Serie A Player Contracts as Investments - Master Thesis -

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Abstract

This paper looks at Serie A player contracts as investments. The data concerns seasons 2010/11 up to 2019/20 for AC Milan, Juventus, Lazio, Napoli and Roma. A club pays an initial investment to acquire a player. Many factors drive the initial investment; age, nationality, where the player transfers from and the position. An investment is successful when the sum of income generated during the contract period and appreciation over time exceeds all contract-related costs. In terms of the Future Value (FV), which considers the time worth of money, the investments are successful on average. Only Napoli has not made successful investments, while the other four clubs have. Furthermore, there exist differences in average historical cost and wage per appearance or minute between both club and contracts.

Contents

1 Introduction

Serie A clubs spent almost 1.5 billion euros on transfer fees in 2019, the highest expenditure of all seasons (Statista, 2022b). In more recent years, 2020 and 2021, it was roughly 1 billion and 774 million euros. Thus, Serie A clubs pay enormous transfer fees to acquire players. The fee is compensation paid by the buying club to the selling club since the player moves from one club to the other (BBC, 2017). The movement is possible due to the transfer system, which balances the interests of the players and the competitiveness of the club (Szymanski, 2015). Thus, the system balances the needs of the player and the club. The transfer market is where these agreements are reached by negotiations, resulting in a new contract offered to the player. The contract specifies, for example, the transfer fee, wages and the length of the contract. To conclude, a transfer is possible due to the existence of the transfer system.

This paper considers players as investments. The goal of an investment is to generate income or appreciation over time (Investopedia, 2023). Of course, the investment comes with several costs. The investment costs are the sum of all costs made during the player's contract period. Two previously mentioned examples are the transfer fees and wages. The club makes all these expenditures to reach the twofold investment goal. The first is to generate income, e.g., receiving rent. The other purpose of the investment is appreciation which means that the value has increased over time (Investopedia, 2023). The club buys a player for a certain amount and can sell that player for the selling price. The increase in value is then the difference between the two. As explained, the sum of costs makes achieving the investment goal possible.

An initial investment is necessary to purchase a player (Malatji, Zhang, & Xia, 2013). For football players, this consists of two components. The first one is the transfer fee. Clubs pay a fee for players with a valid contract at their current club; players with an expired contract move for free. Furthermore, many other factors, such as the player's age, nationality and position, influence the fee. Frick (2007) states that there is much variation in players' transfer fees. The cost of 222 million euros for the transfer of Neymar from Barcelona to PSG in 2017 is still the most expensive one (Statista, 2023). On the other hand, Messi transferred for free to PSG (Transfermarkt, 2023a). These two examples confirm variation in practice. The second component of the initial investment is the agent fee. Sometimes an agent is involved in the negotiation phase and thus receives an agent fee (Bull & Faure, 2023). Therefore, the initial investment is the transfer and agent fee sum. Many factors may influence the initial investment. Therefore, the first research question is as follows:

RQ 1: What factors drive the initial investment of a football player for five clubs in the Serie A for the seasons 2010/11 to 2019/20?

The question shows the area and period of this research. First, the Serie A is chosen because of the existence of data because only Italian clubs provide data on individual players (Risaliti & Verona, 2012). An existing dataset contains the required data of AC Milan, Juventus, Lazio, and Roma. This data includes the seasons 2010/11 up to 2019/20. Therefore, this is the period used in this paper. Furthermore, I collected data for Napoli, resulting in a dataset concerning five clubs. Thus, this paper focuses on AC Milan, Juventus, Lazio, Napoli, and Roma for the seasons ranging from 2010/11 to 2019/20.

The first question explores the height of the initial investment, which is the amount paid to acquire a football player. However, other costs and incomes occur during the contract period. The player receives a yearly salary, another enormous cost for the club. For example, Juventus pays their players a total wage of 323 million in 2021 (Peeters, 2023a). There is much variation between the payrolls players receive. In season 2022/23, the average annual salary per player was highest for Juventus, 5.48 million euros, while players at Lecce only get an average of 0.12 million euros (Statista, 2022a). Besides the wage, there are multiple other costs concerned with the contract. Furthermore, the club can also receive money after acquiring the football player. An example is rent received because a player is rented to another club (Vrooman, 2007). Thus, each player comes with several costs but will also generate income. As discussed, the player is an investment, meaning that the players' expenses likely generate revenue and achieve appreciation over time. The investment is successful when the income and appreciation exceed the costs made for the player.

The evaluation of an investment happens after the contract period. At that point, there is clarity about all costs, income, and appreciation. The known values are necessary to determine whether an investment is successful. The Future Value (FV) shows the worth of the sum of cash flows at the end of the contract period (Naqvi & Naveed, 2015). A positive FV means that there are more monetary inflows than outflows. Thus, an investment is successful when the FV is a positive number. This leads to the second research question:

RQ 2: Are the investments in players successful in terms of the Future Value for five clubs in the Serie A for the seasons 2010/11 to 2019/20?

This question uses complete contracts that include all components of the FV. For these contracts, the selling price is known. The selling price is the largest source of income. On the contrary, the calculation of FV includes six costs. The two most significant contributors are the historical cost and wage. An average per appearance or minute is helpful to compare these costs among contracts. This results in four averages, useful for comparison among contracts. The third research question is as follows:

RQ 3: What is the average historical cost or wage per appearance of minute for a players' contract for five clubs in the Serie A for the seasons 2010/11 to 2019/20?

The academic relevance of this paper is that it is the first to research football players as investments. Each question examines a different aspect of the investment; the initial investment, the success, and the two most considerable costs. It adds to the existing research and gives a starting point for a new field of study in the players' labour market. Furthermore, the data comes from accounting resources and thus has high quality, making conclusions trustworthy and improving academic relevance. The data quality also adds to the literature since I created a new dataset using these reliable sources. Other literature can use this dataset which spares other authors much work since creating a dataset requires much effort. This paper also has immense societal relevance since it contributes to understanding players' labour market. This is relevant for both football clubs and policymakers. The clubs can create a better framework for buying players by looking at them as investments. Furthermore, policymakers can use the insights given in this paper to set better policies or improve existing ones. Thus, this paper adds in terms of academic and societal relevance.

The paper follows with a discussion of existing literature. After that, the data section explains the gathering process and shows descriptive statistics. Then, the methodology consists of three parts which lay the foundation to answer the three sub-questions. Afterwards, the results present answers to these three questions. At last, the conclusion wraps up the paper, and the discussion lists the limitations of this paper and mentions suggestions for further research.

2 Literature review

The employment of footballers starts at the end of the nineteenth century (Sloane, 1969). In 1885, payments to football players were recognised and legalised. This market evolved into a globalised marketplace (Zhang & Pitts, 2018). The market allows players to relocate from one club to another, called a transfer (BBC, 2017; Monteiro, Prates, & Frota, 2022). The transfer market facilitates the option to make a transfer deal between two clubs. Carmichael and Thomas (1993) state that this market has two goals. First, it enables clubs to acquire players to improve the club performance. Furthermore, players can enhance their sporting performance or explore better economic options. FIFA aims to improve the transfer market by imposing a Transfer Matching System (TMS), which simplifies and standardises the transfer processes (FIFA, 2023b). For example, FIFA determines two annual transfer windows (Szymanski, 2015).

Transfers occur during the transfer periods. A transfer is simply a business transaction between two clubs (Goal, 2023). Negotiations happen to come to agree on a deal (Phatak & Habib, 1996). These negotiations are a classic bargaining scenario since there are multiple mutually beneficial agreements where each club has a different preference, i.e. conflict of interest (Carmichael & Thomas, 1993). Contracts specify the outcome of the negotiations. It is crucial to know that contracts are Intangible Fixed Assets (IFA) in the financial statements of football clubs (Lombardi, 2023). An IFA is identifiable when it arises from contractual rights (IFRS, 2023). Amortisation over the useful life of these assets is required as stated in *FRS 10* (Amir & Livne, 2005). This refers to spreading out the costs over the useful life. In the case of contracts, the useful life is the length of the contract period. Each contract specifies the transfer fee. These fees are amortised (Geey, 2016). Furthermore, the contract specifies the player's wage (Buraimo, Simmons, & Szymanski, 2006). The salary is a recurring payment for the club since the player receives the compensation annually (MultiSafepay, 2023). In Serie A, wages account for 68% of the total costs. Therefore, the salary is the highest cost for a player (Baroncelli & Lago, 2006). Moreover, the player receives other payments as well. The contract specifies these extra payments and bonuses, which can be recurring or one-time.

An important topic of discussion is the transfer fee which is the fee involved with a transfer (Kirschstein & Liebscher, 2019). The transfer fee system sets guidelines and regulations regarding transfers and the corresponding fees (FIFA, 2023a). The system has experienced three transformations, namely pre-Bosman (until 1995), Bosman (1995 - 2001) and Monti (from 2001 onwards) (Feess & Mühlheußer, 2003). In the pre-Bosman system, clubs had to pay a fee for every player, including players with expired contracts. In 1995, the Bosman Case occurred at the European Court of Justice. The result was the Bosman system which meant that clubs did not need to pay a fee for players with an expired contract. This system sets regulations related to transfers (Szymanski, 2015). These regulations are still part of the Regulations on the Status and Transfer of Players (RSTP) (FIFA, 2022). Lastly, the Monti system adds rules for players with valid contracts, whereas Bosman only considers expired ones. Nowadays, clubs pay a transfer fee for players with a contract at a particular club and do not pay a fee for players with expired ones.

Many factors influence the height of the transfer fee since it is the approximation of the market value of that player (Carmichael & Thomas, 1993; Kirschstein & Liebscher, 2019). First, age has a significant impact as the fee increases up to the age of 26 and decreases after that, while the average age in the dataset is 23.32 for teams in the Premier League (Ruijg & van Ophem, 2015). Furthermore, Carmichael and Thomas (1993) stated that experience increases with age, but on the other side, the ability decreases after a certain point. Therefore,

they use a quadratic form of the age variable. Herm, Callsen-Bracker, and Kreis (2014) also found an age effect in the context of German football teams. Moreover, evidence exists for the age effect for attackers, midfielders and defenders but not for goalkeepers (Behravan & Razavi, 2021). Second, the position of the player impacts the transfer fee. Goalkeepers have a lower transfer fee than the players in the field for English teams (Ruijg & van Ophem, 2015). Other literature shows that attackers are associated with the highest transfer fees (Gerrard, 2001; Herm et al., 2014). Thus, the literature indicates that the position affects the height of the transfer fee. However, Campa (2022) found no difference between the four positions. That research created four dummies, one for each position. They also found evidence for a third factor influencing the transfer fee: it increased when a player transferred between two clubs within the same league. The reason is that the player is already familiar with the style of play and weakens the competitor's position by taking away a good player. Thus, the previous club has an effect. On the other hand, some players move from the club's youth academy to the first team. This movement is free (Poli, Besson, & Ravenel, 2021). Thus, youth has an impact on the height of the initial investment. Lastly, nationality is also an often-included player characteristic in literature (Müller, Simons, & Weinmann, 2017; Depken & Frei, 2023). For Spanish clubs, a player's value decreases when he has a foreign nationality (Garcia-del Barrio & Pujol, 2007). Brazilian clubs also value Brazilian players more than foreign players (Monteiro et al., 2022).

A transfer is beneficial for many parties. First, the selling club receives the transfer fee. Furthermore, a football agent sometimes plays a role in the transfer market (Bull & Faure, 2023). The agent is the representative of the player in terms of negotiations and has a goal to achieve the best possible deal. The agent receives a fee, an agent fee, for its services; thus, another party benefits from the transfer. The buying club pays this fee. Of course, the player benefits from the transfer as well. When a player transfers, he signs a contract at his new club.

Each payment or income happens at a specific moment, which is essential since the time value of money concept explains that the value of money changes over time (Lokken, 1986). Therefore, the time of the payment matters. Discounting converts future cash flows to obtain their present value. A method that discounts cash flows to the present is Net Present Value (NPV) (Jones & Smith, 1982). The NPV shows the worth of the money of all future cash flows in the present. This is a commonly used concept in many fields (Žižlavskỳ, 2014; Kahn & Nelling, 2010). However, this is not a widely researched topic in football. The opposite concept, Future Value (FV), does not show the value at the beginning of the contract period but at the end (Naqvi & Naveed, 2015).

The calculation of FV includes the cash flows, the number of periods, and a specified

discount rate (Gallo, 2014). Italian football clubs must publish financial statements and information on their players (Risaliti & Verona, 2012). Thus, data on the cash flow and contract period is available. Furthermore, the discount rate has to be specified (Prigge & Tegtmeier, 2019). The rate considers both the time value of money and the risk of anticipated future cash flows (Solntsev, 2014). Therefore, it differs depending on context, time and kind of assets (Caplin & Leahy, 2004; Cochrane, 2011). The rate for European football ranges between 2.08% and 5.32% (Prigge & Tegtmeier, 2019). In this paper, the three Italian clubs formed a homogeneous group and obtained a higher rate than clubs from other countries. Solntsev (2014) presented an approach to calculate a discount rate for a specific football club, and they found a rate of 4.18% for Manchester United. However, limitations and lack of data make applying this approach to some clubs difficult.

3 Data

Multiple sources contain football-related data. This paper collects data from five football clubs. Most of the data comes directly from the financial reports of the football clubs. Auditors control this data to ensure everything is in line with the International Accounting Standard (IAS), as is confirmed by Deloitte for Juventus (Juventus, 2022). Thus, this paper makes a significant contribution by using high-quality data, making the conclusions convincing.

Compared to this data, other sources provide data, such as websites, datasets found on the internet and independent data providers. These sources come with a few problems. First, variation may exist between sources. This can happen since each source gathers its information differently. For example, some sources gather their information by handling the data manually, while others gather it more automatically. Furthermore, each source collects different measures. While one source may contain the number of goals, which is measurable, the other might focus on more subjective criteria, such as the player rating. Thus, there exist many reasons why variation between sources exists. The second problem concerns the quality of the data. The data is not factual, which threatens the quality. Thus, these problems show why these sources can pose a problem for data collection. These problems show the added value of gathering data directly from football clubs.

3.1 Data collection

The data's starting point is a dataset containing players' personal and financial information for the following four clubs: AC Milan, Juventus, Lazio and Roma (Peeters, 2023b). Personal

data includes name, club, year, nationality and birth date. Furthermore, each player has a unique ID number which is helpful for identification. For some players, the dataset stores the previous and next club with the date of transfer in *acquisition date*, $transfer\ from$, *sell date* and $transfer\ to$. Moreover, the dataset contains financial data stored in euros divided by 1,000. First, the transfer fee is the variable *historical cost*, and *historical agent* fee stores the agent fee. Besides, *wage* shows the annual wage for the player. Additionally, some clubs rent their players to or from another club. The amount of rent is stored in the variables *rent received* and *rent paid*. Extra payments and bonuses can be found in *extra acquisition* and *direct* $fees$ when it is part of a player's contract. Lastly, for some players, the *selling price* is known. This is the case when the contract's end is within the dataset.

The previously discussed dataset contains information on four clubs. Risaliti and Verona (2012) identified leading clubs as the five with the most qualifications for the Champions League. Therefore, the fifth club still needs to be added. Table A1 shows Inter has the most qualifications but lacks data. The second-best club is Napoli, therefore chosen as the fifth club. Thus, the clubs in this paper are AC Milan, Juventus, Lazio, Napoli, and Roma.

Data for Napoli is gathered and added to the dataset to obtain a complete dataset for the five clubs. First, personal information for the players is collected (Transfermarkt, 2023b). Then, the corresponding wages for all ten seasons are added (La Gazzetta dello Sport, 2023). After that, financial reports[1] of Napoli help collect some variables (Napoli, 2023). The historical cost is obtained from a table that stores the movements of players[2]. This table has multiple rows for some players, which refers to various transactions of a particular player. The sum shows the correct total monetary amount. The tables are unavailable for the seasons 2011/12, 2013/14 and 2018/19. The surrounding years help in accounting for the missing values. Also, the table provides information on the four variables that give information on previous and future clubs. This was unavailable for part of the players; thus, another source informed about the club history of the player (Transfermarkt, 2023b). Moreover, the selling price comes from a table about departing players[3]. Napoli has not published some data, resulting in unobserved values for the historical agent fee, rent received, rent paid, extra acquisition and direct fees.

For all five clubs, some extra variables are either added or created. First, four extra variables are included (Carrieri, Principe, & Raitano, 2018). The first one stores the age of a player in years. Moreover, a string variable contains the playing position for each player. Furthermore, *apps* counts the number of appearances, which is the number of matches

[1] Bilancio annuale

[2] Tabella di movimentazione dei diritti pluriennali alle prestazioni dei calciatori

[3] Cessioni

played. The last variable, *mins*, shows the number of minutes on the pitch. Then, some variables are created by converting string variables to dummies. The previously mentioned variable *position* stores the position as a string variable. Four variables show the position as a dummy, namely $attacker$, $midfielder$, $defender$ and $goalkeeper$. Furthermore, $Italian$ takes on value one if the player has Italian nationality, *nationality* has the value "Italian", and zero otherwise. Also, the two variables *previous club* and *youth* are generated using $transfer\ from$. The first one has a value of one if the player's previous club is an Italian club, and the latter when the player comes from the club's youth academy.

3.2 Description dataset

The dataset contains a variety of variables which includes 1,739 observations in total. Each observation is a player in a specific year. Thus, the data is on the individual-year level. Table 1 shows the number of observations per club. However, this does not explain much since this differs per player depending on the contract length. In total, there are 575 players. Some players have played at more than one club, as seen from table A2 and thus have multiple contracts within this dataset. Therefore, it is essential to look at the number of contracts instead of the number of players. The dataset contains 625 contracts, which differs from 104 to 139 per club, as shown in table 1.

Table 1: Number of observations and contracts

Club	Observations	Contracts
AC Milan	372	134
Juventus	363	113
Lazio	296	104
Napoli	410	135
Roma	298	139
Total	1,739	625

Table 2 shows the descriptive statistics on the individual-year level. As discussed, there are 1,739 observations in total. However, there are some missing values for specific observations. Therefore, the number of observations differs per variable. First, the table contains the descriptive statistics of the financial variables. The average historical cost is 8,138,420 euros, with a standard deviation of approximately 11 million euros. This variable ranges from zero to almost 116 million euros. A large standard deviation and range indicate variation between players. The table shows the same for many other variables. Furthermore, the mean of the agent fee is approximately 1 million euros. Clubs can also rent their players to another club

or rent players themselves from another club. The club's average rent received or paid is somewhat more than 1.5 million euros for both. The average wage for 1,330 observations is 1,813,000 euros. Two other variables, extra acquisition and direct fees, have relative means of 1,053,128 and 114,530 euros. Lastly, the selling price is known for 144 observations, and its average is roughly 12.4 million euros.

The table also shows descriptive statistics of other variables. Age shows that the average player in the dataset is 32.16 years old. The minimum tells that the youngest player is 20 while the oldest player is 46 years old. Furthermore, the average number of appearances in the first team is 16.05. The maximum is 38, which implies that at least one player in the dataset started all matches since each season in Serie A consists of 38 rounds. Besides, the average player has played 1,437 minutes. The maximum is the total minutes of 38 full matches and implies that there is at least one player that has played all minutes during the season. Additionally, the table shows a summary of a set of dummy variables. It shows that 41.2% is Italian and 58.8% have another nationality. Where the players come from is also known, 45% come from an Italian football club and 9.7% from the club's youth academy. Lastly, most players are midfielders (49.0%), followed by defenders (24.0%), attackers (17.5%) and goalkeepers (9.5%).

The descriptive statistics can differ among clubs, shown in table A3. An important note is that there is no data for certain variables for some clubs, resulting from no available information. These variables have zero observations and contain no mean, standard deviation, minimum and maximum. Furthermore, there exists variation between the clubs for certain variables. An example is the highest historical cost for Juventus, with approximately 13.6 million euros, whereas Napoli has a mean of 3.6 million euros.

Table 2: Descriptive statistics

Variable	Observations	Mean	Std. dev.	Min	Max
Financial					
Historical cost	1,373	8,138,420	11,239,780	0	115,822,000
Historical agent fee	298	1,057,785	1,909,867	0	15,861,000
Rent received	47	1,578,766	2,819,933	0	18,049,000
Rent paid	32	1,537,406	2,147,239	0	10,208,000
Wage	1,330	1,813,000	1,772,462	30,000	31,000,000
Extra acquisition	39	1,053,128	3,314,716	0	20,500,000
Direct fees	477	144,530	735,067	0	8,568,000
Selling price	144	12,351,930	16,115,630	0	101,961,000
Other					
Age	1,238	32.160	5.624	20	46
Apps	1,238	16.053	11.077	0	38
Mins	1,238	1,436.916	954.807	1	3,420
Italian	1,739	0.412	0.492	0	1
Previous club	1,428	0.450	0.498	0	1
Youth	1,428	0.097	0.296	0	1
Attacker	1,315	0.175	0.380	0	1
Midfielder	1,315	0.490	0.500	0	1
Defender	1,315	0.240	0.427	0	1
Goalkeeper	1,315	0.095	0.293	0	1

Note: All the financial variables are measured in euros.

4 Methods

4.1 Drivers of the initial investment

A football club pays an initial investment to acquire a player. This is the sum of the transfer fee, i.e. *historical cost*, and the potential agent fee. Table 2 shows that the historical cost ranges from zero to almost 116 million euros. Besides, the historical agent fee has a maximum of approximately 15.9 million euros with a minimum of zero. Thus, the initial investment has a variation of broadly 131.7 million euros. Many factors can influence this number. Section 2 discussed literature that found a relationship between several variables and the transfer fee. Thus, these variables are likely to influence the initial investment as well. Equation (1) measures the effect of several independent variables. The dependent variable is the natural logarithm of the initial investment, and i corresponds to a certain contract.

$$
\begin{aligned}
ln(initialinvestment)_i = &\alpha + \beta 1 * age_i + \beta 2 * age_i^2 + \beta 3 * Italian_i \\
&+ \beta 4 * previousclub_i + \beta 5 * youth_i \\
&+ \beta 6 * attacker_i + \beta 7 * midfielder_i + \beta 8 * defender_i \\
&+ \epsilon_{it}
\end{aligned} \tag{1}
$$

The regression includes independent variables which may impact the initial investment. The first two independent variables are age and age-squared. The quadratic term indicates that the relationship between the two variables is likely non-linear (Carmichael & Thomas, 1993). Another variable, *Italian*, is a dummy which takes on value one if the football player has an Italian nationality and is zero otherwise. Furthermore, the previous football club of a player may be of importance. *Previous club* measures this effect. Some players come from the youth academy of the club. Therefore, the regression includes a dummy variable *youth* that takes on value one for these players. Lastly, the position can influence the initial investment. There are four positions in football, namely *attacker*, *midfielder*, *defender* and *goalkeeper*. The equation includes three of them and omits the goalkeepers to be able to interpret the results. Furthermore, the regression also has time and club fixed effects in some model versions.

4.2 Future Value (FV)

This paper views player contracts as investments and wants to investigate whether they are successful. A contract's Future Value (FV) is essential for the evaluation. The contract specifies the duration and payments involved with the employment. First, the club pays a transfer fee to acquire the player. This fee is paid fully at the start of the contract. However, since the contract is an IFA, this transfer fee requires amortisation (Geey, 2016; Lombardi, 2023). Therefore, the club does not book the total cost at the start of the contract period. Instead, the club books part of the costs each year, the historical cost divided by the number of years stated in the contract. Sometimes, the contract is negotiated with the help of an agent (Bull & Faure, 2023). The buying club then pays an agent fee at the contract's start. This fee also requires amortisation which is relevant for booking this cost. Furthermore, the contract specifies which payments occur during the contract period. These are recurring, e.g. wage, or one-time payments. These payments all contribute to the total cost of the investment.

Contrary to the costs specified by the definition of investment, the player generates income during the contract period or appreciates over this period. For income, the same

holds as for payments; these can occur once or can be recurring. Appreciation of the player means that the value is higher at the end of the contract period than at the beginning. The difference between the buy and selling price shows the increase in value.

Thus, payments and income occur at the start, end or during the contract period. The dataset contains many financial variables. There is a clear link between these variables and previously explained terms. Figure 1 shows these variables on the timeline of a player contract. At time t, the club acquires the player, and his contract starts here. The first season, period 1, begins at time t and lasts until $t + 1$. For each player, the number of periods differs; therefore, the timeline shows period 1, period 2, and so forth. The last season, $T - t$, ranges from a year before the end of the period to the end of the period at time T. The club pays the *historical cost* and *historical agent fee* fully at the start. Furthermore, *cash outflow* and *inflow* are part of the contract. These can be recurring, a one-time payment or do not occur for a particular player at all. Lastly, at the end of a period, another club can buy the player for the *selling price*.

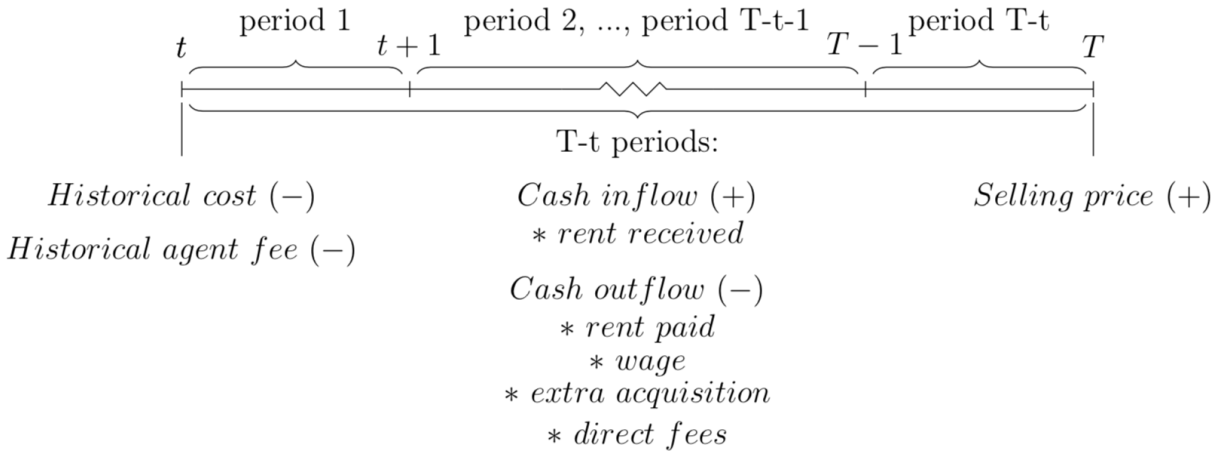


Figure 1: Timeline of a Player's Contract

The timeline shows that the payments and incomes happen at different times. Therefore, the Net Present Value (NPV) formula discounts cash flows. The NPV shows the worth of the sum of all transactions at the beginning of the contract period. A simple NPV formula is given in the equation (2) where n is the year and the discount rate is r (Gallo, 2014). The cash flow consists of incoming and outgoing cash (Ramli & Yekini, 2022). Equation (2) can be adjusted to show the distinction between the two flows. Equation (3) shows the modified version.

$$\text{NPV} = \sum \frac{\text{Year n Total Cash Flow}}{(1 + \text{r})^n} \tag{2}$$

$$\text{NPV} = \sum \frac{\text{Year n Total Cash Inflow}}{(1 + \text{r})^n} - \sum \frac{\text{Year n Total Cash Outflow}}{(1 + \text{r})^n} \tag{3}$$

This general formula can be made more specific for this research. The timeline functions as a guideline to explain the modification. The *historical cost* and *historical agent fee* are paid at the start of the period and thus need no discounting. Additionally, the *cash inflow* and *outflow* can occur during the contract period. Therefore, discounting is necessary for every payment, which explains the sum sign. As mentioned, clubs make periodic payments at the start of the period. Thus, the payments of these variables happen from t till $T-1$, which explains $T-t-1$ in the formula. At the end of the contract, the club can sell their player for the *selling price*. Equation (4) is the modified formula.

$$\begin{aligned} \text{NPV} = &- (\text{Historical cost} + \text{Agent fee}) \\ &- \sum \frac{\text{Cash Outflow - Cash Inflow}}{(1+ \text{r})^{T-t-1}} \\ &+ \frac{\text{Selling price}}{(1+ \text{r})^{T-t}} \end{aligned} \tag{4}$$

The NPV formula calculates the value of all future transactions for a player at the start of his contract at t. The evaluation of an investment happens at the end of the contract period. Thus, it is necessary to calculate the value of all transactions at the end of the contract. Hence, a formula is needed that calculates the value at T for all the past transactions. This value is called the Future Value (FV) of a player. Equation (5) shows a simple version of FV (Naqvi & Naveed, 2015).

$$\text{FV} = \sum \text{Year n Total Cash Flow} * (1+\text{r})^n \tag{5}$$

The simple FV formula needs adjustment to fit this research better. Equation (6) shows the modified version for this research. This formula shows a discount rate of 4%. This rate is specified for the football market and based on previous literature. Solntsev (2014) presented a method to calculate the discount rate for a football club, but due to several problems, this is not possible for the five clubs of interest. On the other hand, the discount rate for European football clubs varies from 2.08% to 5.32%, where the Italian football clubs are a bit above the average (Prigge & Tegtmeier, 2019). The average of these clubs is 3.7%. A discount rate of 4% seems appropriate for Italian clubs since this is a bit higher than the average. Therefore, this research specifies a discount rate of 4%.

$$\begin{aligned} \text{FV} = &- (\text{Historical cost} + \text{Agent fee}) * (1.04)^{T-t} \\ &- \sum(\text{Cash Outflow - Cash Inflow}) * (1.04)^{T-t} \\ &+ \text{Selling price} \end{aligned} \tag{6}$$

The FV gives a value that shows the money's worth at the end of the contract period. This number helps determine which investments are successful and which are not. Successful investments have a sum of inflows that exceeds the aggregate outflows. This is the case for a positive FV. Thus, an investment is successful when the FV of the contract is positive.

4.3 Average historical cost and wage

Player contracts come with considerable costs. The previous section shows the FV calculation, including six monetary outflow variables. Historical cost and wage are two major variables that negatively affect the FV. It is interesting to research the differences between contracts of these two costs.

For comparison of these costs between contracts, it is useful to calculate an average cost per appearance or minute. First, the number of appearances determines the average cost per match. The calculation of the average historical cost per match is simply the total historical cost divided by the number of appearances stored in variable *apps*. The same calculation holds for the average wage per appearance. Furthermore, the number of minutes played, stored in *mins*, is relevant for calculating the average salary per minute. These averages inform about the cost of a particular player per appearance or minute and are helpful for comparison among contracts and clubs.

5 Results

5.1 Drivers of the initial investment

This section investigates what drives the initial investment paid to acquire a particular football player. Equation (1) contains independent variables to explain the relationship between these variables and the initial investment. The dependent variable is the logarithm of the initial investment. Moreover, this section discusses different versions of the model.

Before running the regression, it is essential to check whether multicollinearity exists between the independent variables. Table 3 shows the correlation matrix. This table only includes age and not age-squared since the correlation between age and its transformed

variable would give a wrong impression about the presence of multicollinearity. All the values are well below 0.7, an often-used cutoff point (Coudounaris & Sthapit, 2017; Kalnins, 2018; Brun et al., 2020). Because of the low correlation values, the multicollinearity problem is not present for this set of variables.

Table 3: Correlation matrix

	Age	Italian	Prev. club	Youth	Attacker	Midfielder	Defender	Goalkeeper
Age	1.0000							
Italian	0.2128	1.0000						
Prev. club	0.2816	0.3651	1.0000					
Youth	-0.2160	0.3288	-0.2878	1.0000				
Attacker	-0.0490	0.0251	-0.0343	0.0154	1.0000			
Midfielder	-0.1193	-0.0352	0.0820	0.0383	-0.4573	1.0000		
Defender	0.0788	-0.0508	-0.0849	-0.0693	-0.2607	-0.5610	1.0000	
Goalkeeper	0.1585	0.1061	0.0299	0.0167	-0.1418	-0.3051	-0.1739	1.0000

In this dataset, there are 625 contracts. The club pays the initial investment at the start of the contract period. Therefore, the regression is run on the contract level only to include each contract once. However, there is missing data for several variables, which results in a total of 325 valuable contracts in the regression.

Table 4 depicts the regression results. As can be seen, there are six models with different independent variables per model. The first column shows the regression of the effect of age and Italian on the dependent variable. The age coefficient is positive, while the coefficient of age-squared is negative. This confirms the non-linear relationship between age and the initial investment. Moreover, the negative effect of age-squared is statistically significant at the 5% level, while the effect of age is not. Besides, the initial investment decreases for Italian players. However, this effect is not statistically significant. Adding the previous club and youth, column (2), results in significant results for age-squared, previous club and youth. The initial investment increases when the player transfers from an Italian club and decreases when the player comes from the youth academy. After that, model (3) adds the position dummies. This shows that the initial investment for attackers is larger compared to the initial investment for goalkeepers. Furthermore, the initial investment for midfielders and defenders is lower than for goalkeepers. This implies that attackers have the highest initial investment in this dataset; goalkeepers, midfielders and defenders follow.

In the first three models, the coefficients for age-squared, previous club and youth are statistically significant from zero, except for age-squared in the third model. The other variables are not. Executing a stepwise regression, results in the model shown in column (4). Thus, this finds the same conclusion about which variables are best to include in the model. This model shows that a one-unit increase in age and age-squared are associated

with a 19.1% increase and a 0.5% decrease in the initial investment, respectively, where the first result is not statistically significant while the latter is. Furthermore, transferring from an Italian club is associated with a 41.5% increase in the initial investment, while coming from the youth decreases the initial investment by 307.10%. Those two variables are also statistically significantly different from zero at 10% and 1% significance levels.

Then, fixed effects are added to this model, resulting in model (5). The coefficient for age is statistically significant in this model, whereas it was not in the previous models. Furthermore, the direction of the coefficients stayed the same, whereas the magnitude changed. The change of coefficient is more significant for some variables than for others. Lastly, model (6) adds club-fixed effects. Again, the sign did not change, but the magnitudes did. Besides, the coefficient for the previous club is not statistically significant anymore.

Table 4: Regression results

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Constant	5.167*	7.905***	8.100***	7.749***	4.179	2.894
	(3.049)	(2.756)	(2.720)	(2.675)	(3.005)	(2.714)
Age	0.323	0.179	0.170	0.191	0.421**	0.523***
	(0.198)	(0.183)	(0.187)	(0.177)	(0.198)	(0.181)
Age^2	-0.007**	-0.005*	-0.005	-0.005*	-0.009***	-0.010***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Italian	-0.303	-0.099	-0.127			
	(0.283)	(0.276)	(0.283)			
Prev. club		0.452**	0.427*	0.415*	0.371*	0.104
		(0.222)	(0.219)	(0.224)	(0.221)	(0.206)
Youth		-3.002***	-3.004***	-3.071***	-2.854***	-2.972***
		(0.485)	(0.479)	(0.448)	(0.446)	(0.396)
Attacker			0.202			
			(0.460)			
Midfielder			-0.057			
			(0.447)			
Defender			-0.432			
			(0.470)			
Year FE	No	No	No	No	Yes	Yes
Club FE	No	No	No	No	No	Yes
Adjusted-R^2	0.130	0.229	0.232	0.231	0.242	0.376

Note: The dependent variable is ln(initial investment). The table depicts the mean in regular notation, the standard deviation in brackets and all columns have 325 observations. The table significance is denoted as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The table also contains the adjusted R-squared. This measure represents the dependent variable variation explained by the independent variables (Miles, 2005). The value ranges

from 0.130 to 0.376. Thus, the independent variables explain 13% to 37.6% of the variation of the dependent variable.

As mentioned earlier, the correlation matrix showed no evidence of a multicollinearity problem. Table A4 shows the Variance Inflation Factors (VIF), which can check this conclusion. A rule-of-thumb says that a VIF exceeding ten corresponds to a multicollinearity problem (Curto & Pinto, 2011). Since all values in the table are well below this, this confirms the prior conclusion.

After discussing the coefficients and possible problems, we can formulate an answer to *RQ 1: "What factors drive the initial investment of a football player for five clubs in the Serie A for the seasons 2010/11 to 2019/20?"*. As concluded, the initial investment increases with age in a non-linear way. Furthermore, clubs invest less in Italian players or players originating from their youth academy. Meanwhile, the initial investment rises when a player comes from an Italian club. Furthermore, the players with the highest initial investments are attackers. After that, goalkeepers, midfielders and defenders follow.

5.2 Future Value

This section calculates the FV of player contracts using equation (6). To accurately calculate this number, it is essential to have all contract information, i.e., from the starting point to the end. As seen in table 2, the selling price is only known for 144 contracts. When this number is unknown, the contract has not ended within the dataset resulting in some unobserved data. Therefore, this section focuses on a subset of fully observed contracts. Thus, the subset only contains contracts with known selling price values.

Table 5 shows the average FV and its standard deviation for this subset. First, comparing the two columns informs about the influence of the selling price. The FV is approximately 2.5 million euros on average when the calculation includes the selling price. When excluding the selling price, the FV is almost minus 12 million euros. This implies that the selling price is an important source of income that positively affects the FV.

Thereafter, the first column helps evaluate the success of investments. The subset only contains complete contracts; thus, the calculation of FV includes all monetary in- and outflows of a contract. The average FV for all contracts is 2,456,963 euros. The positive FV shows that the investments are generally considered successful. This answers *RQ 2* which is *"Are the investments in players successful in terms of the Future Value for five clubs in the Serie A for the seasons 2010/11 to 2019/20?"*. Furthermore, the table shows the differences between clubs. On average, AC Milan, Juventus, Lazio and Roma have made successful investments. However, this is not the case for Napoli since this club has a negative mean of

approximately 2.4 million euros.

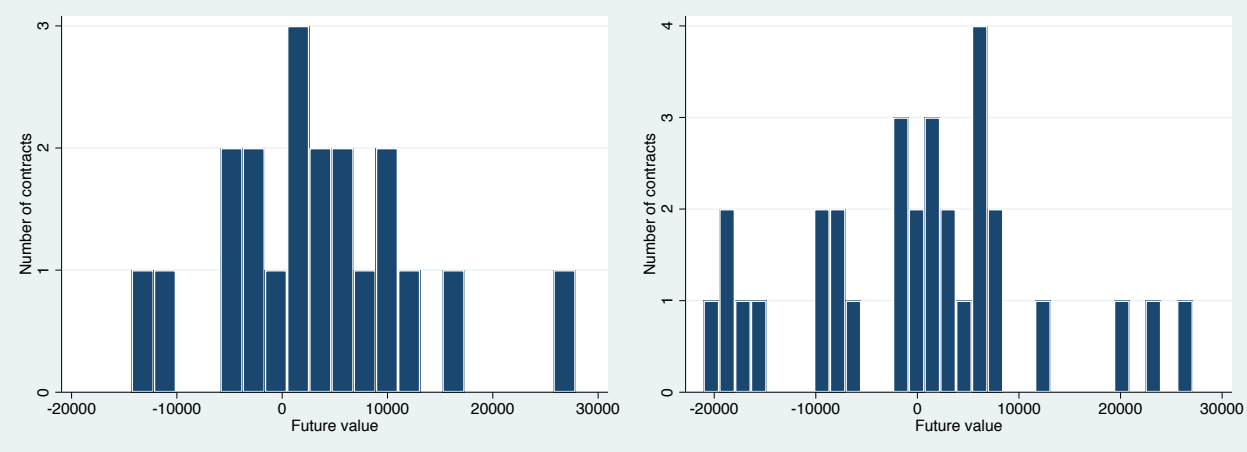
Table 5: Future Value for fully observed contracts

Club	Including selling price	Excluding selling price
Total	2,456,963	-11,958,580
	(13,049,320)	(13,197,170)
	135	*121*
AC Milan	3,166,191	-8,486,510
	(9,577,771)	(8,846,335)
	20	*18*
Juventus	2,408,949	-14,695,050
	(17,683,760)	(18,952,980)
	32	*32*
Lazio	5,704,442	-7,349,355
	(9,955,272)	(5,186,562)
	13	*12*
Napoli	-2,398,257	-11,580,370
	(9,484,522)	(11,578,910)
	45	*39*
Roma	9,001,747	-14,208,120
	(12,836,800)	(10,821,070)
	25	*20*

Note: The table depicts the mean in regular notation, the standard deviation in brackets and the number of observations in cursive. The numbers are in euros.

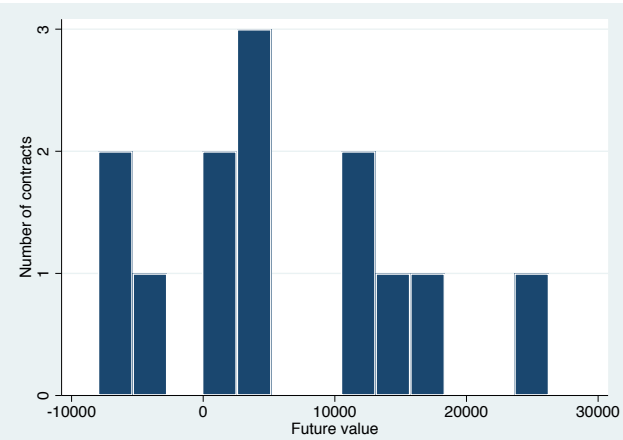
After looking at the mean and standard deviation of the FV of this subset, it is also worthwhile to look at the distribution of these values. Figure 2 shows the distribution of the FV between contracts and clubs[4]. This shows how many transfers have been successful and which ones are not. The figure shows that each club has made both successful and non-successful investments. Hence, a sidenote is necessary for the answer to *RQ 2*: while the investments are successful, on average, for the fully observed contracts in the dataset, there are also non-successful investments part of the dataset for all five clubs.

[4]This figure excludes two outliers for Juventus and Roma. Table A5 shows the values after dropping those outliers. Figure A1 shows the distribution including those outliers.

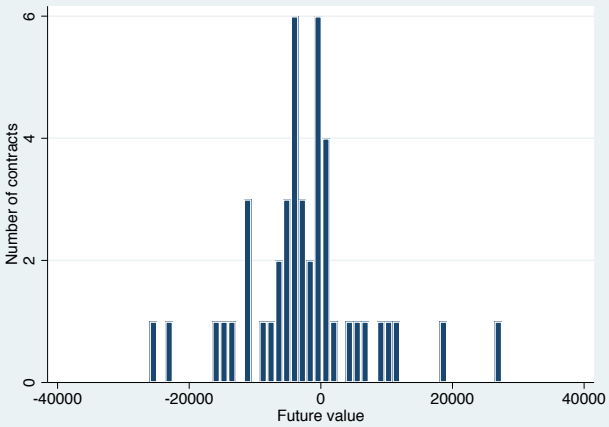


(a) AC Milan

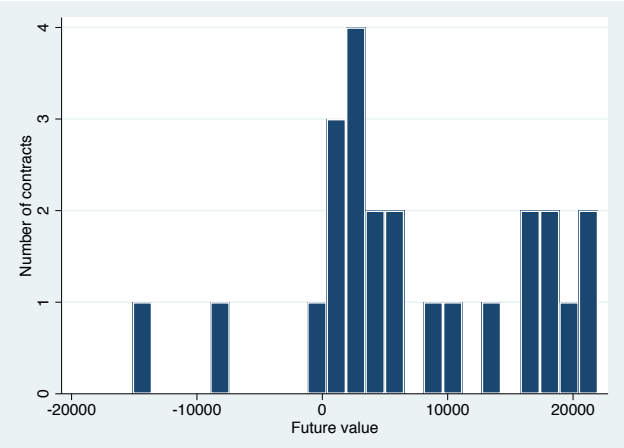
(b) Juventus



(c) Lazio



(d) Napoli



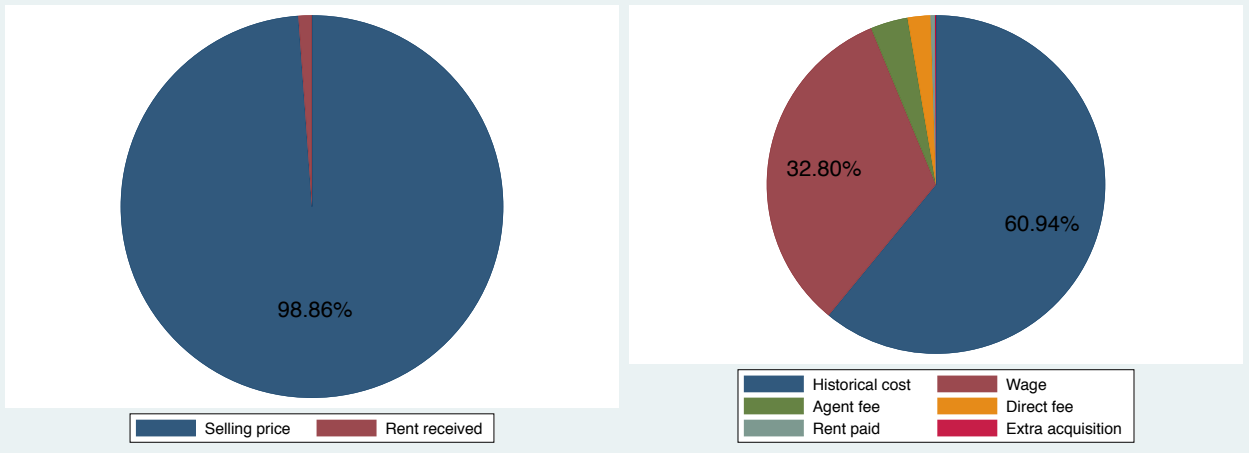
(e) Roma

Figure 2: Distribution of Future Values per club for fully observed contracts

Note: The numbers on the x-axis are shown in thousand euros.

5.3 Average historical cost and wage

This dataset thus contains 135 complete contracts. As previously discussed, the average FV is 2,456,963 euros for these contracts and is largely influenced positively by the selling price. This makes sense since 98.86% of the revenues come from the selling price, as can be observed by figure 3a[5]. On the other hand, costs also influence the FV. Figure 3b[6] shows that the two most considerable costs are the historical cost and the wage, with 60.94% and 32.80%, respectively. This means that the four other costs only contribute to 6.26% of the total costs. Therefore, this section focuses on the two major cost contributors.



(a) Revenues (b) Costs

Figure 3: Distribution components FV

First, table 6 shows the average historical cost per appearance and minute. The table does not show 135 contracts since the number of matches or minutes is not known for every player. The first column shows the average historical cost per appearance. The average for all five clubs together is 888,447 euros. Lazio has the lowest average historical cost per appearance, 213,225 euros, and Juventus has the highest average of around 1.4 million euros. Thus, the first column shows some differences among clubs. Furthermore, the average historical cost per minute played is 22,724 euros, as seen in the second column. The lowest average cost is again for Lazio, followed by Roma, Juventus, Napoli and AC Milan, with average costs ranging from 2,144 euros to 78,844 euros.

[5]Table A6 shows the exact numbers.
[6]Table A7 shows the exact numbers.

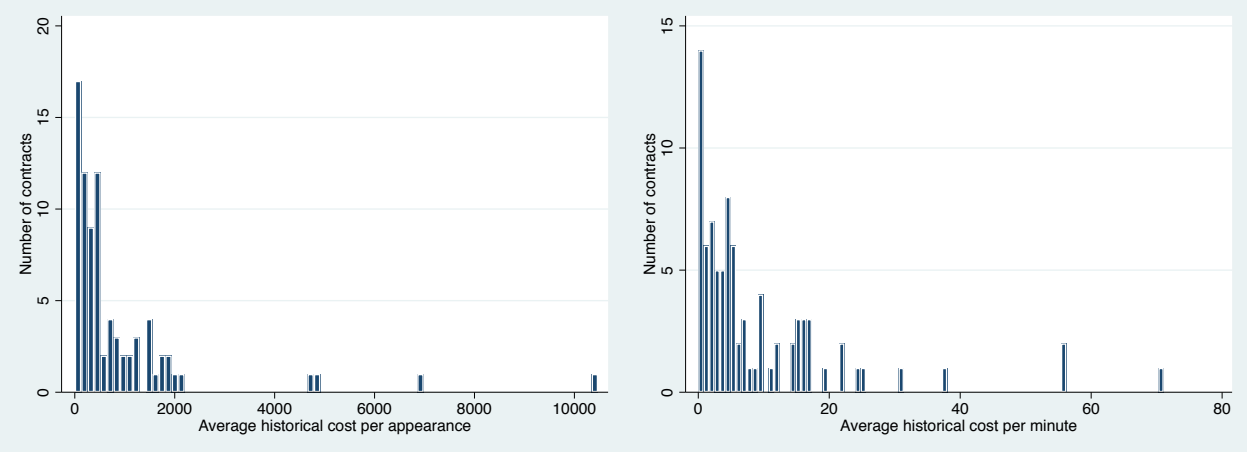
Table 6: Average Historical Cost

Club	Per appearance	Per minute
Total	888,447	22,724
	(1,543,503)	(127,583)
	81	*87*
AC Milan	360,858	78,444
	(555,373)	(297,389)
	15	*16*
Juventus	1,376,945	13,512
	(1,077,918)	(7,982)
	16	*17*
Lazio	213,225	2,144
	(166,539)	(1,932)
	7	*8*
Napoli	1,431,362	14,409
	(2,447,508)	(18,816)
	25	*27*
Roma	402,420	4,527
	(351,984)	(4,385)
	18	*19*

Note: The table depicts the mean in regular notation, the standard deviation in brackets and the number of observations in cursive. The numbers are in euros.

It is worthwhile to also look at the distribution among contracts. First, figure 4a shows the distribution of the average historical cost per appearance. Most contracts have an average historical cost of below 2 million euros per appearance. For a few contracts, it lies above this number. Figure A2 shows the distribution per club as well. This shows that Juventus and Napoli have a few contracts that lie well above this point. These outliers indicate why the average historical cost per appearance in table 6 is highest for these two clubs. Secondly, figure 4b shows the distribution of the average historical cost per minute. This figure excludes one outlier for AC Milan[7]. The majority of the contracts lie between an average historical cost per minute between 0 and 20,000 euros. Figure A4 shows the distribution per club. Again, there are some differences between clubs. Figure A4a excludes the outlier of AC Milan; hence, the outlier is likely the source of the high average observed in table 6. Figure A4 also shows some high values for Napoli, which explains the second-highest expense for this club. To conclude, the distributions give valuable insights into the differences between contracts.

[7]Figure A3 shows the distribution including the outlier.



(a) Per Appearance (b) Per minute

Figure 4: Distribution Average Historical Cost

Note: The numbers on the x-axis are shown in thousand euros.

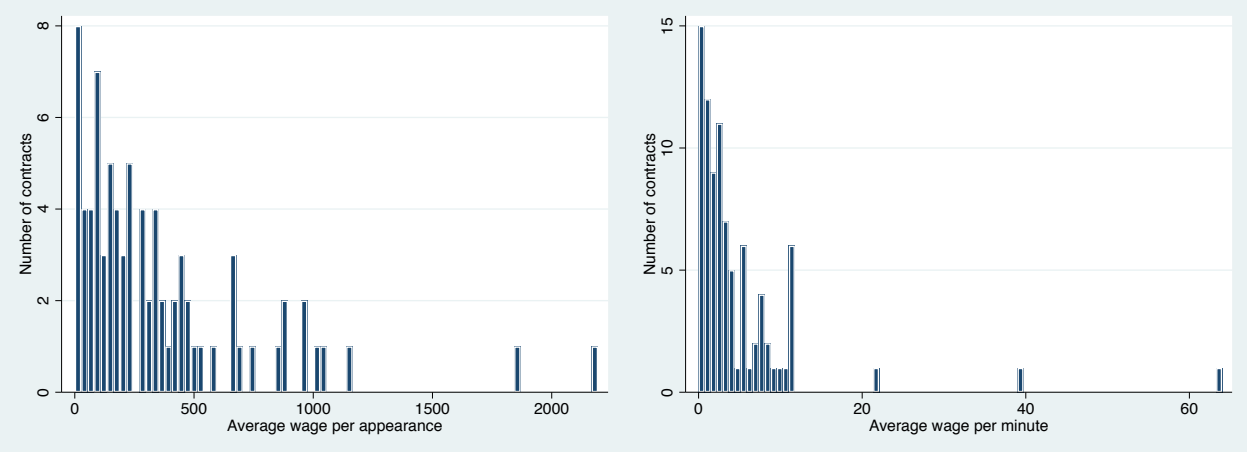
The second major cost contributor to the FV is the wage. Table 7 shows the average salary per appearance and minute. The average pay per appearance is 358,153 euros. This ranges from 256,553 euros to 466,190 euros for Lazio and Juventus, respectively. The averages of the other three clubs fall in this range. Furthermore, the average wage per minute is approximately 5 thousand euros for all contracts. There are some differences between the five clubs. The lowest average salary per minute is 2,973 euros for AC Milan, followed by Napoli, Roma, Juventus and Lazio, with values of 3,641 to 10,537 euros, respectively.

Table 7: Average Wage

Club	Per appearance	Per minute
Total	358,153	5,001
	(392,471)	(8,369)
	81	*87*
AC Milan	285,770	2,973
	(251,907)	(2,966)
	15	*16*
Juventus	466,190	6,107
	(372,257)	(5,709)
	16	*17*
Lazio	256,553	10,537
	(206,936)	(21,701)
	7	*8*
Napoli	404,896	3,641
	(546,117)	(3,392)
	25	*27*
Roma	297,029	5,319
	(295,198)	(8,790)
	18	*19*

Note: The table depicts the mean in regular notation, the standard deviation in brackets and the number of observations in cursive. The numbers are in euros.

Moreover, figure 5 shows the distribution of the average wage. Most contracts have an average salary per appearance below 1 million euros. Figure A5 shows the distribution per club. The two far outliers are players from Napoli and some players of Juventus correspond to average wages of just above 1 million euro. These large values for the two clubs can explain the larger values observed in the first column of table 7. Furthermore, figure 5b shows the distribution of the average wage per minute. This figure shows three contracts with an average salary above 20,000 euros per minute which correspond to Juventus, Lazio and Roma, as seen in figure A6. This again explains why these clubs have the three highest averages observed in table 7. Thus, the distribution helps explain higher values observed when looking at the mean, as stated in the table.



(a) Per Appearance (b) Per minute

Figure 5: Distribution Average Wage

Note: The numbers on the x-axis are shown in thousand euros.

This section researched the two main costs of a player's contract. This helps to answer $RQ3$. The question is *"What is the average historical cost or wage per appearance or minute for a players' contract for five clubs in the Serie A for the seasons 2010/11 to 2019/20?"*. This section already provided a detailed discussion, but some takeaways exist. First, the average historical cost or wage per appearance or minute differs per club. However, there are also differences between contracts at the same club.

6 Conclusion

For this research, I created a new dataset. This dataset contains 625 player contracts from the clubs AC Milan, Juventus, Lazio, Napoli and Roma in the seasons ranging from season 2010/11 up to season 2019/20. The new dataset contributes to the existing literature. Other authors can use this dataset or take the same approach discussed in this paper. Figuring out how and creating the dataset costs much effort, which other authors can spare by copying this paper. Thus, creating a new dataset is also valuable for further research.

Moreover, the data collected is of high quality since it comes directly from the source, which auditors approve. This is possible because clubs in the Serie A publish financial data but also data on individual players (Risaliti & Verona, 2012). Thus, the new dataset's quality is excellent, making it even more valuable. Moreover, the results in this paper are convincing because of the reliable data. Therefore, the results of this paper contribute to the existing literature.

Furthermore, this paper is the first that considers players as investments, another enor-

mous contribution to existing literature. The three sections lay a foundation for further research in this field. First, research already exists on the drivers of transfer fees, but this paper looks at the initial investment, which is the sum of costs at the start of a player's contract. Furthermore, the concept of calculating a FV and connecting it with the success of an investment is new. Upcoming research can extend this framework. Lastly, calculating an average cost per appearance or minute is refreshing. Other studies can define this concept in multiple ways. To conclude, this paper provides results on a newly researched topic and introduces some interesting concepts and ideas that might be relevant for future research.

This paper then answers three questions related to investments. The initial investment, consisting of the transfer and agent fee, is the cost to acquire a player, and *RQ 1* asks what factors influence this amount. First, it matters where the player transfers from. The club wants to invest more in players from another Italian club than when the player comes from a club playing in another country. This means that the country of the previous club influences the height of the initial investment. Furthermore, the initial investment also drops for players from the youth academy. These two effects are statistically significant. Besides, a player's age and initial investment have a non-linear relationship that is statistically significant in some models. Furthermore, the initial investment declines for Italian players. This effect is not statistically significantly different from zero. Lastly, the player's position influences the determination of the initial investment, although the effects are not statistically significant. Clubs want to pay the most for attackers. After that, goalkeepers, midfielders and defenders follow. Thus, these factors partly explain the initial investment.

Then follows the evaluation of the investments in terms of the Future Value (FV). This measure considers the time value of money and generates a sum of all cash in- and outflows. Equation (6) calculates this value for the contracts in the dataset. The evaluation includes entire contracts, which are contracts for which the selling price is known. The first conclusion is that the selling price enormously affects the FV. Furthermore, the positive FV implies that the investments have been successful on average indeed. However, there are non-successful investments in the dataset as well. Furthermore, there is some difference in the success of investments between clubs. On average, AC Milan, Juventus, Lazio and Roma achieved successful investments, while Napoli has not. This answers *RQ 2*.

Two enormous costs are related to the player's contracts. These are the historical cost and the wages. *RQ 3* asks what the average historical cost or wage per appearance or minute is. Section 5.3 shows the specific numbers. Overall, differences exist between both the clubs and contracts.

To conclude, this paper investigated contracts as an investment. Each investment comes with costs to generate income or appreciation over time. The research tells what drives the

value of the initial investment and which investments have been successful. Furthermore, a discussion of the largest sources of income and costs is crucial and thus included. The main contribution of this paper is the new approach in investigating the contract as an investment in combination with using the FV to evaluate whether they have been successful or not.

7 Discussion

The conclusions made in this paper are helpful but come with certain limitations and recommendations for further research. The first limitation of the study is the limited dataset. This paper namely uses data from five football clubs. While these are the leading clubs and thus can be considered the most important ones in Serie A, the number of complete contracts is only 135. There are multiple options to increase this number. The first option is to extend the number of clubs or seasons. This is a straightforward solution to obtain more observations and, thus, more full contracts. It would also be an interesting method not to consider a pre-determined period to investigate but rather make sure that for every player included, the dataset contains the start and the end of the period. This mitigates the issue of many unknown selling prices, a problem in this paper. Besides the limited number of contracts, investigating other leagues would also be interesting. However, this is only possible for some leagues with available data.

Moreover, a second suggestion for further research is to research the effect of more variables on the initial investment. The section that investigates the drivers of the initial investments provides much understanding of what clubs find important in players. Based on these factors, this can be useful to detect which players are likely to be more expensive than other players. The limitation of this regression is the limited number of variables included. Extending the model is a good suggestion for further research.

Another limitation is that the discount rate is estimated. Existing literature is the foundation for the estimation. While this is the best option for this paper, using a more accurate discount rate leads to better estimations of the FV. Therefore, it is an excellent suggestion to use a more precise discount rate in further research. An option is to calculate an appropriate discount rate per football club. This includes specific club characteristics.

To conclude, there are some limitations to this research. However, this paper lays a framework for studying player contracts as investments. Thus, the recommendations are useful for further and more elaborate research.

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A Appendix

A.1 Table Appendix

Table A1: Qualifications of Italian clubs

Round	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22
Final	-	INT	-	-	-	-	JUV	-	JUV	-	-	-	-	-
Semi finals	-	-	-	-	-	-	-	-	-	ROM	-	-	-	-
Quarter finals	-	-	INT	AC	JUV	-	-	-	-	JUV	JUV	ATA	-	-
Round of 16	INT	AC	AC	INT	AC	AC	-	JUV	NAP	-	ROM	JUV	ATA	INT
	JUV	FIO	ROM	NAP	-	-	-	ROM	-	-	-	NAP	JUV	JUV
	ROM	-	-	-	-	-	-	-	-	-	-	-	LAZ	-
Group stage	FIO	JUV	-	-	-	JUV	ROM	-	-	NAP	INT	INT	INT	AC
	-	-	-	-	-	NAP	-	-	-	-	NAP	-	-	ATA
Play-offs	-	-	SAM	UDI	UDI	-	NAP	LAZ	ROM	-	-	-	-	-

Note: The clubs included in this table are AC Milan (AC), Atalanta (ATA), Fiorentina (FIO), Inter (INT), Juventus (JUV), Lazio (LAZ), Napoli (NAP), Roma (ROM), Sampdoria (SAM) and Udinese (UDI).

Table A2: Players per club

Club	Players
AC Milan	Abate, Abbiati, Acerbi, Agazzi, Albertazzi, Alex, Ambrosini, Amelia, Antonelli, Antonini, Aquilani, Armero, Bacca, Bakayoko, Balotelli, Begovic, Bennacer, Bertolacci, Biglia, Birsa, Boateng, Bonaventura, Bonera, Bonucci, Borini, Calabria, Caldara, Calhanoglu, Cassano, Castillejo, Cerci, Constant, Conti, Coppola, Cristante, Cutrone, De Jong, De Sciglio, Deulofeu, Di Gennaro, Didac, Donnarumma, Duarte, El Shaarawy, Ely, Emanuelson, Essien, Fernandez, Flamini, Gabbia, Gabriel, Gattuso, Gustavo Gomez, Halilovic, Hernandez, Higuain, Honda, Ibrahimovic, Inzaghi, Jankulowski, Kaka, Kalinic, Kessie, Krkic, Krunic, Kucka, Lapadula, Laxalt, Leao, Legrottaglie, Leonardo Duarte, Locatelli, Lopez, Luiz, Matri, Mauri, Menez, Merkel, Mesbah, Mexes, Montolivo, Muntari, Musacchio, Nesta, Niang, Nocerino, Ocampos, Oddo, Onyewu, Paletta, Paloschi, Papastathopoulos, Paqueta, Pasalic, Pato, Pazzini, Piatek, Pirlo, Plizzari, Poli, Rami, Rebic, Reina, Robinho, Rodrigo da Costa, Rodriguez, Roma, Romagnoli, Ronaldinho, Saelemaekers, Salamon, Saponara, Seedorf, Silva, Silvestre, Sosa, Storari, Strasser, Strinic, Suso, Taiwo, Torres, Traore, Valoti, Van Bommel, van Bommel, Van Ginkel, Vangioni, Vergara, Vila, Yepes, Zaccardo, Zambrotta, Zapata.

Continued on next page

Table A2 – *Continued from previous page*

Club	Players
Juventus	Alves, Aquilani, Asamoah, Audero, Barzagli, Benatia, Bendtner, Bentancur, Bernardeschi, Bianchi, Bonucci, Bouy, Buchel, Buffon, Caceres, Caldara, Caligara, Can, Cassata, Cavaco, Cerri, Chiellini, Coman, Costa de Souza, Cuadrado, Da Oliveira, Da Silva, De Carvalho, De Ceglie, De Ligt, De Sciglio, Del Piero, Demiral, Dybala, Elia, Estigarraibia, Evra, Fiorillo, Giaccherini, Grosso, Grygera, Higuain, Howedes, Iaquinta, Isla, Kean, Khedira, Krasic, Lanzafame, Legrottaglie, Lemina, Lichtsteiner, Lirola, Llorente, Lucio, Mancuso, Mandragora, Mandzukic, Manninger, Marchisio, Marrone, Martinez, Matri, Mattiello, Matuidi, Melo, Moedim, Morata, Motta, Murara, Muratore, Neto, Ogbonna, Orsolini, Padoin, Pazienza, Peluso, Pepe, Pereyra, Perin, Pinsoglio, Pirlo, Pjaca, Pjanic, Pogba, Quagliarella, Rabiot, Ramos de Oliveira, Ramsey, Rinaudo, Rincon, Romagna, Romulo, Ronaldo, Rugani, Salhiamidzic, Sandro, Schiavone, Simone, Sissoko, Sorensen, Spinazzola, Storari, Sturaro, Szczesny, Tevez, Toni, Traore, Vidal, Vitale, Vucinic, Zaza.
Lazio	Acerbi, Adekanye, Alfaro, Anderson, Badelj, Basta, Bastos, Berisha, Biava, Biglia, Bizzarri, Braafheid, Bresciano, Brocchi, Caceres, Caicedo, Cana, Candreva, Carrizo, Casasola, Cataldi, Cavaco, Cavanda, Ciani, Cissé, Correa, Crecco, De Vrij, Del Nero, Di Gennaro, Diakite, Dias, Djordevic, Djordjevic, Durmisi, Ederson, Firmani, Floccari, Foggia, Garrido, Gentiletti, Gonzales, Gonzalez, Guerrieri, Hernanes, Hoedt, Immobile, Jony, Jordao, Keita, Kishna, Klose, Kolarov, Konko, Kozac, Kozak, Lazzari, Ledesma, Leitner, Leiva, Lichsteiner, Lombardi, Luis, Luiz, Lukaku, Lulic, Marchetti, Marusic, Matri, Matuzalem, Mauri, Mauricio, Meghni, Milinkovic, Milinkovic-Savic, Minala, Morrison, Murgia, Muslera, Nani, Neto, Novaretti, Oikonomidis, Onazi, Palombi, Parolo, Patric, Perea, Pereirinha, Prce, Proto, Radu, Rocchi, Rossi, Scaloni, Sculli, Stankevicius, Stendardo, Strakosha, Tounkara, Vargic, Vavro, Vinicius, Wallace, Zarate, Zauri.

Continued on next page

Table A2 – *Continued from previous page*

Club	Players
Napoli	Albiol, Allan, Amodio, Andujar, Armero, Aronica, Bariti, Behrami, Blasi, Bogliacino, Britos, Bucchi, Calaio, Callejon, Campagnaro, Cannavaro, Cavani, Chalobah, Chavez, Chiriches, Chiriches, Cicireti, Cigarini, Colombo, Costa, Cribari, D'Ursi, Datolo, De Guzman, De Sanctis, De Zerbi, Demme, Denis, Dezi, Di Lorenzo, Diawara, Do Nascimento, Donadel, Dossena, Dumitru, Dzemaili, El Kaddouri, Elmas, Fabian, Fernandez, Ferrari, Fideleff, Folorunsho, Gabbiadini, Gabriel, Gaetano, Gamberini, Gargano, Ghoulam, Giaccherini, Gianello, Gnahore, Grassi, Grava, Hamsik, Henrique, Higuain, Hoffer, Hysaj, Iezzo, Inglese, Inler, Insigne, Jorginho, Karnezis, Koulibaly, Lasicki, Lavezzi, Llorente, Lobotka, Lopez, Lozano, Lucarelli, Luperto, Maggio, Maiello, Maksimovic, Malcuit, Mannini, Manolas, Marfella, Mascara, Mazzarani, Medina, Meret, Mertens, Mesto, Mezzoni, Michu, Milik, Navarro, Novothny, Ospina, Ounas, Pandev, Pavoleti, Pazienza, Petagna, Pia, Quagliarella, Radosevic, Rafael, Reina, Rinaudo, Rog, Rosati, Rrahmani, Rui, Ruiz, Rullo, Santacroce, Santana, Sepe, Sgarbi, Sosa, Strinic, Tonelli, Uvini, Valdifiori, Vargas, Varriale, Verdi, Vinicius, Yebda, Younes, Zalayeta, Zanoli, Zapata, Zerbin, Zielinski, Zuniga.
Roma	Adriano, Alisson, Angel, Antonucci, Astori, Balzaretti, Baptista, Barusso, Benatia, Bertolacci, Bianda, Bojan, Borini, Borriello, Bradley, Brighi, Bruno, Burdisso, Caprari, Cassetti, Castan, Castellini, Cerci, Cetin, Cicinho, Cole, Coric, Cristante, Curci, D'Allessandro, De Rossi, De Sanctis, Defrel, Destro, Diawara, Digne, Dodò, Doni, Doumbia, Dzeko, El Shaarawy, El Sharaawy, Emanuelson, Emerson, Falque, Fazio, Florenzi, Fuzato, Gago, Gerson, Gervinho, Goicoechea, Gonalons, Guberti, Gyomber, Heinze, Holebas, Ibanez, Ibarbo, Iturbe, Jedvaj, Jesus, Juan, Julio, Kalinic, Karsdorp, Keita, Kjaer, Kluivert, Kolarov, Lamela, Ljajic, Ljalic, Lobont, Lopez, Loria, Lucca, Maicon, Mancini, Manolas, Marquinho, Marquinhos, Menez, Mexes, Mirante, Mkhitaryan, Moreno, Nainggolan, Nura, Nzonzi, Okaka, Osvaldo, Palmieri, Paredes, Pastore, Pellegrini, Peres, Perotti, Perrotta, Piris, Pizarro, Pjanic, Ponce, Riccardi, Riise, Romagnoli, Rosi, Rosina, Rudiger, Rui, Salah, Sanabria, Santon, Schick, Seck, Simplicio, Skorupski, Smalling, Spinazzola, Stekelenburg, Strootman, Szczesny, Tachtsidis, Taddei, Tallo, Torosidis, Totti, Ucan, Under, Vainqueur, Veretout, Vermalen, Vucinic, Yanga-Mbiwa, Zaniolo, Zappacosta, Zukanovic.

Table A3: Descriptive Statistics per club

Variable	Club	Observations	Mean	Std. dev.	Min	Max
Financial						
Historical cost	AC Milan	263	7,672,559	10,265,460	0	44,080,000
	Juventus	261	13,612,810	18,641,660	0	115,822,000
	Lazio	257	3,604,588	3,674,509	0	20,200,000
	Napoli	371	7,299,904	7,727,899	1,000	50,000,000
	Roma	221	8,907,606	8,596,948	0	41,123,000
Historical agent fee	AC Milan	0	-	-	-	-
	Juventus	191	1,129,230	2,257,143	0	15,861,000
	Lazio	0	-	-	-	-
	Napoli	0	-	-	-	-
	Roma	107	930,252	1,030,792	0	4,000,000
Rent received	AC Milan	13	948,077	1,225,750	100,000	3,820,000
	Juventus	25	1,918,360	3,731,903	0	18,049,000
	Lazio	0	-	-	-	-
	Napoli	0	-	-	-	-
	Roma	9	1,546,444	825,352	500,000	2,785,000
Rent paid	AC Milan	16	1,314,938	2,553,580	125,000	10,208,000
	Juventus	3	1,666,667	2,886,751	0	5,000
	Lazio	0	-	-	-	-
	Napoli	0	-	-	-	-
	Roma	13	1,781,385	1,495,428	87,000	5,000,000
Wage	AC Milan	276	2,053,841	1,439,430	90,000	9,500,000
	Juventus	264	2,785,795	2,976,738	50,000	31,000,000
	Lazio	284	997,887	512,283	100,000	2,500,000
	Napoli	248	1,400,403	1,076,920	100,000	6,000,000
	Roma	258	1,853,798	1,273,926	30,000	6,500,000
Extra acquisition	AC Milan	8	0	0	0	0
	Juventus	15	237,133	853,717	0	3,321,000
	Lazio	14	1,072,500	849,092	150,000	2,996,000
	Napoli	0	-	-	-	-
	Roma	2	11,250,000	13,081,480	2,000,000	20,500,000
Direct fees	AC Milan	166	104,006	587,368	0	5,854,000
	Juventus	225	186,778	911,827	0	8,568,000

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Table A3 – *Continued from previous page*

Variable	Club	Observations	Mean	Std. dev.	Min	Max
	Lazio	0	-	-	-	-
	Napoli	0	-	-	-	-
	Roma	86	112,221	395,034	0	2,400,000
Selling price	AC Milan	21	10,289,570	8,980,309	0	41,000,000
	Juventus	35	15,637,940	21,651,650	0	101,961,000
	Lazio	13	12,488,460	9,296,666	315,000	29,325,000
	Napoli	50	6,874,260	14,056,170	0	90,000,000
	Roma	25	20,368,240	14,852,750	2,000,000	62,500,000
Other						
Age	AC Milan	268	32.127	6.239	20	46
	Juventus	251	32.709	5.211	20	45
	Lazio	242	32.421	5.618	20	44
	Napoli	243	31.790	5.124	20	44
	Roma	234	31.722	5.789	20	43
Apps	AC Milan	268	14.713	10.221	0	38
	Juventus	251	16.378	10.690	0	37
	Lazio	242	16.496	10.946	0	38
	Napoli	243	16.741	12.403	0	38
	Roma	234	16.064	11.068	0	38
Mins	AC Milan	268	1,318.746	880.601	1	3,420
	Juventus	251	1,468.470	927.194	4	3,318
	Lazio	242	1,469.855	928.040	1	3,420
	Napoli	243	1,500.922	1,071.573	1	3,420
	Roma	234	1,437.876	960.720	1	3,420
Italian	AC Milan	372	0.476	0.500	0	1
	Juventus	363	0.554	0.498	0	1
	Lazio	296	0.291	0.455	0	1
	Napoli	410	0.400	0.490	0	1
	Roma	298	0.295	0.457	0	1
Previous club	AC Milan	314	0.513	0.501	0	1
	Juventus	293	0.515	0.501	0	1
	Lazio	258	0.295	0.457	0	1
	Napoli	299	0.535	0.500	0	1
	Roma	264	0.360	0.481	0	1
Youth	AC Milan	314	0.099	0.299	0	1

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Table A3 – *Continued from previous page*

Variable	Club	Observations	Mean	Std. dev.	Min	Max
	Juventus	293	0.140	0.348	0	1
	Lazio	258	0.093	0.291	0	1
	Napoli	299	0.043	0.204	0	1
	Roma	264	0.110	0.313	0	1
Attacker	AC Milan	268	0.183	0.387	0	1
	Juventus	251	0.159	0.367	0	1
	Lazio	242	0.153	0.361	0	1
	Napoli	243	0.189	0.393	0	1
	Roma	234	0.192	0.395	0	1
Midfielder	AC Milan	268	0.515	0.501	0	1
	Juventus	251	0.534	0.500	0	1
	Lazio	242	0.483	0.501	0	1
	Napoli	243	0.465	0.500	0	1
	Roma	234	0.479	0.501	0	1
Defender	AC Milan	268	0.209	0.407	0	1
	Juventus	251	0.223	0.417	0	1
	Lazio	242	0.285	0.452	0	1
	Napoli	243	0.255	0.437	0	1
	Roma	234	0.244	0.430	0	1
Goalkeeper	AC Milan	268	0.093	0.291	0	1
	Juventus	251	0.084	0.277	0	1
	Lazio	242	0.079	0.270	0	1
	Napoli	243	0.091	0.288	0	1
	Roma	234	0.085	0.280	0	1

Note: All financial variables are measured in euros.

Table A4: Variable Inflation Factors (VIF)

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Age-squared	1.10	1.20	1.25	1.10	2.59	2.64
Italian	1.10	1.44	1.48			
Prev_club		1.33	1.38	1.10	1.13	1.17
Youth		1.24	1.26	1.07	1.13	1.16
Attacker			2.77			
Midfielder			3.66			
Defender			3.08			
2012					1.28	1.29
2013					1.30	1.32
2014					1.45	1.48
2015					1.60	1.62
2016					1.84	1.89
2017					1.75	1.75
2018					1.55	1.58
2019					1.69	1.70
2020					2.22	2.24
Juventus						1.60
Lazio						1.78
Napoli						1.79
Roma						1.77
Mean VIF	1.10	1.30	2.13	1.09	1.63	1.67

Table A5: Future Value for subset excluding outliers

Club	Including selling price
Juventus	56,552
	(11,838,750)
	31
Roma	7,223,738
	(9,459,325)
	24

Note: The table depicts the mean in regular notation, the standard deviation in brackets and the number of observations in cursive. The numbers are in euros.

Table A6: Revenue components of FV

Variable	mean
Selling price	13,175,390
	(16,316,490)
Rent received	151,792
	(768,757)

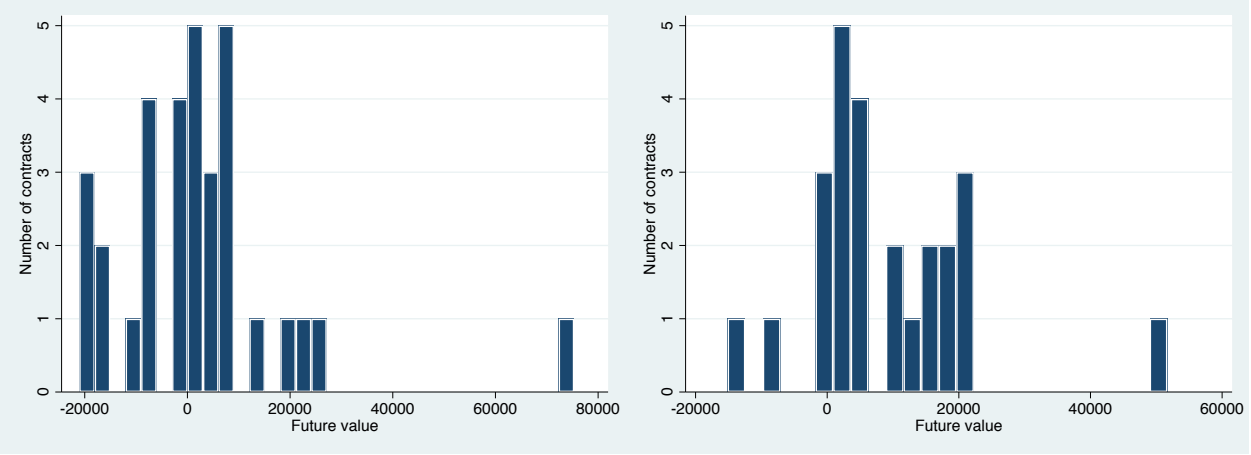
Note: The table depicts the mean in regular notation and the standard deviation in brackets. The numbers are in euros.

Table A7: Cost components of FV

Variable	mean
Historical cost	-6,401,931
	(7,841,486)
Wage	-3,445,302
	(5,075,374)
Agent fee	-375,422
	(1,635,736)
Direct fees	-288,841
	(881,783)
Rent paid	-43,863
	(390,513)
Extra acquisition	-9,774
	(94,798)

Note: The table depicts the mean in regular notation and the standard deviation in brackets. The numbers are in euros.

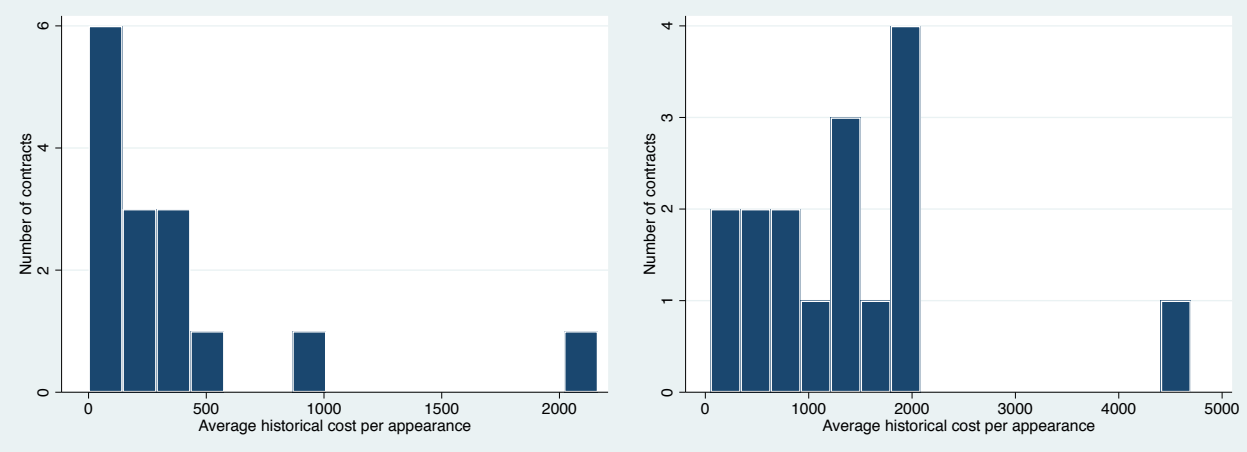
A.2 Figure Appendix



(a) Juventus (b) Roma

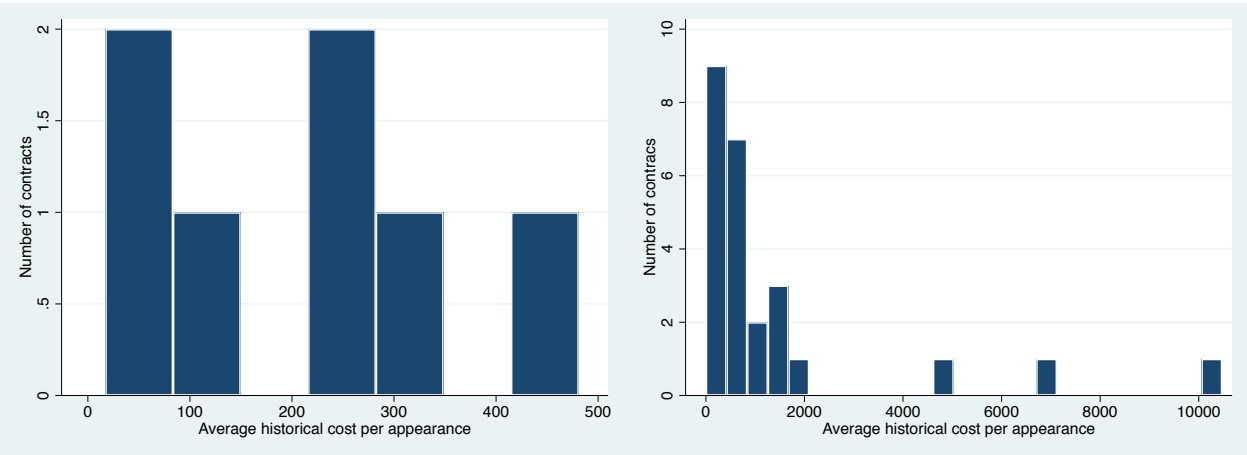
Figure A1: Distribution of FV for Juventus and Roma including their outlier

Note: The numbers on the x-axis are shown in thousand euros.



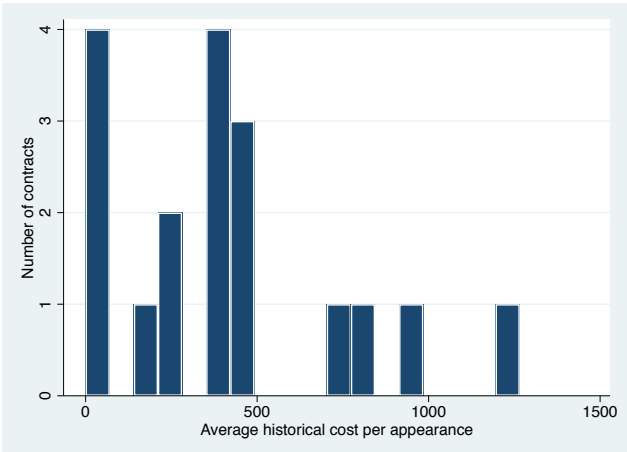
(a) AC Milan

(b) Juventus



(c) Lazio

(d) Napoli



(e) Roma

Figure A2: Distribution Average Historical Cost per Appearance - per club

Note: The numbers on the x-axis are shown in thousand euros.

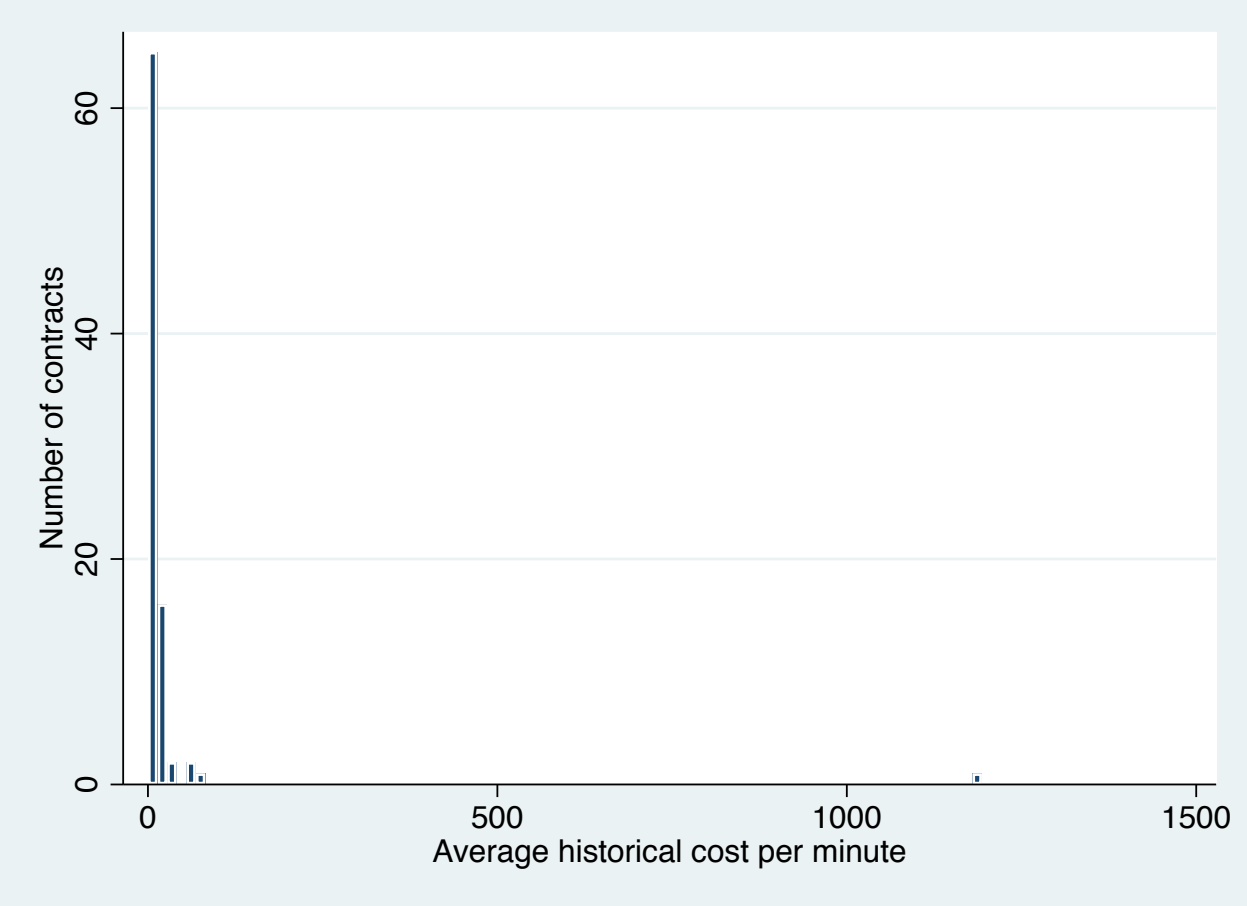
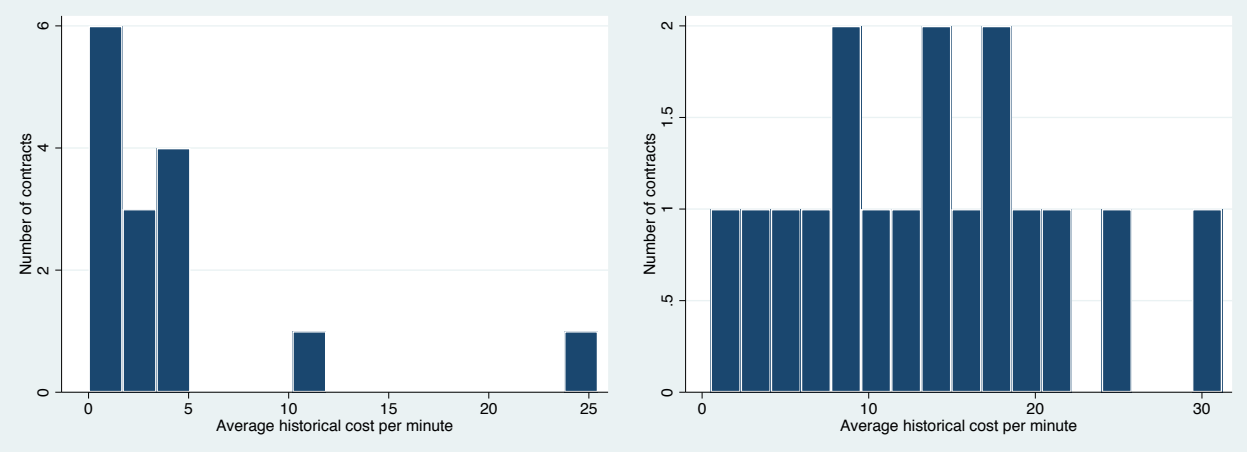


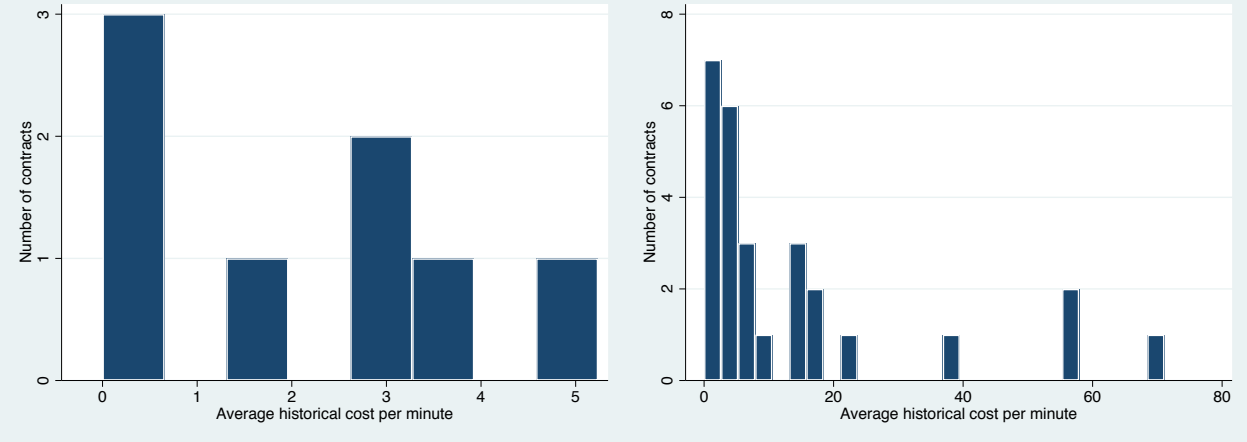
Figure A3: Distribution of Average Historical cost per Minute including the outlier

Note: The numbers on the x-axis are shown in thousand euros.



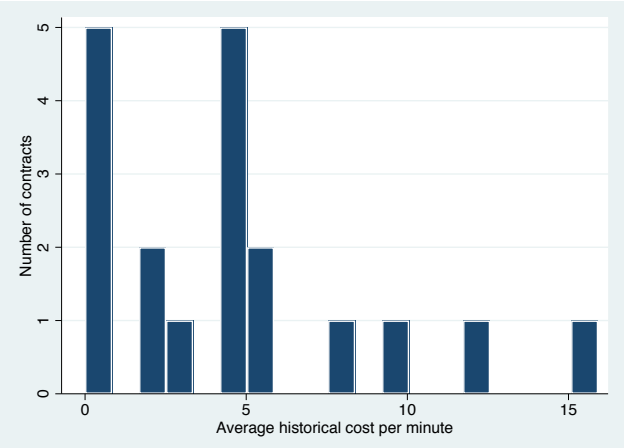
(a) AC Milan

(b) Juventus



(c) Lazio

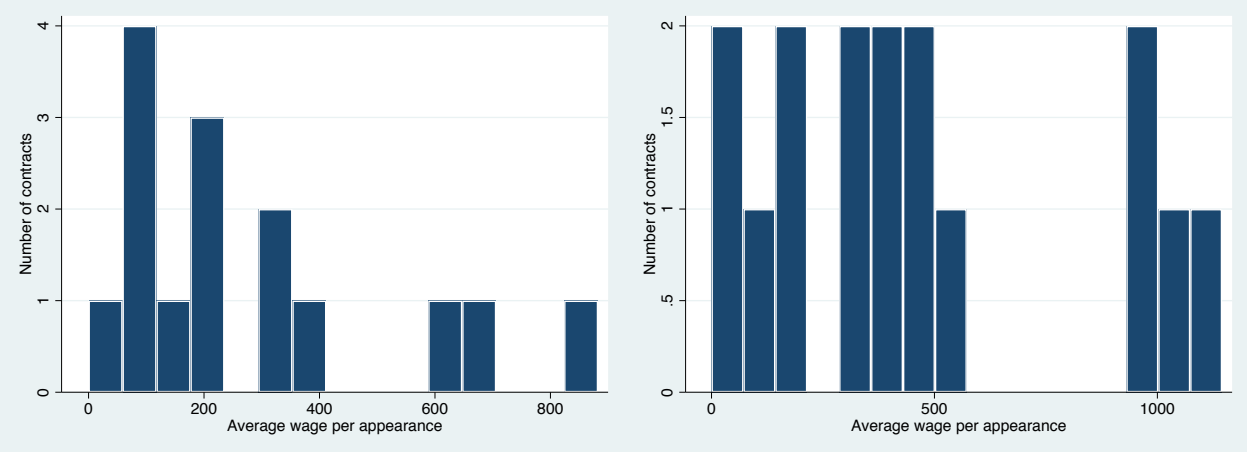
(d) Napoli



(e) Roma

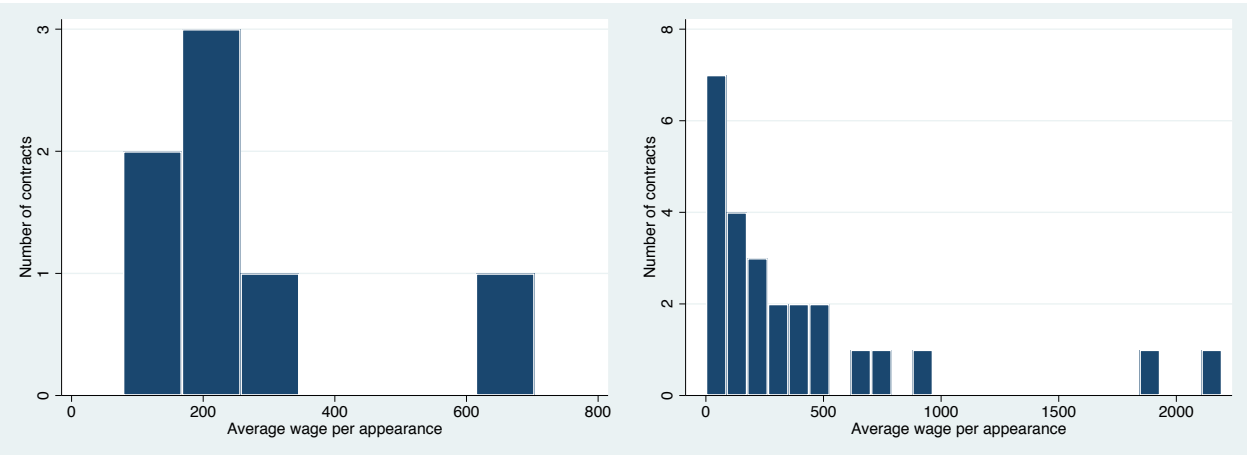
Figure A4: Distribution Average Historical Cost per Minute - per club

Note: The numbers on the x-axis are shown in thousand euros.



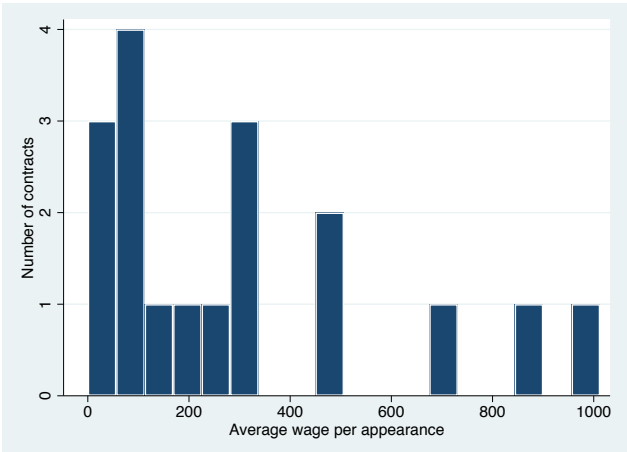
(a) AC Milan

(b) Juventus



(c) Lazio

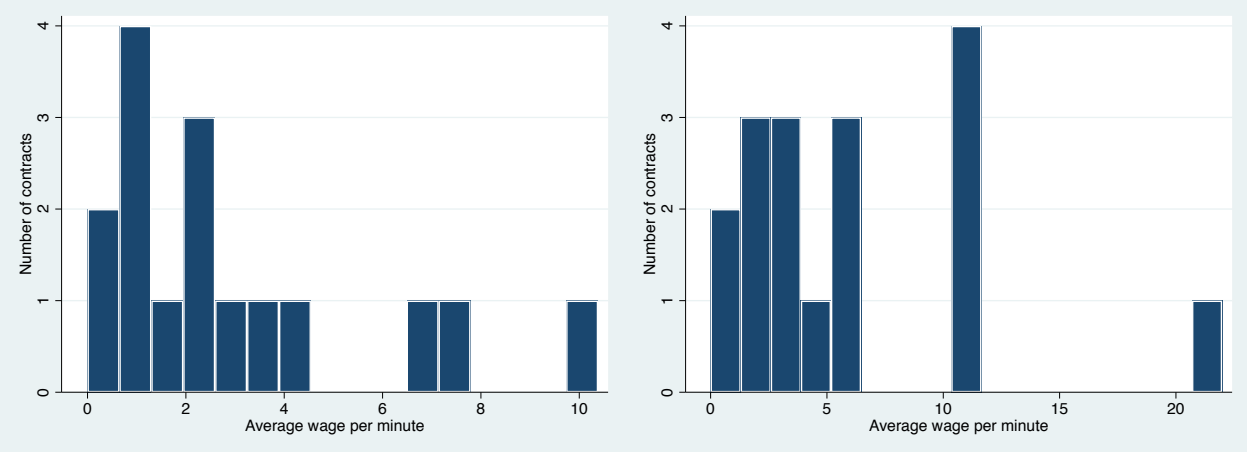
(d) Napoli



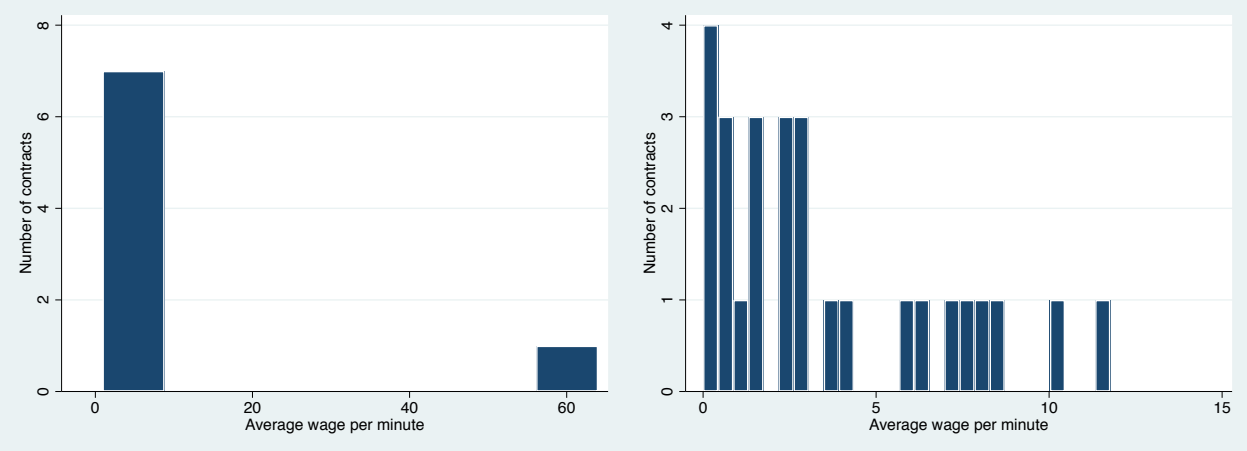
(e) Roma

Figure A5: Distribution Average Wage per Appearance - per club

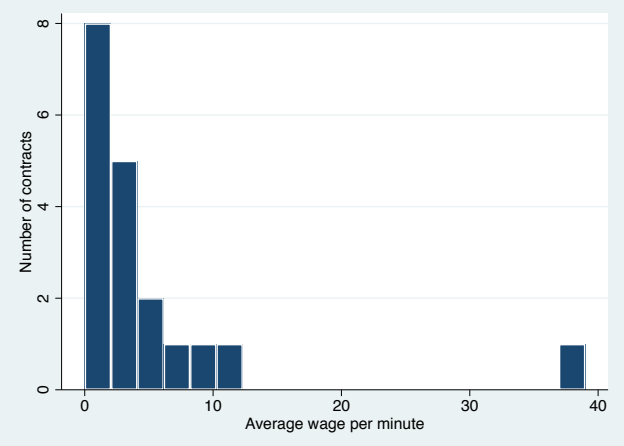
Note: The numbers on the x-axis are shown in thousand euros.



(a) AC Milan (b) Juventus



(c) Lazio (d) Napoli



(e) Roma

Figure A6: Distribution Average Wage per Minute - per club

Note: The numbers on the x-axis are shown in thousand euros.