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Make or buy? Human capital accumulation strategies in European club football

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Abstract

When it comes to discussing club football emotions tend to get heated quite easily across the globe. This heterogeneity in likes and dislikes is not only reflected in name or financial possibilities, but also in the clubs approach to building a team. We analyze whether clubs' strategies regarding buying or cultivating players have a discernable effect on their success on the pitch. For the analysis we employ match level data covering five seasons of play in top-flight Dutch and English club football leagues. The results suggest that players' tenure has a positive and significant effect on the probability of winning, but only in the English Premier League. The positive effect we find for the Premier League aligns with theories of firm specific human capital. We hypothesize the lack of significant effects in the Dutch league to be tied to clubs' inability to keep successful players with the club or buy replacements of equal quality on the transfer market, because the club-specific human capital component takes time to accumulate.

Keywords: Football, human capital, tenure, winning probability

JEL classification: D22, J24, L83

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1 Introduction

"...if one holds his state on the basis of mercenary arms,
he will never be firm or secure"
Niccolò Machiavelli, The Prince, pp 45-46

Can this quote from Machiavelli be readily extended to the case of football or is it possible to 'buy' success in football? This question has fueled a heated and still undecided debate in sports media around Europe. There seem to be two philosophies on the matter in European club football. On the one hand there is the class of clubs that rely mostly on players coming from the in-house football academy. The strategy of this class of clubs is to build a team consisting mainly of players who have been with the club for a long time and who are thus familiar with its culture and way of playing. Examples of clubs advocating this philosophy that immediately come to mind are FC Barcelona, Arsenal FC and Borussia Dortmund.[1] On the other hand, there is a group of clubs that build their team mainly by acquiring arrived players on the transfer market, players who have demonstrated their qualities and proven their value playing for other clubs. Clubs adopting this strategy are generally looking for quick success, frequently with the financial support of a private investor. Manchester City FC, Paris Saint Germain, AS Monaco and Real Madrid CF are illustrative for this philosophy. Of course, both schools of thought have their success stories; with Manchester City FC winning the Premier League for the first time in 44 years in the 2011-2012 season, FC Barcelona dominating both the Primera Division and the Champions League in recent years, Real Madrid winning the Champions League three times in five years and Arsenal FC winning the Premier League without losing a single match in the season 2003-2004. That is, to name a few. However, this anecdotal evidence does not prove either of the two 'business strategies' to be superior to the other. Surprisingly though, to the best of our knowledge this debate has not yet caught the attention of the academic sports literature.

This paper marks an attempt to find empirical evidence for the success of the aforementioned business strategies of, what we denote, *cultivating clubs* that mainly work with players with long tenures with the club and *buying clubs*, who are more agile and flexible in their hiring and letting go of established players. The primary empirical goal is to determine whether total tenure affects the pre-match winning probability.

To analyze the impact of players' tenure with the club on success, we use match data from the British Premier League and the Dutch Eredivisie of the

[1]Note that the choice for this strategy can be voluntarily or forced by financial constraints rendering the club unable to acquire human capital on the transfer market.

seasons 2003/2004 to 2007/2008. The Premier League match level data are combined with annual financial data of the clubs in order to control for a variety of factors affecting the pre-match winning probability in a range of random effects models.[2] The results indicate that cumulative players' tenure has a small but significantly positive impact on match winning probabilities in English Premier League football, but not in the Dutch Eredivisie. The effect appears to be concave and thus diminishing in higher levels of tenure.

We hypothesize that these diverging findings are tied to the overall quality of both competitions in international perspective, meaning that well-performing Dutch teams are unable to keep a successful squad together since the best players are inevitably transferred to top-level competitions such as the English Premier League. This renders Dutch top teams simply unable to adopt a cultivating strategy. This poses less of a problem to English top teams. Since they are among the European elite there is much less incentive for top players to switch clubs, affording the club the deliberate choice between a cultivating or a buying strategy. In addition to significant positive effects from tenure, a higher wage to turnover ratio does not appear to lead to more success on the pitch, implying that some clubs may indeed be paying wages above the true value of their players. While these results do not imply that success cannot be bought in football, they do support the hypothesis that player cultivation and team stability play a role in improving match winning probabilities. While there has not been any previous studies of the impact of team stability in football, the results found are in line with the broader literature on employee productivity and tenure (Auer et al., 2005). The positive effects of player tenure seem to indicate that player success in football does have an aspect that is club specific, or firm specific as it is called in the human capital literature.

The remainder of this paper is organized as follows. Section 2 places our contribution within the match winning probability literature in football and discusses in more detail the relevance of the human capital literature to the research question at hand. Section 4 presents the data and the methodology employed and section 5 presents the empirical results. Section 6 concludes.

2 Estimating the probability of winning in football

The research question of this paper relates to two strands of literature, which we aim to reconcile in our empirical analysis. In this section we briefly

[2]Unfortunately financial data are largely unavailable for Dutch football clubs.

discuss the empirical literature regarding the estimation of the probability of winning in football and the literature regarding the role of human capital accumulation in sports.

The empirical literature dealing with the probability of winning in football is rather scarce.[3] Focusing on the pre-match determinants of performance in football, Szymanski and Smith (1997) investigate the relationship between the wage bill and team performance in terms of position in the English Premier League.[4] They show that there is a high positive correlation between wages and performance. This finding is corroborated by Hall et al. (2002), who present additional empirical evidence suggesting the causality runs from a higher wage bill to better performance, again in terms of a higher position in the league. Falter and Pérignon (2000) estimate the probability of winning for French club teams, showing that playing at home and the standing in the league are the most prominent factors explaining the probability of success. Torgler (2004) and Paul and Mitra (2008) put the explanatory power of the FIFA world ranking to the test in two separate attempts, by investigating to what extent the ranking of a country explains its performance at the World Cup. Their results show that a higher ranking is associated with a higher winning probability. Finally, Bruinshoofd and Ter Weel (2003) present empirical evidence from the Dutch football league suggesting that firing the manager does not lead to a significant performance improvement.

Although only few of the studies discussed in this section particularly deal with the determinants of success at the level of individual matches, they do provide us with a good indication of the factors that are expected to affect the probability of winning in our empirical analysis and which we thus need to control for.

The second relevant strand of literature regards the role of human capital accumulation, particularly in sports. In this respect both the fields of labor economics and human resource management prove to be insightful. We will briefly highlight the most relevant concepts from this literature. The classical theory of human capital developed by Becker (1962) differentiates between general and firm-specific human capital. General human capital is knowledge that can be employed in any job while firm-specific human capital pertains

[3]Most work on the probability of winning in the field of sports has been done in the USA and regards its major team sports such as basketball, American football and baseball where the winning probability is generally related to betting odds, a discussion of which is beyond the scope of this paper.

[4]The empirical analysis at hand concerns pre-match determinants of the winning probability. We will thus abstain from discussing the literature regarding the intra-match determinants of the winning probability, such as number of yellow cards, expulsions, penalty kicks or corner kicks awarded.

to knowledge and experience regarding a single company. Lazear (2003) further introduces the idea of heterogeneous jobs where different human capital types benefit the marginal product of employees at varying rates. In football, cultivating clubs are likely to employ players that have more club-specific human capital, which might constitute an advantage. The question is whether or not club-specific human capital has a noticeable impact on player and team performance. Dustmann and Meghir (2005) suggest that the value of sector or tenure-specific human capital varies across sectors. To the best of our knowledge no previous research concerned the role of firm-specific human capital in football.

While the human capital literature supplies arguments in favor of keeping a stable team and cultivating youngsters, there may also be advantages to having a flexible squad with higher player turnover rates. Models of labor markets with both temporary and permanent employees suggest that unexpected shocks can change the value of an employment relationship over time (Blanchard and Landier, 2002; Cahuc and Postel-Vinay, 2002). Since the football players' quality and the contribution to a particular squad can similarly change over time, having a flexible squad, where underperforming players are routinely replaced, can constitute an advantage. The disadvantage of high turnover rates is uncertainty over a potential new players performance and the cost of bringing in a new player and fitting him into the team. Nevertheless, a rational club is expected to replace an underperforming player if his contribution to the team and the cost of bringing a new player are below the average expected contribution of a new player.

Divergence in clubs' strategies regarding buying players or cultivating them will rest on their expectations of the costs and benefits of investing in players to the club and the quality of players they can bring. We expect that expectations of new players' quality and the value of squad stability differ by club and league, leading to alternative strategies for clubs in similar circumstances. The empirical analysis attempts to identify how clubs employing a strategy of cultivating or buying players' perform relative to each other.

3 Data and methodology

For the empirical analysis we employ data from three sources. Detailed match data are provided by Infostrada Sports and cover all matches played in the English Premier League and the Dutch Eredivisie in the seasons 2003/2004 through 2007/2008 (see tables 6 and 7 in the appendix). In addition to general match information regarding match date and match result, we have information regarding the line-up of each team in each match. We matched

this information to the personal record of each player, which contains his date of birth and contractual starting date with the club. We use this information to calculate the key variable of interest in our analysis: the cumulative tenure of the line-up with the club.[5] As discussed in section 2, the effect of cultivating players on team performance could hypothetically go both ways. If the accumulation of club-specific human capital constitutes a comparative advantage, then firm performance will increase in cumulative tenure. However, if a too rigid human resource policy results in keeping underperforming players with the club too long, this relationship will be negative.

Furthermore, for controlling purposes we calculate the average age of the line-up of each team in each match. We expect the relationship between the average age of a team and the winning probability to show an inverted U-shaped form. A very young team is expected to lack experience and strength and thus perform less well, ceteris paribus that is, than older teams. However, only to a certain point where players have accumulated a certain amount of experience and reach their physical peak, after which the winning probability starts decreasing in team age. In addition, we also construct two variables which are employed as a proxy for form. We argue that the number of points gained in the three most recent league matches is a good proxy for momentum or short-term form.[6] The current ranking in the league prior to a match is used as a proxy for long-term or seasonal strength. We expect both proxies for form or strength to positively affect the winning probability.

To be able to control for club specific characteristics we merge to our match data seasonal financial data of the clubs. More particularly, we use turnover and the total wage bill as a percentage of turnover to account for the club specific characteristics, which are obtained from the web site www.footballeconomy.com. Turnover serves as a proxy for club size, where larger clubs, with more financial possibilities are naturally expected to perform better than smaller clubs. In addition, wages as a percentage of turnover is employed as a proxy for player quality. We assume the labor market for football players to be relatively efficient, implying that better players will be paid a higher wage than less gifted players. The winning probability will then

[5]We also experimented with the number of players in the match line-up that joined the club before their 19^{th} birthday as an operationalization of the cultivating business strategy. However, the variation in this variable turns out to be negligible and thus not suited for our purpose.

[6]The construction of this variable is cumulative of nature. This implies that the first match of the season yields a missing value by default, the value of the short-term form variable for the second match is based solely on the result of the first match, for the third match on the result in the first two matches and from the fourth match of the season onwards it is derived from the most recent three matches.

most likely increase in the relative wage bill, provided that the intrinsically better players also perform better. Unfortunately, financial data concerning Dutch clubs are sparsely available and we are thus unable to control for club specific financial characteristics in the analysis of the Dutch Eredivisie.

Finally, we construct a dummy variable indicating whether a particular match is considered a derby, based on The New Football Pools (2008), in which the top-30 most heated rivalries in English club football are established based on empirical research and a Wikipedia-page listing the most prominent rivalries in Dutch club football (see tables 8 and 9 for a list of the identified derbies). The impact of this variable on team performance is expected to be ambiguous. Due to the special dynamic of derbies and the emotions tied to them, we expect a lower ranked team playing a higher ranked team in the setting of derby to have a higher winning probability than would be expected for an identical match only without the derby predicament. Analogously, a higher ranked team is expected to face a lower winning probability in a derby against a lower ranked team than would otherwise be expected.

The variables discussed in this section, which serve as input for the empirical analysis, are summarized in table 1. We translate each match into two observations, one from the perspective of the home team and one from the perspective of the away team. Following Falter and Pérignon (2000) we refer to the reference team as the team 'identifying' the observation and the opponent as the adverse team.

Table 1: Definition of explanatory variables

		Premier League		Eredivisie	
variable	description	mean	standard deviation	mean	standard deviation
human capital variables					
mean age	average age in years of the line-up	27.3	1.4	26.1	1.4
cumulative tenure	cumulative (mean) tenure in years of the line-up	23.2 (2.1)	10.4 (0.9)	20.4 (1.9)	7.1 (0.6)
team variables					
points last 3 matches	points gained in the previous three matches				
ranking at match start	ranking position at match start				
match variables					
home	value is 1 if the reference team is playing a home game				
derby	value is 1 if the match at hand is considered a derby				
financial variables					
turnover	total turnover in millions of £	69.8	41.0	NA	NA
wage ratio	wage bill as % of turnover	63.8	14.8	NA	NA

Sources: Infostrada Sports, www.footballeconomy.com and The New Football Pools (2008)

We employ the random effects probit-model to estimate the relationship between the cumulative tenure of the starting line-up and match winning probability. A standard pooled model would lead to inefficient results since it ignores the unobserved heterogeneity unique to each of the N fixtures.

Since each fixture is analyzed from two perspectives, we have $i = 1, ..., 2N$ fixture and team perspective combinations. Each combination is observed for the t^{th} time, with the maximum of $T = 10$ since each fixture will have been played two times during a season and in at most 5 seasons. The result of a game is treated as a binary variable $R \in 0, 1$ where $R = 1$ indicates a win. The error term is made up of the time-invariant portion a_i and the match specific portion u_{it}. The estimated model can be written as:

$$Pr(R_{it} = 1|x_{it}, \beta, a_i) = x'_{it}\beta + a_i + u_{it} \tag{1}$$

4 The English and Dutch football leagues

The characteristics of the two leagues we analyze, namely the British Premier League and the Dutch Eredivisie, are likely to affect whether or not we can see any differences in the performances of clubs with strategies. The structure of the two leagues are only marginally different; 20 clubs compete in the Premier League and 3 are relegated each year as opposed to 18 clubs playing in Eredivisie which has a potential of 3 relegated teams depending on play-off results. The more fundamental difference is the financial clout and value of the clubs in each league. If there are financial constraints to keeping successful players or buying high quality replacements, neither buying nor making a successful team is a viable long-term strategy.

One way to check whether there are constraints to keeping a stable squad is to look at the squad stability of leagues' top teams. Table 2 shows the cumulative tenure of the top 5 clubs in the Premier League and the Eredivisie. We would expect that successful teams hold on to their players, who brought them success in the first place. The top 5 clubs in the Premier League in the Premier League appear to have both higher average cumulative tenure and their cumulative tenure is more stable overtime. The figures seem to indicate that successful Premier League clubs are able to keep their squads together while Eredivisie clubs' squads are reshuffled frequently regardless of their success. The difference is not surprising considering both the differences in financial value of these leagues and the desire for highly valued players to play in bigger leagues than the Eredivisie.

Table 2: Mean cumulative tenure of the seasonal top 5 (in days)

season	Eredivisie	Premier League
2003/2004	8,937	12,586
2004/2005	7,766	12,075
2005/2006	7,614	11,702
2006/2007	6,302	12,039
2007/2008	7,097	12,849

The alternative for keeping good players is buying new players of sufficiently high quality. Table 3 shows the differences in transfer sales and expenditures of the Premier League and the Eredivisie. Eredivisie clubs appear to be financially constrained in buying players as well. Unsurprisingly the volume of transactions is much smaller in the Eredivisie. More relevantly, the Eredivisie clubs are selling more than they are able to buy. Once again, financial constraints seem to imply that any strategy based on buying players will be limited in the Eredivisie.

Table 3: Cumulative seasonal transfer expenditures (in millions of euro)

	Eredivisie		Premier League	
season	Sales	Expenditures	Sales	Expenditures
2003/2004	59.25	30.53	184.34	427.92
2004/2005	70.84	28.58	180.72	500.87
2005/2006	76.76	38.07	235.23	501.25
2006/2007	89.11	62.44	258.38	553.86
2007/2008	168.16	111.01	476.44	934.7

Source: www.transfermarkt.com

The differences between the two leagues lead us to hypothesize that any differences between the winning probability of teams based on their cumulative tenure will be more apparent in the Premier League. Eredivisie clubs seem unable to keep successful players in their squads and do not have the option to buy players to the extent that Premier League clubs can. Since neither strategy is feasible, short-term financial concerns and players' willingness to move to or stay in the Eredivisie determines the clubs' strategies rather than a conscious decision by the club. If neither make or buy strategies can be applied, it is less likely that we will observe any differences in performance based on squad stability measured through cumulative tenure.

5 Empirical results

The results of our empirical analysis provide support for the hypothesis that a cultivating strategy adds to the winning probability, but only in the English Premier League. Column 1 of table 4 shows that the cumulative tenure of the starting eleven of the reference team is positively associated with the winning probability. In addition, a longer cumulative tenure of the adverse team is associated with a lower winning probability of the reference team. The impact of age is less prominent (column 2), we only find small negative impact of the reference teams mean age on the winning probability.[7]

These findings are robust to the inclusion of match specific control variables (column 3); both coefficients of cumulative tenure remain significant. Although the estimated impact of cumulative tenure is smaller once we control for match specific characteristics, the results still indicate that a longer cumulative tenure adds to the winning probability of a team. The match specific control variables return the expected results. The number of points gained in the last three league matches, which we consider a proxy for short-term form, positively affects the probability of winning a match, although the coefficient is only significant for the adverse team. In addition, the higher the ranking of the team at match start, the higher the winning probability.[8] The home advantage plays an important role in determining the winning probability, resulting in a significant and relatively large estimated coefficient. Whether a match constitutes a derby does not affect the winning probability of winning in any way.

Including club specific financial control variables (column 4) further adds to the explanatory power of our model. Total turnover, which we consider a proxy for the size and the financial possibilities of a club, is positively associated with the winning probability. Both coefficients are significant and return the expected sign. In addition, the wage ratio does not seem to be tied to match success. In our most elaborate model the impact of cumulative tenure on match success of the reference team remains significant and positive. The magnitude of the impact is considerable; a 1 percent increase in the cumulative tenure increases the probability of success by 0.55 percent. However, including the financial control variables renders the impact of cumulative tenure of the adverse team on the winning probability of the reference team insignificant.

[7] We also experimented with squared values of mean age, in order to capture the hypothesized non-linearities in the effect of mean age on the winning probability. However, this did not yield any useful results.

[8] Note that the higher the ranking, the lower the value. Hence, the estimated coefficient is negative for the reference team, and positive for the adverse team.

Table 4: Determinants of the winning probability in English Premier League football (seasons 2003/04-2007/08)

	(1)	(2)	(3)	(4)
Cumulative tenure (REF)	0.192***		0.116***	0.055**
	(0.017)		(0.019)	(0.024)
Cumulative tenure (ADV)	-0.182***		-0.107***	-0.027
	(0.017)		(0.019)	(0.024)
Mean age (REF)		-0.016***	-0.005	0.007
		(0.006)	(0.005)	(0.007)
Mean age (ADV)		0.015***	0.008	-0.008
		(0.006)	(0.005)	(0.006)
Points last 3 matches (REF)			0.001	-0.001
			(0.004)	(0.004)
Points last 3 matches (ADV)			-0.009**	-0.008*
			(0.004)	(0.004)
Ranking at match start (REF)			-0.012***	-0.004*
			(0.002)	(0.002)
Ranking at match start (ADV)			0.010***	0.004*
			(0.002)	(0.002)
Turnover (REF)				0.002***
				(0.000)
Turnover (ADV)				-0.003***
				(0.000)
Wage ratio (REF)				0.001
				(0.001)
Wage ratio (ADV)				-0.001
				(0.001)
Derby dummy			0.014	0.017
			(0.043)	(0.044)
Home dummy			0.202***	0.198***
			(0.014)	(0.016)
No. of observations	3,800	3,800	3,700	2,782
No. of teams	30	30	30	27

Notes: Coeffficients are presented as marginal effects. All regressions include season fixed effects. t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The regressions regarding the Dutch Eredivisie yield less pronounced results (table 5), although our findings regarding the control variables are comparable between the Premier League and the Eredivisie. Cumulative tenure is only significant for the adverse team in our basic model (column 1), but once we include match specific control variables (column 3) both the estimates of cumulative tenure of the reference and the adverse team are insignificant, in addition to average team age, which yields insignificant coefficients altogether. The ranking at match start of both the reference and the adverse team and the home dummy variable return significant coefficients, each with the expected sign. In addition, the magnitudes of these estimates are largely in line with the estimates for the Premier League, which we take as an indication for the presence of internal consistency in the data. Finally, short term

form and the derby dummy variable do not significantly affect the winning probability in the Dutch league.

Table 5: Determinants of the winning probability in Dutch Eredivisie football (seasons 2003/04-2007/08)

	(1)	(2)	(3)
Cumulative tenure (REF)	0.038		0.006
	(0.031)		(0.027)
Cumulative tenure (ADV)	-0.055*		-0.016
	(0.031)		(0.027)
Mean age (REF)		0.006	-0.006
		(0.008)	(0.007)
Mean age (ADV)		-0.007	0.003
		(0.008)	(0.007)
Points last 3 matches (REF)			-0.01
			(0.039)
Points last 3 matches (ADV)			0.189***
			(0.016)
Ranking at match start (REF)			0.004
			(0.004)
Ranking at match start (ADV)			-0.006
			(0.004)
Derby dummy			-0.019***
			(0.002)
Home dummy			0.019***
			(0.002)
No. of observations	3,060	3,060	2,968
No. of teams	24	24	24

Notes: Coeffficients are presented as marginal effects. All regressions include season fixed effects. t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In terms of interpretation of the diverging findings for the English Premier League and the Dutch Eredivisie we hypothesize that these are tied to the relative quality of both competitions in international perspective. We suggest that well-performing Dutch teams are unable to keep a successful squad together since the best players are inevitably transferred to top-level competitions such as the English Premier League after a relatively short period of time. This renders Dutch top teams simply unable to adopt a cultivating strategy. To English top teams this poses less of a problem, since they are among the European football elite there is much less incentive for top players to switch clubs, leaving the club the deliberate choice between a cultivating or a buying strategy. In addition, Dutch clubs seem to be financially constrained to a larger extent than English clubs are. This renders replacement of the best-performing players who are transferred away by players of equal

top-level quality more difficult for Dutch clubs relative to English clubs. Even if replacements of equal quality can be found, the club-specific human capital of departing players will be lost and accumulating this by the newly acquired replacements takes time.

6 Conclusion and discussion

A myriad of factors impacts on team success on the pitch. In this paper, we analyze the effect that players' cumulative tenure has on winning probabilities in two European club football leagues. While the effects of firm-specific human capital on productivity are notoriously difficult to distinguish from wages, club football provides an interesting case in which both success, tenure and their relationship are easily measured. At least in the English football league, there appears to be a case for arguing that club-specific human capital has value. As expected, the cumulative tenure of the squad does not appear to have an impact on Dutch club success on the pitch.

We suggest two avenues for future research. While we control for a variety of pre-match factors impacting on winning probabilities, our results do not prove the existence a causal relationship between tenure and success. Future research could use changes in foreign player quotas or other potentially exogenous changes to confirm the results found in our reduced form analysis. Another potential area for research is the effect of players' tenure or nationality in other sports and international competitions. The rise in the number of players born outside the country where they are playing provides an especially interesting case to study.

A Appendix

Table 6: Clubs in the English Premier League (2003-04/2007-08)

club	season appearances	club	season appearances
Arsenal	5	Manchester United	5
Aston Villa	5	Middlesbrough	5
Birmingham City	4	Newcastle United	5
Blackburn Rovers	5	Norwich City	1
Bolton Wanderers	5	Portsmouth	5
Charlton Athletic	4	Reading	2
Chelsea	5	Sheffield United	1
Crystal Palace	1	Southampton	2
Derby County	1	Sunderland	2
Everton	5	Tottenham Hotspur	5
Fulham	5	Watford	1
Leeds United	1	West Bromwich Albion	2
Leicester City	1	West Ham United	3
Liverpool	5	Wigan Athletic	3
Manchester City	5	Wolverhampton Wanderers	1

Table 7: Clubs in the Dutch Eredivisie (2003-04/2007-08)

club	season appearances	club	season appearances
ADO Den Haag	4	Heracles Almelo	3
AZ	5	NAC Breda	5
Ajax	5	NEC	5
De Graafschap	2	PSV	5
Excelsior	2	RBC Roosendaal	3
FC Den Bosch	1	RKC Waalwijk	4
FC Groningen	5	Roda JC	5
FC Twente	5	Sparta Rotterdam	3
FC Utrecht	5	VVV Venlo	1
FC Volendam	1	Vitesse	5
FC Zwolle	1	Willem II	5
Feyenoord	5	SC Heerenveen	5

Table 8: Derbies in English Premier League football

derby	fixture
Black Country derby	Wolverhampton Wanderers vs West Bromwich Albion
North West derby	Liverpool vs Manchester United
South Coast	Portsmouth vs Southampton
Second City derby	Birmingham City vs Aston Villa
Tyne-Wear derby	Sunderland vs Newcastle United
North London derby	Arsenal vs Tottenham Hotspur
Merseyside derby	Everton vs Liverpool
Roses derby	Leeds United vs Manchester United
Manchester derby	Manchester City vs Manchester United

Source: The New Football Pools (2008)

Table 9: Derbies in Dutch Eredivisie football

derby	fixture
Gelderse derby	Vitesse vs NEC
Rotterdamse derby's	Feyenoord vs Sparta Rotterdam vs Excelsior
Noord-Hollandse derby	Ajax vs AZ
Gelderse derby	De Graafschap vs Vitesse
Brabantse derby	PSV vs NAC Breda
Brabantse derby	Willem II vs RKC Waalwijk
Brabantse derby	NAC Breda vs Willem II
derby van het Noorden	FC Groningen vs SC Heerenveen
Twentse derby	Heracles Almelo vs FC Twente
Overijsselse derby	FC Zwolle vs FC Twente
Limburgse derby	Roda JC vs VVV-Venlo
Noord-Hollandse derby	FC Volendam vs AZ

Source: Wikipedia *http : //nl.wikipedia.org/wiki/Derby_(sport)#Nederland* (downloaded on October 23^{r}d 2013)

References

Auer, Peter, Janine Berg, and Ibrahim Coulibaly. 2005. Is a stable workforce good for productivity? *International Labour Review* 144 (3): 319–343.

Becker, Gary S. 1962. Investment in human capital: A theoretical analysis. *The journal of political economy* 70 (5): 9–49.

Blanchard, Olivier, and Augustin Landier. 2002. The perverse effects of partial labour market reform: fixed-term contracts in france. *The Economic Journal* 112 (480): 214–244.

Bruinshoofd, Allard, and Bas Ter Weel. 2003. Manager to go? performance dips reconsidered with evidence from dutch football. *European Journal of Operational Research* 148 (2): 233–246.

Cahuc, Pierre, and Fabien Postel-Vinay. 2002. Temporary jobs, employment protection and labor market performance. *Labour Economics* 9 (1): 63–91.

Dustmann, Christian, and Costas Meghir. 2005. Wages, experience and seniority. *The Review of Economic Studies* 72 (1): 77–108.

Falter, Jean-Marc, and Christophe Pérignon. 2000. Demand for football and intramatch winning probability: an essay on the glorious uncertainty of sports. *Applied Economics* 32 (13): 1757–1765.

Hall, S., S. Szymanski, and A. S. Zimbalist. 2002. Testing causality between team performance and payroll the cases of major league baseball and english soccer. *Journal of Sports Economics* 3 (2): 149–168.

Lazear, Edward P. 2003. Firm-specific human capital: A skill-weights approach, NBER Working Paper Series No., National Bureau of Economic Research.

Paul, Saumik, and Ronita Mitra. 2008. How predictable are the fifa worldcup football outcomes? an empirical analysis. *Applied Economics Letters* 15 (15): 1171–1176.

Szymanski, S., and R. Smith. 1997. The english football industry: profit, performance and industrial structure. *International Review of Applied Economics* 11 (1): 135–153.

The New Football Pools, . 2008. Football rivalries report 2008, Technical report, The New Football Pools.

Torgler, Benno. 2004. The economics of the fifa football worldcup. *Kyklos* 57 (2): 287–300.