Business of Sports

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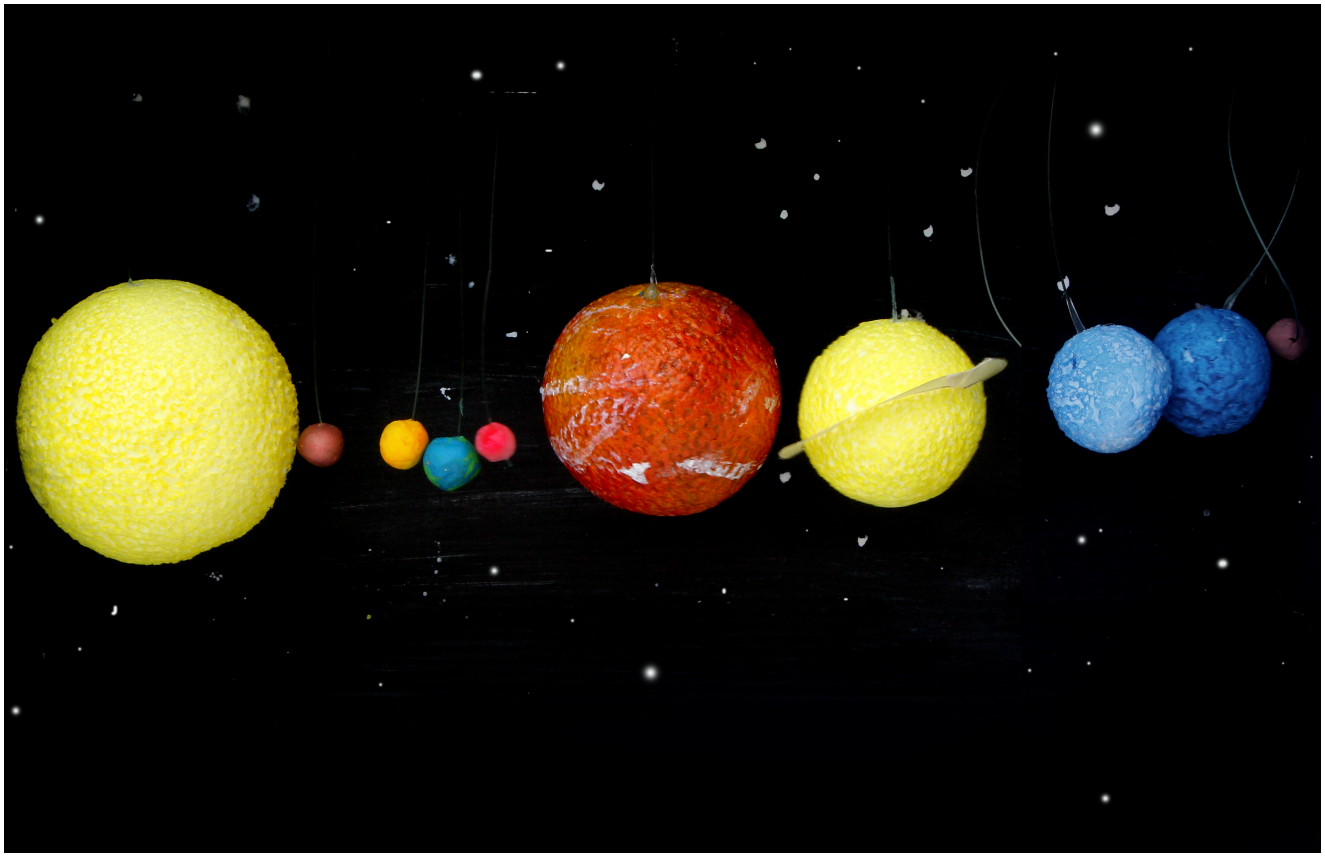
Economic Models

An economic model is a **simplified** description of reality, designed to yield hypotheses about economic behavior that can be tested. An important feature of an economic model is that it is necessarily **subjective** in design because there are no objective measures of economic outcomes.

Different economists will make different judgments about what is needed to explain their interpretations of reality.

Economic Models

Figure: Solar System Model



- How is it different than the real world (or in this case, real solar system)?
- What is the purpose of this model?

Profit Maximization

As we said last week, a firm's objective is to maximize profit:

$$\Pi = TR - TC$$

Π: Profit
TR: Total Revenue
TC: Total Cost

Total Revenue

Total Revenue (TR)

$$TR = \text{price} \times \text{quantity sold}$$
$$= p \times q$$

Sports franchises can obtain revenue several ways:

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

Total Cost

Total Cost (TC) is not easily calculated. In economics, we include all the firm's 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 *(10 in example below)*.
  - Example: renting a building. The rent of a building is a cost that usually does not change (does not depend on output).
- Variable costs: costs that varies with level of output *(7Q in example below)*.
  - Example: concessions. If we are looking to sell more concessions (output), we would have to buy more food.

Example: $TC = 7Q + 10$

Total Cost

"The NCAA Isn't Going Broke, No Matter How Much You Hear It"

`https://fivethirtyeight.com/features/the-ncaa-isnt-going-broke-no-matter-how-much-you-hear-it/`

Once or twice a year, as predictably as the launch of college football season or March Madness, we're treated to the "everyone's broke" meme in college sports.

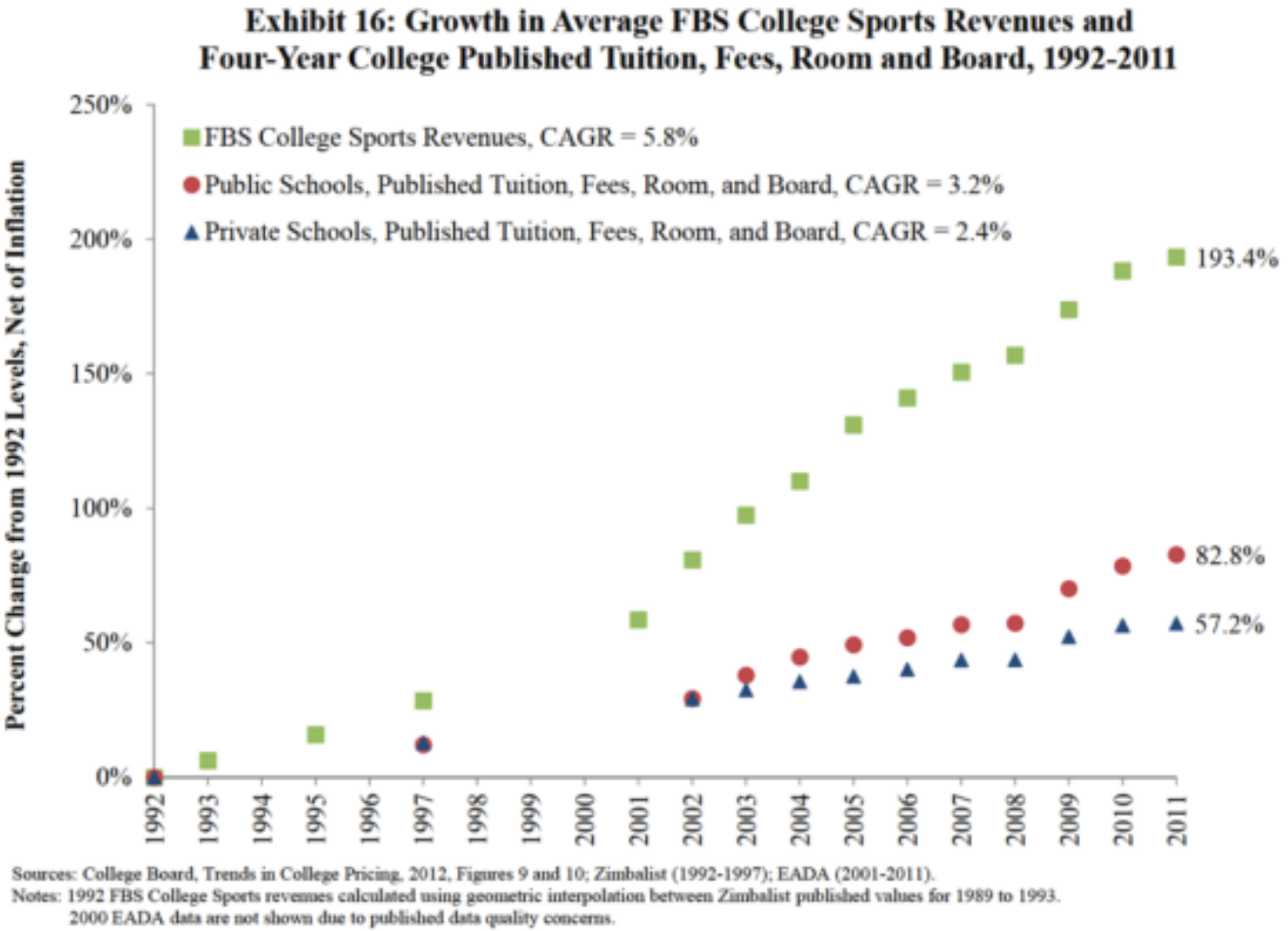
Along with the data they compiled, Erik Brady, Steve Berkowitz and Jodi Upton put out a companion piece addressing the familiar claim that college sports are reaching a crisis point where they will begin to crumble under their own cost. As economics professor Andrew Zimbalist says in the article, "It's an unstable situation."

Total Cost

As far back as Howard Bowen's revenue theory of cost, economists have known that within the context of a nonprofit organization, if a department on campus gets a budget, it spends it. Revenues grow, budgets grow, spending grows.

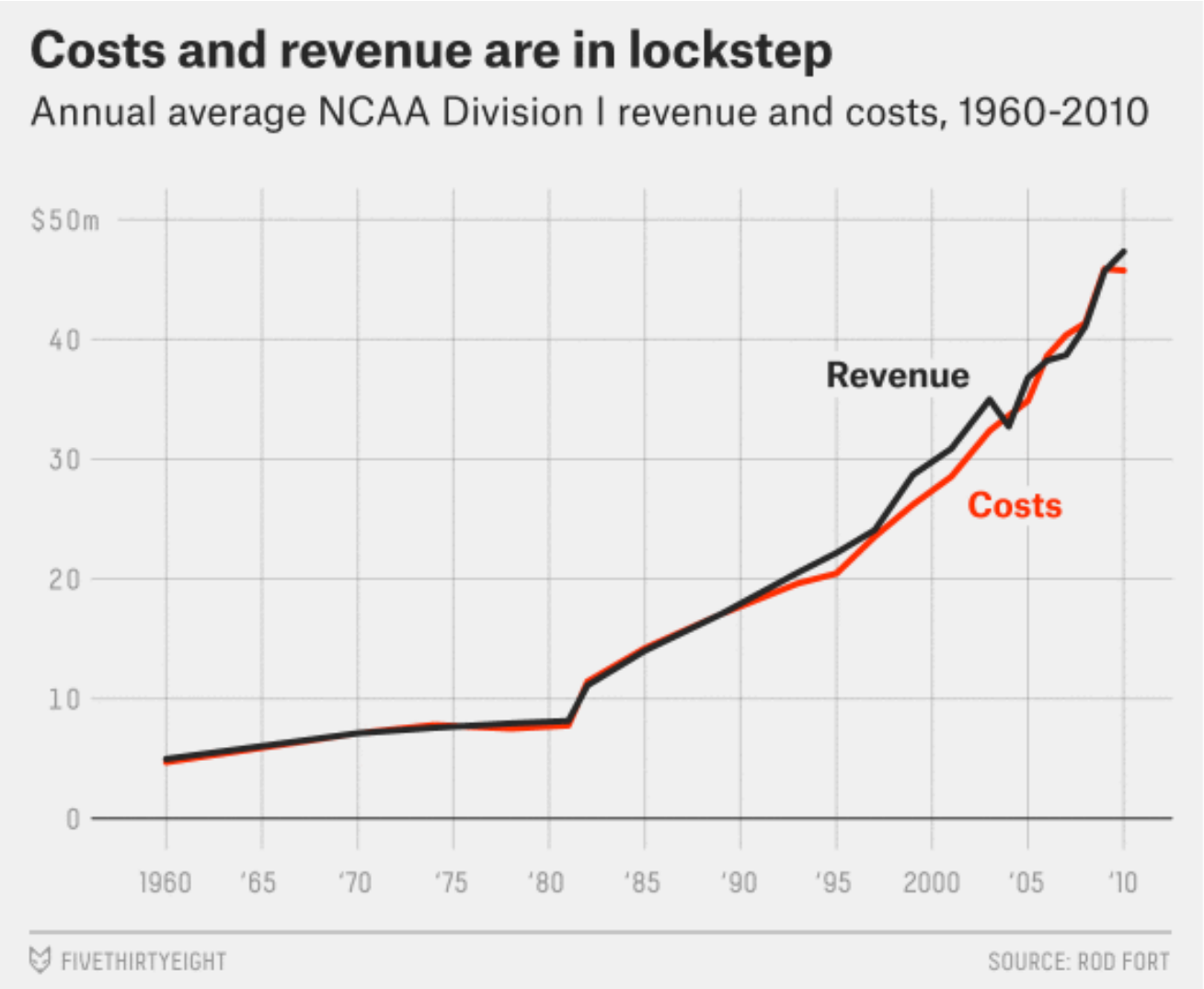
Total Cost

Figure: Revenue Growth



Total Cost

Figure: Costs and Revenues



Total Cost

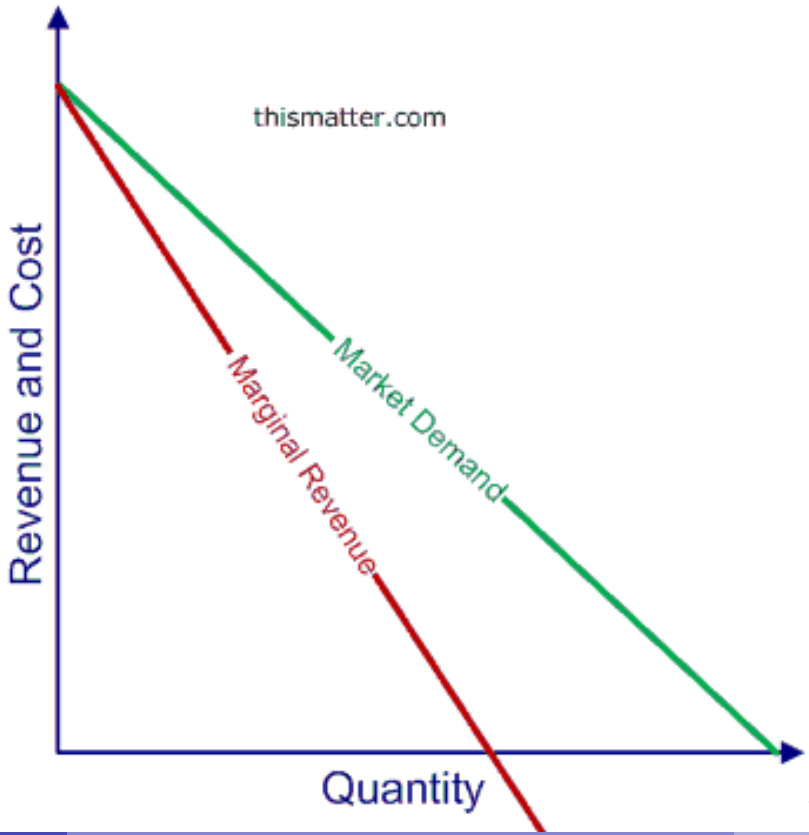
Why do programs want to appear poor?

'Keeping awareness of the rent flow low, permits either certain athletic or other university officials discretion over use of the flows. As a result, the most common practice over many decades has been to minimize or diminish apparent surpluses. In fact, the supposed losses have been a means for university presidents to pursue "cost containment."'

Monopoly

In a monopoly, the seller can affect price by altering quantity (and vice versa). To maximize profit, the seller sets marginal revenue (MR) equal to marginal cost (MC). The marginal revenue has the **same intercept** as the demand curve on the price axis, and is **twice as steep**.

Figure: Marginal Revenue and Demand



Monopoly

$$\Pi = TR - TC$$
$$\Pi = p(q) \times q - TC$$

Monopoly

Example: Let the inverse demand (denoted p(q)) be as follows:

$$p(q) = 180 - 5q$$

Find the marginal revenue.

We know that in a monopoly, the marginal revenue will have the same intercept as our inverse demand, and that the slope will be twice as steep. Thus the marginal revenue is:

$$MR = 180 - 10q$$

Monopoly

Suppose that the (inverse) demand for Brett's Best baseball gloves (in millions) is as follows:

$$p(q) = 180 - 5q$$

And that total cost is:

$$TC = 25q^2$$

And marginal cost is:

$$MC = 50q$$

Find the optimal quantity and price.

Monopoly

Find the optimal quantity and price.

We set MR equal to MC:

$$180 - 10q = 50q$$
$$q = 3$$

To find price, plug quantity (q) into inverse demand:

$$p = 180 - 5 \times 3$$
$$p = \$165$$

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]."

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]."

Sports franchises are considered (local) monopolies and can influence price by altering demand.

Why are sports franchises considered monopolies?

Team Quality

https://www.youtube.com/watch?v=__G4RrlGmVk

Team Quality can be increased by buying better players, personnel, etc.

Notice that increasing team quality will not only increase total cost, but may also increase total revenue.
How might increasing team quality increase revenue?

Management finds a balance between change in revenue and cost by changing team quality.

Team Quality

Before, we had:

$$\Pi = p(q) \times q - c(q)$$

Now let s be the number of stars a team has. We can write the profit function as:

$$\Pi = p(q, s) \times q - c(q) - c(s)$$

c(q) – cost of having fans in attendance
c(s) – cost of having stars on team

Notice that p(q,s) is affected by both quantity, q, and number of stars, s. Also, there is an added cost term with input s.

Data shows that in the NFL, team quality does not affect attendance that much. Thus, demand isquality inelastic.

Team Quality

Why might team quality be a bigger concern to franchise owners in European sports/leagues?

Figure: Neymar at PSG

Franchise Value

Why might European team have a wide range of market values, whereas American teams are a lot closer together?
Top franchises: `https://en.wikipedia.org/wiki/Forbes%27_list_of_the_most_valuable_sports_teams`

Franchise Value

As seen before, we can calculate future value (or present value) given present value (or future value), time (t), and interest rate (i). We can also estimate interest rate (i) if we are given present value and future value.
Example: Suppose that a franchise value has increased from a value of

$160 million to $819 in 10 years. What is the interest rate?

$$
\begin{aligned}
PV(1+i)^t &= FV \\
160 \times (1+i)^{10} &= 819 \\
(1+i)^{10} &= \frac{819}{160} \\
(1+i) &= \frac{819}{160}^{1/10} \\
i &= \frac{819}{160}^{1/10} - 1 \\
i &= 0.177
\end{aligned}
$$

Franchise Value

Suppose an investor is looking to buy a franchise. What would be the expected benefit of buying the franchise?

$$PV(1+i)^t = FV$$

$$PV = \frac{FV}{(1+i)^t}$$

We can add in discounted expected profits $\sum_{t=1}^{T} \frac{E[\Pi_t]}{(1+i)^t}$ to estimate the value of a club.

$$E[B] = \frac{V_T}{(1+i)^T} + \sum_{t=1}^{T} \frac{E[\Pi_t]}{(1+i)^t}$$

$E[B]$ is the expected benefit from purchasing the franchise, and V_T is the future value of the club (at time T).

Franchise Value

Example: Suppose that market value (v) of the Pullman Bison in 3 years (T) is \$4 million, the interest rate (i) is 5%, and the club is expecting to have the following profits in the next 3 years (starting next year).

Table: Expected profits from next year on

Year(t)	$E(\Pi)$
1	\$100,000
2	\$120,000
3	\$130,000

What is the expected benefit of owning the club (for the next 3 years)?

Franchise Value

Table: Expected profits from next year on

Year(t)	$E(\Pi)$
1	\$100,000
2	\$120,000
3	\$130,000

$$E[B] = \frac{V_T}{(1+i)^3} + \sum_{t=1}^{T} \frac{E[\Pi_t]}{(1+i)^t}$$

$$E[B] = \frac{4,000,000}{(1+i)^3} + \frac{100,000}{(1+i)^1} + \frac{120,000}{(1+i)^2} + \frac{130,000}{(1+i)^3}$$

$$E[B] = 3,455,350 + 95,238 + 108,844 + 112,299$$

$$E[B] = \$3,771,731$$

Franchise Value

What are some other things that an owner (or potential owner) might need to consider to be "successful"? Do they only need to consider pricing and team revenue?
https://www.youtube.com/watch?v=UlCGP_aEO-o

Franchise Value

Are expected profits (and future value) the same for every potential investor?

Figure: Mark Cuban

Franchise Value

The more popular the sport, the higher the franchise value (obviously).

The greater the population in the area where a club is, the higher the franchise value tends to be.

Which sport would you expect to have the highest franchise values?
What city would you expect to have the highest franchise values?