Demand Tools

- How do we measure the responsiveness of demand?
  - Elasticity of demand

Price Elasticity of Demand

- Measures the responsiveness of the Q_D to a change in the price of the product. Note well: the term elasticity by itself always refers to price elasticity of demand unless otherwise specified.

Coefficient of Price Elasticity of Demand

- Formula for measurement of price elasticity.
- E_D = absolute value [%change in Q_D / % change in P]
- **Expanded Midpoint Formula:**
  - $E_D = |(Q_2 - Q_1)/((Q_1 + Q_2)/2)]/ [(P_1 - P_2)/((P_1 + P_2)/2)|$

Note well: The value for a price elasticity of demand coefficient is always reported as positive. We are concerned with the magnitude and not the sign for this formula. The sign will always be negative.

Price Elasticity and Total Revenue

- Total Revenue: the amount received from the sale of the tickets.

$$TR = P \times Q$$

- Elasticity is an important concept because of its relationship to total revenue.

Elastic Demand

- If the price elasticity of demand coefficient is greater than one then demand is said to be elastic.
- Thus the percentage change in Quantity demanded of tickets is greater than the percentage change in price.
- When price is decreased then TR will rise and if price is increased then TR will fall.
- Price and TR move in the opposite direction.

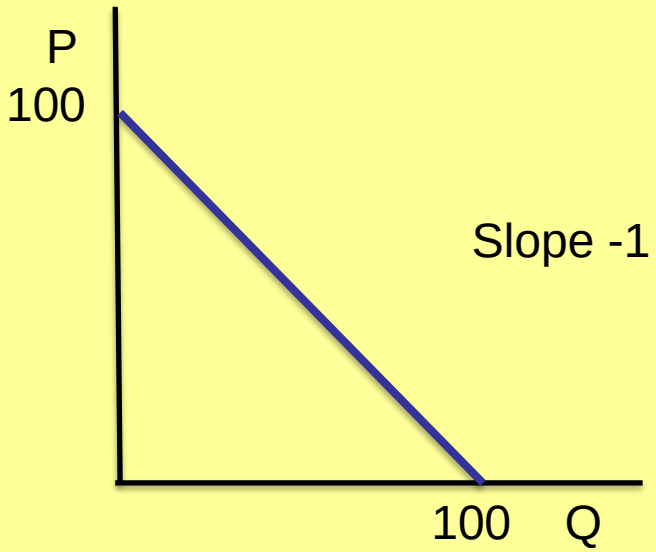
Inelastic Demand

- If the price elasticity of demand coefficient is less than one then demand is said to be inelastic.
- Thus the percentage change in Q demanded of tickets is less than the percentage change in price.
- When price is increased then TR will increase and when price is decreased then TR will decrease.
- Price and TR move in the same direction.

Unitary Elastic

- If the price elasticity of demand coefficient is equal to one then demand is said to be unitary elastic.
- Thus the percentage change in Q demanded of tickets is equal to the percentage change in price.
- When price is changed TR remains the same.

Straight line demand curve



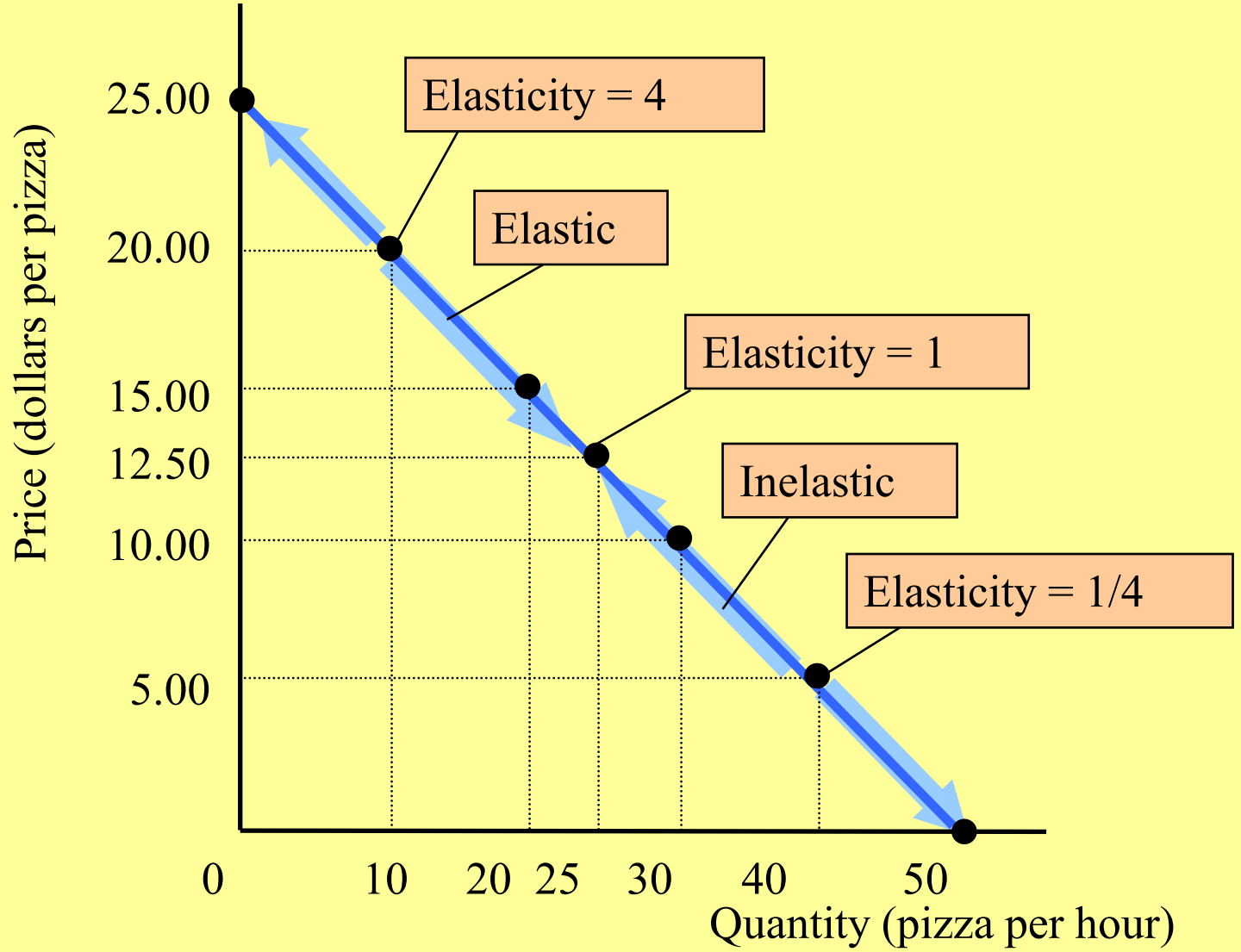
Men's Tickets	%Δ Q_D	P	%Δ P	E_D	TR
0		100			0
	10/5		10/95	19	
10		90			900
	10/15		10/85	5.67	
20		80			1600
	10/25		10/75	3	
30		70			2100
	10/35		10/65	1.86	
40		60			2400
	10/45		10/55	1.22	
50		50			2500

Men's Tickets	%Δ Q_D	P	%Δ P	E_D	TR
50		50			2500
	10/55		10/45	.82	
60		40			2400
	10/65		10/35	.54	
70		30			2100
	10/75		10/25	.33	
80		20			1600
	10/85		10/15	.18	
90		10			900
	10/95		10/5	.05	
100		0			0

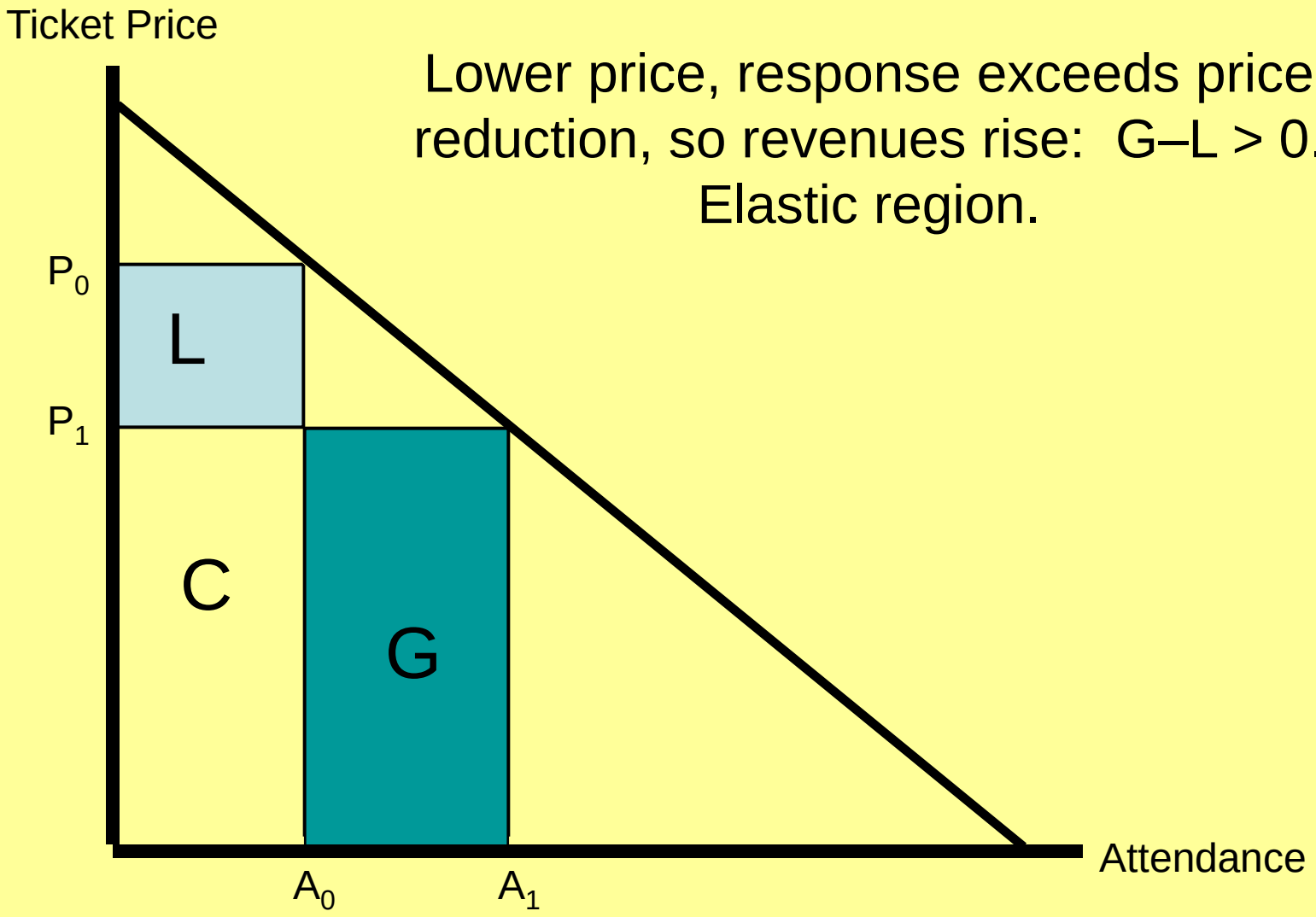
Midpoint Rule

- Any straight line demand curve which intersects both the x and y axes will exhibit three ranges of elasticity.
- Above the midpoint on a straight line demand curve demand is elastic; below the midpoint demand is inelastic. At the midpoint, or for a region spanning equal distances above and below the midpoint, demand is unitary elastic.

Elasticity Along a Straight-Line Demand Curve

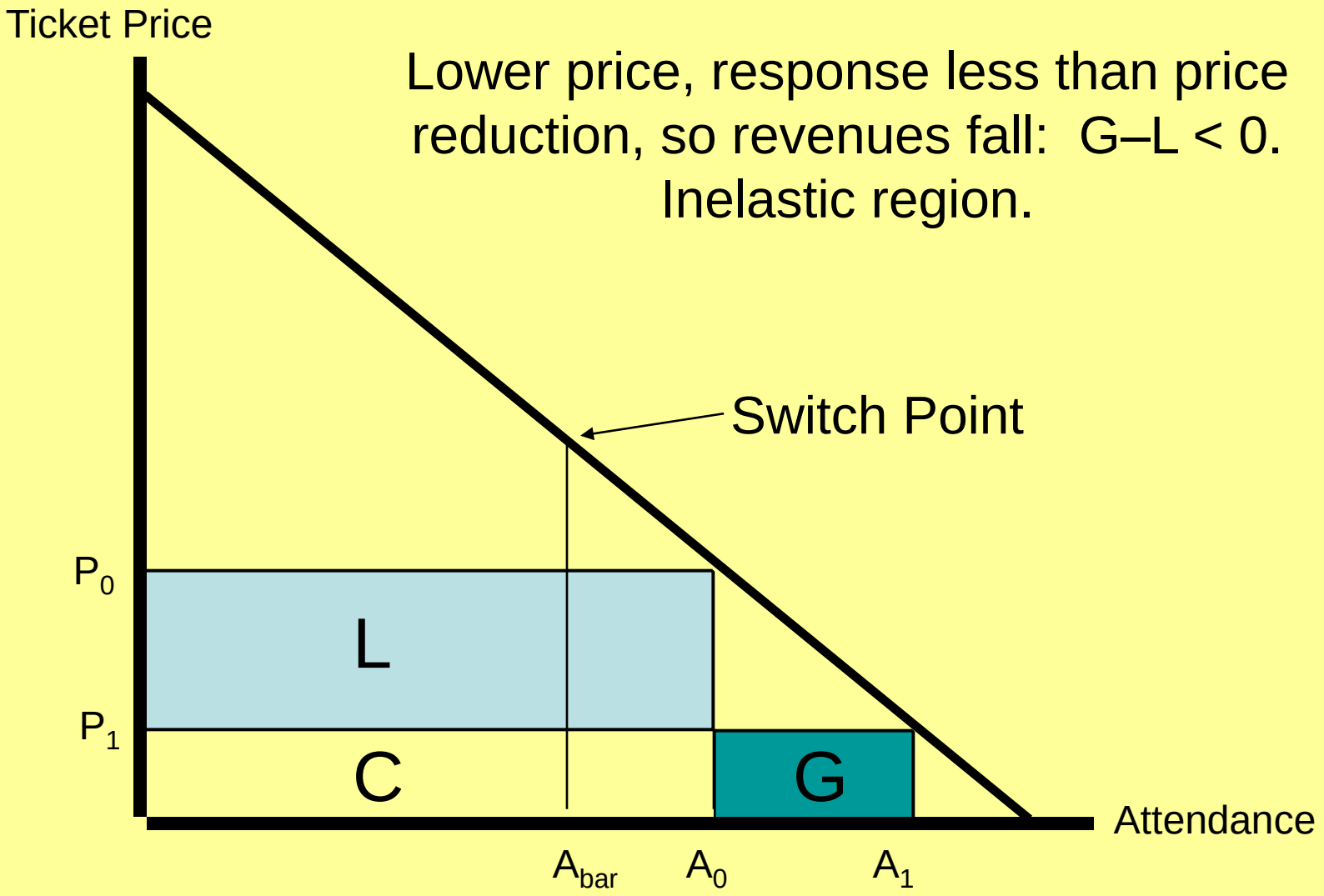


Elasticity, total and marginal revenue.



Lower price, response exceeds price reduction, so revenues rise: G–L > 0. Elastic region.

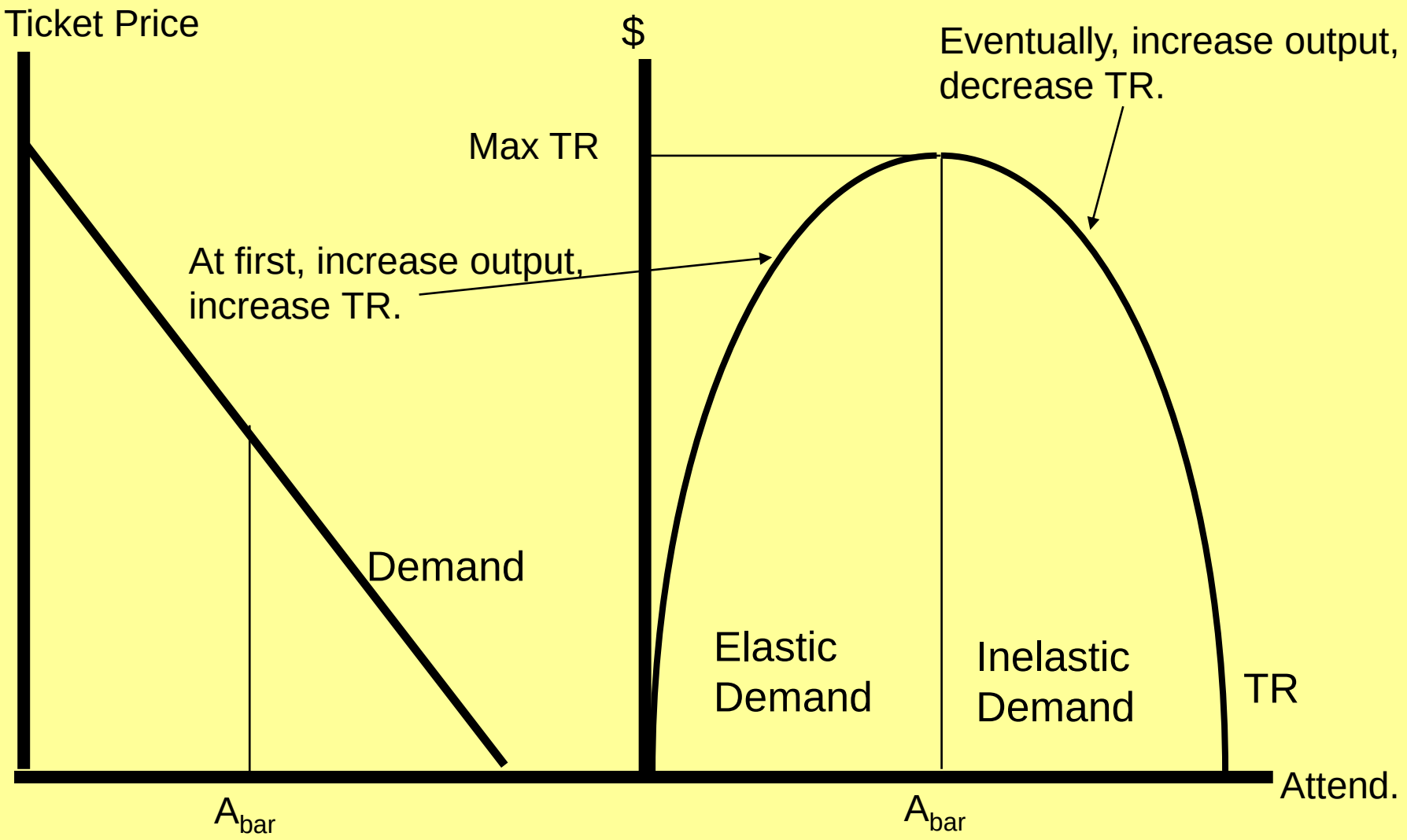
Inelasticity



Total Revenue Area of Graph

- TR can be illustrated on a graph as the rectangular area under the demand curve at a point.
- **TR is at its highest level at the midpoint of the demand curve.**

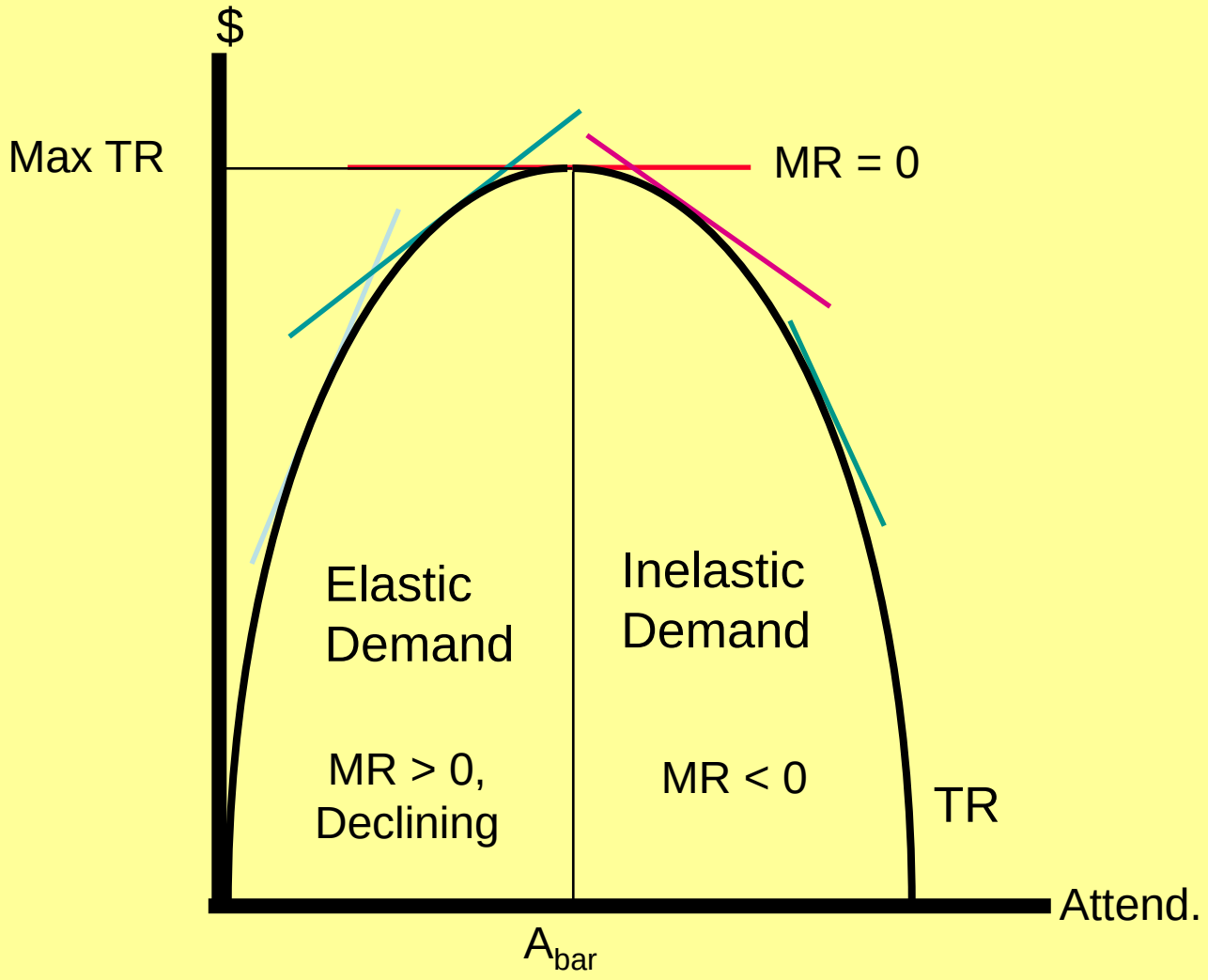
Team Total Revenue



Marginal Revenue

- Definition: $MR = \frac{\Delta TR}{\Delta Q}$
- In the limit, MR is the slope of the TR function.
- Derivation: Just track the slope of TR as output increases.

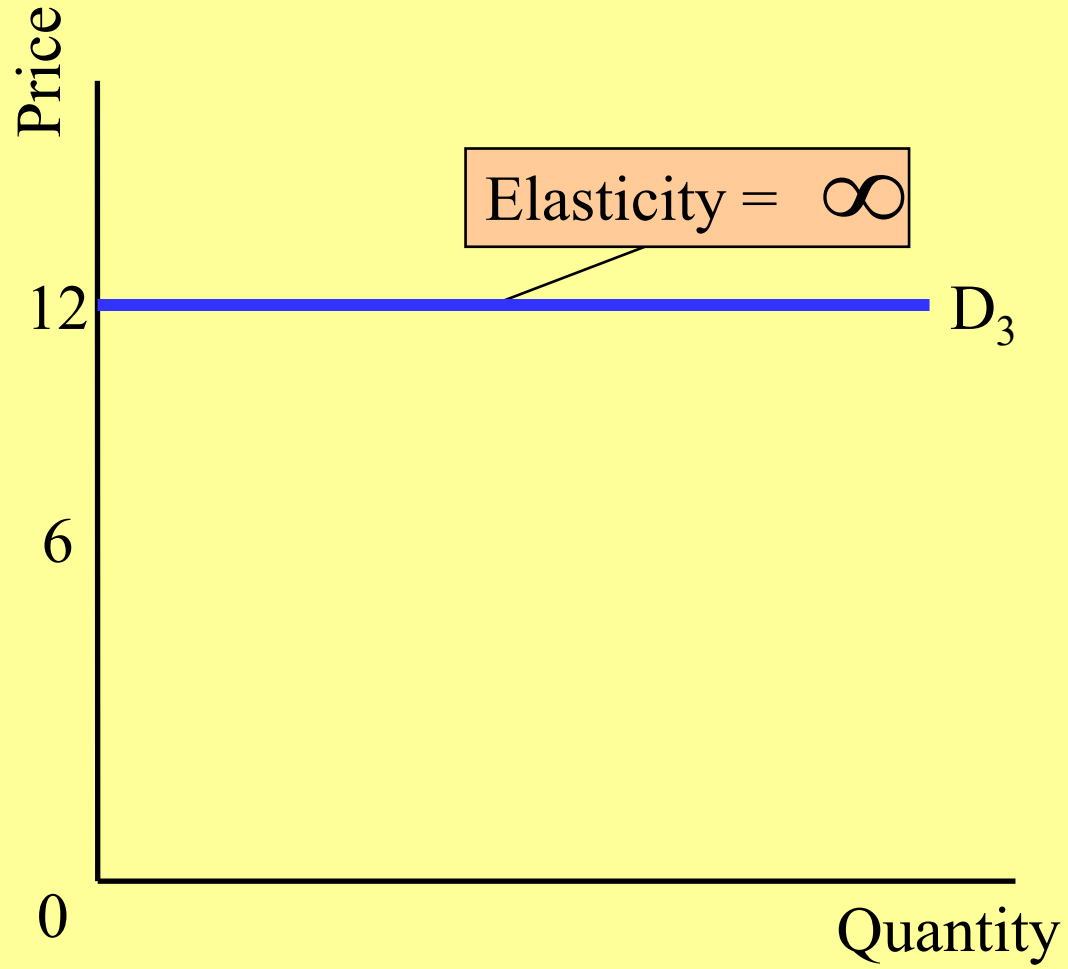
Marginal Revenue



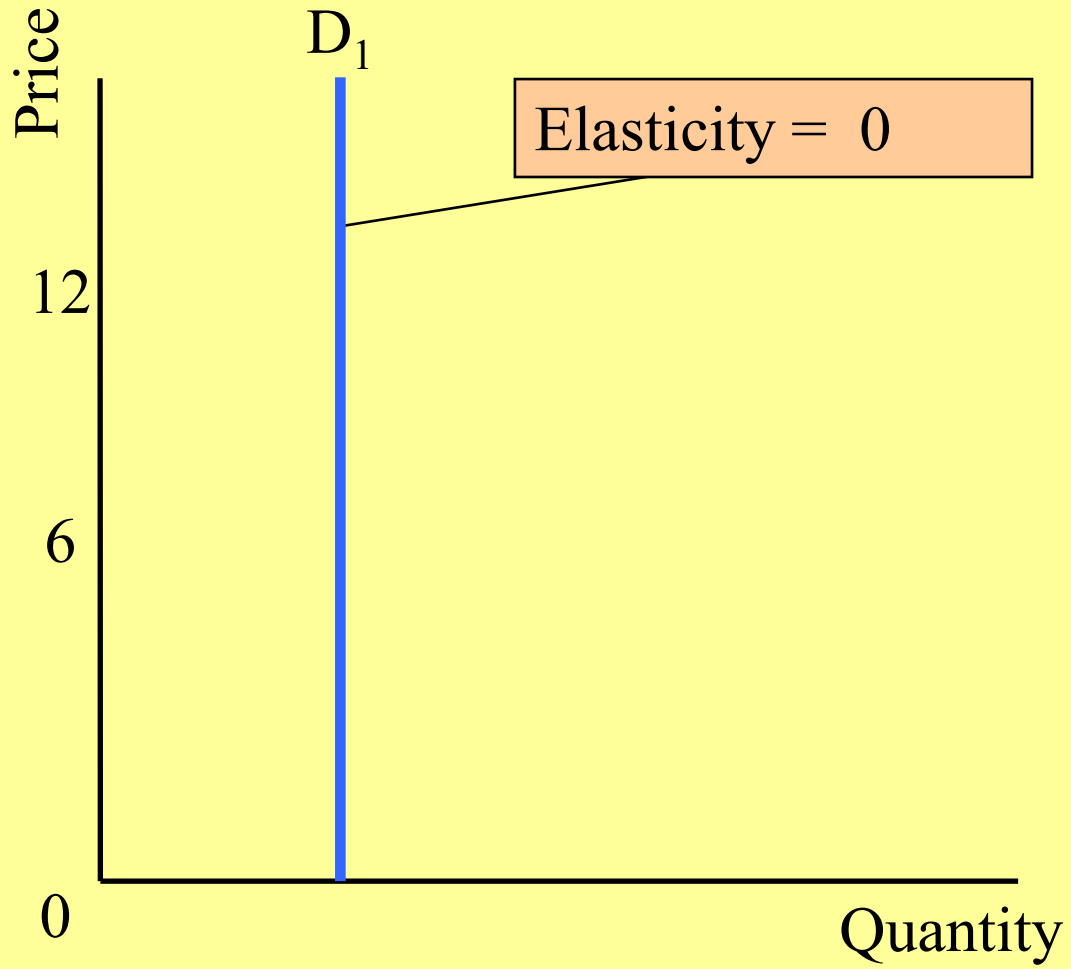
Extremes of Elasticity

- **Perfectly Elastic**: E_D = infinity. The demand curve is a perfectly horizontal straight line.
- **Perfectly Inelastic**: $E_D = 0$. The demand curve is a perfectly vertical straight line.
- **Unitary Elastic**: $E_D = 1$. It is possible to construct a demand curve that is unitary elastic throughout. It is a curve such that every rectangle under the curve has the same area.

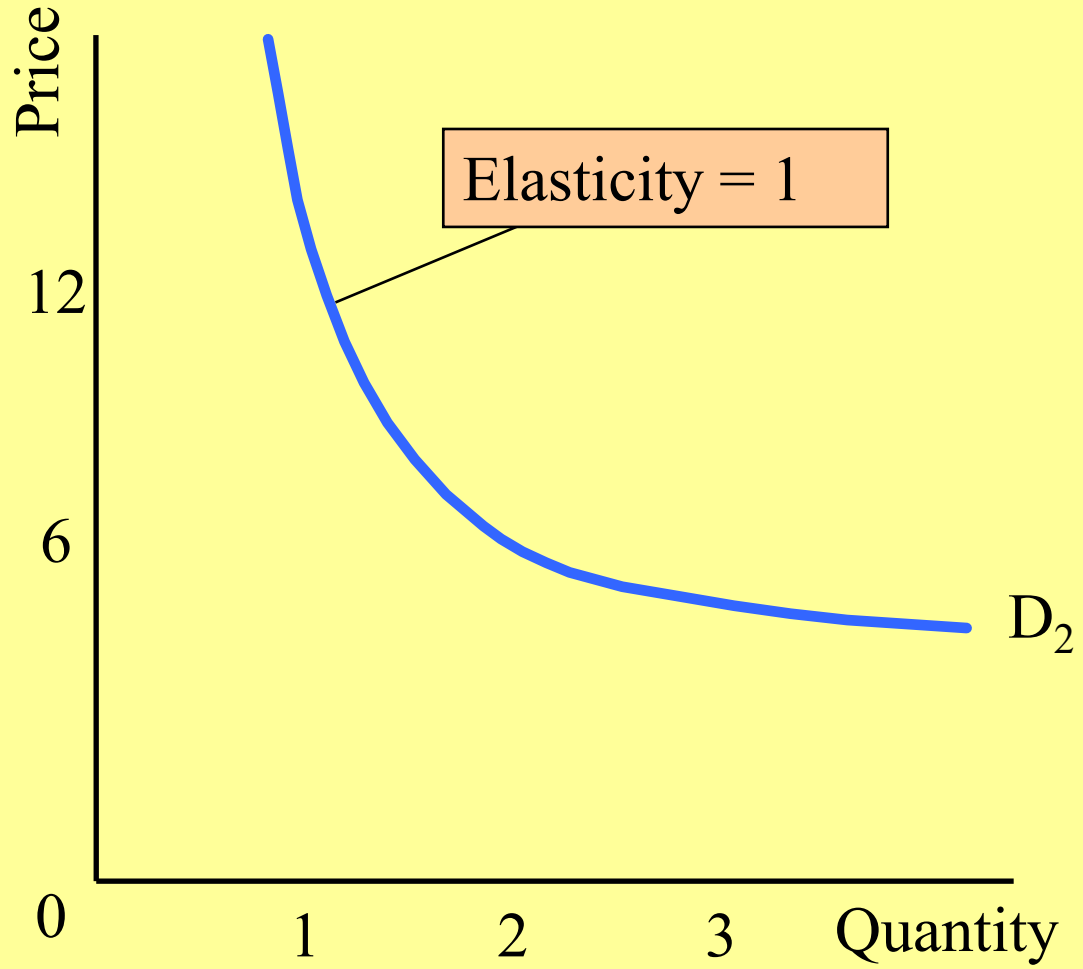
Perfectly Elastic Demand



Perfectly Inelastic Demand



Unitary Elastic Demand



Relative Elasticity

- **Relatively Elastic**: A flatly sloped demand curve may only contain the portion of the curve above the midpoint, hence the curve illustrates elastic demand. Note well: the slope and elasticity are not the same thing.
- **Relatively Inelastic:** A steeply sloped demand curve may contain only the portion of the curve below the midpoint, hence the curve illustrates inelastic demand.

Determinants of Price Elasticity of Demand

- Substitutes: the more close substitutes there are for a product, the higher is the elasticity of demand. Related, the more broadly we define the good, the lower is the elasticity of demand.
- Portion of Budget: the smaller the percentage of your budget spent on a good, the lower price elasticity of demand.
- Time to adjust: The elasticity of demand increases over time.
- Necessity vs Luxury: Normal goods more elastic than inferior goods

Other Elasticities

- Income Elasticity

  Ei = %change in Qd / % change in income

  measures normal and inferior goods

- Cross Price Elasticity

  Exz = %change in Qdx / % change in Pz

  measures the degree of substitute and complement

Market power in sports

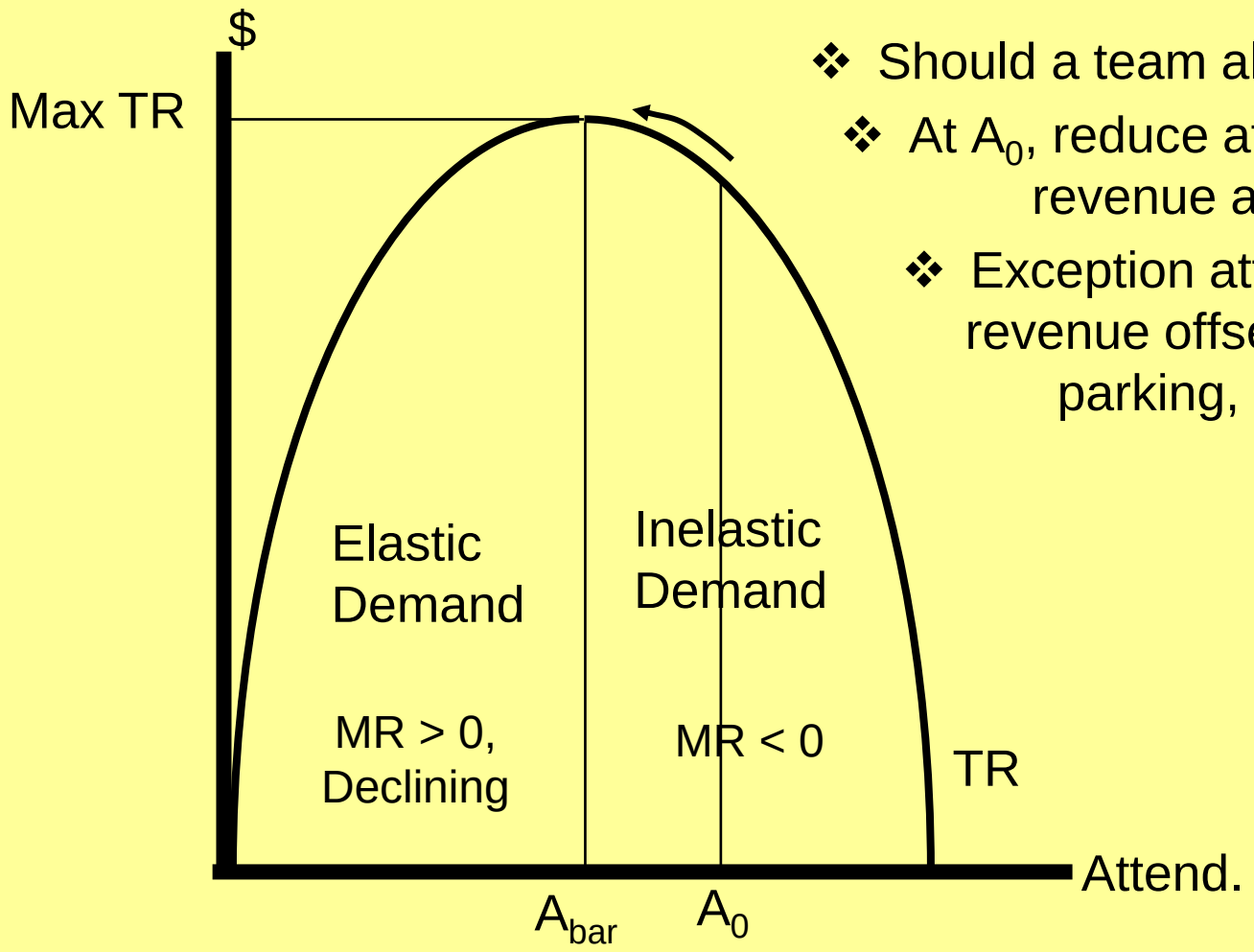
- Why the downward slope at the individual team level?
- Market power for teams.
- Teams make it happen through leagues and conferences:
- Exclusive territory & membership control.
- Exceptions?
- When population warrants more than one team.

Ticket Pricing with empty seats

Quantity	Price	TR	MR
0	10	0	
1	9	9	9 (9-0)
2	8	16	7 (8-1)
3	7	21	5 (7-2)
4	6	24	3 (6-3)
5	5	25	1 (5-4)
6	4	24	-1 (4-5)
7	3	21	-3 (3-6)
8	2	16	-5 (2-7)

Full stadium P = 2 TR = 16, Max Revenues P = 5 TR = 25

Lesson #1: inelastic pricing?



- Should a team allow empty seats
- At A_0, reduce attendance, increase revenue and lower cost.
- Exception attendance-related revenue offsets (concessions, parking, memorabilia)

Lesson #2: shifting demand and total revenue.

- Increasing attendance can only take you so far in your aim to increase revenue.
- Eventually, the only recourse is to shift the total revenue function.
- How can this happen?
- Something must increase demand.
- Any ideas?

Lesson #2, cont’d.

- Rules Innovations: Expanded play-offs, rules changes, rules enforcement.
- Other Innovations: Half-time shows, cheerleaders (then pro cheerleaders), musical interludes, applause-meter races, DiamondVision, mascots, food service, better stadium amenities, uniform innovations and sales.
- Just go to a minor league baseball game to find out what’s coming next.

Small v. Large Market

- Important Point of Analysis:
- Much is bandied in the press about small and large market teams. But just what does this mean? Data show that it doesn't always go by population. We'll take DeepThroat's advice and. . . .
- Follow the money.

A Useful Construct

- Comparing Small and Large Market Teams:
- “Large” and “small” only can be meaningful in terms of revenue.
- Demand (willingness to pay) for sports is greater in some places.
- “Large” can be taken to mean “a greater willingness to pay for all levels.”

A Useful Construct Continued

GB Packers, large or small market?

Population:

- MSA: 312,000
- NFL city average: 3.7 million

Revenues:

- GB 2005: $194 million, 12th in NFL
- NFL team average: $192 million
- NFL team median: $186 million
- NFL team minimum: $158 (AZ)

A Useful Construct Continued

<u>GB Packers, large or small market?</u>

So, Packers are:

- Half the average population.
- Right at average revenue.
- 5% greater than median revenue.
- 23% greater than minimum revenue.

“Small market?”

A Useful Construct Continued

*Always think of teams in terms of market revenue potential:

Larger potential– Larger market team

Lower potential– Smaller market team.

Don’t Forget: Preferences Vary

Go back to the general data:

NYY top MLB.

NYI bottom NHL!

And Don’t Forget: Things Change!

A Revenue Tale of Two Cities (MLB)

	1990	2005
Atlanta Braves	25/26	12/30
Seattle Mariners	26/26	8/30

It is typically true that larger revenue market teams dominate, but don’t forget that the faces change.

Summary

- Demand, its variation across sports and market power.
- Demand and sports fan “welfare.”
- Demand, elasticity, total revenue and marginal revenue in sports.
- Revenue variation and competitive imbalance in sports.