The soccer globalization game

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Arsenal fielded record-breaking XI

Arsenal are believed to have set a Champions League first during Wednesday’s (13/9-2006) 2-1 win against Hamburg by fielding a line-up comprising 11 different nationalities. UEFA statisticians are trawling the record books after the Daily Telegraph alerted them to Arsenal’s multi-national look when Justin Hoyte replaced Kolo Toure in the 28th minute. "I cannot think it has ever happened before,” one statistics expert told the Telegraph.

The record-breaking team played 41 minutes before Julio Baptista and Mathieu Flamini replaced Robin van Persie and Alexander Hleb.

Arsenal's record XI: Jens Lehmann (Germany); Emmanuel Eboue (Ivory Coast), Johan Djourou (Switzerland), Justin Hoyte (England), William Gallas (France); Tomas Rosicky (Czech Republic), Gilberto (Brazil), Cesc Fabregas (Spain), Alexander Hleb (Belarus); Emmanuel Adebayor (Togo), Robin van Persie (Holland).

Above information captured from various web pages
Some more facts and figures

- Brazilian soccer player exports for around $1 bill. between 1994-2005
- 55% increase between 04-05 (positive trend)
- Coffee yearly exports (2003) around $1.3 bill.

→ Soccer exports amounts to more than 10% of coffee exports (main Brazilian export good)


Outline

• Develop a simplified game model to shed light on player migration patterns in European soccer.
• Discuss model extensions
• Redevelop the model to discuss Profit-vs. Win-maximization.
Setting

- 2 clubs have made a player buying decision.
- The choice is between a "Foreign" or a "Local" player.
- We focus on a single match (CL-qualifier).
- Hence, a win/loose situation. Winning yields a substantial revenue, loosing yields nothing.
- The buying choice affects playing strength differently between the "Foreign/Local" groups.

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Some notation

$T_i$: Team $i$ (Player $i$ in the game) $i \in \{1,2\}$

$R$: Revenue (monetary consequence) of a win (assumed equal for both teams – relaxable assumption)

$F_i, L_i$: Player buying decision, team $i$ can buy $F_i$ or $L_i$

$\mu_i$: Possible extra cost of using a ”Foreign” player as opposed to a ”Local” player for team $i$.

$\frac{1}{2} + \varepsilon$: $P(\text{Team } i \text{ beats team } j| \text{ team } i \text{ buys } F_i \text{ and team } j \text{ buys } L_j)$

$\varepsilon > 0$

Last definition above is due to an inherent assumption of equal initial playing strength between teams. Hence, the probability that either beats the other is $\frac{1}{2}$. Additionally, we assume equal quality among both ”Foreign” as well as ”Local” players. However, The ”Foreign” player is assumed better (per unit buying cost) by $\varepsilon$. 
Some more assumptions

i) The buying price equals between all $F_i, L_i$. (Hence it is omitted from the game).

ii) $R >> \mu_i$ (The value of qualifying for CL is much larger than the added cost of using a "Foreign" player).

iii) The buying choice is made without knowledge of the other teams buying choice for both teams (A simultaneous game).

iv) No other incomplete information is inherent in the game. (A game of complete information).
The game formulation

Given previous assumptions, it is straightforward to construct the normal form game below:

\[
\begin{array}{c|c|c|c}
 & F_2 & L_2 \\
\hline
F_1 & \frac{1}{2} R - \mu_2 & (\frac{1}{2} - \varepsilon) R \\
\hline
T_1 & \frac{1}{2} R - \mu_1 & (\frac{1}{2} + \varepsilon) R - \mu_1 \\
\hline
L_1 & (\frac{1}{2} + \varepsilon) R - \mu_2 & \frac{1}{2} R \\
\hline
\end{array}
\]
Nash equilibria (NEQ)

The analytic part is easier (initially) if we restrict ourselves to the case $\mu_1 = \mu_2 = \mu$

Given the above assumption, either *

$$\frac{1}{2} R - \mu > \left(\frac{1}{2} - \varepsilon\right) R$$

or

$$\frac{1}{2} R - \mu < \left(\frac{1}{2} - \varepsilon\right) R$$

**Unique NEQ ($F_1, F_2$)**

**Unique NEQ ($L_1, L_2$)**

* The highly unlikely $=$ situation with an infinite number of NEQ are ommitted here.
Not a very revolutionary result…

Some (ridiculously) simple algebra:

\[ \frac{1}{2}R - \mu > \left( \frac{1}{2} - \varepsilon \right)R \Rightarrow \varepsilon R > \mu \]

or in plain english: If the expected marginal revenue gain by choosing a "Foreign player" (\(\varepsilon R\)) is larger than the marginal extra cost (\(\mu\)), then both teams choose the "Foreign Player" in equilibrium.

Note however, that the R-values are typically very big (CL-premium). So a relatively small \(\varepsilon\) may lead to significant \(\varepsilon R\)-values that may superseed most \(\mu\)-values.

Note also the inherent Prisoner’s Dilemma structure [both teams would actually prefer the \((L_1, L_2)\) outcome given coordination possibilities].
"Urban" or "rural" teams: $\mu_1 \neq \mu_2$

The variation between different clubs’ choice of "foreigner share" is vast.

Obviously, one plausible explanation could be that "richer" clubs buy more players than "poorer" clubs.

On the other hand a game-type of explanation is readily available through our model.
"Urban" or "rural" teams

It is perhaps not unlikely that making a brazilian player perform (happily) in say Barcelona – Spain, is easier (and cheaper) than say Tromsø Norway

The consequence is: (modelwise)

\[ \mu_{Tromsø} \gg \mu_{Barcelona} \]

It is (relatively) straightforward to show [algebra omitted here]
That if:

\[ \mu_i > \varepsilon P > \mu_j \forall i, j \in \{1,2\} \]

Then "pooling" or "separating" NEQs exist.
Temporary conclusion

• Perhaps not ”revolutionary” conclusions so far. ”Buying foreign players if they contribute more to income than they cost is (of course) expected.

• However, the modelling frame makes it easy to expand analytic possibilities
  • In the paper we also analyze ”crowding costs” as well as team specific revenues.
Shifting focus to player quality through price

- Slightly more interesting results are obtainable by the same modelling frame - but a simple model change is needed.
- Now we look at the same two (equally good) clubs facing the same type of match, but the buying decision relates to an expensive ($E_p$) or a cheap ($C_p$) player.
- Hence, the added cost of "handling" a foreigner ($\mu$) is removed, and explicit buying costs for the expensive player ($c_E$) and the cheap player ($c_C$) are added. ($c_E > c_C$)
- Apart from this simple change, all other model assumptions are kept.
Resulting game is shown below

\[
\begin{array}{ccc}
E_P & & C_P \\
& T_2 & \\
E_P & \frac{1}{2} R - c_E & (\frac{1}{2} - \varepsilon) R - c_C \\
T_1 & \frac{1}{2} R - c_E & \frac{1}{2} R - c_C \\
C_P & (\frac{1}{2} + \varepsilon) R - c_E & \frac{1}{2} R - c_C \\
\end{array}
\]
Some (sports economic) authors [Késenne among others] claim objective function differences between US and European sports.

Some say that US sports producers maximise profits while European sports producers (at least to a greater extent) maximise the probability of winning.

If this is correct, one should expect larger financial/economic problems in European compared to US sports.

This kind of problem can be easily analyzed at micro level through the modelling framework we apply.
The Win-maximization game

Obviously, a win-maximization version of the previous game is obtained by $R=1$ and $c_E=c_C=0$ in the previous figure.

As indicated to the right, the not very surprising NEQ of both teams buying expensive is obtained.

Hence, consistency with traditional views - unique NEQ $(E_P, E_P)$
The profit-maximizing game

- The interesting result is obtained when the profit-maximizing game (the original game of this section) is examined.
- It is structurally (NEQ-wise) equal to the first game we examined, and has hence 2 possible (interesting) NEQ possibilities:

\[ \varepsilon R > c_E - c_C \quad \text{or} \quad \varepsilon R < c_E - c_C \]

- Unique NEQ \((E_p, E_p)\)
- Unique NEQ \((C_p, C_p)\)
Implications:

- A possible objective difference may not necessarily explain financial success/failure - US/Europe
- It is perfectly possible that both continents are profit-maximisers and still allocate talent resources differently
- Additionally, a different explanation emerges: size of $R$.
- If $R$ is sufficiently bigger in Europe than in US, both continents may maximise profits, but the game effect may still lead to talent "overinvestment" in Europe given that $R_{Europe} >> R_{US}$. 