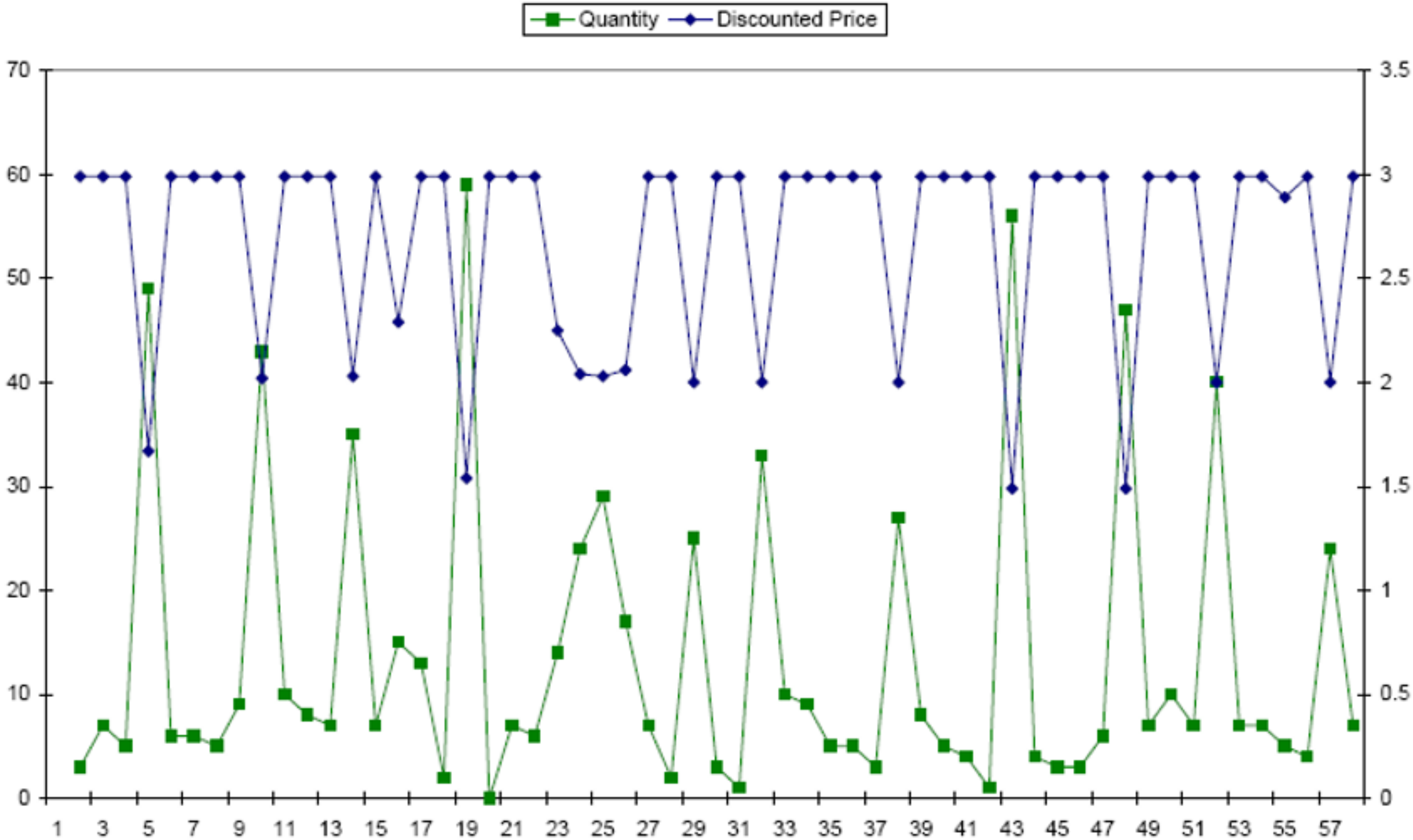
Minute Maid 64oz Orange Juice, Store X, Jul. 2001 - Aug. 2002: Actual Unit Sales



Minute Maid 64oz Orange Juice, Jul. 2001 - Aug. 2002: Price with Promotion Discount



Minute Maid 64oz Orange Juice, Jul. 2001 - Aug. 2002: Actual sales data vs. price



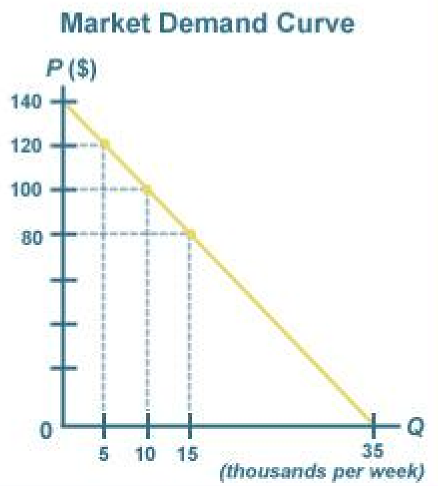
Demand curve: Definition

Plots quantity consumers will buy at any given price

- Determined by consumer preferences, prices of substitutes and complements, income, etc.
- Units of measurement must be specified for price ($ or ¢ or ￥) and quantity (pounds, gallons, kilograms)

Demand Schedule

P	Qd (thousands)
$140	0
$120	5
$100	10
$80	15
$60	20
$40	25
$20	30
$0	35

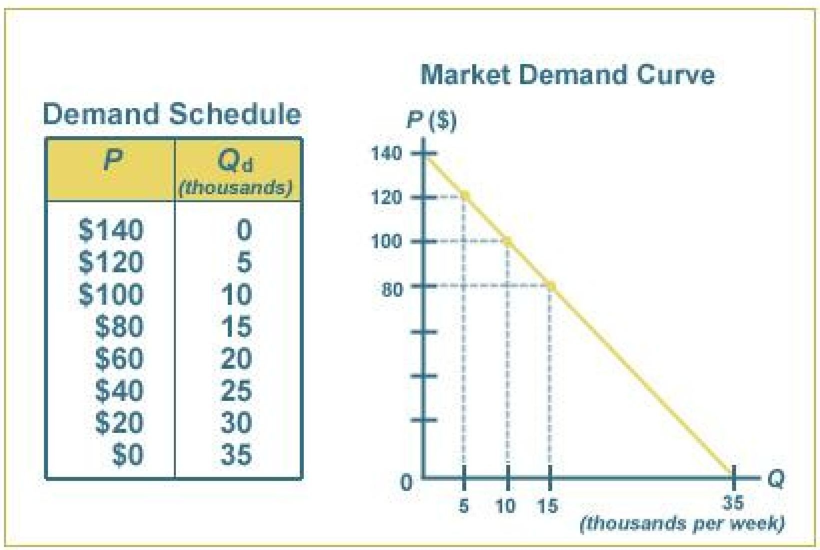


Linear demand

Non-linear demand

Demand curve: Remarks

1. Economists write the demand equation as quantity as a function of price: $Q_d = D(p)$
2. However, economists normally plot the “inverse” demand curve as price as a function of quantity.



Linear demand

Non-linear demand

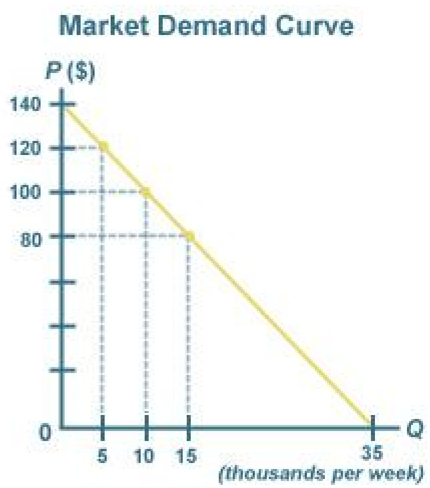
Two different ways of interpreting demand functions

<u>One consumer</u>: If P=$140, she buys nothing, P=$120 she buys 5 units, P=$80 she buys 15 units, and so on...

<u>Many consumers</u>, each buys 1 unit (aggregate demand curve): If P=$140, no one buys,
P=$120, 5 consumers enter the market,
P=$80, 15 consumers enter the market, and so on...

Demand Schedule

P	Q_d *(thousands)*
$140	0
$120	5
$100	10
$80	15
$60	20
$40	25
$20	30
$0	35

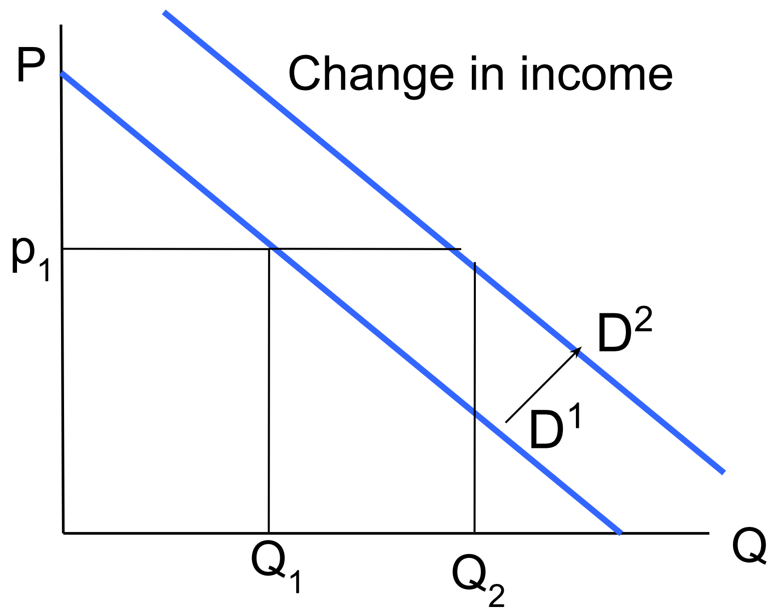


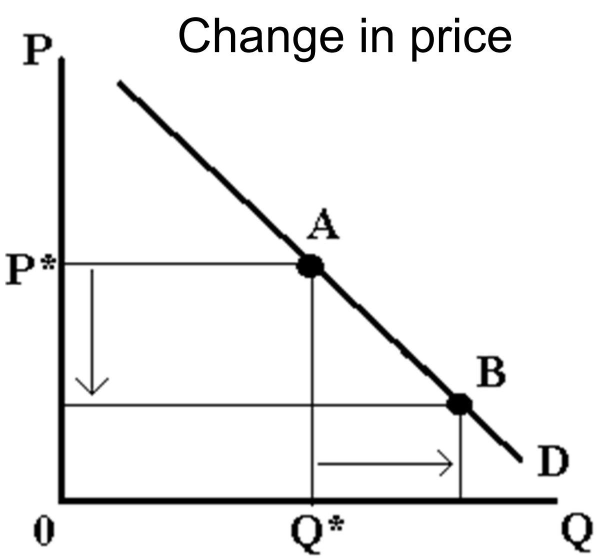
Demand curve: Movement on the curve versus movement of the curve

General formulation of demand is: $Q_d = D(p; I, a, s, p_S, p_C)$

where, p = own price, p_S = price of a substitute good, p_C = price of a complement
The following are called demographic variables: I = income, a = age, s = season

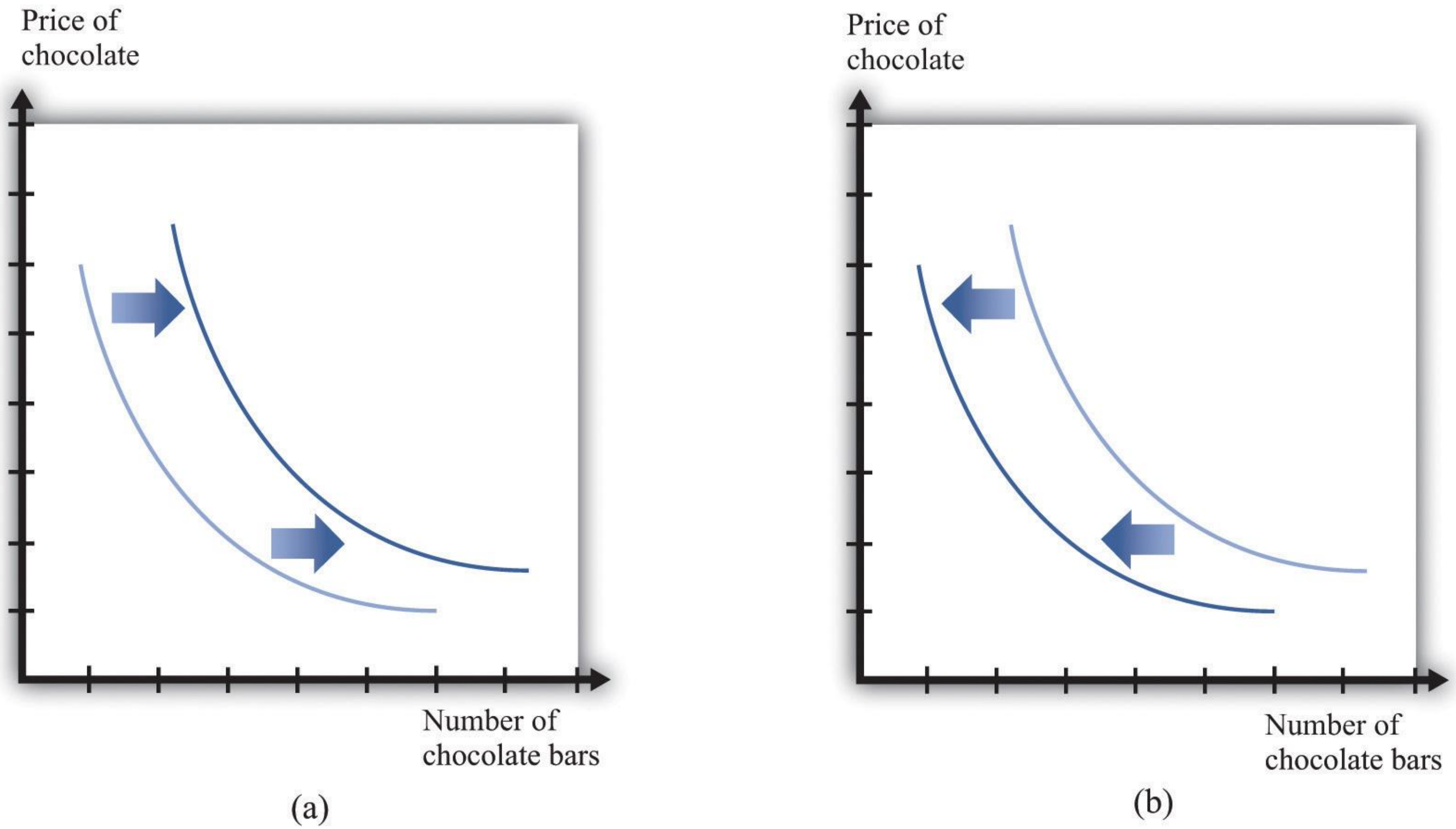
The rule to remember: (1) Because P and Q are on the axes, the movement is on the curve. (2) Because Income is not on the axes, the movement is of the curve!





Income effects on demand

A. Chocolate is a “normal” good [for Alice]
B. Chocolate is an “inferior” good [for Ben]



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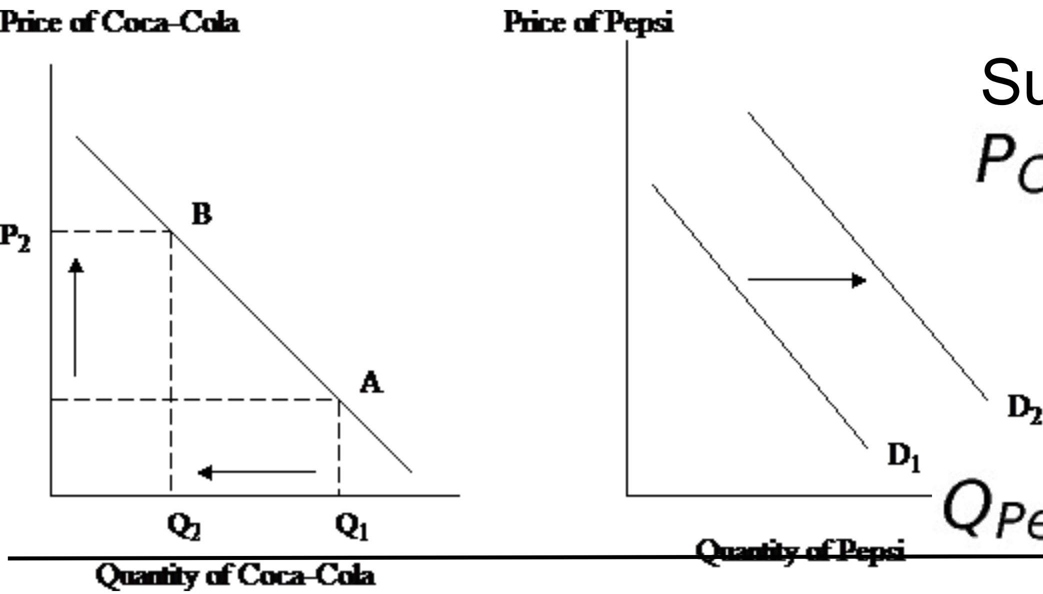
Substitutes versus complements

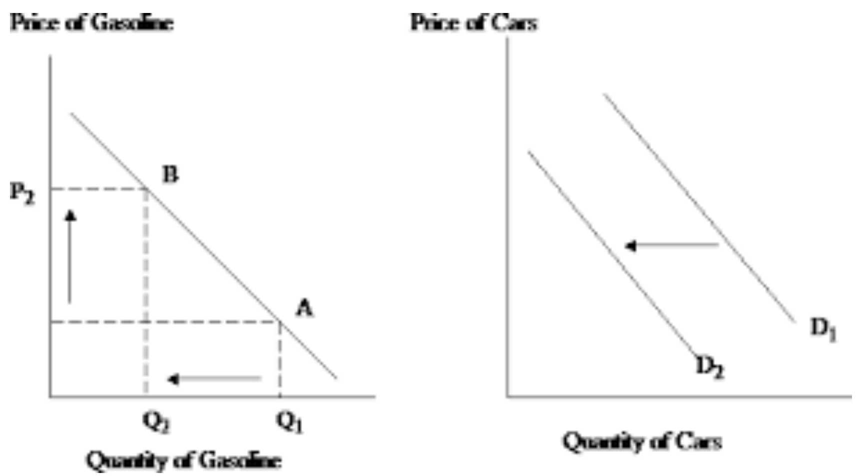


Substitutes (Coke and Pepsi)

$$P_{Coke} \uparrow \Rightarrow Q_{Coke} \downarrow \Rightarrow D_{Pepsi} \uparrow$$

Algebraic example:

$$Q_{Pepsi} = 16 - 4P_{Pepsi} + 2P_{Coke}$$



Complements: (Gas and SUVs)

$$P_{Gas} \uparrow \Rightarrow Q_{Gas} \downarrow \Rightarrow D_{SUV} \downarrow$$

Algebraic example:

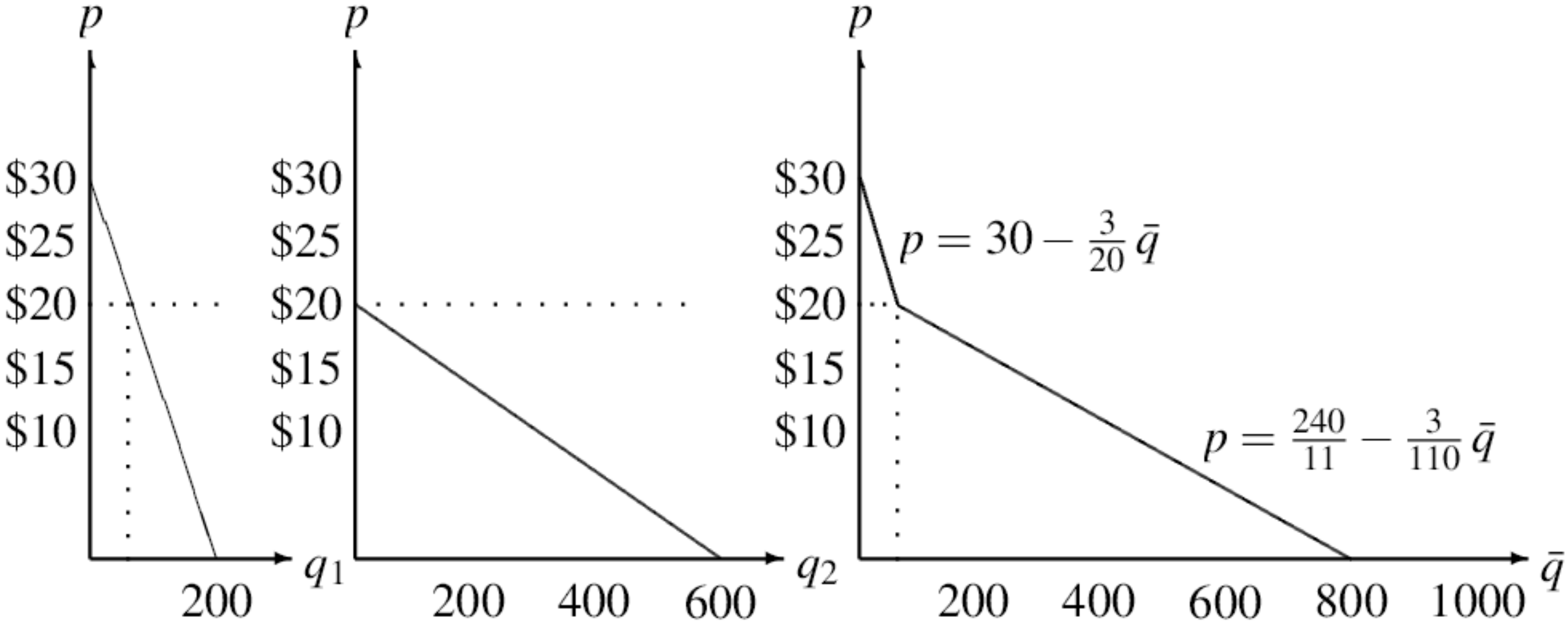
$$Q_{SUV} = 16 - 4P_{SUV} - 2P_{Gas}$$

Demand aggregation: How to combine individual demand functions (horizontal summation)

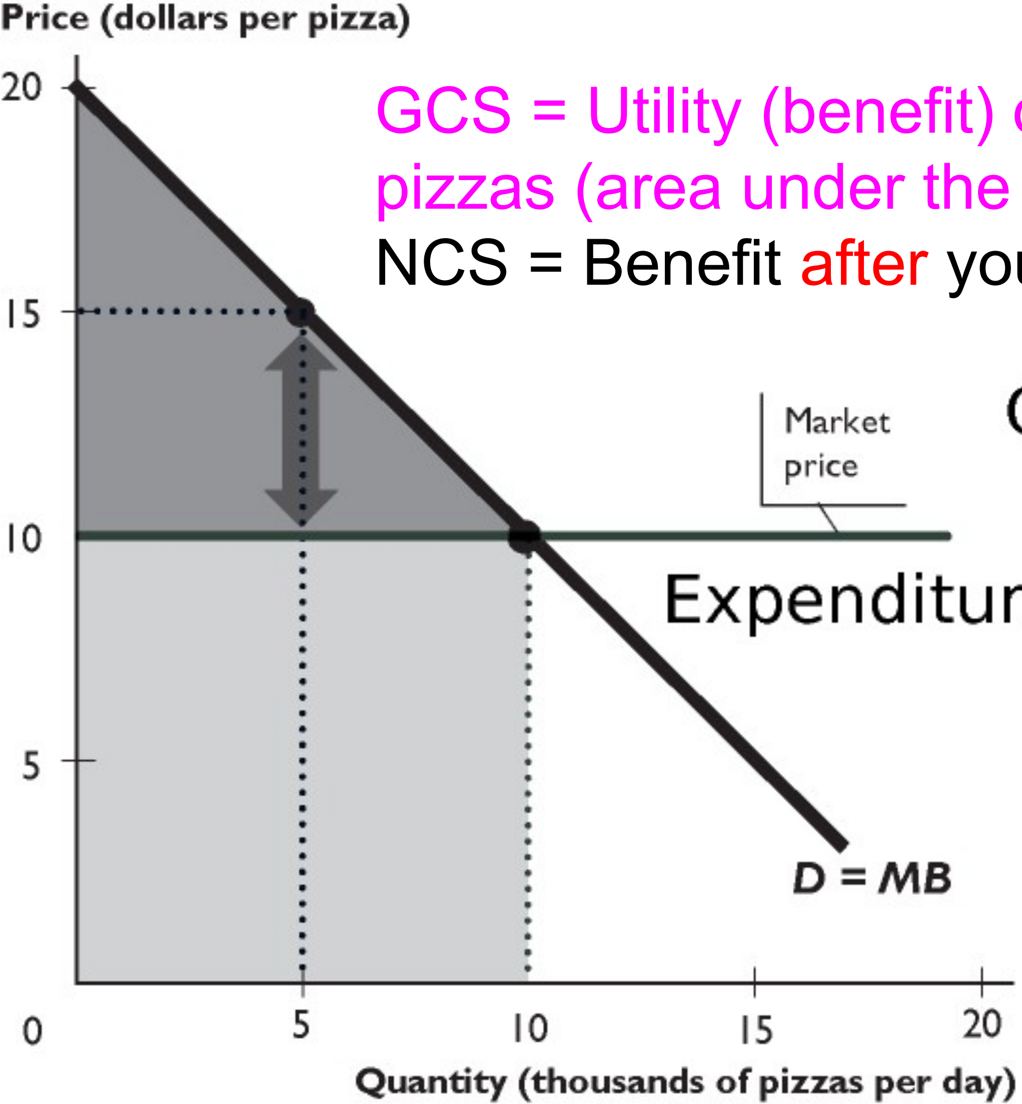
$$p_1 = 30 - \frac{3}{20} q_1$$

$$p_2 = 20 - \frac{1}{30} q_2$$

$$p(\bar{q}) = \begin{cases} 0 & \text{if } p > \$30 \\ 30 - \frac{3}{20}\bar{q} & \text{if } \$20 < p \leq \$30 \\ \frac{240}{11} - \frac{3}{110}\bar{q} & \text{if } 0 \leq p < \$20. \end{cases}$$



Gross and net consumer surplus



GCS = Utility (benefit) derived from consuming 10 pizzas (area under the demand curve)

NCS = Benefit after you paid $100 for 10 units

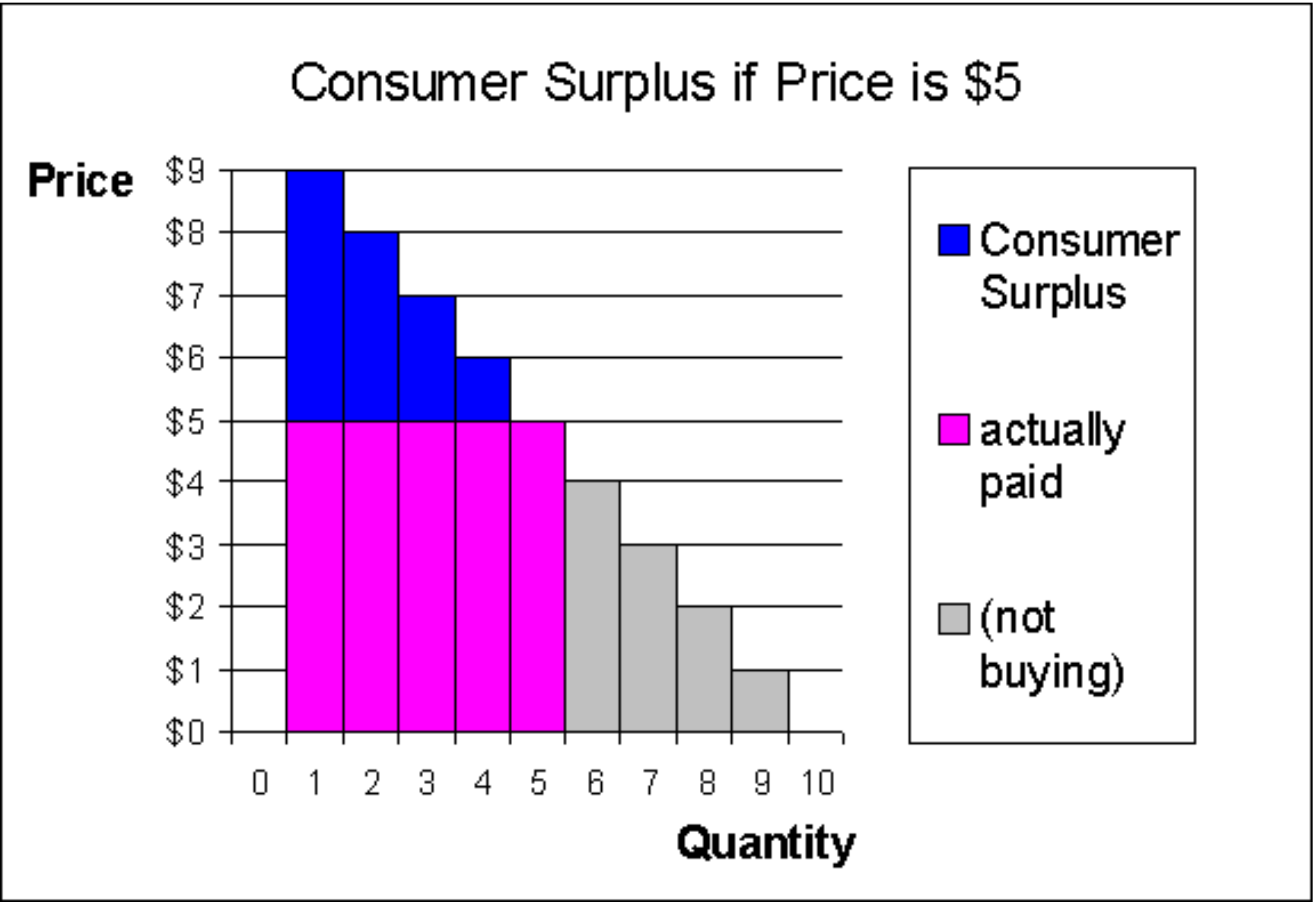
$$GCS = \frac{20+10}{2} \cdot 10 = 150$$

$$\text{Expenditure} = P \cdot Q = \$10 \cdot 10 = \$100$$

$$NCS = 150 - 100 = 50$$

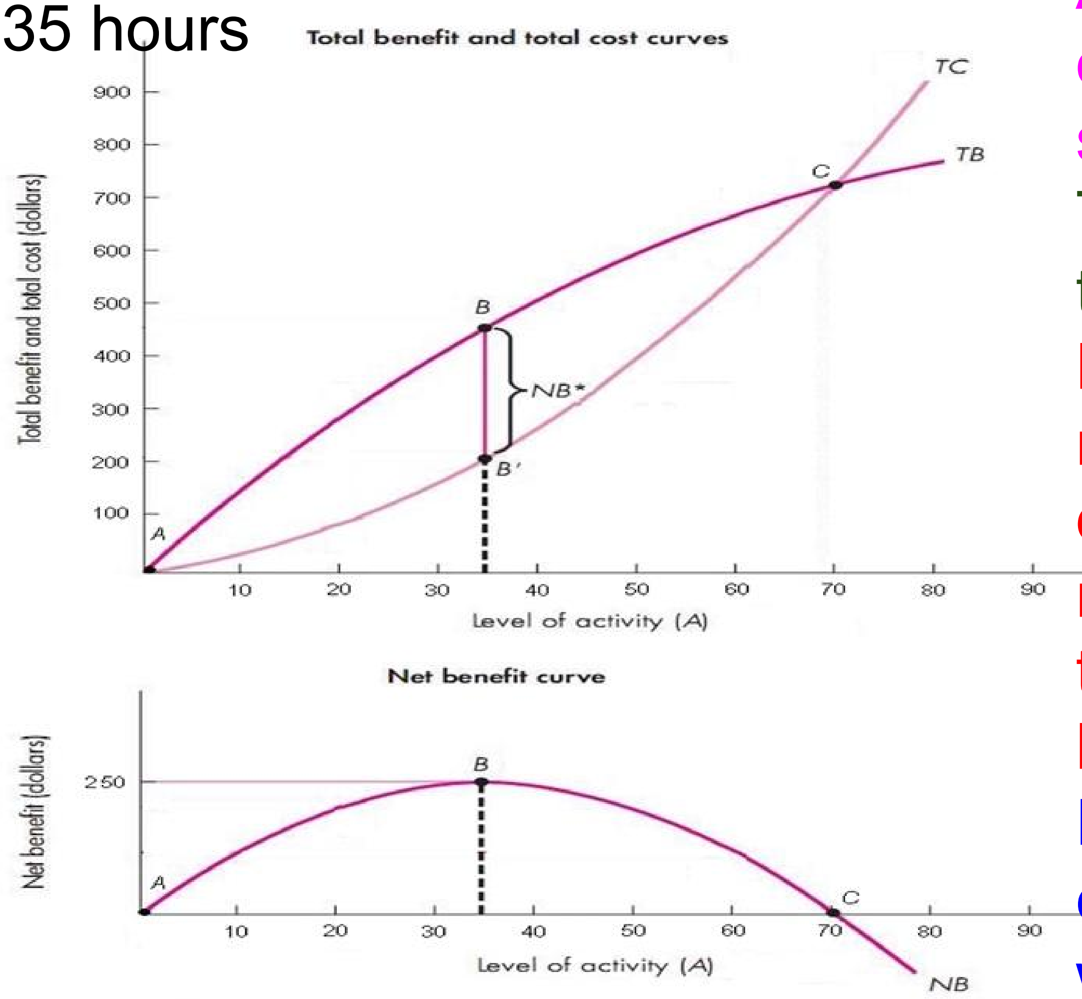
NCS is also the area of the upper triangle (often referred to as “consumer surplus” (w/o the “net”)

Consumer surplus: Construction



Thinking on the margin: How quantity demanded is determined

Quantity of skiing hours demanded = 35 hours



Approach overview: Think of an activity (consumption) such as hours of skiing

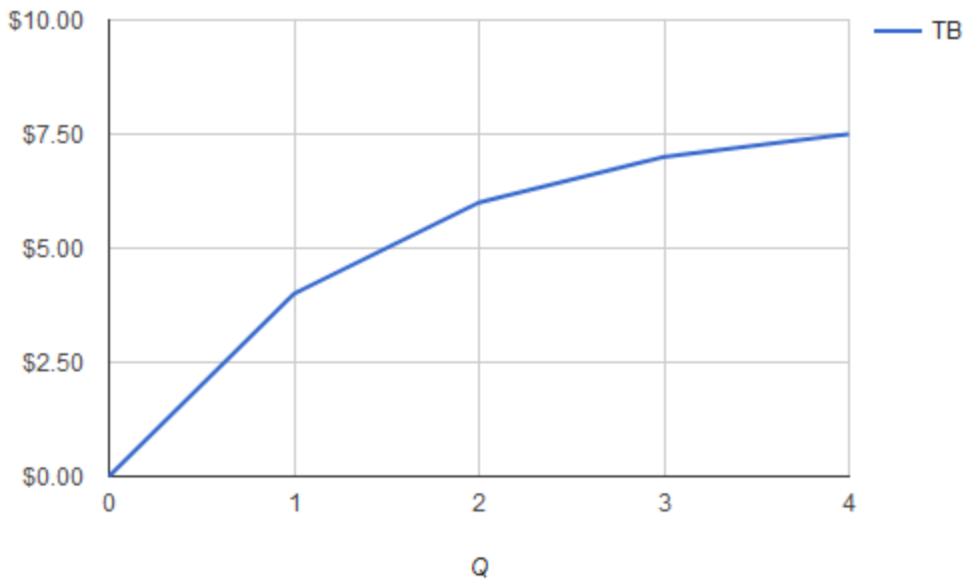
Total benefits (TB): Quantify total enjoyment in $ terms

Key Concept: Diminishing marginal benefit: Skiing during the 51st hour does not add much fun compared to skiing during the 10th hour

Rising total cost (TC): You enter rush hour (weekend) when cost/hour gets higher

Thinking on the margin: Constructing the TB curve

Q	TB
0	$0.00
1	$4.00
2	$6.00
3	$7.00
4	$7.50



The consumer is willing to pay (benefits) $4 for one hour, $6 for two hours, $7 for three hours, and $7.50 for four hours of skiing

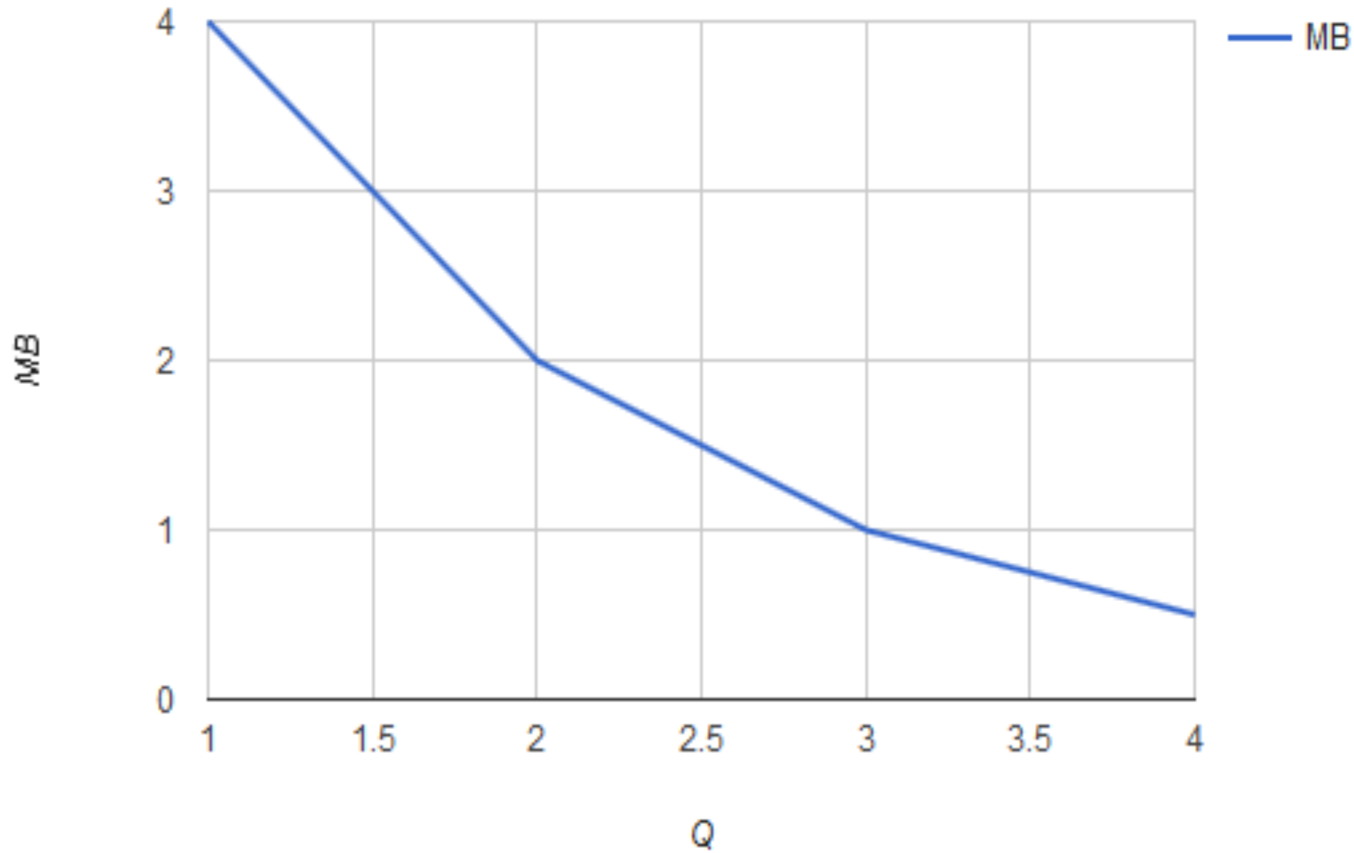
Computing marginal benefit (benefits from consumption

$$MB(1) = \frac{\$4 - \$0}{1 - 0} = \$4 \qquad MB(2) = \frac{\$6 - \$4}{2 - 1} = \$2$$

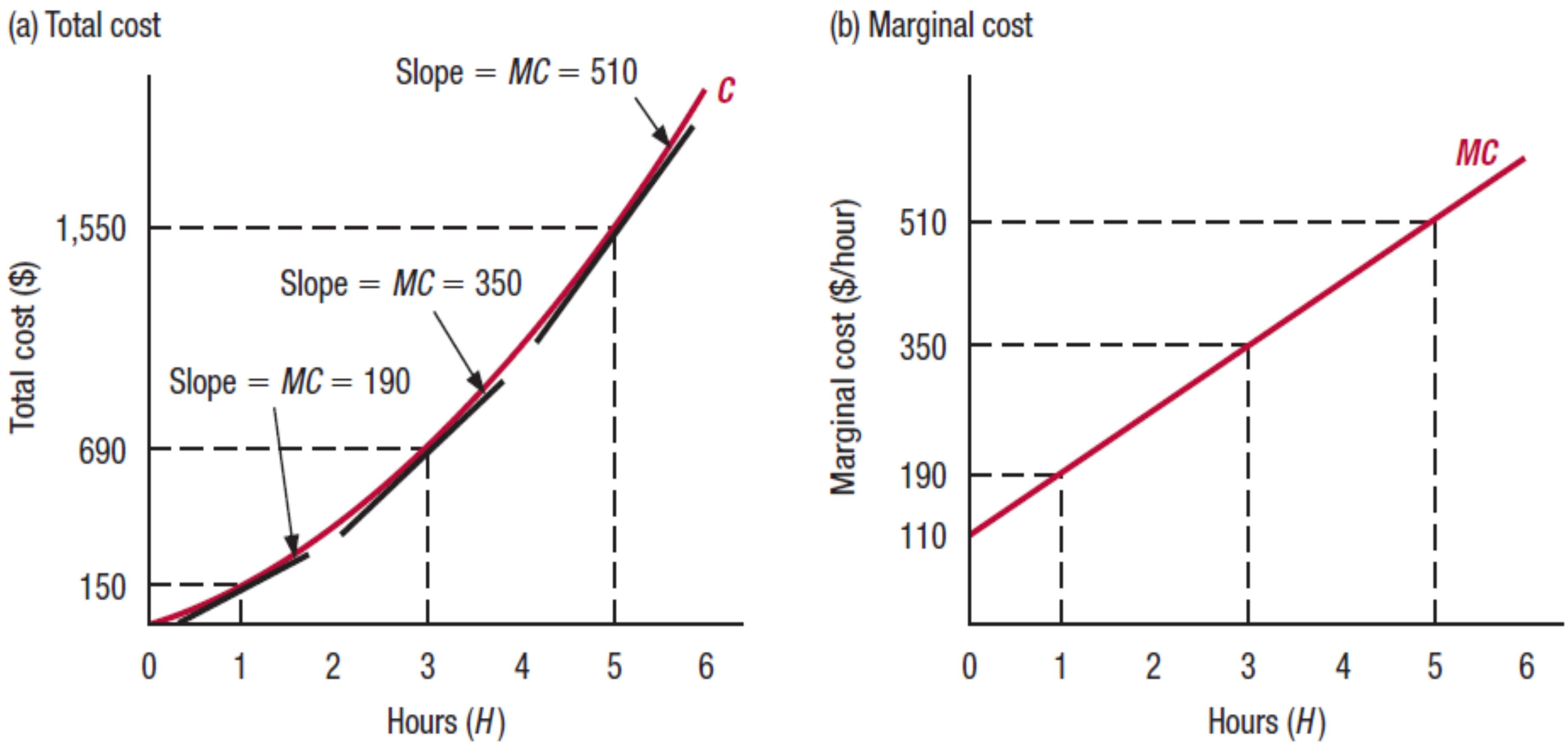
$$MB(3) = \frac{\$7 - \$6}{3 - 2} = \$1 \qquad MB(4) = \frac{\$7.50 - \$7}{4 - 3} = \$0.50$$

Constructing the MB curve from the TB curve

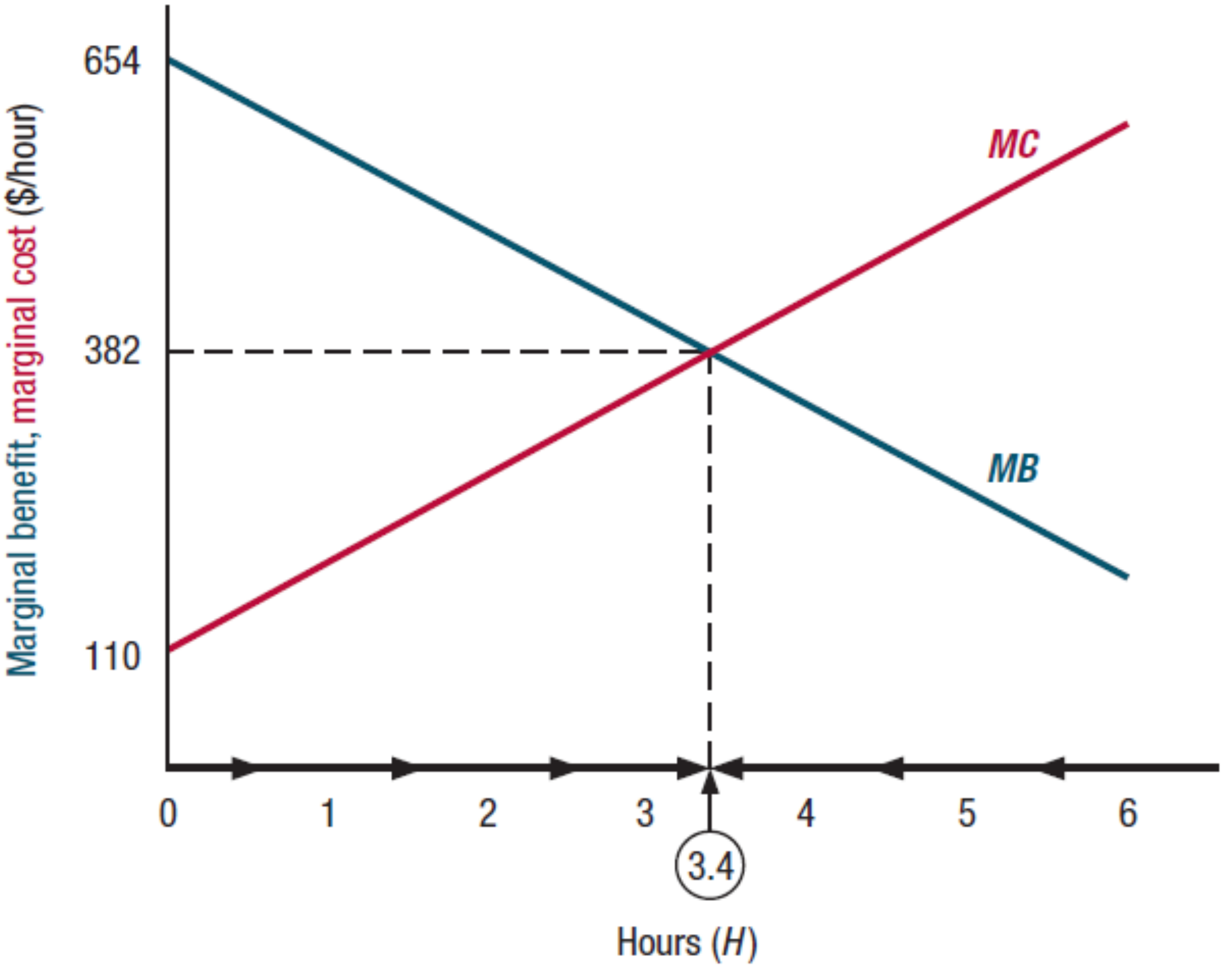
Q	MB
0	
1	4
2	2
3	1
4	0.5



The total cost and marginal cost of consuming a service



First way to determine optimal consumption choice: MB = MC



If MB > MC increase consumption

If MB < MC decrease consumption

Which is the same as looking at the equal-tangency points on TB & TC