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Talent Development and Labour Market Integration: The Case of EU Football

Pehr-Johan Norbäck, Martin Olsson and Lars Persson

Research Institute of Industrial Economics
P.O. Box 55665
SE-102 15 Stockholm, Sweden
info@ifn.se
www.ifn.se

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Pehr-Johan Norbäck
Research Institute of Industrial Economics

Martin Olsson
Research Institute of Industrial Economics and IFAU

Lars Persson
Research Institute of Industrial Economics and CEPR

Abstract

We analyse how the Bosman ruling changed the incentives for football clubs in the European Union (EU) to develop talents. We show that the stiffer bidding competition over star players after the Bosman ruling has spurred talent development primarily in EU countries without established top clubs. This, in turn, has had a positive impact on their junior and senior national teams' performance. However, the stiffer bidding competition has also led to a lower competitive balance in the Champions League, as non-established clubs prefer to sell their star players instead of challenging the top clubs. We provide empirical evidence consistent with these findings.

Keywords: Sports industry, star players, Champions League, Bosman ruling
JEL classification: J44. L50, L83

*The authors can be reached at pehr-johan.norback@ifn.se, martin.olsson@ifn.se and lars.persson@ifn.se. We are grateful to the Marianne and Marcus Wallenberg Foundation and Tom Hedelius's and Jan Wallander's Research Foundation for financial support. We have greatly benefited from comments from Magnus Henrekson and Henrik Horn.

1 Introduction

In the European Union (EU), sport is acknowledged to have a significant and growing impact on the economy. The sports industry accounts for almost one percent of the total employment in member countries, with Iceland and Sweden on top with 2% and 1.5%, respectively.[1] Watching sports engages even more people. In particular, watching football is currently a large part of many people's lives. According to FIFA (Federation Internationale de Football Association), 3.2 billion fans watched the World Cup in 2014 on TV.[2] Success in international football tournaments is probably one of the most desired national successes for citizens in a European country. In a study on a German sample, Wicker, Kiefer, and Dilger (2015) find that the average amount people are willing to pay for Germany winning the European Championship in football is almost as high as the amount they are willing to pay for winning the overall medal table in the Olympic games, which involves hundreds of sports (Euro 40.74 versus Euro 46.47).

The value of watching and playing football requires competitive balance between participants: uncertainty of the outcome in a game is crucial for its value. To uphold competitive balance, the big leagues in U.S. (the NBA, NFL, and NHL) all use salary caps and redistribute resources or players to less successful teams (an example is the draft system, where worse performing teams get priority when choosing future stars).

In the EU, however, since the Bosman ruling in 1995, football leagues have needed to follow the same labour laws as other industries, and the use of such league restrictions is limited. On 15 December 1995, the European Court of Justice decided that the existing EU football transfer fee system — which placed restrictions on the free movement of workers (players) — was not compatible with EC law, i.e., the Bosman ruling. The Bosman ruling changed the European transfer fee system profoundly by allowing players to move freely to another club at the end of their contract without the old club receiving any economic compensation. Moreover, the Bosman ruling prohibited quotas on the number of foreign EU players that a club could have in its squad. Before Bosman, clubs were under the so-called "three plus two rule" in international games, allowing at most three foreign players in the squad plus two additional foreign players if they came from the club's own academy. With the Bosman ruling in place, clubs were allowed to have as many EU players as they want in their squad. As a consequence, the best EU leagues and their top clubs experienced a major influx of foreign EU players.[3]

[1] These numbers include persons employed in sport-related economic activities according to the NACE Rev. 2 classification regardless their occupation, as well as all persons with a sport-related occupation (ISCO-08 classification) regardless the economic sector they work in. To obtain the employment figures in sports, the following NACE and ISCO codes were considered, as they reflect the "statistical definition" of the Vilnius Definition of Sport: NACE code 93.1 "Sport activities" and ISCO code 342 "Sports and fitness workers" (http://ec.europa.eu/eurostat/web/sport/statistics-illustrated).

[2] www.fifa.com.

[3] Ichniowski and Preston (2014) report that in the major leagues in Europe, namely, the so-called top five leagues (England, France, Germany, Italy and Spain), the number of foreign players increased from approximately 15% just before 1995 to approximately 35% in 2000.

This raises the issue of how the unregulated EU football labour market affects the competitive balance in the EU. Does competition in the labour market lead to functioning competition in the football market as well? With an unregulated labour market for star players, it is easier for an ambitious outsider club to build up a new top team (e.g., Manchester City) — but at the same time, it is also easier for established clubs to keep their incumbent advantages by buying star players from rival upcoming clubs (e.g., Real Madrid). For the success of clubs in this environment, their ability to develop their own talents into superstars (e.g. Barcelona and La Masia) is crucial.

In this paper, we examine how the abolishment of regulated transfer fees and the prohibition of quotas on the number of foreign EU players in a club's squad has affected the incentives for talent development at the club level and how this in turn has affected the competitive balance at the club level — as well as at the national team level — in the EU. To this end, we first derive three statistical facts about how the competitive balance in the EU has changed since the Bosman ruling.

To start, we find that the Bosman ruling has worsened the competitive balance in the main European club league, the Champions League. In the period before 1995, approximately 30% of the clubs that reached the round of 16 in a given year did so the following year as well. In the period after 1995, this share increased by nearly 20 percentage points, revealing a higher concentration of a few top clubs in the later stages of the tournament.[4][5]

- *Fact 1: The competitive balance in the Champions League decreases post-Bosman.*

We then turn to the competitive balance at the national level, where we compare how the five top nations (England, France, Germany, Italy and Spain) in the EU15 have performed relative to the ten bottom (Austria, Belgium, Denmark, Greece, Ireland, Northern Ireland, Netherlands, Scotland, Sweden and Portugal) EU15 countries in World Cup tournaments from 1978 to 2014.[6] Before the Bosman ruling, the top nations earned on average approximately 0.5 more points per game than the bottom nations. After the Bosman ruling, the gap narrows by approximately 0.3 points as bottom nations improve their performance. Thus:

- *Fact 2: In the World Cup tournament, the bottom EU15 countries have improved their performance after the Bosman ruling relative to the top EU15 countries.*

[4] The higher concentration of a few top clubs after the Bosman ruling does not rule out an increase in the competitiveness among the top clubs.

[5] Peeters (2011) finds that the Champions League has had a negative effect on the competitive balance in European leagues. Schokkaert and Swinnen (2016) compare the competitive balance in the Champions League and in the European Championship and document a decreased competitive balance in the early rounds of the Champions League but an increased competitive balance in the later rounds.

[6] For Germany, we use the performance of West Germany before the reunification of Germany in 1990. The top five countries are usually referred to as the Big 5 nations and have the best domestic leagues in terms of the average attendance at games, club performance in European cups and economic revenues that the clubs generate. The company Deloitte has ranked European clubs by their revenues since the 1997/98 season in its annual report "The Deloitte Football Money League". Clubs from the top five nations dominated the rankings in all years considered.

Finally, we address performance at the junior level. Without a direct measure of the talent development intensity in EU15 countries over time, we focus on the performance in the European Champion for under-16 players. Since clubs in EU are not allowed to poach young players by the Union of European Football Associations (UEFA), any effect on the competitive balance between the top and bottom nations at the youth level is likely to, at least partly, reflect the differential effects on incentives to develop new talents at the national level. Before the Bosman ruling, the top nations earned on average approximately 0.4 points more per game than the bottom nations. After the Bosman ruling, the gap decreases by around 0.3 points per game. Hence, we find that:

- *Fact 3: In the European Championship for under-16 players, the bottom ten EU15 countries have improved their performance after the Bosman ruling relative to the top five EU15 countries.*

How can these three facts be reconciled? One explanation is that the Bosman ruling allowed incumbent clubs in the top EU countries to attract the best players from the bottom EU countries, producing increased inequality at the club level. Playing in top clubs, in turn, allowed the top players from the smaller countries to improve their skills, strengthening their national teams relative to those of the larger countries. While a story of migration combined with learning can explain the two first facts — less competitive balance at the EU club level, but more competitive balance at the EU national level — it cannot explain why the youngest nationals from the smaller countries also appear to improve their performance relative to those from the larger countries. In the following section, we will argue that all three facts can be understood from the perspective of how the incentive for talent development in small EU countries was affected by the Bosman ruling.

To explore how the Bosman ruling changed the incentive for talent development in the European football market, we combine a talent development model with a hiring model. In the model, there is a Champions League tournament with incumbent clubs in possession of star players[7] from large countries. Additionally, there are several outside clubs from smaller countries, including a nursery football club that has the skill to develop talents into star players (in an extension section, we allow incumbent clubs to search for star players without a qualitative change in results). In Stage 1, the nursery club exerts effort to find a star player. If successful, the club can offer the player a long term contract. In Stage 2, the nursery club decides whether to retain the star player and challenge the incumbent clubs in the Champions League or to sell the star player to an incumbent club. The nursery club enters if no incumbent club submits a bid higher than the nursery club's reservation price. In Stage 3, the Champions League is played, and the

[7] See, for instance, Richelieu, Lopez and Desbordes (2009). The advantage that these clubs have typical originates in their large local fan base. However, in the contemporary globalized European football market, their strength lies not only in their possession of star players but also in their brand names, which have created an international fan base. Clubs who want to challenge these top clubs thus need to invest in star players as well as marketing to overcome their fan disadvantage. For instance, the "newcomers " Manchester City and Paris Saint Germain have invested heavily in both star players and marketing.

club with the star player will have a larger expected winning percentage. The clubs then receive revenues from prize sums and commercial sales in proportion to the share of matches won.[8]

As described by Terviö (2006), many in the sports industry thought that the abolishment of transfer fees would lead to less investment by clubs in the talent development of young players. Fear of a "brain drain" of talented players at smaller clubs also followed Bosman. Pre-Bosman, top players were strongly tied to the club even after contract termination, enabling the club to keep most of the proceeds from a sale. Post-Bosman, however, top players could leave as free agents after demonstrating their skill in the nursery club. This would leave players little reason to share the proceeds from a transfer with the nursery club.

However, we will show that the Bosman ruling could in fact have strengthened the incentives to search for and develop players at nursery clubs. This is explained as follows: First, if there is a risk of injury (or uncertainty of the true talent of a player), a risk-averse star player will be willing to sign a long term contract with a nursery club in exchange for an up-front payment. A risk-neutral nursery club can exploit this insurance motive and hence secure a significant share of the proceeds in a future sale as well after the Bosman ruling. Moreover, with the restrictions on the usage of foreign players lifted after the Bosman ruling, incumbent clubs will bid more aggressively to secure a star player in their own squad and keep rivals from adding this player to their squads. The stronger bidding competition post-Bosman pushes up the price in a sale, which will then make the nursery club more willing to sell the star player to one of the incumbent clubs rather than to challenge them and attempt entry into the Champion's League. This in turn worsens the competitive balance at the EU club level (explaining Fact 1). The higher reward generated from the sales of high-quality players under bidding post-Bosman dictates the lower share of this value going to the nursery club. Effectively, this translates into a stronger incentive for nursery clubs to find and develop star players, which in turn explains why the national teams in the smaller EU countries improved their performance post-Bosman (explaining Fact 2 and 3).

In summary, we argue that the Bosman ruling led to the emergence of a liquid market for star players, where stiff bidding competition between incumbent clubs over star players suggested that the reward for nursery clubs from selling star players was larger than the reward from keeping them and challenging the more established clubs. The high reward in selling players has in turn led to greater incentives to develop star players in nursery clubs in the smaller countries, which then explains the better relative performance of the national teams in the smaller EU countries.

We end our analysis with a welfare discussion. Football is perhaps the most popular sport in the world. FIFA (Federation International de Football Association) reports that approximately 4% of the world's population participates actively in football, either as players or as referees.[9] However, watching at football is even more popular. In 2014, 1/7 of the world's population watched at least part of the game as Germany defeated Argentina by 1-0 in the World Cup

[8] The theoretical model builds on the model developed in Norbäck and Persson (2014) to understand how the entry-sale pattern of entrepreneurs depends on the intensity of product-market competition.

[9] The figures stems from the Big Count survey that FIFA conducted in 2007 (www.fifa.com)

final.[10] No other sport can attract that kind of audience.[11] Since the Bosman ruling changed the competitive balance — worsening it at EU club level, while improving it at the national level — the overall welfare effects on a single country would depend on where most of the football utility stems from. If people in a country predominately derive football utility from the success of its national team (or national star players), for example, then the Bosman ruling should have increased welfare in the smaller countries predominantly endowed with the nursery clubs. The higher expected return to talent development induced organizations and players to invest more in training, leading to greater welfare in the source countries of the players, even if the migration of star players occur.

2 Related Literature

Several papers have addressed how the free movement of players after Bosman has affected the competitive balance at the national level. Frick (2009) finds that the Bosman ruling did not affect the competitive balance of national teams in countries importing players and those exporting players. This result is supported by Binder and Findlay (2012), who find that the ruling had no impact on the competitive balance between national teams in Europe. However, Berlinschi et al. (2013) show that the migration of football players improves the performance of the national team for countries with lower-quality clubs.[12] Other papers have addressed how the Bosman ruling has affected clubs' incentive to develop new talents. Ericson (2000) argues that the abolition of transfer fees and ownership rights creates a free-rider problem in talent development that can force smaller clubs to sell their talented players before the end of their contract, thereby draining smaller markets of player quality. Therefore, in order for clubs in smaller markets to develop talents, transfer fees are needed to cover the training costs. Terviö (2006) shows that transfer fees are needed to allocate competitive playing time between players of different abilities efficiently. Without transfer fees, a club obtains revenue only from a player's current output because if the player turns out to be better than expected, he will leave the club. This reduces the incentive to hire young talents.

We add to this literature by showing that the fear that the Bosman ruling would dampen the incentives for clubs in smaller countries to develop players does not appear to be well founded. The key reason is that football clubs in EU were also allowed to have more players from other member states in their squads. Among the major top clubs (incumbents), this leads to an increased willingness to pay for star players to preempt rival clubs from acquiring them. If the increased total willingness to pay for star players is sufficiently large, then the smaller clubs, despite obtaining a smaller share of the total sale revenues from a weaker bargaining position

[10] www.fifa.com.

[11] In comparison, the Super Bowl in 2016 attracted 111.3 million viewers (www.money.cnn.com)

[12] See also Milanovic (2005), who argues that a more open football market in combination with skill spillover leads to less inequality between national teams and Gelade and Dobson (2007), who show that more international players in a national team tend to result in better performance.

regarding players, will still receive larger proceeds. An alternative explanation of why the Bosman ruling has improved the performance of smaller EU countries is that players from these countries capture spillovers associated with playing in better leagues. Such an effect is likely a part of the story, but our finding on the improved results at the under-16 level in the small EU countries also suggests that stronger incentives to develop talents in smaller EU countries are in play. The reason is that players at the under-16 level have mainly trained and played in their country of origin because clubs in Europe are prohibited from poaching players if they are younger than sixteen.

Our paper also contributes to the literature on the economics of the European "promotion and relegation" organizational form of leagues and the development of the Champions League.[13] Noll (2003) examines the incentive structure and efficiency of different organizational structures of leagues. Noll concludes that the European system of promotion and relegation is superior to the closed structure of North American leagues. The reason is that it distributes teams across locations in a manner that delivers greater consumer benefits than a system of fixed memberships and ensures stable competition among teams in a city and among leagues in a nation. In contrast, Buzzacchi, Szymanski, and Valletti (2003) compare the European open football leagues, which permit entry by the process of promotion and relegation, to the closed leagues of North America, which have no automatic right of entry. They find that the open leagues are less balanced dynamically than the closed leagues. Hoehn and Szymanski (1999) examine the effect of whether teams play in both national and international leagues (Champions League) and argue in favour of the creation of a European super league and against teams playing both in the super league and in national leagues. Szymanski (2003) examines a model in which the outcome may be either too little or too much competitive balance. Implications for European football in general and the Champions League in particular are then discussed. We extend these findings by identifying incumbency (sunk costs) as a driver of clubs' success in league competition and argue that incumbency advantages have become more important in the more integrated European football market. This in turn implies that the goals of competitive championship balance in European football are less likely to be realized in the future.

Our paper also contributes to the literature on migration and brain drain. This research has examined both the costs and the benefits of migration of a country's best-educated workers.[14] Closely related to our study are the studies that have developed models where migration prospects

[13] The European Commission (2007) describes the "promotion and relegation principle" as one of the key features of the European model of sport. It is the principle whereby the worst-performing teams at a given level of league are demoted at the end of the season to play in the immediately junior league and are replaced by the best-performing teams from the latter league.

[14] On the benefit side are remittances to the home country (see e.g. Özden and Schiff 2006), return migration of brains who have acquired new skills abroad, networks created by skilled migrants that increase beneficial exchanges of goods, factors and ideas between the home and source countries (Lopez and Schiff 1998; Oettl and Agrawal 2008), and spillovers to source countries from technological development due to the concentration of human capital in the most advanced economies (see Grubel and Scott (1966), McAusland and Kuhn (2009, 2011) and Mountford and Rapoport (2011)). See also Docquier et al. (2012) for an overview.

raise the expected return on human capital; see Mountford (1997), Stark et al. (1997), Stark et al. (1998), Vidal (1998). A higher expected return induces people to invest more in education at home, which could lead to positive welfare effects on the source countries despite the occurrence of the migration of highly skilled people. We add to this literature by studying the effects of the human capital investment of global sports experts (football players) on an integrated market, namely, the production of direct welfare benefits for citizens in source countries in the form of happiness through sports success, which is mainly consumed through the expanded global broadcasting of football games.

Finally, our paper is related to the literature on superstars. Rosen (1981) shows how quality differences between agents lead to more than proportional differences in wages, turning agents with only a small quality advantage into "superstars" earning substantially more than the others. In the context of globalization, Manasse and Turrini (2001) develop an international trade superstar model showing that globalization increases wage differences between skilled and unskilled employees. The increasing wage heterogeneity comes from redistribution of income between exporting and non-exporting firms with different skill intensities. Mori and Turrini (2005) examine skill heterogeneity in a "new economic geography" model of location. They show that in the presence of pecuniary externalities, workers with higher skill choose to stay in the places where aggregate skill and income are greater, while the less skilled remain in other locations. Gersbach and Schmutzler (2015) develop a matching model where firms compete both in the product market and in the managerial market. They show that globalization (integration of product markets and managerial pools) leads to an increase in the heterogeneity of managerial salaries. The reason is that the more intense competition induced by globalization enhances the payoff for being more efficient in the sense that the profit difference between the most efficient firm and its less efficient competitors inevitably increases. We add to this literature by showing that market integration can lead to increased regional inequality of superstar organizations (football clubs) but decreased regional inequality of superstar supply (national team success). The reason is that market integration in the EU, as initiated by the Bosman ruling, increases both the possibility for incumbent clubs to preemptively buy star players from small EU countries and the incentive for nursery clubs in small EU countries to develop superstars for sale.

3 Stylized Facts: Bosman and Competitive Balance in the EU

In this section, we provide evidence of how the Bosman ruling has affected European football at three different levels: at the club level, at the national youth level, and at the national senior level.[15] At the national level, we conduct a simple difference-in-differences analysis to see how the relative performance between the top and bottom nations in the EU15 changes after the Bosman ruling. We conduct this exercise for the European Under-16 Championship and the World Cup

[15] All data have been collected from the website of The Rec.Sport.Soccer Statistics Foundation; http://www.rsssf.com.

tournament. At the club level, we turn to the Champions League and simply compare the concentration of top clubs in the later stages of the tournament before and after the ruling. It is important to note that after the Bosman ruling, the prize money and commercial value of the Champions League has increased steadily. In addition, the tournament structure has changed over time by allowing more clubs from the top leagues to enter at the group stage. With our simple empirical analysis, we are unable to disentangle these effects from one another. Instead, we estimate their aggregated effect.

3.1 Champions League

At the club level, we turn to Champions League. Binder and Findlay (2012) show that after the Bosman ruling, clubs from the top nations in Europe have dominated the Champions League even more than in the years before the ruling.[16] Figure 1 confirms the previous finding that the Champions League has become more dominated by the top clubs in the years after the Bosman ruling. The figure displays the share of clubs that reached the round of 16 in two consecutive years for the period from 1980 to 2014.[17] In the period prior to 1995, approximately 30% of the clubs that reached the round of 16 in a given year did so in the next year as well. In the period after 1995, this share increases gradually up until 2005 and then stabilizes at a new higher level. To test whether this increase is statistically significant, we run a linear probability model where the dependent variable takes the value of one if a club that has reached the round of 16 in a given year does so in the next year as well. The independent variable takes the value of one in all tournaments after 1995 and is zero otherwise. Estimating this model shows that in the period before the Bosman ruling, around 30 percent of the clubs reached the round of 16 in two consecutive years. This share increases by around 21 percentage points on average in the period after the Bosman ruling — the estimate is highly statistically significant (p-value equal to 0.000).

3.2 National teams

Did the Bosman ruling affect the competitive balance at the national level? Existing evidence suggests that Bosman ruling had a small overall effect on the national ranking of European countries (Binder and Findlay, 2012) and that the competitive balance between countries importing players and those exporting players was unaffected (Frick, 2009). We address the question by analysing match performance in the World Cup tournaments from 1978 to 2014.[18] Analysing match performance instead of country ranking has several advantages. First, it ensures that

[16] In 1999, the admission rules for Champions League were change when more than one club from the highest ranked leagues was directly qualified. Schokkaert and Swinnen (2016) show that this change has decreased the competitive balance in the earlier rounds of the tournament but that the outcome in later rounds has become less predictable.

[17] Note that the Champions League replaced the European Cup in 1992 when a group stage also was added.

[18] For Germany, we use the performance of West Germany before the reunification of Germany in 1990.

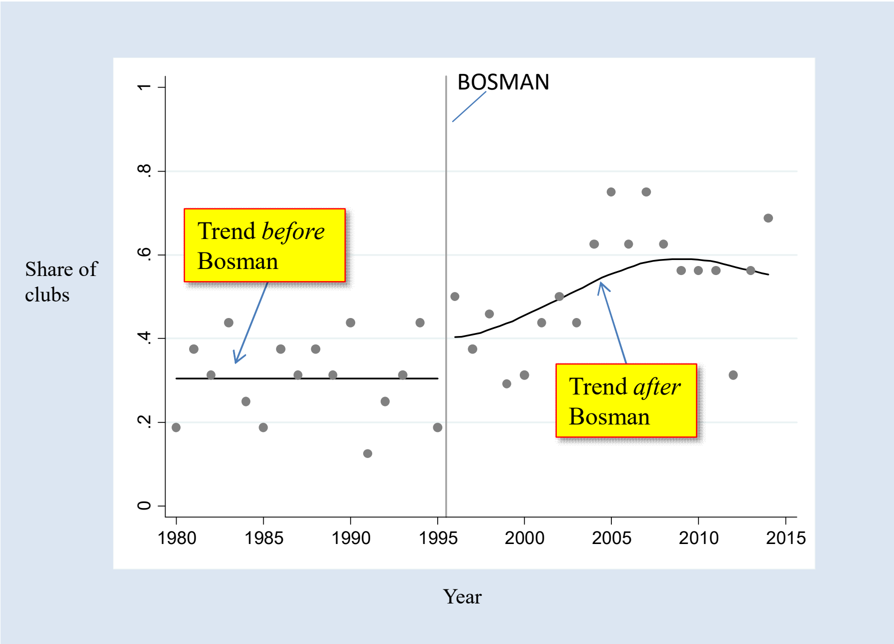

Figure 1: The share of clubs that reached the round of 16 in the Champions League in two consecutive years. Note: Lines represent kernel-weighted local polynomial smoothing regression using the periods 1980-1995 and 1996-2014 with a Epanechnikov kernel function and optimal bandwidth. The year of the Bosman ruling is indicated by the vertical line.

all countries have incentives to perform at their absolute highest level. Rankings such as the Elo and FIFA rankings are partly based on friendly matches in which the coaches may want to try new players or strategies instead of winning the games. Second, when the FIFA rankings are calculated, friendly games are given fewer points but an equal weight as competitive games. This means that the FIFA ranking depends partly on a country's propensity to play friendly matches; a country that plays many friendly matches instead of competitive matches will, all else equal, obtain a lower rank. Third, using match performance, we can exclude matches in which two bottom or top EU15 countries played one another; rankings are based on all matches independent of the opponent.

Figure 2 displays the average points per match taken by the bottom and the top EU15 nations in World Cup matches from 1978 to 2014 when playing against a country outside the EU15.[19] The figure suggests that before the Bosman ruling, the top five nations take more points per game on average than the ten bottom nations. However, after the Bosman ruling, the bottom nations improve their average performance relative to the top nations. However, this relative improvement in performance for the bottom nations is gradual over time.

To statistically test for a Bosman ruling effect on the competitive balance between top and bottom EU15 countries, we estimate the following difference-in-differences model:

$$y_{imt} = \alpha + \beta Bosman_t + \gamma BottomEU15_i + \delta BottomEU15_i \times Bosman_t + \mathbf{X}_t'\mathbf{\Psi} + \boldsymbol{\varepsilon}_{it} \quad (1)$$

where y_{imt} is the points taken by country i in match m in year t. $BottomEU15_i$ takes the value of one if country i belongs to the bottom ten countries in the EU15 and is zero if country i belongs to the top five countries in the EU15. The top five nations are England, Spain, Germany, Italy, and France, and the bottom EU15 countries are Austria, Belgium, Denmark, Greece, Ireland, Northern Ireland, Netherlands, Scotland, Sweden, and Portugal.[20] $Bosman_t$ takes the value of one in all years after the Bosman ruling in 1995 and is zero otherwise. Consequently, the constant α is the average points taken per game by top nations before Bosman. The coefficient γ captures the average point difference between bottom and top nations before the ruling (the average points per game taken by the bottom nations before Bosman is given by $\alpha + \gamma$). The coefficient β is the change in average points taken by top nations before and after the Bosman ruling (the average points for the top nations in the period after Bosman is given by $\alpha + \beta$). The difference-in-differences estimator is represented by δ and captures the change in average points per game taken by the bottom EU15 countries before and after Bosman relative to the same change in average points per game taken by the top EU15 countries.

Table 1 displays World Cup results using the model in Eq. 1. In Column 1, the constant shows

[19] When calculating the average number of points per game, a win gives two points, a draw gives one point and a loss gives zero points. All points are given after extra time but before penalties, and we exclude all matches between two bottom or two top EU15 nations.

[20] The top five nations are usually referred to as the Big 5 nations and have the best domestic leagues in terms of the average attendance at the games, club performance in European cups and economic revenues that the clubs generate.

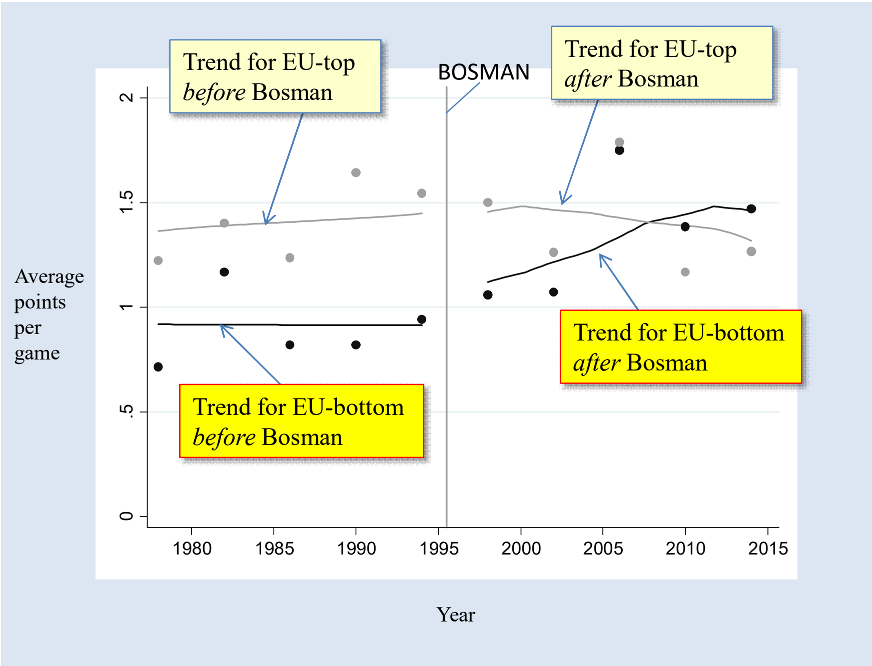

Figure 2: Average points per game in World Cup tournaments by top and bottom EU15-nations when playing a non-EU15 country. Note: Dots represents tournament averages for respectively group, and, the lines represent kernel-weighted local polynomial smoothing regression using the periods 1980-1995 and 1996-2014 with a Epanechnikov kernel function and optimal bandwidth. The year of the Bosman ruling is indicated by the vertical line.

that the top EU15 countries take on average 1.38 points per game before the Bosman ruling. During the same period, the bottom EU15 countries take on average 0.54 points less per game. Top nations experience no statistically significant change in performance after Bosman. The difference-in-differences estimate is positive but imprecisely estimated (p-value equal to 0.126). Taken literally, the estimate suggests that the bottom nations improve their performance by 0.29 points per game after the Bosman ruling relative to top nations. The model in Column 2 adds controls for whether the tournament is played in an EU15 country or in a South American country and adds dummy variables for which round of the tournament the match was played. The inclusion of these control variables leaves the estimate unchanged but increases the precision of the difference-in-differences estimate (p-value equals 0.084). These results support the idea that the average relative performance advantage that top nation have in tournaments played before the Bosman ruling is nearly abolished in tournaments after Bosman.

In Columns 3 and 4, the sample is restricted to matches where a EU15 country plays against a country outside the EU15 (third country). In this sample, top and bottom nations can improve their performance over time without cannibalizing each other. This allows the average performance of the two groups to independently change over time. The difference-in-differences estimate is precisely estimated and suggests that the bottom EU15 countries improve their performance relative to the top EU15 countries in World Cup tournaments after the Bosman ruling by 0.39 points per game. Finally, in Columns 5 and 6, the sample is restricted to matches that have been played between top and bottom EU15 nations. Only 42 matches have been played between one top and one bottom EU15 country in a World Cup during the period from 1978 to 2014. This sample is too small to perform any statistical analysis on, but for completeness, we display the results.

Table 2 presents the results of a linear probability model with a dependent variable taking the value of one if the home team at least achieves a draw and is zero otherwise. Hence, the model makes no differences between a win and draw (as opposed to the model used for Table 1). The difference-in-differences estimate is now precisely estimated for the full sample and shows increased performance for the bottom nations after the Bosman ruling relative to top nations; see Columns 1 and 2. Restricting the sample to matches versus third countries shows that the gap before Bosman between the top and bottom nations (represented by the coefficient for bottom) is nearly closed after the Bosman ruling (represented by the coefficient for DiD); see Columns 3 and 4. Analysing match performance in World Cup tournaments since 1978 thus suggests that the Bosman ruling increased the average performance of bottom EU15 nations relative to that of the top EU15 nations.

3.3 European Under-16 Championship

Finally, we analyse whether the Bosman ruling affected the talent development of young players in EU15 countries. Without a direct measure of talent development over time at the country level, we rely on data on the performance of countries in the European Under-16 Championship.

We use this data since clubs are not allowed to poach players until they have turned sixteen. Therefore, any Bosman effect on the competitive balance within the EU15 at the European Under-16 Championship is likely to reflect differential effects on the incentive to develop new talents at the country level rather than, for instance, an effect of the migration of young players. Although players at the age of 16 can play for clubs outside their home country, they will have received almost all of their football schooling in their home country. The European Under-16 Championship was played during the period from 1982 to 2001. In 2002, the under-16 tournament was replaced by an under-17 tournament. However, to minimize any effect of migration on performance, we will focus on the results of the under-16 tournament.

Figure 3 displays the average points per match taken by the top five and the ten bottom EU15 nations in European Under-16 Championship matches from 1985 to 2001 (the year 2001 is the last year of the tournament).[21] The figure suggests that before the Bosman ruling, the top five nations took more points per game on average than the ten bottom nations. The pattern continues after the Bosman ruling, but the gap narrows as the bottom countries start to perform relatively better on average.

Table 3 presents the re-estimated results (1). Panel A presents the results for the years from 1982 to 2001, while Panel B presents the results when adding the results from the under-17 tournament (covering the period from 1982 to 2016). Focusing on Panel A, the estimated constant in Column 1 shows that before the Bosman ruling, top nations take on average 1.2 points per game. During the same period, the bottom countries take on average 0.45 points less per match. After the Bosman ruling, top nations experience no statistical change in their average results; i.e., they continue to take around 1.2 points per game (as seen by adding the constant and the estimate for $POST_t$). However, the difference-in-differences estimate shows that the gap between the top and bottom EU15 countries narrows to 0.26 points per match after Bosman. Splitting the sample into matches where EU15 countries play each other or a third country reveals a relatively improved performance by the bottom nations when they played against top EU15 nations; when the bottom nations play against third countries, however, see Columns 2 and 3. The same pattern is seen when we run a linear probability model where the dependent variable takes the value of one if the home team at least achieves a draw and is zero otherwise; see Column 4, 5 and 6.

Interestingly, adding the under-17 results for the years after 2001 reveals a drop in performance in the years just after the change in the structure of the tournament, see Figure 4. This drop translates into smaller difference-in-differences estimates; see Panel B in Table 3. However, the results still suggest a relative improvement by the bottom EU15 nations when playing the top EU15 nations.

[21] When calculating the average number of points per game, a victory gives two points, a draw gives one point, and a loss gives zero points. Points are calculated after extra time but before penalties.

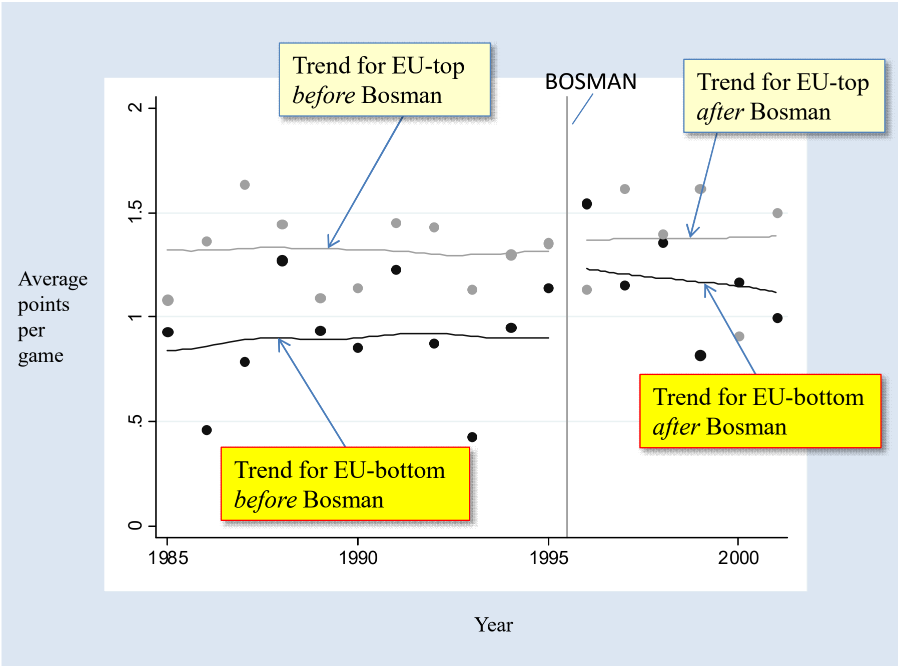

Figure 3: Average points per game in European Championship tournaments for boys under 16 by top and bottom EU15. *Note*: Dots represent tournament averages for respective group, and the lines represent kernel-weighted local polynomial smoothing regression using the periods of 1980-1995 and 1996-2001 with a Epanechnikov kernel function and optimal bandwidth. The year of the Bosman ruling is indicated by the vertical line.

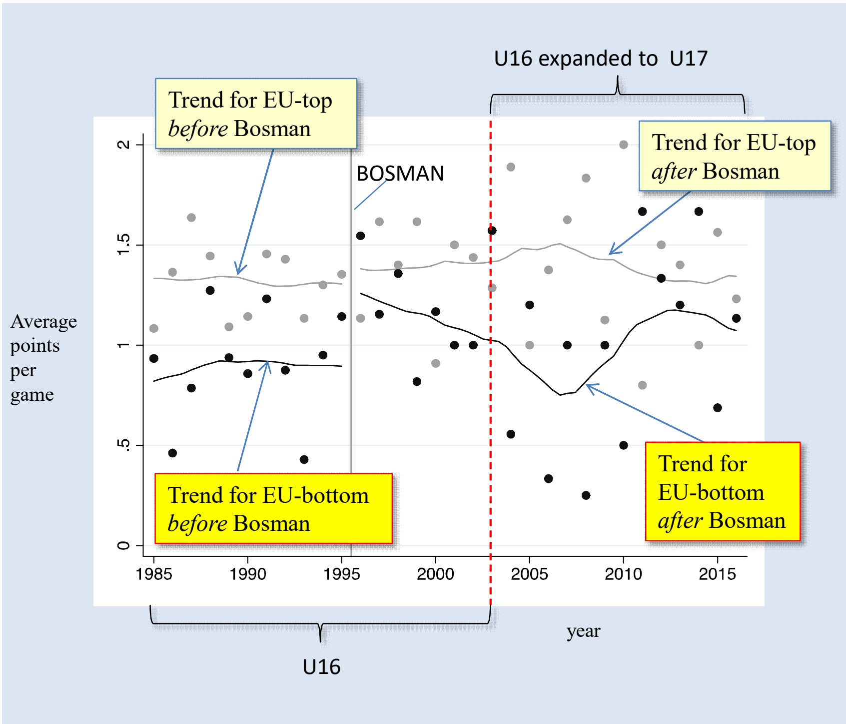

Figure 4: Average points per game in European Championship tournaments for boys under 16 and under 17 by top and bottom EU15. *Note:* Dots represent tournament averages for respective group, and the lines represent kernel-weighted local polynomial smoothing regression using the periods of 1980-1995 and 1996-2016 with a Epanechnikov kernel function and optimal bandwidth. The tournament was for boys under 16 during the period 1980-2001, and for boys under 17 during 2001-2016. The year of the Bosman ruling is indicated by the vertical line.

3.4 Summing up

Our analyses suggest that the Bosman ruling has affected the competitive balance in European football at different levels. At the club level, the Champions League has become less competitive following the Bosman ruling and its expansion. However, the competition at the national level in the EU15 appears to have increased, as traditionally weaker countries have become relatively stronger compared to the top five countries over the past twenty years. The same result is seen at the national level for youths (under 16). In the next section, we present a theoretical framework to explain these results and to better understand how institutions affect incentives and outcomes in elite education and competition.

4 The Model

Consider the following simple model of the Champions League. There are C profit-maximizing clubs in Europe that compete for m seats in the Champions League, where $m < C$.[22] Clubs are of two types: There are $I < m$ incumbent football clubs (e.g., Barcelona, Bayern Munich, Juventus and Manchester United). Incumbent clubs have reached their position over time, for example, by having high local demand or support from wealthy owners, and have been able to invest heavily in players. These player assets are labelled k_0, and the investment cost F associated with generating these player assets is sunk. For simplicity, we assume that the possession of these k_0 assets implies that incumbent clubs reach the Champions League with certainty.[23]

The remaining $C - I > 0$ clubs are "outside" clubs (e.g., RSC Anderlecht, FC Copenhagen, and Malmö FF). Outside clubs have inferior player assets, $\kappa < k_0$, and have to qualify in competition with other outside clubs for the $m - I > 0$ remaining seats in the Champions League. We assume that at the outset, the investment cost F is sufficiently high that none of the outside clubs will find it profitable to upgrade assets from κ to k_0 to reach the Champions League with certainty. $C - I > m - I > 0$ outside clubs will not qualify.

One of the $C - I$ outside clubs is a *nursery* club (n). The nursery club is endowed with the skill — or potential — to discover and develop talented players that can become star players, i.e., players of exceptional quality. The nursery club can challenge the incumbent clubs in the Champions League provided that it succeeds in developing a talented player into a star player. However, to seriously challenge the incumbent clubs in the Champions League, the nursery club also needs to upgrade its player squad quality from κ to k_0 at the fixed cost F.

The details are as follows:

- In Stage 1, the nursery club makes a costly investment in talent scouting and development, which increases the probability of finding and delivering a star player. If successful, the

[22]In our model, entering the Champions League is equivalent to reaching the group stage. Presently, there are $m = 32$ seats in the group stage.

[23]With possession of k_0, they reach the top position in their respective national leagues, which grants them a seat in the Champions League.

potential star player signs an initial contract with the nursery club at a low wage. Nature then brings out the talented player's true quality. After the quality of the talented player is revealed, the contract is renegotiated; the player is given a fixed wage cost if the contract is prolonged. In short, the new contract balances the star player's option to try his luck as a free agent against insurance in the event of injury (in which case his career ends). If the renewed contract is signed, then the star player must play for the nursery club in the national league and later in the Champions League in Stage 4, unless the player is sold to an incumbent club in Stage 2. The national league, which we do not model in detail, also serves as a verification device for the star player's quality, as incumbent clubs can observe the player in a competitive environment. To keep the main analysis tractable, we initially abstract talent investments by incumbent clubs, an assumption that is relaxed in Section 5.4.1.

- In Stage 2, provided that it has succeeded in delivering and contracting a star player, the nursery club first makes a choice between retaining the star player and selling him (by means of a first-price perfect information auction) to potential buyers, i.e., the I incumbent clubs. If the nursery club sells the star player, it will abstain from upgrading its player assets κ and will need to go through uncertain qualifying rounds to reach the Champions League. If the nursery club declines the incumbent clubs' bids on the star player and upgrades its player squad quality to k_0, it will qualify for the tournament with certainty. Recall that we have assumed that incumbent clubs reach the Champions League with certainty.

- In Stage 3, the Champions League is played out, and clubs win matches in proportion to the their share of the total player assets. The clubs then receive revenues from prize sums and commercial sales in proportion to the share of matches won.

We solve the game via backward induction.

4.1 Stage 3: Champions League is played out

We begin with the match interaction in the Champions League. Suppose that the nursery club (n) has succeeded in finding a star player in Stage 1. The *set of possible owners of the star player* in the tournament is then $\mathcal{L} = \mathcal{I} \times n$, where $\mathcal{I} = \{1, 2, ..., i, ...I\}$ is the set of the incumbent clubs and n is the nursery club. Let $l \in \mathcal{L}$ denote the identity of the club with the star player k (given from the acquisition game in Stage 2).

As incumbent football clubs are symmetric, there are only two types of ownership of the star player: *nursery* ownership ($l = n$) and *incumbent* ownership ($l = i$). In addition, we have the outcome in which the nursery club fails to find the star player ($l = 0$). We then have *four* types of clubs to track, $h = \{E, A, NA, O\}$, i.e., *the "entering" nursery club* (E), an *acquiring incumbent club* (A), a *non-acquiring incumbent club* (NA) and finally an *outside club* (O), which succeeded in uncertain qualifying rounds.

The outcome of the Champions League in terms of the winning percentage of matches played is determined from a logit contest success function:[24]

Assumption 1. *Let $k_h(l)$ be the amount of total player assets possessed by a club of type h in the Champions League when ownership of the star player k is l. The winning percentage of matches $z_h(l)$ of a club of type h is defined by the following logit contest success function: $z_h(l) = \frac{k_h(l)}{K(l)}$, where $K(l) = \Sigma_h k_h(l)$ is the total amount of club assets.*

We can consider the share of matches won, or the winning percentage, $z_h(l)$, to be a proxy for the outcome of the Champions League. While it does not capture the details of how clubs proceed from the group stages to the ensuing finals, we would argue that Assumption 1 captures the outcome of Champions League competition in a reasonable way.[25]

4.1.1 Absent star player ($l = 0$)

It is convenient to define K as the amount of player assets, or aggregated player quality, as a benchmark when the nursery club fails to find a star player,

$$K = \underbrace{Ik_0}_{\text{Incumbent clubs' player/assets}} + \underbrace{(m-I)\kappa}_{\text{Outside clubs' player/assets}}, \tag{2}$$

where, again, I is the number of incumbent clubs in the Champions League and $m - I$ is the number of outside clubs that reach the tournament through qualifying rounds.

Thus, if the nursery club fails to find a star player ($l = 0$), the share of matches won in the Champions League by a (non-acquiring) incumbent (NA) and an outside club (O) that has qualified are

$$z_{NA}(0) = \tfrac{k_0}{K} > z_O(0) = \tfrac{\kappa}{K} > 0, \tag{3}$$

Note that the winning percentage of an incumbent exceeds that of an outside club, as the former has player assets of higher quality, $k_0 > \kappa$.

4.1.2 The nursery club retains the star player ($l = n$)

What if the nursery club has succeeded in finding and developing a talent into a star player in Stage 1? If the nursery club chooses to retain the star player ($l = n$) and to upgrade its complementary player assets from κ to k_0 in Stage 2, the winning percentage of the entering nursery club (E), the non-acquiring incumbent clubs (NA) and the qualifying outside clubs (O) fulfil the following:

$$z_E(n) = \tfrac{k+k_0}{K+k+(k_0-\kappa)} > z_{NA}(n) = \tfrac{k_0}{K+k+(k_0-\kappa)} > z_O(n) = \tfrac{\kappa}{K+k+(k_0-\kappa)}. \tag{4}$$

[24] See Szymanski (2003).

[25] In reality, there is a lottery that allocates the clubs in the group stage (based on ranking) and in the later stages of the tournament. Ex ante, the clubs do not know which clubs are assigned to the different groups. All else equal, if the aggregate quality increases, the expected winning percentage for an individual club would decline, which is captured here in reduced form.

Note how $k + (k_0 - \kappa)$ is the addition of player assets in the Champions League compared with the benchmark K arising from the presence of the star player and from the upgraded player assets of the nursery club. By possessing the star player, the entering nursery club wins a higher share of its matches than the incumbent clubs do. Incumbent clubs win a higher share than outside clubs that have qualified without any star players.

4.1.3 The nursery club sells the star player to an incumbent club ($l = n$)

What if the nursery club has succeeded in delivering a star player in Stage 1 but sold him to an incumbent in Stage 2 ($l = i$)? The winning percentages of the acquiring incumbent (A), the non-acquiring incumbents (NA) and the qualifying outside clubs (O) (one of which is the nursery club) are now

$$z_A(i) = \tfrac{k+k_0}{K+k} > z_{NA}(i) = \tfrac{k_0}{K+k} > z_O(i) = \tfrac{\kappa}{K+k} > 0. \tag{5}$$

Note how k is now the only addition in player assets relative to the benchmark, K. Hence, the competition between clubs for winning matches is less intense under an incumbent acquisition than that when the nursery club goes for the Champions League. To see this, note that when selling the star player, the nursery club cannot upgrade its initial player assets, and the total player assets in the tournament are lower under a sale, $K(i) = K+k < K(n) = K+k+(k_0 - \kappa)$.

We will assume that incumbent clubs always win a larger share of their matches than qualifying outside clubs do, $z_{NA}(n) > z_O(0)$. This holds if outside clubs' initial player quality κ is sufficiently small. Using (3)-(5), it then directly follows that

$$\underbrace{z_A(i) > z_E(n)}_{\text{Possessor of star player}} > \underbrace{z_{NA}(0) > z_{NA}(i) > z_{NA}(n)}_{\text{Incumbent without star player}} > \underbrace{z_O(0) > z_O(i) > z_O(n)}_{\text{Qualifying outside club}} > 0. \tag{6}$$

Possession of the star player gives a club the highest winning percentage. An incumbent with the star player will win a higher share of matches than the nursery club would when in possession of the star player ($z_A(i) > z_E(n)$). This occurs because entry by the nursery club stiffens the competition among clubs (compare the denominator in Equations 4 and 5). Moreover, a non-acquiring incumbent club will win a higher share of its matches when there is no star player present, $z_{NA}(0) > z_{NA}(l)$. Moreover, conditional on the possession a star player in the Champions League, the share of matches won by a non-acquiring incumbent is lower when the nursery club has the star player, $z_{NA}(i) > z_{NA}(n)$. Similarly, outside clubs are better off without the star player in the tournament, $z_O(0) > z_O(l)$. Their worst-case scenario is that the nursery club is strengthened by the presence of the star player and complementary players, $z_0(i) > z_0(n)$.

Clubs obtain revenues from prize sums and commercial revenues. In our working paper, we allow for strategic interaction among clubs in the product market, represented by the sales of tickets, broadcasting rights, advertising or merchandise. To simplify exposition, we shall use R as the *total sum of prize money in the Champions League and associated commercial revenue* over which clubs compete. We will then assume that the amount of revenue earned by each club R_h is proportional to the share of matches won in the tournament

$$R_h = z_h(l)R, \tag{7}$$

To simplify further, we normalize revenues generated by clubs outside the Champions League to zero.[26]

4.2 Stage 2: Selling or retaining the star player?

Suppose now that the nursery club has developed and contracted a star player in Stage 1. Then, in Stage 2, there is first an acquisition game in which the nursery club chooses between retaining or selling the star player, k.

4.2.1 Qualifying for the Champions League

If the nursery club sells the star player, then it will not find it profitable to upgrade its players from κ to k_0.[27] The nursery club's way into Champions League is then through uncertain qualifying rounds, where the probability of participating in the tournament is as follows:

$$\lambda_O = \frac{m-I}{C-I} \in (0,1), \tag{8}$$

where, again, m is the number of seats in the Champions League, I is the number of incumbent clubs and C is the total number of clubs that can potentially enter the tournament, where $C - I > m - I > 0$ implies a risk of being outside the Champions League.

What if the nursery club does not sell the star player, k? Provided that the nursery club invests in complementary players to k_0, it will pass the qualifying rounds with certainty, assuming that the quality of the star player is sufficiently high, which we capture as follows.

Assumption 2. (i) *Let* $\lambda_E(n) = 1$ *for* $k = k^{\min} \geq 0$. *(ii) Star player quality fulfills* $k \geq k^{\min}$.

Given the qualification process for the Champions League, we can now turn to the nursery club's choice between retaining or selling the star player.

4.2.2 The auction

If the nursery club decides to sell the star player, the selling process is depicted as an auction in which the I incumbent clubs simultaneously post bids and the nursery club then either accepts or rejects these bids. Each established club announces a bid, b_i, for the star player. $b =$

[26] The results will not change as long as the main source of prize money or other revenues stems from the Champions League.

[27] Intuitively, the nursery club comes from a league without direct access to the Champions League. Therefore, the increase in the probability of qualifying with assets k_0 (rather than assets κ) is not sufficient to cover the fixed cost F.

$(b_1, ..b_i.., b_m) \in R^m$ is the vector of these bids. Following the announcement of b, the star player may be sold to one of the incumbent clubs at the bid price or remain in the possession of the nursery club n. If the nursery club rejects these bids, it will enter the Champions League. If more than one bid is accepted, the bidder with the highest bid obtains the star player. If there is more than one club with such a bid, each club obtains the star player with equal probability. The acquisition is solved for Nash equilibria in undominated pure strategies. There is a minimum amount ε chosen such that all inequalities are preserved if ε is added or subtracted. The acquisition price is denoted S.

There are three different valuations of the star player:

- v_n in (9) is the reservation price of the nursery club.[28] It is the value for the nursery club retaining the star player and entering the Champions League with certainty relative to selling the star player and entering uncertain qualifying rounds to reach the tournament. Using (7), we obtain

$$v_n = \underbrace{[z_E(n) - \lambda_O z_O(i)]}_{(+)} \times R - F, \tag{9}$$

  where F is the cost of upgrading complementary players from κ to k_0.[29][30] From (4), (5) and (8), $z_E(n) - \lambda_O z_O(i) > 0$ represents the (expected) increase in the share of matches won with the star player relative to share of matches won without the star player — adjusted for uncertain entry through qualifying. Hence, $[z_E(n) - \lambda_O z_O(i)] \times R$ represents the expected increase in revenues from retaining the star player, where R is the sum of total commercial value and prize money in the Champions League.

- v_{ie} in (10) is the entry-deterring value of obtaining the star player for an incumbent club when the nursery would otherwise retain the star player and enter the Champions League.

$$v_{ie} = \underbrace{[z_A(i) - z_{NA}(n)]}_{(+)} \times R - T, \tag{10}$$

  where T is a transaction cost incurred by the incumbent club when buying the star player.[31] From (4) and (5), $[z_A(i) - z_{NA}(n)] \times R$ is the expected increase in revenues when buying the star player relative to the revenues when facing competition from the nursery club in possession of the star player. An incumbent club's willingness to pay for the star player

[28] Note that the valuation of the nursery club coincides with that of an outside club buying the star player. For simplicity, we assume that outside clubs are not part of the auction.

[29] Note that the upgrading cost F is the way we capture that the nursery club is not an incumbent. In other words, what defines an incumbent is that it has sunk the cost F.

[30] Recall that we have assumed that the nursery club makes no revenues if it does not qualify for the Champions League.

[31] Note that we do not need a transaction cost to derive our results. However, it seems likely that one reason why player transfers have decreased over the past few years is that international transaction cost has decreased due to the harmonization of the legal rules within EU.

stems from the increase in the share of games won with the star player, $z_A(i) - z_{NA}(n) > 0$, allowing it to take a larger share of prize money in the Champions League and the commercial revenues, R.

- v_{ii} in (11) is the preemptive value of obtaining the star player for an incumbent club when a rival incumbent club would otherwise obtain him. This valuation is similar to the entry-deterring value, the difference being that the increase in the share of matches won with the star player is derived from the alternative being that a rival incumbent club would otherwise seize him.

$$v_{ii} = \underbrace{[z_A(i) - z_{NA}(i)]}_{(+)} \times R - T. \tag{11}$$

Three remarks are useful for solving for the equilibrium business strategy of the nursery club.

Remark 1: The contract with the star player Note that the star player has a contract with the nursery club at the beginning of Stage 2. The contract between the nursery club and the star player does not affect the sale decision. As shown in the next section, the reason is that the contract involves fixed payments that are pre-determined in Stage 1 and are the same regardless of the club's commercialization strategy. Note also that the payments to the player can be spread out over the different stages: for instance, if a sale occurs, some of these payments may be taken over by the buying incumbent.

Remark 2: Ranking incumbents' valuations Second, note that an incumbent club's entry-deterring valuation v_{ie} must exceed its preemptive valuation v_{ii},

$$v_{ie} > v_{ii}. \tag{12}$$

because $z_{NA}(n) < z_A(i)$ from (6). Intuitively, incumbent clubs are more willing to pay for the star player when the alternative is that the star player stays with the nursery club than when the star is acquired by a rival incumbent. The reason is the stronger competition under entry by the nursery club arising from the latter club's upgrading of complementary players from κ to k_0.[32]

Remark 3: Incumbents' net valuations Finally, it is useful to define incumbents' net valuations, i.e., the difference in their valuations of the star player v_{ii} and the nursery club's reservation price v_n. Using (9), (10) and (11), we have

$$v_{il} - v_n = \underbrace{\left\{ \underbrace{[z_A(i) - z_{NA}(l)]}_{(+)} - \underbrace{[z_E(n) - \lambda_O z_O(i)]}_{(+)} \right\}}_{(-)} \times R + [F - T]. \tag{13}$$

[32]This result is not crucial for our results, although it makes the exposition simpler.

In Appendix A.2, we show that the first (large) bracketed term in (13) is negative. That is, the nursery club obtains a larger increase in its winning percentage from retaining the star player than an incumbent club obtains from buying him: $z_A(i) - z_{NA}(l) < z_E(n) - \lambda_O z_O(i)$. From (6), it follows that the reason for this must be that the nursery club faces a worse situation without the star player than the incumbent club does without him, $z_{NA}(l) > \lambda_O(i) z_O(i)$. While an incumbent club from a major league has a direct seat in the Champions League, the nursery club coming from a minor league faces uncertain qualifying rounds, $\lambda_O \in (0,1)$. Moreover, because the nursery club's initial player assets are of lower quality than those of an incumbent, $\kappa < k_0$, the nursery club will perform worse without the star player in the Champions League, $z_O(i) < z_{NA}(l)$. The precarious situation without the star player creates a higher gross value of the star player for the nursery club.

4.2.3 Why nursery clubs sell their best star player

We will now examine how the business strategy of the nursery club — upgrading initial player assets to complement the star player in the Champions League versus selling the star player and gambling for entry into the tournament with weaker players – is related to the quality of the star player, k. One might think that the nursery club would always choose to go for the Champions League with the star player. In this section, however, we will show that a higher quality k of a star player will induce the nursery club to pursue a sale. Moreover, a higher quality of a star player will induce fierce bidding competition among incumbent clubs, making a sale potentially very lucrative.

Formally, let k^{ED} be the quality level at which the entry-deterring motive for an incumbent acquisition of the star player just matches the nursery club's reservation price, $v_{in} = v_n$. Let k^{PE} be the quality level at which the preemptive motive for an incumbent acquisition is equal to the nursery club's reservation price, $v_{in} = v_n$.

We then have the following proposition:

Proposition 1 *The nursery club will (i) go for Champions League if the quality of the star player is sufficiently low, $k \in (k^{\min}, k^{ED})$; (ii) sell the star player at sales price $S^* = v_n$ and attempt to reach Champions League through the qualifying rounds if the quality of the player is intermediate, $k \in [k^{ED}, k^{PE})$; and (iii) sell the star player at sales price $S^* = v_{ii}$ and attempt to reach the Champions League through the qualifying rounds if the quality of the player is sufficiently high, $k \in [k^{PE}, k^{\max})$.*

Let us explore an increase in the quality of the star player. From Assumption 1 and (9), the reservation price of the nursery club v_n must be increasing in the quality of the star player:

$$v'_{n,k} = \left[\underset{(+)}{\frac{dz_E(n)}{dk}} - \lambda_O \underset{(-)}{\frac{dz_O(i)}{dk}} \right] \times R > 0, \tag{14}$$

where we use v'_k as the notation for the derivative, $\frac{dv}{dk}$. Intuitively, the entry value for the nursery club is increasing in k, as a better star player enables the club to win a larger share of its matches, $\frac{dz_E(n)}{dk} > 0$. However, the entry value is also decreasing in k because if the nursery club sells the star player to an incumbent club, a better star player makes it more difficult for the nursery club to win matches given successful qualification for the Champions League, $\frac{dz_O(i)}{dk} < 0$.

How do then incumbents react? From (10) and (11), we have

$$v'_{il,k} = \left[\underset{(+)}{\frac{dz_A(i)}{dk}} - \underset{(-)}{\frac{dz_{NA}(l)}{dk}} \right] \times R > 0. \tag{15}$$

Similarly, incumbents' willingness to pay for the star player is driven by the difference in performance between having the star player and without the star player. Incumbents are willing to pay more for higher player quality because when in possession of the player, they win more matches ($\frac{dz_A(i)}{dk} > 0$). However, they are also willing to pay more for a star player to avoid facing that player in a rival club; recall that the incumbent's winning percentage declines with star player quality if he is playing for the nursery club or a rival incumbent club ($\frac{dz_{NA}(l)}{dk} < 0$).

Which of these valuations increase the most? Using (14) and (15) and rearranging,

$$v'_{il,k} - v'_{n,k} = \underbrace{\left\{ \underbrace{\left[\underset{(+)}{\frac{dz_A(i)}{dk}} - \underset{(+)}{\frac{dz_E(n)}{dk}} \right]}_{(-)} - \underbrace{\left[\underset{(-)}{\frac{dz_{NA}(l)}{dk}} - \lambda_O \underset{(-)}{\frac{dz_O(i)}{dk}} \right]}_{(-)} \right\}}_{(+)} \times R > 0, \tag{16}$$

with proofs relegated to Appendix A.1.

Thus, the entry-deterring valuation, v_{in}, and the preemptive valuation of an incumbent club, v_{ii}, increase more than the nursery club's value of entry, $v_{n,}$, when the quality of the star player increases. Inspecting (16) clearly shows that the reason is that the winning percentage in the Champions League for a non-acquiring incumbent club deteriorates faster in star player quality than does the nursery's expected winning percentage when being an outside club (i.e., when selling the star player), i.e., $\frac{dz_{NA}(n)}{dk} < \lambda_O \frac{dz_O(i)}{dk} < 0$. Put simply, due to its incumbent position, a non-acquiring incumbent club stands to lose more from meeting a better star player at a rival club: this is the reason that incumbents' valuations increase more swiftly in star player quality than does the nursery club's reservation price, $v'_{in,k} > v'_{n,k}$.

It is now straightforward to derive Proposition 1. Figure 5, Panel (i) depicts the nursery club's reservation price, $v_{n,}$, the entry-deterring valuation of an incumbent club, v_{in}, and the preemptive valuation of an incumbent club, v_{ii}, all as functions of star player quality, k. These are all strictly concave functions of k from Assumption 1. Suppose that the entry cost F in (13) is not too high. We then know that the entry value must exceed the incumbents' entry-deterring valuation at lower star player quality, $v_n > v_{in} > v_{ii}$. Thus, entry into the Champions

League for the nursery club ($l^* = n$) is chosen in the region $k \in (k^{\min}, k^{ED})$, as depicted in Panels (i) and (ii) in Figure 5. Because the entry-deterring valuation will increase more strongly than the nursery club's reservation price, $v'_{in,k} - v'_{n,k} > 0$, *an entry-deterring acquisition* by an incumbent at acquisition price $S^* = v_e$ must occur at $k = k^{ED}$, as shown in Panel (ii) in Figure 5. Other incumbent clubs will not preempt a rival acquisition of the star player in the region $k \in [k^{ED}, k^{PE})$, as the preemptive value will be lower than the reservation price, $v_{ii} - v_n < 0$.[33] From (6), when the quality of the star player is not too high, non-acquiring incumbent clubs predominantly benefit from obtaining a higher winning percentage under a rival acquisition, $z_{NA}(i) > z_{NA}(e)$ (giving weak incentives to challenge an acquisition undertaken by a rival). Thus, as shown in Panel (ii) in Figure 5, the nursery club sells the star player ($l^* = i$) at price $S^* = v_n$.

From (16), we also know that the preemptive valuation increases more strongly than the nursery club's reservation price, $v'_{ii,k} - v'_{n,k} > 0$. As shown in Panel (i) in Figure 5, when the star player quality increases into the region $k \in (k^{PE}, k^{\max})$, the incumbent clubs' preemptive valuation then becomes strictly higher than the nursery club's reservation price, $v_{ii} > v_e$. This induces a bidding war among incumbent clubs, driving the equilibrium sales price of the star player above the entry value or reservation price of the nursery club, $S^* = v_{ii} > v_e$. The nursery club will now sell the star player ($l^* = i$) at sales price $S^* = v_{ii}$ in this region. Note that when preemptive acquisitions occur, the nursery club will earn a premium from selling under bidding competition because the buying incumbent pays an acquisition price that is higher than the nursery club's reservation price, $S^* = v_{ii} > v_n$. However, when selling without bidding competition in the region $k \in (k^{ED}, k^{PE})$, the nursery club receives only the reservation price, $S^* = v_n$.

4.3 Stage 1: The nursery club's search for talent

In Stage 1, the nursery club first invests an amount ρ_E into a talent search . For simplicity, we assume that the probability of successfully finding talent is simply the effort, $\rho_E \in [0, 1]$, and a quadratic effort cost,

$$y(\rho) = \frac{\mu}{2} \times (\rho_E)^2 \tag{17}$$

where $\mu > 0$.

If the nursery club succeeds in finding a talented player, the true quality of the player is as yet uncertain. To capture this uncertainty, we assume that the quality of the talented player k is drawn by nature from a cumulative distribution $G(k)$ with density $g(k)$ over $\left[k^{\min}, k^{\max}\right]$. Upon discovery, the talented player is first hired under an initial contract at low pay, w_0, which we normalize to zero. When the draw by nature is revealed, his contract is renegotiated. Why would the star player renew his contract with the nursery club? The reason is as follows:[34] Prior

[33] From (12), $v_{ie} > v_{ii}$. As shown in Figure 5, there must then exist a region near k^{ED} where $v_{ii} < v_n$.

[34] Spaniel (2012) shows how the renewal of baseball contracts has these characteristics. His model, however, does not contain the element of asymmetric information and verification, nor does he model the sports competition and

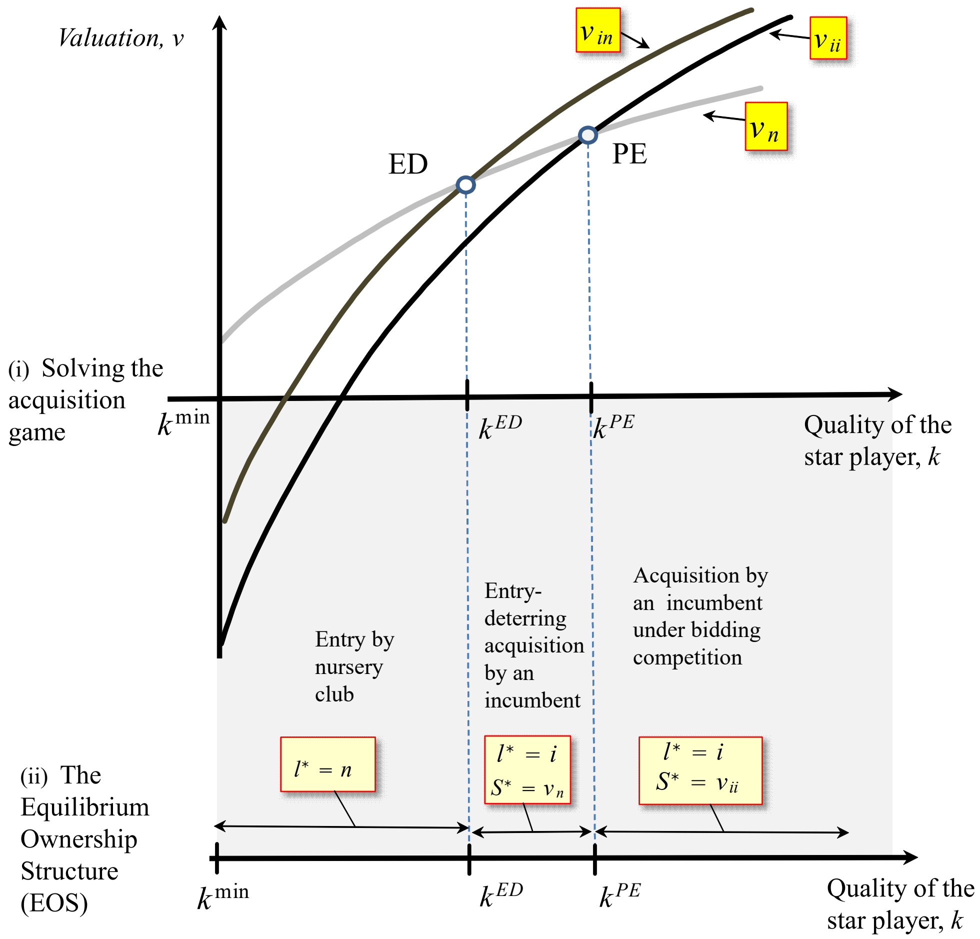

Figure 5: Solving the nursery club's decision to keep or sell the star player, k.

to the interaction in the Champions League, the star plays matches in the national league for the nursery club. These matches verify the star player's true quality to incumbent clubs. The star player would otherwise be subject to Akerlof's lemons problem, as incumbents would be willing to pay only for his average quality.[35] However, playing matches before the Champions League also involves a risk of injury (in which case the star player's career ends).[36] Assuming that the player is risk averse, he then has an incentive to renew the contract with the nursery club at a wage that is lower than what he would receive by rejecting the contract renewal and instead attempting to exploit future bidding competition among the nursery club, other outside clubs and the incumbent clubs as a free agent.

To see this, Proposition 1 is applied first to find the wage ω that the star player could obtain as a free agent prior to the Champions League:

$$\omega = \begin{cases} v_n, \ for \ k \in (k^{\min}, k^{ED}), \\ v_n, \ for \ k \in [k^{ED}, k^{PE}), \\ v_{ii}, \ for \ k \in [k^{PE}, k^{\max}), \end{cases} \tag{18}$$

The risk of injury implies that the player will only realize payoff ω with probability $p \in (0, 1)$. This can be exploited by the nursery club. Let the utility of the star player be $U(w) = w^\beta$ for $\beta \in (0, 1)$. The nursery club can offer a wage w^* given from $(w^*)^\beta = p\omega^\beta$ at which the star player is indifferent between renewal with the nursery club or (after playing in the national league) leaving as a free agent. By calculation,

$$w^* = p^{\frac{1}{\beta}}\omega \tag{19}$$

Thus, $p^{\frac{1}{\beta}} \in (0, 1)$ can be interpreted as the share of the revenues as a free agent ω that the star player receives as a (certain) salary from renewing with the nursery club.[37] Assuming that the nursery club is risk neutral, let $\xi_E(l)$ be the nursery club's reward from renewing the contract, paying the star player w^* in (19) and then making its decision to sell or retain the star player according to Proposition 1

$$\xi_E(l) = \begin{cases} \phi p v_n + \lambda_O[(1-p)z_O(0) + pz_O(i)] \times R, \ for \ k \in (k^{\min}, k^{ED}), \\ \phi p v_n + \lambda_O[(1-p)z_O(0) + pz_O(i)] \times R, \ for \ k \in [k^{ED}, k^{PE}), \\ \phi p v_{ii} + \lambda_O[(1-p)z_O(0) + pz_O(i)] \times R, \ for \ k \in [k^{PE}, k^{\max}), \end{cases} \tag{20}$$

In (20), $\lambda_O[(1-p)z_O(0) + pz_O(i)] \times [R + P]$ is the expected profit of reaching the playoff without the star player. Importantly, $\phi = 1 - p^{\frac{1-\beta}{\beta}} \in (0, 1)$ can be regarded as the share of the expected

equilibrium ownership.

[35] Without seeing the star player play in competitive games, they would estimate his quality using the expected quality $E[k] = \int_{k^{\min}}^{k^{\max}} kg(k)dk$. The nursery club would then be willing to sell the star player only if he were of below-average quality, which would reduce incumbents' expected quality further. Without matches in the national league prior to the Champions League, the market for the star player breaks down.

[36] This risk could also be because the star player's talent was overvalued due to early physical development or due to social problems.

[37] Note that $p^{\frac{1}{\beta}} < 1$ because this inequality implies $p < 1^\beta = 1$.

free agent revenue, $p\omega$, that now is accrued by the nursery club. From (20), it is clear that the nursery club is better off by signing the contract (19), $\xi_E(l) > 0$.

It then follows that the nursery club's expected net reward $\bar{\xi}_E$ from succeeding in finding a talented player is

$$\bar{\xi}_E = \underbrace{\lambda_O \int_{k^{\min}}^{k^{\max}} [(1-p)z_O(0) + pz_O(i)] \times Rg(k)dk}_{\text{Expected profit without the star player (sale or injury)}} + \underbrace{\phi p \left[\int_{k^{\min}}^{k^{ED}} v_n g(k)dk + \int_{k^{ED}}^{k^{PE}} v_n g(k)dk + \int_{k^{PE}}^{k^{\max}} v_{ii} g(k)dk \right]}_{\text{Expected profit from the star player without injury (entry or sale)}} \quad (21)$$

Let $\bar{\Pi}_E = \rho_E \bar{\xi}_E + (1-\rho_E)\xi(0) - y(\rho_E)$ be the expected net profit for the nursery club, where $\xi(0) = \lambda_O z_O(0) \times R$ is the expected reward when failing to find a talented player and the expected reward from finding a talented player in (21). By solving for the optimal effort ρ_E^* from the first-order condition, $\frac{d\bar{\Pi}_E}{d\rho_E} = 0$, we obtain

$$\rho_E^* = \frac{\bar{\xi}_E - \xi(0)}{\mu} \in (0,1), \quad (22)$$

where μ in (17) is assumed to be sufficiently large to have $\rho_E^*(l) < 1$.

5 The Bosman Ruling

By appealing to the fundamental principle of the free movement of workers in the EU, the 1995 Bosman ruling fundamentally changed the European football market. The Bosman ruling had two major implications: (i) pre-Bosman, clubs could — more or less — keep players in their squads indefinitely. Even if a contract had expired, as long as the club paid a wage to a player, the player could not move freely to a new club unless a transfer fee was paid. (ii) International transfers of players between clubs in different countries were less common, as UEFA rules restricted the use of foreign players (only three foreign players could be used in a match). The European Court of Justice ruled that these restrictions contradicted the free movement of labour — one of the cornerstones of the European Union project to integrate Europe. After 1995, these two restrictions were no longer in place.

In this section, we will explore how the Bosman ruling affected the nursery club's decision to retain or sell the star player and, more importantly, how it affected the nursery club's incentive to search for and develop star players. To capture the Bosman ruling in our model, we make the following assumption:

Assumption 3. *Pre-Bosman: (i) The nursery club keeps the full reward from developing the star player, i.e., $\alpha = 1$. (ii) The restrictions on the use of foreign players implied that a buying incumbent has $b(k_0 + k) < k_0 + k$ in effective player assets, where $b \in (\frac{k_0}{k_0+k}, 1)$.*

5.1 How Bosman created a market for star players

Consider the situation before the Bosman ruling and suppose that the nursery club has contracted with the star player. Part (ii) in Assumption A3 implies that the incumbent clubs have reached the cap on the number foreign players through their investment in k_0. Hence, when buying the star player, an acquiring incumbent club cannot make full use of its squad. The share of matches won under an incumbent acquisition then fulfils the following:

$$z_A(i) = \frac{b(k+k_0)}{K+b(k+k_0)-k_0} > z_{NA}(i) = \frac{k_0}{K+b(k+k_0)-k_0} > z_O(i) = \frac{\kappa}{K+b(k+k_0)-k_0} > 0. \tag{23}$$

The nursery club, however, is not restricted in its use of the star player k because the player is native. The nursery club can then proceed to buy the same number of foreign players as the incumbents k_0, and hence, the winning percentages when the nursery club retains the star player are still given by (4). Thus, the pre-Bosman reservation price is still v_n from (9). Substituting (23) into (10) and (11) and relabelling the incumbents' entry-deterring and preemptive valuation as v_{in}^{PRE} and v_{ii}^{PRE}, respectively, gives the following lemma, which is straightforward and proved in Appendix A.3.

Lemma 2 *There exists a unique* $b^* \in (\frac{k_0}{(k+k_0)}, 1)$ *such that for* $b = b^*$, $\frac{d\left(v_{il}^{PRE}-v_n\right)}{dk} = 0$.

We then have the following proposition:

Proposition 3 *Suppose that* $b = b^*$ *holds pre-Bosman, such that star players are never sold and transferred. Then, as the Bosman ruling lifts the restriction on the use of foreign players* ($b = 1$)*, a market for star players is created post-Bosman for which the equilibrium ownership of the star player is given by Proposition 1.*

Figure 6 illustrates the impact of the Bosman ruling on the European football market. Pre-Bosman, the cap on the usage on foreign players ($b = b^* < 1$) dampens the incumbent clubs' interest in acquiring the star player. This is shown in Panel (i), where the pre-Bosman entry-deterring and preemptive valuations, v_{in}^{PRE} and v_{ii}^{PRE}, are depressed and not increasing in the quality of the star player to a sufficient degree to match the increase in the reservation price v_n. As shown in Panel (iii), the nursery club retains the star player because the incumbents' willingness to pay is too low. However, post-Bosman, the restriction on foreign players is lifted ($b = 1$). This shifts the entry-deterring valuation and the preemptive valuation from their pre-Bosman levels, v_{in}^{PRE} and v_{ii}^{PRE}, up to their post-Bosman levels, v_{in} and v_{ii}, and a market for star players is created. As shown in Panel (ii), the star player is again sold at the reservation price $S^* = v_n$ for medium-quality players in the region $k \in (k^{ED}, k^{PE})$, while for very high-quality players in the region $k \in (k^{PE}, k^{\max})$, bidding competition occurs, and the price for the star player is driven all the way up to $S^* = v_{ii} > v_n$.

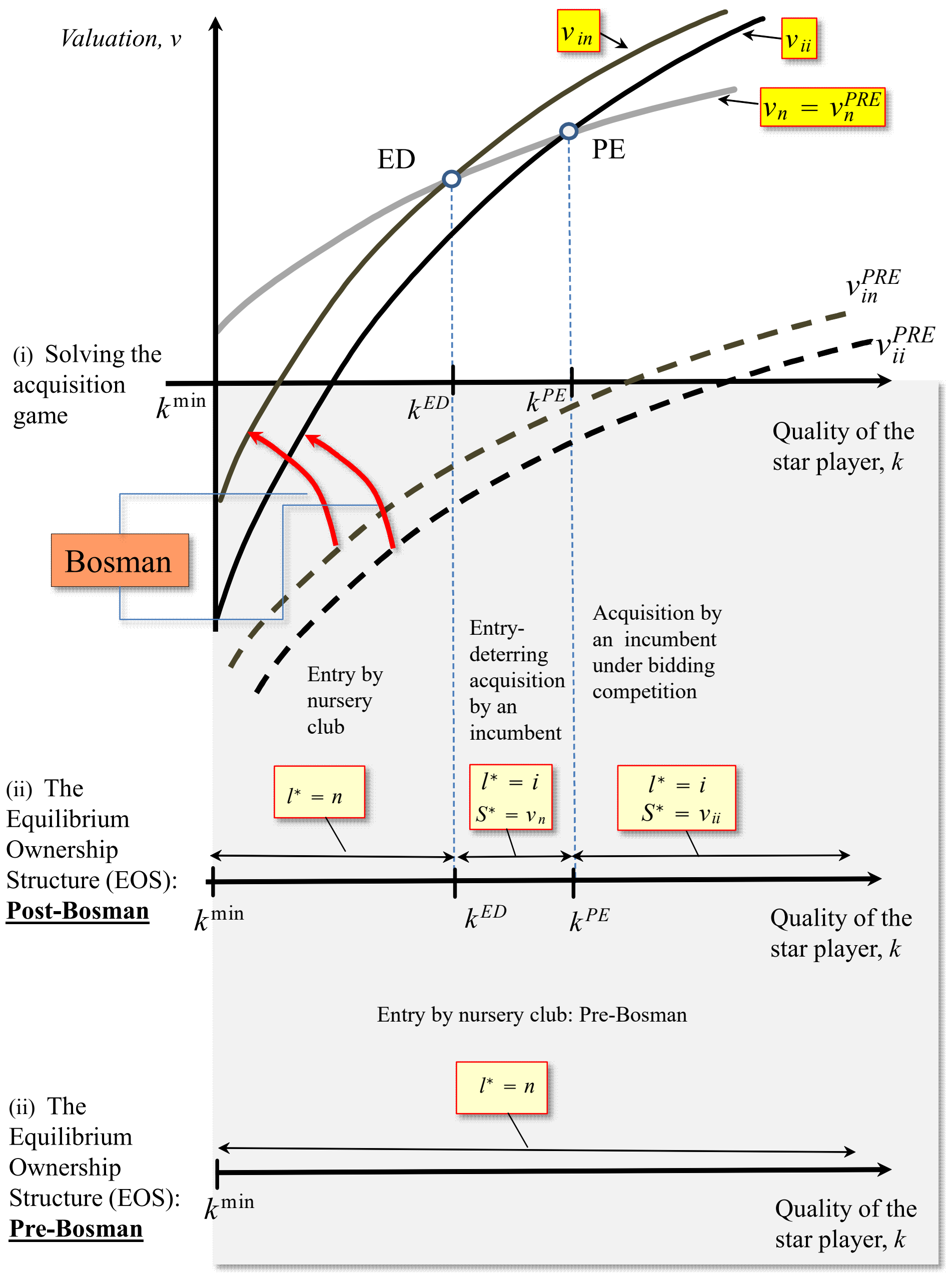

Figure 6: Deriving the equilibrium ownerhip of the star player: comparing pre-Bosman to post-Bosman.

5.2 Why Bosman may have promoted talent development

How did the Bosman ruling affect a nursery club's incentives to find and develop star players? At first glance, one might believe that the Bosman ruling must have deteriorated a nursery clubs' incentives to find and develop football players. This is because, by Assumption A3(i), the nursery club will need to leave a large portion of the future revenues to the player, as the star player's bargaining position is significantly improved by the possibility of playing clubs against one another other by acting as a free agent.

For exposition, again make the simplifying assumption in Proposition 3 that star players were not sold prior to the Bosman ruling. Capturing the "slavery contracts" in place before the Bosman ruling, Assumption 3(i) implies that the nursery club will not need to share revenues with the star player pre-Bosman (apart from paying a low wage to uphold the contract, which we have normalized to zero). It then follows that the reward for the nursery club succeeding in finding and developing a talented player in the pre-Bosman era can be written as

$$\xi_E^{\text{Pre}} = pv_n + \lambda_O[(1-p)z_O(0) + pz_O(i)] \times R \tag{24}$$

Let $\bar{\xi}_E^{\text{Pre}} = \int_{k^{\min}}^{k^{\max}} \xi_E^{\text{Pre}} g(k)dk$. Assuming that the nursery club maximizes its net expected payoff $\bar{\Pi}_E^{\text{Pre}} = \rho_E \bar{\xi}_E^{\text{Pre}} + (1-\rho_E)\xi(0) - y(\rho_E)$, the optimal search effort in the pre-Bosman environment is

$$\rho_E^{\text{pre}} = \frac{\bar{\xi}_E^{\text{Pre}} - \xi(0)}{\mu} \in (0,1), \tag{25}$$

where, again, $\xi(0) = \lambda_O z_O(0) \times [R+P]$ and μ is assumed to be sufficiently large to have $\rho_E^{\text{Pre}} < 1$.

We can now compare the search efforts by the nursery club pre- and post-Bosman. We first have the following lemma:

Lemma 4 *If the star player is risk averse and the risk of injury is sufficiently high (i.e., if $\phi \equiv 1 - p^{\frac{1-\beta}{\beta}}$ is sufficiently high), there exists a unique superstar quality, $k^{PE'} > k^{PE}$, such that $\phi pv_{ii} = pv_n$.*

Lemma 4 is illustrated in Figure 7. When the star player is risk averse and the risk of injury is sufficiently high, he will demand a lower share of the revenues created by a future sale to incumbent clubs. This leaves a larger share of the expected revenues to the nursery club. As shown in the diagram, there must exist a star player quality $k^{PE'}$ at which the share of the expected sales price that goes to the nursery club ϕpv_{ii} will be higher than the expected value of entering the Champions League pv_n. Because, as discussed in Remark 1, the fixed wage of the star player does not affect the decision to sell or retain the star player, the threshold $k^{PE'}$ must exceed k^{PE} (at which $v_{ii} = v_n$).

We can then examine how the Bosman ruling — captured by Assumption A3 — affects the search for talent by the nursery club. Using (22) and (25)

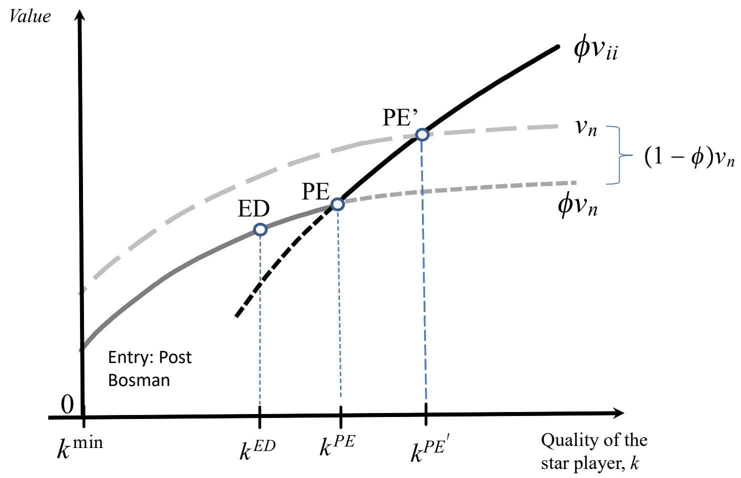

Figure 7: This figure illustrates how the Bosman ruling, by lifting the restrictions on the use of foreign players, increases incumbent clubs' valuations for star players, creating a market for star players.

$$\rho_E^* - \rho_E^{\text{Pre}} = \frac{p}{\mu}\left(- \int_{k^{\min}}^{k^{PE}} (1-\phi)\, v_n g(k) dk + \int_{k^{PE}}^{k^{PE'}} \Big[\underbrace{\phi v_{ii} - v_n}_{(-)}\Big] g(k) + \int_{k^{PE'}}^{k^{\max}} \underbrace{[\phi v_{ii} - v_n]}_{(+)} g(k) dk \right) \tag{26}$$

The first negative expression within the parentheses in 26 simply reflects that when the nursery club enters the Champions League after Bosman, it needs to share these entry revenues with the star player. Intuitively, this gives a lower incentive to search for a star player of lower quality, as shown in Figure 7.

The second expression in the parentheses in (26) compares the revenues given a star player quality that is sufficiently high to generate bidding competition among incumbents. As seen in Figure 7, the nursery club still incurs a reduction in revenue after Bosman. However, as shown by the third term in (26), when the player reaches a sufficiently high quality, the bidding competition when the restriction on the usage of foreign players is lifted becomes so intense that the nursery club's revenues will exceed the pre-Bosman level — even when the revenues are shared with the star player. If the last term in (26) is sufficiently large, the incentive for the nursery club to develop talent can increase even post-Bosman.

We have the following proposition:

Proposition 5 *The impact of the Bosman ruling on the nursery club's incentive to search for and develop talent into star players is ambiguous. However, if the gain from selling star players* $k > k^{PE'}$ *is sufficiently high, then the nursery club's incentive to find and develop talent may increase after Bosman,* $\rho_E^* > \rho_E^{Pre}$.

5.2.1 The Bosman ruling and national team performance

We now turn to national team performance. Without loss of generality, assume that each club C has its own country of residence. There is also an an outside country that has K_L in player quality, e.g., a country in South America. Then, let $Z_E(l)$ be the winning percentage of the national team of the nursery club's home country.

$$Z_E(l) = \frac{K_E(l)}{K_L + K_E(l)} \tag{27}$$

where $K_E(l)$ is the amount of player assets in the national team when the nursery club has succeeded in obtaining the star player. It follows that $K_E(i) = k + \kappa$ under a sale of the star player, as the star player is always available for the national team. If we make the assumption that the nursery club needs to buy players from abroad when it upgrades its players from κ to k_0 when pursuing entry in the Champions League with the star player, it follows that $K_E(n) = k + \kappa = K_E(i) > K(0) = \kappa$. Intuitively, having the star player available will then increase the winning percentage of the national team,

$$Z_E(l) = \tfrac{k+\kappa}{K_L+k+\kappa} > Z_E(0) = \tfrac{\kappa}{K_L+\kappa}, \; l = \{i, n\}. \tag{28}$$

Note that the expected share of matches won by the national team, conditional on the nursery club succeeding in its search for talent, is $\bar{Z}_E = \int_{k^{\min}}^{k^{\max}} Z_E(l)g(k)dk$. It then follows that the unconditional expected share of matches won by the national team in the nursery club's country when playing against an outside country must be

$$E[Z_E] = Z_E(0) + \rho_E^* \times p \times \underbrace{[\bar{Z}_E - Z_E(0)]}_{(+)}, \tag{29}$$

where ρ_E^* is the endogenous probability or search intensity with which the nursery club succeeds in producing a star player, p is the probability that he is not injured and $\bar{Z}_E - Z_E(0)$ is the increase in the share of matches won with the star player in the national team.

Similarly, we can also calculate the expected share of matches won pre-Bosman. Since $Z_E(i) = Z_E(n)$, we have

$$E[Z_E^{\text{Pre}}] = Z_E(0) + \rho_E^{\text{Pre}} \times p \times \underbrace{[\bar{Z}_E - Z_E(0)]}_{(+)} \tag{30}$$

From (29) and (30), it immediately follows that the difference in the share of matches won pre- and post-Bosman depends on the difference in the search intensity, i.e., $\rho_E^* - \rho_E^{\text{Pre}}$. We then have the following proposition:

Proposition 6 *If the stronger bidding competition among incumbent clubs post-Bosman increases the effort by the nursery club to succeed in its talent development, $\rho_E^* > \rho_E^{Pre}$, then the share of matches won by the national team against third countries will increase post-Bosman, $E[Z_E] > E[Z_E^{Pre}]$.*

Let us end this section with a simple welfare observation. Assume that nationals in a country predominately derive utility from the success of its national team. We can then state the following corollary:

Corollary 1 *If the stronger bidding competition among incumbents post-Bosman increases the effort by the nursery club to succeed in its talent development, $\rho_E^* > \rho_E^{\text{Pre}}$, and if sports consumers predominantly derive utility from national team performance, the national welfare will increase in the country of the nursery club post-Bosman, as $E[Z_E] > E[Z_E^{\text{Pre}}]$.*

Thus, Corollary 1 suggests that migration prospects can raise the expected return to investment in human capital, thereby inducing organizations and players to invest more in training, which leads to positive welfare effects in the source countries even if migration of highly skilled people occurs. In particular, the migration of global sports experts (football players) can then produce direct welfare benefits for citizens in source countries in the form of "happiness" through sports success.

5.3 Explaining stylized facts

Let us now summarize our findings and relate these to the stylized facts in Section 3 which documented how the competitive balance has evolved at the club and national levels.

Proposition 3 and Proposition 1 can explain Fact 1 of a declining competitive balance after the Bosman ruling: The Bosman ruling implied that quotas on the use of foreign EU players by a club were prohibited, which significantly increased incumbents' value of attracting players with high quality. As the value of allocating talent to incumbent clubs competing in the Champions League rose more than the value of allocating talent to nursery clubs (with ambitions to enter the Champions League), the result was a greater concentration of top players in the incumbent clubs and an associated decline in the competitive balance at the club level.

Fact 2 then showed that in the senior World Cup tournament, the bottom EU15 countries improved their performance after the Bosman ruling relative to the top EU15 countries. Fact 3 showed that the same pattern was present in the European Championship for under-16 players (U16). The standard explanation for this pattern is that players from the bottom EU15 countries capture spillovers associated with playing in better leagues. Our explanation of the associated increase in competitive balance at the national level stresses the impact of Bosman on the incentives to produce top players.

At first glance, one might believe that the Bosman ruling would imply weaker incentives for nursery clubs to find and develop top players. From essentially being able to capture all the proceeds in a sale pre-Bosman, the nursery club would have little left in terms of proceeds from a transfer post-Bosman, as top players would leave as a free agents after demonstrating their skill in the nursery club.

However, Section 4.3 showed that if there is risk of failure for the talent star player while remaining at the nursery club (e.g., risk of injury) and if the star player is risk averse, the nursery club could offer a longer contract in exchange for an up-front payment. In this way, the nursery club could secure a significant share of the proceeds from a future sale. Without restrictions on the usage of foreign players post-Bosman, the incumbent clubs would bid aggressively in order to secure a proven star player in their own squad — while keeping rivals' from adding him to their squads. The resulting increase in the value of a top player could then offset the lower share going to the nursery club post-Bosman. The net result would be a stronger incentive for nursery clubs to develop star players. This mechanism can explain why the national teams of the smaller EU countries, which primarily host nursery clubs, became more successful post-Bosman.

Of course, knowledge spillovers associated with free movement after the Bosman ruling might also have played an important role in the improvement in the relative performance of the national teams of smaller EU countries. As talented players from small countries take places in incumbent clubs from larger countries, this may also lead to decreased learning for talented players from the larger countries. How can we then distinguish between the role of knowledge spillovers and the role of changed incentives to produce top players in the improved performance of national teams from the smaller EU countries? The improvement in the performance of the national teams of the smaller EU countries relative to that of the larger EU countries for players under 16 is not easily explained by knowledge spillovers, as players under 16 are too young to move abroad.

5.4 Extensions

In the following extensions, we briefly discuss how results would change (i) if incumbent clubs also searched for talent and (ii) if we allowed the nursery club to reinvest the proceeds from selling the star player.

5.4.1 Rivalry between established and nursery clubs over talent search

In the model, we have ignored the possibility of incumbent clubs discovering and developing star players. This may be a reasonable assumption because the probability of finding and developing a talented player into a star player is presumably very small. Thus, for established clubs to obtain star players, they need to buy them rather than foster them themselves. How would our results change if we allowed for incumbent search and development of star players?

Having incumbent clubs simultaneously searching for star players will of course decrease the incentive for the nursery club to find new talent. However, while the nursery club will experience a significantly higher incentive to search for a star player when it can sell the player under bidding competition to incumbents rather than pursuing entry into the Champions League, incumbents may not react with higher search efforts when realizing that the nursery club will attempt to sell the player under bidding competition. Essentially, this implies that the results that we obtained above on how selling the star player under bidding competition increases the nursery club's search ambitions may not be strongly affected by allowing incumbents to search for superstars. Appendix A.4 illustrates this somewhat surprising result.

5.4.2 Allowing for reinvestment of sale proceeds

What would happen in the long run if the nursery club could reinvest the sale proceeds in new players? First, if the player's bargaining position in the contract stage is strong, the net profit for the nursery club will be small, and the possibility to reinvest and upgrade its team would be minor. Thus, in this case, the possibility of challenging the incumbents in the long run would be small. However, if the player's bargaining position in the contract stage is weak and the quality of the player is very high, then the net profit for the nursery club can be substantial Moreover, if this occurs repeatedly, then this club might accumulate sufficiently financial capital to challenge the incumbents in the long run. Examining this issue in detail seems an interesting avenue for future research.

5.4.3 Factors other than Bosman

Section 3 provides on a difference-in-differences regression analysis of the effect of the Bosman ruling on national team performance. Of course, it is also important to note that after the Bosman ruling in 1995, many other fundamental institutional changes occurred: the prize money and commercial value of the Champions League increased steadily over the past two decades, the number of incumbent clubs in the group stage was increased, a second group stage round was played during 1999 to 2003, and the number of total clubs in the Champions League increased.

In our working paper, we use our model to explore how higher commercial revenues and prize money, a greater presence of incumbent clubs and an increase in the number of competitive clubs affect the probability of the nursery club succeeding in finding a star player and how these factors affect the competitive balance at the club and national level. The other institutional changes have differing effects on the incentive for the nursery club to invest in talent search and on the competitive balance, and it is difficult to predict their net effect. We would then argue that the Bosman ruling had a first-order effect, while the subsequent changes in institutions, taken together, had a limited joint influence.

6 Conclusion

The Bosman ruling changed the European football market profoundly by allowing free movement of players within EU and prohibiting quotas on the number of EU players in a club's squad. As such, the Bosman ruling expanded the labour market for players and shifted power from clubs to players. In this paper, we take a step towards a systematic investigation on how changes in the market structure, such as the Bosman ruling, affect talent development and competitive balance. We set up a model with three key features. First, traditionally strong clubs in large countries (incumbents) have an advantage in the form of club-specific assets (players and fans). Two, smaller clubs, so-called nursery clubs, are equally good as incumbent clubs at developing talents. Three, talented players are willing to sign long-term contracts with nursery clubs due to the risk of injury (or failure).

With this model, we show that an expanded labour market for players and a shift in the balance of power from clubs to players lead to a vertically organized market with few top clubs and many nursery clubs acting as suppliers of star players. The reason is that the incentives for nursery clubs to make profit switches from competing with incumbent clubs to develop and sell star players. Moreover, stronger competition between incumbent clubs over star players implies that nursery clubs and talents receive a higher share of the aggregate surplus in the market, and thus the incentive for talent development increases. The model's theoretical results are consistent with the trends that have been present on the European football market after the Bosman ruling. A higher concentration of a few top clubs in the later stages of the Champions League and an increased competitive balance between traditionally stronger and weaker EU 15 countries, both at the senior and junior levels.

We observe that the demand for football has increased in the EU despite the decrease in the competitive balance in the Champions League. Why is that? We believe that it stems from the fact that players from smaller EU countries are becoming more competitive in the Champions League, as captured by the improved performance of smaller EU countries in international tournaments. The supporters from the smaller countries could then derive utility from watching (mainly on TV) these players in the Champions League. Competitive balance in national team tournaments functions as a complement to the less- balanced Champions League. It is therefore from a welfare perspective that keeping the status of these national team tournaments high seems important. In the big US sports, this is not an issue, as most participants and spectators are from the same nation.

In our analysis, we have abstracted several important factors that appear to be fruitful avenues for future research. Incorporating financial strength into the analysis should yield important insights. Up-and-coming clubs with strong financial support are likely to be able to challenge incumbent clubs and therefore break up the existing structure of the European football market. In fact, Manchester City is currently developing a business model very similar to a multinational enterprise with affiliates all over the world functioning as internal suppliers of superstars. City Football Group (CFG) owns, or co-owns, six clubs on four continents and the contracts of 240 male professional players and two dozen women.[38]

Examining how different financial restrictions and revenue-sharing schemes affect the intensity of the competitive balance at both the club and national team levels also appears to be of particular relevance. Another potential development is external investment in and ownership of potential star players. If the nursery club cannot secure the money to retain the star player, it may obtain such financing from outside private equity owners (i.e., third-party ownership).

Finally, we believe that it is important to examine the operation of the market for young talent and its effect on the competitive balance at both the club and national levels. One might conjecture that the early sale of young talent might be counterproductive to both the young

[38] Manchester City's plan for global domination , the Guardian, https://www.theguardian.com/news/2017/dec/15/manchester-city-football-group-ferran-soriano

talent and other talented players in the same league. Could restrictions on the market for young talent along the lines of the draft system used by the NHL in the U.S. be beneficial for European football? Another interesting extension would be to examine how a young talented player and his family's incentives are affected by different types of regulations. How can a system balance the incentives of the individual (family) with those of the nursery club?

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A Appendix

A.1 Proof of Equation (16)

From (9), (10) and (11), by calculation:

$$v_{il} - v_n = [z_A(i) - z_{NA}(l) - (z_E(n) - \lambda_O(i) z_O(i))] \times R + F - T. \tag{A.1}$$

Note that

$$sign\left[\frac{dv_{il}}{dk} - \frac{dv_n}{dk}\right] = sign\left(\frac{d[z_A(i) - z_{NA}(l) - (z_E(n) - \lambda_O(i) z_O(i))]}{dk}\right). \tag{A.2}$$

From (3)-(5), we obtain

$$\frac{d[z_A(i) - z_{NA}(i) - (z_E(n) - \lambda_O(i) z_O(i))]}{dk} = \frac{K - \lambda_O \kappa}{(K+k)^2} - \frac{K - \kappa}{(K + k - \kappa + k_0)^2} > 0 \quad \text{(A.3)}$$

$$\frac{d[z_A(i) - z_{NA}(n) - (z_E(n) - \lambda_O(i) z_O(i))]}{dk} = \frac{K - \lambda_O \kappa}{(K+k)^2} - \left(\frac{K - \kappa - k_0}{(K + k + k_0 - \kappa)^2} \right) > 0 \quad \text{(A.4)}$$

since $k_0 > \kappa > 0$ and $\lambda_O \in (0,1)$.

Hence, from (A.2), (A.3) and (A.3), it follows that $\frac{dv_{il}}{dk} > \frac{dv_n}{dk}$.

A.2 Equation (13)

Equations (A.2) and (A.3) also allow us to prove the sign of the bracketed term in (13), i.e.,

$$z_A(i) - z_{NA}(l) - (z_E(l) - \lambda_O(i) z_O(i)) < 0.$$

First, note that (A.2) and (A.3) imply that $z_A(i) - z_{NA}(l) - (z_E(l) - \lambda_O(i) z_O(i))$ is monotonically increasing in k. Then, note that

$$\lim_{k \longrightarrow \infty} [z_A(i) - z_{NA}(l) - (z_E(l) - \lambda_O(i) z_O(i)) = 0 \quad \text{(A.5)}$$

since $\lim_{k \longrightarrow \infty} [z_A(i)] = 1$, $\lim_{k \longrightarrow \infty} [z_E(n)] = 1$ and $\lim_{k \longrightarrow \infty} [z_{NA}(l)] = \lim_{k \longrightarrow \infty} [z_O(i)] = 0$.

A.3 Proof of Lemma 2

First, note that from (23), the acquiring incumbent cannot increase its share of won matches compared to the case when the nursery club enters if $b\,(k + k_0) = k_0$. Hence, $b > k_0/(k + k_0)$ introduces a natural lower bound. We then have

$$v_{il}^{PRE} - v_n = [z_A(i) - z_{NA}(l) - (z_E(n) - \lambda_O(i) z_O(i))] \times R + F - T \quad \text{(A.6)}$$

with the share of matches $z_h(i)$ now given from (23). Equations (A.3) and (A.4) now take the form

$$\frac{d[z_A(i) - z_{NA}(i) - (z_E(n) - \lambda_O(i) z_O(i))]}{dk} = b\frac{K - \lambda_O \kappa}{(K+bk)^2} - \frac{K - \kappa}{(K + k - \kappa + k_0)^2} \quad \text{(A.7)}$$

$$\frac{d[z_A(i) - z_{NA}(n) - (z_E(n) - \lambda_O(i) z_O(i))]}{dk} = b\frac{K - \lambda_O \kappa}{(K+k)^2} - \left(\frac{K - \kappa - k_0}{(K + k + k_0 - \kappa)^2} \right) \quad \text{(A.8)}$$

where it can be checked that $\frac{d[z_A(i) - z_{NA}(i) - (z_E(n) - \lambda_O(i) z_O(i))]}{dk}\Big|_{b = k_0/(k+k_0)} = \frac{-K+\kappa}{(K+k-\kappa+k_0)^2} < 0$ and $\frac{d[z_A(i) - z_{NA}(n) - (z_E(n) - \lambda_O(i) z_O(i))]}{dk}\Big|_{b = k_0/(k+k_0)} = \frac{-K+\kappa+k_0}{(K+k-\kappa+k_0)^2} < 0$. Since $\frac{dv_{il}^{PRE}}{dk} = \frac{dv_{il}}{dk} < \frac{dv_n}{dk}$ is strictly positive for $b = 1$ from (A.3) and (A.4), there must exist a $b^* \in (k_0/(k + k_0), 1)$ such that $\frac{dv_{il}^{PRE}}{dk} = \frac{dv_n}{dk}$.

A.4 Allowing for incumbent talent search

Consider a setting where the nursery club and only one of the incumbent clubs search for potential star players. In Stage 1, the clubs invest in player development ρ_E to scout star talent k. For simplicity, assume that the probability of succeeding with a star player is the investment level, i.e., $\rho \in [0,1]$, and that investment is associated with an increasing and strictly convex cost $y(\rho) = \frac{\mu}{2}\rho^2$. To simplify further, we assume that if both the nursery club and the incumbent club find the star player, the player will sign for the incumbent club. A reason for this is that the incumbent club have more financial resources, contacts and reputation, thereby giving the incumbent club the upper hand in this situation. Finally, for the sake of exposition, we assume that the quality of a talent is known. We show that under mild conditions, we can extend the interaction to a setting where talent quality is not known in advance. To highlight the interaction between the nursery club and the incumbents, we also simplify the impact of the Bosman ruling and model this as a reduction in the transaction T.

The expected profits for the nursery club and the incumbent club can be written:[39]

$$\Pi_E = \underbrace{(1-\rho_i)\left(\underbrace{\rho_E \xi_E(l)}_{\text{Nursery succeeds}} + \underbrace{(1-\rho_E)\lambda_O(i)z_O(0)\times R}_{\text{Nursery succeeds}}\right)}_{\text{Incumbent club fails}} - y(\rho_E) \tag{A.9}$$

$$\Pi_i = \left(\underbrace{\rho_i z_A(i)}_{\text{Incumb. succeeds}} + \underbrace{(1-\rho_i)\{\underbrace{\rho_E z_{NA}(i)}_{\text{Nursery succeeds}} + \underbrace{(1-\rho_E)z_{NA}(0)\}}_{\text{Nursery fails}}}_{\text{Incumbent fails}}\right) \times R - y(\rho_i) \tag{A.10}$$

As shown in (A.9), the nursery club can sign the star player only when it succeeds and the incumbent club fails. This occurs with probability $(1-\rho_i)\,\rho_E$, in which case the nursery club receives the reward $\xi_E(l)$, which depends on whether or not it keeps or sells its star player in Stage 2 — as shown in (20). As shown in (A.10), the incumbent club obtains the same product market profit as an acquiring incumbent club, $z_A(i) \times R$ if it succeeds , which occurs with probability ρ_i. If the incumbent club fails, which occurs with probability $1-\rho_i$, it obtains the same expected profit as an non-acquiring incumbent, $[\rho_E z_{NA}(l) + (1-\rho_E)z_{NA}(0)] \times R$, where $\rho_E z_{NA}(l) \times R$ is the established club's expected profit if the nursery club succeeds and $(1-\rho_E)z_{NA}(0) \times R$ is the expected profit if the nursery club fails. Each club chooses effort (i.e., the success probability) to maximize its expected net profit, taking the effort of the rivals as a given. The first-order

[39] We drop the index of the identity of the established clubs.

conditions are

$$(1-\rho_i^*(l))\left\{\xi_E(l)-\lambda_O(i)z_O(0)\times R\right\} = \mu\rho_E^*(l), \tag{A.11}$$

$$\left[z_A(i)-\underbrace{\{\rho_E z_{NA}(l)+(1-\rho_E)z_{NA}(0)\}}_{\text{(Replacement effect)}}\right]\times R = \mu\rho_i^*(l), \tag{A.12}$$

where we assume that the effort cost $y(\cdot)$ is sufficiently convex that the second-order conditions are fulfilled. The left hand side (LHS) in each equation is the marginal benefit associated with choosing a marginally higher search effort (i.e., success probability), while the right hand side (RHS) is the marginal cost.

To illustrate how bidding competition affects incentives, suppose that the quality of the star player is sufficiently high to generate bidding competition if a sale occurs, i.e., $k > k^{PE}$. From (20), the reward is $\xi_E(i) = v_{ii} + \lambda_O(i)z_O(i) \times R$. If a sale of the star player is not viable — for instance, if the transaction costs are very high — the reward in (A.11) is the entry value $\xi_E(e) = z_E(n)\times R - F$. Now, consider the clubs' actions. If entry with the star player is the only option for the nursery club, the Nash equilibrium in search efforts $(\rho_E^{Entry^*}, \rho_{i1}^{Entry^*})$ is shown at the point labelled Entry* in Panel (ii) of Figure A.1 at the intersection the clubs' reaction functions. Note that the reaction function of the nursery club, labelled $\mathcal{R}_E^{Entry}$ (representing the nursery club's optimal search effort for a given choice of the incumbent club), is downward sloping in the $\rho_E - \rho_{i_1}$ space in Panel (ii), so that the nursery club will choose a lower effort when the incumbent club chooses a higher effort. This follows because a higher effort by the incumbent club ρ_{i_1} reduces the nursery club's marginal expected benefit from succeeding (the LHS in Equation A.11), while the marginal cost is not affected (the RHS in Equation A.11). The nursery club then chooses its highest effort when $\rho_i = 0$, labelled ρ_E^{Entry}. In contrast, the incumbent club's reaction function, labelled $\mathcal{R}_i^{Entry}$, is upward sloping in the $\rho_E - \rho_{i_1}$ space, as shown in Panel (ii) of Figure A.1. Thus, the incumbent club's response to a higher search effort by the nursery club is also to choose a higher search effort. To see why, note that the marginal benefit of succeeding in (A.12) first consists of the profit or revenues with the star player, $z_A(i) \times R$. The marginal benefit from succeeding is, however, reduced by the second term, which mirrors a "replacement": when the incumbent club succeeds, it replaces the profits that the club would obtain when failing. More specifically, the replacement effect, $[\rho_E z_{NA}(n) + (1-\rho_E)z_{NA}(0)] \times R$, is the established club's expected profit as a non-acquirer, where the first term is the expected profit when the nursery club succeeds and the second is the profit when the nursery club fails. The replacement effect is rewritten as $R - \rho_E\left[z_{NA}(0) - z_{NA}(n)\right] \times R$, where $z_{NA}(0) > z_{NA}(n)$ from (6). Note that if the nursery club chooses a higher search effort, ρ_E, the expected loss from entry, $\rho_E\left[z_{NA}(0) - z_{NA}(n)\right] \times R$, will increase, which in turn reduces the whole replacement effect, $R - \rho_E\left[z_{NA}(0) - z_{NA}(n)\right] \times R$. Thus, since an increased search effort by the nursery club ρ_E reduces the expected loss from replaced profits, the incumbent club will choose a higher success probability, ρ_i.

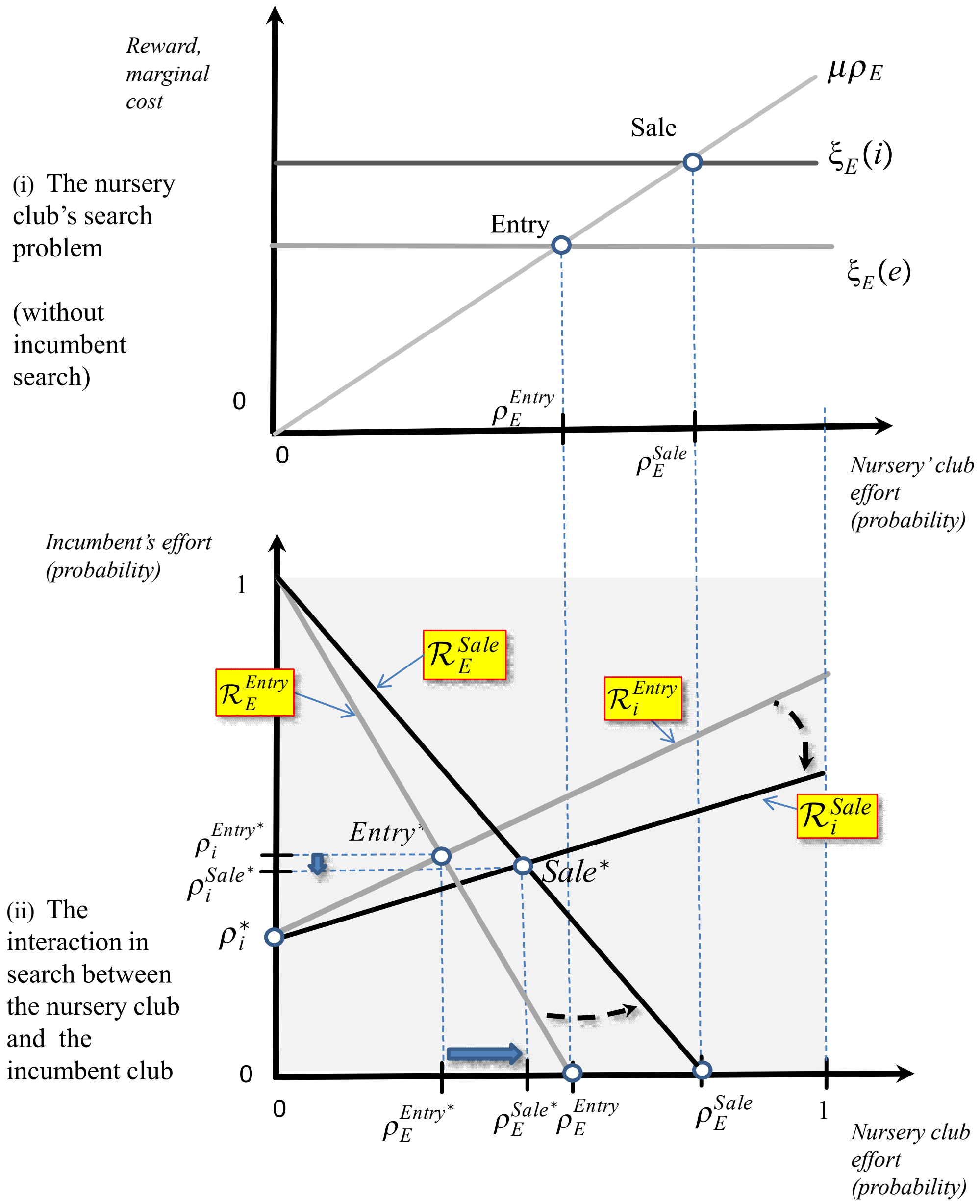

Figure A.1: Panel (i) shows the search choice in stage 1 by the nursery club without incumbent search. Panel (ii) shows the strategic interaction in stage 1 between the nursery club and one incumbent club and how this depends on the anticipated outcome in stage 2.

Let us now examine how the equilibrium search efforts by the clubs are affected if commercialization by sale becomes viable, which we can do by assuming that the transaction cost is reduced. The Nash equilibrium-given future sale, labelled *Sale** in Panel (ii) of Figure A.1, is obtained by first substituting $\xi_E(i) = v_{ii} + \lambda_O(i)z_O(i) \times R$ from (20) into the first-order condition (A.11). Turning to the incumbent club, we note that sale under preemptive bidding competition must leave all established clubs with the same net profit $z_A(i) \times R - T - v_{ii} = z_{NA}(i) \times R$. Hence, we can merely replace the winning percentage $z_{NA}(n)$ in (A.12) with $z_{NA}(i)$. From Lemma 1, as shown in Figure 5(iii), we know that a sale of the star player under preemptive bidding competition gives the nursery club a higher reward than that under entry, $\xi_E(i) - \xi_E(e) = v_{ii} - v_n > 0$. For a given effort by the incumbent club, it then follows that the nursery club will always choose a higher search effort under sale. Hence, the nursery club's reaction function under a sale ($\mathcal{R}_E^{Sale}$) must be located to the right of the reaction function under entry ($\mathcal{R}_E^{Entry}$). How does the incumbent club react? First, from (6), a non-acquiring incumbent club will have a higher winning percentage under a rival acquisition than under certain entry by the nursery club, $z_{NA}(i) > z_{NA}(n)$, since competition is less intense. This implies that the replacement effect in (A.12) is larger under sale. With a larger expected profit being replaced under sale, the incumbent club will therefore choose a lower search effort under sale, and the reaction function for the incumbent club will shift down from $\mathcal{R}_i^{Entry}$ to $\mathcal{R}_i^{Sale}$ in Panel (ii) in Figure A.1(ii). Comparing the Nash equilibria under entry and sale, *Entry** and *Sale** in Panel (ii) then makes it clear that sale in Stage 2 will increase the equilibrium search effort by the nursery club, while the research effort by the incumbent may even decrease.

We have the following result:

Proposition 7 *Suppose that the transaction cost (T) is initially very high, so that the nursery club — when it is successful in its search for a star player, $k > k^{PE}$ — keeps the star player in order to go for the Champions League. Then, there is a significant decrease in the transaction cost, so that if the nursery club succeeds in finding the star player, it will sell it under bidding competition to an incumbent club. This will increase the search effort of the nursery club, $\rho_E^{Sale} > \rho_E^{Entry}$, while the change in the search effort of the incumbent club cannot be signed, $\rho_i^{Sale} \gtreqless \rho_i^{Entry}$. If the replacement effect is sufficiently strong, the incumbent's search effort might even decrease.*

Table 1: Average points per match by EU15-top and EU15-bottom in World Cup tournaments before and after the Bosman ruling in 1995

	All (1)	All (2)	Third (3)	Third (4)	EU15 (5)	EU15 (6)
Bosman × Bottom EU15	0.289	0.290*	0.393**	0.394*	-0.260	-0.260
	(0.188)	(0.157)	(0.182)	(0.197)	(0.254)	(0.258)
Bosman	0.031	0.013	-0.003	-0.022	0.130	0.130
	(0.110)	(0.118)	(0.137)	(0.150)	(0.143)	(0.154)
Bottom EU15	-0.535***	-0.542***	-0.495***	-0.500***	-0.615***	-0.615***
	(0.142)	(0.075)	(0.120)	(0.124)	(0.176)	(0.178)
WC_{EU}		0.160		0.212		2e-17
		(0.134)		(0.139)		(0.232)
WC_{South}		0.062		0.043		3e-17
		(0.141)		(0.107)		(0.376)
Constant	1.380***	1.032***	1.409***	1.008***	1.308***	1.308***
	(0.080)	(0.241)	(0.060)	(0.144)	(0.110)	(0.168)
R^2	0.073	0.094	0.057	0.099	0.167	0.167
N	368	368	284	284	84	84

Notes: When calculating the average number of points per match, a win is given two points, a draw one point and a loss zero points (all points given after extra time but before penalties). ”Bosman” is a binary variable taking the value one after Bosman ruling in the year 1995, and zero before.”Bottom EU15” is a binary variable taking the value one for the countries Austria, Belgium, Denmark, Greece, Ireland, Netherlands, Northern Ireland, Portugal, Scotland and Sweden, and, zero for the countries England, France, Germany (West Germany before the unification), Italy and Spain. ”WC in EU15” is a binary variable taking the value one for World Cup tournaments in a EU15 country, zero otherwise.”WC in South America” is a binary variable taking the value one for World Cup tournaments in a South American country, zero otherwise. Column 1 and 2 includes all WC-matches involving at least one EU15 country. Column 3 and 4 restrict the sample to matches where a EU15 country plays a non-EU15 country (third country). Column 5 and 6 restrict the sample to WC-matches between EU15 countries. Standard errors clustered at the country level. Standard errors in parentheses: * indicates p¡0.10, ** indicates p¡0.05 and *** indicates p¡0.01

Table 2: Probability to at least draw in matches by EU15-top and EU15-bottom in World Cup tournaments before and after Bosman

	All (1)	All (2)	Third (3)	Third (4)	EU15 (5)	EU15 (6)
Bosman × Bottom EU15	0.197***	0.205**	0.259***	0.268**	-0.130	-0.130
	(0.058)	(0.072)	(0.076)	(0.094)	(0.175)	(0.176)
Bosman	0.004	-0.020	-0.050	-0.069	0.144	0.139
	(0.043)	(0.057)	(0.061)	(0.068)	(0.095)	(0.101)
Bottom EU15	-0.278***	-0.286***	-0.260***	-0.272***	-0.308***	-0.308***
	(0.047)	(0.052)	(0.061)	(0.068)	(0.098)	(0.010)
WC_{EU}		0.081		0.117*		-0.010
		(0.134)		(0.139)		(0.232)
WC_{South}		0.062		0.035		-0.049
		(0.087)		(0.070)		(0.210)
Constant	0.826***	0.584***	0.864***	0.596***	0.731***	0.746***
	(0.021	(0.160)	(0.034)	(0.136)	(0.047)	(0.096)
R^2	0.064	0.095	0.050	0.102	0.144	0.145
N	368	368	284	284	84	84

Notes: Results after extra time but before penalties. ”Bosman” is a binary variable taking the value one after Bosman ruling in the year 1995, and zero before.”Bottom EU15” is a binary variable taking the value one for the countries Austria, Belgium, Denmark, Greece, Ireland, Netherlands, Northern Ireland, Portugal, Scotland and Sweden, and, zero for the countries England, France, Germany (West Germany before the unification), Italy and Spain. ”WC in EU15” is a binary variable taking the value one for World Cup tournaments in a EU15 country, zero otherwise.”WC in South America” is a binary variable taking the value one for World Cup tournaments in a South American country, zero otherwise. Column 1 and 2 includes all WC-matches involving at least one EU15 country. Column 3 and 4 restrict the sample to matches where a EU15 country plays a non-EU15 country (third country). Column 5 and 6 restrict the sample to WC-matches between EU15 countries. Standard errors clustered at the country level. Standard errors in parentheses: * indicates p¡0.10, ** indicates p¡0.05 and *** indicates p¡0.01

Table 3: Performance by EU15-top and EU15-bottom in the European Cup for boys under 16

	All	Third	EU15	All	Third	EU15
	(1)	(2)	(3)	(4)	(5)	(6)
	Points per match			P(At least draw)		
Panel A: under 16						
Bosman × Bottom EU15	0.263*	-0.191	1.080***	0.141**	-0.082	0.540***
	(0.150)	(0.169)	(0.213)	(0.065)	(0.082)	(0.091)
Bosman	0.038	0.038**	-0.540***	-0.068	0.082	-0.331***
	(0.111)	(0.126)	(0.123)	(0.046)	(0.047)	(0.055)
Bottom EU15	-0.452***	-0.168	-0.958***	-0.204***	-0.051	-0.479***
	(0.142)	(0.113)	(0.099)	(0.044)	(0.055)	(0.060)
Constant	1.198***	1.155***	1.479***	0.754***	0.589***	0.988***
	(0.080)	(0.113)	(0.351)	(0.027)	(0.174)	(0.179)
R^2	0.065	0.07	0.183	0.04	0.04	0.158
N	440	278	162	440	278	162
Panel B: under 16 plus under 17						
Bosman × Bottom EU15	0.146	-0.117	0.654***	0.057	-0.082	0.327***
	(0.100)	(0.133)	(0.144)	(0.063)	(0.047)	(0.089)
Bosman	0.081	0.347***	-0.327**	-0.006	0.082	-0.202***
	(0.075)	(0.061)	(0.120)	(0.044)	(0.047)	(0.059)
Bottom EU15	-0.452***	-0.166	-0.958***	-0.203***	-0.051	-0.479***
	(0.099)	(0.112)	(0.099)	(0.045)	(0.055)	(0.057)
Constant	1.062***	0.823***	1.479***	0.664***	0.755***	0.932***
	(0.228)	(0.260)	(0.351)	(0.100)	(0.028)	(0.115)
R^2	0.06	0.07	0.13	0.03	0.04	0.11
N	691	411	280	691	411	280

Notes: Results after extra time but before penalties. "Bosman" is a binary variable taking the value one after Bosman ruling in the year 1995, and zero before."Bottom EU15" is a binary variable taking the value one for the countries Austria, Belgium, Denmark, Greece, Ireland, Netherlands, Northern Ireland, Portugal, Scotland and Sweden, and, zero for the countries England, France, Germany (West Germany before the unification), Italy and Spain. Column 1 and 2 includes all U16-matches involving at least one EU15 country. Column 3 and 4 restrict the sample to matches where a EU15 country plays a non-EU15 country (third country). Column 5 and 6 restrict the sample to matches between EU15 countries. All models include dummies for the round of the tournament (group , quarterfinals, semifinals, third place match and finals). Standard errors clustered at the country level. Standard errors in parentheses: * indicates p¡0.10, ** indicates p¡0.05 and *** indicates p¡0.01.