Sports Leagues and Competitive Balance

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League Formation

A league provides a reliable schedule, championships, and systematic rivalries.

Sports leagues act as joint ventures.

- A joint venture is a business enterprise in which two or more independent entities collaborate to achieve some commercial objective.
- With a league, clubs can cooperate to make their output attractive to their fans, pool their broadcast rights, and negotiate with the players union.

League Formation

Definition
A **cartel** is a group of independent firms that agree not to compete with one another in order to increase individual profits.

Cartels often agree to fix prices, restrict production, rig bids, divide markets, or refuse to deal with others.

Some think of sports leagues as cartels, but teams in a league act more like local monopolists as they usually have the major part of their market share in the location where they reside.

Profit Maximization

Clubs will act "selfishly" in the sense that they will only be concerned with their own profits.

Although, a club will care about the financial well-being of the others as the other's success may contribute to their own success.

Leagues form primarily because it is in the clubs' best financial interest to become members of a league (i.e. clubs will receive more profits).
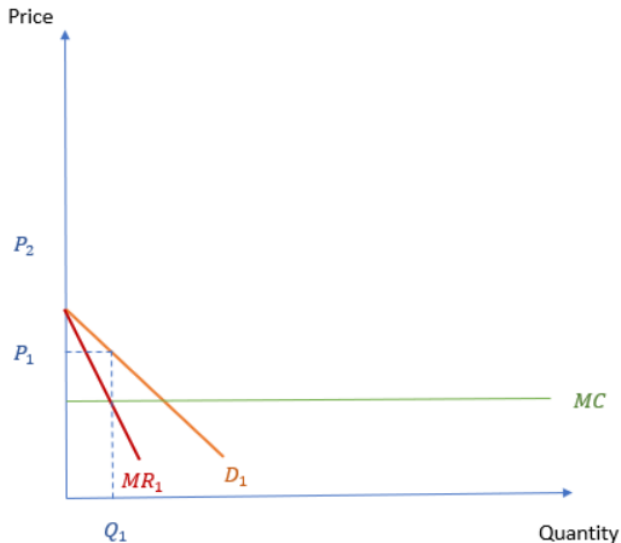
Profit Maximization

How can this be explained by our previous profit formula?

With leagues, a club's:

- Demand increases (thus revenue increases)
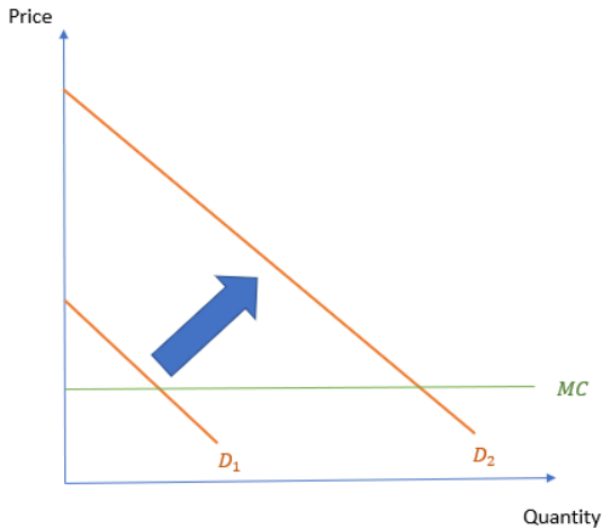- Costs decrease

Profit Maximization

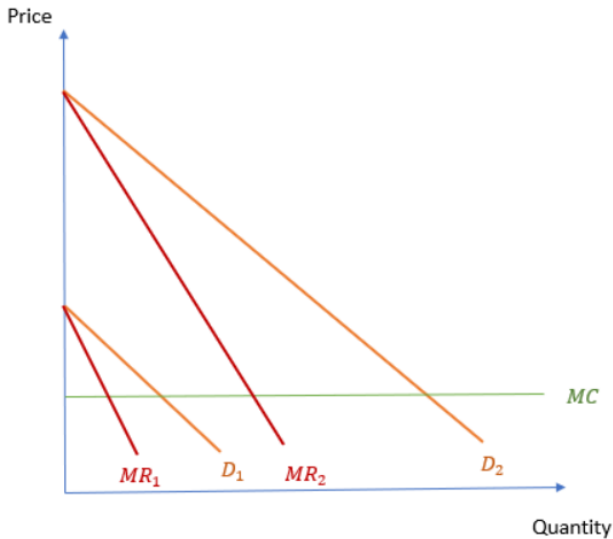# Profit Maximization

Figure: Demand

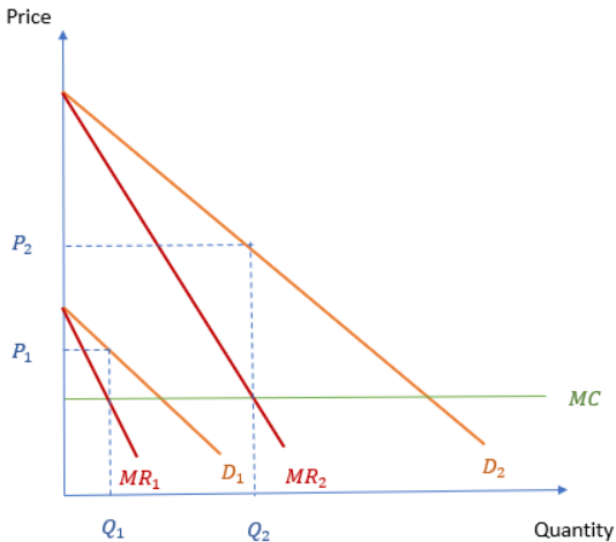# Profit Maximization

Figure: Demand

Profit Maximization

Profit Maximization

The main reason for the increase in profits can be attributed to increase in demand.

Demand increases since:

- Leagues can provide predictable schedules
- Traditional rivalries can form
- There can be championships
- Performance can be more meaningful

Profit Maximization

The games will become more popular, and thus the fans willingness to pay for tickets, concessions, parking, and licensed merchandise will increase.

Networks and cable television providers will pay more for broadcasting rights.

Sponsors will pay more for naming rights.

Profit Maximization

How do European Leagues compare with American Leagues (generally)?

English football league system

https:
//en.wikipedia.org/wiki/English_football_league_system#
Promotion_and_relegation_rules_for_the_top_eight_levels

Profit Maximization

League membership:

- A league must decide on the number of franchises and their locations.
- Potential members who wish admittance may be denied entry in order to preserve the profits of the incumbent members.
- A set of prerequisites may be developed.
  - One prerequisite may be about the owners' wealth in order to maintain the league's financial stability.
  - Transfer of ownership may have to be approved by the league.

Why might the league be concerned about the transfer of ownership of a franchise?

Profit Maximization

Location, location, location:

Leagues must determine franchise locations.

- Most club owners will want to locate in larger metropolitan areas in order to have a big enough fan base to support the team.
- In order to maximize profit, franchise locations should not be close together.
- Although, some cities, like Los Angeles and New York, may be able to support multiple teams of a league.

Relocation of a franchise can increase league stability.

Location

Profit Maximization

Major sports leagues are usually governed by the membership.

- Individual members agree to follows the rules, as they are designed to maximize profit.
- Authority is granted to a commissioner who is to make decisions that can affect the owners.

Rules of play must be uniform so that players and fans understand what is happening during games.

League members must agree to dates and locations of games.

League members must also agree to the procedure for determining the league champion.

Profit Maximization

League members agree on various aspects of the market for players like:

- Eligibility requirements
    - Age
    - Gender
- How and when draft is conducted
- Salary Caps
- Mobility restrictions
- Penalties for off-field behavior
- Other player issues

League Expansion

League expansion might happen for two reasons:

- Profitable opportunity
- Leagues preempt the development of a rival league

League Expansion

What issues might a new sports franchise have?

https://fivethirtyeight.com/features/
vegas-has-the-best-expansion-team-in-the-history-of-pro-sport

League Expansion

Why doesn't a league expand to every financially viable location?
It is necessary to leave some markets unserved because clubs can get more
from their current home city by having a credible threat of moving?

Monopoly Power

Monopolists have all market power, and can therefore influence price and quantity purchased.

A monopoly implies that there are no substitutes. There may be many imperfect substitutes. For example, MLB is the only seller of major league baseball games, but it has imperfect substitutes: minor league, college, and high school baseball games.

Economists might object to the idea of a monopolist as it leads to an underproduction of the output and a consequent misallocation of scarce resources.

Monopoly Power

The demand curve shows the fans' willingness to pay.

Remember that under competition, the firms set price such that: P=MC.

Consumer Surplus - the difference between the fans' willingness to pay and the price that is actually paid. (Area between the demand and price)

Producer Surplus - the difference between the amount a producer receives and the minimum amount the producer is willing to accept. (Area between the price and marginal cost)

Monopoly Power

Competitive Market
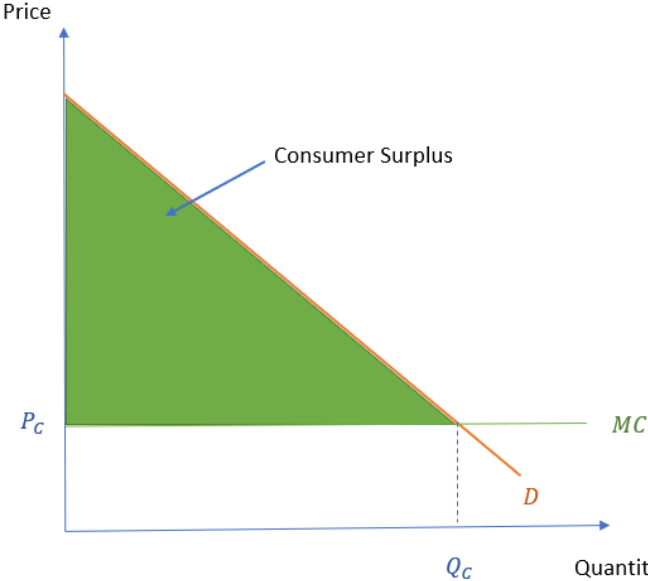
Monopoly Power

Monopoly

Competitive Balance

Google Searches for MLB Teams
Relative popularity, 2004-2014

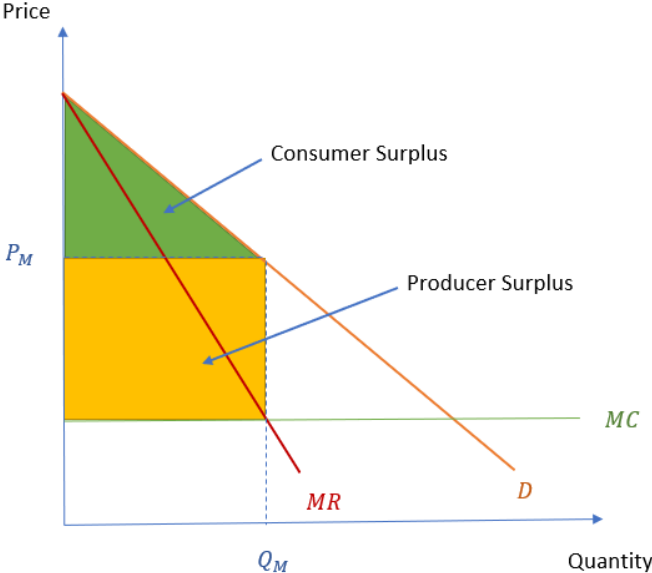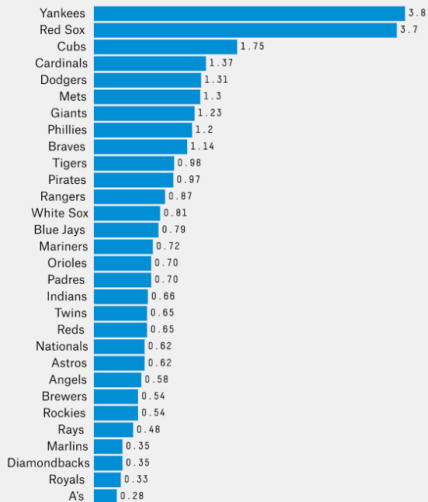| Team	Value
Yankees	3.8
Red Sox	3.7
Cubs	1.75
Cardinals	1.37
Dodgers	1.31
Mets	1.3
Giants	1.23
Phillies	1.2
Braves	1.14
Tigers	0.98
Pirates	0.97
Rangers	0.87
White Sox	0.81
Blue Jays	0.79
Mariners	0.72
Orioles	0.70
Padres	0.70
Indians	0.66
Twins	0.65
Reds	0.65
Nationals	0.62
Astros	0.62
Angels	0.58
Brewers	0.54
Rockies	0.54
Rays	0.48
Marlins	0.35
Diamondbacks	0.35
Royals	0.33
A's	0.28

FIVETHIRTYEIGHT SOURCE: GOOGLE TRENDS

NBA Team Popularity
Relative frequency of Google searches

Team	Value
Lakers	4.47
Heat	2.82
Celtics	2.06
Bulls	1.84
Knicks	1.65
Rockets	1.56
Spurs	1.51
Nets	1.34
Pistons	0.98
Cavaliers	0.98
Raptors	0.95
Mavericks	0.93
Suns	0.91
Thunder	0.74
Warriors	0.63
Clippers	0.58
Nuggets	0.58
Pacers	0.56
76ers	0.54
Trail Blazers	0.51
Magic	0.51
Timberwolves	0.42
Bobcats	0.41
Kings	0.41
Jazz	0.40
Pelicans	0.40
Grizzlies	0.35
Wizards	0.35
Hawks	0.32
Bucks	0.30
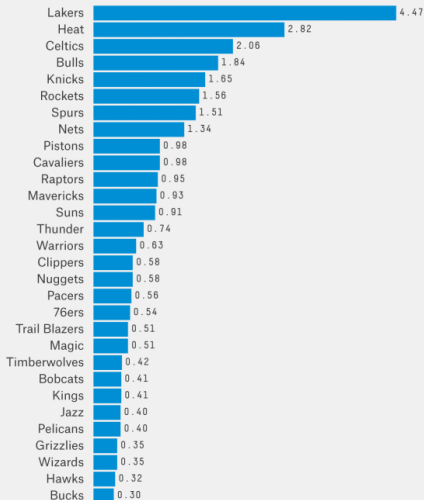
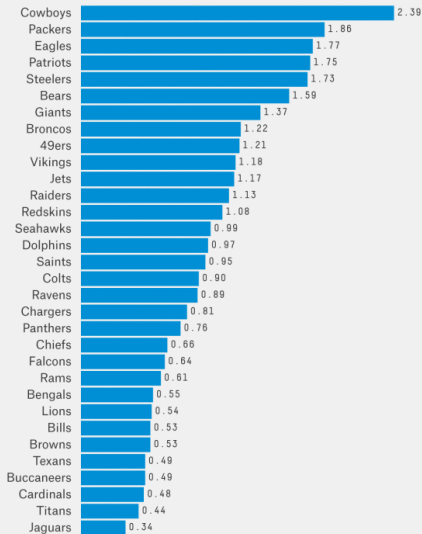FIVETHIRTYEIGHT SOURCE: GOOGLE TRENDS

Competitive Balance

NFL Team Popularity
Relative frequency of Google searches

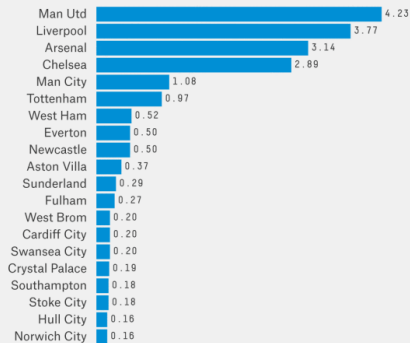| Team	Value
Cowboys	2.39
Packers	1.86
Eagles	1.77
Patriots	1.75
Steelers	1.73
Bears	1.59
Giants	1.37
Broncos	1.22
49ers	1.21
Vikings	1.18
Jets	1.17
Raiders	1.13
Redskins	1.08
Seahawks	0.99
Dolphins	0.97
Saints	0.95
Colts	0.90
Ravens	0.89
Chargers	0.81
Panthers	0.76
Chiefs	0.66
Falcons	0.64
Rams	0.61
Bengals	0.55
Lions	0.54
Bills	0.53
Browns	0.53
Texans	0.49
Buccaneers	0.49
Cardinals	0.48
Titans	0.44
Jaguars	0.34

English Premier League Team Popularity
Relative frequency of Google searches

Team	Value
Man Utd	4.23
Liverpool	3.77
Arsenal	3.14
Chelsea	2.89
Man City	1.08
Tottenham	0.97
West Ham	0.52
Everton	0.50
Newcastle	0.50
Aston Villa	0.37
Sunderland	0.29
Fulham	0.27
West Brom	0.20
Cardiff City	0.20
Swansea City	0.20
Crystal Palace	0.19
Southampton	0.18
Stoke City	0.18
Hull City	0.16
Norwich City	0.16

SOURCE: GOOGLE TRENDS

Competitive Balance

It is important to achieve some semblance of equality of talent, or competitive balance. Fans want competition!

This need for balance leads to league rules that limit competition off the field in order to improve competition on the field. These rules include:

- Revenue sharing
- Salary caps and luxury taxes
- Reverse-order player drafts

Revenue Sharing

There is a considerable amount of revenue sharing in major sports leagues:

- National broadcast revenues are shared equally among teams
- Trademark licenses generate shared revenue
- Gate Receipts can have shared revenue:
    - In the NFL there is a 60-40 split between the home and away team.
    - In the MLB there is an 85-15 split between the home and away team.

One purpose of revenue sharing is to prop up the financially weaker teams.

https://www.washingtonpost.com/news/sports/wp/2017/09/28/
why-revenue-sharing-one-of-the-nbas-thorniest-issues-demands-
?utm_term=.1e9e674883f5

Revenue Sharing

Revenue sharing can help out a club in a weak market.

Example: Let the Pullman Lions be the team in the strong market, and the Kennewick Panthers be the team in the weak market. Suppose that the Pullman Lions are playing at home, and that there is a 75-25 revenue split. Now suppose that the Pullman Lions get a raw revenue of $160 million and incur a payroll cost of $100 million, whereas the Kennewick Panthers get a raw revenue of $80 million and also incur a cost of $100 million. What are the profits of each team?

Revenue Sharing

Example (cont.):

<u>Pullman Lions:</u>
Revenue: $(.75) \times (\$160) + (.25) \times (\$80) = \$140$
Profit: $140 - $100 = $40

<u>Kennewick Panther:</u>
Revenue: $(.75) \times (\$80) + (.25) \times (\$160) = \$100$
Profit: $100 - $100 = $0

Revenue Sharing

The Short-Run Profit-Maximizing Approach

(You will use this approach in problem set 1): Suppose the league imposes a revenue sharing policy of s*100/(1-s)*100 where s is between .5 and 1. Thus the home team receives s*100 percent of its revenue and (1-s)*100 percent of the away team's revenue; and the away team receives (1-s)*100 percent of its revenue and s*100 percent of the home team's revenue.

The formal equations for revenue sharing are:

$$\Pi_{Home} = sTR_{Home} + (1-s)TR_{Away} - TC_{Home}$$
$$\Pi_{Away} = sTR_{Away} + (1-s)TR_{Home} - TC_{Away}$$

Revenue Sharing

If we only consider profit, and one team's choices do not affect the other team's demand, then the home team maximizes profit when:

$$sMR_{Home} = MC_{Home}$$

and the away team maximizes profit when:

$$sMR_{Away} = MC_{Away}$$

Revenue Sharing

In this class, when we work on revenue sharing problems, we will assume that the home team is the team in the strong market, and the away team is the team in the weak market.

Revenue Sharing

Example: Let the demands for the home and away teams be
$P_H = 200 - 3H$ and $P_A = 90 - 4A$ respectively, and marginal cost is \$50.
H and A are in thousands of fans. What will be each team's revenue be?

$$MR_H = MC_H$$
$$200 - 6H = 50$$
$$H^* = 25$$
$$MR_A = MC_A$$
$$90 - 8A = 50$$
$$A^* = 5$$
$$TR_H = (200 - 3(25)) \times 25$$
$$= \$3125$$
$$TR_A = (90 - 4(5)) \times 5$$
$$= \$350$$

Revenue Sharing

Example: Let the demands for the home and away teams be
$P_H = 200 - 3H$ and $P_A = 90 - 4A$ respectively, and marginal cost is \$50.
H and A are in thousands of fans. What will be each team's profit be?

$$\Pi_H = 3125 - 50 \times 25$$
$$= \$3125 - \$1250$$
$$= \$1875$$
$$\Pi_A = 350 - 50 \times 5$$
$$= \$350 - \$250$$
$$= \$100$$

Revenue Sharing

Example: Let the demands for the home and away teams be
$P_H = 200 - 3H$ and $P_A = 90 - 4A$ respectively, marginal cost is \$50, and total cost is 50H and 50A. If the teams employ revenue sharing of 80-20, what will be each team's revenue be?

$$sMR_H = MC_H$$
$$.8(200 - 6H) = 50$$
$$H^* = 22.9$$
$$sMR_A = MC_A$$
$$.8(90 - 8A) = 50$$
$$A^* = 3.4$$
$$TR_H = .8 \times (200 - 3(22.9)) \times 22.9 + .2 \times (90 - 4(3.4)) \times 3.4$$
$$= \$2457.37$$
$$TR_A = .8 \times (90 - 4(3.4)) \times 3.4 + .2 \times (200 - 3(22.9)) \times 22.9$$
$$= \$809.16$$

Revenue Sharing

Example: Let the demands for the home and away teams be
$P_H = 200 - 3H$ and $P_A = 90 - 4A$ respectively, marginal cost is \$50, and
total cost is 50H and 50A. If the teams employ revenue sharing of 80-20,
what will be each team's profit be?

$$\Pi_H = 2457.37 - 50 \times 22.9$$
$$= 2457.37 - 50 \times 22.9$$
$$= \$1312.37$$
$$\Pi_A = 809.16 - 50 \times 3.4$$
$$= 809.16 - 50 \times 3.4$$
$$= \$639.13$$

Revenue Sharing

In the long run, winning should increase revenue. Is there a correlation between spending and wins?
`https://fivethirtyeight.com/features/`
`dont-be-fooled-by-baseballs-small-budget-success-stories/`

Revenue Sharing

The Long-Run Profit-Maximizing Approach

In the previous model, we only looked at pricing which can be seen as a short run maximization problem. Now, we consider total revenue and total cost as functions of winning. Notice that total revenue and total cost are increasing in winning (that is to say, if we increase wins, we increase total revenue and cost). Profit for team 1 is then:

$$\Pi_1 = TR_1(W_1) - TC_1(W_1)$$

where W_1 is the number of wins of team 1.

Revenue Sharing

If we account for revenue sharing, we get the following profit function for team 1:

$$\Pi_1 = sTR_1(W_1) + (1-s)TR_2(W_2) - TC_1(W_1)$$

an additional win by team 1 increases its revenue by MR_1, and it gets to keep sMR_1 of that. When team 1 wins another game, team 2 loses a game and its revenue falls by MR_2. Team 1 receives $(1-s)$ of that reduced revenue: $(1-s)MR_2$.

Revenue Sharing

When team 1 wins, team 2 loses and thus:

$$TR_1(W_1) : \Uparrow$$
$$TC_1(W_1) : \Uparrow \qquad\qquad -TC_1(W_1) : \Downarrow$$
$$TR_2(W_2) : \Downarrow$$

$$\Pi_1 = s\overset{\Uparrow}{TR_1}(W_1) + (1-s)\overset{\Downarrow}{TR_2}(W_2) - \overset{\Downarrow}{TC_1}(W_1)$$

Competitive Balance

Herfindahl-Hirschman Index (HHI) is a measure of industrial concentration

- It is used primarily to evaluate the competitiveness of industries for antitrust purposes
- The higher the HHI, the more concentrated the industry
- The Department of Justice and the Federal Trade Commission consider an industry unconcentrated (or competitive) if the HHI is below 1,500.
- If the HHI exceeds 2,500, a market is considered highly concentrated.
- If the HHI is between 1,500 and 2,500, a market is considered moderately concentrated.

$$HHI = \sum_{i=1}^{n} s_i^2$$

where s_i is the market share of firm i, and n is the number of firms.

Competitive Balance

Table 4.2. Herfindahl-Hirschman Index – Major League Championships, 1980–2009

League	Herfindahl-Hirschman Index[*]
Major League Baseball	749
American League	1272
National League	1177
National Football League	884
National Basketball Association	1822
National Hockey League	1058

Competitive Balance

Example: Suppose that there are 4 firms in an industry, and that firm 1 has 50% share of the market, firm 2 has 30% share of the market, firm 3 has 15% share of the market, and firm 4 has 5% share of the market. What is the HHI for this industry?

$$HHI = \sum_{i=1}^{n} s_i^2$$
$$= 50^2 + 30^2 + 15^2 + 5^2$$
$$= 3,650$$

Free Agency

Example: Suppose that there are 4 firms in an industry, and that firm 1 has 50% share of the market, firm 2 has 30% share of the market, firm 3 has 15% share of the market, and firm 4 has 5% share of the market. What is the HHI for this industry?

$$
\begin{aligned}
HHI &= \sum_{i=1}^{n} s_i^2 \\
&= 50^2 + 30^2 + 15^2 + 5^2 \\
&= 3,650
\end{aligned}
$$

Free Agency

Some wins are worth more in some cities than in others. So the willingness to pay for wins is higher in some cities than others.

Total revenue (TR) is a function of the team's winning percentage. As winning percentage increases, total revenue increases. Thus, marginal revenue is positive but negatively sloped.

Free Agency

In order to maximize revenue, teams equate their marginal revenues. Suppose all players are on teams 1 or team 2.

If $MR_1 < MR_2$, team 2 would value an additional win more than team 1

- Team 2 would buy better players (from team 1) to win more.
- Shift in talent will continue until $MR_1 = MR_2$

Why would team 1 allow good players to be sold to team 2? The extra revenue from selling players to team 2 is greater than the extra revenue from keeping those players. Both teams will be better off if they equate $MR_1 = MR_2$