Berri

Chapter 2

Market Size and Wins

# Objectives

* To examine the relationship between market size and outcomes using a deductive approach.
* To examine the relationship between market size and outcomes using an inductive approach.
* To be able to interpret and explain wins in sports.
* To begin to develop an understanding of the criteria for evaluating statistical models.

# Outline

1. From the Law of Demand to team revenue
2. Debating team costs
3. Why do the Yankees dominate?
4. Market size and wins: The data from MLB
5. Modeling market size and wins in professional sports
6. Modeling payroll and wins in professional sports
7. A basic model of wins in professional sports
8. A simple guide to evaluating empirical models
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   2. Specifying the model
   3. Statistical significance and economic significance
   4. Explanatory power
   5. Robustness of results
   6. Prior beliefs?

# Teaching Tips

## From the Law of Demand to team revenue

### Creating Student Interest

* Ask some students if they have a favorite professional sports team. Then, ask them if this team was completely their choice or was also a favorite of their parents or family. Ask if that team would have a large or small demand for tickets to see the team play. Ask if they can identify which variables might affect the demand for that team. Try to direct the discussion toward market size, team quality, and stadium size.

### Presenting the Material

* *Presenting the Material*Begin with a review of a demand equation. Extend that into a total revenue equation, and then discuss how maximizing revenue would be of interest to a team. Remind students that the key assumption here is that teams have market power. That is why price is a function of quantity. Also mention that this team is a simple monopolist who charges a single price to all customers. Teams often charge different prices for general admission, club seats and luxury box seats. Mention that the model can be extended to deal with a discriminating monopolist. Table 2.1 shows how total revenue grows and then falls as price continues to fall. Once total revenue is determined, move to the determination of marginal revenue.

## Debating team costs

### Creating Student Interest

* Ask your students to consider the costs of putting on a game. These costs in general can be classified into venue costs, player costs, general and administrative costs and travel expenses. Next, ask your students which of these costs are fixed costs and which are variable costs. If the game is not sold out, what is the marginal cost of allowing one more fan to come in and watch the game? What costs would the team incur from that one fan: picking up peanut shells, the extra water from a flushed toilet? There is not much additional cost.

### Presenting the Material

* Show Figure 2.3, where the marginal cost of an additional fan is basically zero. As an alternative, then show Figure 2.4, where marginal cost rises as quantity increases. Graphically show that profits are maximized by producing the quantity where marginal cost = marginal revenue and then by pricing off of the demand curve. Figure 2.5 shows this profit-maximizing graph. Mathematically, you can then use the previous equations to solve for the profit-maximizing quantity and price.

## Why do the Yankees dominate?

### Creating Student Interest

* Since you’ve asked your students who their favorite teams are, now ask if they have teams that they hate. Ask them to explore the origin of this hatred. Is it a question of arrogance or jealousy? Is it competitive hometown pride that fuels their dislike for the other team? Next point out that while fans dislike the rival team the Tigers need the Yankees to show up in order to put on a game. Point out that while teams are rivals on the field they are also partners in producing a game. This may be unique to the production of sporting contests.

### Presenting the Material

* This section uses deductive reasoning that presents theories of why the Yankees may have enjoyed continued success: a bigger market creates more revenue, which allows the team to acquire better talent, which translates to wins.

## Market size and wins: The data from MLB

### Creating Student Interest

* How valid is it to assume that market size leads to higher levels of success? This is a quantitative question and is one that we can measure and explore.

### Presenting the Material

* Figure 2.7 shows the data points of Table 2.4 along with a trend line. The trend line is upward-sloping, which indicates that in baseball there is a direct relationship between market size and team success. But is this true in other sports?

## Modeling market size and wins in professional sports

### Creating Student Interest

* Tell the students that if we are going to measure the relation between market size and team success, we are going to need some rules for doing so. This section will give us an introduction to determining if the relationships we see are statistically valid or not.

### Presenting the Material

* Explain that the regression line is the line of best fit. It is the line that passes through and comes close to as many points as possible. Explain what we mean by regression models and what we are trying to understand by using them. The four essential elements to present are coefficients, *t*-statistics, *p*-values, and *R*2. Tables 2.5 through 2.8 all examine market size and team winning. Market size is only significant in baseball

## Modeling payroll and wins in professional sports

### Creating Student Interest

* Going back to an earlier discussion, ask your students how we can model whether higher teams that have higher payrolls actually do win more games. What two variables do they want to include? Which is the independent variable?

### Presenting the Material

* Tables 2.9 through 2.12 all show statistically significant payroll variables. The conclusion is that having higher payroll (assumedly for better talent) does indeed win more games, but this impact is not equal across all sports.

## A basic model of wins in professional sports

### Creating Student Interest

* Ask your students: if they were general managers of a team, would they like to pay players based on the contribution the players make in winning games? Assuming they agree to that, tell them it first needs to be discovered why teams win games.

### Presenting the Material

This section moves from univariate to multivariate analysis. The reason for multivariate analysis is to avoid omitted variable bias. Briefly explain you’re your coefficients will be unreliable if you omit relevant variables from the model. Using points for and points against, explain the statistical significance of each variable. Point out how increasing the number of variables increased the *R*2 value.**History of the NPF History of the NPF** Remind students that the Adjusted*R*2 value corrects for this issue.

## A simple guide to evaluating empirical models

### Creating Student Interest

* Ask your students if, based on the *R*2 values, they buy the relationship between runs scored, runs allowed, and team wins. If they do, then ask them what they think about a conclusion by Levitt and Dubner in the book *Freakonomics* that the legalization of abortion affects the rate of violent crime. Tell them their model had a high *R*2.

### Presenting the Material

* Let the students know that a high *R*2 does not mean that we have a great model. This section presents six areas to consider when deciding whether to give credibility to a model: a good theoretical basis, the specification of the model, the limits on statistical significance, the limits on explanatory power, the consistency of findings from other studies, and controlling our own bias from prior beliefs.

## Common Student Struggles

Students who are quantitatively weak will be interested in the topic but may shy away from the use of multivariate models. Even students who have no aversion to math may not have had a statistics course yet, and so to them this is a foreign land. Since this is a critical chapter for understanding the material in future chapters, take your time with it and make sure that students are on board with the topics and terminology.

Likewise, some students may find the transition from the demand curve to finding the maximizing price and quantity difficult. An understanding of the needed steps should be reinforced. The problems at the end of the chapter will provide needed practice with these topics.

Remind your students that the goal is to explain what we observe. We’re not asking them to do an econometric study, only to be able to interpret the results. Given that, one takeaway from this chapter is that market size only helps explain team wins in the sport of baseball. Team payroll helps explain team wins across the four sports studied but does so unevenly across leagues.

# Additional Resources

Berri, D. J. (1999). Who is “Most Valuable”? Measuring the player’s production of wins in the National Basketball Association. *Managerial and Decision Economics, 20*(8), 411–427.

Ferguson, D. G., Kenneth, G., Stewart, K. G., Jones, J. C. H., & Le Dressay, A. (1991). The pricing of sports events: Do teams maximize profit? *The Journal of Industrial Economics, 39*(3), 297–310.

Glossary of basketball statistics: <http://www.basketball-reference.com/about/glossary.html>

McFall, T. (2016). *The (peculiar) economics of NCAA basketball*. New York, NY: Palgrave MacMillan.

NBA player statistics by team lineup: <http://stats.nba.com/lineups/traditional/>

NBA team efficiency rankings: <https://www.teamrankings.com/nba/stat/offensive-efficiency>

# Handout 2-1

Date\_\_\_\_\_\_\_\_\_  Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Class\_\_\_\_\_\_\_\_ Professor\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Using the concepts from Section 2.6, suppose you were asked to model how hockey players contribute to their team winning. List at least five variables you would want to include in your study. What type of relationship (positive or negative) would you expect to see with each variable? Are there any variables that you think may have a multi-collinearity problem?

Answer: Answers will vary, but some typical variables might include goals scored, goals allowed, assists, whether the player was a defensive player, and time in the penalty box. If the variables are expected to help the team win, we would expect to see a positive sign, and if they are expected to lessen the chances of winning, we would expect to see a negative sign.

# Handout 2-2

Date\_\_\_\_\_\_\_\_\_  Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Class\_\_\_\_\_\_\_\_ Professor\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Suppose you read a news story online stating that a recent study showed that 73% of all Americans who died last year ate white bread. Your friend, who also read the story, concludes that to reduce the death rate in the United States, all white bread should be outlawed. Is this inductive or deductive reasoning? What’s wrong with the conclusion, and what does that say about the study?

Answer: Because this was a study using statistics and data, the study used inductive reasoning. Your friend extrapolated from the findings of the study using deductive reasoning. Because the theoretical foundation of your friend’s logic is lacking, the conclusions drawn are not reliable.