UNIVERSITÀ POLITECNICA DELLE MARCHE
FACOLTÀ DI ECONOMIA "GIORGIO FUÀ "

Corso di Laurea Triennale in Economia e Commercio

The Economics of Football: an Empirical Analysis on Serie A data

Relatore:
Lucchetti Riccardo

Rapporto finale di:
Fiori Tommaso

Anno Accademico 2020/2021

Contents

List of Figures

List of Tables

Foreword

Football market expenditure is growing each year. This work aims to analyze its evolution during these years and, since players represent the major economic asset for football clubs, to give the reader an idea of which factors clubs take into consideration to determine the market value of their players.

Regarding the problem of economic evaluation of football players, this paper focuses on market values, which are estimates of transfer fees, the actual prices paid on the market.

In Chapter 1, a brief description of Serie A both from an historical and an economic perspective are presented, giving the reader note on the growth and the crisis of the Italian major league compared with the European ones.

In Chapter 2, football transfer evolution is analyzed both from a general point of view and from its evolution as a result of the regulation introductions by supervisory bodies (UEFA and FIFA). Especially, the text shows how the introduction of the FFPR, the Homegrown Player Rule, the 6+5 Rule and the Bosman Ruling have influenced clubs' decisions on football transfers.

In Chapter 3, the "Wisdom of Crowds" phenomenon is presented, which has already been largely studied by the literature, and its relation with football market, for which the site Transfermark provides a renowned application. The section 3.3 of Chapter 3, shows what Transfermarkt and La Gazzetta dello Sport data have been collected to provide reliable estimates of transfer fees.

Finally, Chapters 4, 5, 6 show the empirical analysis made on market values controlling through the variables presented in section 3.3.

Chapter 1

Serie A: a brief journey through a glorious league

Serie A is the highest professional level of the Italian football league system and has a very long history, it was founded in 1898 by the FIGC (Federazione Italiana Giuoco Calcio) while it has been organized with its actual structure - a round-robin tournament - since 1929. Serie A has experienced glorious moments throughout its history, that put it among the top five European leagues.

The 1930s were the first years when the Serie A became known at European level, during this period Juventus FC had won for the first time five titles, ushering the first chiampionship winning streak. Thirties were also the period of the first World Cup title of Italian National Team, achieved in 1934 and repeated in the next edition of 1938.

The 40's decade were marked by the "Grande Torino" period ended up tragically with Superga's tragedy, which faded old hierarchies and started the modern age of Italian football, dominated by the big threes (Juventus, Inter and Milan).

Albeit Serie A had a huge growth until the 1950s, it had become more renowned since the 1960s when Nereo Rocco led Milan to the UEFA Campions League's victory and became the first Italian team to win that title. Still in the 1960s Helenio Herrera, called "Il Mago", made Inter win two UEFA Champions League and started "Grande Inter" epic, Omar Sivori was the first Serie A player to win FIFA Golden Ball, the most prestigious individual award for football players, and the Italian National football team, captained by Giacinto Facchetti, won his only European Championship.

Certainly, the most memorable decade of Serie A was the 1990 that started with the World Cup held in Italy which brought a lot of passion and enthusiasm. During the 90s seven teams called "Sette Sorelle" (Seven

Sisters) - Juventus, Inter, Milan, Roma, Lazio, Fiorentina and Parma - were contending the title and winning the highest competitions at European level, Ronaldo, Matthaus, Zidane, Weah, Baggio and Van Basten were winning the FIFA Golden Ball while playing with Italian teams and Italy was the land of football.

This state of grace of the Serie A started to fall with the corruption scandal called "Calciopoli" uncovered in 2006, which involved many team managers and referees and led Juventus to relegation. Although the Italian National team won the FIFA World Cup in 2006 and Milan won the UEFA Champions League in the following year, Serie A began to be more dimly viewed by the national and foreign public opinion.

Since the 1990s, as analyzed by Boeri and Severgnini[1], Italian teams have lost their ability in attracting top players from other leagues compared with the top European leagues, have less international competitiveness due to fewer financial resources and have registered a steady growth of debts causing solvency problems. Moreover, many clubs have suffered chronic losses and corruption scandals which led UEFA to introduce Financial Fair Play Regulation, which will be discussed in section 2.1, in 2010 in order to reduce bankruptcy risk.

Many clubs didn't manage to take advantage of the opportunity deriving from pay-tv broadcast rights which would have brought many economic resources, thus we have witnessed the failure of many football clubs. Di Domizio, Caruso and Frick[2] highlighted how between 2003 and 2020 127 clubs, one from Serie A, 11 from Serie B and 115 from Serie C couldn't afford to enrol themselves to their respective leagues.

Nowadays, as reported by AREL,[3] Italian football club owners cannot afford to adopt overspending transfer policies. In 2016, the aggregated turnover of the European top divisions reached €18.5 billion—an increase of 9.5% compared to 2015—while total costs amounted to €18.7 million, 61.5% of which was due to employment costs. The introduction of the Financial Fair Play regulation attenuated the economic imbalance of European football with a remarkable reduction of aggregate loss, which passed from €1.7 billion in 2011 to 0.3 billion in 2016. Moreover, the asset profile has also strongly improved, with equity increasing from €3.3 billion in 2011 to €6.7 billion in 2016. Italian football is growing at a slower pace than its European counterparts. In terms of average club revenues among the big five, Italy ranked 4th

[1]Boeri and Severgnini (2014)
[2]Caruso et al. (2020)
[3]Arel et al. (2018)

(€100.2 million), after England (€244.4 million), Germany (€149.6 million), and Spain (€126.3 million) and ahead of France (€74.2 million).

In a recent scientific publication[4] UEFA has estimated that between 2009 and 2018 in Europe transfer expenditures had grown by €5 billion - from €3 to €8 billion - with a significant increase of net capital gains of around €3.5 billion.

In particular, as reported by the last report of FIGC[5], Serie A registered a huge increase in net capital gains, as these passed from €443,2 million in 2013/14 season to €713 in 2018/19 season. Furthermore, 60% of the €712 million from net capital gains were realized by the top seven teams in the league while in the past this was a mid - low teams procedure.

Over the last few decades, elite professional football has become a global industry[6] and has increasingly played a key role in the entertainment industry, as we see from the growth of broadcast rights revenues. In this context, the crucial part of the clubs' worths are the players who represent high profile assets.[7].

In this development stage football clubs have faced changes in management structure and in their operating methods.[8] If we consider foreign football clubs, especially English ones, these changes are clear while Italian ones didn't manage to change their assets. The business performance of the Italian football clubs is mainly influenced by their incapacity to turn around a club's finances boosting match-day takings (the majority of them do not own the stadium) or from renting out VIP boxes at their grounds on match days. The majority of their finances come from broadcasting and sales of players (e.g. 24% in season 2016-2017).

[4]UEFA (2018)
[5]Arel et al. (2020)
[6]Kennedy and Kennedy (2012)
[7](Binder and Findlay, 2012)
[8]Smith and Stewart (2010)

Chapter 2

Football Transfers

The history of football transfers is very long, so it's difficult to find its birth date because documents are rare to be discovered. The first concept of transfer, as we know nowadays, is traceable to England when the FA (The Football Association) introduced player registration sometime after 1885, when football had been recognized as professional.[1]

Therefore, players had to be registered with a club in order to be able to play and they could not play for other teams in the same season while they could leave their teams at the end of the season to join other ones.

Since 1893, when the retain-and-transfer system was introduced, players had not been able to move to other clubs without the permission of the club they were registered with. This restriction was introduced to stop clubs tempting other clubs' players in order to avoid a self-reinforcing system which would have created an aristocracy of clubs inside the league.

Rottenberg,[2] presenting the first economic analysis of transfer restrictions in professional team sports in 1956, had demonstrated that labour-market restrictions preclude players from earning salaries equal to their marginal productivity.

In 1995, a major innovation, called "The Bosman Ruling" (discussed in section 2.2) was introduced with a European Commision sentence.

In 2002/03 season UEFA introduced transfer windows, i.e. players can be bought only in two periods: from the end of the season to 31st August and in the entire month of January.

When a club is interested in signing a player it usually makes an official enquiry to the club which has their target under contract. The enquiry has to be official, all forms of "tapping up" are forbidden in many professional leagues.

[1] FIFA (21 August 2014)

[2] Rottenberg (1956)

The parts involved in the negotiation are the two clubs - the seller and the buyer - and the football agent, who represents the player in his general interests. Football agents charge fees for their services, which usually are a percentage of their client's wage and sometimes a bonus from the tranfer fee.

The transfer fee is the price that a club pays a seller for the player. It is created as an agreed value between the decision values of the parties and results from negotiations. The same applies to a player's salary, which is the price for the manpower provided.

There are many variables involved in establishing the transfer fee, Verbon has shown that the optimal transfer fee rate is a positive function of player capability, a negative function of the relative size of the home country of the talents, and should moreover be relatively high when talents are in high demand.[3]

It's difficult to date back to the first trasferred player but we have records of the first player to be transferred for a fee of over £100: the Scottish striker Willie Groves, who was playing for West Bromwich Albion when he moved to Aston Villa in 1893.

Since 1983 transfer fees have been steady increasing - the new record for spending of €6.6 billion was recorded in 2019[4] - leading clubs to spend more than they earn in order to succeed. Overspending has undermined the clubs' long-term chances of survival, so UEFA introduced Financial Fair Play Regulations (FFPR) in 2010.

2.1 UEFA Financial Fair Play Regulations

In 2010, to protect the clubs' financial viability, UEFA issued its Financial Fair Play Regulation (FFPR).

The FFPR constitued an enhancement of the Club Licensing System[5] - which is a set of criteria to be fullfilled in order for clubs to be eligible to participate in UEFA club competitions - introduced in 2004-2005 with the aim to regulate the world of European football and create a more competitive and level playing field.

Furthemore, in order to reflect changes in the footbal environment the regulations of FFPR have been constantly updated (2012, 2015, 2018) but their purposes still remain the same. Their goals, as reported by 2018 UEFA

[3] Verbon (2007)

[4] Poli et al. (2019)

[5] Here the entire regulation: https://www.uefa.com/insideuefa/protecting-the-game/club-licensing/

Club Licensing and Financial Fair Play Regulations[6], are:

- to further promote and continuously improve the standard of all aspects of football in Europe and to give continued priority to the training and care of young players in every club;

- to ensure that clubs have an adequate level of management and organisation;

- to adapt clubs' sporting infrastructure to provide players, spectators and media representatives with suitable, well-equipped and safe facilities;

- to protect the integrity and smooth running of the UEFA club competitions;

- to allow the development of benchmarking for clubs in financial, sporting, legal, personnel, administrative and infrastructure-related criteria throughout Europe

FFPR provide that clubs must observe some economic and financial limits, such as break-even, given by the difference between relevant income and relevant expenses, liquidation of the last year before the license application, dearth of transfer debts, conformity to employee wage payments and economic - financial forecasts data sharing.[7]

Moreover, for all these parameters there are different thresholds, which are judged with acceptable deviation principle, for what the qualification is considered accepted even with a maximum aggregate loss less than a given threshold. FFPR is monitored by an external body of UEFA, the two-chamber Club Financial Control Body (CFCB).

The sanctions are declared by CFCB, and they go from fines, witholding and player transfer bans to disqualification from the European competitions.

FFPR have influenced sport and business's strategic interdependence in football as an 'event or action' that could instigate different priorities and different actions. Therefore, the decision between holding a player on the roster in order to bet on his performance and win prizes from competitions or selling him to make a capital gain are in contrast and FFPR have made clubs focus more on their financial sustainability.

[6]UEFA (2019)
[7]Morrow (2013)

According to Deloitte,[8] FFPR was welcomed as an opportunity to change the mind-sets of many clubs, in the hope that they would take a more balanced approach to running their businesses, thus it became reasonable that small clubs would tend to sell their players.

However, Carlsson-Wall, M. Kraus and K. Kraus,[9] based on data coming from the Swedish league, argue that the conflict between athletic and financial goals depends on league ranking. Hence, for the high ranked clubs there is close cause and effect relationship so both the decision can be made with no apparent efforts whereas for mid-low ranked clubs the conflict between the two decisions it's very tough.

Although FFPR have achieved great results[10] in in each and every one of the five years from its establishment - net debt to revenue plunging from 65% to 35%, clubs' incomes more than ever an increase €1600 million, net equity doubling - it has been severely criticised.

Madden[11] showed in his work that break-even requirement imposition never leads to a Pareto improvement. On the contrary, it creates Pareto inefficiencies.

Another major critique regards the loose of competitiveness in tournaments. In particular, Preuss et al[12] demonstrate by applying the Prisoner's Dilemma that clubs have strong incentives to bypass FFPR, which imposes additional costs both on clubs, as well as on UEFA, which must spend additional resources to detect deviant behavior.

Authors claim that FFPR might produce undesired or even adverse effects, i.e. rich clubs can sustain FFPR costs more easily than smaller one which is why leagues loose their level of competitivness.

Therefore, the third main critique is strictly connected with the one analyzed before as it argues that when the competitivness starts decreasing the FFPR effects would be to freeze the current set-up, making it difficult for small clubs to change the dominance of big ones.

To support this cause, Sass[13] shows that in the long run there is only one steady-state equilibrium, in which big clubs dominate small clubs and the competitive balance is maximally uneven, by providing a dynamic regression model.

However, counterarguments of main critiques have been presented and

[8]Deloitte (2014)

[9]Carlsson-Wall et al. (2016)

[10]Results are updated to 2017, when UEFA's president Aleksander Čeferin reported UEFA Financial Sustainability and Research data

[11]Madden et al. (2014)

[12]Preuss et al. (2014)

[13]Sass (2012)

the debate on FFPR still continue.

2.2 The Bosman Ruling

As we said in the previous chapter, over the last few decades professional football has completely changed since its birth date but players are still the major clubs assets. Football players' tranfers have been increasing for as long as globalization has been rising and football organizations have intervened to correct system's flaws, not always with good results.

If we want to draw a football market timeline, the Bosman ruling will definitely be a milestone.

The Bosman ruling[14] is a 1995 European Court of Justice decision concerning freedom of movement for workers, freedom of association, and direct effect of article 39[2] (now article 45 of the Treaty on the Functioning of the European Union) of the TEC (Treaty establishing the European Economic Community, also known as Treaty of Rome, 1957). In 1990 Jean-Marc Bosman was a 26 years old Royal Football Club Liegi's player who wanted to move to USL Dunkerque at the end of the season. In 1990 Bosman, who was at his final year of contract, was not allowed to move because Royal Football Club Liegi had found USL Dunkerque's transfer fee proposal too low. Nevertheless, USL Dunkerque had not increased its offer so Royal Football Club Liegi refused to release Bosman and reduced his wage by 70%.[15]

In the meantime, Bosman was banned by the Belgian federation for not signing Royal Football Club Liegi's cut-price contract so he decided to take his case to the European Court of Justice.

The European Court of Justice agreed with Bosman ruling that transfer fees after the expiration of a contract were an obstacle to the free movements of workers, as they are against the 39th article of the TEC, which set off free movement for workers.

Before the European Court of Justice's decision on the Bosman case, European clubs were considered the owners of players they had under contract. Hence, even after a contract expired players were not entitled to play for another club without permission of their former club and clubs were allowed to ask transfer fees for changing club.[16]

Since 1995, players have been able to move freely from one club to another when their contract expires and they can sign precontracts within six months prior to their current teams contracts' expiring date.

[14] club liégeois SA v Jean-Marc Bosman et al. (1993)
[15] Ask (2014)
[16] Verbon (2007)

In addition, the court established that the limit of foreign players signed with clubs must exclude European ones. In the 1995 the number of foreign players who were playing in Italy was 67, the next year it became 99, reached 128 in 2001 and had increased by 56.5% in 2015. In 2015, as reported by CIES (International Centre for Sports Studies), among the top ten cosmopolitan clubs six were Italians.

The Bosman ruling, which is an example of workers' migration control, is undoubtely a positive development in the football market because it has increased players' freedom in choosing their future clubs but it has intensified market instability and inequality. In fact, after the Bosman ruling small clubs and small leagues tried to hold on to players by offering them mid-long term contracts but in the end they have moved on to big ones.[17]

Small clubs have suffered since Bosman ruling because they can no longer hold on to their top players for the long term as they can wait their contracts' expiring date to freely move abroad. That's why small clubs in order to prevent themselves from losing their best players sell them very soon, weakening their rosters. Before 1995 many lesser known teams had won UEFA Champions League while these days this seems very unlikely to happen, as we witness the hegemony of a few European clubs.

2.3 More migration controls: Homegrown Player Rule and 6+5 Rule

Since the Bosman ruling, major clubs have been stockipiling top players from small clubs, which is why in order to stop this common practice UEFA introduced the "Homegrown Player Rule"[18] in the 2006-07 season.

The Homegrown Player Rule is migration control action, which provides that clubs can only enter a European competition if their roster of players contains at least a certain number of players who were trained by the club itself. UEFA's rule aims to encourage the local training of young players, and increase the openness and fairness of European competitions by restricting the demand for foreign players.

Since the 2008/09 season homegrown players required to play UEFA Champions League and UEFA Europa League are a minimum of eight homegrown players in a squad limited to 25. The definition of homegrown players, given by UEFA is:

[17] Feess and Muehlheusser (2003b)Feess and Muehlheusser (2003a)
[18] UEFA (2019)

> 'Homegrown' players as those who, regardless of their nationality, have been trained by their club or by another club in the same national association for at least three years between the age of 15 and 21. Up to half of the locally-trained players must be from the club itself, with the others being either from the club itself or from other clubs in the same association.

The action doesn't have any nationality conditions, because after the Bosman rulingsuch conditions have been illegal within UE borders. European Commission confirmed the "Homegrown Player Rule" to be legal in a statement in May 2008.

Following the "Homegrown Player Rule", FIFA[19](Fédération Internationale de Football Association) proposed to introduce the "6+5 Rule" during a meeting in 2008. The rule provided that every club must line up at least six players eligible to play for the national team of the country of the club while there is no restrictions for players under contract nor substitutes.

In January 2007 Joseph Blatter, the ex-president of FIFA, declared in a BBC interview to be strongly against the preeminence of foreign players in clubs.

However, in the same judgement of the "Homegrown Players Rule" the European Commision ruled the "6+5 Rule" illegal and discriminatory as it goes against the art. 39 CE which order the abolition of any discrimination shape based on worker's nationality, occupation, retribution and conditions.

[19]FIFA is a non-profit organization and the highest international governing body of association football

Chapter 3

The Football Market

3.1 Market value

Market values provide estimates of transfer fees, which are the actual prices paid on the market, and beside conceptual differences, as analyzed by Cachucho et al.[1] they are comparable. In fact, market values are very important in transfer negotiations because they are used by buying and selling clubs as information on a player's monetary value.

Furthemore, a player's market value has been defined as "an estimate of the amount of money a club would be willing to pay in order to make [an] athlete sign a contract, independent of an actual transaction" by Herm et al.[2] During trecent years, market values across all leagues have generally increased and they still are, the average player was worth €5.4 million in 2009/10 and €6.0 million by 2014/15, an 11 percent increase in only six years.

However, there are significant differences between positions, Richau et al.[3] highlighted that in 2019 among the 20 players with the highest market values are 14 forwards, 4 midfielders, 1 defender and 1 goalkeeper, which underlines considerable differences by position.

The steady inflation, equal to 25.8% for the last five years[4], of market values seems to confirm the Palomino and Sakovics[5] statement by which in an environment where different leagues compete for the top star players, it is in the interest of each and every league to provide its teams the incentives to bid a high price for the top talents compared to foreign teams because a

[1] He et al. (2015)
[2] Herm et al. (2014)
[3] Richau et al. (2019)
[4] Poli et al. (2019)
[5] Palomino and Sákovics (2003)

performance-based distribution of revenues provides such incentives.

3.2 Transfermarkt: market values estimated by the crowd wisdom

Market values are very important, as we said previously, in negotiations, thus clubs have been estimating them for long in order to get more information. Recently, with the growth of football fans' interest in market values web communities that provide estimates of players' market values have been increasing.

This phenomenon, called "crowdsourcing", finds its roots on what the so called "Wisdom of Crowds". The "Wisdom of Crowds" is a sociological theory which claims that crowds of non-experts give a better opinion than a single expert.

Its roots are very ancient as the first who wrote about it was Aristotle in "Politics" and many authors have applied it in different fields, from predicting sports event results[6] to judging movies (e.g. IMDb or Rotten Tomatoes).

The major website that provides estimates of players' market value is Transfermarkt. Transfermarkt is a German website launched in 2001 and since 2009 has been launching several versions for different countries. The market value assignment procedure it is very simple, once a user is registered in the website they can give their opinion on football transfers rumors, can follow discussion threads and submit their estimation of a player's market value and comment on it.

Transfermarkt encourages its users to propose and discuss the players' market value in order to give the best possible estimation. Once users give their opinion, the website aggregates the individual estimates to provide market values. Every two or three months Transfermarkt opens a valuation window when users are invited to give their estimates to revise the previous market values.

The evolution of this valuation over the course of a player's career is then depicted on the player's profile page, which also shows the player's current and former clubs, playing position, personal characteristics, and performance in terms of titles and cups.

However, the aggregation method, as highlighted by Herm et al.[7], does not seem very democratic as all user estimates do not have equal value but use a hierarchical approach.

[6] Trott (2006)

[7] Herm et al. (2014)

Moreover, the final market value is not calcutated as the mean or median of all individual estimates but some users, called by Herm et al. the "judges", have the final say. The judges' task is to review other users' estimates and select and weigh them when making their decisions, so they can decrease or increase the influence of users they consider to be less or more qualified. This valuation method is used to reduce lack of objectivity in users' estimations which will bias the result.

Transfertmarkt's market values are remarkable and considered by experts an excellent indicator of clubs' willingness to pay for an other club's player. Furthemore, they are used by many clubs and player agents as reference in player contract negotiations and they have been largely used by researchers in the sports economics or management literature.

3.3 Data collection

All the data I have collected are taken from Transfermarkt, except for salaries which are from La Gazzetta dello Sport. First of all, I had to choose which variables take into account and, due to the countless number of them, I chose to consider only three groups: the first one concerns only the individuals' football performances, the second one is related to the caractheristics of the individuals (such as age, height, etc...) while the last one is about the individuals' economic profile.

Regarding the first group of variables, I chose to consider only the perfomances realized in the following competitions:

- FIRST TIER LEAGUE: The highest level of football competition in every single country.
- NATIONAL TEAM: I used only the senior national teams' data because those for minor national teams aren't the same for all the players I considered.
- UEFA CHAMPIONS LEAGUE: The major European competition.
- UEFA EUROPA LEAGUE: The second highest European competition after the UEFA Europa League

For all these competitions I took into account six variables:

- NUMBER OF APPEARANCES
- MINUTES PLAYED: I reckon this variable could give a more accurate estimate of the appearances on the field

- GOALS: I used scored goals for outfield players
- GOALKEEPERS GOALS: I used conceed goals for goalkeepers
- ASSISTS
- YELLOW CARDS: The double yellow cards is counted as one red card
- RED CARDS
- INJURIES: Measured in days of injury because in different leagues they correspond to a different number of games

The second group contains all the variables related to the inviduals' characteristics. They are:

- AGE
- HEIGHT
- POSITION: I used only four 4 positions: goalkeepers, defenders, midfielders and forwards
- FOOT

The last one considers individuals' economic variables, which are:

- MARKET VALUE: As given by Transfermarkt. I took this into account for three different times and it gives a measure of the indiduals' skills on the pitch.
- SALARY
- EXPIRATION DATE OF THE CONTRACT

Chapter 4

Descriptive statistics

4.1 Market value

Transfermarkt provides estimates for players' market value every four months in order to balance market value with sports performance and to check its evolution during player's career. Analyzing market value at different times, we can see that it barely tends to change in the short term. In fact, the current market value tends to be similar to or slightly different from the one before.

Therefore, sport performance will unlikely modify market values in the short term and the longer the playing career, the more it will resist variations. Hence, the analysis is based not on perfomance increase but on the cumulative one, where early years will have a greater weight than later ones.

Summary Statistics, using the observations 1–507

Variable	Mean	Median	S.D.	Min	Max
Mkv1220	9,88	4,50	13,7	0,0500	90,0
Mkv0820	9,91	4,50	13,7	0,00	85,0
Mkv0619	9,97	4,50	14,3	0,00	100,

Looking at the table, which synthesizes market values of every Serie A player in three different moments (June 2019, August 2020 and December 2020), confirms what said previously. That is, findings a short time apart are similar.

4.2 Age

A player's age is one of the most influential variables for determining his market value[1]. Analyzing the frequency distribution shown in figure 4.1, it seems that players start to play at professional level at 17 years old while they retire between 39 and 40 years old.

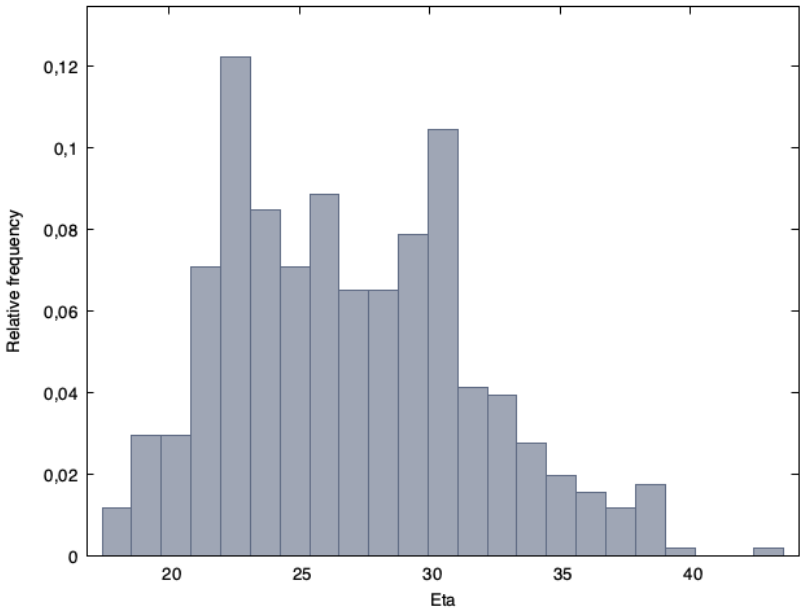


Figure 4.1: Frequency distribution of players' age

However, the majority of players are between 23 and 30 years old but there are significant differences between roles, as goalkeepers' mean age is 29 years old while outfield players' is 26 years old. Furthemore, goalkeepers tend to have longer careers, retiring around 41 and 42 years old, than outfield players who retire between 38 and 39 years old.

Thereupon, age is truly important for the club, such that Ante[2] claimed that in the summer transfer window of 2018/2019 season it was the only significant variable for every role, and it is strongly connected to contract decisions, e.g. younger players will have longer contracts in order to avoid losing them for free in their prime.

Thus, age is always studied in relation to the remaining period of the contract.

[1] He (2012)
[2] Ante (2019)

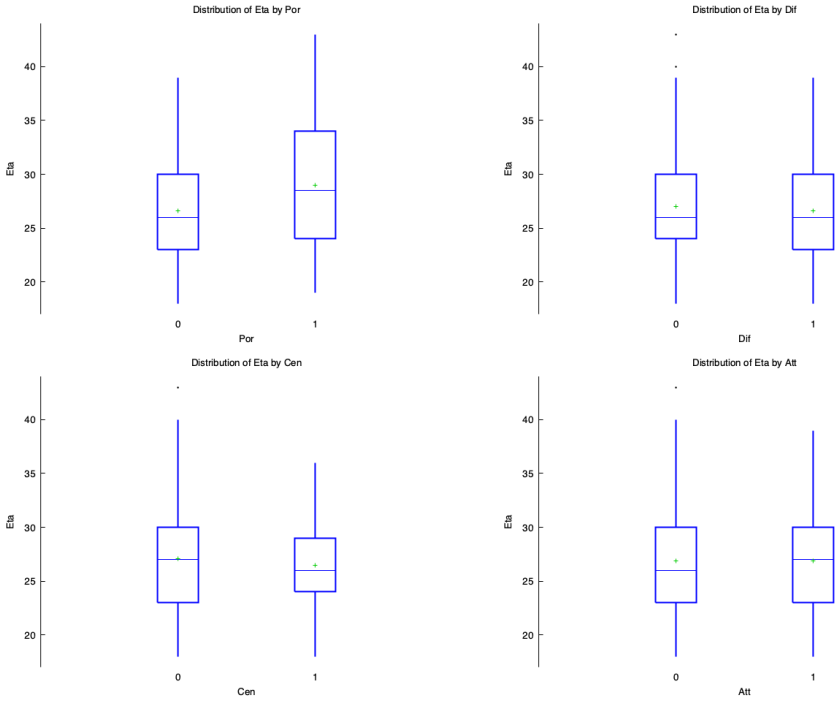


Figure 4.2: Factorized boxplot of age given role

4.3 Contract length

The contract between a club and its player is the only guarantee for it to ensure player's performance and his publicity rights. Once the contract expires, the club cannot claim anything else from the player and he is free to sign with any other club.

As analyzed by Football Benchmark[3], the contract length is a key factor in figuring out players' market value. Coupled with what was said in the previous section, it is not surprising that there is a relationship between a player's age and his contract length.

This relationship is shown in figure 4.3, which gives a measure of the correlation between a player's market value, his age and his contract length. Accordingly to the correlation matrix, between age and market value there is a negative correlation, because the older the player, the less will be his market value since he would probably have fewer year of career ahead and would be more exposed to injuries.

Moreover, the correlation between market value and contract length depends on the remaining years of contract. The correlation between market

[3]Benchmark (2020)

value and contracts close to expiration, which are the ones with one or two years of contract remaining, is negative while the one between market value and long contracts, which are the ones with more than two years remaining, is positive. Hence, the longer the contract, the higher will be the price a club needs to pay to buy the player while shorter ones mean that the owner club will accept lower offers to avoid losing the player without compensation.

Then, the correlation between age and contract length, as the one between market value and contract lengths, depends on the remaining years of contract. But now, the correlation between age and contracts close to expiration is positive while the one between age and long contracts is negative.

Again, this means that an older player will have a shorter contract while a younger one will have a longer contract. Consequently, to keep older players, clubs, will not offer long contracts but shorter ones because their performance and their market values are going to decrease. On the contrary, to ensure younger players clubs will not offer short contracts but longer ones in order to prevent them from becoming free agents and, as said before, to maintain their market value high

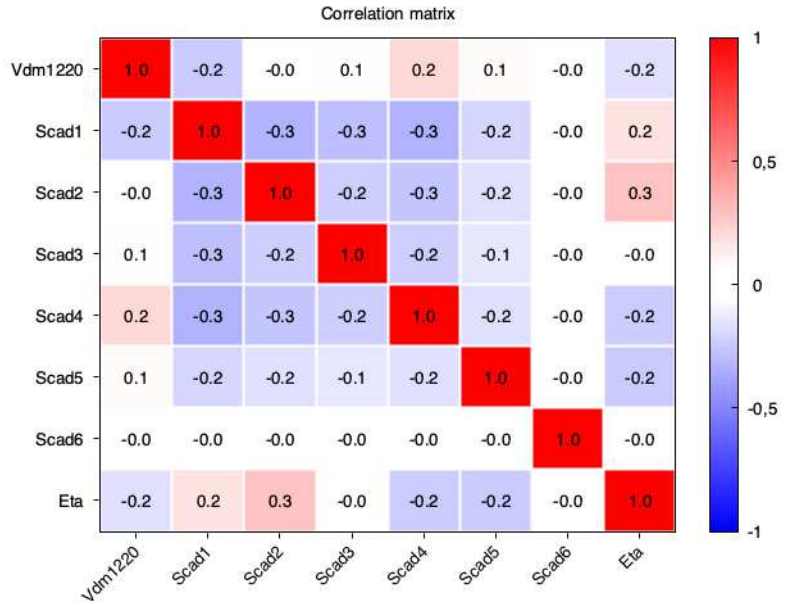


Figure 4.3: Correlation matrix between market value, expiration dates and age

4.4 Player's role

Regarding player's role, what the entire literature has already highlighted seems to be confirmed. In fact, factorized boxplot of market value against player's role shows that player's market value is different between positions.

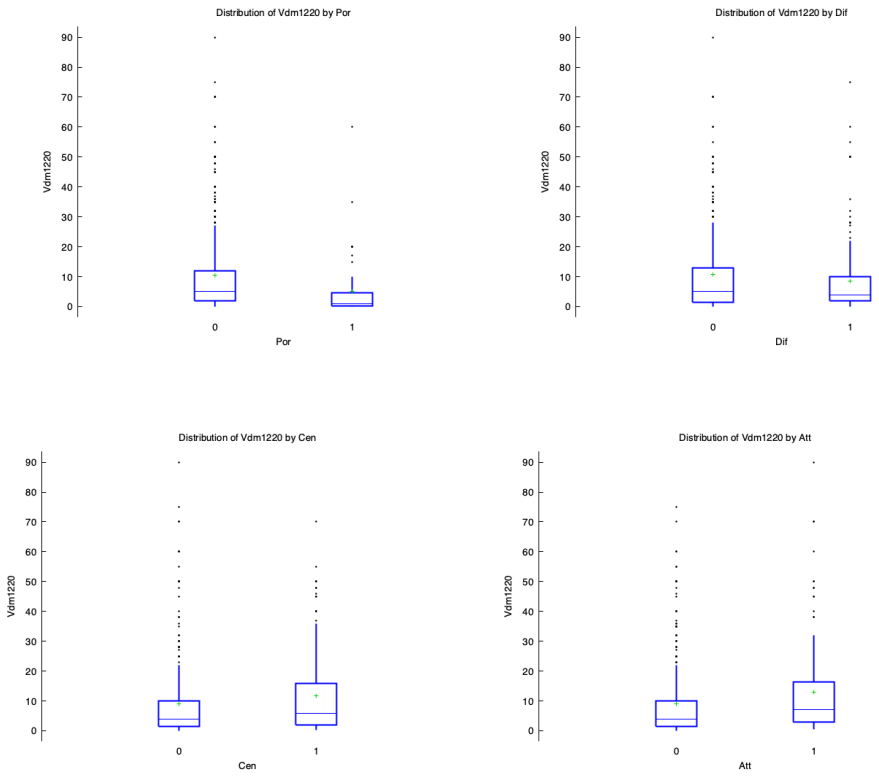


Figure 4.4: Factorized boxplot of market values against positions

Looking at figure 4.4, it stands out that forwards are the players with the highest market values while goalkeepers are the ones with the lowest market values. Market values seems to grow as the chance to score increases, so from low to high the order is goalkeepers, defenders, midfielders and forwards.

This result goes along with the rhetorical quote: "In football who scores, wins".

Chapter 5

Market value and salary analysis

It is reasonable to think that the football skills level of the i-th player, called s_i, are described by an amount of observable data, such as goals scored, assists, etc. Hence, the football skills level can be defined as a function like $s_i = g(x_i)$, which written extended $g(x_i)$ will be:

$$g(x_i) = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_k x_{ki} + e_i$$

Furthemore, market value v_i which, once again, gives an estimate of transfer fees, can be thought as a function of a player's football skills level and a term called e_i, where $e_i = v_i - \lambda s_i$ and is given by all the factors that describe the players's longevity. Hence, the skills level being equal, the higher the longevity, the higher will be the player's market value.

Then, market value functions as follows:

$$v_i = \lambda s_i + e_i$$

However, all the variables we take into account will never give us the same estimate made by the club, which has a more complete point of view knowing out-pitch values of the player, e.g. if he has a strong leadership or, on the contrary, if he is a rule breaker.

Starting with the assumption that clubs, knowing information that we cannot know, provide the best estimates for players' market value, the best summary will be players' wages, which are established by clubs based on their analysis. Therefore, wage will also be a function of an amount of variables analyzed by clubs, such as

$$w_i = \gamma s_i + u_i$$

Where

$$s_i = \frac{1}{\gamma} w_i - \frac{1}{\gamma} u_i$$

and u_i are all the information that only clubs own.

As a result of including wage function inside market value one and solving easy calculations, we arrive at:

$$v_i = \beta_0 w_i + \beta_1 e_i - \varepsilon_i$$

Where:

$$\beta_0 = \frac{\lambda}{\gamma} \quad \text{and} \quad \varepsilon_i = \frac{\lambda}{\gamma} u_i$$

The purpose of this text is to prove that clubs provide the best estimates for transfer fees, owning information that the public does not know. Therefore, the public in order to determine a player's market value will use a function of this form:

$$v_i = \beta_0 w_i + \beta_1 e_i + \beta_2 x_i - \varepsilon_i$$

Where x_i are all the public information for the i-th players that will alter a club's estimation.

Hence in Chapter 6, β_2 will be proved to be zero and so that the best estimates for transfer fees are given by the clubs.

Chapter 6

Discussion

The analysis is based on considering a player's market value as the dependent variable while the player's wage as the benchmark variable. First, I took into account only the expiring date of the contract, the player's age, his wage and the regularities, which are $reg = \frac{minutes\ played}{age-15}$ which give us the minutes played per season, since fifteen years old is the minimum age for playing at professional level. Then, I did an OLS regression on the player's market value adding the robust standard errors. The model presents an accurate R^2 and the variables are strongly significant.

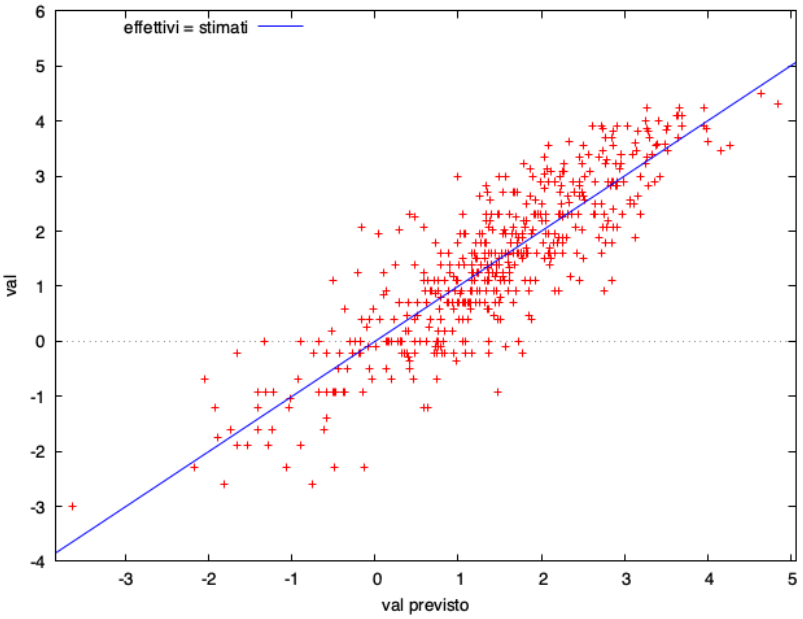


Figure 6.1: OLS graphic

n: 507 R^2 : 0.750352

Regarding the expirations, only the variable Scad6, which is a dummy variable for the players whose contracts expire by the end of the 2025/2026 season, appears to be significant while the other variables for expirations are not significant.

However, doing an omitted variable test on the variables for the expiring dates between the 2020/2021 and 2024/2025 seasons give a p-value of 0.00168 which will bring us to confirm that the expiration of the contract is significant for the market value. This result confirms the analysis made by CIES[1], which enlightens the correlation between the expiration of the contract and the player's market value.

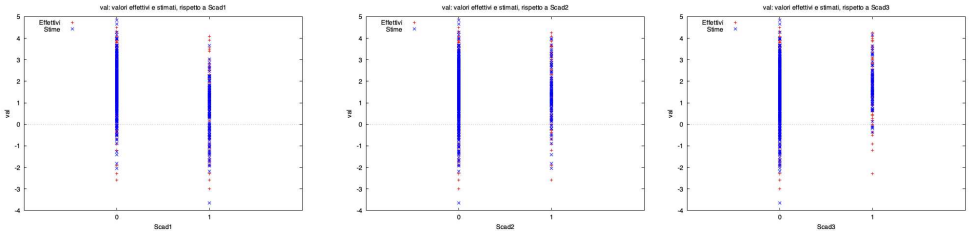
Omitted variable test on expiration variables

Null hypothesis: the regression parameters are zero for the variables Scad1, Scad2, Scad3, Scad4, Scad5 Test statistic: Robust F(5, 494) = 3,92611, p-value 0,00168347 Omitting variables improved 1 of 3 information criteria.

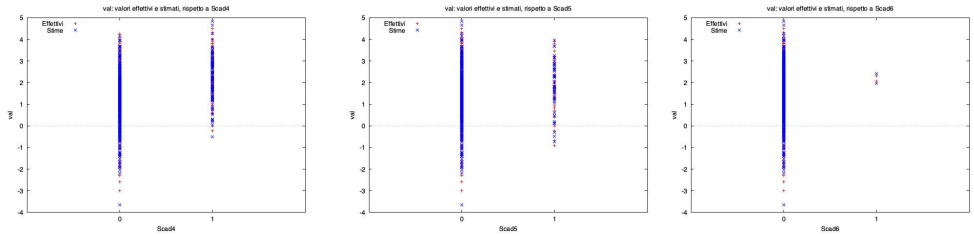
Furthemore, the effect of a contract close to expiration on a player's market value is negative, because clubs will obviously prefer to sign a free agent player with no fees rather than dealing with the former club and negotiate the fee to pay. Hence, clubs with players with contracts close to expiration will push them to renew or will accept lower proposals than the real market values in order to avoid losing them for nothing.

On the contrary, a longer contract means higher market value because clubs will offer their players long contracts to ensure their performance.

Figure 6.2: Real and estimated values, against expiration dates



[1]Poli et al. (2020)



Concerning age, it has a different trend between goalkeepers and outfield players although for both there is a non-linear relation with market value. Moreover, both for goalkeepers and for outfield players age is strongly significant. The highest market-value players seem to be the ones between 23 to 29 years old although there are some players outside this range. This may be due to the fact that players in that age range have already gained some experience and still have years ahead for playing. On the contrary, for the highest market-value goalkeepers there is not a very defined range as their careers last longer compared with outfield players. Hence, if a club wants to hire a player it will likely spend more if the player is between 23 and 29 years old.

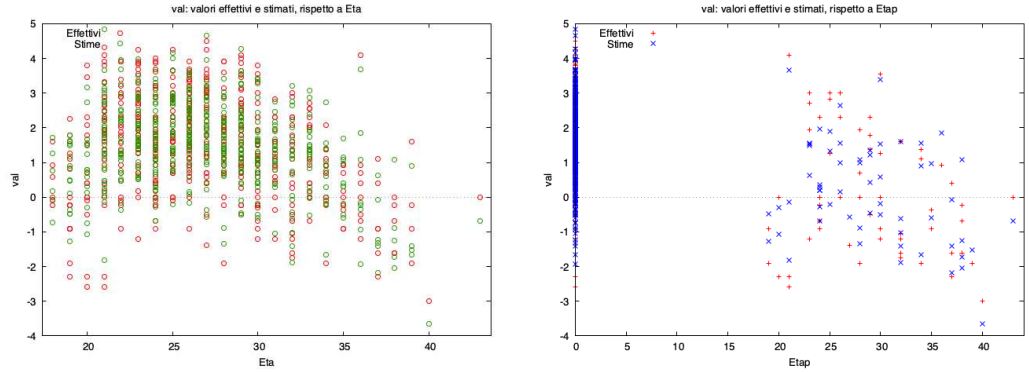


Figure 6.3: Real and estimated values, against outfield players' age and goal keepers' age

Another major result is that wage is strongly significant, as confirmed by Caruso et al. study[2], and its coefficient is very close to 1, which confirms the assumption made previously (see chapter 5) that wage provides the best estimate for the market value of the player since it is the evaluation made by his club, which has the best possible information for making the estimate. Thus, to establish a player's market value the club will rely on his wage.

[2]Caruso et al. (2016)

Therefore, as we can see by looking at fig. 6.4, a strong relationship exists between wage and market value.

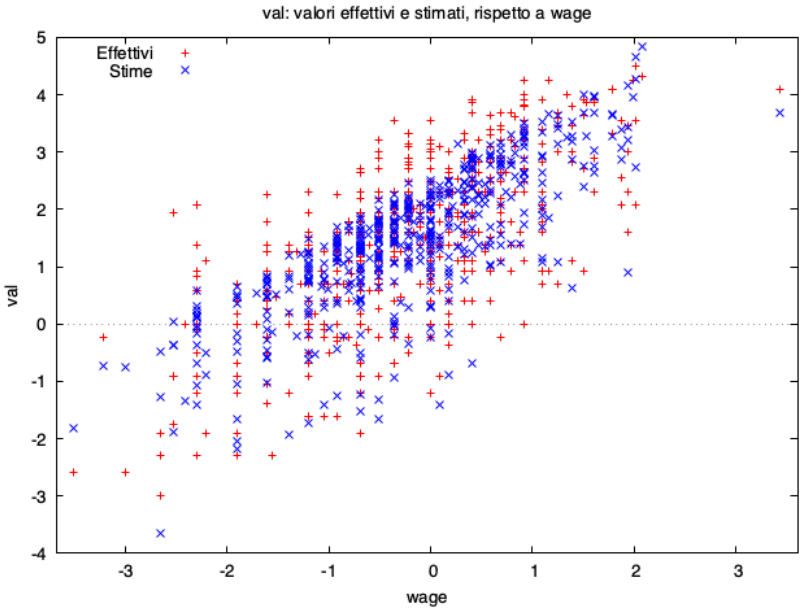


Figure 6.4: Relationship between wage and market value (in logs)

Analyzing this outcome from a different point of view, we can study the wage bill of every Serie A club and its relationship between the aggregate market value. Therefore, it should not be surprising that clubs with the highest wage bill are the ones with the highest team market value. Thus, clubs with the highest wage bill are also the ones who hire the most talented players (table 6.1), reaching and maintening high standards of competitiveness[3].

However, Hall et al.[4] argue that the causal link between sport success and economic means is not so clear because a successful club increases its revenues through different ways and all these extra-revenues are spent to adjust its wage bill and to hire more talented players. The authors claim that this process, called by Di Betta and Amenta[5] "self-reinforcing mechanism", creates and develops a clubs' aristocracy.

[3]Frick (2013)
[4]Hall et al. (2002)
[5]Di Betta et al. (2010)

Table 6.1: Clubs, aggregate market values and wage bill

Club	Number of Players	Aggregate Market Value	Wage bill
Juventus	24	689,60	123,24
Inter	24	606,90	79,800
Napoli	23	557,50	59,200
Milan	26	496,30	49,100
Roma	28	370,30	66,200
Atalanta	24	357,90	23,450
Lazio	26	353,20	41,500
Sassuolo	28	217,15	16,950
Fiorentina	24	198,00	26,750
Cagliari	22	165,15	23,550
Torino	24	145,90	24,880
Bologna	25	138,50	20,010
Hellas Verona	27	138,38	13,560
Udinese	25	130,45	14,090
Parma	25	112,80	17,440
Sampdoria	26	104,80	17,730
Genoa	24	77,350	18,840
Spezia	29	53,900	10,200
Benevento	26	48,500	15,170
Crotone	27	47,750	10,235

6.1 Results

Table 6.1 shows the results commented on in the previous section. Accordingly to what was already shown in Chapter 5, the variables available for the public seem not to be significant because they had already been considered by the club in determining player's wage.

The effect of variables available for the public is absorbed by the wage, which is determined by the club not only considering them but also considering private informations. Therefore, not being significant, public information can be excluded from the model, which brings to the results exhibited in table 6.1 and analyzed before.

Thus, that clubs provide best estimates for transfer fees is proven.

	Coefficient	Std. Error	t-ratio	p-value
const	−2.74913	1.16677	−2.356	0.0189
Scad1	−0.146368	0.296454	−0.4937	0.6217
Scad2	0.123382	0.301197	0.4096	0.6822
Scad3	0.125180	0.315350	0.3970	0.6916
Scad4	0.245637	0.301775	0.8140	0.4161
Scad5	0.135704	0.300833	0.4511	0.6521
Scad6	0.788816	0.383095	2.059	0.0400
Eta	0.461967	0.0867555	5.325	0.0000
Eta2	−0.0112891	0.00155759	−7.248	0.0000
Etap	−0.120033	0.0255203	−4.703	0.0000
Eta2p	0.00371034	0.000786324	4.719	0.0000
regolarita	0.000380797	8.35655e–05	4.557	0.0000
wage	0.862937	0.0561907	15.36	0.0000

Mean dependent var	1.440274	S.D. dependent var	1.424499
Sum squared resid	256.3324	S.E. of regression	0.720341
R^2	0.750352	Adjusted R^2	0.744287
$F(12, 494)$	141.7935	P-value(F)	2.2e–151

Table 6.2: Output table

Bibliography

Ante L. 2019. Determinants of transfers fees: Evidence from the five major european football leagues. Technical report, University of Hamburg, Faculty of Business, Economics and Social Sciences.

Arel, PricewaterhouseCoopers, FIGC. 2018. Report calcio. Technical report.

Arel, PricewaterhouseCoopers, FIGC. 2020. Report calcio. Technical report.

Ask M. 2014. Bosman still struggling with ruling that rewards soccer's free agents. *The Wall Street Journal* .

Benchmark KF. 2020.
URL `https://www.footballbenchmark.com/home`

Binder JJ, Findlay M. 2012. The effects of the bosman ruling on national and club teams in europe. *Journal of Sports Economic* **13**: 107–129.

Boeri T, Severgnini B. 2014. *The decline of professional football in Italy*. Edward Elgar Publishing.

Carlsson-Wall M, Kraus K, Messner M. 2016. Performance measurement systems and the enactment of different institutional logics: insights from a football organization. *Management Accounting Research* **32**: 45–61.

Caruso R, Di Domizio M, Frick B. 2020. Intelligenza collettiva e valore di mercato dei calciatori: il caso transfermarkt. *Rivista di Diritto ed Economia dello Sport* **XVI, Fasc. 2**.

Caruso R, Di Domizio M, Rossignoli D. 2016. Aggregate wages of players and performance in italian serie a. *MPRA Paper* .

club liégeois SA v Jean-Marc Bosman R, others, des associations européennes de football (UEFA) v Jean-Marc Bosman U (eds.). 1993. *Union royale belge des sociétés de football association ASBL v Jean-Marc Bosman*, C-415/93.

Deloitte. 2014. Annual review of football finance 2014 highlights. Technical report, Sports Business Group, http://www.deloitte.co.uk/ sportsbusinessgroupto access/download.

Di Betta P, Amenta C, et al. 2010. A die-hard aristocracy: competitive balance in italian soccer, 1929-2009. *Rivista di Diritto ed Economia dello Sport* **6**: 13–40.

Feess E, Muehlheusser G. 2003a. The impact of transfer fees on professional sports: An analysis of the new transfer system for european football. *Scandinavian Journal of Economics* **105**: 139–154.

Feess E, Muehlheusser G. 2003b. Transfer fee regulations in european football. *European Economic Review* **47**: 645–668.

FIFA. 21 August 2014.
URL `https://www.fifa.com/about-fifa/official-documents`

Frick B. 2013. Team wage bills and sporting performance: evidence from (major and minor) european football leagues. In *The econometrics of sport*. Edward Elgar Publishing.

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

He M, Cachucho R, Knobbe A. 2015. Football player's performance and market value. *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases* .

He Y. 2012. Predicting market value of soccer players using linear modeling techniques. *University of Berkeley (working paper)* .

Herm S, Callsen-Bracker HM, Kreis H. 2014. When the crowd evaluates soccer players' market values: Accuracy and evaluation attributes of an online community. *Sport Management Review* **17**: 484–492.

Kennedy P, Kennedy D. 2012. *Football Supporters and the Commercialisation of Football: Comparative Responses Across Europe*. Routledge.

Madden P, et al. 2014. *Does Break-Even Regulation of Soccer Clubs Make Sense?*, volume 1405. School of Social Sciences, University of Manchester.

Morrow S. 2013. Football club financial reporting: time for a new model? *Business and Management: An International Journal* **3**: 297–311.

Palomino F, Sákovics J. 2003. Inter-league competition for talent vs. competitive balance. *Edinburgh School of Economics Discussion Paper Series* **22**: 783–797.

Poli R, Ravenel L, Besson R. 2019. Financial analysis of the transfer market in the big-5 european leagues (2010-2019). Report 47, CIES Football Observatory.

Poli R, Ravenel L, Besson R. 2020. Scientific evaluation of the transfer value of football players. Report 53, CIES Football Observatory.

Preuss H, Haugen K, Schubert M. 2014. Uefa financial fair play: the curse of regulation. *European Journal of Sport Studies* .

Richau L, Follert F, Frenger M, Emrich E. 2019. Performance indicators in football: The importance of actual performance for the market value of football players. *Sciamus - Sport und Management* **10**: 41–67.

Rottenberg S. 1956. The baseball players' labor market. *Journal of Political Economy* **64**.

Sass M. 2012. Long-term competitive balance under uefa financial fair play regulations. *FEMM Working Papers* .

Smith AC, Stewart B. 2010. The special features of sport: A critical revisit. *Sport Management Review* **13**: 1–13.

Trott D. 2006. The wisdom of crowds - by james surowiecki. *The Economic Record* **82**: 365 – 366.

UEFA. 2018. Uefa club licensing and financial fair play regulations. Technical report, UEFA.

UEFA. 2019.
URL `https://www.uefa.com/insideuefa/protecting-the-game/protection-young-players/?referrer=%5C%2Fnews%5C%2Fnewsid%5C%3D943393`

Verbon HAA. 2007. Migrating football players, transfer fees and migration controls. *CESifo Working Paper Series* .