Chapter 2: The Business of Sports

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January 11, 2019

Economic Models

What are economic models?

An economic model is a simplified description of reality, designed to yield hypotheses about economic behavior that can be tested using data.

Examples of basic economic models

1. $Q^d = a - bP$. (Quantity demanded (Q^d) is a linear function of price (P).)

2. $Y = f(L, K)$ (Output (Y) of a firm is a function of labor (L) and capital (K).)

Properties of economic models

1. Follows logical and intuitive reasoning
2. Needs econometric and statistics to test its validity.
3. Relies on assumptions and hence not always true.

Profit Maximization Problem

As discussed in previous lecture, a sports team/ franchise acts a a profit maximizing firm. Thus its profit can be represented as:

$$\pi = TR - TC$$

Where,

- π is profit.
- TR is total revenue.
- TC is total cost.

Total Revenue (TR)

In a simple model we have

$$TR = Price(P) * Quantity(Q)$$

Where, revenue for a sports franchise can come in the below forms

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

Total Cost (TC)

Total Cost (TC) is not easily calculated. In economics, we include all the firms opportunity costs.

$$TC = \text{accounting costs} + \text{opportunity costs}$$

Total costs can be divided into fixed costs and variable costs:

- Fixed costs: costs that are constant no matter how many good (or services) are produced.
  - Example: Football stadium at WSU. The cost incurred to built the martin stadium does not change depending on how many tickets are sold in a season.
- Variable costs: costs that varies with level of output.
  - Example: Revenue from merchandise. If you wish to sell an additional hat, you need to physically make an additional hat.

Monopoly.

Is a sports franchise considered a monopoly?

A monopoly by definition exists when a specific person or enterprise is the only supplier of a particular commodity [or service].

Why are sports franchises considered monopolies?

Sports franchises are considered (local) monopolies since,

- they can set the price for tickets, broadcasting right.
- they also have complete control over number of tickets to sell.
- whether or not they want to sell broadcasting/ trademark rights or not.

Monopoly profit maximization problem

Now, in order to maximize profit first we need to define profit as a function of price and quantity. We do this since sports can set both prices and quantity.

Lets, consider an example in which a franchise collects revenues on from tickets sales

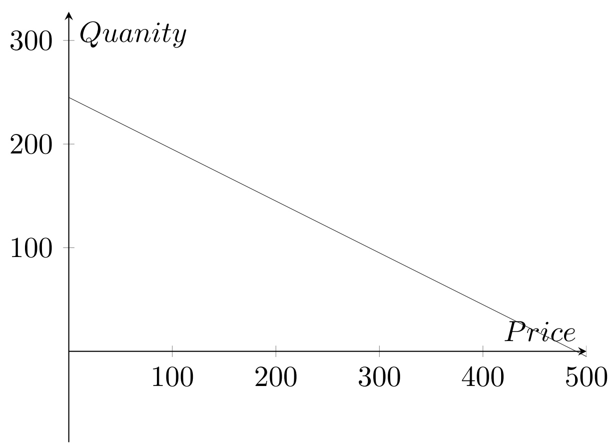
Let, the demand for tickets sales (Q) be represented by.

$$Q = 245 - 0.5 * P$$

If rearranged can be written as

$$P = 490 - 2 * Q$$

The demand curve can be graphically represented as below:



Next let cost of producing 1 ticket equal \$ 10. Therefore, total cost is

$$TC = 10 * Q.$$

Now since we know TR = $P * Q$ and TC = $10 * Q$. Lets rewrite the profit function in term of price (P) and quantity (Q).

$$\pi = P * Q - 10 * Q$$

Next, since we also have price (P) in term of quantity (Q) from the demand function, lets replace P with $480 - 2 * Q$.

$$\pi = (490 - 2Q) * Q - 10 * Q$$

Which can be rearranged as

$$\pi = 490Q - 2Q^2 - 10Q$$
$$= 480Q - 2Q^2$$

How would it look graphically?

Since the objective is to maximize profit by setting an optimal Q. The optimization problem faced by the franchise is:

$$\max_{Q} \left\{ 480Q - 2Q^2 \right\}$$

Next, in order to find the optimal Q, we need to find Q where the slope of the profit function is equal to 0.

And since we know a derivative represents a slope, we take the partial derivative with respect to Q and set it equal to 0. i.e.

$$\frac{d\pi}{dQ} = 0$$

Taking the partial derivative with respect to Q, gives us:

$$\frac{d\pi}{dQ} = \frac{d}{dQ}\left(480Q - 2Q^2\right) = 480 - 4Q$$

Next setting it equal to 0, gives us:

$$480 - 4Q = 0$$

And solving for Q gives us the optimal level of Q i.e.

$$Q^* = 120$$

Next, if we plug in Q^* back into the demand function we get the optimal level of P^*

$$P^* = 490 - 2Q^* = 490 - 240 = \$250$$

And the corresponding profit is:

$$\pi^* = 250 * 120 - 10 * 120 = \$28,800$$

What other factors can influence ticket prices besides quantity (number of tickets available for sale)?

In other words, what additional factors will allow franchise to charge a higher price and hence make higher profit:

- Star players in a team: https://www.cnbc.com/2018/10/05/lebron-james-effect-boosts-lakers-ticket-and-merchandise-sales.html

- Wimbledon vs U.S. Open Tennis ticket prices.
  - https://www.tennistours.com/us-open/tickets/
  - https://www.wimbledon.com/en_GB/atoz/tickets_and_ticket_prices.html
  - https://www.youtube.com/watch?v=ONTGnwsSSf8