"Superstar Effects in Italian Football: an Empirical Analysis"(*)

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Abstract

In this paper we investigate wage determination among professional football players ranked in the Italian A and B series. Since football is a highly labour intensive activity, both scale economies and scarcity of the most talented players emerge as the main determinants of the high earnings levels observed. In particular, the marginal revenue product of a player is related to the extra price that a spectator is willing to pay to see him play (live or on television) times the number of spectators who are attracted. In this context, the relationship between individual productivity and pay can lead to "superstar" effects. We use data on individual earnings and other personal characteristics of Italian football players in the 1995/6 season to estimate pseudo-human capital earnings equations and test the relevance of "superstar" effects in wage determination. Significant "superstar" effects are found in earnings after controlling for a large set of personal characteristics, individual performance indicators and either team fixed effects or team-specific variables.

Special Theme: Labour markets in professional team sports

JEL: J2, J3, J4
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1. Introduction

One stylised fact that characterises modern labour markets is the very high earnings that some professions command. Whilst traditional human capital theory maintains that there is a close relationship between workers' productivity and their earnings, no amount of investment in human capital or training could possibly explain the huge differences in pay that are sometime observed. In the attempt to reconcile this puzzling evidence, attention has recently been focused onto the implications of talent and how the latter is translated into earnings. In this context, the scarcity of talents should be able to account for the large differences in pay for some workers. In most professions, however, even very talented workers - Nobel prize winners, for example, who can expect to earn much higher salaries as compared to most of their work-mates – compare unfavourably with the very-high-earnings professions - like movie stars - (see Nelson, *et al.*, 2001). Hence, it appears as if neither differences in human capital investments nor heterogeneous (latent) talents can reconcile traditional explanations with the existence of astronomically high earnings. The fact that few individuals in selected professions can enjoy huge salaries has been denoted in the economic literature as "superstar" phenomena (Rosen, 1981). Casual observation suggests that superstar effects are most commonly observed in the entertainment business and in professional sports (Adler, 1985; Fort and Quirk, 1995).

So why is that some professional sportsmen and media stars earn incredibly high salaries while even talented workers in other fields do not get as much? This question is frequently addressed by the media which often blame these phenomena as "against societal values" and as "waste of resources". Conversely, economists characterise the situation as evidence of "scarcity rents"[1]. In a seminal paper, Rosen (1981) discussed the role that non-convexities in production may have on the distribution of revenues. In particular, he showed

how the interaction between technology and demand can create the opportunity for even small differences in talent - that is, professions in which 'talent' is highly valued by consumers - to determine disproportionate differences in earnings. It is scale economies that can turn potential earnings so high. In sport and media professions consumers' demand for excellence has a significant role in determining the market value of the products offered by most talented individuals. In (professional) sports, for example, the marginal revenue product of a player is related to the (extra) price that a consumer is willing to pay to see him play (live or on television) times the number of consumers. Clearly, the increase in demand is not driven by the price mechanism; it is the reputation effect that a "superstar"'s talent has in attracting large audiences that dominates. As long as most football fans agree that Baggio is one of the best players (in Italy, back in 1995), he will be able to earn salaries that are far larger than those earned by other players who are only slightly less talented[2]. Reputational effects are not the only explanation of why huge differences in earnings are found among professional football players. Technology facilitates the reproduction of the product at low cost and this, together with consumer demand, permits expansion of the market (Rosen, 1981). First, football matches can be seen in large stadiums by many (paying) spectators simultaneously; second, media coverage has significantly increased the scope of these events in recent decades. A World Cup Championship or European Cup Final or even just a serie A league match can, nowadays, attract a remarkably large audience all over the world. It is large audiences generated both by television broadcasts and by attendance at games, together with consumers' perceptions that other players are imperfect substitutes, which generate superstar

[1] An interesting discussion of the debate between the 'social value of sports' and the economic motivation for paying high salaries to superstar is reported in Rosen and Sanderson (2001).

[2] It is interesting to note that if there is no agreement among consumers as to who is supposed to be the best player - i.e due to imperfect observability of talent or because of different tastes - a reduced dispersion in earnings levels of superstar may result (i.e. in the upper tail of the distribution).

rents[3]. It should be noted, however, that duplication of services at constant marginal cost is, in the case of football, of second order in importance with respect to other industries where superstar effects are also relevant. In professional football, each match is different and, most important, consumers value "live" performances (whether on television or at the stadium) far more than video replays. Hence, even if football superstars can reach very large markets at a relatively low price, the argument that constant marginal cost of production is an important feature of superstar effect is probably much less relevant in the context of football.

In this paper we study wage determination among professional football players ranked in the Italian A and B series.[4] In particular, we investigate to which extent the relationship between individual productivity and pay can lead to "superstar" effects. We use data on individual earnings and other personal characteristics of Italian football players in the 1995/6 season to estimate pseudo-human capital earnings equations augmented of "superstar" effects. The paper contributes to the existing literature in different ways. First, it uses a unique data set with information on personal characteristics of a large number of professional football players appearing in Italian football and their earnings, as well as indicators of individual and team performance. The issue of "superstar" effects in wage determination is directly addressed and tested[5]. The main set of results shows that significant "superstar" effects are present in Italian football. In particular, in Italian football, a three-tier pay structure for (professional) players seems to exist, namely: ordinary players, international players and top superstars. International players and superstars receive significant salary premia over and above the earnings level determined by their experience and performance.

[3] The combined effect of customers' agreement on player talent and preference for live performances, that can reach a mass audience, contribute to the skewness in the earnings distribution, by stretching the far right (upper) tail of the distribution (see fig.1).

[4] We should stress that availability of data on sportsmen's earnings is much more limited in Europe relative to North America. To our knowledge, the only other European study to estimate an earnings function for players in team sports is Lehmann and Weigand (1999) who use data on German footballers in the top division in 1998.

[5] Lack of data prohibits testing for superstar effects by direct estimation of players' marginal revenue products, along the lines proposed for US baseball and basketball by MacDonald and Reynolds (1994) and Hausman and Leonard (1997), respectively.

The paper is organised as follows. In section 2, we briefly describe the structure of Italian (professional) football and present the main features of the data used. Section 3, discusses the empirical strategy and the econometric specification. Section 4 presents the main results and the last section concludes.

2. Data and Stylised Facts on Italian football

Italian (professional) football is structured along three major divisions (*serie*): A, B and C; however only the first two (A, B) can be really considered as formed by 'professional' players. Team membership in the divisions is contingent on performance and ranking in the national championship. Every year the worst performing teams are relegated to the next lowest division (*serie*) whilst the best performing teams from the lower divisions are promoted upwards[6]. Specifically, four teams are relegated (out of 18) from serie A to B and are replaced by the same number of promoted clubs. This system facilitates a high degree of turnover of serie A clubs, allowing for equality of opportunity for smaller teams but not necessarily equality of outcomes, since the top places in serie A are typically dominated by a small number of large clubs (Szymanski, 2000). Most Italian cities have a local team (some more than one) which is supported by the community both in terms of committed fans and financial sponsorship. The best performing teams, such as A.C. Milan and Juventus, tend to attract greater fan support, generate higher revenues (i.e. sales of tickets, broadcast rights, merchandising, etc.) and pay higher earnings to their top players.

[6] This is at variance with the structure of soccer in the U.S. (as well as other sports, such as: (American) football, baseball, basketball and hockey). Basically, in the U.S., there is no system of promotion and relegation and new entry of teams depends on franchise allocation by existing members and the payment of a substantial fee (Hoehn and Szymanski, 1999; Rosen and Sanderson, 2001).

2.1. Data

Our empirical analysis requires data on player salaries together with data on player and team characteristics. Salary data for the 1995-96 Italian season are taken from an annex to the newspaper *Il Giornale*, published on March 15 1996. These salaries are gross of tax but net of bonuses and signing-on fees and represent pre-season values as at August 1995. The players are all first-team squad members and youth trainees. Salary information is available for all clubs in series A and B and details can be found for 730 players.

Player career performance statistics and team information, for the 1994-95 season and earlier, are taken from *Almanacchi del Calcio*, *Tuttocalcio 1998-99*, and the *European Football Yearbook 1995-96*. Not all the players for whom salaries are recorded have matching career details and the number of players for which all data are available is 593.[7] *Tuttocalcio 1998-99* also provided us with information on career records of coaches employed by the clubs at the start of the 1995-96 season but records of the coach of one team (Brescia) in our sample were missing and this reduces the sample for which all data are available to 580.

Descriptive statistics for our variables are shown, with definitions, in Table 1 using the sample of 593 players which is used below for fixed effects estimation. Further details of the salary distribution are shown, by quantiles, in Table 2. This reveals a highly unequal distribution with substantial skewness, as one would expect for popular entertainers. In figure 1, we also report a non-parametric estimate (kernel) of the overall earnings distribution. The asymmetry of the distribution, as well as the long (upper) right tail indicate the presence of a restricted number of individuals with very high earnings. For example a player located at the 99 percentile of the distribution earns over 10 times more than players located around the

[7] Data are missing for players who do not appear in *Tuttocalcio 1998-99*. There are two main types of missing player: those who retire after 1995-96 and those who emigrate after 1995-96. The latter includes at least two possible "superstars", Gianfranco Zola and Gianluca Vialli who both moved to England in 1996.

median of the distribution, and 45 times more if compared to the 10th percentile of the distribution.

The measure of *SUPERSTAR* is found by computing the number of career goals per serie A season (or strike rate) for each player and then taking the number of standard deviations away from the mean. We therefore rule out "superstar" status for serie B players, by construction. Hence, *SUPERSTAR1* denotes a dummy variable equal to one for players who have career strike rates one to two standard deviations away from the median. *SUPERSTAR2, SUPERSTAR3, SUPERSTAR4+* are corresponding dummy variables for players with strike rates two to three, three to four and more than four standard deviations from the median. Only three players are in the *SUPERSTAR4+* category: Roberto Baggio of AC Milan (and Italy), Abel Balbo of Parma (and Argentina) and Giuseppe Signori of Lazio (and Italy). All three are attackers (according to *Tuttocalcio 1998-99*) and our measure of superstars is clearly biased towards forwards. We would expect attackers, as goalscorers, to be the more glamorous players with higher media profiles than defenders, for example. It appears that *SUPERSTAR4+* contains the top two players in the 1995 salary distribution, Baggio and Signori. The highest paid player was Roberto Baggio, whose salary of six billion lira was over 60% greater than that of Guiseppe Signori.[8] Our three superstars had, at 1995, average Serie A career goals per season of 15.15, roughly a goal every two games, and well above the average for serie A forwards of 4.6 goals per season.

3. Empirical specification

Our estimating equation is:

[8] We did not wish to impose "superstar" status by casual impression. However, it would be useful to explore other methods of defining superstar, such as citations in reports of football matches, sales of named replica shirts and questions about fans' views in fan surveys. These alternative methods were not available to us. Our use of

$$Ln(SALARY) = a_0 + a_1\boldsymbol{EXPERIENCE} + a_2\boldsymbol{PERFORMANCE} + a_3\boldsymbol{REPUTATION} + a_4\boldsymbol{SUPERSTAR} + (\text{team fixed effects or } a_5\boldsymbol{TEAM\ QUALITY}) + \text{error} \quad (1)$$

Variables representing player experience include age and appearances. In a pseudo-human capital formulation, we would expect that player salaries increase with both age and number of appearances but at a diminishing rate. The use of age and appearances jointly in a players' earnings function represents a departure from the established practice of North American studies (Gius and Johnson, 2000; Hamilton, 1997; Idson and Kahane, 2000; Jones *et al*., 1999; Kahn, 1993) which typically include years of experience in the league studied or number of career appearances but not both, and not jointly with age. Those studies can legitimately exclude age since most North American sports have a draft system where players enter major leagues at a fairly uniform age of entry, just after college graduation. Entering age and experience together would generate multicollinearity in estimated earnings functions for North American team sports. In European football, however, players are not drafted and can enter professionally at many different ages. Hence, it is more appropriate to utilise age (*AGE*) and appearances separately. The age variable is given the quadratic form standard in estimated age-earnings profiles (*AGE SQ*).

Some literature on estimation of models of transfer fees for footballers in England makes a distinction between most recent experience (the previous season) and accumulated experience prior to that season (Carmichael *et al*., 1999). We follow this procedure in our model of player salaries. Given a short playing career, of eight years duration on average, we would expect most recent experience to have a higher weight in the determination of player salaries than accumulated experience up to the start of the previous season.

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an objective indicator to test for superstar effects follows Hamlen (1991) who considers a measure of voice quality (harmonic range) in the case of popular singers.

Italian football has a tiered structure, with promotion and relegation between series A, B and C. As a consequence, we would expect experience gained in serie B to have a smaller impact on player salaries compared to experience gained in serie A. The level of experience gained is a reflection of player quality, and hence marginal revenue product. Our experience variables include *PREVIOUS APPSA*, *PREVIOUS APPSA SQ*, *PREVIOUS APPSB*, *PREVIOUS APPSB SQ*, *APPS94A*, *APPS94A SQ*, *APPS94B*, and *APPS94B SQ*. The label *94* denotes the 1994-95 season while *A* and *B* refer to Series A and B, respectively. Each indicator is entered with a squared term to capture non-linearity.

In the case of Italy, we have only limited data on player performance measures. We assign positional categories (*FOR* = forward, *MID* = midfielder, *DEF* = defender, *GK* = goalkeeper) as presented in *Tuttocalcio 1998-99*. For each player we have details on goals scored and "assists", defined as passes leading directly to goals scored. The goals and assist measures are each interacted with positional categories and with series A and B status to generate *FOR GOALS 94A*, *MID GOALS 94A*, *DEF GOALS 94A*, *FOR GOALS 94B*, *MID GOALS 94B*, *FOR ASS 94A*, *MID ASS 94A*, *DEF ASS 94A*, *FOR ASS 94B*, *MID ASS 94B* and *DEF ASS 94B*. We do not have information for goalkeepers on shots saved or for defenders on blocks, interceptions and tackles. In this respect, we do not have the depth of player performance indicators available for more individualistic North American team sports such as baseball, basketball and hockey.[9]

The absence of a full set of player performance indicators might lead to omitted variable bias. In addition to goals and assists as performance measures, we can indirectly control for performance by including variables to proxy player reputations. Players who perform outstandingly well for their clubs are selected for international team appearances (henceforth "internationals") in friendly matches and international tournaments (European

[9] In England, detailed statistics on performances, by game, of Premiership footballers are available from Carling OPTA (Carmichael *et al*., 2000) but salary information is not available.

Cup and World Cup). *ITALY INT* and *OTHER INT* denote dummy variables for Italian and non-Italian internationals who made appearances for their countries in the 1994-95 season, but who are not included under the *SUPERSTAR* definition.[10] The purpose of this distinction is to estimate separate salary premia for international players and superstars. The set of players within the international categories will comprise the full range of positions, unlike superstars. We would expect that players of current international standing would command a salary premium relative to non-selected players, but would derive a lower salary premium compared to superstars. It may be noted that very few serie B teams had international players.

In the 1995-96 season, labour market restrictions denied Italian teams the opportunity to field more than three foreign-born players in a particular serie A or B match. This restriction was removed towards the end of the 1995-96 season following the "Bosman ruling" of the European Court of Justice in December 1995 (Simmons, 1997; Szymanski, 1999)[11]. With labour market restrictions still in force at the beginning of the 1995-96 season, we predict higher salaries for "other" international players compared to Italian internationals, on the grounds that only the very best foreign international players would be sought by Italian clubs. In 1995, the international coverage of players embraced France, Denmark, Eastern Europe and South America. Following the Bosman ruling of 1995, a greater number of non-Italian international players migrated to serie A in order to seek improved earnings opportunities.

Some North American studies make use of a reputation variable defined as selection for Major League Baseball or National Hockey League "all star" post-season games, where players select the best teams from their respective conferences (Idson and Kahane, 2000; Jones *et al*., 1999; Kahn, 1993). Frick (2000) goes further and nominates appearances in "all

[10] There are 37 Italian internationals and 7 non-Italian internationals in our sample.
[11] The Bosman ruling made illegal the payment of transfer fees for players who were out of contract and who wished to transfer clubs across EU boundaries. As a consequence, the football authorities reformed their transfer systems and made possible greater freedom of movement for players.

star" games for the National Basketball Association as a (significant) measure of superstar status. Our measure of international status differs from measures used in North American sports. International soccer teams play a regular sequence of games, including tournaments (with entry competition and finals), whereas North American "all star" games tend to be one-off exhibition games. Also, international soccer teams are typically selected, with a large squad, by an appointed coach whereas North American "all star" teams may be chosen by peer voting.

As well as games involving the Italian national team, there are also lower level international fixtures, including a European tournament, reserved specifically for younger players, aged 21 or under. These are "under 21" matches. Some players selected for the under 21 team also play, currently or eventually, for the full the international team. But many players selected for the under 21 team do not graduate to full international status. We expect these players, denoted by *UNDER 21 ONLY*, to command some premium relative to those not selected but a lower premium relative to "full" internationals. Data availability restricts the under 21 category to Italian players only and there are 68 of these in our sample.

We can take account of team-specific effects in two ways. One is to use fixed-effects estimation, assigning unobserved team effects to constant terms. Alternatively, we can measure some team characteristics explicitly. One indicator of team performance is league position in the 1994-95 season. This ranges from 1 at the top of serie A to 35 at the bottom of serie B. For the teams who were not relegated and did not participate in a relegation playoff game at the end of 1994-95, the rankings are 1 to 14, as shown in the final league table. Rank 15 is given to the team which won the relegation playoff (Genoa). Ranks 16 to 18 are awarded to the three teams promoted from serie B in order of league placing. We view these teams as having higher status than the four relegated teams from serie A who are assigned positions 19 to 22. Ranks 23 to 34 are awarded to serie B teams by league placing and rank

35 is allocated to the four promoted teams from serie C. The higher the league position, the lower is the position (*POS*) and, we predict, the greater the salary commanded by all players of that team, *ceteris paribus*.

It is also possible that player salaries may be determined by the ability of the coaches who they work with. Coaching and player ability may be complementary inputs in team production. Hence, we construct variables to measure coaching attributes. Career details of the head coaches in Italian football (allenatori) are reported in *Tuttocalcio* (with one exception). Idson and Kahane (2000) proposed measures of coaching experience and coaching performance in their study of complementary team inputs and player salaries in the National Hockey League. In the case of Italian football, we find a high correlation between games coached in a particular serie and win percent ratio achieved in the same serie (correlation coefficients of 0.69 for serie A and 0.49 for serie B). Coaches who win more survive longer and coach more games.[12] Hence, we include just the career win percent ratios of these coaches (where a win is given the value 1 and a draw is given the value 0.5), again separately constructed for achievement in Series A and B (*COACH WINA* and *COACH WINB*).

Head coaches in soccer have a dual role. They manage player turnover by releasing unsuitable players and they are (usually) responsible for hiring new players who they consider will add to team performance. Better coaches will be able to attract better players to work with. Head coaches are also responsible for raising the performance of existing players by appropriate training methods, motivation and game tactics.

A coach with a high win percent ratio in serie A games should also attract better quality, higher productivity players who will be paid more, *ceteris paribus*, than other

[12] Using data on records of Australian Rules football coaches spanning over 60 years, Borland and Lye (1996) find that the probability of coach-team separation decreases with the coach's tenure and experience. In an analysis of German football, Hautsch *et al.* (2001) find that coaches' duration in a team spell varies positively

players. Also, coaches with a more successful track record of managing winning teams in serie A should be better able to raise player performance and so augment player salaries. These considerations suggest that the coefficient on *COACH WINA* will be positive. The impact of coaches' win percent in serie B, however, is ambiguous in sign. Serie B coaches tend to be of lower quality, by a "matching" principle, but the superior coaches in serie B, with high win percent records, are likely to be better able to raise player performance and salaries. However, the better serie B coaches are potentially upwardly mobile and likely to be promoted to serie A, either with their current club or by migration.

4. Results

Table 4 reports four sets of regression results[13]. Columns (1) and (2) report Fixed Effects General Least Squares estimates (FGLS). Column (2) offers restricted estimates with the insignificant effect of *SUPERSTAR1* removed, and with *SUPERSTAR2* and *SUPERSTAR3* merged into *SUPERSTAR23*. A Wald test cannot reject coefficient equality of *SUPERSTAR2* and *SUPERSTAR3* (*p*-value of 0.796).

Before turning to our primary variables of interest, the superstar categories, we can note some relevant influences of our control variables. First, the significant roles of age and experience, and their squares, are very much as one would predict for a pseudo-human capital earnings function. This suggests that at least part of a footballer's salary is determined by maturity and experience of performance at different levels of play and not just by ability. It is clear, though, that serie A experience is rewarded more highly than serie B experience. The turning point of age in the age-earnings profile is 28.5, and this conforms to the industry

with win percent and that coaches of top teams have significantly longer survival times than coaches of lesser ranked teams.

[13] The following variables were included in a preliminary general specification and then removed due to lack of significance: dummy variables for positional categories, goals conceded by goalkeepers in each serie, appearances and goals scored in serie C and dummy variables to denote groups of foreign nationality, such as non-Italian European Union and South American.

consensus on the age at which footballers reach peak levels of performance in their careers. Beyond the age of 29, greater experience, in terms of tactical ability and knowledge of the game, is offset by worsening physical performance, including reduced speed and fitness and greater susceptibility to injury. This is reflected in player salaries.

Turning points for accumulated appearances before 1994-95 are 233 for serie A and 120 for serie B. The peak of the experience-earnings profile arrives much earlier for serie B compared to serie A, reflecting the superiority of the latter. The turning point for 1994-95 experience is 37 for serie A, which is not attainable given a maximum of 34 games for the season. Hence the role of *APPS94A SQ* is just to capture non-linearity. For serie B, we cannot reject linearity between salary and 1994-95 appearances.

The pattern of coefficients of the four appearance variables vindicates our decision to partition experience into recent and previous appearances, and between series A and B. It is clear that extra appearances in serie A are rewarded more highly than extra games played in serie B. Extra appearances in the 1994-95 season generate greater salary increments than extra appearances prior to 1994-95, in both series A and B, so more recent experience has a higher weighting in player salaries, given age.

The only significant coefficients on the performance variables are those for *FOR ASS 94A* (10% level only), *MID GOALS 94A* (at the 5% level for the restricted specification in column (2), 10% level in the full specification) and *FOR GOALS 94B* (at 5% or better in both specifications). The lack of significance of *FOR GOALS 94A* may simply be a reflection of the fact that leading goalscorers in serie A are likely to be either "superstars" or players of international status. The impacts of goalscoring in the top tier are then picked up in these variables. In contrast, forwards with serie B clubs who have higher strike rates are rewarded with larger salary increments than forwards with fewer goals to their credit. The significant coefficient on *FOR GOALS 94B* may reflect the lack of superstar status and the much lower

probability of selection for international representation for serie B players. For midfield players in serie A, who are meant to be more versatile than forwards or defenders, the ability to score goals generates a salary premium above midfielders who do not. However, additional goals for midfield players in serie B do not appear to be rewarded at all. There is tentative evidence that forwards in serie A who create goals, as well as score, are rewarded for this extra dimension to their game.

We now turn to the impact of "superstar" status on player salaries, which is our main focus of attention. Inspection of the coefficients on international status and superstar status reveals a three-tier pay structure for players in Italian football: ordinary players, international players and top superstars. The salary premia for international players and superstars are over and above increments earned by experience and performance, shown by our control variables. The lowest wage premium for players with international status (just over 30%) goes to those who achieve under 21 international recognition but go no further. This is nevertheless quite a substantial premium. Players selected for the full Italian national team in 1994-95 received a higher salary premium of around 45% to 47%. Players representing other national teams gain a yet higher salary premium of over 60%

Superstars are delineated by number of standard deviations of career goals per season away from the median. There is no significant impact on player salaries of career goals per season up to two standard deviations of goals per season away from the median. Players in this category are just not "special" enough to warrant a salary premium over and above measures for experience and performance. But players who achieve career goalscoring performance levels in serie A of two to three standard deviations away from the mean derive a substantial salary premium, of 48% in the general specification in column (1). Combining players with serie A strike rates of two to four standard deviations away from the median gives a salary premium of 40%, from the estimates in column (2). There are just three players

under the heading *SUPERSTAR4+* in our sample. These players, who include the highest paid player in the sample, Roberto Baggio, jointly earn a salary premium of 78% (restricted model) or 87% (general model). Taking the "under 21 only" category as a benchmark, there is some suggestion here of convex returns to the top superstars. However, taking the restricted point estimates in column (2) across superstar categories, the structure of "superstar" premia relative to non-internationals appears to be approximately linear with the extra premium to *SUPERSTAR4+* estimated at 37% and the premium to *SUPERSTAR23* over non-internationals estimated at 41%. Even more discouraging to the superstar theory is the result that a Wald test cannot reject the hypothesis that the premia for *SUPERSTAR23* and *SUPERSTAR4+* categories are equal (*p*-value of 0.25).

The fixed effects estimates incorporate unobserved effects for each team. Since we do have some team specific information available, it would seem appropriate to utilise it by means of OLS estimation. Results are reported in Columns (3) and (4), where the latter is a restricted version of the former with reduced number of superstar categories. We confine our discussion to the restricted case. The roles of the control variables are much the same as for the fixed effects estimates, apart from the significance of *FOR ASS 94A* at a higher (5%) level.

The new control variables, denoting team characteristics, generally perform well. Teams which obtained higher league positions in 1994-95 (lower value of *POS*) offer higher salaries to players (2.3% per place, *cet.par.*) than teams which achieve lower league positions. The variables representing coaching performance also contribute explanatory power to the regression. The win percent ratio of coaches in serie A has a highly significant impact on player salaries. Coaches with high win percent ratios are likely to survive longer in serie A and are more likely to find and attract players of better ability. They are also likely to be better able to add value to players of given ability than coaches with inferior win percent

records. The impact of coaches' win percent in serie B on player salaries is negative, possibly reflecting the lower status of serie B teams, and the correlation of win percent and experience in Serie B. The coefficients of the three variables denoting team characteristics are jointly significantly different from zero at the 5% level (*p*-value of 0.00).

The preference for OLS results over FGLS results rests on the view that the former have behavioural content, while the unobserved fixed effects in the latter lack economic interpretation, by definition. The particular team-specific effects that we have identified as statistically significant (the win percent records of coaches and the team rankings of league positions) do appear plausible and similar variables have been used successfully in North American studies of player earnings (e.g Idson and Kahane, 2000). Inclusion of these effects appears to us to be superior to the use of anonymous fixed effects.

The ranking of salary premia as between under 21 internationals, full internationals and superstar categories is unchanged but the premium for full internationals is now somewhat larger. Italian internationals gain a wage premium of 55%, while non-Italian internationals earned a higher premium of 64%. Once again, we combine *SUPERSTAR2* and *SUPERSTAR3* into a single category and the merged indicator attracts a salary premium of 37%, only slightly above that for under 21 international status.

The main difference in the OLS estimates is the much larger premium attributable to top superstars. This is now 97%, and looking purely at the superstar categories, we do appear to have evidence in favour of convex returns to the highest superstar category. From our point estimates in column (4) of Table 4, the three top superstars selected by our career strike rate criterion obtained a salary premium 60 percentage points greater than the nearest "superstar" category, *SUPERSTAR23*, which in turn has a premium of 37% above non-international players. This is much stronger evidence in support of convex returns to superstar status for footballers than was found from the FGLS estimates in column (2).

But is the difference between premia for superstar categories statistically significant? A Wald test that the coefficients on *SUPERSTAR23* and *SUPERSTAR4+* are equal rejects the null hypothesis (*p*-value of 0.025). Comparing superstar categories with international categories we cannot reject coefficient equality of *SUPERSTAR4+* and *OTHER INT* (*p*-value of 0.28), suggesting that foreign internationals are close to top superstars in terms of the pay premia that they command. Nor can we reject the hypothesis of equal salary premia for top superstars and Italian internationals (*p*-value of 0.14). It is possible that these international categories may contain some superstars and further work is needed to ascertain whether this is so.

Of course, it must be stressed here that the players who we have categorised as superstars are not necessarily much more able, or even more important in team production than their colleagues who play in goal, defence of midfield. We have asserted that players who score goals gain higher profiles and recognition amongst fans and the media than players who do not. The superstar categories only pick up one dimension of ability, goalscoring, which converts to match-winning potential. The higher price attached to this ability is generated by superstar status which in turn is imposed by fan and media attention. It is the large audiences, both from television broadcasts and from attendance at games, together with customer perceptions that other players are imperfect substitutes, which generate superstar status (Rosen, 1981).

5. Conclusions

This paper has shown how superstar effects on pay, along the lines proposed by Rosen (1981), can be estimated empirically for a sample of Italian footballers in 1995. Our measure of pay is basic salary and excludes performance-related components such as

incentive bonuses which are prevalent in footballers' contracts (direct payments for team positions, appearances, goals scored, international recognition *etc.*).

Our preferred OLS results capture plausible controls for player productivity grouped under the headings of experience, performance and reputation. Our reputation variables help alleviate omitted variable bias that would arise from absence of finely detailed performance measures. We also control for team-specific influences on player salary. OLS estimation of a pseudo-human capital earnings function from a sample of 580 players points to the existence of a convex structure of rewards across our set of superstar categories, defined according to career goals per season scored in serie A. We should stress that we have chosen a particular indicator of superstar status and, clearly, further work is necessary to examine alternative measures.

If we think of the top three players as the best players in Italian football measured by our goals per season indicator, then we have a structure of salary premia which is consistent with the rewards obtained, for example, by first-place finishers (as opposed to runner-up, third-placed finisher and not being placed) in Professional Golf Association tournaments (Ehrenberg and Boganno, 1990). Our results are consistent with Rosen's (1981) theory of superstars, in which a relatively small number of performers dominate their industry and earn a disproportionate share of revenues. Industry characteristics cited by Rosen as likely to generate superstars are duplication of services at constant marginal cost and the perception by consumers that other performers, who might perform similar services, are highly imperfect substitutes. In professional football, each match is different and consumers value the "live" performance (whether on television or at the stadium) far more than video replays. In the film industry, studios can create duplicate prints of movies at nearly constant marginal cost. Unlike movies, duplication of football matches is not possible. Each match, even if replayed between the same teams, has a different context and meaning for the audience. Hence,

Rosen's argument that constant marginal cost of production is an important ingredient of superstar status may hold for movie stars (Nelson *et al.*, 2001) and musical performers[14] but not for footballers or other sports stars.

We are left with the conclusion that it is imperfect substitution of player services, as perceived by the audience, which is the primary driving force of convex returns to superstars in football and in sports generally. Ironically, it does not follow that all of the audience for a particular match even likes the superstars who are playing. Football generates affinity towards particular teams and immense rivalry. If a superstar appears for an opposing team, a vast number of fans will want to watch the player concerned, if only to watch him and his team suffer a downfall. It is the perceived importance of the superstar player, which will usually be bound together with the prestige of his team, which generates intense audience interest, imperfect substitutability of similar types of player and a convex reward structure.

Italian football commands large audiences and has a large market size relative to most European football leagues. Only the English and Spanish Premier Leagues are comparable in size of team and league revenues. The best players, including superstars, are attracted to the teams and leagues with highest revenues. We would therefore not expect to find similar evidence of superstar effects in smaller European football leagues and this is a proposition worthy of empirical investigation.

[14] However, an attempt to test for superstar effects amongst popular musicians did not find support for the hypothesis (Hamlen, 1991).

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Data and other statistics

- Almanacchi del Calcio
- European Football Yearbook 1995-96
- Il Giornale, March 15 1996
- Tuttocalcio 1998-99,

Table 1 - Variables and descriptive statistics

Variable names	Description	Mean values (standard deviation)
INDIVIDUAL DATA		
Ln (SALARY)	Gross salaries (net of bonuses and signing-on fees) pre-season values 1995	
AGE	Age (in years)	25.6 (3.58)
AGE SQ	Quadratic term in age (in years)	669.3 (186.4)
PREVIOUS APPSA	Accumulated appearances prior to the 1994-95 season in serie A and B (respectively) and squared terms	36.1 (63.0)
PREVIOUS APPSA SQ		5258.0 (16372)
PREVIOUS APPSB		39.3 (55.4)
PREVIOUS APPSB SQ		4611.1 (11616)
APPS94A	Appearances in 1994-95 season in serie A and B (respectively) and squared terms	8.53 (12.2)
APPS94A SQ		223.9 (362.1)
APPS94B		10.4 (14.1)
APPS94B SQ		306.5 (462.5)
INDIVIDUAL PERFORMANCE INDICATORS		
FOR (#)	Forward	
MID (#)	Midfielder	
DEF (#)	Defender	
GK (#)	Goalkeeper	
FOR GOALS 94A	Goals scored by forward in A	0.489 (2.37)
MID GOALS 94A	Goals scored by midfielder in A	0.206 (0.85)
DEF GOALS 94A	Goals scored by defender in A	0.089 (0.50)
FOR GOALS 94B	Goals scored by forward in B	0.648 (2.68)
MID GOALS 94B	Goals scored by midfielder in B	0.320 (1.20)
DEF GOALS 94B	Goals scored by defender in B	0.094 (0.51)
FOR ASS 94A	"assists" by forward in A	0.184 (1.00)
MID ASS 94A	"assists" by midfielder in A	0.206 (0.85)
FOR ASS 94B	"assists" by forward in B	0.229 (1.02)
MID ASS 94B	"assists" by midfielder in B	0.287 (0.98)
ITALY INT (#)	Appearance in Italian national team (1994-95)	0.062
OTHER INT (#)	Appearance in other national teams (1994-95)	0.012
UNDER 21 ONLY (#)	Appearance in Italy under 21 team but not full national team	0.115
SUPERSTAR INDICATORS		
SUPERSTAR1 (#)	One to two standard deviations away from median goals per season in serie A	0.078
SUPERSTAR2 (#)	Two to three standard deviations away from the median goals/season	0.029
SUPERSTAR3 (#)	Three to four standard deviations away from the median goals/season	0.010
SUPERSTAR4+ (#)	Four and more than four standard deviations from the median	0.005

	goals/season	
	Obs.	593
TEAM CHARACTERISTICS		
POS	League position (see text)	19.69 (10.6)
COACH WINA	Career win percent ratios of coaches in A	0.314 (0.242)
COACH WINB	Career win percent ratios of coaches in B	0.426 (0.235)
	Obs	580

Notes: dummy variables are marked with (#) and indicate relative proportion in the sample.
Sources: Almanacchi del Calcio; European Football Yearbook (1995-96); Il Giornale (March 15, 1996); Tuttocalcio (1998-99)

Table 2 Quantiles of the salary distribution
(Earnings in millions of lira)

Quantile	Non-international, non-superstar	Non-superstar	Superstar	All
0.10	52	62	256	74
0.25	110	130	504	145
0.50	219	254	882	282
0.75	361	473	1891	560
0.90	555	860	2494	1164

Figure 1 - Non-parametric (Kernel) estimates of the earnings distribution

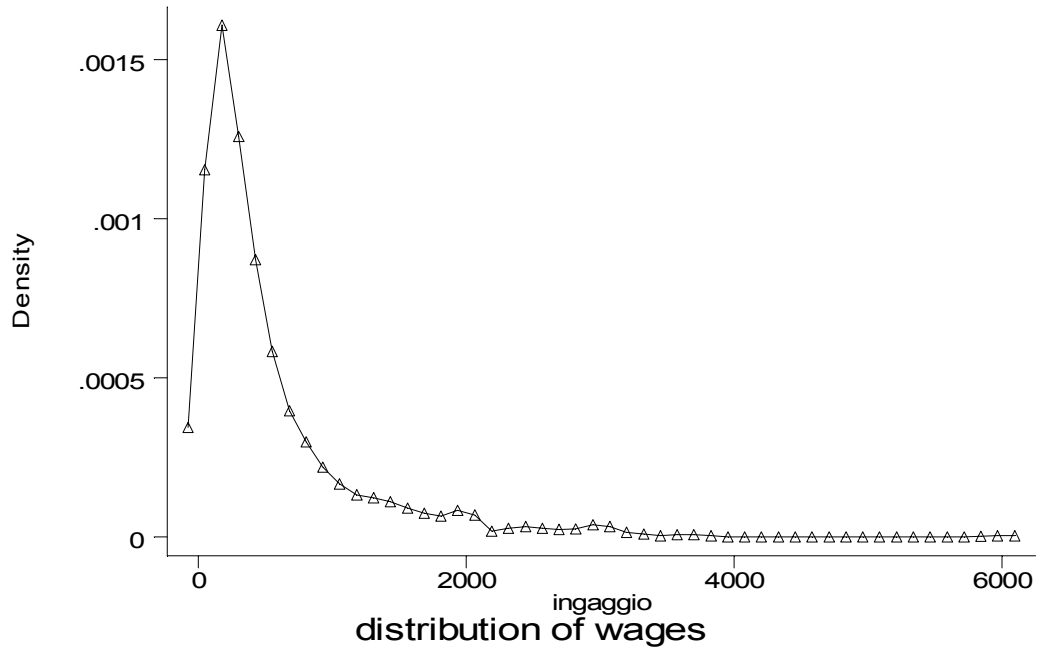

Table 3 - Fixed effects and ordinary least squares regressions, dependent variable is ln (*SALARY)*

Variable	(1) FGLS	(2) FGLS	(3) OLS	(4) OLS
AGE	0.809 (0.000)	0.810 (0.000)	0.846 (0.000)	0.847 (0.000)
AGE SQ	-0.0142 (0.000)	-0.0143 (0.000)	-0.0151 (0.000)	-0.0151 (0.000)
APPS 94A	0.0454 (0.000)	0.0461 (0.000)	0.0446 (0.000)	0.0450 (0.000)
APPS 94A SQ	-0.000607 (0.013)	-0.000635 (0.009)	-0.000591 (0.027)	-0.000611 (0.022)
APPS 94B	0.0211 (0.005)	0.0212 (0.005)	0.0197 (0.025)	0.0198 (0.024)
APPS 94B SQ	-0.000093 (0.681)	0.000098 (0.663)	-0.000129 (0.618)	-0.000133 (0.607)
PREV APPA	0.00331 (0.001)	0.00356 (0.000)	0.00309 (0.003)	0.00327 (0.002)
PREV APPA SQ	-7.08E-06 (0.024)	-7.50E-06 (0.015)	-4.25E-06 (0.178)	-4.45E-06 (0.152)
PREV APPB	0.00264 (0.006)	0.00270 (0.005)	0.00251 (0.011)	0.00257 (0.009)
PREV APPB SQ	-0.000011 (0.009)	-0.000011 (0.009)	-8.15E-06 (0.065)	-8.20E-06 (0.06)
FOR ASS 94A	0.0417 (0.109)	0.0453 (0.076)	0.0531 (0.050)	0.0547 (0.028)
FOR ASS 94B	0.0190 (0.472)	0.0202 (0.444)	0.00131 (0.941)	0.00233 (0.893)
MID ASS 94A	0.0235 (0.417)	0.0242 (0.403)	0.0365 (0.118)	0.0370 (0.110)
MID ASS 94B	-0.0189 (0.525)	-0.0203 (0.494)	-0.0127 (0.640)	-0.0134 (0.622)
FOR GOALS 94A	0.0066 (0.620)	0.0097 (0.439)	0.00648 (0.628)	0.00746 (0.494)
FOR GOALS 94B	0.0224 (0.030)	0.0232 (0.024)	0.0319 (0.000)	0.0327 (0.000)
MID GOALS 94A	0.0523 (0.099)	0.0656 (0.024)	0.0604 (0.096)	0.0710 (0.029)
MID GOALS 94B	0.0255 (0.296)	0.0290 (0.231)	0.0181 (0.410)	0.0206 (0.346)
DEF GOALS 94A	0.0340 (0.433)	0.0318 (0.462)	0.0456 (0.189)	0.0437 (0.207)
DEF GOALS 94B	0.0422 (0.323)	0.0414 (0.332)	0.0425 (0.145)	0.0425 (0.145)
UNDER 21 ONLY	0.307 (0.000)	0.303 (0.000)	0.319 (0.000)	0.316 (0.000)
ITALY INT	0.469 (0.000)	0.445 (0.000)	0.568 (0.000)	0.550 (0.000)
OTHER INT	0.639 (0.001)	0.606 (0.002)	0.669 (0.000)	0.644 (0.000)
SUPERSTAR 1	0.102 (0.308)		0.0779 (0.467)	
SUPERSTAR 2	0.476 (0.001)		0.441 (0.006)	
SUPERSTAR 3	0.413 (0.095)		0.278 (0.325)	
SUPERSTAR 23		0.409 (0.001)		0.369 (0.008)
SUPERSTAR 4+	0.874 (0.016)	0.780 (0.022)	1.014 (0.001)	0.969 (0.000)
COACH WINA			0.465 (0.001)	0.469 (0.001)
COACH WINB			-0.210 (0.038)	-0.208 (0.041)
POS			-0.0232 (0.000)	-0.0232 (0.000)
R^2	0.690	0.689	0.779	0.778
N. obs	593	593	580	580

Note: *p*-values in parentheses. Fixed effects regressions in columns (1) and (2) and estimated by Generalised Least Squares, OLS regressions in columns (3) and (4) and *p*-values computed using heteroscedasticity-consistent standard errors. A constant term is included in each regression.