The Valuation of Human Capital in the Football Player Transfer Market

An investigation of transfer fees paid and received in the English Premier League

Master thesis Financial Economics

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Introduction

The excitement in science can often be found in its application to fields that are uncharted and unexpected. It is this kind of research that offers an interesting test of relevance for scientific theories, by providing a challenging contextual framework. Hence, many academics have turned to the field of professional team sports to implement and test various economic theories, either out of pure curiosity or interest for the game. On both these grounds, this thesis focuses on the valuation of the most important assets in a specialized and differentiated market place: football players in the English Premier League. Specifically, we analyze the variance in transfer fees paid and received by English Premier League clubs in order to acquire players' services in the seasons 2008-2009 and 2009-2010. In this, we try to establish whether asset characteristics are the main determinants of value, or whether contextual variables (e.g. buying and selling club characteristics) 'obscure' asset valuation.

Individual football players cannot be seen as performing in a vacuum, as football is a team sport. Football is the most popular sport globally, and produces some of the most recognizable international superstars. Yet, the sport is simultaneously one of the least individualized sports, as it is difficult to ascribe football team performance to identifiable and discrete qualities or actions of individual athletes. Perhaps this relatively low level of individualization contributes to the popularity of the game, but it does not help the rational valuation of individual assets in the business. Yet these valuations take place ever more abundantly (and under increasing public scrutiny), but on what basis? This thesis aims to provide insight into the workings of the football transfer market and the board rooms of professional football clubs. Furthermore, we model the determinants of transfer fees, and assess their economic merit. In this, we attempt to provide a review of the practice of valuations in the player transfer market, and offer an answer to the apparent paradox of valuating individual performance in a team context.

Allow us to sidestep to Major League Baseball (MLB), one of the most individualized team sports globally. In one of the more famous sports chronicles, *Moneyball*, Michael Lewis (in the financial world better known for *Liar's Poker*) outlines the economics of modern professional baseball. The book is built around his fascination with the fact that 'richer' teams don't always win. As he puts it: '*the market for baseball players was so inefficient, and the general grasp of sound baseball strategy so weak, that superior management could still run circles around taller piles of cash' (p. 122).* He tells the tale of one team, the Oakland Athletics, who based their player acquisition policy on statistical analysis of player performance (now referred to as 'sabermetrics'), rather than merely on scout

reports. As one of the poorer teams in baseball, they succeeded in putting one of the best teams in the league on the field for numerous years. Consequently, *Moneyball* received great attention, and is often cited as being solely responsible for the introduction of sabermetrics to the greater public and into many baseball front offices. Nowadays, the statistic-crazed Americans have embraced sabermetrics, and most baseball fans will know all about an individual player's 'WAR' (Wins Above Replacement level player), 'wRAA' (weighted Runs Above Average created) or 'xFIP' (expected Fielding Independent Pitching). Quantitative analysis has even gone so far as to put a dollar value on every 'WAR' a player generates in a season (roughly $5 million for 2011). As such, the uprising of sabermetrics has shaped the valuation of assets in the business of baseball.

We are not as ambitious in saying that our work is going to shape the business of football. As pointed out earlier, the nature of football differs greatly from baseball, as it is one of least individualized sports around. On the opposite end of the spectrum, baseball appears to be a sport defined by the individual performance of two types of athlete: pitchers and hitters. Yet, resemblances remain, as both sports are team sports and as such performance is partly discrete, and partly collective. In baseball, pitchers' performances are helped by superior defense in the field. A hitter's ability to score and drive in runs depends greatly on whether his teammates actually get on base. And external factors are at play as well. Hitters will hit more home runs in smaller stadiums, or at higher altitude for that matter. Hence, in team sports in general, the pure contribution to team performance by an individual athlete is difficult (though not impossible) to capture. As public attention to the game of football increases, more advanced player statistics will develop, as a player's activities on the field will be increasingly dissected into goals, assists, distance travelled, correct back and forward passes, tackles made, possessions lost and won, and so forth. In fact, these statistics are already on account, albeit not publicly available. However, the goal of this thesis is not to create a 'WAR'-like statistic for football, although we expect football to eventually move in that direction.

In general, there are various aspects to the economics of professional team sports that make for interesting topics of research. The labor market, for one, is a popular field of choice, as it is unique in many respects. Professional team sports are usually characterized by a high level of exposure. Hence, the extent of the information on the performance and background of individual employees publically available is exceptionally large, as touched upon already. The combination of highly specialized, publically available information on individual (and team) performance, coupled with the public, explicit (or implicit) valuation of these athlete's contributions makes for exceptional labor market research opportunities. Consequently, athlete transfer markets have been fascinating phenomena

for the practical economist. They do not only provide a detailed laboratory for various labor economists, but they also present the financial economist with an interesting dataset of asset valuations.

The challenge herein lies in finding an applicable valuation technique, given the unique (public) position and institutional context in which sport management operates. Disintegrating this context into a relevant economic framework in itself can be a very trying endeavor. As professional sports teams almost exclusively work in leagues that are based on principles of simultaneous interdependence and intense competition, league regulations can often be confusing as to their (intended) results and practical implementation and implications. Hence, a crucial factor in analyzing sports labor and transfer markets, as well as league dynamics and context, are the objectives of the owners of professional sports clubs. These objectives dictate the incentive schemes throughout these markets, acting as an overshadowing element that needs to be explicitly incorporated in any economic model on the subject. Owner intentions determine the standards of efficiency and effectiveness implied in the club's operations, thus imposing a sense of (ir)relevance to any economic model in its application to these markets. It is these intentions that distinguish the market from other, less monopolized and perhaps more financial-return-driven industries.

The sports economics literature has focused on many more fields of interest to academics, such as managerial efficiency, issues of competitive balance both on and off the field and the link between sporting success and financial prosperity. In establishing a comprehensive model for the valuation of athletes in the football transfer market, all these aspects should merit consideration. Hence, our study of the economics of the football transfer market is structured as follows: Chapter 1 describes the context of the football labor market. Herein, context refers to the competitive landscape professional football organizations operate in, the business model that they employ, the regulatory environment that they face and the actual workings of the player transfer market. Chapter 2 describes the model that we employ to analyze variances in transfer fees, and how we have come to this model. We identify and proxy possible determinants, also with the help from previous academic efforts. After discussion of the findings, we offer suggestions for further research, which will be followed by a conclusion.

Chapter I – The Context of the Football Transfer Market

As we attempt to valuate the contribution of an athlete to a team's value and his or her consequent value on a player transfer market, it is important to be able to place player transfers in context. We discuss context regarding the nature of business of professional sports organizations, the competitive landscape they operate in, the practice of the football transfer market and its institutional constraints. The unique competitive and institutional environment in which professional sports organizations operate, coupled with the intense public scrutiny they face is what sets them apart from other, more conventional academic fields of interest. Hence, it is also this distinctive context that provides value for research, and as a result has attracted a surprisingly large number of scholars. In fact, academic interest at times has become preoccupied with the market place that exists in European football, and the competitive incentives that accompany it. For us, the competitive and institutional context provides a framework for understanding how value is created (or is intended to be created) in the industry, and, consequently, how individual athletes add value to professional team sport organizations. Furthermore, this institutional context has historically been an important determinant of the valuation of individual athletes, although less prominently so in recent times.

The Union of European Football Associations (UEFA) provides a very useful overview of the European football market every year. Based on the financial statements submitted by the majority of top division clubs, it supplies the public with a plethora of important (and less important) facts on the state of European football in general in its annual 'Club Footballing Landscape' reports. Furthermore, every year Deloitte publishes its 'Annual Review of Football Finance'. These reports include information on club licensing, league structures, gross attendances, financial results, competitive balance, balance sheets, stadium ownership, and, not insignificantly, player salaries and transfer fees. Facts like these touch on all of the themes that determine the context in which European football operates, and will therefore serve as a guideline through its description.

The existential question that this thesis is in fact asking is 'What is the product football?', as it is this product and the contribution to it by individual athletes that we will be valuating. According to Rottenberg (2000), professional team sports should be seen as an industry with teams as the firms, which produces a form of entertainment for which other industries produce an imperfect substitute. The latest UEFA report offers a measure for the output of the industry, as European football has turned into an €11.7 billion industry in revenue by 2010, drawing a total crowd of over 101 million in stadium attendances. Although the industry size as a whole may not be too impressive to the average economist, Matheson (2003) notes that European football is indisputably the most popular

sport globally. Market values for the most renowned teams compare to their American peers (Frick, 2007), while commercialization in the American market has often preceded European trends. Hence, European football as a form of entertainment is a highly successful product. Yet, according to UEFA figures, European clubs managed a collective loss of €1.2 billion in the 2009-2010 season. Consequently, questions arise as to the competitive landscape that exists and the incentives that drive the business of European football.

1.1 Competitive context

Academic interest in the economics of professional sports was initiated by Rottenberg (1956), in his review of the American baseball players' labor market. He outlines the multitude of labor mobility restrictions and other cohesive efforts that existed in Major League Baseball, and explicitly links these to competitive forces that are imposed and necessary for the league as a whole to thrive. Amongst others, he introduces the notion that professional teams need to be of roughly equal 'size'[1] in order for any of them to succeed. Although this particular thought has later been negated by academia, (e.g. Sloane, 2006) it does highlight the high level of interdependence that distinguishes professional sports. Yet, Rottenberg's central point is that these restrictions may as well be lifted, as an unrestricted market would yield a similar distribution of talent and competitive landscape.[2] In this, Rottenberg was the first solicitor of applying contemporary economic theory to the field of sports, and he did this with some significance.

Rottenberg's central idea of competitive balance has evolved into an entire strand of literature (e.g. Buzzachi et al., 2003, Forrest et al., 2005, Cairns et al., 2005), with debates on the significance of *'uncertainty of outcome'* (a common proxy for competitive balance, see section 1.1.2) intertwining with the institutional context of sports leagues. Rottenberg was the first to point out this link, as he argued that a roughly equal distribution of talent in any league is necessary for there to exist uncertainty of outcome. However, his main point is that cohesion is not a necessary form of governance in order to achieve this equal distribution. A free labor market would not necessarily imply all talent to be 'bought' by relatively richer (or more popular, or otherwise more endowed) teams, due to the simple law of diminishing returns. Diseconomies of scale set in when the difference

[1] Rottenberg advocates an allocation of baseball teams around the US that would ensure roughly equal product market sizes, leading to equal revenue potential around the league.

[2] As Szymanski (2006) notes, Rottenberg's case shows remarkable resemblance to the Coase Theorem, which was introduced in 1960. Coase stated that economic efficiency is best achieved (i.e. externalities avoided) if property rights are fully allocated and freely tradable. Coase's work has stood at the basis of for example the Kyoto Protocol and its creation of a trade market for emission rights.

between teams becomes too great, as rich teams will prefer winning by close margins to winning by great margins. Rottenberg also argues that differences need to exist, as a total equal allocation of funds, through complete pooling of revenue streams (and a subsequent equal ability to bid on talent), would wipe out any (financial) incentive to win. The public would turn to substitutes for entertainment, indicating the delicate balance that exists between distribution of talent, competitive balance, individual team incentives and collective league success.

1.1.1 Owner objectives: Competitors and collaborators

Cairns et al. (1986), in their survey of the economics of professional team sports, distinctly set out to distinguish between academic ventures into league objectives, the product market, the labor market and league rules. Although the topics are obviously deeply related, it is useful to first develop a notion of the objectives that motivate individual team owners into venturing into and investing in professional sports teams. It is these objectives that eventually dictate the investment decisions made in the football player transfer market. Rottenberg (1956), in his plea for an unrestricted baseball labor market, depends on the assumption that '*baseball-team owners are rational maximizers of money quantities'* (p. 252). He bases this assumption on the notion that it is unlikely that people will risk vast sums of capital for the 'pure joy of association with the game' (or 'psychic income' as he refers to it).

In an academic sense, the concept of 'maximizers of money quantities' (regardless of whether the assumption is realistic), is a crucial assumption in any economic model regarding the football transfer market. For instance, many scholars (e.g. Feess & Muhlheusser, 2003; Kesenne, 2000 and 2005; Rottenberg, 2000) apply the Coase Theorem in arguing that leagues with profit-maximizing owners have an 'efficient distribution of (athlete) talent'. Obviously, in Rottenberg's ideal world, an efficient distribution is an (almost) equal one, ensuring uncertainty of outcome. However, as the practice of sporting leagues dictates, natural endowments in revenue potential disturb this ideal and leagues rarely approach equality in playing talent. In the Coase Theorem, this initial distribution of property rights does not influence the efficient distribution. Consequently, Szymanski (2006) argues that professional football is a suited test-case for the practicality of the Coase theorem, as property rights are relatively well defined and the cost of bargaining is acceptable. This raises the question of whether bargaining in this practical approximation of an unrestricted market indeed results in an efficient economic distribution of resources. A test of Coase's brethren is hence one of the efficiency

of bargaining in the football transfer market, and of the owner objectives that dictate decision making in the industry.

Although Rottenberg's seminal paper may be seen as the initiator of the sports economics literature, the application to (European) football was introduced by Sloane (1969). He vehemently disagrees with the assumption of profit maximization, arguing that, as half of the clubs in England's highest division were run at an operational loss, arguments other than profit must exist for owners to continue running these ventures. This statement may be true today, as the 2011 UEFA report tells us that European football lost a collective €1.2 billion in 2008/2009. Figure 1 enhances this statistic, by indicating the profitability across European leagues.

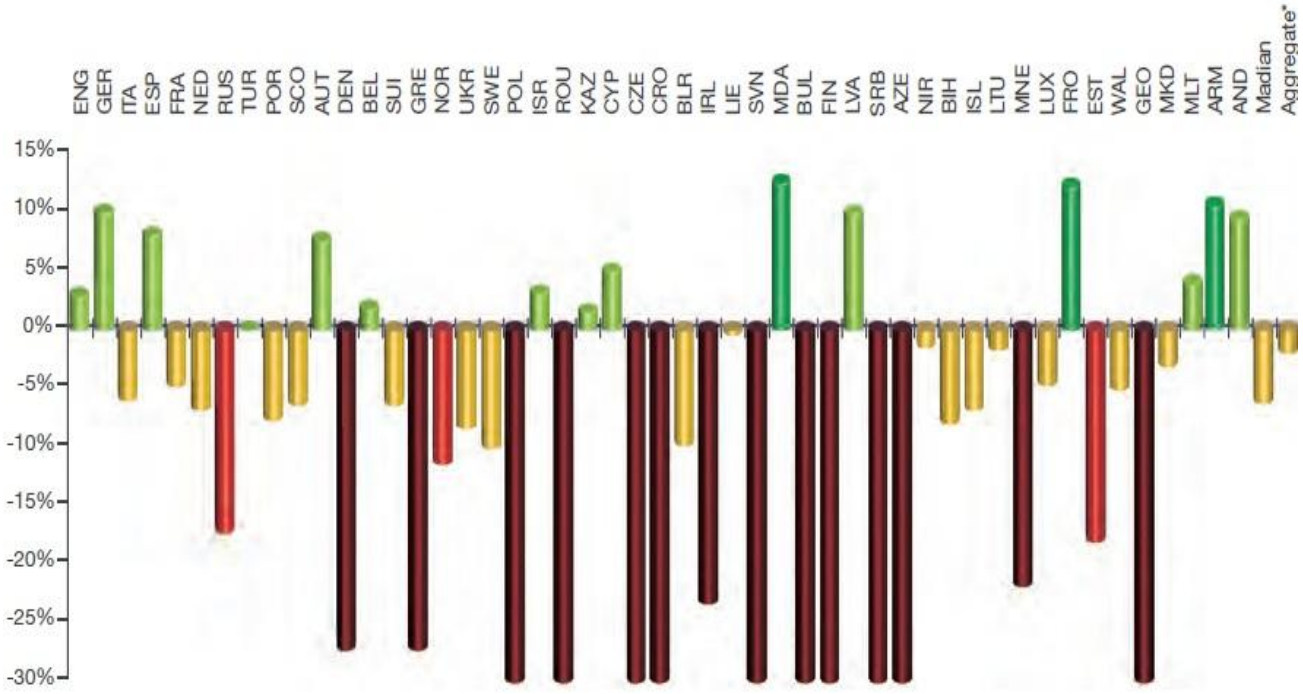

Figure 1: Profitability per league
This graph shows league-wide profits/losses as a percentage of revenue for each European league (country names abbreviated above). Source: UEFA (2011).

In a later paper, Sloane (1971) introduces three other possible objectives for team owners: security (avoiding bankruptcy, more likely an important consideration at lower levels), sales maximization (an extension of the premise that the product of football is primarily entertainment) and a broader concept in *utility maximization*. In his search for the most appropriate framework, he arrives at the objective of utility maximization as a function of playing success, (the dominant factor), average stadium attendance, and 'health of the league' (which refers to a 'keenly fought competition') subject to some minimum after-tax profit constraint. This is a sophistication of a 'win-maximization'

(maximization of sporting success) objective driven purely by the 'psychic income' of owning a club. Obviously, this utility perspective only differs from the profit perspective in practice if sporting success does not drive financial success to a large degree (see section 1.2.2). By comparing the practical implications of both theorems (Sloane, 1980), it is suggested that the reality will lie somewhere in between: utility maximizers are unlikely to forget about financial considerations and profit maximizers may be willing to forego some profit in order to enhance their chances of winning.

More recent literature also supports this departure from the profit maximizing perspective. In their examination of player expenditures by English and Spanish football clubs – given the competitive landscape that exists – Garcia-del-Barro & Szymanski (2006) find that club decisions resemble a win-maximization strategy under a budget constraint.[3] Szymanski (2006) in his discussion of the Coase Theorem in English football, also concludes that the theorem does not apply, as owners are not (merely) motivated by profit maximization.[4] Hence, we have to depart from the basic assumption that professional football team owners try to maximize profits for their personal gain, and as such may not necessarily assume that these organizations are run efficiently. Therefore, we need to raise the question of whether the market for football players itself is efficient, and whether these athletes are valuated rationally.

1.1.2 Collective league objectives and competitive balance

The objectives employed by individual team owners is what eventually dictates a team's behavior regarding player transfers. Yet, these cannot be seen separately from (collective) league objectives and subsequent competitive balance considerations that come to mind. Like football players playing in a team, football organizations by no means operate in a vacuum (underscored by Sloane's inclusion of a 'health of the league' variable in his utility maximization framework). As teams attempt to generate the attention of the general public, they depend highly on the nature and quality of play of the other teams in the league. Scholars have generally tackled this issue of interdependence by stressing the need and demand for 'uncertainty of outcome'. Herein, uncertainty of outcome is the academic proxy for the competitive balance that exists within leagues. Cairns et al. (2005) describe this demand for close contests as a *'specific demand-side externality'* (p.5), that defines the unique nature of professional team sport organisations. They go on to distinguish between the three forms

[3] In an interesting side note, they find that club presidents, particularly with a background in the construction industry, are more inclined towards this win-maximisation objective.
[4] In his model, profit maximization equates attendance maximization. As is argued below, this may not be true for modern football.

of league uncertainty of outcome that are generally used, and how the concept is linked to the production function in professional team sports.

At first they discuss the uncertainty in the outcome of matches, which may be approached through pre-game differences in either league position or point totals, or through betting odds for individual matches (as described in Forrest et al., 2005). Another distinguishable form is uncertainty of outcome in seasons, which can be studied via closeness in league contests (e.g. through point differentials at the end of seasons, or the number of lead changes atop a league's standings) or variances in seasonal outcomes of individual teams. The absence of long-run league domination by individual teams or a group of teams is the final version of uncertainty of outcome in academia. Whether this latter form is, in fact, a form of uncertainty of outcome that fans care about is questionable, as natural endowments in revenue potential (as touched upon earlier) often dictate the dominance by a select group of teams in the long run.[5] As shown in Figure 2 below, the number of domestic champions is in decline since the 1980's, indicating the onset of league championship dominance in European football. Hence, an apparent balance should exist between tendencies of utility (or win) maximizing teams to dominate leagues and profit-maximizing teams to maintain competition within leagues. By all means, dominant teams will also benefit from dominating more closely contested leagues instead of winning easily. In practice, this 'balance' is achieved through restrictive measures on labor markets and financial means available to clubs. This clearly reflects the interaction between the two realms of sporting competition and economic competition: football clubs being interdependent and competitors at the same time (Sloane, 1971).

1.2 Business context

Basically, professional football organizations are in the business of extracting value from the entertainment that their product (the performance of their football team relative to other, related football teams) provides to their customers. Herein, we can temporarily ignore whether this value is extracted in order to benefit the owner financially (i.e. profit maximizing) or non-financially (i.e. win maximization). In a nutshell, academics have advocated a business model which identifies stadium attendances as the main driver of football club revenue, and these match-day spectators in turn are driven to the stadium by their demand for close contests (i.e. uncertainty of outcome). However, as in any industry, the business model of professional football organizations has evolved greatly over

[5] This fact may be accepted by supporters and other stakeholders in the long-run and has a dubious influence on long-term financial performance: Buzzachi et al. (2003) suggest that fans may be indifferent to the dominance of a small number of teams.

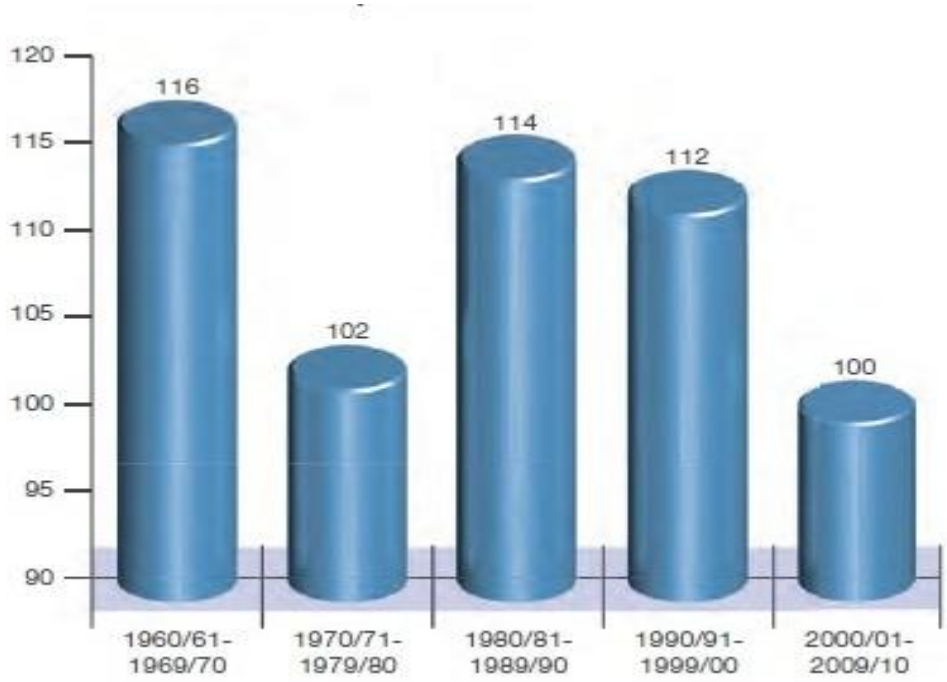

Figure 2: Development of Competitive Balance in European Soccer
This graph depicts the total number of *different* champions per decade across 25 top divisions in European leagues. Obviously, the maximum number of league champions per decade (250, as all leagues have a minimum of 10 teams) is never reached, and the strong decrease of the figure in the last decade could be an indication of more concentrated league championship races (source: UEFA, 2011).

time. Particularly, the opportunities for sports organizations to extract value have increased multifold, with the introduction of new media and the increased opportunities for fans to follow the events surrounding their favorite teams. Teams do not only generate revenue through the sale of tickets at stadium gates, but they also sell merchandise, have millions watching at home and may even provide their own television shows on non-match days for football-hungry fans. Figure 3 gives a general description of the sources of income in different European leagues. To the economist, it is of obvious significance to investigate what drives these sources of income. After all, we try to find out how exactly individual football players add value to a football club.

1.2.1 Revenue drivers: Stadium attendance

Studies have linked attendance figures to population (an important determinant), income and ticket price elasticities[6], 'championship significance' (whether either team in a match matters to the championship)[7], unemployment rates (which may be an indicator for economic cycles) and even the

[6] Price and income elasticities are often found to be insignificant. However, this may not necessarily be interpreted as price/income inelasticity, as data problems in attendances (sellouts, season tickets, data reliability) and price (price discrimination, season tickets, data collection) are abound.
[7] Calculated by the amount of points needed to become champions (ex post)

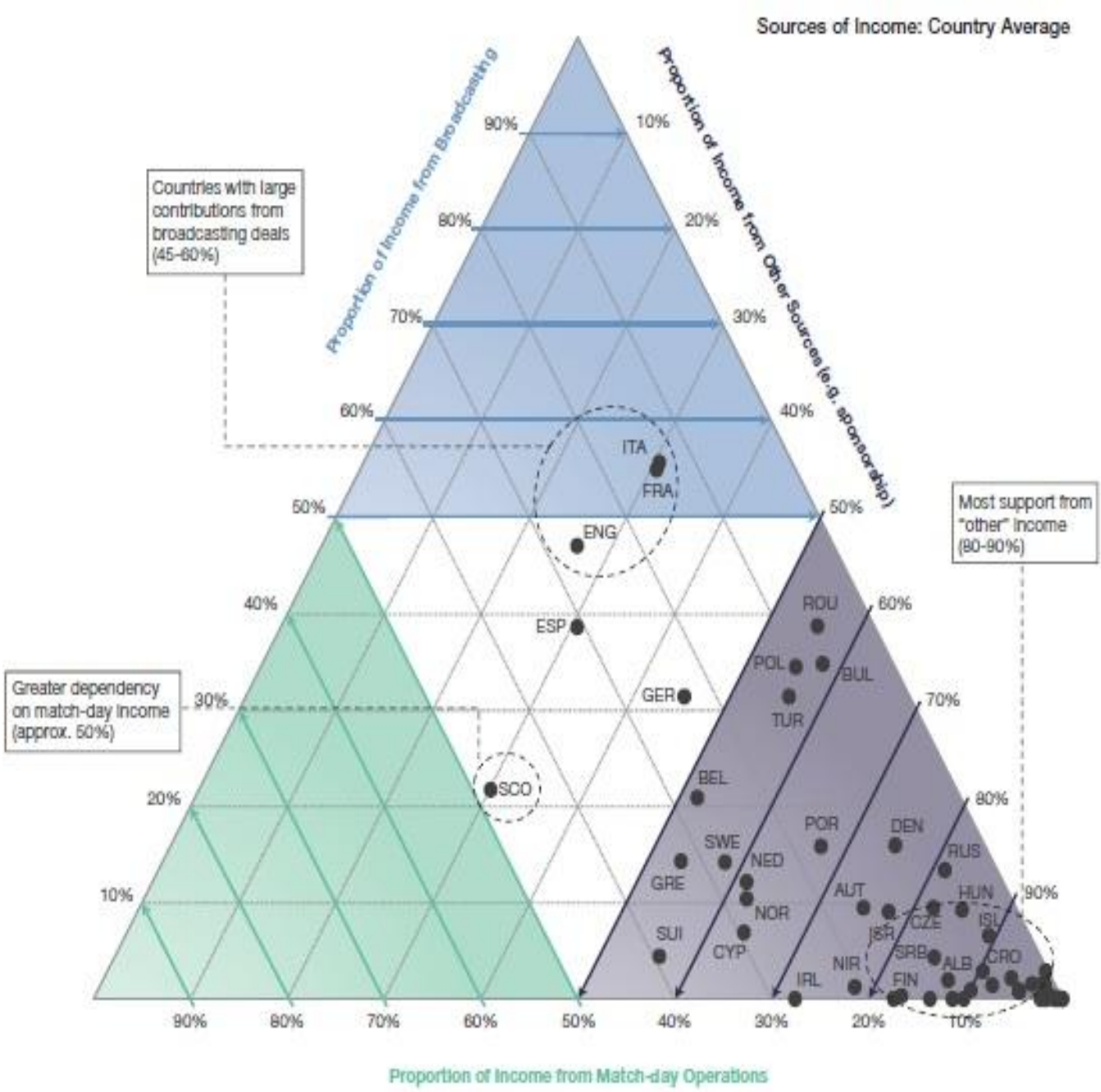

Figure 3: Sources of income across European leagues

This figure clearly divides football club revenue into three categories: match-day operating income (tickets, catering), income from the sale of television (and internet) broadcasting rights and other sources of income, such as sponsorship deals and sale of merchandise. League averages for all European leagues are given, showing strong differences between leagues. For example: the Spanish Primera Division ('ESP') depends greatly on broadcasting income (38%) with both match-day and 'other' income providing for 31% of revenue. What is especially striking is the low dependence of the major European leagues (England, Spain, Germany, Italy and France) on 'other' income relative to all other leagues (which depend greatly on sponsorships). Furthermore, the differences that exist in the significance of match-day operating income are worthy of notice, as attendances never determine over 50% of revenue. Source: UEFA (2011).

weather (Cairns et al., 2005). These studies implicitly assume stadium attendances to be the most important source of revenue to clubs.[8] However, according to the 2011 UEFA report, in 2009, gate receipts accounted for a mere 22% of reported income in English football (the focal point of our research), well behind broadcasting income (36%), and equivalent to revenue from sponsorship (25%) and other commercial activities (17%). For comparison: Deloitte (2011) conveys how Manchester United's broadcasting income amounted to a mere 14% of revenue in 1996/1997 and then grew to 37% in 2009/2010 (at €128 million).[9] In their study of support in Spanish football, Barajas & Crolley (2005) find attendances to be the most important driver of revenues. They cite significant and positive correlations between attendance figures and several revenue indicators (advertising, television rights, match-day income and others).[10] Whether this limited statistical evidence makes a satisfactory case for attendances as the key driver to revenues remains to be seen.

In this light, Forrest et al. (2005) investigate whether (match) uncertainty of outcome also determines the size of television audiences for the English Premier League. They point to the potential differences that exist between television audiences and stadium attendances, as stadium spectators will obviously mostly support the home team, while television audiences need not make this distinction. As such, they mention that stadium attendances may be more prominently determined by a preference for a home win than a preference for outcome uncertainty.[11] They also stress the data difficulties involved in observing true demand for stadium attendance, due to for example season tickets sales and stadium sellouts. By bypassing these issues through studying the 'couch potato audience', they hope to find a more accurate link between uncertainty of outcome and demand. After controlling for such factors as team quality, they find a significant relationship, although remarking that '*the magnitude of its impact appears to be modest relative to the prominence of the issue in discussion of sports policy*' (p.659). In other words, the impact of competitive balance issues on television audiences appears to be less than academia would expect.

As television audiences have become a dominant revenue source, factors other than sporting success and uncertainty of outcome could become more relevant to financial success. Some limited

[8] In the utility function by Sloane (1971) however, attendance is also included to reflect the entertainment purpose of the game.

[9] In the Premier League, broadcasting rights are sold collectively by clubs, and broadcasting revenue is then distributed based on television appearances (25%) and league finishing position (25%), with the remaining 50% being shared equally.

[10] Surprisingly, they find a relatively low correlation between attendance and match-day income.

[11] They refer to research according to which attendances are maximized at a 60% probability of a home win.

American research[12] (most prominently Horowitz, 1974) attempts to explain variations in broadcasting fees paid to clubs and finds local population, team performance, marketing ability, bargaining skills and profit orientation to be of influence. Although these (limited) results may not reflect the European situation accurately, the suggestion that attendances and television audiences have different determinants may be valid. Certainly, a good case can be made for televised football being a different product from in-stadium football, as they differ in experience, convenience, availability and price. Hence, the introduction of televised football has essentially changed the nature of the product 'football' and as such the business model employed by professional football organizations. A ripple effect is certainly in place on the player transfer market, as marketability and sponsoring considerations may become legitimate inputs into a transfer decision. Furthermore, this may add validity to the remark that 'the transfer market is a means of maintaining interest in the game' (Sloane, 1969, p. 187), in addition to a necessity in ensuring on-pitch performance.

1.2.2 Sporting success and financial success

Traditionally, financial prosperity was assumed to be caused by teams enjoying good seasons and hence drawing many fans into their stadiums. As discussed in depth above, consensus still does not exist on whether financial success is a mere byproduct of sporting success, or the actual objective of the professional sports organization. As such, it is extremely difficult to model and establish which of the two comes first. However, it is beyond a doubt that a clear link exists. Figure 4 below shows that high-income teams are usually assured a spot in the top of the league. Figures 5 and 6 enhance this analysis for the larger European competitions (and the Champions League[13]). The graphs show that it is more logical to focus on personnel expenditure, as football players do remain the most important assets clubs possess. The strong correlation between personnel costs and on-pitch success, suggests that titles can indeed be 'bought'. In fact, relatively large personnel expenditures appear to be a prerequisite for any hope of success. Yet, surprisingly, Deloitte (2011) finds a strong correlation between wage costs and league position in England for the top four and bottom three positions, but not in between. Figure 6 indicates a slightly different relationship, with a huge variance in league finishes for the least 'generous' clubs, a variance that appears to drop as clubs become (or can afford to be) more generous in their personnel spending.

[12] It should be noted that the American broadcasting environment is way more complex than its European (and English) peer in the division between local and national broadcasting rights, and comparability is therefore an issue.

[13] The UEFA Champions League is a highly lucrative cup competition. This competition is usually dominated by a select number of teams from the five major European competitions, as the qualification system for the cup strongly favors the top teams from these competitions.

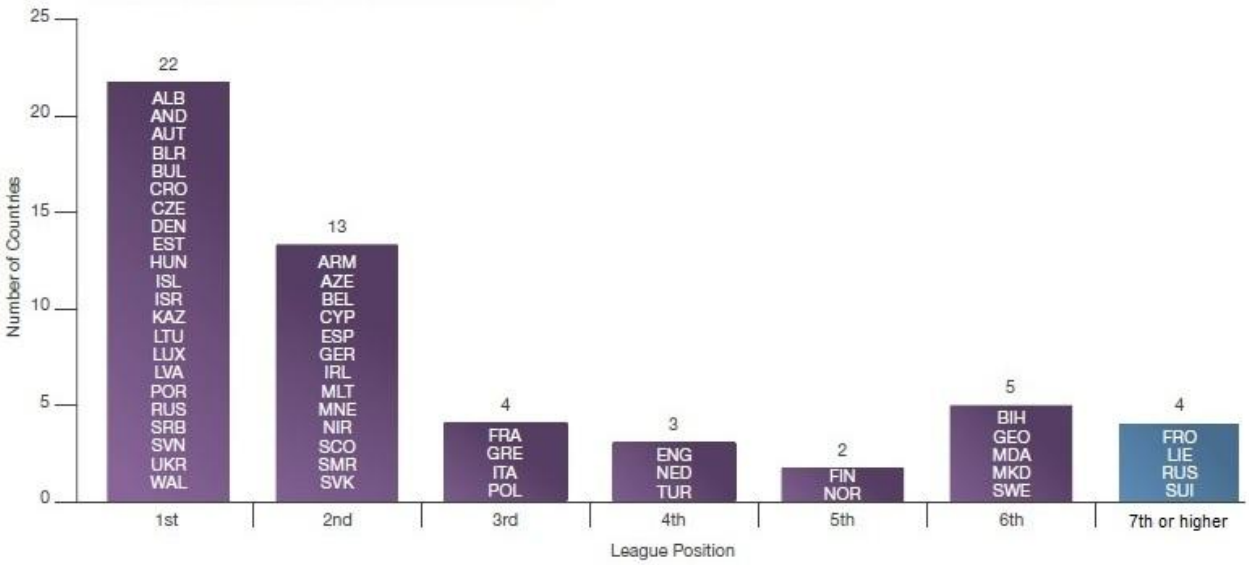

Figure 4: Link between sporting and financial success across Europe

This figure depicts the dominance of the teams that generate the most revenue in a league, by indicating their league finishes for the season 2008/2009. Across 53 European leagues, these teams finished in the top two positions an overwhelming 35 times (source: UEFA, 2011).

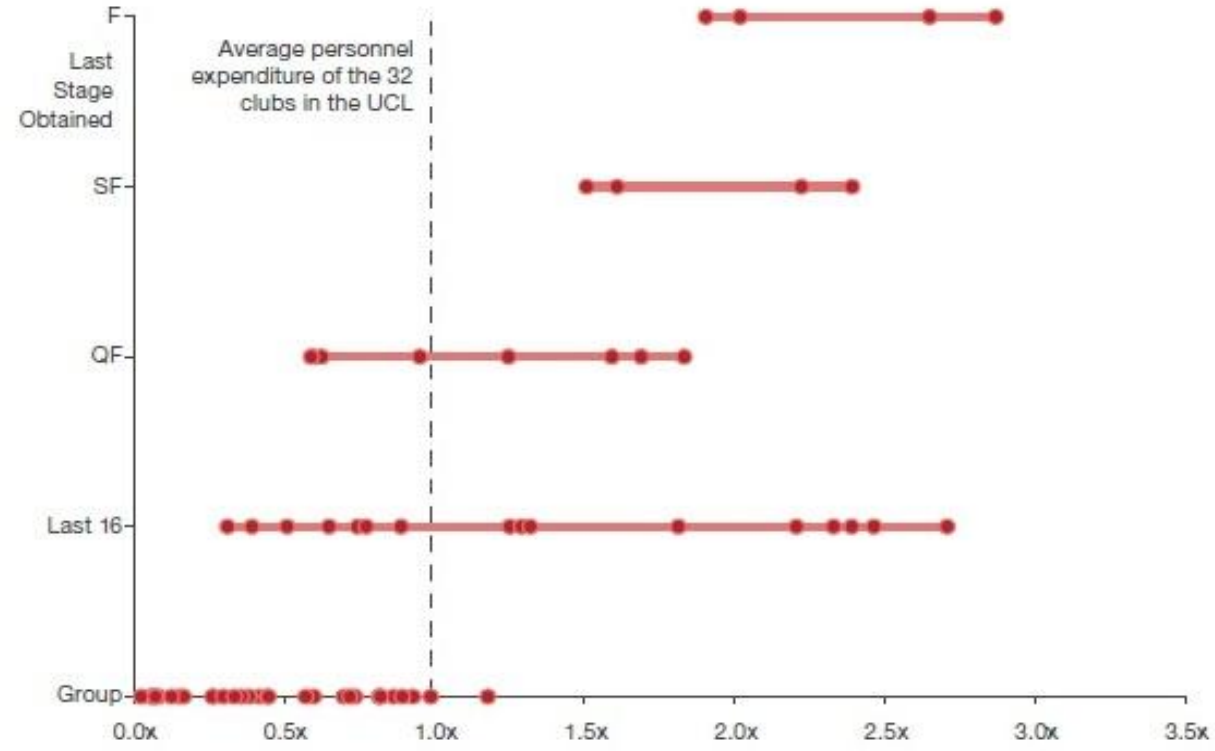

Figure 5: Relative personnel expenditure and Champions League success

This graph indicates the range of personnel expenditures (which are mainly expenditures on player salaries) by UEFA Champions League participants depicted against the stage at which they got eliminated from this prestigious competition. The scale of personnel expenditures appears to be constantly increasing, as clubs that spend more on player salaries advance further in the competition than less generous clubs. Source: UEFA (2011).

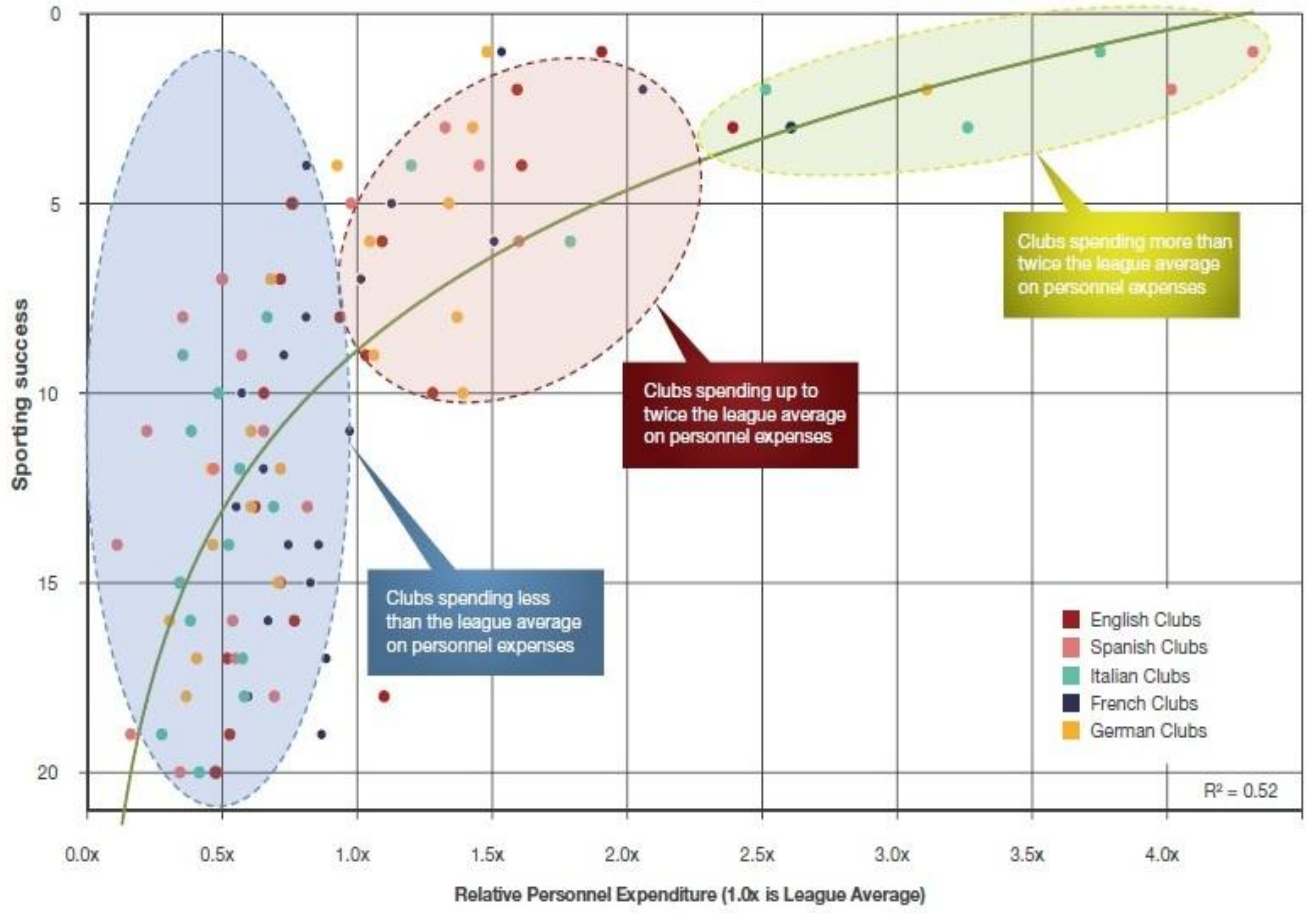

Figure 6: Relative personnel expenditure and league success
This graph depicts relative personnel expenditures (relative to league average) against league finish (x-axis) for the five major competitions (color markings are used to indicate the origin of clubs) for 2008/2009. The graph indicates a positive relation between relative spending and league finish, although interestingly the marginal benefit of allowing for a larger payroll appears to be decreasing, as clubs reach higher league positions (source: UEFA, 2011).

In conclusion, the link between individual owner objectives, collective league objectives and on-and-off-the-field club performances is a maze of impressive proportions. Clubs are simultaneously competitors and collaborators, which brings up interesting questions on industry structure (and subsequently the rents to be derived from players) and competitive balance (and whether a more equal competitive balance enhances club income). An essential link that has often been made is one between financial and sporting success. With changing dynamics in the football industry, this connection takes on new dimensions. Possibly, the strongest link that exists between these two nowadays is summarized by Kase et al. (2006), as they argue that *in the long run*, healthy finances are crucial in facilitating continuous sporting success. Ultimately, these issues need to be linked to the valuation of assets in the football player transfer market, and a good place to start is to identify the 'value drivers' of a professional football club, i.e. the determinants of television audiences, sponsorship deals etcetera. The objectives of the economic agents in this are the basis of a proper

empirical analysis. However, in the context of team sports 'it is still not clear that we are capable in principle of empirically distinguishing utility and profit-maximizing behavior' (Cairns et al., 2005, p.8). This observation has severe implications for any realistic model on the issue and empirical research in the field of professional team sports.

1.3 Regulatory context

Historically, competitive balance concerns have spurred extensive restrictive controls in sports labor markets. These concerns often find their source in differences in endowments in fan base, stadium capacity and – by extension – financial might. The urge of leagues to resist financial means becoming the primary determinant of sporting success has primarily resulted in various measures influencing the mobility of athletes in the labor market. Other significant measures include the regulation of athlete wages and the redistribution of financial resources throughout the league.[14] Yet, some teams in the English Premier League do not appear to be bound by financial constraints in their search for sporting success. Most notably, Chelsea and Manchester City have seen enormous inflows of resources recently (Chelsea: £725 million net investment in six years, Manchester City: £440 million net investment in 1.5 years; Deloitte, 2011), which seem to blur the financial and competitive landscape. Economists will immediately notice that regulatory measures will eventually impact the valuation of athletes significantly, by affecting the rents that teams can derive from individual players. Specifically, restrictions on mobility that still exist need to be taken into consideration when evaluating a player's value.

There have been several attempts in which leagues have tried to control the athlete labor market. Cairns et al. (2005) sort these regulatory measures into four types: reserve rules (the ability of an organization to *unilaterally* bind active players to clubs), drafting arrangements (controlling the distribution of the influx of young talent into an organization, only common in the US), entry or territorial restrictions (also for clubs) and maximum wage controls. Reserve rules have received considerable academic attention, as they have been perceived as the most flagrant abomination of free market principles. In Sloane (1971), it is even discussed whether the (baseball) league should be seen as 'the firm' from an economic perspective, given the extent of monopoly power the league had over clubs and athletes. Sloane (1969) discusses the English 'retain and transfer' system in depth, likening it to the 'reserve clause' in American baseball as described by Rottenberg (1956). Hence,

[14] One may see the irony in leagues stimulating the financial success of teams (by ensuring interest in the league) through negating the impact of these same financial factors. Hence, redistributive financial measures are a logical result.

team sports have an extensive history of athlete exploitation (Sloane comparing the labor market to a slave market), although in European football these measures have since largely been dismantled. In English football – the focus of this research - two sets of regulatory bodies are relevant. With the increased internationalization of the sport, international bodies like FIFA (worldwide) and UEFA (Europe) have become more active legislators, imposing a comprehensive set of rules to be enforced by the local league association (The FA in England). Local league associations themselves also impose rules specific to their respective competitions. Lastly, the English football labor market distinguishes itself through specific labor laws that significantly impact international labor mobility.

1.3.1 European transfer restrictions and regulations

Most restrictions that exist nowadays are determined by more centralized bodies like European (UEFA) or global (FIFA) football associations, as opposed to local league associations (although these do impose them). As player movements have taken on an increasingly international character and labor mobility is unparalleled, centralization has become a necessary vice in order to control ever more abundant player migrations. The liberalization and intensification of the transfer market has caused some controversy, as player transfers themselves have become an industry that feed many mouths. Current issues under revision are (amongst others) player representation, the transfers of youth players and financial fair play in general. This last point is a strong indication of the financial unbalance that exists in modern football. It may be argued that this unbalance can largely be ascribed to developments in the football transfer market and vice versa.

Much of the dynamics in current football player mobility are sourced in an influential decision by the European Court of Justice (ECJ). In the (in)famous 1995 'Bosman-arrest', the ECJ ruled that conditions in the football player labor market were in violation of article 39 of the Treaty of Rome, by limiting the players' freedom of movement.[15] Hence, football clubs were no longer free to charge a transfer fee for a player's registration at the end of the player's contract. In a side note, European leagues were forbidden to discriminate on grounds of (European) nationality, bringing an end to quota imposed on the amount of 'foreign' players allowed in the squad.[16] This brought about a fundamental change in the labor market for football players, as clubs transitioned from essentially being monopolists over their employees' services. The rents derived from football players by clubs decreased significantly, as the market increasingly approached the theoretical case of monopolistic

[15] See Court of Justice of the European Communities, case 415/93.

[16] Lang et al. (2009) actually support these foreigner restrictions, arguing that they can promote competitive balance (as they harm larger clubs more) while spurning financial stability (through limiting player wages).

competition. Carmichael et al. (1999) stress the relative freedom in the market, by mentioning the large amount of buyers and sellers, relative freedom of (subjective) information (in the evaluation of players' performance) and freedom of contract. By essentially introducing 'free agency' (freedom of contract) in the European football player market, the ECJ effectively redistributed wealth from clubs to players. In a reaction to pending free agency, player contracts were lengthened, salaries increased and player mobility skyrocketed (Frick, 2007).

However, according to the invariance proposition advocated by Rottenberg (1956), the distribution of property rights to players' services should not influence the distribution of playing talent. Goddard & Wilson (2008) support this notion, as they find significant similarities in pre- and post-Bosman hazard functions for employment transition. Feess & Muhlheusser (2002) find that the Bosman system does have an impact, as it increases social welfare. In their model, the system enhances both investments in and efforts by players. DeJonghe & Van Opstal (2008) don't agree with these conclusions, as they argue that the system introduces a free-rider problem. They argue that, as players reach free agency, large clubs can profit freely from the talent development skills of small clubs (and, by extension, player talent automatically flows towards the 'major' leagues).[17] Theoretically, these developments could have deflated transfer fees, as the rents to be derived from players by clubs decreased. However, competition for players' services increased multifold, as did the football industry as a whole, and as Frick notes, average transfer fees surged accordingly.

This trend of liberalization was reinforced per the introduction of the so-called Monti-rules (Feess & Muehlheusser, 2003). These 'rules' (incorporated into the FIFA Regulations on the status and transfer of players, article 17) state that a player can unilaterally end his contract at a club by paying a fine for breach of transfer after three years (or two years, if the player is over 28 years old). The classical test case herein is the case of Andy Webster, who was allowed to terminate his contract with his former club (Scottish Heart of Midlothian) for a mere £150.000, in spite of a valuation of £5 million by the club. Although this ruling has since been confirmed by the International Sports Tribunal CAS[18], surprisingly few players have chosen to take advantage of it (by being able to leave their club for a new club and a higher salary at a relatively low fine). This might be the result of a rumored 'gentleman's agreement' between the clubs, which have pledged not to contract any players invoking the Monti-rules. Another factor withholding players is that the determination of the fine

[17] This first point is not entirely true, as 5% of any transfer fee is to be redistributed to the club(s) at which the player has 'developed' between his 12th and 23rd birthday (FIFA Regulations on the status and transfer of players, annexe 5)

[18] Case number 1300, available from www.tas-cas.org

does not appear to be indiscriminate. The rules call for the fine to be based on the remaining value of the contract (as happened in the case of Andy Webster), but also on the laws of the country and 'specificity of the sport'. If these rules were to be applied more often, it should lead to the lengthening of contracts – strengthening the effect of the Bosman ruling.

1.3.2 Transfer restrictions specific to the UK

As any labor market in the UK, the football labor market is regulated through British law. Hence, British regulators have imposed restrictions that make the British transfer context unique, and have a significant influence on the mobility and valuation on several groups of players in the transfer market. In order for non-EU players to qualify for a work permit, they either need to have played in 75% of all international games for their country in the last two years, or qualify as being 'able to contribute significantly to the development of the game'.[19] This is an important restriction on international transfers to the UK, as many players (especially young talents) do not (yet) meet these requirements. As such, the rule would appear to limit the inflow of young talent into the English Premier League. Yet, English clubs circumvent this restriction by contracting young players and temporarily loan them to foreign clubs, until they qualify for a work permit. Still, this procedure is inconvenient, as clubs have no control over and benefit from the player for some time. As such, the rule would appear to impose a premium on EU-born players, who do not need to qualify for a work permit.

The recruiting and protection of youth players has also developed into an important issue in international football. Under FA regulations (Rule C3), minors from 14 years onwards may be offered 'scholarships' , thus ensuring their registration to the club.[20] At the age of 16, they may sign their first contract in professional football. This arrangement cannot be seen apart from UEFA rules regarding the use of 'homegrown players' (a player qualifies as 'homegrown' if he has played at the same club for at least three years between the ages of 15 to 21) by clubs. Prominently, UEFA has decreed clubs to include at least eight homegrown players into their 25-man Champions League or Europa League squads. Hence the controversy over the recruitment of youth players, as richer clubs now set their sights on luring young talent away from other clubs, ensuring their talent stream is in compliance with UEFA rules.

[19] This last provision is reviewed by a special panel of the FA, and it is difficult to qualify for, see 'Governing Body Endorsement Requirements for Players Application for a GBE'.

[20] This relatively young age has proven to be an advantage to English clubs in attracting youth players, as they can offer financially attractive packages at a relative young age in comparison to other European clubs.

With regard to the recruitment of players, clubs are not allowed to directly approach players under registration with other clubs, without permission of the latter. On the subject of youth players, clubs are not allowed to approach youth players under the age of 16.[21] Inventive financial constructions are also restricted, as clubs are not allowed to do business directly with 'third parties' (parties that are not clubs) in relation to player registrations. [22] Furthermore, clubs need to make sure that third parties do not hold any registration or economic right on acquired players. However, this has not stopped players from being used as investment vehicles on several occasions. A striking example is the transfer of Argentinean players Carlos Tevez and Javier Mascherano to relegation-bound West Ham United. They were placed at West Ham by investment company MSI, which held a significant proportion of the players' transfer rights. After one season, West Ham indeed relegated (and were fined £5.5 million by the FA) and Mascherano and Tevez were transferred to Liverpool and Manchester United respectively.

In conclusion, it is apparent that the player transfer environment has become ever more complicated. Although the Bosman ruling appeared to create freedom and simplicity in the football industry, many limitations on the mobility of players still exist. These restrictions are crucial inputs, as they significantly influence incentives in the football transfer market. Specifically, British labor law appears to create a bias in the market, placing a (further) premium on UK-born players. Furthermore, UEFA and FIFA rules have increased the attention for the (international) recruitment of youth players, and as such 'homegrown' players are also at a premium. The huge sums of money involved in player transfers have attracted many parties trying to benefit from player talent, prompting the FA to install rules restricting inventive financial constructions (third party ownership). Hence, the player transfer market has become a complicated market place, one that we hope to dissect properly.

[21] In practice, this is (regrettably) not rare. In 2009, FIFA banned Chelsea FC from partaking in the international transfer market for violation of these rules.

[22] A good example of such constructions are the 'talent pools' employed at financially distressed Dutch club Feyenoord, who have sold 75% of the transfer gains in multiple pools of upcoming prospects to third-party investors for upfront cash. This case is a good indication of the significance of these constructions, as the talent pool structure would appear to induce a significant agency problem in the sale of the included players by Feyenoord. After all, the club is responsible for the sale, while reaping only a relatively small part of the benefits.

1.4 The practice of player transfers

Our research focuses on transfers to and from the clubs in the English Premier League in the seasons 2008-2009 and 2009-2010. This focus approach is triggered by the fact that, as mentioned above, differences in transfer regulations still exist between European leagues. The Italian Serie A for example, imposes a maximum of three 'foreign' (non-EU) players per game-day squad. Hence, we feel that if we focus on one competition, we can better grasp the determinants of player transfers. In this, the Premier League is an obvious choice. As outlined below, English clubs are extremely active on the international football transfer market. Transfer activity in the Premier League is often well-publicized, which should help data availability. Furthermore, English clubs are often relatively professionally run, for example they are the first to introduce statistical analysis into professional football organizations.[23] This should help market efficiency for one, and as such, we feel that a short introduction to English football is in place.

1.4.1 English professional football

English professional football in general is divided into four divisions that total 92 entrants. The English Football League was founded in 1888, and has remained relatively stable, although the first division separated itself out of financial considerations in 1992 to form the Premier League. Since then, the league has developed into an impressive force, generating €2.326 billion in revenue and a €93 million profit in 2008/2009. According to the latest Deloitte report, England is by far the 'richest' league, beating the second best (Germany's Bundesliga, the only other profitable league) by over 30%, or €750 million in revenue. However, the world's top two revenue generating clubs were Spanish (Real Madrid and Barcelona). English clubs are extremely active on the international player transfer market, with Premier League clubs spending a total of over £714 million, an impressive £298 million of which stayed in the UK. Net transfer spending (transfer fees paid -/- transfer fees received) by Premier League clubs amounted to £220 million, caused largely by Manchester City's net spending of £125 million in 2008/2009.

An extensive system of promotion and relegation is in effect in England, with the bottom three teams from the Premier League descending to The Championship (formerly division one) and so forth. As the Premier League separated in order to profit from the sale of its own broadcasting rights, the

[23] Several clubs now employ a department for 'football analysis', where quantitative analysis and statistics gathering comes to the aid of on- and off-the-pitch decision making.

financial gap between the top and lower divisions has escalated (Szymanski, 2001).[24] The league appears to be dominated by large revenue teams like Manchester United, Arsenal, Chelsea, and to a lesser extent Liverpool and Manchester City.[25] However, Deloitte reports a moderate revenue ratio of 6 between the top and bottom team in 2008/2009, indicating relative financial parity within the league (compared to a ratio of 25 in Spain).[26] European parity is an issue as well, as the 2011 Deloitte report mentions that Europe's top 20 revenue generating clubs reported over 25% of the European football market's revenue in 2008/2009, strongly reflecting the huge financial impact of the Champions League. Furthermore, although financially the Premier League appears to be relatively balanced, on the pitch it is not. The fact that, since the separation of the Premier League, only one team other than Manchester United, Arsenal or Chelsea has won the championship, (Blackburn Rovers in 1994-1995) is a clear indication of the sporting dominance of these top teams.[27]

1.4.2 The role of player agents

Player transfers are huge investments to clubs, as players still represent their most important capital. There are several channels through which transfers can be established, as described to us in interviews with football executives at three Dutch clubs (see section 2.1). Larger clubs employ a large and extensive network of player scouts, who evaluate players and tip off clubs on upcoming talents. Agents also have an extensive and sometimes questionable role in player transfers. They often represent players and as such try to generate interest for their players' services (and can have significant influence on which team a player chooses to go to). On the other hand, they can also represent the clubs themselves, as they employ their network in an attempt to fill needs within the player squad of a club. Obviously, this can lead to several conflicts of interest, and FIFA is now reviewing the entire player agents system. The last common initiation of a player transfer is through the hiring of a new manager at a club, who can insist on one or several players he has worked with before to be brought in. Whether this is rational club policy, is questionable.

[24] Successful promotion to the Premier League is rumored to be 'worth' over £60 million.

[25] Maybe coincidentally, since recently all of the Premier League's top teams have foreign owners, as only half of the league's 20 clubs are still under English ownership.

[26] Spain's Primera Division does not sell its broadcasting rights collectively (clubs do this individually for their home games), creating substantial differences in broadcasting revenue.

[27] However, Forrest et al. (2005) argue that, regardless of championship tension, there are relatively few 'meaningless' matches in the league, given the fights for European football (up to eight teams qualify) and relegation. Consequently, attendances have steadily risen since the 1980's, when there was substantially more championship tension.

Not only has the role of player agents become a very controversial one, it has also become a very expensive transaction cost. In 2008/2009, agent fees increased by 4% to £80 million In England alone, representing over 12% of total transfer spending (Deloitte, 2011). In practice, players always seek professional representation, and some have been represented from a very young age onwards. FIFA has installed a licensing system (reviewed and questioned in Papaloukas, 2007) and FIFA rules dictate that only licensed player agents may chaperon player transfers between clubs registered at affiliated associations. However, the player agent landscape has grown into a very complicated one. As, in the aftermath of the Bosman-arrest, international player mobility and transfer fees grew substantially, talented football players became a popular commodity. It is hence not rare for players to have multiple representatives, or for agents to own large percentages of players' transfer rights. As such, player agents can receive compensation for their services in several ways. The most conventional manner is by receiving a percentage of player income. However, they are also paid substantial fees by buying clubs at the establishment of a transfer. FIFA is now discussing the dismantling of the current agent licensing system, as it tries to introduce more transparency at player transfers.

As per UEFA rules, during two transfer periods, player registrations are allowed to be transferred between clubs. Players not under contract (free agents) are not bound by this transfer window, and some limited exceptions to the transfer window restriction exist (most notably: excessive injuries at a club). As noted by Frick (2007), although free agents don't require a transfer fee, they are not completely free of charge, as they often ask for (and receive) sizeable signing bonuses. Transfer fees are rarely paid up front; payment usually takes place in several terms with a bank guarantee to absolve the selling club from risk (UEFA reports that almost €2.2 billion was still payable in transfer fees after the 2009 season, 36% of which was not due until after the 2010 season). Player transfers may also include elevator clauses, which can increase the transfer fee through sporting success of the buying club (titles, progression in the UEFA Champions League, etc). Furthermore, it is not uncommon for clubs not to sell the entire transfer rights to a player, maintaining the chance at compensation for a future sale of the player. Lastly, loan constructions involving players are not uncommon (usually for half a season or an entire season). Besson et al. (2011) even find that every 25 player squad contains almost one loan player on average. These constructions often include an option to buy the player at the end of the period.

In conclusion, the role of player agents is an important consideration in player transfers. The fees that they charge are often undisclosed, and their network can often determine the new club of a

player. Other factors that can affect a club's transfer policy in practice include the arrival of a new manager, and the agents that the clubs themselves employ to find new talent. Further consideration are loan constructions, which may include a 'call-option' on the player. Unfortunately, these factors are often unpublicized and as such hard to integrate into any model. Yet, one of the most important omissions in previous research has to be the salaries paid to players, as clubs are becoming ever more generous in their remuneration policies. These have come to present an investment in players similar to transfer fees in size (albeit not in timing). As such, they are extremely relevant in the transfer decision, and are discussed below.

1.4.3 Player compensation

As European labor market controls have been loosened, the labor market has approached Rottenberg's (1956) ideal of a free market. Theoretically, Rottenberg argues, this free market should facilitate a satisfactory competitive balance, while redistributing rents from clubs to players. As player salaries[28] have increased substantially the last couple of decades, (Deloitte states that the wages grew by over 55% from 2006-2009, reaching a new record of 67% of revenue)[29] the latter contention may prove to be correct. Indeed, in American baseball it may even be argued that the introduction of free agency (dismantling of the reserve rule) has caused a significant amount of players to be paid more than their (marginal) worth (Cairns et al., 2005, p.47). A rationale is offered in Lehn (1982), as he argues that the transfer of property rights in future services of players from clubs to players has spurred an increased number of multi-year contracts. Consequently, clubs take on the risk of injury (which was previously a commonly shared risk), inducing significant moral hazard. However, the Monti-rules do restrict the maximum length of contracts to 5 years. Dietl et al. (2008) argues that this harms risk-averse players, as it limits the degree of future injury risk that clubs are able to absorb on behalf of the players. In their model, players would prefer the more restricted pre-Bosman arrangement. Yet, they negate the contention that the liberalization of the football player labor market has induced longer-term contracts to players overall, in order to delay their free-agency. This perspective is supported by Frick (2007), who concludes that in the post-Bosman era, average contract length has increased from 2.5 to 3 years. In conclusion, obviously player salaries are a significant cost to clubs. As such, their considerable inflation poses an important consideration with regard to transfer prices and policies, and club policies as a whole.

[28] Performance bonuses usually make up a substantial proportion of a player's compensation.

[29] Frick (2007) also finds that player salaries in Germany's Bundesliga doubled between 1992/1993 and 1996/1997, and again in the season 2000/2001.

Hence, the European football transfer market is increasingly approaching the theoretical ideal of a free market. The lifting of restrictions on player mobility has induced landslide changes in the European football landscape, shaping the competitive landscape and consequently the distribution of talent between teams and leagues. Yet, by no means has the liberalization set about a simplification of the transfer market, on the contrary. Financial imparity between and within leagues has sharpened, especially with the financial considerations attached to the UEFA Champions League and distribution of broadcasting rights. These imparities provide an incentive for leagues to ensure competitive balance through regulation of the competitive landscape, and as such UEFA has already announced the introduction of a comprehensive set of rules regarding 'financial fair play'. Other issues that affect the football transfer market are the limitations that still exist, for example on the transfer of youngsters and 'homegrown' rules. A very important issue is the role of player agents, and the conflicts of interest that might arise. It is questionable whether the agent-licensing system induces a fair and efficient distribution of talent. Yet, evidently the player agent system imposes severe transaction costs in the market. Once again, major changes in this system have been announced, indicating the sizeable influence of the ever-changing institutional framework. Its main feat has surely been the liberalization of the players' labor market, and the subsequent redistribution of wealth from clubs to players. Players' salary inflation has become a very prominent cost – and thus transfer consideration – to clubs. However, it is not only the clubs that benefit from these fundamental changes in the transfer market, as we also hope to benefit from these developments in creating an extensive model regarding the determinants of transfer fees in the English football transfer market. As such, it is clear that the football transfer market has become an ever more interesting playground for the practical economist.

Chapter II - The Analysis

Due to its public nature, professional football provides a unique context for the valuation of human capital. As elusive and intangible as human capital is, measuring its performance is often done arbitrarily. Obviously, in an economic sense, the market for football players is a labor market just like any other. However, the explicit valuations of human capital (through the publication of transfer fees), coupled with the amount of player statistics that are meticulously collected by analysts, journalists and club employees, presents a rare opportunity to the (financial) economist. As such, we attempt to model the determinants of transfer fees, hence investigating the valuation of *transferred* players. We stress this last point, as only transferred football players are the athletes that are publicly valuated. In our modeling of the transfer fee equation, we draw (amongst others) on the (contextual) knowledge of the previous chapter, in determining in what ways a player adds value to a football club.

This chapter is organized as follows: first we discuss our investigations into the practice of player valuations and transfers. We then move on to discuss the structure of our model: the determinants of transfer fees and proxies for them. For these determinants and proxies, we offer an intuitive and academic validation. After this, we offer up our data collection process, methodology and present and discuss our results. We conclude by offering suggestions for further research.

2.1 Player valuation in practice

In our attempts to gain insight into the workings of the football transfer market, we found executives at three Dutch football clubs willing to give us a sneak preview of the valuation of football players in practice.[30] The consensus conclusion of all three executives was that the market for football players was inherently irrational. The executives' conclusion was in a nutshell: 'Value is what fools are willing to pay for it', implying the existence of a winner's curse in the football transfer market. The snowball effect in the market was especially stressed, as cash flows from expensive player transfers by 'rich' clubs tend to trickle down to smaller clubs as well. As such, a spending spree by one club appears to (potentially) cause contagion in the entire market. The limited bargaining position of smaller clubs was another issue of discussion, as player transfer fees in smaller competitions (like the Dutch league) can - at times - exceed annual budgets. At this point, smaller clubs are often forced to sell

[30] These were respectively: Rudy Douma, financial Director at AZ Alkmaar, Manfred Laros and Peter Bonthuis, financial and (former) general director respectively at Sparta Rotterdam, and Jeroen Slop, financial director at Ajax Amsterdam; to whom we owe many thanks.

their players, as they do not have the financial flexibility nor the leverage to wait out transfer periods and count on their players to maintain value.

As to the decision making involved in transfer decisions, the inputs of the scouting department were stressed as being crucial to the transfer decision. Obviously, the clubs differed in their decision making, but scouting reports coupled with peer group analysis were often the basis for determining player value. Unsurprisingly, in such a relatively small market as The Netherlands, 'commercial' arguments (such as the influence of the player on e.g. merchandise sales) were never a consideration in determining the value a player would provide to a club. The role of club managers (coaches) was also discussed, but was found to differ greatly between clubs. They either initiated the scouting process by asking for reinforcements in specific positions (and were then subsequently involved in the final decision making), or they were not involved in the process at all. In conclusion, executives stressed that there was much to be gained in player transfer decision making. Both the inputs into the process as the process itself would benefit greatly from a more professional approach.

Unfortunately, we are unable to use many of the inputs that professional football organizations use in considering player transfers. These notably include the above mentioned (subjective) scouting reports and more advanced and accurate (objective) player performance statistics that are employed in some football organizations.[31] However, we are able to get a feel for the valuation of football players from some interesting practical examples. First of all, we need to give some insight into the accounting value of football players. On club balance sheets, accounting practice in professional football subscribes that intangible assets (i.e. players) are capitalized at acquisition cost and depreciated over their 'useful life' (which in practice is usually taken to be player contract length.[32] An important implication of this practice is that homegrown players have *no* accounting value, as they have not been 'acquired'.

An interesting practical example of the valuation of a player contract appeared in a case before the Court of Arbitration for Sport (CAS).[33] A legal dispute arose between a well-known player (Adrian Mutu) and his (former) team over the termination of his contract. As the player had breached his contract (by using cocaine), he was fired on the spot *and* the club claimed significant damages from

[31] For example, London-based Opta is a company collecting and analyzing sports statistics as a service to (amongst others) football clubs. Many of the top teams in England, Italy and Spain make use of their services: www.optasports.com.
[32] For a discussion of the 'useful lives' of football players, see Amir & Livne (2005).
[33] CAS case number 1644, available from www.cas-tas.org

the player. These damages included the wasted cost of acquisition, but also the 'replacement cost' of the player and damage to the club's 'commercial brand values'. The club argued that as the player was contractually obliged (and could be reasonably expected) to provide future benefits to the club (by playing for them), compensation for these losses was in place. Although the tribunal did award a record amount of damages (over €17 million payable by the player to the club), these damages were mainly based on the unamortized acquisition transfer fee and legal fees. Hence, unfortunately for our research, the CAS failed to set any standard for the valuation of a player's future value to a club, by discarding it in their judgment.

An intriguing insight into the way that clubs measure a player's value is apparent in some more inventive transfer transactions. Notably, as mentioned before, some transfer fees are partially dependent on future player and (buying) club performance. The variable (or optional) proportion of the fee can be sizeable[34], but these performance proxies are - surprisingly - often not very sophisticated. Player performance measures used often include amount of games played over a certain time span or even goals scored (usually for strikers only). Club performance measures include championships, and performances in continental club competitions. Notably, in 2011, Dutch club Ajax Amsterdam received a €1 million bonus for Spanish Real Madrid reaching the Champions League quarterfinals – two years after the subject of the transfer, Dutch striker Klaas-Jan Huntelaar, had been transferred *out* of the Spanish club again. The fact that the performance measures used here are publicly available and not very sophisticated, is encouraging for our approximation of the actual determinants of transfer fees.

2.2 Determinants of transfer prices

Intuitively, the determination of transfer fees in the player transfer market appears to be twofold. On the one hand, there is the value that a player represents to both the selling and buying club. As a transfer is established, the player supposedly represents a higher value to the buying club than to the selling club, as – theoretically - players should move towards where their marginal value is the highest. On the other hand, there is the bargaining position of both the selling and buying party. Consequently, several researchers have adopted a bargaining approach with regard to the establishment of transfer fees. For example, Carmichael & Thomas (1993), incorporate the value of a player to the respective clubs in their utility function, and derive a theoretical Nash equilibrium which

[34] For example, the July 2011 transfer of Chilean striker Alexis Sanchez from Italian club Udinese to Spanish giants Barcelona reportedly includes a €11.5 million variable fee, on top of a €26 million fixed fee.

is then tested through regression analysis. We roughly follow this intuition, by incorporating both player-specific and club-specific determinants of transfer fees in our model. However, we should not ignore the several other academic efforts at investigating player transfer fees.

For example, a non-bargaining approach is presented by Carmichael et al. (1999), who investigate the determinants of value for *all* football players, not merely the transferred ones, through transfer fees paid. Their main objection to the bargaining approach is that transferred players are not a random sample of all football players, as clubs may simply be unwilling to part with certain players. In correcting for this selection bias, they employ a Heckman two-step procedure, by using the residuals of a 'probability of transfer' equation to correct OLS estimation errors of the fee equation. As such, they argue that a player's contribution to team value is primarily determined by innate ability and investments in human capital (training). Hence, in their estimation of a transfer fee equation they include both direct and indirect measures of these, based on either individual characteristics or selling club status.[35] The included factors are then meant to predict the future contribution of the player to on-the-field.

A very interesting and rather alternative approach to determining football player value builds on the fact that, as argued before, revenue streams in the football industry currently stem greatly from sources other than stadium attendances. Television audiences, advertising and marketing income now figure prominently into the income statements of professional football organizations. On the level of individual players, these athletes not only add value by drawing crowds to the stadiums, but also by drawing viewers to television broadcasts and by selling merchandise. Ideally, measures for these valuable contributions would be included as determinants of transfer fees.[36] Pujol et al (2008) tackle this issue in an intriguing strand of the literature. They valuate professional athletes through assessing their 'popularity and notoriety', assembling these into a 'media value measure'. Popularity and notoriety are measured by estimating the amount of news generated by individual players, as data on web-pages devoted to them and their relevant club and competition is collected periodically (using several filters).[37] In the opinion of the researchers, all relevant information is eventually

[35] They explicitly exclude buying club characteristics, as these cannot factor into the probability of transfer equation (after all, non-transferred players have no 'buying club').

[36] We mention above that commercial concerns do not factor into the transfer decision for Dutch clubs. However, as we investigate player transfers to and from the Premier League, it is very much possible that these concerns are relevant to transfer decisions by clubs from other leagues.

[37] Frick (2007) also mentions research into the existence of a 'superstar effect' through measuring the amount of Google hits.

The determinants of transfer fees in European football[a]

Author(s) and year of publication	Data	Dependent variable/ estimation technique	Significant findings
Eschweiler and Vieth (2004)	254 transfers in the German Bundesliga in the seasons 1997/1998–2002/2003	Log of transfer fee in constant 1996 prices; OLS regression	Positive: log sponsoring revenues and log attendance of buying club; buying/selling club qualified for European cup competition, defender, midfielder, forward (ref.: goalie), age, FIFA-coefficient of country of origin, international caps Negative: age^2, international caps^2
Feess, Frick and Muehlheusser (2004)	239 transfers in the German Bundesliga in the seasons 1994/1995–1999/2000	Log of standardized transfer fee; OLS regression as well as Heckman two-step estimation (with $n = 604$)	Positive: remaining contract years, remaining contract years interacted with 'Post-*Bosman*' regime, age, career games played, international caps, forward, buying club qualified for European cup competition, player is from south America Negative: age^2, career games played^2, player is a semi-professional
Frick and Lehmann (2001)	1,211 (out of 1,269) transfers in the German Bundesliga in the seasons 1983/1984–1999/2000	Log of transfer fee in constant 1985 prices; OLS regression	Positive: age, career games played, career goals scored, international caps, selling club from western Europe, south America, time trend Negative: age^2, career games played^2, international caps^2, selling club from German third division, north America, Asia
Dobson, Gerrard and Howe (2000)	114 (out of 198) transfers in semi-professional (non-league) English football, 1988–1997	Log of transfer fee; OLS regression	Positive: age, goals scored previous season, average attendance of selling club in previous season, number of seats in buying club's stadium, average attendance of buying club in previous season Negative: age^2, league position of selling club in previous season, goal difference of selling club in previous season, stadium capacity of buying club
Carmichael, Forrest and Simmons (1999)	240 mover as opposed to 1,789 stayer in the English football leagues in 1993/1994	Log of transfer fee; Heckman two-step procedure to control for selection bias	Positive: age, games played for current club, games played for other clubs, goals scored in league matches, goals scored in cup matches, international caps Negative: age^2, selling club playing in second, third or fourth division
Dobson and Gerrard (1999)	1,350 english football League transfer fees (out of 2,215 moves), June 1990–August 1996	Log of transfer fee in constant 1990 prices; OLS regression	Positive: age, career games played, career goal scoring rate, games previous season, goals previous season, international caps, under 21-international caps, goal difference of buying club previous season, buying club playing in first or second division, goal difference of selling club last season Negative: age^2, number of previous clubs, career games played^2, league position of buying club previous season, league position of selling club previous season
Speight and Thomas (1997a)[b]	217 arbitrated settlements on disputed transfers referred to the Football League Appeals Committee, 1978/1979–1991/1992 and 187 transfers settled by negotiation during 1990/1991 season	Log of transfer fee in constant 1990 prices; OLS regression, joint estimate (all cases) as well as separate estimates (arbitrated vs. negotiated cases)	Positive: age, games played previous season, average attendance of buying club in previous season, buying team playing in first, second or third division (ref. league: fourth division), average attendance of selling club in previous season, league position of selling club, selling club playing in first or second division Negative: age^2, league position of selling club previous season squared, arbitrated settlement (dummy)
Speight and Thomas (1997b)[c]	164 arbitrated settlements of disputed transfer fees for out-of-contract players in English football league, 1985/1986–1989/1990	Log of arbitrated fee, final buyer offer and final seller offer in constant 1989 prices	Positive: age, international caps, career goals scored, number of games played in previous season, average attendance of buying club, goal difference of buying club previous season Negative: age^2, selling club's goal difference, league position of buying club previous season, buying club playing in third or fourth division

Reilly and Witt (1995)	202 transfers in the English football leagues in 1991/1992	Log of transfer fee; OLS regression	Positive: appearances last season, goals scored current season, age, forward, full international, seller is a first, second or third division club; buyer is a first, second or third division club (ref.: club is from fourth division) Negative: number of previous clubs
Carmichael and Thomas (1993)[c]	214 transfers in the English football league in the season 1990/1991	Log of transfer fee; OLS regression	Positive: average attendance of buying club in previous season, goal difference of buying club in previous season, buying club playing in first, second, or third division (ref. league: fourth division), goal difference of selling team in previous season, selling team playing in first or second division, career games played, arbitrated fee (dummy) Negative: league position of buying club in previous season squared, league position of selling club in previous season squared, player age squared

[a]For ease of presentation, significant interaction effects are not reported in column 'major findings'.
[b]Results from estimations with selling club's last offer and buying club's last offer are virtually identical and are not displayed here for sake of brevity.
[c]Table includes only results from preferred estimation.

Figure 7: Determinants of transfer fees in European Football
Frick (2007) investigates the European football players' labor market in the aftermath of the Bosman and Monti rulings. He presents an extensive overview of academic findings with respect to factors affecting player remuneration, career duration, contract length and transfer fees paid. Perhaps unsurprisingly, he finds great similarities between the factors affecting player salaries and those that influence transfer fees. Most notably, these are: player age, career games played, international caps played and buying and selling club success. Frick does stress that an important determinant has so far been (mostly) absent from the analysis. Current contract duration figures to be an extremely important determinant of transfer fees, certainly after the introduction of free agency. Yet, data on individual contracts and contract duration are hard to come by and often unreliable, and as such do not often factor into academic models. (Source: Frick, 2007)

translated into media value, and hence no further measure of player performance or talent is necessary to estimate their value. Their estimations appear to be fairly close to actual prices paid in the transfer market, especially when compounded into the estimated value of entire teams. Obviously, such a measure would be a helpful input in any paper in search of the determinants of transfer prices, although one may argue over the contention that media value is the sole destination of all relevant information (even in this information age). Yet such research is unfortunately beyond the scope of this thesis, and as such we are unable to provide adequate proxies for the media value of a player.

Identifying relevant determinants of transfer fees is a fairly uncomplicated, intuitive procedure. The main difficulty in this research lies in finding appropriate proxies that adequately approach the intuition of the aforementioned determinants. Together with the blatant inefficiencies that exist in the football transfer market, it is this part of the process that is the source of most of the statistical 'noise' in valuating football players. Previous academic efforts have identified various variables that appear to significantly influence the transfer fees paid for football player. These are summarized by Frick (2007) in figure 7 above (although significant interaction effects are not included in the table). Several proxies show up in most - if not all - of the studies. We will include many of these proxies, as well as add a few of our own. As such, we will now discuss the various determinants that we have identified, the proxies for them and their intuitive and academic validation.

2.2.1 Future player performance

The main determinant of (future) player value to any club has to be his (projected) performance on the pitch. Regardless of whether there is a clear link between financial and sportive success, and whether a player has a significant 'media value' impact, a football player's job is primarily to help his team win games. We follow the reasoning of Carmichael et al. (1999), by arguing that (innate) player ability and investments in human capital are best used to predict future performance. Obviously, innate ability determines the potential performance level of a player. Consequently, the level of this potential performance actually reached by the player is determined by the investments in human capital (training and other efforts). These two factors are often derived from several proxies for past player performance, which is then an indirect predictor of future performance.

We include both direct and indirect proxies for player talent and investments in human capital. The 'direct' proxies refer to measures of past player performance, and are popularly used in previous literature (see figure 7). Basically, the thinking here is that human capital and talent can be derived from a player's past on-the-pitch performance. We argue that essentially, a player's performance is how he influences the probability of his team winning a game.[38] However, we should keep in mind that it is for good reason that professional football organizations depend greatly on the (subjective) player evaluations of their scouting departments.[39] Basic, publicly available football statistics inadequately measure and approximate the contribution of a player to the chances of his team winning a game. Obviously, this inefficiency is not reserved for football player performance only: it is true for all our determinants that they are not *directly* measured, hence the need for the use of proxies (in general). Consequently, we also derive a player's talent and human capital from indirect indicators. As we hope that these act as an adequate predictor of future player performance, we will now discuss the several talent and human capital proxies used in our research.

The most popular and direct statistic that has always been (meticulously) reported in football is the **goal-scoring** statistic. It is obvious that this factor is mostly a direct measure of performance, as scoring goals is often associated with a good performance (in a simplistic view). Yet, it is a flawed measure of talent (and human capital), as for example, untalented players can also score goals on good teams. In our research, we include the amount of goals a player has scored in the previous

[38] For a discussion on the 'perfect football statistic', as inspired by the Dutch documentary 'Heilig Gras' (April 29th, 2011, Nederland 3), please see appendix 1.

[39] However, there are clubs (in England in particular) that have set up some sort of football analysis department, which specializes in the (statistical) measurement of football performance, and who also provide inputs for transfer decisions.

season, as from our interviews we have learned that it is often the most recent performances that weigh heavily in player evaluations.[40] (We do note that this last point may be most true for younger players, as the variance in their performance is the greatest.) However, there is a clear link between the amount of goals a player scores and the value he provides for his club. By scoring goals, a player adds significantly to the probability of his team winning a game. The problem with the goal statistic is, however, that *not* scoring goals does not necessarily detract from the probability of the team winning a game. This is especially true when considering the individual positions of players, as defenders are not usually expected to contribute on the goal-scoring front. Hence, interaction terms can come in handy: goal-scoring defenders may, for instance, be of extra value, as they contribute on both offensive and defensive ends. In a variation on the goal-statistic, we can also include a **goal-rate** measure: the amount of minutes of playing time needed per goal scored. This would give a measure of the efficiency of a player in contributing to the probability of a win: players that need relatively less time on the pitch to score a goal are more valuable. After all, playing time is scarce (it is divided within squads that usually include around 25-30 players over a season). Including this goal-rate would also deal with the high correlation that exists between the amount of games played and goals scored (which in our main sample amounts to 0.51, and even 0.74 when only considering strikers) by incorporating both.

A further direct proxy for player performance that consistently shows up in academic research is the **number of games** that a player plays for a team (or has played in his career). Obviously, scout evaluations are not limited to mere (Premier) league games, so instead we collect the total number of games a player has appeared in over the last year. This includes domestic competition games, but also continental club competition games (Champions League, Europa League, Copa Libertadores, etcetera) and games played in the national squad (international caps)[41]. The basic intuition behind the statistic might be simple: ceteris paribus, better performing players will play more games than others, making it a good measure of relative performance (to one's teammates). This implies that it is not necessarily a good measure of player talent (for example, good teams are usually stacked with playing talent, not all of whom can actually play). However, it may act as an adequate measure of human capital, as players that perform well in training sessions and are highly motivated, often play games. As playing games is the only way in which a player can actually provide value to a team and influence the probability of winning games, it is expected to have a significant impact on transfer

[40] We use the past season as the evaluation period for all direct talent and human capital proxies. For winter transfers, this evaluation period shifts to the most recent half of the season.
[41] This also includes other representative teams: national teams under 21, under 20, under 18, etcetera.

fees. It is again not a perfect measure: the amount of games a player plays has a very flimsy link to the degree of how he influences the chances of his team winning a game. Also, by including international caps, underperforming players from talent-bare countries are awarded extra credit, while it penalizes players from countries with traditionally strong football pedigrees. Similarly, by including continental club competition games, we award players who play in strong teams (and thus play intra-continentally more often) extra chances to score higher in the games played column. Yet, we find it necessary to count these games as well, as they will be evaluated by scouting departments.

Another factor that directly influences the games-played statistic and consequently has its baring on player performance, is the **injury-proneness** of a player. To our knowledge, this statistic is yet to show up in empirical research (Tunaru et al., 2005 do make mention of it in relation to their Opta Index measure), mostly because of the limited (public) availability of data. There is a fair amount of noise in our use of the statistic as well, but by including it we still hope to solve a little piece of the puzzle. We collect data on the number of weeks that a player has been injured over the previous season. Obviously, previously incurred injuries may be a very inaccurate predictor of future injuries, and injuries relate to many more things than just personal fitness. For example, playing in more physical competitions (the English and Italian leagues are good examples), may increase the risk of injury. However, it is clearly a proxy for human capital (less so of talent), as training methods at clubs have a significant bearing on physical fitness. Yet, in practice, all players undergo extensive physical tests before signing a contract with their new club, and clubs carefully examine the medical records of prospective players. This should mitigate the risk of injury to clubs. However, some players remain more injury prone than others, influencing the value they can have to their club and how they can influence the probability of winning games.

As mentioned, we feel that these direct performance measures are inadequate in predicting future player performance. By including indirect proxies for player ability and human capital, we hope to provide more accurate predictions, and hence a fuller explanation of transfer fees. A factor included in all of the literature on transfer fees is player **age**. A player's career is, after all, usually limited to his age 18-35 years (football players rarely break 40, and most of those are goalkeepers). As most (if not all) researchers, we employ both the age of a player (as of the start of the transfer period) and **age^2**, in order to allow for a *structural break* in the influence of age on transfer fees. Carmichael et al. (1999), amongst others, hypothesize that player performance increases with player age (experience), albeit at a decreasing rate. As player reach their peak performance level, age will be valued negatively, as player performance will decrease. However, if age were seen as a proxy for player

talent or potential performance, one would actually expect a negative relationship between age and the transfer fee. After all, if we were able to keep player performance equal, a lower age will be valued positively (and there might even be a premium on variance in player performance). Hence, the age variable is an intriguing proxy to keep track off. It is this variable where the distinction between player potential and performance becomes especially blurred. With the inclusion of accurate performance measures it would be a good proxy for player potential, yet with the non-availability of these it might be a better measure of player performance.

Another popular (indirect) proxy for ability and investments in human capital is whether or not a player has been selected for playing for his country's squad (**international caps**). For this, we compute a dummy variable as to whether a player has been selected for one of his country's representative teams over the last year (this also includes national youth teams, as not to penalize younger players in the sample). Obviously, this is again a relative measure, this time relative to players with the same nationality. Herein, it is once again an imperfect proxy of both performance and talent. It might be considered a measure of talent because only the most talented players get selected for their national squads. On the other hand, a national squad selection is also a mere snapshot evaluation of a player at that moment, perhaps making it a better proxy for (recent) performance. Yet, players might also be selected for their national squads based mostly on their reputation. However. an important item to note is that, in order to be allowed to transfer to the UK, players actually need to have played in 75% of their country's national squad games. Hence, over 70% of the players in our sample actually play national caps, diminishing the distinguishing value of the statistic.[42]

A further factor relating to the nature of the transfer that we include in our model is whether the transfer amounts to a **domestic transfer** (between clubs participating in a professional English league). We would expect English clubs to have more precise and in-depth scouting reports on players in their own league, as Great Britain is the source of their scouting (and agent) network. Hence, Premier League clubs would be willing to pay a premium for players from their domestic league, as one would expect the uncertainty in performance to be lower (obviously, this 'premium' is only a premium as these specialized inputs are not available to us). As such, we expect a positive relationship between transfer fees and the domestic transfer dummy.

[42] Over 84% of non-UK players in our sample play international caps.

A last indirect measure of ability and human capital that we include is player nationality. We group players into three (dummy) categories: **UK-player**, **non-EU players** and 'other' (non-UK EU players, the reference group). We suspect nationality to be of influence, as players may face adaptation issues due to cultural issues and differences in style and intensity of play (for which the Premier League is renowned). These of course should be less severe for UK-players. We divide non-UK players into two groups, as we suspect there to be gradations in the cultural and physical adjustments necessary. European leagues are generally thought to be of a higher level of play and professionalism, and cultural differences to the UK may lessen due to proximity. Furthermore, as we have argued earlier, European law (i.e. the Bosman and Monti rulings) dictate a premium on EU-born players. Hence, non-EU nationality is expected to be valued negatively, all other things equal. Yet, as we have inadequate measures of player performance and talent, nationality may also be argued to be an indicator of these determinants, as only exceptional talents and/or performers are expected to be of interest to Premier League clubs. Please note that as domestic transfers do not by definition include UK-players, these two do not measure the same thing (although they show significant correlation[43]).

2.2.2 Player function

After establishing proxies for player talent and human capital, previous studies usually underline that these factors need to be corrected for the function that a player will be fulfilling in the team. This for example relates to the 'specialism' of a player on the pitch, as some positions may come at a premium in the market. This premium may be either caused by the rarity of the skill of the players in that specialism, or by the special (key) role that they may fulfill in a team's play. Furthermore, some players may be able to play in multiple positions, providing value through their versatility.

We need to discount a player's performance and innate ability to the specialism he performs on a team in order to get a feel for the true value he provides to a team. To this end, we first need to include positional dummies (**goalkeeper**, **defender**, **attack**, reference group is midfielders[44]). It is not unfathomable that positions are valued differently, as attackers are usually seen as the 'difference makers' on a team. The (somewhat unsophisticated) thinking here is that good strikers can win a team games, but good defenders can only 'not-lose' a team games. We further include a dummy for whether a player is a **central** player (playing on the axis of the pitch). Central players are often

[43] Correlations are reported in appendix 2.

[44] We use midfielders and not goalkeepers as the reference group, in order to avoid singular matrix issues in our regressions due to the limited number of in-sample goalkeepers.

thought to be more crucial to a team, as they lead their respective lines and divide play. Player **height** could also be an indicator of a player's function on a team, as it is a proxy for the ability to win aerial challenges and head the ball. As such, height is especially valuable to defenders (who more often face passes played through the air) and strikers (being able to head crosses may be a skill relevant to one's goal-scoring ability). A last indicator of player specialism is a player's footing: we include dummies for players who are **left-footed only** and for players who are able to use **both-feet** (right-footed players, who constitute a majority, being the reference group). Obviously, all human beings are able to use both feet, but in football the majority of players have a weak foot, which they use significantly less for passing or shooting the ball. As players able to use their left or both feet are relatively scarce, they may offer extra value to their clubs, as they allow for more variation in play. Furthermore, players able to use both feet offer more versatility to their clubs, as they are able to play on both sides of the pitch (wing positions can be determined by footing).

2.2.3 Bargaining positions of buyer and seller

Following up on the bargaining approach as discussed earlier, we will argue that factors of buying and selling clubs will feature in the transfer decision and fee as well. Specifically, we deem both a club's size (financially) and its past performance to be of significant influence to the bargaining position of clubs. This reasoning has some empirical support, as in the bargaining model of Carmichael & Thomas (1993), stadium attendance, profit levels and playing success factor into the utility function of clubs (herein attendances proxy the *entertainment* function of the club, which we ignore). Subsequently, the utility function determines a club's bargaining position through affecting *pre-bargaining utility* and the *risk-aversity* of a club. Alternatively, in their real-option pricing framework, Tunaru et al. (2005) argue that club turnover can influence the value that a player can provide to a club (positively). Similarly, Pujol et al. (2007) suggest that a (composite) club's media value correlates with transfer fees paid for players.

Drawing from these findings, we hypothesize that a club's budget for the coming season, as well as its performance over the previous season will influence the transfer fee.[45] We include budget proxies, as we have experienced (from our interviews) that financial planning in the football industry is often budget based, making it the relevant measure for financial club size. As such, we explicitly do not include profit levels (nor a proxy for the entertainment value of a team), as we cannot distinguish

[45] The inclusion of a future budget determinant may seem to lead to endogeneity issues, as a club's budget will rely heavily on the drawing power of its players, whom can be acquired in the pre-season transfer market. Yet we stress that we use past-season proxies for the future budget determinant.

between club owner objectives (as discussed in the previous chapter). We are unable to intuitively determine the influence of club size (measured in terms of budget) on bargaining positions for buying and selling parties. Financial constraints may force a club to sell a player (or determine the decision to *not* buy a player, a decision we ignore in our research). Alternatively, knowledge of the financial capacity of large clubs may allow selling clubs to take the stance that the large club can afford to overpay. Regarding historical performance, last season's poor (or surprisingly good) results may establish the need for a club to act as a buyer, due to for example unfulfilled (or newly established) fan expectations. Conversely, poor results in the previous season are only assumed to result in a selling spree in extreme cases such as relegation. As such, club-specific factors are expected to factor into transfer fees, although the effects for buying and selling clubs may differ significantly.

As we attempt to proxy past club performance, again, we use the past season as the evaluation period (or half a season in the case of winter transfers). As such, we assume the backward-looking element in fan expectations, sponsoring and broadcasting revenues etcetera, to be limited to one season. Obviously, as a club's performance on the pitch is the quintessential outcome of the game and focal point of fan interest, simple proxies exist for this determinant. Besides the obvious measure of past season's final **league position** we also include past season's **goal difference.** We insist on including the latter, as it is sometimes though to be a more accurate measure of a team's 'true' performance.[46] Combining the two should give a pretty accurate impression of a team's performance (although they obviously should be highly correlated). Furthermore, we include dummies[47] for **promotion** and **relegation**, as these past performances have severe (financial) consequences and as such significantly influence a club's bargaining position. The one flaw that exists in these performance measures is that they give no indication of performance relative to how the team was expected to perform (by fans and sponsors). Hence, we include the (imperfect) proxy of **managerial change**. As managers are usually held responsible for the performance of their teams, discontent with a team's performance is a prominent reason for a football front office to make a change in the managerial staff. Obviously, other reasons exist as well: managers may leave on their own initiative in order to pursue better opportunities, managers may retire and often new team presidents bring in the managers of their choice as well, regardless of previous performance. Including the managerial change proxy is also interesting, as new managers often insist on bringing in

[46] In baseball, the 'run-differential' statistic is a popular proxy, even though seasons in (US) Major League Baseball constitute 162 games.

[47] These are essentially special league position dummies, and in our winter sample are dummied according to whether clubs are in the position to relegate/promote at the start of the transfer period.

several players of their own choosing, as they implement a new style of play and try to shape the squad to their football 'philosophy'. This may hamper a (buying) club's bargaining position, as selling clubs can assume these players to be badly wanted.

With regard to buying and selling clubs (future) budgets, unfortunately historical budgets are not easily available and collectable for all in-sample clubs. Hence, we have tried to get an indication of next year's budget in a rather simplistic way: by collecting data on **stadium capacity** and on whether a club has qualified for its respective **continental club competition**. The stadium capacity proxy is intriguing, as it is mostly a measure of revenue *potential* (although obviously ticket prices figure into this as well). As shown before, stadium attendances are no longer the primary source of income to football clubs in European leagues. Yet, 'bigger' (richer) clubs often still have larger stadia than less endowed clubs. We admit it to be an imperfect measure, as gate receipts or even attendance figures would have been a more direct (yet still imperfect, for example due to sell-outs and season tickets) proxy for the drawing power (and hence revenue potential) of clubs. Unfortunately, reliable figures on gate receipts were not at our disposal, and this measure most closely resembled it. The inclusion of continental club competition qualification is intuitively clear, as these can be a prominent source of revenue (especially the Champions League). Clearly, the statistic is highly correlated to league position, but it does have strong ramifications on a club's budget. Furthermore, most capital-laden teams are usually represented in continental club competitions, making it also an indirect proxy for club size.

2.3 Data collection

We hand-collect data on the transfer fees paid (in Euros) and proxies described above for all player transfers to and from the English Premier League in the 2008-2009 and 2009-2010 seasons. Our final sample of player transfers includes 340 player transfers (61 of which were winter transfers). Ten player transfers were omitted from the original sample due to severe data unavailability (usually on individual player performance), and a further nine were discarded as these constituted player swaps. Furthermore, 37 player transfers were omitted as these were rent constructions. We discard rental agreements, as player transfer rights are not exchanged in the transaction (although clubs often include an option to buy the player at the end of the rental period). As such, renting a player is substantially different in nature by being merely temporary.[48] For the 340 transfers, data on the

[48] These transactions may be more appropriately analyzed in a real-option setting, with them essentially being real call options.

proxies described above were manually collected from www.transfermarkt.de (and its English counterpart, www.transfermarkt.co.uk), a comprehensive website on worldwide statistics that has committed to collecting football statistics since September 2001. Data collected were cross-checked on various football-specific local and global websites such as www.soccerway.com, espn.soccernet.go.com, www.thefa.com, www.vi.nl (Dutch website) and various official club websites. Descriptive statistics for all our proxies are offered in table 1 below. Furthermore, figure 8 provides a distribution of (summer) transfer fees paid.

The most serious data problems we encountered surrounded the injuries as reported by www.transfermarkt.de. Primarily, these were only consistently available for players playing in the English Premier League, German Bundesliga and Spanish Priméra Division, and contained quite some noise. Consequently, we provide regression results both in- and excluding the injury statistic, as including it would significantly limit the sample. We work with two basic samples: summer and winter transfers. These cannot be combined into a single sample, as the evaluation periods for player and club performance measures differ.[49] Hence, the winter transfer period acts as a control sample and results are reported separately (in the appendices). We see no rational grounds on which to assume that winter transfers are different in nature (other than the evaluation period), so their omission from our main (summer transfer) sample should not cause any bias.

Furthermore, in order to avoid bias, free transfers are included in our sample. Free transfers are a strange phenomenon, especially in the study of player transfers and hence player value. They can occur as clubs do not require a fee for a player under contract, with a club essentially giving away a player's services for some reason (e.g salary relief, bad performance). However, a very frequent occurrence (thanks to the Bosman case) is also that players are transferred at the end of their contract, as a transfer fee is then no longer required in order to obtain their services. Consequently, especially the explanation of free transfers suffers from a crucial omitted variable in our analysis: remaining player contract duration. Hence, as we are unable to distinguish between the former transaction and the latter (non-)transaction in our sample, we offer regression results for both regressions in - and excluding free transfers. Lastly, our transfer sample includes 21 goalkeepers (16 of which in summer). For these, we collected additional performance measures: goals conceded in the past season and clean sheets in the past season. Yet, the number of in-sample goalkeepers did not allow for reliable regression results.

[49] We did think about extrapolating half-season measures, but considering the fact that many competition schedules are incompatible with one another, we concluded this to be impractical.

Period		Summer 08/09 (n=133)	Summer 09/10 (n=146)	Total summer (n=279)	Total winter (n=61)
Player Characteristics					
Price (€ millions)	Mean	5.44	5.05	5.24	4.05
	Minimum	0.00	0.00	0.00	0.00
	Median	3.00	2.50	2.90	2.10
	Maximum	43.00	94.00	94.00	20.00
Player age	Mean	26.67	26.24	26.45	26.92
	Minimum	17.53	18.38	17.53	19.45
	Median	26.58	25.84	26.21	26.77
	Maximum	38.67	36.99	38.67	35.35
Player length (meters)	Mean	1.83	1.83	1.83	1.82
	Minimum	1.68	1.69	1.68	1.68
	Median	1.83	1.83	1.83	1.82
	Maximum	2.01	2.02	2.02	1.96
Games played previous season	Mean	30.43	32.76	31.65	14.48
	Minimum	3.00	2.00	2.00	0.00
	Median	30.00	34.00	32.00	14.00
	Maximum	64.00	66.00	66.00	34.00
Goals scored previous season	Mean	3.62	4.73	4.20	1.80
	Minimum	0.00	0.00	0.00	0.00
	Median	2.00	2.00	2.00	1.00
	Maximum	29.00	28.00	29.00	12.00
Goal rate previous season	Mean	636	750	695	372
	Minimum	0	0	0	0
	Median	276	406	321	180
	Maximum	4,666	4,716	4,716	2,720
Injuries past season in weeks	Mean	1.97	2.83	2.36	1.49
	Minimum	0.00	0.00	0.00	0.00
	Median	0.00	0.00	0.00	0.00
	Maximum	27.00	20.00	27.00	14.00
Goalkeeper	Mean	0.08	0.03	0.06	0.08
Defender	Mean	0.33	0.34	0.34	0.34
Midfield player	Mean	0.36	0.37	0.37	0.34
Forward player	Mean	0.23	0.25	0.24	0.23
Central player	Mean	0.79	0.68	0.73	0.75
Left-footed	Mean	0.21	0.23	0.22	0.23
Both left- and right-footed	Mean	0.19	0.13	0.16	0.11
UK-nationality	Mean	0.27	0.38	0.33	0.38
Non-EU-nationality	Mean	0.23	0.21	0.22	0.15
International caps	Mean	0.80	0.66	0.73	0.64
Domestic transfer	Mean	0.48	0.62	0.51	0.57

Table 1: Descriptive statistics

Period		Summer 08/09 (n=133)	Summer 09/10 (n=146)	Total summer (n=279)	Total winter (n=61)
Buying club characteristics					
Stadium capacity	Mean	39,227	35,068	37,050	35,181
	Minimum	13,108	9,653	9,653	6,280
	Median	35,200	30,984	31,367	31,367
	Maximum	99,354	80,000	99,354	80,000
Goal difference past season	Mean	10.26	5.46	7.75	-0.11
	Minimum	-23.00	-27.00	-27.00	-22.00
	Median	14.00	6.00	8.00	-2.00
	Maximum	58.00	52.00	58.00	25.00
League position past season	Mean	7.60	8.53	8.09	10.54
	Minimum	1.00	1.00	1.00	1.00
	Median	6.00	8.00	7.00	11.00
	Maximum	22.00	20.00	22.00	20.00
Lower division	Mean	0.24	0.26	0.25	0.13
Continental club competition	Mean	0.44	0.23	0.33	0.36
Managerial change	Mean	0.49	0.44	0.46	0.54
Promotion	Mean	0.17	0.10	0.13	0.05
Relegation	Mean	0.03	0.01	0.02	0.10
Selling club characteristics					
Stadium capacity	Mean	40,081	38,105	39,047	37,637
	Minimum	11,026	6,000	6,000	14,209
	Median	36,240	35,303	35,303	34,711
	Maximum	99,354	99,354	99,354	80,018
Goal difference past season	Mean	7.17	7.36	7.27	2.56
	Minimum	-42.00	-29.00	-42.00	-22.00
	Median	2.00	7.50	5.00	1.00
	Maximum	58.00	70.00	70.00	31.00
League position past season	Mean	9.05	8.31	8.66	8.97
	Minimum	1.00	1.00	1.00	1.00
	Median	9.00	8.00	8.00	8.00
	Maximum	21.00	19.00	21.00	20.00
Lower division	Mean	0.10	0.19	0.15	0.11
Continental club competition	Mean	0.50	0.26	0.37	0.34
Managerial change	Mean	0.54	0.56	0.55	0.51
Promotion	Mean	0.02	0.05	0.04	0.07
Relegation	Mean	0.09	0.07	0.08	0.13

Table 1 (continued): Descriptive statistics

Table 1 provides the mean, minimum, median and maximum observations for all data collected (only mean observations are provided for dummies). Descriptive statistics are provided for separate summer transfer periods, and for aggregated summer and winter transfers periods.

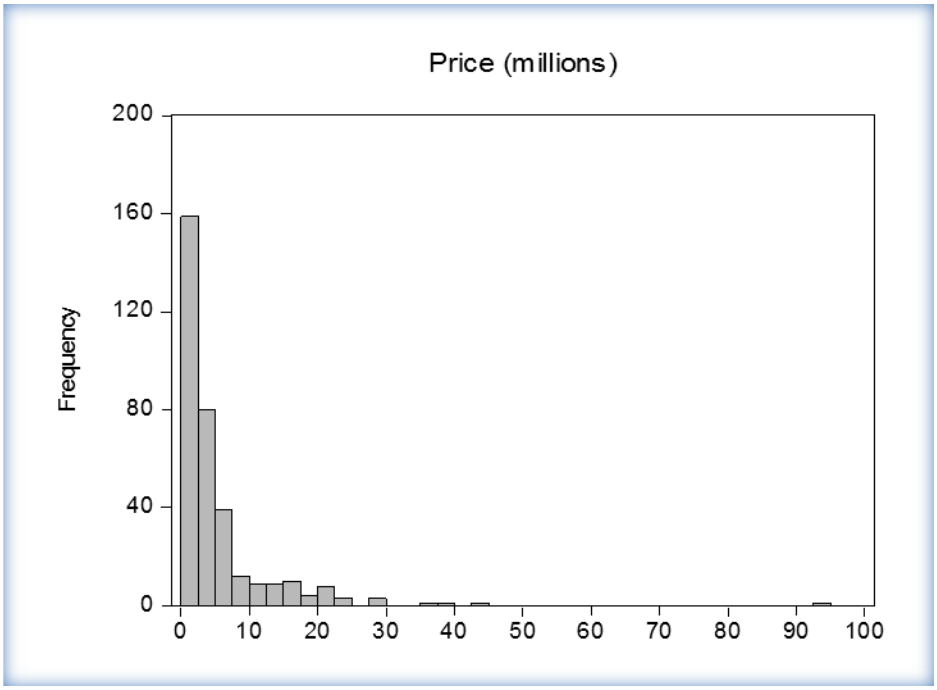

Figure 8: Distribution of transfer prices
This figure shows the skewed distribution of in-sample transfer prices. Notable are the huge outliers between €35 million and €45 million, and obviously the Cristiano Ronaldo transfer (€94 million). These are corrected by using the natural logarithm.

2.4 Methodology & Model specification

As the goal of our research is to model the determinants of player transfer fees, simple regression analysis should suffice to establish links between player- or club-specific characteristics and transfer fees paid. Figure 7 displays the fact that previous research has exclusively used OLS regression, albeit sometimes with a twist (e.g. the Heckman two-step procedure from Carmichael et al, 1999). In our model, we employ the natural logarithm of transfer fees (in € millions) as the dependent variable. This allows us to include some apparent outliers that may still include valuable information, such as the Cristiano Ronaldo transfer. With one exception, all direct and indirect measures of player performance or talent are included as described above, along with proxies for club size and performance. The exception is based on our analysis of the various correlations (see appendix 2). One correlation between proxies stands out as hazardous, as (buying and selling) club league position and goal difference over the past season show a huge negative correlation (in both cases, around -0.9). This would invariably lead to multicollinearity issues, and biased coefficients. As such, we exclude a club's league position from the club performance analysis, as we feel that goal difference is a better proxy for a club's 'true performance'.

For the description of a player's function on a team, we employ positional dummies and the 'central' dummy. A 'versatility' dummy, which is the sum of the left-footed-only and both-feet dummies, is included to capture the added value of non-right-footed players. We also include interaction terms between the goals statistic and defender and attacker dummies (we use midfielders as the reference group, and omit goalkeepers as these rarely score a goal), in order to correct the goal statistic for player function. Lastly, we include interaction terms between player height and dummies for defenders and attackers. These are included, as height is hypothesized to be especially valuable at these positions.

We make a distinction between several samples, and provide coefficient estimates for all (albeit in the appendices for some). Firstly, as explained earlier, we do not lump summer and winter transfers into one sample, as the assumed evaluation period of player and club performance differs greatly. We have no intuitive rationalization for assuming that winter transfers are different in nature, and as such (as this sample is significantly smaller), we report its results as a control group in our appendices. This is supported by our descriptive statistics, as no notable differences between summer and winter samples appear to exist. The only apparent differences appear to be in goal rate (which is plausible: the average goal rate is strongly influenced by players who do not score a single goal, and this is more likely to happen in only half a season) and in buying club performance (indicating that poor performing clubs use the winter transfer period in an attempt to 'save' their season, which is certainly of interest). The lower average winter transfer prices may reflect the fact that the benefit of ascertaining the player's services *in the current season* is half a season less.

Furthermore, our main sample (which includes summer transfers for the 2008-2009 and 2009-2010 seasons) contains 61 free transfers. Although these obviously contain information (bad players can be let go for underperformance or having proved to possess little talent), they also often indicate players being at the end of their contract. As contract duration data is not included in our research, we report estimates for both samples in- and excluding free transfers. We take special notice of the regressions excluding free transfers, as we are interested in the determinants of value for transferred players. Players at the end of their contract are not actually transferred, and as such of no interest to us.

Lastly, our data on injuries contains a significant amount of noise and is not available for 87 players in our summer transfer sample alone. Hence, we also report estimates for an equation omitting injuries as a determinant, both in the full sample and in the sample excluding free transfers. As such,

Analysis	*Univariate*			*Multivariate*			*Multiv Ex injuries*		
	N=220			N = 149, adj R^2 = 0,54			N = 220, adj R^2 = 0.42		
	C	P	R^2	C	P	F	C	P	F
Direct measures of talent/human capital									
Goals scored	0.055	0.000	0.087	0.018	0.548	0.000	0.009	0.739	0.000
Goal rate	0.000	0.360	0.004	0.000	0.728		0.000	0.475	
Games played	0.040	0.000	0.238	0.041	0.000		0.030	0.000	
Injuries	0.021	0.337	0.006	0.012	0.470		NA	NA	
Indirect measures of talent/human capital									
Age	-0.025	0.261	0.006	0.900	0.000	0.000	0.668	0.002	0.002
Age^2	-0.001	0.155	0.009	-0.018	0.000		-0.014	0.001	
International caps	0.641	0.000	0.056	-0.049	0.803		0.319	0.056	
UK-nationality	-0.145	0.372	0.004	-0.296	0.099		-0.227	0.223	
Non-EU nationality	0.098	0.601	0.001	-0.355	0.049		-0.188	0.263	
Domestic transfer	0.057	0.712	0.001	0.726	0.000		0.615	0.001	
Player function									
Goalkeeper	-0.360	0.357	0.004	0.010	0.980	0.959	-0.087	0.823	0.986
Defender	-0.062	0.700	0.001	-0.195	0.971		-0.201	0.969	
Attack	0.164	0.371	0.004	-3.105	0.504		-1.988	0.660	
Goals*Defender	0.076	0.227	0.007	-0.006	0.935		-0.004	0.958	
Goals*Attack dummy	0.040	0.002	0.044	-0.004	0.908		0.012	0.658	
Central position	-0.037	0.838	0.000	0.220	0.253		0.198	0.232	
Versatility	-0.016	0.921	0.000	-0.094	0.510		-0.089	0.494	
Player height	-0.820	0.493	0.002	-0.641	0.731		-0.895	0.615	
Player height*Defend	-0.034	0.699	0.001	0.092	0.975		0.133	0.962	
Player height*Attack	0.088	0.379	0.004	1.632	0.524		0.980	0.693	
Buying club size									
Stadium capacity	0.000	0.000	0.168	0.000	0.165	0.009	0.000	0.012	0.001
Cont club competition	0.865	0.000	0.129	0.512	0.007		0.623	0.001	
Buying club performance									
Goal difference	0.009	0.010	0.030	0.000	0.955	0.846	-0.003	0.569	0.251
Promotion	-0.359	0.121	0.011	-0.250	0.350		-0.039	0.874	
Relegation	-1.680	0.011	0.029	-0.406	0.471		-1.147	0.037	
Managerial change	0.016	0.917	0.000	-0.019	0.902		0.058	0.688	
Selling club size									
Stadium capacity	0.000	0.004	0.037	0.000	0.559	0.840	0.000	0.243	0.395
Cont club competition	0.531	0.001	0.050	0.015	0.936		0.082	0.647	
Selling club performance previous season									
Goal difference	0.007	0.022	0.024	0.001	0.825	0.198	0.001	0.878	0.724
Promotion	-0.902	0.081	0.014	0.412	0.503		-0.218	0.629	
Relegation	0.090	0.769	0.000	-0.179	0.440		0.048	0.850	
Managerial change	0.010	0.950	0.000	-0.286	0.045		-0.171	0.214	

Table 2: Regression results summer sample

This table reports coefficient estimates (denoted by 'C'), individual p-values ('P') and F-test p-values ('F') for groups of proxies (determinants) for our sample of all summer transfers. We report univariate results, (including R^2) and report multivariate results in- and excluding injuries (all samples explicitly *exclude* free transfers, these results are reported in appendix 3).

Analysis	*Multivariate*		*Excluding ft*		*Excluding injuries*		*Ex injuries & ft*	
	N=192, adj R^2=0.51		N=149, adj R^2=0.57		N = 279, adj R^2=0.44		N = 218, adj R^2=0.44	
	C	P	C	P	C	P	C	P
Direct measures of talent/human capital								
Goals scored	0.021	0.105	0.019	0.130	0.015	0.195	0.013	0.299
Goal rate	0.000	0.965	0.000	0.900	0.000	0.695	0.000	0.599
Games played previous season	0.035	0.000	0.038	0.000	0.028	0.000	0.028	0.000
Injuries	0.004	0.783	0.019	0.201	NA	NA	NA	NA
Indirect measures of talent/human capital								
Age	0.447	0.006	0.842	0.000	0.346	0.012	0.714	0.000
Age^2	-0.010	0.001	-0.017	0.000	-0.008	0.002	-0.015	0.000
International caps	0.018	0.914	-0.153	0.376	0.275	0.038	0.326	0.033
UK-nationality	-0.055	0.724	-0.186	0.239	-0.127	0.389	-0.253	0.138
Non-EU nationality	-0.184	0.228	-0.293	0.071	-0.174	0.205	-0.265	0.091
Domestic transfer	0.404	0.004	0.577	0.000	0.412	0.002	0.628	0.000
Buying club size								
Stadium capacity	0.000	0.014	0.000	0.035	0.000	0.000	0.000	0.000
Continental club competition	0.313	0.023	0.557	0.000	0.371	0.005	0.621	0.000

Table 3: Specialized model (summer sample)
This table displays the fee equation for a model excluding redundant determinants (and hence proxies), based on the F-test analyses. Coefficient estimates ('C') and individual p-values ('P') are reported for all our samples (excluding either or both free transfers ('ft') and injuries, as well as a sample including both).

we are primarily interested in fee equation for the sample excluding both free transfers and injuries. As we are interested in the *determinants* of player value in the transfer market, we investigate the joint significance of proxies (for given determinants) through the Wald F-test. If the null-hypothesis of the Wald-test can be accepted, determinants are deemed to be redundant. Based on the F-test analysis, in table 3 we provide a model excluding the redundant determinants. We include this last table, in order to see whether coefficients are affected by omitting redundant variables. Although we explicitly focus on value *determinants*, we obviously do not ignore the estimates for (nor the significance of) various interesting individual proxies.

2.5 Discussion

We can derive various conclusions on what factors determine transfer fees in practice. Based on the univariate analysis for example, one would conclude that goals scored is an adequate predictor of future player performance, as it significantly influences transfer fees. However, univariate analysis certainly does not tell the whole story, as other proxies turn out to be better estimators of talent and human capital under a more elaborate and relevant set of ceteris paribus conditions.

A variable that does perform well in both uni- and multivariate analyses, is the number of games played by a player in the previous season. Remarkable is the strong explanatory power of the relevant univariate model (R^2 of 0.238), indicating that the variable acts as in important indicator for player performance, and consequently player talent and human capital. Club characteristics especially, show remarkable significance in the univariate analyses, performance that (generally) vanishes once we correct for the influence of other factors in a multivariate sense. As such, club characteristics may be seen as good *indirect* indicators of player quality: once we include more direct indicators of player quality, their individual influence disappears.

Sticking with club characteristics, we do find some support for the bargaining framework, as indicators of buying club size show little signs of futility, both individually and jointly. Our results indicate, for example, that clubs that play in the Champions League (or comparable competitions) in the next season, are willing to pay significantly more for comparable players. In bargaining framework terminology, this indicates that buying clubs with large (projected) budgets suffer from a much higher risk-aversity in transfer fee negotiations (due to diminishing marginal utility), and selling clubs know it. For non-believers in the bargaining framework, the result is clearly indicative of the quality of decision making in the football transfer market, as large/rich clubs spend their money less wisely. It would seem strange to believe that large clubs, with all the funds at their disposal for better decision making, would just throw their money into the transfer market carelessly. However, the Dutch football executives we interviewed would surely agree this is exactly what happens, implying the presence of a winner's curse in the bidding for football players. Obviously, we do not have a clear view of the incentives at work in the football industry. Regardless, we can certainly conclude buying club size to be an input into the transfer decision, one way or the other.

We are pleasantly surprised by the strong joint significance of our direct proxies for player talent and human capital. We had perceived these variables to be inadequate predictors of future performance, and goals (or goal rates) indeed appear to be irrelevant to the determination of transfer fees. Disappointingly, injuries also hardly appear to be a relevant performance indicator, although we feel this is primarily indicative of the amount of noise in the collected statistic. However, as mentioned earlier, clubs do seem to value one factor in particular: the amount of games a player has played the previous season. Obviously, this factor is an important precondition for (and indirect proxy of) a player providing value to a team, and hence, is priced accordingly.

The indirect predictors of future player performance also prove to be reliable and relevant proxies for talent and human capital, both jointly and individually. Specifically, 'age' (and 'age^2') and 'domestic transfer' produce significant coefficients across the various multivariate models. We are happy to find the domestic transfer premium, as this factor clearly improves clubs' ability to predict future performance. However, we would especially like to highlight the role of 'age' in our model, as it is of particular interest to us. We had hypothesized negative coefficients in the univariate sphere (age being primarily a proxy for talent) and positive coefficients in the multivariate sphere (age being associated with performance, after correcting for performance decline through age^2). Although significant coefficients are not to be found in the univariate model (except when we include free transfers, see appendix 3), multivariate results are consistent with our expectations. Hence, age is a better proxy for performance, as, for example, experience helps players perform on a higher and more consistent level - up to a certain age. The age and age^2 coefficients in our models suggest that players reach their decline between the age of 24 and 25 (from there on, age is valuated negatively). We had expected this breaking point to be at a later age, although our other models imply even earlier 'peeks' in the parabola (around age 22). We suspect that if we could have incorporated proxies for player *talent* alone, peak performance would have been at a later age. Regardless, age plays an interesting and significant role as an indirect indicator of ability and human capital, as it incorporates both player performance and talent.

The other four determinants (player function, buying club performance and selling club size and performance) show clear signs of futility, with (almost) none of the individual coefficients showing any significant influence. The F-test confirms the redundancy of these determinants. This is especially surprising for player function, as one would expect that a player's value differs through the role he performs on a team. Possibly, we do not sufficiently recognize the relevant player functions to distinguish, as other researchers do find corrections for player function. Alternatively, it could be that the ability to score a goal is nowadays not a skill more rare than the ability to avoid conceding a goal, or the skill to divide play. As mentioned before, it may also be that club characteristics (selling club characteristics in particular) are most appropriately used as being primarily indirect indicators of player quality. It is in this capacity that they are incorporated in the fee equation and probability of transfer estimation of Carmichael et al. (1999).

The irrelevance of buying club performance is surprising, as we expected football executives to *overreact* to disappointing previous performances (due to fan expectations and perhaps ownership pressures). Yet, the only proof for the influence of (past) buyer performance is the significance of the

'relegation' term in the models that exclude injuries. The negative coefficient is rather flimsy justification for the bargaining perspective, as relegated teams would have significantly lower pre-bargaining utility (which should indeed lower the transfer price). As such, they should definitely not be willing to overpay, and basically go 'bargain-hunting' (herein, again, buyer performance is an indirect indicator of player quality). However, we should not forget the joint insignificance of the buying club performance determinant, and as such acknowledge that the individual influence of 'relegation' is limited at best.

The results from our smaller fee equation (excluding redundant determinants) are not shockingly different from our initial estimations. Coefficients change slightly but are generally consistent in both sign and significance, indicating the robustness of our results (also across samples). Encouraging is the significance of the 'international caps' factor in the models excluding injuries, indicative of its possible relevance in predicting future performance (several scholars have found it to be of significant influence). Unfortunately, the winter transfer period does not act as a very good control sample (see appendix 3). Models show far less significance, both in individual coefficients as in joint significance tests of determinants. We do note that these results will be biased due to sample size issues. Consequently, multicollinearity is a severe issue in these small samples, as models show great explanatory power but little to none significant proxies. As such, we should be wary of the large correlations that exist between our explanatory variables. We persist (with the one exception of 'league position') in including these variables (e.g. 'domestic transfer' and 'uk-nationality'), as individual omission of these correlated proxies does not cause significant changes in coefficients and p-values. Furthermore, we feel that we have a sufficient (summer) sample size to deal with multicollinearity, as well as sound intuitive and theoretical arguments for including all these factors.

Concluding, we find various relevant variables influencing transfer fees in the football transfer market. However, these variables are limited to two sets of determinants of player value: projected future player performance and buying club size. As such, we come to the (perhaps unsurprising) conclusion that player ability and human capital investments are highly relevant to the determination of transfer fees. We take particular interest in the special influence of player age on transfer fees, which is nicely highlighted in our regression results. We find limited validation for the use of the bargaining framework, as buying club size proxies are jointly significant throughout the various samples. As such, larger clubs do seem to suffer from a decline in leverage in negotiations, although some may say that our results are merely indicative of the inefficiencies that exist in the football

transfer market. Regardless, we do note that there is much to be gained in this area of research, both through the evolution of available research variables as through the evolution of the market itself.

2.6 Suggestions for further research

As we have stressed multiple times, it is extremely difficult to adequately approach the actual inputs into today's transfer decisions. Our research in essence suffers from several omitted variables, on various levels. As noted by Frick (2007) and others, a crucial factor missing in current research is the remaining contract duration of transferred players. This is a critical determinant of bargaining power in transfer negotiations, but is unfortunately often unavailable. In a similar note, we realize we are yet to stress that transfer fees do not represent the total investment in a player. As we use proxies to estimate future performance, we should also incorporate a player's future salary, as this commitment can often approach (or even supersede) the paid transfer fee.[50] Similarly, it should also be kept in mind that wage costs saved factor into the decision of the selling club. Difficulties arise immediately in that salaries can depend strongly on performance bonuses, and in that the length of the stay of a player at a club is highly unpredictable. Yet, it remains a crucial input into the transfer decision. Furthermore, significant omissions include agent fees at transfers and signing bonuses.

In addition, direct measures of player performance (and hence ability and human capital) that are openly available are (currently) far off from the quality of scouting reports – the actual inputs into transfer decisions. Our measures vastly understate the team-element of the game, and (amongst others) fail to adequately distinguish between the various player actions that are relevant to the outcome of games. As such, these measures fail to measure a player's *actual* contribution: his influence on the probability of the team to win or lose a game. More accurate research should think of incorporating comprehensive statistics such as the Opta Index to proxy (relative) player performance. Alternatively, in order to correct for player talent (or his ability to influence his team's chances of winning a game), one could think of separately investigating various transfers *by the same player*. It is common that players change clubs multiple times throughout their career. As, supposedly, their innate ability does not change greatly throughout their career, we are already provided with a specialized data set of players that are eerily similar. This kind of research would then have a better chance of investigating the influence of investments in human capital (or actual player performance) and other factors on transfer fees.

[50] In this light, Kedar-Levy & Bar-Eli (2008), present a model to determine the optimal compensation schedule of athletes.

Comprehensive statistics such as a media value proxy also need to be incorporated, as it is through this channel that a player increasingly provides value to a club. Furthermore, we are limited by the available proxies of club size. Data on club budgets or even balance sheet data would be hugely helpful in exploring the bargaining model more thoroughly. More fundamentally, many contextual variables (as discussed in chapter 1) are not included in our research. We do not have detailed, accurate or reliable figures on stadium attendances and television audiences, nor proxies for sponsorship deals and so forth. An important contextual variable that is crucial to fan interest in the game (and as such, the game's validity as a vehicle for entertainment) is *uncertainty of outcome*. This variable is one the fundamental characteristics of the game that attracts so many fans. Yet, it is hard to establish a link between uncertainty of outcome and individual teams or players, let alone transfer fees paid. Perhaps future research could develop some kind of methodology for typifying players as being extraordinarily exciting or unpredictable in their level of play. However this is also beyond the scope of our research.

Ideally, research on player transfers should account for the objectives of team owners, as discussed in depth in chapter one. One may think of including profit figures (with awareness of accounting standards in professional football), or include a dummy for financial- and non-financial-driven clubs or even leagues. Herein, we are also reminded that we should keep in mind these results are for the Premier League transfers only (although we also include transfers into and out of the Premier League). Researchers are usually attracted by the overall transparency of Premier League clubs, as well as the apparent (relative) professionalism employed in decision making. However, as based on our interviews, herein we might also find the biggest source of 'noise' in our research: the inefficiency and irrationality that exists in the international football transfer market.

On the methodological front, this research is limited through our inadequate data collection capabilities. We acknowledge that a bargaining framework likely is imperfect in the current liberalized transfer market. In effect, a bargaining approach implies bilateral monopoly by focusing on the bargaining positions of either party, negating the process that precedes negotiations. As transfer restrictions have consistently been loosened, competition for players' services is likely to intensify, and many more influences factor into player transfers than merely pre-bargaining utility and risk aversity. As such, we expect research into the determination of football player transfer fees to make great strides, as relevant data and statistical measures evolve and become more readily available. It remains an intriguing area of research, as it is a unique opportunity to witness the practical (financial) valuation of (intangible) human capital.

Conclusion

The football transfer market is an intriguing, relatively uncharted and potentially very relevant vehicle for explorations of the practical valuations of intangible assets: human capital. As attention for the product football has increased multifold over the last decade(s), the player transfer market has evolved into an international arena of competing stakeholders, with player agents, club executives, and national and international football associations all fighting over the product football and its primary source of income: football players. Hence, any attempt to analyze the empirical valuation of (transferred) football players should try to incorporate a multitude of determinants. Thankfully, the player transfer market is becoming less and less bound by market restrictions. However, the fact that it is a more liberalized market does not mean that it is an efficient market by definition, as the agents operating in it (primarily clubs) may show 'irrational' behavior (not driven by financial incentives per se) specific to the football industry.

After applying a basic bargaining approach, we find that individual player performance and innate ability are prominent determinants of transfer fees. This result is obviously unsurprising, but what is significant to notice is that indirect measures of performance and/or innate ability appear to be more adequate in approaching these determinants. Furthermore, we find reason to believe that buying clubs may be the victim of their own success, as their size brings transfer fees up to levels unexplained by measures of performance or ability. This lends credence to the use of a bargaining framework, although limitedly so. Obviously, many prominent variables influencing transfer prices are not available in our research. However, there is reason to believe that transfer decisions themselves are greatly imperfect. One may spot an ironic paradox here: we are drawn to the football transfer market for empirical research, expecting to find a clear set of human capital valuations coupled with various objective measures to evaluate the performance of individuals. What we find is a market described by insiders as inefficient and arbitrary, with vastly flawed performance measures.

Hence, if there is one inference to be drawn from our research regarding the valuation of human capital in general it is this: it is by and large *imperfect*. As such, there is much to be gained in both empirical research and practice itself. However, the field remains a fascinating topic of research for the practical economist. Although it is a labor and product market like any other, its public position creates dynamics and incentives that never cease to amaze undersigned. Hence, as football statistics and other data become more elaborate, commonly used and available, we expect an interesting evolution of empirical research, results that we await with great curiosity.

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Appendices

Appendix 1: The 'perfect' football statistic

As mentioned extensively throughout this paper, a player's performance on the pitch is extremely hard to measure and quantify into some overriding statistic. It is for good reason that clubs historically have depended on the subjective efforts of their professional scouting department in order to assess the performance (and talent) of (prospective) players: current objective measures simply do not do the trick. Clearly, traditional player-specific statistics such as goals scored, shots on target, assists and saves insufficiently capture an individual player's contribution to a team's chance of winning (or losing, or drawing) a game. The 'goal' statistic for example, blatantly ignores all team (and opposing team) actions that precede a goal. Similarly, saves and goals conceded are the mere statistics that apply to goalkeepers, both disregarding the fact that defenders (and opposing attackers, and so forth) have a huge influence on whether a goalkeeper actually needs to make a save, and whether he actually can. As such, traditional player statistics do not account for such crucial factors as a player's position on the pitch and his teammates' influence on his own performance. With this in mind, we find it interesting to hypothesize on what would compute the 'ideal' football statistic, that perfectly captures a player's contribution to team *performance*. In this, we were inspired by a Dutch commentary on football statistics in the English Premier League, and the parallels that can be drawn to American (statistics-crazed) sports.[51]

It would seem that we are far off from the 'perfect' football statistic that exactly captures the true value of any individual player to a team. As football is a game evolving around goals scored and conceded, any proxy for player performance on the pitch would have to be linked to either goal prevention or goal creation. Ideally, all actions attributable to individual players would be converted into a statistic such as 'probability of scored goal added' and 'probability of conceded goal subtracted'. Such a statistic would require an extensive and fundamentally different analysis of on-the-field actions. For example, one could imagine an analysis based on the division of the pitch into numerous small grids of equal size. For each grid, the probability of a goal scored (or conceded) after the possession of the ball by a given team in that grid, within a given timeframe (for example, the next minute) could be computed. Consequently, individually attributable actions such as passes and tackles could be coupled to the probability of a goal scored or conceded (within that given timeframe). Hence, for example a successful pass into a grid with a high scoring probability would have more value to the team than a successful pass on a team's own half of the pitch. Similarly,

[51] 'Heilig Gras', April 29th, 2011, Nederland 3.

successful defensive tackles would have more value in grids with a high probability of conceding a goal, as individual player actions are more adequately weighed to the contribution that they provide to team success. Obviously, the ideal statistic would distinguish between more player actions, identify actions at set plays (free kicks, corners) and would also involve actions that don't involve the ball (positional play).

From a researcher's point of view, this perfect statistic would also be a good measure of *relative* performance. We quickly can draw a parallel to the 'WAR' (or Wins created Above Replacement level player) statistic, as computed in American baseball. By setting a benchmark in 'replacement level player performance' (a minor league player, the football equivalent of a youth player), player performance is easily comparable. Although the technology for this kind of analysis appears to be present (the 2011 Champions League final was covered by 38 television cameras for instance), to our knowledge such statistics have not yet been developed. The closest thing to it appear to be comprehensive statistics such as the 'Opta Index' as described in Tunaru et al. (2005), which distinguish between a great number of separate player actions. Unfortunately, this statistic is not publicly available, and was not made available for this research, despite efforts to the contrary. Hence, we have to stick to traditional player statistics. Obviously, these are all imperfectly linked to our theoretical ideal of a 'goal probability added' statistic, indicating the scarcity in available football player statistics.

Appendix 2: Correlation matrix

		Player characteristics																
		Age	Length	Games	Goals	Goal rate	Injuries	Gk	Defender	Midfield	Attack	Central	Left-only	Both-feet	UK-national	Non-EU	Int. Caps	Dom. Transfer
Player char.	Age	**1.00**																
	Length	-0.05	**1.00**															
	Games	0.00	-0.02	**1.00**														
	Goals	0.00	-0.07	0.50	**1.00**													
	Goal rate	0.05	-0.06	0.34	-0.17	**1.00**												
	Injuries	0.03	-0.04	-0.14	0.02	-0.06	**1.00**											
	Gk	0.13	0.29	-0.13	-0.15	-0.16	-0.11	**1.00**										
	Defender	0.01	0.29	-0.07	-0.36	0.18	0.07	-0.17	**1.00**									
	Midfield	-0.09	-0.33	0.00	-0.07	0.07	-0.02	-0.16	-0.55	**1.00**								
	Attack	0.02	-0.10	0.15	0.56	-0.20	0.01	-0.12	-0.43	-0.41	**1.00**							
	Central	-0.08	0.18	-0.02	0.17	-0.09	-0.08	0.13	-0.34	0.16	0.15	**1.00**						
	Left-only	0.06	0.01	0.02	-0.04	0.03	0.00	-0.10	0.21	-0.05	-0.13	-0.15	**1.00**					
	Both-feet	0.02	-0.03	0.02	0.08	-0.11	0.13	-0.10	-0.12	0.08	0.09	0.08	-0.20	**1.00**				
	UK-national	-0.12	-0.07	-0.07	-0.02	-0.05	-0.03	0.06	-0.05	-0.06	0.10	0.04	-0.02	-0.14	**1.00**			
	Non-EU	0.06	-0.12	0.07	0.02	0.05	-0.08	-0.05	-0.13	0.17	-0.02	-0.07	-0.04	0.10	-0.35	**1.00**		
	Int. Caps	-0.09	0.01	0.24	0.14	0.12	0.18	-0.01	0.00	-0.05	0.06	-0.07	-0.04	0.14	-0.34	0.22	**1.00**	
	Dom. Transfer	0.03	0.03	-0.05	-0.03	-0.03	0.04	0.11	0.05	-0.11	0.01	0.00	0.00	-0.17	0.50	-0.13	-0.23	**1.00**
Buyer char.	Stadium cap.	-0.08	-0.05	0.29	0.16	0.07	0.08	-0.06	0.05	0.00	-0.03	-0.11	0.09	0.17	-0.10	0.13	0.21	-0.23
	Goal diff.	0.01	-0.01	0.02	0.04	0.00	0.07	0.07	-0.07	0.06	-0.02	-0.03	0.08	0.10	-0.06	0.03	0.10	-0.24
	League pos.	-0.02	-0.03	0.03	0.03	-0.01	-0.04	-0.09	0.02	-0.07	0.09	0.04	-0.10	-0.02	0.07	-0.01	-0.06	0.23
	Lower div.	0.11	0.01	-0.28	-0.14	-0.10	-0.15	0.15	-0.05	-0.03	0.02	0.05	-0.04	-0.13	0.18	-0.14	-0.34	0.25
	Cont. comp.	-0.11	-0.03	0.16	0.10	0.03	0.12	0.02	-0.02	0.07	-0.07	-0.07	0.08	0.04	-0.19	0.14	0.21	-0.30
	Man. Change	-0.10	-0.12	0.03	0.09	-0.08	-0.06	-0.06	-0.11	0.03	0.12	0.04	-0.09	0.05	-0.11	0.12	0.11	-0.19
	Promotion	0.14	0.04	-0.18	-0.11	-0.06	-0.09	0.09	0.00	0.02	-0.06	0.07	0.03	-0.09	0.04	-0.17	-0.23	0.10
	Relegation	0.15	-0.11	0.10	0.14	0.08	-0.03	-0.03	-0.11	0.05	0.09	0.08	-0.07	-0.06	-0.02	0.01	0.07	-0.01
Seller char.	Stadium cap.	-0.04	-0.05	-0.02	-0.02	0.02	0.23	0.00	-0.03	0.01	0.03	0.04	0.04	-0.01	-0.17	0.00	0.11	-0.24
	Goal diff.	0.00	-0.05	0.08	0.15	0.01	0.01	0.01	-0.08	0.01	0.09	0.09	-0.03	-0.02	-0.18	-0.04	0.10	-0.37
	League pos.	-0.01	0.04	-0.07	-0.13	0.01	0.02	-0.01	0.07	-0.01	-0.06	-0.07	0.05	0.04	0.18	0.02	-0.12	0.37
	Lower div.	-0.07	-0.03	-0.05	0.10	0.02	-0.08	-0.05	0.00	0.10	-0.09	0.09	0.00	-0.04	0.08	-0.13	-0.16	0.10
	Cont. comp.	-0.04	0.01	0.04	0.09	-0.05	0.07	0.06	-0.02	-0.06	0.06	0.04	-0.01	0.07	-0.23	0.06	0.19	-0.32
	Man. Change	0.05	-0.05	0.06	0.04	0.01	-0.01	-0.09	0.02	-0.05	0.08	0.10	-0.03	0.00	-0.12	0.07	-0.02	0.03
	Promotion	0.04	-0.07	0.02	0.23	-0.07	-0.02	-0.04	0.01	0.02	-0.02	0.02	0.01	-0.07	0.03	-0.08	-0.08	0.09
	Relegation	-0.06	0.04	-0.03	-0.03	-0.01	0.14	0.01	0.05	-0.01	-0.05	-0.07	0.13	-0.04	-0.02	-0.08	-0.06	0.12

Table 4: Correlation matrix

Table 4 displays correlations between the various variables used in the regression. Correlations above 0.5 are highlighted in red, yet we only omit the league position variable out of multicollinearity considerations.

		Buyer characteristics								Seller characteristics							
		Stadium cap.	Goal diff.	League pos.	Lower div.	Cont. comp.	Man. Change	Promotion	Relegation	Stadium cap.	Goal diff.	League pos.	Lower div.	Cont. comp.	Man. Change	Promotion	Relegation
Buyer char.	Stadium cap.	**1.00**															
	Goal diff.	0.37	**1.00**														
	League pos.	-0.30	-0.91	**1.00**													
	Lower div.	-0.32	0.15	-0.26	**1.00**												
	Cont. comp.	0.45	0.59	-0.52	-0.35	**1.00**											
	Man. Change	-0.01	-0.37	0.39	-0.29	-0.08	**1.00**										
	Promotion	-0.24	0.20	-0.36	0.70	-0.27	-0.32	**1.00**									
	Relegation	-0.11	-0.12	0.18	0.03	-0.12	0.08	-0.05	**1.00**								
Seller char.	Stadium cap.	0.19	0.10	-0.06	-0.09	0.20	-0.01	-0.14	-0.05	**1.00**							
	Goal diff.	0.28	0.20	-0.14	-0.12	0.26	0.04	-0.04	0.09	0.48	**1.00**						
	League pos.	-0.26	-0.17	0.09	0.14	-0.25	-0.06	0.06	-0.10	-0.43	-0.93	**1.00**					
	Lower div.	-0.04	-0.03	0.02	0.06	-0.01	-0.01	0.07	0.12	-0.21	0.07	-0.06	**1.00**				
	Cont. comp.	0.27	0.22	-0.15	-0.13	0.27	0.09	0.00	-0.05	0.41	0.68	-0.66	-0.21	**1.00**			
	Man. Change	-0.07	-0.08	0.07	-0.05	0.02	0.10	-0.08	-0.16	-0.09	-0.34	0.31	-0.04	-0.16	**1.00**		
	Promotion	-0.08	-0.07	0.09	-0.08	0.00	0.04	-0.05	0.21	-0.16	0.13	-0.21	0.66	-0.14	-0.11	**1.00**	
	Relegation	-0.06	-0.02	-0.04	-0.01	0.00	-0.09	0.01	-0.05	-0.09	-0.32	0.46	0.07	-0.27	0.05	-0.05	**1.00**

Table 4: Correlation matrix (continued)

Table 4 displays correlations between the various variables used in the regression. Correlations above 0.5 are highlighted in red, yet we only omit the league position variable out of multicollinearity considerations.

Appendix 3: Remaining regression results

Analysis	*Univariate*			*Multivariate*			*Multiv Ex injuries*		
	N=279			N = 192, adj R^2 = 0.51			N = 279, adj R^2 = 0.43		
	C	P	R^2	C	P	F	C	P	F
Direct measures of talent/human capital									
Goals scored	0.062	0.000	0.098	0.041	0.179	0.000	0.018	0.447	0.003
Goal rate	0.000	0.066	0.012	0.000	0.951		0.000	0.755	
Games played	0.040	0.000	0.250	0.033	0.000		0.027	0.000	
Injuries	0.001	0.957	0.000	0.004	0.776		NA	NA	
Indirect measures of talent/human capital									
Age	-0.077	0.000	0.075	0.485	0.006	0.000	0.307	0.035	0.000
Age^2	-0.001	0.000	0.085	-0.011	0.001		-0.007	0.009	
International caps	0.651	0.000	0.064	0.009	0.958		0.262	0.059	
UK-nationality	-0.024	0.872	0.000	-0.094	0.584		-0.111	0.488	
Non-EU nationality	0.052	0.752	0.000	-0.186	0.259		-0.146	0.319	
Domestic transfer	0.068	0.620	0.001	0.499	0.002		0.443	0.002	
Player function									
Goalkeeper	-0.518	0.080	0.011	0.074	0.850	0.926	0.010	0.975	0.973
Defender	0.010	0.946	0.000	-1.441	0.778		-1.570	0.722	
Attack	0.079	0.622	0.001	-3.534	0.423		-1.551	0.688	
Goals*Defender	0.121	0.044	0.015	-0.005	0.944		0.004	0.954	
Goals*Attack dummy	0.041	0.001	0.042	-0.001	0.984		0.016	0.523	
Central position	0.076	0.220	0.001	0.103	0.557		0.110	0.442	
Versatility	0.095	0.624	0.002	-0.015	0.911		-0.071	0.536	
Player height	0.650	0.534	0.001	-0.614	0.735		-0.846	0.589	
Player height*Defend	0.007	0.927	0.000	0.840	0.762		0.883	0.714	
Player height*Attack	0.047	0.594	0.001	1.805	0.460		0.708	0.740	
Buying club size									
Stadium capacity	0.000	0.000	0.141	0.000	0.131	0.074	0.000	0.004	0.001
Cont club competition	0.725	0.000	0.089	0.287	0.114		0.357	0.034	
Buying club performance									
Goal difference	0.007	0.018	0.020	0.000	0.990	0.736	-0.002	0.649	0.318
Promotion	-0.321	0.113	0.009	-0.201	0.422		-0.019	0.927	
Relegation	-1.230	0.009	0.024	-0.538	0.244		-0.808	0.041	
Managerial change	-0.076	0.583	0.001	-0.025	0.858		0.046	0.710	
Selling club size									
Stadium capacity	0.000	0.015	0.021	0.000	0.749	0.779	0.000	0.316	0.366
Cont club competition	0.396	0.005	0.028	-0.117	0.522		0.124	0.428	
Selling club performance previous season									
Goal difference	0.006	0.040	0.015	0.004	0.345	0.090	0.000	0.917	0.564
Promotion	-0.869	0.013	0.022	-0.873	0.056		-0.449	0.147	
Relegation	-0.088	0.729	0.000	-0.351	0.112		-0.138	0.515	
Managerial change	0.056	0.685	0.001	-0.159	0.251		-0.099	0.416	

Table 5: Regression results summer sample (continued)

This table reports coefficient estimates (denoted by 'C'), individual p-values ('P') and F-test p-values ('F') for groups of proxies (determinants) for our sample of all summer transfers. We report univariate results, (including R^2) and report multivariate results in- and excluding injuries (all samples explicitly *include* free transfers).

Analysis	*Univariate*			*Multivar Ex injuries*		
	N=47			N = 47, adj R^2 = 0.38		
	C	P	R^2	C	P	F
Direct measures of talent/human capital						
Goals scored	0.155	0.003	0.179	-0.062	0.624	0.793
Goal rate	0.000	0.130	0.050	0.000	0.896	
Games played	0.065	0.000	0.262	0.036	0.373	
Injuries	0.233	0.001	0.295	NA	NA	
Indirect measures of talent/human capital						
Age	0.025	0.571	0.007	1.619	0.246	0.923
Age^2	0.000	0.666	0.004	-0.030	0.253	
International caps	0.680	0.048	0.084	0.393	0.517	
UK-nationality	-0.257	0.437	0.013	-0.266	0.680	
Non-EU nationality	0.397	0.387	0.017	-0.271	0.683	
Domestic transfer	-0.070	0.837	0.001	0.169	0.790	
Player function						
Goalkeeper	0.688	0.395	0.016	1.812	0.349	0.811
Defender	-0.723	0.030	0.101	-21.745	0.439	
Attack	0.319	0.394	0.016	-16.982	0.466	
Goals*Defender dummy	-0.090	0.733	0.003	-0.200	0.712	
Goals*Attack dummy	0.172	0.008	0.145	0.055	0.769	
Central position	0.280	0.456	0.012	0.454	0.549	
Versatility	-0.055	0.873	0.001	-0.263	0.645	
Player height	-5.835	0.017	0.120	-13.203	0.274	
Player height*Defend	-0.394	0.031	0.100	11.976	0.442	
Player height*Attack	0.150	0.469	0.012	9.530	0.463	
Buying club size						
Stadium capacity	0.000	0.000	0.330	0.000	0.132	0.187
Cont club competition	1.028	0.001	0.209	-0.345	0.571	
Buying club performance						
Goal difference	0.005	0.705	0.003	-0.012	0.693	0.515
Promotion	-1.519	0.020	0.115	-0.385	0.715	
Relegation	-0.735	0.207	0.035	-1.237	0.200	
Managerial change	0.416	0.202	0.036	-0.061	0.907	
Selling club size						
Stadium capacity	0.000	0.241	0.030	0.000	0.457	0.749
Cont club competition	0.715	0.038	0.093	-0.081	0.881	
Selling club performance previous season						
Goal difference	-0.001	0.948	0.000	0.025	0.313	0.437
Promotion	-0.359	0.541	0.008	0.189	0.862	
Relegation	-0.655	0.214	0.034	-0.358	0.716	
Managerial change	0.407	0.211	0.035	0.752	0.142	

Table 6: Regression results winter sample

This table reports coefficient estimates (denoted by 'C'), individual p-values ('P') and F-test p-values ('F') for groups of proxies (determinants) for our sample of all winter transfers. We report univariate results, (including R^2) and report multivariate results in a model excluding injuries (the model including injuries did not have a sufficient number of observations (all samples explicitly *exclude* free transfers, results for samples including free transfers are reported below).

Analysis	*Univariate*			*Multivariate*			*Multiv Ex injuries*		
	N=61			N = 42, adj R^2 = 0,76			N = 61, adj R^2 = 0.49		
	C	P	R^2	C	P	F	C	P	F
Direct measures of talent/human capital									
Goals scored	0.147	0.002	0.152	0.137	0.583	0.005	-0.131	0.075	0.050
Goal rate	0.000	0.055	0.061	-0.001	0.034		0.000	0.155	
Games played	0.060	0.000	0.256	0.102	0.001		0.049	0.009	
Injuries	0.112	0.041	0.098	-0.038	0.467				
Indirect measures of talent/human capital									
Age	-0.027	0.450	0.010	-0.257	0.748	0.092	0.756	0.226	0.111
Age^2	-0.001	0.357	0.014	0.002	0.889		-0.015	0.183	
International caps	0.646	0.023	0.085	-0.358	0.536		0.202	0.612	
UK-nationality	-0.031	0.914	0.000	0.169	0.728		-0.099	0.826	
Non-EU nationality	0.318	0.417	0.011	0.454	0.260		0.219	0.600	
Domestic transfer	0.173	0.540	0.006	0.416	0.464		0.364	0.354	
Player function									
Goalkeeper	-0.157	0.757	0.002	0.029	0.975	0.186	-0.380	0.636	0.490
Defender	-0.504	0.082	0.051	-37.686	0.072		-6.963	0.565	
Attack	0.388	0.239	0.023	-11.412	0.288		-0.553	0.959	
Goals*Defender	0.059	0.812	0.001	-0.481	0.288		0.211	0.534	
Goals*Attack dummy	0.189	0.002	0.149	-0.274	0.327		0.088	0.498	
Central position	0.178	0.582	0.005	0.015	0.985		0.368	0.395	
Versatility	0.022	0.939	0.000	-0.179	0.734		-0.054	0.866	
Player height	-5.425	0.007	0.121	-11.225	0.028		-3.848	0.316	
Player height*Defend	-0.261	0.106	0.044	20.724	0.071		3.656	0.582	
Player height*Attack	0.183	0.319	0.017	6.823	0.255		0.320	0.956	
Buying club size									
Stadium capacity	0.000	0.000	0.276	0.000	0.001	0.005	0.000	0.006	0.021
Cont club competition	0.894	0.001	0.162	-0.387	0.483		0.028	0.940	
Buying club performance									
Goal difference	0.012	0.333	0.016	0.007	0.747	0.170	-0.001	0.956	0.175
Promotion	-1.230	0.053	0.062	-2.660	0.030		-1.198	0.108	
Relegation	-0.624	0.179	0.030	-0.615	0.368		-0.436	0.380	
Managerial change	0.290	0.297	0.018	0.582	0.194		0.431	0.171	
Selling club size									
Stadium capacity	0.000	0.096	0.046	0.000	0.815	0.971	0.000	0.151	0.336
Cont club competition	0.436	0.134	0.038	-0.013	0.975		-0.073	0.848	
Selling club performance previous season									
Goal difference	0.000	0.995	0.000	0.027	0.096	0.395	0.016	0.323	0.331
Promotion	-0.081	0.885	0.000	-0.083	0.935		-0.049	0.938	
Relegation	-0.605	0.139	0.037	-0.143	0.897		-0.665	0.294	
Managerial change	0.249	0.370	0.014	0.317	0.387		0.237	0.496	

Table 7: Regression results winter sample (continued)

This table reports coefficient estimates (denoted by 'C'), individual p-values ('P') and F-test p-values ('F') for groups of proxies (determinants) for our sample of all winter transfers. We report univariate results, (including R^2) and report multivariate results in- and excluding injuries (all samples explicitly *include* free transfers).

Analysis	*Multivariate*		*Excluding ft*		*Excluding injuries*		*Ex injuries & ft*	
	N=43, adj R^2=0.66		N=33, adj R^2=0.62		N = 47, adj R^2=0.43		N = 218, adj R^2=0.44	
	C	P	C	P	C	P	C	P
Direct measures of talent/human capital								
Goals scored	0.044	0.379	0.057	0.366	-0.001	0.982	0.047	0.417
Goal rate	0.000	0.222	0.000	0.257	0.000	0.430	0.000	0.722
Games played previous season	0.069	0.000	0.053	0.070	0.039	0.024	0.036	0.116
Injuries	0.067	0.070	0.074	0.301	NA	NA	NA	NA
Indirect measures of talent/human capital								
Age	0.023	0.961	-0.029	0.972	0.785	0.061	0.825	0.160
Age^2	-0.002	0.812	-0.001	0.931	-0.015	0.048	-0.016	0.158
International caps	-0.215	0.456	-0.526	0.309	0.253	0.367	0.324	0.406
UK-nationality	0.240	0.498	0.041	0.931	0.009	0.980	-0.084	0.835
Non-EU nationality	0.089	0.772	0.439	0.342	-0.009	0.977	-0.085	0.830
Domestic transfer	-0.209	0.505	-0.057	0.899	0.159	0.582	-0.091	0.810
Buying club size								
Stadium capacity	0.000	0.004	0.000	0.017	0.000	0.005	0.000	0.012
Continental club competition	0.449	0.070	0.658	0.096	0.434	0.094	0.400	0.214

Table 8: Specialized model (winter sample)

This table displays the fee equation for a model excluding redundant determinants (and hence proxies), based on the F-test analyses. We do not bother to base this reduced model on F-tests in the winter sample, as sample size issues influence the reliability of these tests for the winter sample. Instead, we offer the same specification of the specialized sample for comparison. Coefficient estimates ('C') and individual p-values ('P') are reported for all our samples (excluding either or both free transfers ('ft') and injuries, as well as a sample including both).