A Work Project, presented as part of the requirements for the Award of a Master's Degree in Economics from the Nova School of Business and Economics.

Collusion in the football labor market – the effects of misallocations

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Work project carried out under the supervision of Steffen Hoernig

21-05-2021

Abstract

This research investigates the existence of structural misallocations of players in the football labor market, in the context of an intervention by the Portuguese Competition Authority against a no-hiring agreement between clubs. We undertook an econometric analysis of two player datasets, from the Portuguese league and from other European leagues. Our main finding is that big teams use more valuable players less, indicating that big teams hoard valuable players. Finally, we conclude that, due to insufficient regulation in each league, structural misallocations contribute to a lack of competitive balance.

Keywords: collusion; football market; complementarity; misallocations; competitive balance; regulation

I am thankful to my brother, Inês, Stefano, and Marta, who helped me to accomplish this project or have been essential crutches during my master's in Nova. I have to thank, of course, my parents, who have always been supportive in many ways during my academic path. Finally, I am grateful to have had the opportunity to work with Professor Steffen Hoernig, from whom I have learned so much and conducted the research at an outstanding level, always trying to help me with seriousness, accuracy, and understanding. I thank Professor Steffen Hoernig for stopping me the first time because it made me face challenges in life with more hope, start looking into research as a possible professional path, and produce a better paper.

Table of Contents

1. Introduction

Collusion in the labor football market is a particular subject that, although not clearly discussed in most football literature, is already present when approaching the concept of competitive balance. The fan experience and club development are affected by competitive balance, which is, in turn, as referred to, affected by any collusive agreement. The first Portuguese league will be our analysis object, while the scope of this research encompasses recent events of modern football and embraces a European-level approach. This research tries to measure misallocations in the labor football market and their negative influence on the quality of the game.

Thus, the central aim of this research is to provide a better understanding of how football labor misallocations, induced by agreements or governance structures, decrease the extent of football as a vehicle for good private, public, and social results.

To summarize, in this research, we start with the literature review to provide insights into what has already been discussed in the football labor market and collusion in past research. In that chapter, we also highlight what the new contributions from this paper in this field are. Then, in the next chapter, we describe the football market and the Portuguese league, pointing out all its relevant features in economic terms such as competitive balance and dependence of small teams on big teams. We also point out relevant features in structural terms such as the decentralization of the Portuguese league and the European framework. In the "AdC" (Autoridade da Concorrência) chapter, we quickly refer to the intervention of "AdC", which was based on forbidding an agreement by clubs not to hire players who unilaterally terminate their contracts, and how it motivated our research. Finally, in the last three chapters, we explain the approaches taken to find empirical answers to the research question, results and interpretations, and conclusions.

2. Literature review

Most of the many papers written on labor market collusion, or, more specifically, about the generation of a monopsony, share the common conclusion that this matter is usually harmful from a social welfare perspective. The discussion of who has more power in the labor market was already pointed out by Smith (1776), where "it is not (…) difficult to foresee which of the two parties must, upon all ordinary occasions, have the advantage in the dispute, and force the other into a compliance with their terms" because "the masters, being fewer in number, can combine much more easily". The last sentences express that "in concentrated labor markets, few buyers of labor and a lack of credible competition from new entrants gives employers the ability to set wages lower than they would be in a competitive market" (Bivens et al., 2018). Moreover, "it is argued that, if employers have monopsony power, then workers are likely to be over-worked in the sense of being forced to work more hours than they would like given their wage" (Manning, 2003).

Labor market collusion is also related to non-compete agreements (which are more connected to this specific research) and no-poach agreements. "Non-compete agreements are contracts between workers and firms that delay employees' ability to work for competing firms" (US Department of Treasury, 2016). All these topics (from monopsony to no-poach agreements) are an active area of research. All of them are widely recognized as unfavorable to labor conditions, consumer surplus, and social welfare.

In the football market, the story does not change. The result is expected to be the same. Still, it is helpful to observe the adverse effects of this type of collusion in this specific market and how it is related to other relevant factors that I will mention.

As Bougheas & Downward (2003) point out, in a football team, even though there are individual tasks, "the productivity of players is dependent on other players," which enhances

the complementarity of this market labor force. Also, in Poli et al. (2016), we have the statement, "Apart from the intrinsic qualities of players, complementarity between teammates is decisive when it comes to success". As a critical example of how crucial the role of complementarity in this market is, we have this citation on the paper of Bougheas & Downward (2003), which stresses the interdependence of players at the expense of the individual quality of the players:

> "Suppose that one team has filled all positions with high-talented players with only one exception, task j, where it has only a low-talented player. Another team has filled all positions with low-talented players except task j, where there is a high-talented player available. Then an exchange of players can improve the first team without affecting the absolute strength of the second team."

In particular scenarios, while a transfer does not occur, efficient allocations do not occur, generating an impossibility of the emergence of a Pareto improvement or, at least, a "social welfare improvement", because the asset that should be traded is "frozen" and, therefore, considered a misallocation. Through collusion, as we will see more detailed in two chapters, this misallocation is more probable to exist and can also counteract the competitive balance of the respective football league instead of promoting it, which affects the economic growth of the sport as Mourão & Cima (2015) states: "Sports competitions lacking in competitive balance quickly become stagnant, losing fan interest and support, losing commercial value, and winding up in a recessionary phase that may end in failure of the competition itself".

A collusive agreement hindering efficient allocations introduces a tacit gap between small and big teams by compromising competitive balance in a football league. Regarding competitive balance, the panorama is sharply different when comparing Europe to the US. The European lack of instruments to increase competitiveness among more clubs will be explored in the next chapter, but the transfer system can provide a glimpse of some issues to tackle. In many European leagues, the winner varies between just two or three teams, and, on some occasions,

the winner does not change at all for seven/eight years, as it happened in Bundesliga and Serie A. The theory of uncertainty of outcome comprises a situation where there is a “degree of unpredictability about the result and by extension that the competition as a whole does not have a predetermined winner at the outset of the competition” (Li et al. (2019) citing Forrest & Simmons, 2002). Using this theory, we shall say the “degree of unpredictability of outcome”, which is already low in the Portuguese league, decreases with collusive behavior, hence the urgency of avoiding misallocations. This low degree of unpredictability about the outcome expected in the Portuguese league matches jeopardizes, of course, the competitive balance and, indirectly and after that, other economic indicators such as social welfare.

First, if competitive balance is affected, "not only an important source of sports development but also an important determinant of sports revenues" (Mourão & Cima, 2015) is affected as well. One may think protecting competitive balance enables the appearance of "inefficiencies" that decrease the total revenues of a sports league. Suppose we are redistributing revenues to the worst teams (or using other strategies more familiar in the United States sports policy) that usually are the "messiest" organizations. In that case, we may end up in an outcome where their endeavor diminishes (in a backward bending labor supply case), or they might engage in unproductive practices like losing games on purpose to get the best lottery draft pick (as some NBA teams have already been accused of). Nevertheless, the sacrifices and risks that come with these "competitive balance" policies compensate, and the balance is positive, as the United States example shows us. Despite having these economic counterparts, we have much more spectators connected to the sport once we achieve a well-balanced, competitive sports league as “we recognize that we love sports because of their ability to sustain our attention during tight matches” (Mourão & Cima, 2015), which increases the revenues dramatically and offsets disadvantageous effects covered in this paragraph.

Secondly, and related to the first point, as it was quoted, an essential source of development is affected (by a low degree of unpredictability of outcome in the Portuguese league), because sport impacts many other relevant areas of the society "performing an educational, public health, social, cultural and recreational functions" being "a key vehicle through which policy objectives in these fields can be pursued" (Gardiner & Welch (2011) citing Directorate-General X, 1998)). This placing of sport as a critical vehicle to achieve social goals is even more important when it is football, portraying overwhelming potential as it is the most popular sport in Europe.

"The anthropological assumption that human beings are in general defined by a playful dimension" (Beichelt (2013 citing Huizinga, 2004)) is the main reason to explain the requirement of a competitively balanced league. Aiming to analyze it with more resources throughout these pages, the effects of teams not accepting players who unilaterally terminate because of tacit collusion relate to competitive balance scarcity as "the perfect game is a symbiotic contest between equal opponents. The practical economic problem is that professional sports leagues form imperfectly competitive natural cartels where games are played between teams with asymmetric market power." (Vrooman, 2011). Moreover, as it was mentioned and in the same line of reasoning of the last statement, "The level of league revenues, which provides a measure for the success of the league as a unit, depends not only on the aggregate level of talent but also on its distribution." (Bougheas & Downward, 2003).

Finally, this research aims to study the effects of misallocations in the labor football market which are present, not only in specific cases where a legal entity has intervened as in Portugal (analyzed in more detail in two chapters), but also in general European football as its context reflects lack of competitive balance and, therefore, misallocations. The existing literature in economics and, particularly in sports, has not dealt with this aspect yet.

3. Description of the market

When describing the football labor market in the Portuguese League, one feature stands out immediately: besides complementarities in football players within each team already referred, the talent distribution among teams is sharply uneven. It "is one of the least balanced leagues (jointly with the Dutch and the Greek leagues), independent of the measures" (Mourão & Cima (2015) citing Goossens, 2006)) including just five different winners since its foundation in 1934 among 72 clubs that participated. It is important to underline that two of those winners only won each time (Belenenses and Boavista). The number of teams of teams in the league changed from 8 to 20 and is now composed of 18 teams. When analyzing the first five standings of the last 20 seasons, we have the same five teams most of the time: Benfica, Porto, Sporting, Braga, and Guimarães. Benfica and Porto were always in the first five places in the last 20 seasons. Sporting left one time, Braga four times, and Guimarães twelve times. Boavista, Paços, União de Leiria, and Arouca (1 time), Belenenses, Estoril, and Rio Ave (2 times), Marítimo (3 times), and Nacional (4 times) were the teams that occupied one of the five first places when the Sporting, Braga, or Guimarães did not.

This is mainly due to how the Portuguese league operates and how its intervention is powerless when it comes to policies promoting competitive balance. The Portuguese league is characterized by regular and standard administrative functions but does not hoard many executive functions capable of influencing the game economically. Mirroring this uneven distribution of talent between teams and the negligence by the Portuguese league to reduce this type of inequality, in the season 2018/2019, Benfica and Porto had their entire respective team's total market values eight times (or more) bigger than all other teams except for Sporting, Braga, and Guimarães. More specifically, to enhance this huge gap, Benfica and Porto's respective team's total market values was sixteen times (or more) larger than each of the last five teams in the Portuguese league of that year.

In this scenario, small teams often rely and depend on big teams: corruption stories often emerge, feeding the idea that big clubs and small clubs work together, and, most important, the linkage between teams is expectably taking into account each team's economic situation and ambitions. Hoey et al. (2020) underline that “small clubs lack the possibility to give their players exposure to top clubs, because they are effectively barred from entering European-wide competitions, such as the Champions League" and the lack of games played (and quality of games played), when compared with big teams, slows up the evolution of their players. These are factors that also contribute to a larger dependence of small teams on big teams.

Like Hoey et al. (2020) pointed out, “it is striking that the transfer system does not significantly reward most small clubs for their role in discovering and training young talent”. In the European market, buying and selling players as a business is a common activity that usually worsens the dependence between small and big teams mainly because "the transfer system clearly fails to redistribute significant amounts of revenues to smaller clubs” (Hoey et al., 2020). As small teams rely tremendously upon earnings from transfers of players they have developed, big teams can take advantage of their financial situation, which turns into a vicious cycle.

The Portuguese league football market has a second feature linked with the first feature mentioned before: the decentralization of broadcasting rights and commercial revenues. These elements of this specific market are decisive when judging the competitive balance of the Portuguese league and, indirectly, misallocations, as I will resume this topic later in this chapter. First, these elements influence the competitive balance because they are two of the four primary sources of revenue for each team, in addition to sponsorships and revenues from UEFA. Second, and more importantly, it influences competitive balance insofar as it is decentralized. There has been some news related to a part of this matter announcing that in 2027 when broadcasting deals finish, at least the broadcasting rights will be centralized. Regarding this subject, the “Liga Portuguesa de Futebol Profissional” (LPFP) and the “Federação Portuguesa

de Futebol" (FPF) must present a centralized model proposal until the of the 2025/2026 season. Moreover, the "FPF" and the "Liga de clubes" have already signed this centralization of broadcasting rights officially in the last January to begin in the 2027/2028 season, as already mentioned.

Nevertheless, this is not the case yet. The best framework in Europe, at least in revenues terms, is the Premier League where both broadcasting rights and commercial revenues are centralized, knowing that "the sports like football to be quite ambitious and powerful, need a set of infrastructure and support that can sustain their activity" (Simão (2017) citing Mourão, 2010)). We also know "open and closed-market theories both lead to the same paradox: revenue sharing does increase competitive balance" (Vrooman, 2011). Thus, the English league is not the leader in broadcasting rights revenues and commercial revenues because of the centralization itself but because it uses centralization to fight competitive unbalance by revenue sharing, which creates a positive and soaring loop of total revenues.

The utility of the league as a broker in its executive functions surpasses its administrative functions and represents a shivering medium to achieve better outcomes. This idea is underpinned with numbers: for instance, in 2018, the Premier League invoiced 2.9 billion euros in broadcasting revenues while the second-best league in that category (La Liga) invoiced almost three times less with 1.2 billion euros. These results are directly related to revenue sharing, which develops competitive balance, and it is an excellent instrument to reduce the dependence of small teams on big teams. The Portuguese League, despite having one of the best European leagues in terms of broadcasting revenues (seventh place in 2017 with 126 million euros), "stifles" potential growth in competitive balance because it is the only league in Europe (beyond the Cypriot league) without centralization power over any of the four main revenue's sources of a football team. Without the existence of centralization powers, neither exists revenue sharing.

Many differences emerge when extending this Portuguese league football market analysis to the world's panorama. Some of them, concerning European leagues, were already discussed, but the United States (US) and Europe examples have not been discussed yet. The National Basketball Association (NBA) in the US is a basketball league in which the major goal to success in revenues is to achieve good patterns of competitive balance. However, it has different conditions and circumstances when compared with football in Europe.

Salary caps, drafting systems, revenue sharing, centralization of sponsorships, etc., are well-known in the NBA. Many structural changes and adjustments would be needed in each European country and in Europe as a whole to reach a higher degree of competitive balance in Europe and the Portuguese league. Right now, the scenario in Europe is conducive to create more misallocations than the American scenario. When we plunge into the European football reality versus the American reality, even if we do not observe obvious catastrophic results in European social welfare and a clear waste of a small (yet significant) portion of potential GDP growth because the interpretation is not apparent, we realize at least American production is higher with the same resources by a simple reason: talent distribution.

4. Intervention of "Autoridade da Concorrência"

On the 8th of April of 2020, the Portuguese League of Professional Football (PLPF) announced that the First and Second Portuguese leagues decided to agree to not accepting players who unilaterally terminate with their respective teams. Following this announcement, the "Autoridade da Concorrência" (AdC) intervened, forbidding this type of agreement. This "collusion attempt" from the PLPF was about to proceed without the consultation of the Player's Union. The primary justification (to proceed) relied on facing the economic repercussions of the pandemic, and the direct consequence of this joint action would be control of players' wages.

The AdC stopped this joint action because “its mission is to ensure the application of the rules for the promotion and defense of competition (...) with respect for the principle of market economy and free competition, aiming the efficient functioning of markets, the optimal allocation of resources and the interests of consumers” (AdC announcement).

So, considering all these factors, the AdC, taking into account the “irreparable damage (...) in the market for hiring assets that are decisive for the quality of the teams in terms of participation in sports competitions” (AdC announcement), threatened these football teams with a fine of daily six thousand euros starting after a warning period and ending at the moment team’s decision to stop the tacit collusion. This was a potential agreement between companies to restrict competition. Hence it was forbidden by competition law. That is why later, in April 2021, the AdC issued a formal accusation against the already mentioned PLPF for breaching competition rules. However, although the AdC prohibited this potential agreement, it did not analyze the potential effects of the agreement from an economic perspective more deeply looking into this specific market, which we will analyze in this research.

5. Description of data and approaches

To not only consider whether the AdC decision was correct in economic terms, but also to observe more generally if structural misallocations in the football market exist, I have collected and organized two different data sets from three sources: website "transfermarkt"[1], website "fbref"[2], and the "Fifa" videogame database[3]. The first data set contains the "national" data where we have three big Portuguese teams (Benfica, Porto, and Sporting) and three small Portuguese teams (Setúbal, Tondela, Belenenses) with minutes played in the season by each player, matches played in the season by each player, each player’s respective market value at

[1] https://www.transfermarkt.pt/
[2] https://fbref.com/en/
[3] https://www.sofifa.com/

that time, each player's respective Fifa overall rating at that time, and the information if the player has arrived at the club at the beginning of the season, across five different football seasons (from 2015/2016 to 2019/2020). The second data set is the "international" data, and it aims to see if there are misallocations across Europe more broadly. The international data have the same resources as the national data across the same five different football seasons, except for the fact they do not include the information if the player has arrived in the club at the beginning of the season and the fact that we have five different big teams (Juventus, Man. City, PSG, Bayern, Barcelona) and five different small teams (Espanyol, Anderlecht, Nice, Schalke, Feyenoord) from five different leagues in both cases.

One way of trying to determine an answer to the question of whether the player allocation is efficient or not is to see whether players are used or not according to their stand-alone value, and that is why we will regress players' usage (expressed by minutes played or matches played) on their value (expressed by Fifa overall rating or market value) with different econometrics methods. This is to observe the marginal contribution to the team and declare the existence of structural misallocations or not when comparing big and small teams.

The dependent variable in every regression will be *"Minutos*, " representing minutes played by each player. The independent variables vary between national and international data, but *"marketvalue"* or *"FIFA"*, *"dummy_big"*, and *"big_marketvalue"* or *"big_FIFA"* are common in most of the regressions representing, respectively, the market value of the player or the overall Fifa rating of the player, a dummy variable for whether the team is big (in which case returns one) or small (in which case returns zero), and the interaction term which is the multiplication of *"dummy_big"* times *"marketvalue"* or *"FIFA"*. Finally, when analyzing the national data, we add three more variables named *"transferido"*, *"big_and_transf"* and *"transf_marketvalue"* or *"transf_FIFA"*, which represent, respectively, a dummy variable for whether the player has arrived from a transfer in that season (in which case returns one) or has

been already in the team since the previous season (in which case returns zero), an interaction term which is the multiplication of *"transferido"* times *"dummy_big"*, and another interaction term which is the multiplication of *"transferido"* times *"marketvalue"* or *"FIFA"*.

When performing the tests in STATA, I have used two different approaches: OLS regressions performed in national data and international data, and panel data regressions performed in national data and international data. More specifically, in panel data, I have used the random effects model because it was the best model when opting between fixed effects or random effects (after performing the Hausman test), and also when opting between OLS and random effects (after performing the Breusch and Pagan Lagrangian multiplier test).

6. Estimation, results, and interpretations

Table 1 below presents the correlation and regressions made on *"marketvalue"* and *"FIFA"* to see whether these variables provide the same information or not in the national data and international data. It also presents the four most simple linear regressions of *"Minutos"* and *"marketvalue"* and *"Minutes"* and *"FIFA"* (in each data) to see if there is a good level of significance.

Table 1:

VARIABLES	MODELS			
	NATIONAL DATA		INTERNATIONAL DATA	
	(1) OLS with marketvalue	(2) OLS with FIFA	(3) OLS with marketvalue	(4) OLS with FIFA
marketvalue	0.00009*** *(0.000006)*		0.000036*** *(0.0000016)*	
FIFA		55.94*** *(7.13)*		109.85*** *(3.69)*
Constant	1153.7*** *(53.9)*	- 2653.9*** *(516.8)*	1245.6*** *(40.24)*	- 6623.2*** *(284.9)*
Correlation between marketvalue and FIFA	0.8304		0.7762	

*Notes: Standard errors of parameters estimates are in parentheses. Significance at the 1%, 5% and 10% level is signaled by ***, ** and *, respectively.*

As we can see, in all four regressions, the coefficients are positive and significant. Analyzing the results about correlation, in both national data and international data, we have strong correlations between *"marketvalue"* and *"FIFA"*, having 0.8304 and 0.7762, respectively, in each data. Now, in the following two table's analysis, when doing regressions with the same variables but toggling between *"marketvalue"* and *"FIFA"*, if the results are similar, they will be stronger and more revealing because *"marketvalue"* and *"FIFA"*, are, again, highly correlated.

Table 2 below presents the models performed using national data, different regressions (each one of them with different sets of variables), results of coefficients, standard deviations, and levels of significance.

Table 2:

	MODELS OF NATIONAL DATA		
VARIABLES	(1) OLS with marketvalue	(2) OLS with FIFA	(3) Panel data
marketvalue	0.00017*** *(0.00004)*		0.00016*** *(0.00004)*
FIFA		109.25*** *(18.34)*	
Transferido	320.2** *(134.8)*	860.63 *(2148.5)*	338.65** *(133.84)*
Dummy_big	160.009 *(138.9)*	2160.8 *(1576.5)*	171.9 *(141.4)*
Big_marketvalue	- 0.0001*** *(0.00004)*		- 0.00012*** *(0.00004)*
Big_FIFA		- 35.4 *(22.13)*	
Big_and_transf	- 445.9 *(394.3)*	- 689.5* *(352.75)*	- 488.06 *(391.7)*
Transf_marketvalue	- 0.00003 *(0.00004)*		- 0.00003 *(0.00004)*
Transf_FIFA		- 9.2 *(31.38)*	
Constant	912.52*** *(93.24)*	- 6263.7*** *(1252.7)*	901.9*** *(94.69)*

*Notes: Standard errors of parameters estimates are in parentheses. Significance at the 1%, 5% and 10% level is signaled by ***, ** and *, respectively.*

Table 3 below presents the models performed using international data, different regressions (each one of them with different sets of variables), results of coefficients, standard deviations, and levels of significance.

Table 3:

VARIABLES	MODELS OF INTERNATIONAL DATA		
	(1) OLS with marketvalue	(2) OLS with FIFA	(3) Panel data
marketvalue	0.00009*** *(0.000008)*		0.00007*** *(0.000009)*
FIFA		106.7*** *(7.29)*	
Dummy_big	125.08 *(92.26)*	- 1807.6*** *(668.09)*	27.7 *(101.58)*
Big_marketvalue	- 0.00005*** *(0.000008)*		- 0.00004*** *(0.0000093)*
Big_FIFA		19.5** *(8.823)*	
Constant	1012.704*** *(66.76)*	- 6258.52*** *(535.6)*	1042.28*** *(71.48)*

*Notes: Standard errors of parameters estimates are in parentheses. Significance at the 1%, 5% and 10% level is signaled by ***, ** and *, respectively.*

As we can see from tables 2 and 3, *"dummy_big"* is significant just in one of the models: model 2 of Table 3. In that specific regression, the coefficient associated with this dummy variable is negative. Nevertheless, in all other regressions, *"dummy_big"* is not significant. Therefore, we can't say that big clubs use players less in general because there is only one evidence of it when accounting for every regression, including panel data regressions.

Secondly, looking into tables 2 and 3, we observe the significance of *"big_marketvalue"* in most regressions and the significance of *"big_FIFA"* in most regressions that represent, more or less, the same. This is because, as we pointed out at the beginning of the chapter, *"marketvalue"* and *"FIFA"* are highly correlated. We may say that because in most of the

regressions (random effects and OLS regressions) of both data's the results of *"big_marketvalue"* and *"big_FIFA"* are significant, and the coefficients are negative (except in one significant regression in which is positive), big teams use more valuable players less. Three regressions have significant results with a negative coefficient, and just one shows the opposite with a positive and significant coefficient.

Regarding *"transferido"*, this was a variable adopted in the national data (Table 2) to see whether players that arrived from a transfer in that season differ from players that had been already in the team since the previous season. We may say (with a higher uncertainty) that happens because, in most of the regressions (random effects and OLS regressions) of the national data, the results of *"transferido"* are significant. The coefficients are positive when significant; teams, in general, use more players that arrived from a transfer in that season. More precisely, two regressions have significant results with a positive coefficient.

Regarding *"big_and_transf", "transf_marketvalue",* and *"transf_FIFA"* (from Table 2 again, the analysis is inconclusive in all 3 regressions of the national data (random effects and OLS regressions) because coefficients are always not significant, except *"big_and_transf"* which is significant at a 10% level one time (model 2).

Finally, doing a panel data analysis of international and national data's but also linking with the OLS analysis, we may say that they show the same pattern in this specific aspect that needs to be underlined: *"dummy_big"* is usually not significant but the interaction of *"dummy_big"* with *"marketvalue"* (*"big_marketvalue"*) is usually significant and negative.

7. Conclusion

First, given the results obtained in the last chapter, it is essential to state that the AdC intervention was very justifiable and coherent. Without its intervention, collusion between clubs would cement the existing structural misallocations, as the data indicates both at an international and national level. Collusion, by restraining trade, would "freeze out" efficient allocations that could correct and improve competitive balance in the Portuguese league.

More specifically, the national data, which refers to some of the Portuguese teams trying to collude, has some significant results that directly bring more power and consistency to the AdC decision. First, as we already pointed out in the last chapter, big teams use more valuable players less, which enables small teams to enjoy better players from big teams if these players were allowed to switch teams, increasing efficient allocations and competitive balance. Collusion between clubs would not allow this. Second, since recently transferred players are more used in general according to the national data, agreements that forbid transfers of players who unilaterally terminate would be a hurdle to a more competitive Portuguese league.

Now, analyzing in more detail the European football panorama, we may say that, due to the comparison with the US and, mostly, due to our empirical analysis of the last chapter, there are structural misallocations. When analyzing just the results provided by the international data, we have two relevant conclusions: at least when looking at a simple OLS regression using the *"FIFA"* variable, big teams use players less in general when compared with small teams; in all the three models of the international data, including the panel data model, big teams use more valuable players less.

Literature in sports economics has never developed the concept of structural misallocations in European football. This research concludes that there are signs of it, especially due to the results underlined in the last paragraph. These results show big teams, at an international level,

"squander" top players because those are not used according to their stand-alone value, and even players, in general, are less used by big teams.

After describing, in the literature review part, all the advantages of a European framework that promotes competitive balance, evidence indicates that that framework is not fully developed. Without evaluating measures of the European and world football sovereign powers (like FIFA, UEFA, or even government bodies) but instead focusing just on what the evidence shows, European football could have a Pareto improvement regarding its participants if the system were to engage in avoiding these structural misallocations, as the case of the Premier League already underline. Letting a player leave from a bigger team and joining a smaller team raises the total value of the teams, which seems a paradox, but it is not. Suppose the rules, in terms of transfers, are applied to protect and develop a well-balanced system where teams, across time, are rebuilt to have a low variation in talent (because of complementarities enhanced in the literature review) and a similar overall quality between teams in the same leagues. In that case, we shall have a positive balance in terms of social welfare.

On the other hand, if the transfer system does not support a well-balanced system, many players that are not allowed to compete the amount of time they should compete will continue to stagnate or decrease in its quality for not playing the number of minutes they should, portraying the dependence of small teams in big teams.

Finally, the centralization from the European leagues is also vital to refer as something to be addressed in further research as a possible factor that can strengthen competitive balance. Having shown that player allocation and use are unbalanced, centralization could solve that problem, although this research does not investigate it.

It is also relevant to say that we would have liked to measure the potential difference in the complementarity of players between big and small teams. Nevertheless, we did not have the

necessary data. So our analysis is strictly dependent on players' stand-alone value to determine whether there is a misallocation in the football market.

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9. Appendix

Short description of data:

In the national data, we have 629 observations and 387 players, and, besides what has already been referred to, we also have the columns of the player's short name and its respective team.

In the international data, we have 1289 observations and 591 players, and, besides what has already been referred to, we also have the columns of the player's short name and its respective team.

Overall, between, and within variations in the national panel data:

Variable		Mean	Std. Dev.	Min	Max	Observations
Player~d	overall	189.6224	111.2341	1	387	N = 625
	between		111.8615	1	387	n = 387
	within		0	189.6224	189.6224	T-bar = 1.61499
Ano_t	overall	3.0944	1.38063	1	5	N = 625
	between		1.304399	1	5	n = 387
	within		.7433825	1.0944	5.427733	T-bar = 1.61499
Min	overall	1387.134	1067.946	0	4170	N = 625
	between		930.1694	0	4170	n = 387
	within		570.096	-802.8656	3153.134	T-bar = 1.61499
value_~r	overall	5643688	6665165	50000	4.90e+07	N = 625
	between		5598551	185000	3.25e+07	n = 387
	within		2386974	-1.24e+07	2.21e+07	T-bar = 1.61499
dummy_~g	overall	.4768	.4998615	0	1	N = 625
	between		.4922611	0	1	n = 387
	within		.0833333	-.1898667	.9768	T-bar = 1.61499
transf~o	overall	.224	.417256	0	1	N = 625
	between		.4116879	0	1	n = 387
	within		.2056883	-.4426667	1.024	T-bar = 1.61499
multiply	overall	4844112	7107361	0	4.90e+07	N = 625
	between		6039907	0	3.25e+07	n = 387
	within		2344970	-1.32e+07	2.13e+07	T-bar = 1.61499
multip~2	overall	.0384	.1923138	0	1	N = 625
	between		.1910174	0	1	n = 387
	within		.1027142	-.4616	.7884	T-bar = 1.61499
multip~3	overall	609840	1953240	0	1.90e+07	N = 625
	between		1828994	0	1.75e+07	n = 387
	within		1113762	-6390160	1.33e+07	T-bar = 1.61499

Hausman test (choosing between fixed or random effects in the national panel data):

```
. hausman fixed random

Note: the rank of the differenced variance matrix (3) does not equal the number of coefficients
        being tested (6); be sure this is what you expect, or there may be problems computing the
        test.  Examine the output of your estimators for anything unexpected and possibly consider
        scaling your variables so that the coefficients are on a similar scale.

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+------------------------------------------------------------
   value_eur |    .0000282      .000166       -.0001378        .0000515
   dummy_big |   -668.8139     171.9751        -840.789        472.7948
 transferido |    359.8927     338.6594        21.23334        184.7949
    multiply |   -.0000152    -.0001208        .0001057        .0000526
  multiply_2 |   -63.40582    -488.0655        424.6596          546.76
  multiply_3 |    -.000011    -.0000357        .0000247        .0000526
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        3.34
                Prob>chi2 =      0.3423
```

BP Lagrangian multiplier test (choosing between OLS or random effects in the national panel data):

```
Breusch and Pagan Lagrangian multiplier test for random effects

        Min[Player_id,t] = Xb + u[Player_id] + e[Player_id,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+------------------------------
                     Min |    1140509       1067.946
                       e |   849973.3         921.94
                       u |   74024.89       272.0752

        Test:   Var(u) = 0
                                chibar2(01) =    25.44
                             Prob > chibar2 =   0.0000
```

Overall, between, and within variations in the international panel data:

Variable		Mean	Std. Dev.	Min	Max	Observations
Player~d	overall	296.5842	171.4012	1	591	N = 1282
	between		170.7513	1	591	n = 591
	within		0	296.5842	296.5842	T-bar = 2.1692
Season~e	overall	2.99454	1.409503	1	5	N = 1282
	between		1.299806	1	5	n = 591
	within		.9549098	.9945398	5.327873	T-bar = 2.1692
Minutos	overall	1809.013	1292.601	0	4980	N = 1261
	between		1161.902	0	4530	n = 583
	within		608.8353	-1151.387	4841.413	T-bar = 2.16295
value_~r	overall	1.52e+07	1.85e+07	100000	1.23e+08	N = 1282
	between		1.48e+07	100000	1.06e+08	n = 591
	within		5633876	-3.21e+07	4.71e+07	T-bar = 2.1692
dummy_~g	overall	.5031201	.5001854	0	1	N = 1282
	between		.492338	0	1	n = 591
	within		.0867189	-.2968799	1.30312	T-bar = 2.1692
multiply	overall	1.24e+07	1.98e+07	0	1.23e+08	N = 1282
	between		1.57e+07	0	1.06e+08	n = 591
	within		5588234	-3.49e+07	4.43e+07	T-bar = 2.1692

Hausman test (choosing between fixed or random effects in the international panel data):

```
. hausman fixed random

Note: the rank of the differenced variance matrix (1) does not equal the number of coefficients
        being tested (3); be sure this is what you expect, or there may be problems computing the
        test.  Examine the output of your estimators for anything unexpected and possibly consider
        scaling your variables so that the coefficients are on a similar scale.

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+------------------------------------------------------------
   value_eur |    1.64e-07     .0000796       -.0000795        .0000102
   dummy_big |   -362.9351     27.70445       -390.6395        288.6509
    multiply |   -4.00e-06     -.000045         .000041        .0000107
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        1.83
                Prob>chi2 =      0.1760
```

BP Lagrangian multiplier test (choosing between OLS or random effects in the international panel data):

```
Breusch and Pagan Lagrangian multiplier test for random effects

        Minutos[Player_id,t] = Xb + u[Player_id] + e[Player_id,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+------------------------------
                 Minutos |    1670816       1292.601
                       e |   688409.6       829.7045
                       u |   298104.1       545.9891

        Test:   Var(u) = 0
                             chibar2(01) =   146.22
                          Prob > chibar2 =   0.0000
```