Chapter 4: Competitive Balance

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Herfindahl-Hirschman Index (HHI)

$$HHI = \sum_{i=1}^{n} S_i^2 * 10,000$$

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

Example 1 :

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?

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

$$= 50^2 + 30^2 + 15^2 + 5^2$$

$$= 3,650$$

Example 2 :

Suppose now there are 5 firms and that firm 1 has 40% share of the market, firm 2 has 30% share of the market, firm 3 has 15% share of the market, firm 4 has 5% share of the market and firm 5 has 10% share of the market. What is the HHI for this industry?

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

$$= 40^2 + 30^2 + 15^2 + 5^2 + 10^2$$

$$= 2,850$$

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

Noll Scully measure (NSm) from competitive balance

The Noll Scully measure (NSm) is another way to measure competitive balance. In this case the farther the Noll Scully ratio is from 1.0, less competitive balance there is.

$$NSm = \frac{\sigma_A}{\sigma_I}$$

Where, σ_I is the idolized standard deviation i.e

$$\sigma_I = \frac{0.5}{\sqrt{N}}$$

N is the number of games in a season.

σ_A is the actual standard deviation i.e

$$\sigma_A = \left[\frac{1}{n}\sum_{i}^{n}(W_i - 0.5)^2\right]^{1/2}$$

n is the number of teams in the league and w_i is the winning percentage of i team.

Example 1 :

Suppose that there are 4 teams in an industry, and that team 1 has 60% winning record, team 2 has 40% winning record, team 3 has 30% winning record, and team 4 has 70% winning record. The total number of games in this league is 100. What is the Noll-Scully measure for this league?

Firstly,

$$\sigma_I = \frac{0.5}{\sqrt{N}} = \frac{0.5}{\sqrt{100}} = 0.05$$

Firstly,

$$\sigma_A = \left[\frac{1}{n}\sum_{i}^{n}(W_i - 0.5)^2\right]^{1/2}$$

$$= \left[\frac{1}{4}\Big((.6-0.5)^2 + (.4-0.5)^2 + (.7-0.5)^2 + (.3-0.5)^2\Big)\right]^{1/2}$$

$$= \left[\frac{1}{4}\Big((.1)^2 + (-0.1)^2 + (.2)^2 + (-.2)^2\Big)\right]^{1/2}$$

$$= \left[\frac{1}{4}\Big(0.1\Big)\right]^{1/2}$$

$$=0.158$$

Therefore, Noll-Scully measure is equal to

$$= \frac{\sigma_A}{\sigma_I} = \frac{0.158}{0.05} = 3.16$$

Example 1 :

Now suppose again there are 4 teams in an industry, and that team 1 has 60% winning record, team 2 has 40% winning record, team 3 has 40% winning record, and team 4 has 60% winning record. The total number of games in this league is 100. What is the Noll-Scully measure for this league?

Firstly,

$$\sigma_I = \frac{0.5}{\sqrt{N}} = \frac{0.5}{\sqrt{100}} = 0.05$$

Secondly,

$$\sigma_A = \left[\frac{1}{n}\sum_{i}^{n}(W_i - 0.5)^2\right]^{1/2}$$

$$= \left[\frac{1}{4}\Big((.6-0.5)^2 + (.4-0.5)^2 + (.6-0.5)^2 + (.4-0.5)^2\Big)\right]^{1/2}$$

$$= \left[\frac{1}{4}\Big((.1)^2 + (-0.1)^2 + (.1)^2 + (-.1)^2\Big)\right]^{1/2}$$

$$= \left[\frac{1}{4}\Big(0.04\Big)\right]^{1/2}$$

$$=0.1$$

Therefore, Noll-Scully measure is equal to

$$= \frac{\sigma_A}{\sigma_I} = \frac{0.1}{0.05} = 2$$

This shows that when winning percentage is more balanced among team the Noll-Scully measure reduces and moves closer to 1.

How to deal with competitive balance

- Reserve clause.
- Revenue sharing.
- Salary caps.

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 teams winning percentage. As winning percentage increases, total revenue increases. Thus, marginal revenue is positive but negatively sloped.

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 $MR_1 = MR_2$

Revenue Sharing
It will re balance TR and profit between strong and weak teams. However it will have no impact on winning percentage.

Therefore in terms of competitive balance it will reduce HHI (implying a higher level of competitive balance).

However it will not impact the Noll Scully ratio.

Salary Cap
If the salary cap is set correctly, below equilibrium MR, it will directly impact the winning percentage of teams and reduce the Noll Scully ratio.

Reserve clause
Two implications:

1. Transfer of wealth from players to owners
2. Income is transferred from strong market teams to weaker ones.

Competitive Balance in NBA:

https://www.youtube.com/watch?v=ZkFNE8wPcxE