Economics of Sports in America

EconS 321: Fall 2017

Introduction: Foundations of Sports Economics

Module 1, Chapter 2

Chapter 2: The Business of Sports

Objectives:

- ❏ Discuss the demand for sports as a good
- ❏ Explain the principles of profit maximization as applied to the business of sports
- ❏ Examine costs and revenues in these businesses
- ❏ Examine the value of sports franchises
- ❏ Review the Present Value concept in relation to sports

Lesson Direction

Scarcity

Rationing

Competition

Demand for Sports

Quantity demanded:
- Attendance

Price:
- Price of admission

Team	Avg. Ticket	Pct. Change	Avg. Premium Ticket	Beer	Soft Drink	Hot Dog	Parking	Cap	FCI	Pct. Change
Chicago Bears	$131.90	21.6%	$362.02	$9.25 20	$5.00 16	$5.00	$49.00	$25.00	$685.10	14%
Washington Redskins	$119.52	17.2%	$370.20	$9.00 20	$5.00 22	$6.00	$57.50	$30.00	$657.58	10.1%
New England Patriots	$130.73	7.2%	$566.67	$7.50 20	$4.00 22	$3.75	$40.00	$21.95	$652.82	4.5%
San Francisco 49ers	$117.00	0.0%	$343.21	$10.00 16	$4.00 16	$4.50	$60.00	$26.00	$633.92	0.0%
New York Giants	$123.40	0.0%	$509.17	$5.00 12	$3.00 12	$6.00	$30.00	$25.00	$619.60	0.0%
Dallas Cowboys	$110.20	0.0%	$346.96	$8.50 16	$5.00 20	$5.50	$75.00	$19.99	$614.78	0.0%
Denver Broncos	$114.00	29.6%	$386.47	$6.75 16	$4.50 20	$5.00	$30.00	$20.00	$577.50	19.8%
Baltimore Ravens	$112.11	11.9%	$290.63	$8.50 16	$8.00 32	$3.00	$40.00	$10.00	$569.44	5.7%
New York Jets	$110.54	14.5%	$359.41	$5.00 12	$3.00 12	$6.00	$25.00	$15.00	$543.16	-1.9%
Miami Dolphins	$98.25	50.8%	$234.28	$7.75 20	$4.00 20	$6.00	$20.00	$25.99	$520.48	30.7%

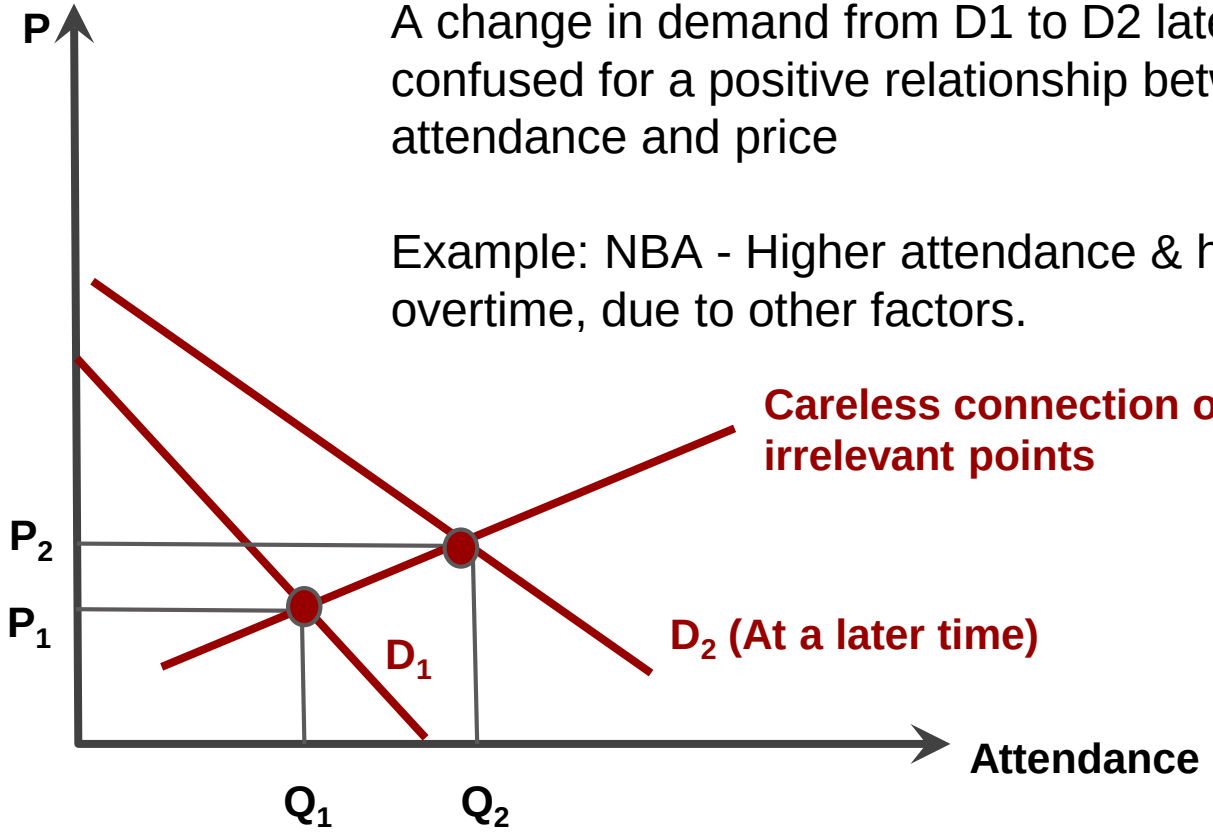
2016 MLB 2015 NHL 2016 NFL 2015 NBA

Highest Ticket Prices in College Sports (TiqIQ)

Successful Teams & Large Markets Charge Higher Prices:
http://blog.tiqiq.com/2015/01/seahawks-nfc-championship-tickets-8-last-years-prices/

Law of Demand

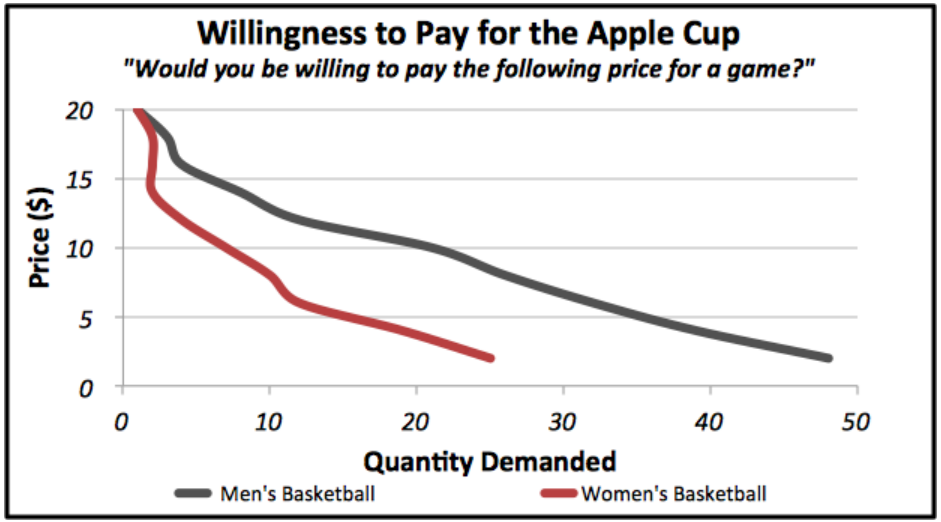
As price goes up, quantity demanded of the good goes down



Increases in Demand vs. Upward Sloping Demand

So what is it that determines the demand for Sports?

- We can move along the demand curve by changing price.
- What shifts the demand curve?



So what is it that determines the demand for Sports?

- Fan Preferences
  - Experience
  - Preferences change: women's basketball ↑ over time
  - Preference for quality
  - Uncertainty of outcome: Fans prefer their team to win in a close game
- Fan Income
  - Are sports normal goods?
    - Maybe inferior goods?
  - As income ↑, fans may switch from college to pro basketball

So what is it that determines the demand for Sports?

- Prices of Other Goods
  - Substitutes
    other entertainment, pro sports in other leagues
    As opera ticket prices ↑, demand for sports ↑
    "Should I just buy U of I tickets instead?"
  - Complements
    parking, concessions
    As parking fees ↑, demand for sports ↓

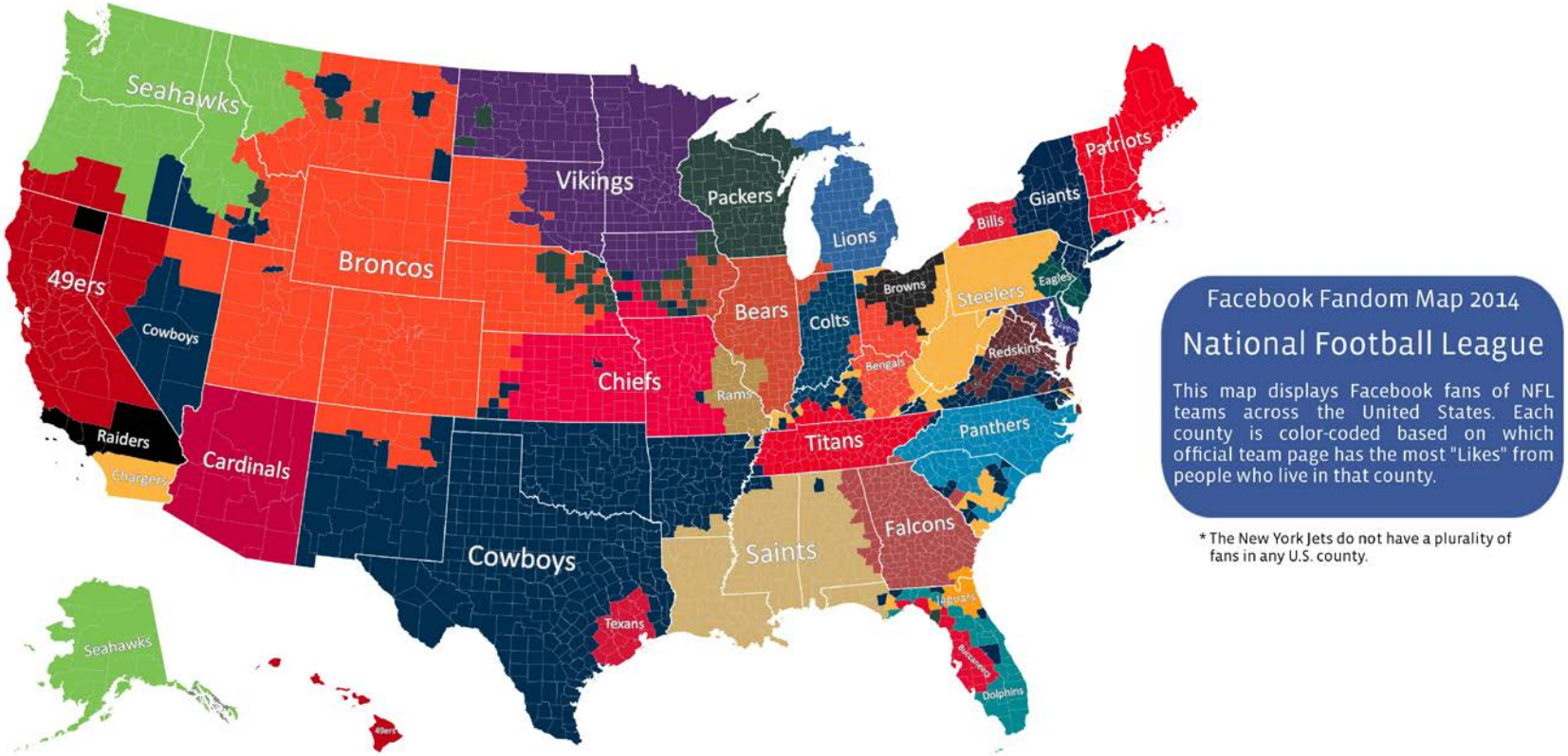
So what is it that determines the demand for Sports?

- Fan Expectations
  - Fans expect prices to ↑, demand for sports ↑ today
    Example: lifetime reservation rights, personal seat licenses

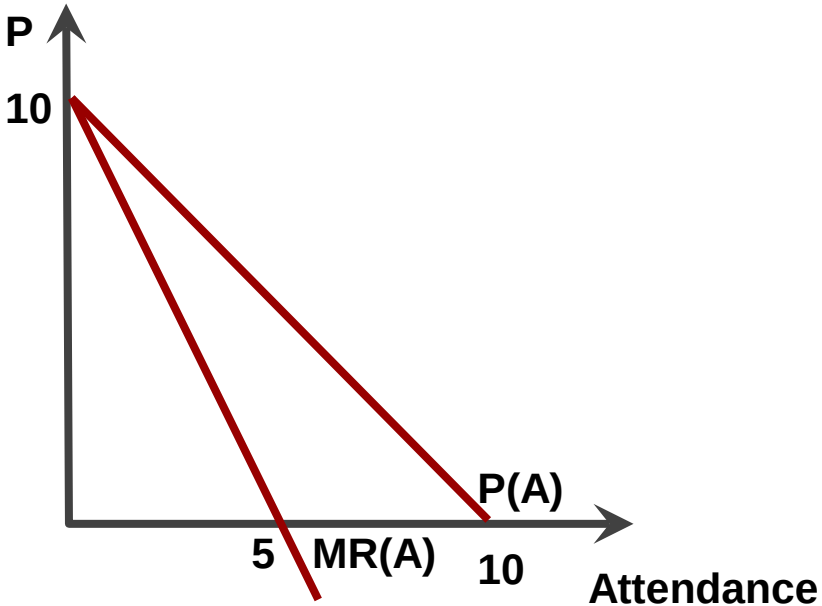
So what is it that determines the demand for Sports?

- Population
  - Bigger population – higher demand
  - Consider 2 universities of equal quality (one in a densely populated area, one in a rural area). Whose demand will be to the right?


CANADA
Okanogan Range
Okanogan
Kettle Range
Columbia
Lake Chelan
Glacier Pk
3221
Cascade Range
Olympic Mts
Seattle
W
Wenatchee Mts
WASHINGTON
Spokane
Spokane
Columbia River Basin
Tacoma
Olympia
Mt Rainier
4392
Yakima
Snake
Yakima
Mt Adams
3751
Columbia
Blue Mts
OREGON
IDAHO
Pacific Ocean



Exclusive Geographic Territories vs. Perceived Territories



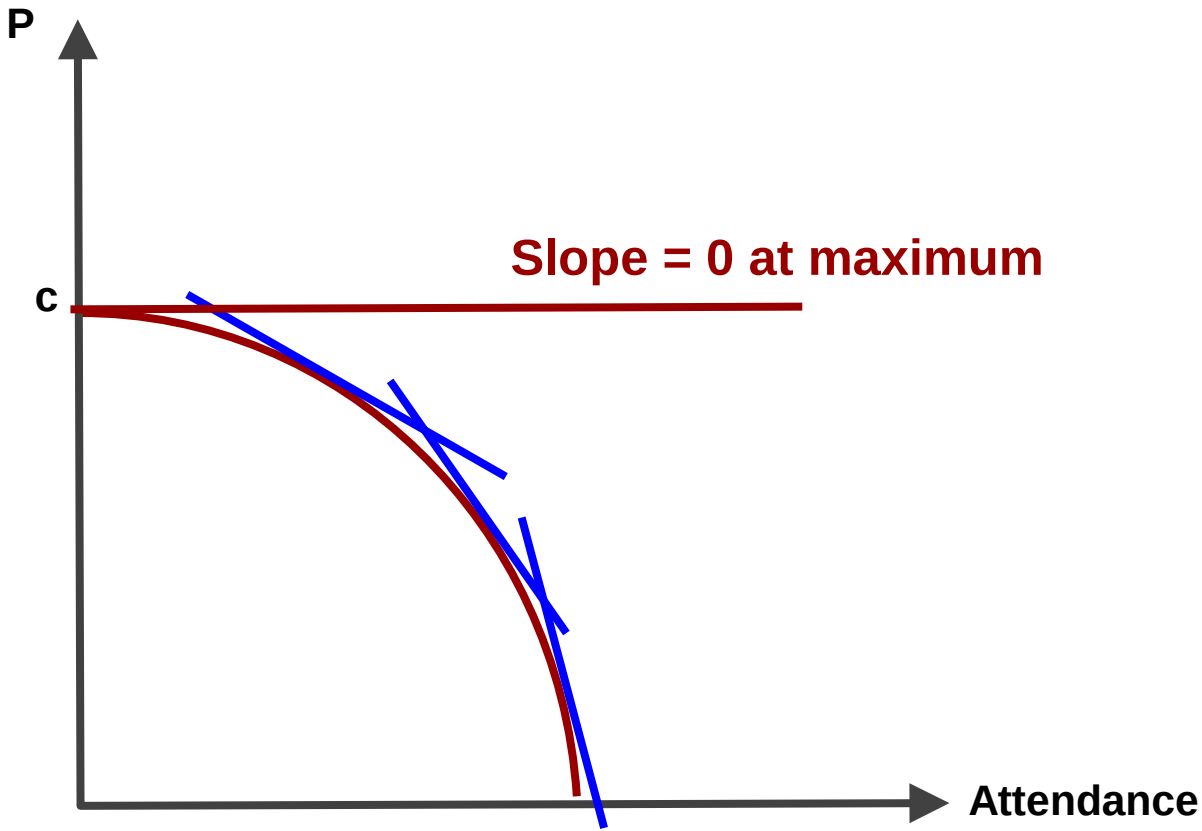
$$P(A) = 10 - A$$

$$MR(A) = 10 - 2A$$

Price	Atten.	Revenue
$1	9	$9
$2	8	$16
$3	7	$21
$4	6	$24
$5	5	$25
$6	4	$24
$7	3	$21

Mathematical Example of Revenue (Not in Lecture Notes)

Profit in Sports



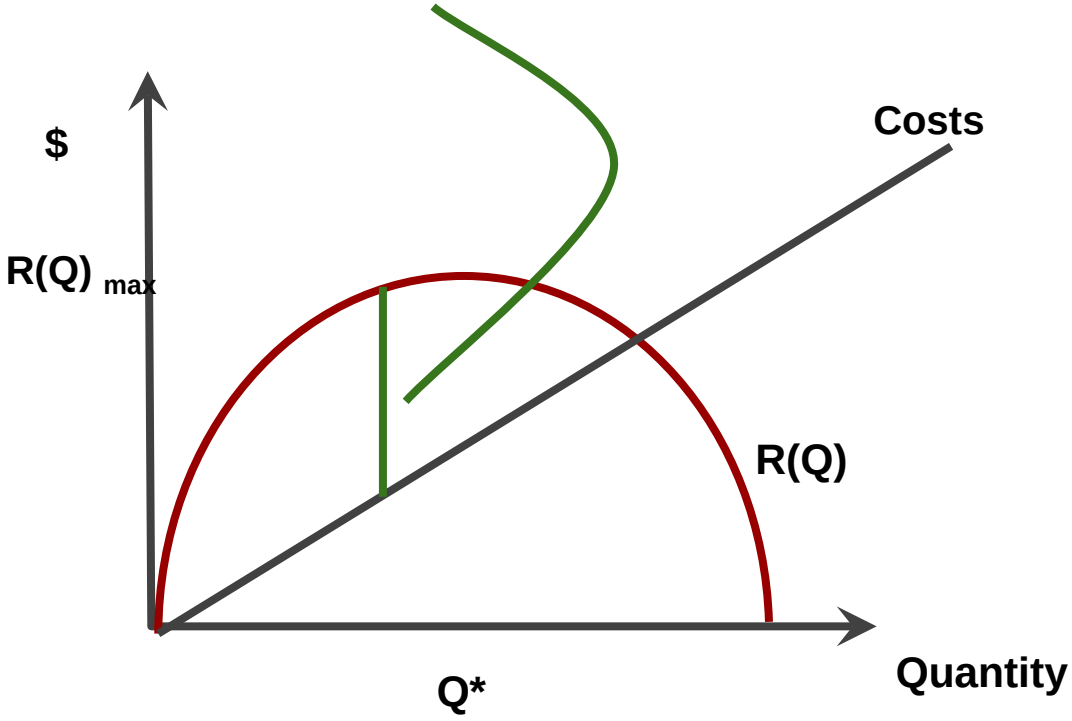
Slope:
Is not constant at every point

Each point on the curve has a different slope

Only one interesting point on the entire curve

What Do You Mean slope = P'?

Maximize the gap between revenue and costs



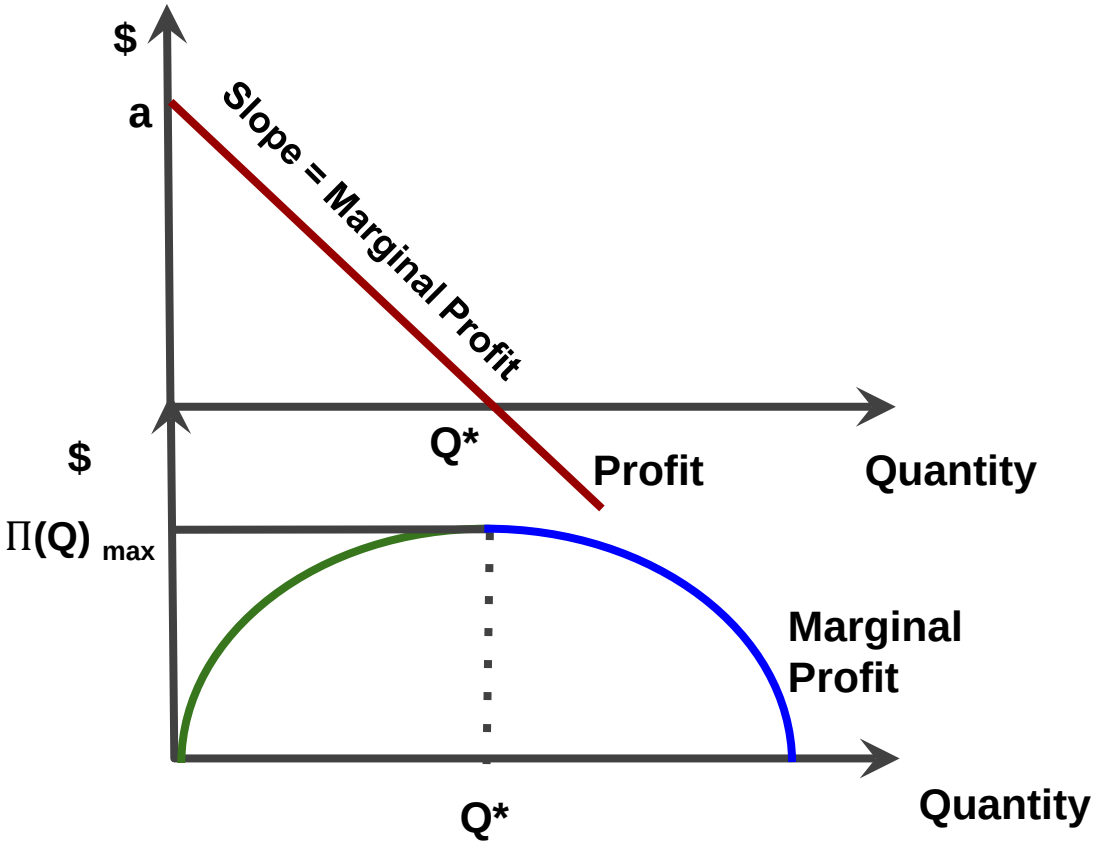
Profit Maximizing Rule

Sell the good as long as additional revenue is more than additional cost

MR = Additional Revenue
MC = Additional Cost

MR ≥ MC

Profit = Revenue - Cost



Recall:

Profit:

$$\Pi(Q) = TR(Q) - TC(Q)$$

Marginal Profit:

$$\frac{d\Pi}{dQ} = \frac{dTR(Q)}{dQ} - \frac{dTC(Q)}{dQ}$$

$$M\Pi = MR(Q) - MC(Q)$$

Max Profit occurs where:

$$M\Pi = MR(Q) - MC(Q) = 0$$

$$MR(Q) = MC(Q)$$

Going forward:

Derivative ≈ Slope

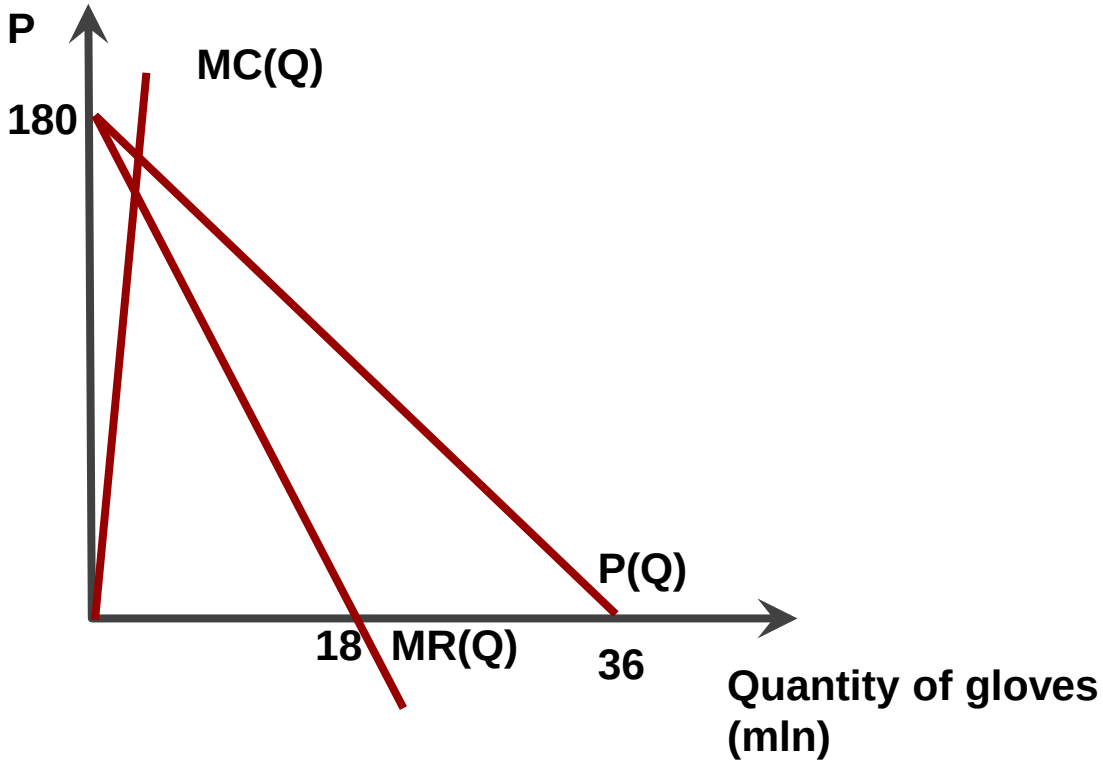
Decision Making with Derivatives

Profit in Sports
(A Numerical Example)

A Numerical Example

Suppose you know that the demand function for Brett's Best baseball gloves is:
$P(Q) = 180 - 5Q$
The cost function of Brett's Best baseball gloves is:
$TC(Q) = 25Q^2$

Find the Total Revenue, Total Cost functions.
Then find profit-maximizing Quantity, Price, and the maximum Profit



Demand for Brett's Best baseball gloves:
P(Q) = 180 – 5Q

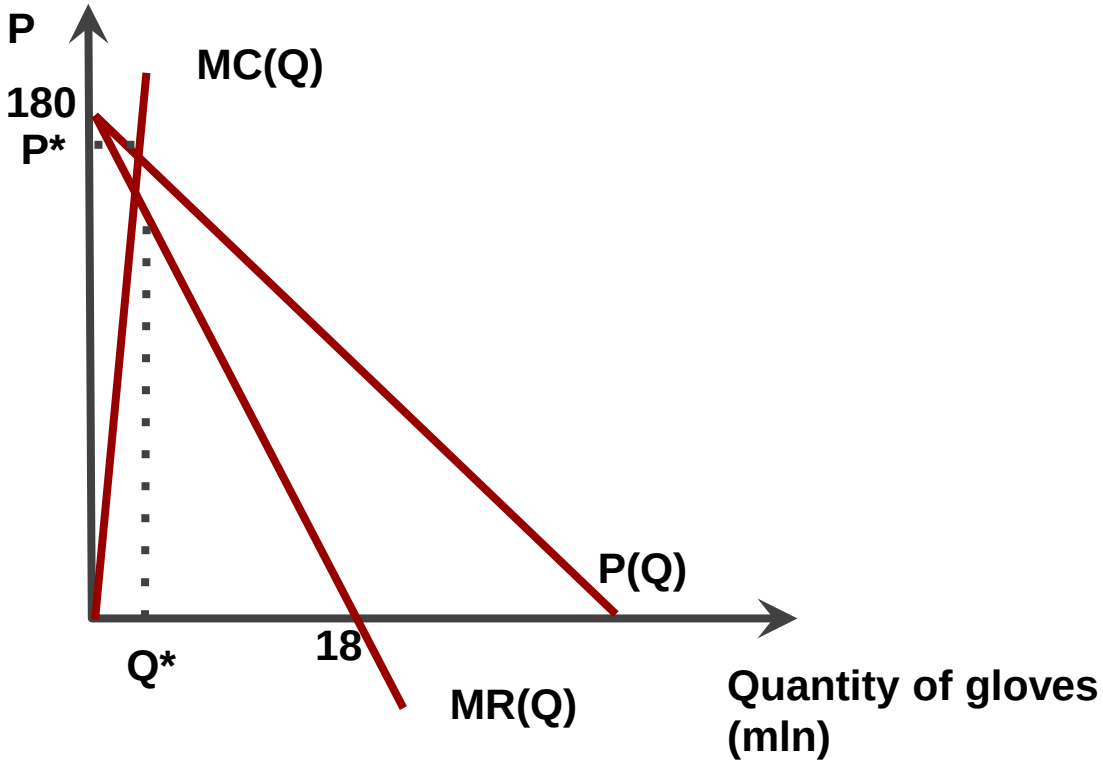
Total Revenue:
TR(Q) =P(Q)·Q
=(180 – 5Q) ·Q
= 180Q – 5Q²

Marginal Revenue:
MR(Q) =$\frac{dTR}{DQ}$=180 – 10Q

Total Cost:
TC (Q) = 25Q²

Marginal Cost:
MC (Q) = $\frac{dTC}{DQ}$ = 50Q

A Numerical Example



Profit-maximizing Quantity Q*:

MR = MC

180 – 10Q = 50Q

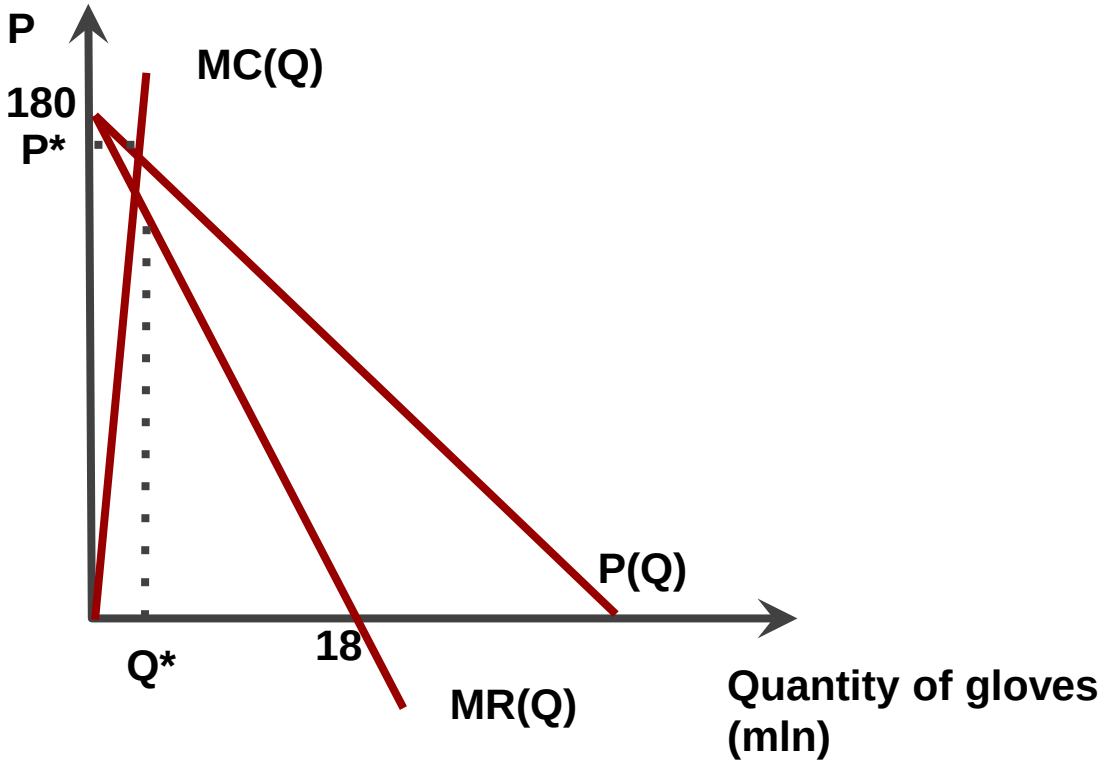
Q* = 3 mln

Profit-maximizing Price P* (plug Q* into the Demand function):

P* = 180-5Q* = $ 165

Demand for Brett's Best baseball gloves:
P(Q) = 180 – 5Q

A Numerical Example



Maximum Profit

Π^* =TR-TC

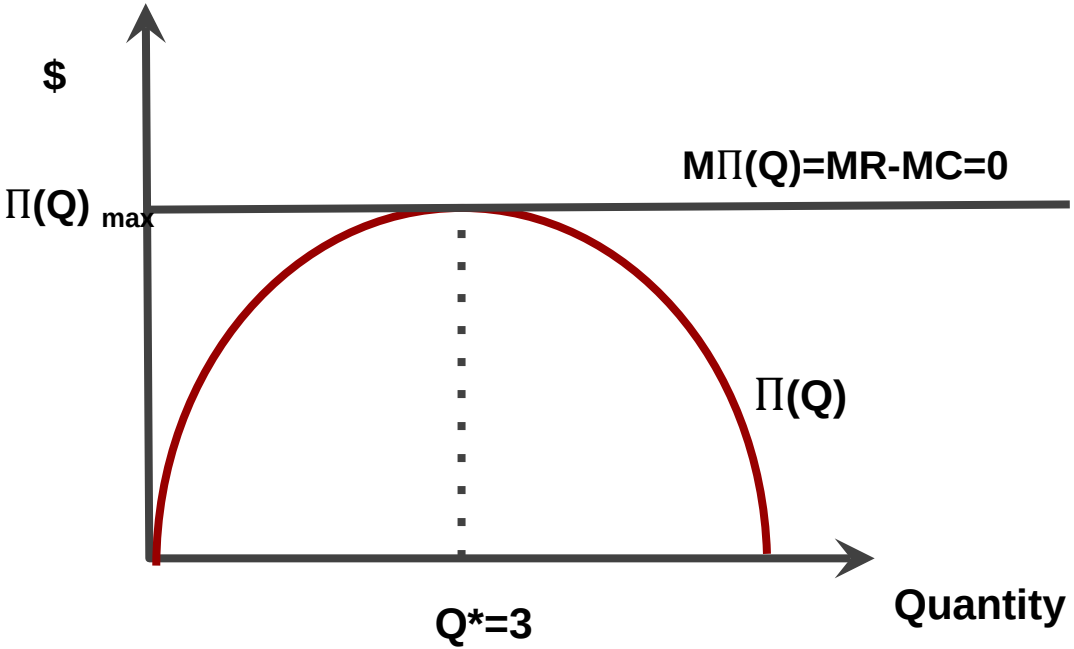
$=180Q - 5Q^2 - 25Q^2$

= $ 270 mln

Demand for Brett's Best baseball gloves:

P(Q) = 180 – 5Q

A Numerical Example



A Numerical Example

Revenues and Costs

Revenue sources:

- Gate Receipts
- Stadium Revenues
- Broadcast Revenues
- Trademark Licensing Fees
- Naming Rights

Revenues and Costs

Costs

- In the short run: almost all costs fixed
  - Salaries fixed by contract
  - Venue and office space costs fixed
  - Travel costs, meals etc have limited flexibility
  - None of these are influenced by attendance (which is what fluctuates)
  - Variable costs (affected by attendance): post-game cleanup, repair costs
- In the long run: both fixed and variable costs
  - Variable costs:
    - Costs associated with location, venue, team personnel, salary structure and team quality
  - Fixed costs:
    - Costs associated with the required game schedule, pre-season and post-season commitments

Revenues and Costs

Club Profit – difference between total revenues from all sources and total costs associated with them (Profit = TR – TC)

Profit and Team Quality

The club's general manager should select team quality to maximize profit.

Assume team quality is determined by the number of stars on the roster. Suppose S is the number of stars (better players) on the team. The manager acquires the stars at a cost C(S). The price of a ticket is now a function of quantity (attendance) and team quality (S): P(Q, S).

Profit $\Pi = P(Q,S) \cdot Q - C(Q) - C(S)$

Profit and Team Quality

Profit is maximized by adding stars until: Marginal Benefit of adding another star = Marginal Cost of another star.

Marginal Benefit = $\frac{\partial P\ (Q,S)}{\partial S} \cdot Q$

Change in price that can be charged due to an added star

Number of teams

Marginal Cost = $\frac{\partial C(S)}{\partial S}$

Increase in team payroll necessary to add another star

MB = MC will determine the optimal number of stars on the team

Profit and Team Quality

- How sensitive is attendance to team quality?

  - Let's take the NFL
  - Some teams with poor records do have poor attendance

  Example: 2010 season, Oakland Raiders (8-8 record) – 73% attendance

  - Other teams with poor records have high attendance

  Example: 2010 season: the Carolina Panthers (2-14) – 98% attendance
  Seattle Seahawks (7-9) – 100% attendance
  At the same time, the NY Jets (11 – 5) – only 95% attendance

  Why is that? The NFL is so popular that the demand is quality-inelastic

Value of a Professional Club

Is the present value of the stream of expected future profits:

PV of the Profit

PV of the market value of the franchise

$$PV(\Pi) = \sum_{t=1}^{T} \frac{\Pi_t}{(1+i)^t} + \frac{v}{(1+i)^t}$$

where: Π_t is expected profit in year t, i is the discount (or interest) rate, T is the owner's time horizon (some time period in the future), v is the market value of the franchise at time T (in that future period). Both profit and franchise value are discounted to present, by dividing by $(1+i)^t$

Value of a Professional Club

- Actual profitability of major league clubs is unclear.
- The owners are reluctant to admit that they earn any profit. Why?
  - This is because players' unions will ask for a larger share of the total revenues. If the owner can persuade the union that they are not making profit, the unions may not ask for more of the revenue
  - In private clubs: owners' books and financial records are not public (not available through Securities and Exchange commission filings)
  - Publicly held clubs: typically are a part of a larger business entity. E.g. the Tribune Company owned the Chicago Cubs + owns various news media. Thus one cannot separate the profits made specifically by the club.
  - One indicator of profit – many potential owners

Value of a Professional Club

- Why own a team?

  - Franchise Value Growth
    - Example: NFL

    2016: Avg value = $2.34 bln.

    Highest value: The Dallas Cowboys, 4.2 bln
    - Example: NBA

    2016: Avg value >1 bln for the first time

  - Other benefits
    - Gives owners celebrity status

NFL Franchise Values (Blair, Sports Economics)

Year	Average Value (mln)	Rate of Return from Year to Year
1995	$160	
1996	$174	8.75%
1997	$205	17.82%
1998	$288	40.49%
1999	$385	33.68%
2000	$423	9.87%
2001	$466	10.17%
2002	$531	13.95%
2003	$628	18.27%
2004	$733	16.72%
2005	$819	11.73%

Franchise Value Growth in the NFL

- Table 2.9 in the textbook shows the average franchise values during the 1995 – 2005 period.

- What compound growth will increase the average franchise value from $160 mln to $819 mln over 10 years?

- $PV(1+i)^n = FV$
  where PV – present value
  FV – future value, n - # years
- $160(1+i)^{10} = 819$
- $(1+i)^{10} = 819 /160$
- $i = (819/160)^{1/10} – 1 = 0.177$
- Thus average franchise value in the NFL rose by a compound annual growth rate of 17.7 percent

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Franchise Value Growth in the NFL

- The following table shows the revenue by the Chicago Bears from 2001 – 2015

- Suppose the interest rate was 0.05 (5%).
- What was the total revenue in the period from 2012 to 2015 in 2015 dollars?

Answer:

TR = 308 + 314 + 352 + 385 = 1,359,000,000

Chicago Bears Franchise Values 2001 - 2015

Year	Nominal Revenue (mln U.S. dollars)	Real Revenue (mln US dollars Base year: 2015)
2001	124	166
2002	132	174
2003	175	225
2004	193	242
2005	201	244
2006	209	246
2007	226	258
2008	241	265
2009	254	281
2010	266	289
2011	286	301
2012	298	308
2013	309	314
2014	352	352
2015	385	385

Franchise Value Growth in the NFL

- What is the Future Value of this revenue (2012-2015) as of 2015?

- **Answer:**
- $PV(1+i)^n = FV$
  where PV – present value
  FV – future value, n - # years
- FV of 2015 revenue only: FV = 385 mln
- FV of 2014 revenue only:
  $FV = 352 \text{ mln} * (1+0.05)^1 = 369.6 \text{ mln}$
- FV of 2013 revenue only:
  $FV = 314 \text{ mln} * (1+0.05)^2 = 346.13 \text{ mln}$
- FV of 2012 revenue only:
  $FV = 308 \text{ mln} * (1+0.05)^3 = 356.54 \text{ mln}$

- Summing over all future values:
- Total FV = 385 + 369.6 + 346.13 + 356.54 = $1,458,000,000

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