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Relative Income Position and Performance: An Empirical Panel Analysis

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Summary

Many studies have established that people care a great deal about their relative economic position and not solely, as standard economic theory assumes, about their absolute economic position. However, behavioral evidence is rare. This paper provides an empirical analysis on how individuals' relative income position affects their performance. Using a unique data set for 1114 soccer players over a period of eight seasons (2833 observations), our analysis suggests that the larger the income differences within a team, the worse the performance of the soccer players is. The more the players are integrated in a particular social environment (their team), the more evident this negative effect is.

Keywords: Relative Income, Positional Concerns, Envy, Performance, Social Integration

JEL Classification: D000, D600, 8222, 9210, L830

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I. INTRODUCTION

Standard economics assumes individuals to evaluate their welfare in absolute terms. Choices affect only the agents directly involved. However, individuals may judge their own situations in relation to other individuals' situations. Leading economists, such as Adam Smith, Karl Marx, Thorstein Veblen or James Duesenberry, have long expressed the importance of the relative position and social concerns.. Nevertheless, standard economics pays little attention to the consequences of relative position. Accordingly, Senik (2005), providing an overview of the literature, points out that "it is surprising that in spite of the large theoretical literature on relative income and comparison effects […] empirical validation of this conjecture is still scarce" (p. 47).

Research on happiness (for example, Easterlin 1974, 1995, 2001, Clark and Oswald 1996, Watson et al. 1996, Groot and van den Brink 1999, Tsou and Liu 2001, McBride 2001, Lyubomirsky 2001, Frey and Stutzer 2002a,b, Stutzer 2004, Kingdon and Knight 2004, Layard 2003, Luttmer 2005, Ferrer-i-Carbonell 2005, Dorn et al. 2005) has found strong empirical support for the importance of the relative position Also, laboratory experiments using the ultimatum game indicate that subjects are concerned with their relative position (Frank and Sunstein 2001, Kirchsteiger 1994). Furthermore, as an alternative strategy, some researchers have used hypothetical questions regarding choice between alternative states or outcomes, where the choices allow for checking out relative positional concerns (Alpizar et al. 2005, Johansson-Stenman et al. 2002, Solnick and Hemenway 1998, Tversky and Griffin 1993, Zeckhauser 1991). Nevertheless, many economists are still skeptical of the importance of positional concerns, because empirical evidence about its behavioral relevance remains scarce.

This paper links positional concerns to observable behavior in the field by looking at an individual's work performance. Relative income is certainly a major determinant of people's position. Thus, Frank and Sunstein (2001, p. 347) stress that "[…] positional

concerns typically loom larger with income than with the goods that regulation attempts to provide (safety, leisure time, leave to take care of children and ailing relatives)." This paper also contributes to the growing literature that investigates the link between pay and performance. However, contrary to previous studies, we also investigate the relevance of the relative income position. Lazear (2000, p. 1346) points out that: "Much of the theory in personnel economics relates to effects of monetary incentives on output, but the theory was untested because appropriate data were unavailable"[1].

A key compensation policy discussed in the literature is that of the promotion tournament. Lazear and Rosen (1981) started to theoretically investigate the behavior of players in response to the incentives created by a tournament.[2] The effect of positional differences on performance is theoretically open. Some theories suggest that the resulting frustration (of those with a low position) leads to resignation and poorer performance. Other theories suggest that a larger positional difference induces individuals to try to achieve a higher position, and hence raises performance. This paper argues that various factors systematically influence which of the two effects is likely to prevail. The more individuals are integrated into a particular social environment, the more differences in relative position lead to frustration and poorer performance. The individuals concerned may feel that they have little possibility to change their social position, so that they tend to resign themselves, thus lowering their performance. In contrast, less well-integrated individuals are less burdened by positional concerns and a given income difference therefore has little or no effect on their performance.

Empirical analysis of the behavioural impact of positional concerns is hindered by the lack of useful income data. The opportunity of using sports data has led to a growing

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1 See, for example, Abowd (1990), Jensen and Murphy (1990), and Gibbons and Murphy (1990) for studies that investigate the relationship between pay and managerial performance or corporate returns, or Asch (1990) for Navy recruiters reactions to different incentive plans.

2 See also, for example, Nalebuff and Stiglitz (1983), Green and Stokey (1983), O'Keefe, Viscusi and Zeckhauser (1984), Rosen (1988), McLaughlin (1988), Rees (1992), Prendergast (1999).

empirical literature, testing existing theory with sports data[3] (see Ehrenberg and Bognanno 1990a, 1990b, Becker and Huselid 1992, Orszag 1994, Lynch and Zax 1998, 2000, Fernie and Metcalf 1999, Maloney and McCormick 2000, Melton and Zorn 2000, Sunde 2003). This paper uses sports data to investigate the impact of soccer players' relative income position on their performances. The broad sample covers eight seasons of the German premier soccer league (*Bundesliga*) between 1995/1996 and 2003/2004[4], including 2833 observations and 1114 players, a salary proxy and several performance variables. The empirical data has low variable errors. Performance is clearly observable and is free of discrepancies, compared to frequently used performance variables, such as GDP. Furthermore, soccer games are comparable to field experiments due to the fact that a match takes place in a controlled environment. Soccer players are faced with the same rules and restrictions. Thus, when investigating the connection between relative concern and performance, many factors can be controlled for. The paper analyzes to what extent the relative income position of a player affects his sport performance, holding the absolute income level constant. The relative income position is proxied by the difference between teammates' average salaries and players' individual salaries. The empirical results are robust[5]. The results are consistent with the general hypothesis that the relative income position has a strong impact on players' individual performance. The larger the income differences in a team are, the worse is the performance of the players. The econometric estimates are also consistent with the more specific hypothesis that social integration strengthens this negative effect on performance. Section II provides a short overview of the relevant literature. Section III develops our theoretical approach. Section IV presents the empirical results and Section V discusses implications for business practice and offers concluding remarks.

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[3] There are also some studies that test the theory of tournaments outside the context of sport (see, e.g., Knoeber and Thurman 1994, Eriksson 1999, Rees 1992).

[4] It was not possible to consider the year 1997 because no proxy for players' salaries is available).

[5] We also used the ratio, instead of the differences, and the results remain robust.

II. POSITIONAL CONCERNS: AN OVERVIEW

Positional concerns due to relative judgments are common. People constantly compare themselves with their environment and care greatly about their relative position, which influences individual choices. Thus, not only is the absolute level of an individual's situation important (e.g., income), but also the relative position.

Marx (1849) stresses that we measure our wants and pleasures in relation to society. Similarly, Galbraith (1958) points out that consumer demands are largely influenced by society. Veblen (1899) emphasizes the importance of one's relative position in society with his concepts of conspicuous leisure and consumption. Contrary to standard utility theory, Duesenberry's (1949) utility concept is characterized by systematically interdependent utilities. Thus, he explicitly incorporated relative preferences into consumer theory. Marshall (1961), the creator of the modern demand theory, "recognized the power and prevalence of the human desire for 'distinction'" (p. 12). Even Friedman (1962), whose theory of savings did not rely on relative wants, referred to the following example: "The college professor whose colleague wins a sweepstake will envy him but is unlikely to bear him any malice or to feel unjustly treated. Let the colleague receive a trivial raise that makes his salary higher than the professor's own, and the professor is far more likely to feel aggrieved. After all, the goddess of chance, as of justice, is blind. The salary raise was deliberate judgment of relative merit" (p. 166, cited in McAdams, 1992, p. 103).

More recently, several economists included the concept of interdependent preferences to allow social comparisons and also stressed the relevance of the relative position (e.g., Becker 1974, Easterlin 1974, Scitovsky 1976, Schelling 1978, Pollak 1976, Boskin and Sheshinski 1978, Frank 1985, Akerlof and Yellen 1990). Other social sciences, such as social psychology, sociology or anthropology, have placed considerable emphasis on the relevance of relative preferences as fundamental to human motivation. The psychological theory of

social comparison (see Festinger 1954) and the sociological theory of relative deprivation (Stouffer 1949) show that comparisons with others are an important phenomenon. Relative deprivation theory investigates interpersonal and inter-group relations and comparisons. It stresses that a lower perception of one's own (group) status or one's own welfare in relation to another person (group) can be the source of hostility towards the other individuals or groups. A person may get frustrated when his/her situation (e.g., individual earnings) falls relative to the reference group. The person feels deprived. If improvement with the situation is slower than expected, the experience of frustration can even lead to aggression (see, e.g., Walker et al. 1984). However, Clark and Oswald (1996) point out that "the lack of empirical evidence, except of what most economists view as of a circumstantial nature, has kept relative deprivation theory on the periphery of research in economics" (p. 360). Clark and Oswald (1996) show that people's reference groups are individuals with similar personal characteristics, such as gender, job etc.

As mentioned in the introduction, happiness research has found strong evidence for the importance of relative position. Some empirical studies found behavioral evidence for the extent to which positional concerns matter. For example, Neumark and Postlewaite (1998) queried whether women's decisions to seek paid employment depend on the employment or incomes of other women. Thus, they investigate the question of whether relative income comparisons could affect their employment decision. As a reference group, they focus on women's close relatives, but instead of making comparisons between sisters, they investigate whether women's employment is affected by the employment of their sisters-in-law and whether women's employment is affected by the income of their husbands relative to the income of their sisters' husbands. Their results strongly support the relevance of positional concerns.

III. THEORETICAL CONSIDERATIONS

Empirical research on the link between pay and managerial performance has been hindered by the lack of available data in the past (see Lazear 2000). Therefore, a number of researchers use sports data – where performance can be relatively well measured – from disciplines like golfing (see Ehrenberg and Bognanno 1990a, 1990b; Melton and Zorn 2000; Orszag 1994), horse racing (Fernie and Metcalf 1999; Lynch and Zax 1998), tennis (Sunde 2003), car racing (Becker and Huselid 1992) and running (Maloney and McCormick 2000) in order to test existing theories in promotion tournaments.

The majority of empirical evidence using sports data supports the positive impact of monetary incentives on sportive performance. Using golf data from the US Senior PGA Tour in 1984, Ehrenberg and Bognanno (1990a) found that the amount of prize money has a positive influence on players' performance. The observed effect occurs primarily in the later rounds of a tournament, due to the marginal returns on efforts. Players with larger marginal returns achieve better scores. Ehrenberg and Bognanno (1990b) were able to confirm most of these results, using European PGA Tour data from the year 1987. Only their previous finding that exempt players are more responsive to financial incentives was not clearly supported by the European data.

Although Orszag (1994) found no statistically significant link between the amount of total prize money and golfers' performance using data from the US Senior PGA Tour of 1992, further studies confirmed Ehrenberg's and Bognanno's (1990a, b) initial findings. For instance, using 1994 and 1995 data, and trying to eliminate any possible survival biases, Melton and Zorn (2000) found support for their theory that the amount of prize money in Senior PGA tournaments affects players' performance. Further empirical support for a positive relationship between pay and performance results from research on tennis tournaments and horse races. Sunde (2003) uses data from the final two rounds of the most important tennis tournaments for professionals – from the men's ATP tour. The results

indicate that the amount of prize money positively affects a player's performance, if you count the number of games won and the total number of games played.

Lynch and Zax (1998) examine the role prizes play in Arabian horse races in the US and Canada between 1991-1995 and find support for a positive relationship between the prize spread and the absolute level of performance. Along the same lines, Fernie and Metcalf (1999) investigate relationship between pay and performance in an unbalanced panel of 50 individuals over eight years. They find that a hard working jockey receives higher extra pay. Interestingly, the results also demonstrate that reputation lags behind performance or, in other words, that it takes a certain time for good performance to be recognized.

Evidence from sports data supports the proposition that the overall level of performance in a tournament is affected by the amount of prize money paid. Becker and Huselid (1992) use the National Association for Stock Car Auto Racing (NASCAR) 1990 circuit and the International Motor Sports Association (IMSA) data for the years 1989 and 1990. They find that increased variation in the absolute spread between higher and lower finishers has a statistically significant positive impact on participant performance, but at a diminishing rate. But little evidence has been found that the actual tournament structure affects the performance. Maloney and McCormick (2000) work with data from 115 foot races held in the southeastern United States from 1987 to 1991. The results indicate that higher prizes are associated with faster times for individuals already in the race and that the higher prizes also attract a faster field. A higher concentration of the prize money leads to higher effort levels. On the other hand, using road races on certified courses in the United States and abroad in 1994, Lynch and Zax (2000) couldn't find a robust impact of a positive prize effect. After controlling for runners' ability through individual fixed effects or world-ranking points, the incentive effect mostly disappears (it remains only statistically significant for the marathon). The results suggest that races with larger prizes lead to faster times due to the fact they attract faster runners rather than encourage runners to run faster.

Focusing on team sports, this study goes beyond investigating the performance impact of *absolute income* by studying the performance impact of *relative income*. However, the theoretical predictions are countervailing. It is therefore not possible to predict whether larger income differences raise or lower individual performance.

Our *first hypothesis* therefore leaves open *whether positional income concerns in general have a positive or a negative impact on individuals' performance.*

An individual's income is a key factor in comparisons. When people compare their salaries, it is generally with people close to themselves (Layard 2003). Positional concerns are extremely widespread in the workplace. Layard (2003) points out: "In organisations, calm can often be maintained only by keeping peoples' salaries secret" (p. 8). Elster (1991) reports that, in China, model workers spend their bonus on a good meal for everybody to avoid harassment by their colleagues. A manager keeps bonuses low because he fears the other workers and because he wants to avoid the envy of other executive officers. Frank and Sunstein (2001) report that surveys of employers and employees suggest that salaries depend on what employees think other people are paid. Furthermore, the perception of the relative position has a large effect on their morale.

Festinger (1954) stresses that people do not generally compare themselves with the rest of the world, but with a much more specific group, typically with others they see as being similar to themselves or, in his words, "close to one's own ability" (p. 121). Thus, soccer players, like in other team sports, compare themselves with other soccer players, especially their teammates. Similarly, soldiers in World War II seem to have made comparisons primarily with members of their own military group (Stouffer 1949). Thus, it seems reasonable to assume that a soccer player's income position relative to other teammates' income position has an impact on his own behavior.

There are two countervailing theories about how income differences influence performance. One stream of literature stresses the negative consequences of envy (see, e.g.,

Schoeck 1966). An envious person may "prefer that others have less, and he might even sacrifice a little of his own wealth to achieve that end" (Zeckhauser 1991, p. 10), behavior that has been found in experiments (see, e.g., Kirchsteiger 1994). An envious person increases his utility by destroying some of the others' assets, even if such an action carries its own costs (*cutting off one's nose to spite one's face*). Thus a negative sum interaction is started. The performance of those with lower income may decrease due to frustration ("it *could* have or it *should* have been me"). They feel it impossible to "keep up with the Joneses" – in the case of soccer, with the team superstars. As a consequence, the performance is lowered.

Relative income effects may include negative aspects that go beyond envy per se. Players dislike being in a lower income position, because the relative position may signal that they and their future prospects are lowly evaluated by others. Such perceptions and signals harm their relation with others, and affect their self-conception and performance.

A contrasting theory argues that large income differences lead to better performance as they raise the incentive to achieve a similar status. A positional arms race is provoked through the process of rivalry (see Landers et al. 1996).

The *second hypothesis* suggests that *newcomers in a team are less influenced by positional concerns. Their performance is less, if at all, affected by the income differences existing in the team.*

The effect of positional concerns is influenced by the pressure to conform. The established members expect new members to adjust to the mores existing in their group or team. Failure to conform is punished, mainly by social sanctions, but sometimes also in other ways (Schoeck 1966). In the case of a soccer team, a newcomer has quite high transaction and adaptation costs. He has to find his place in a team that consists of many players who already know each other well. A player has to gain the acceptance of his colleagues in order to become effective in the team.

The *third hypothesis* suggests that *the behavior of foreign players is less motivated by positional concerns than the behavior of domestic players.*

Foreign players may also be subjected to more pressure to conform than domestic players. However, soccer leagues in most countries today are cosmopolitan. According to our data set for the German *Bundesliga,* 45% of the players are foreigners. It is therefore to be expected that positional concern differences do exist, but are not very marked, between foreign and domestic players.

The *fourth hypothesis* suggests that *positional effects lowering performance are stronger among high performing teams.*

High performing teams tend to be more vulnerable to positional concerns than low performing teams. In an extraordinarily successful team, each team member tends to associate superior performance with his or her individual performance rather than with other team members. Differences in income negatively affect performance and are therefore less acceptable, while frustration and performance deterioration can be explained using relative deprivation theory. A relatively rapid average promotion rate for the group as a whole tends to lead to frustration about individual promotion rates. The rapid promotion of colleagues in the U.S. Air Corps during World War II inflated soldiers' expectations and resulted in disappointment (Stouffer 1949). In the sports industry, a winner-take-all market exists in many situations. A small number of people get enormous amounts of money compared to other athletes (see Rosen 1981, Frank and Cook 1995). Top teams often have several superstars. For example, *Table A1* in the Appendix indicates that five of the richest soccer players in Europe are playing for the same team (Real Madrid). Players in successful teams, who are paid less than other teammates, may be frustrated, which negatively affects their performance. Relative deprivation theory suggests that soccer players feel angry when they lack something they desire, but which other teammates, such as superstars, have. Players feel worse off when they have less fame and money than their teammates with similar attributes

with whom they most frequently compare themselves. Moreover, superstars profit from the success of their team outside of the soccer field. For example, David Beckham, best paid soccer star in 2004 (see Appendix A1) signed a five year 50 million EURO contract with Gillette in September 2004, in addition to multi-million EURO contracts with other companies, such as Adidas, Pepsi or Vodafone (see soccer-europe.com). His teammates believe that they deserve similar rewards, according to their contribution to the success of the team.

IV. EMPIRICAL RESULTS

1. Data

Empirical studies of the effects of income differences on managerial behavior have been hindered by the lack of data on individual performance and the lack of publicly available income data. In contrast, in certain sports, individual and team performance is well defined and can be readily observed. This applies to professional soccer. As a side effect, the rising commercialization of soccer led to better data sets. For example, in England, publicly listed clubs must publish their annual reports (Kern and Süssmuth 2003). In some cases (as in the case of the German *Bundesliga*), even salary data for individual players, or at least good proxies thereof, are available.

This paper uses a unique data set of professional soccer players in the German premier soccer league *Bundesliga,* which is one of the most important soccer leagues in the world. IMP, the official data provider of the *Bundesliga* and several broadcasting networks, provided the data. This data includes soccer players' individual performance (e.g. goals, assists, duels won) and personal background data (e.g. age, nationality, position) over a period of eight seasons between 1995/1996 and 2003/2004. We investigate an unbalanced panel of 1040

players covering 2833 observations. During the eight seasons, 28 different clubs participated in the league due to annual promotion and relegation.

Although the salaries of soccer professionals are not officially revealed by the *Bundesliga*, there is substantial transparency. The most prominent soccer magazine in Germany, the *Kicker Sportmagazin*, develops players' market value estimates on an annual basis. They provide a good proxy for actual salaries being paid by the clubs[6]. Before a new season starts, the editorial staff develops an estimation of players' market values. This data has been collected in a consistent and systematic manner for several years by almost the same editorial team and is therefore likely to be consistent. The market values taken from *Kicker Sportmagazin* are highly correlated with players' in the few cases where they are actually observed. Publicly available data are provided by *Transfermarkt.de* but is only available for the season 2003/2004. The correlation between these two data sources is high (r=0.754)[7]. These proxies for salaries are satisfactory, especially when analyzing the relative position of soccer players compared to their teammates. In addition, our data set includes individual transfer prices, as well as earnings from ticket sales, merchandizing, and sponsoring revenues at the team level.

2. Empirical Model

In the quantitative analyses, the following baseline equation is estimated:

$$PERF_{it} = \beta_0 + \beta_1 CTRL_{it} + \beta_2 ABSAL_{i(t-1)} + \beta_3 RELSAL_{i(t-1)} + TEAMD_i + TD_t + \mu_i + \varepsilon_{it}$$

[6] Information from the *Kicker Sportmagazin* has been used for empirical research studies in the past (see for instance Eschweiler and Vieth (2004), Huebl and Swieter (2002), Lehmann and Weigand (1998, 1999) and Lehmann and Schulze (2005).

[7] Historical data are not provided by *Transfermarkt.de* as the Internet site just started to collect this information in 2005. Furthermore, *Transfermarkt.de* covers only a limited number of players in the German *Bundesliga*.

where $PERF_{it}$ is the performance of player *i* at time *t*. Several performance variables, such as goals, assists, shots, ball contacts, duels and duels won are used. These dependent variables refer to active involvement and success in the game. $ABSAL_{i(t-1)}$ is the lagged salary level of a player. To check for non-linearity, we also consider the squared value of the salary level. $RELSAL_{i(t-1)}$ is the lagged relative salary of player *i*, measured as the difference between teammates' average salaries and players' individual salaries[8]. Using lagged values helps to reduce causality problems (see detailed discussion in subsection 5). The regression also contains several control variables $CTRL_{it}$ such as AGE, AGE SQUARED, players' position in the game (ATTACK, MIDFIELD, DEFENSE) and team dummy variables, as many players change their position in the field and in their team over time. $TEAMD_i$ is a set of team dummy variables and TD_t is a set of time dummies controlling for possible differences in the players' environment; μ_i is the individual effect of player *i*, and ε_{it} denotes the error term.

3. Pay and Performance: Basic Results

We first apply three different methodologies (pooling regression, random effect model and fixed model) to all available performance measures. To identify which empirical method is most suitable, we performed two statistical tests: the Lagrangian Multiplier (LM) test (see Breusch and Pagan 1980) of the random effect model and the Hausman specification test (Hausman 1978) to compare the fixed effect and the random effect models. The LM test indicates that the null hypothesis of the individual effect μ_i being 0 is rejected in all cases at the 1% significance level (chi-square statistics between 57 and 307). Thus, the results suggest that the cohort effect is not zero, which means that the pooling regression is not suitable. In all cases, the Hausman specification test rejects the null hypothesis that the individual-level

[8] Experts' estimations of players' salaries after the previous season. As mentioned previously, we check the robustness of the results using the ratio instead of the difference to measure the relative income position.

effects are adequately modeled by a random-effect model at the 1% significance level (chi-square statistics between 210 and 345). Thus, individual effects are not uncorrelated with the independent variables, which support the use of individual fixed effect models. However, it should be noticed that the results we obtain remain robust in all three different methodologies.

Table 1 presents the basic estimation results, using the entire set of six dependent variables representing various aspects of players' performance: goals, assists, shots, ball contacts, duels and duels won. The relative income has a strong *negative* impact for all types of performance, suggesting that the results are robust. The higher the difference between teammates' average incomes and players' individual incomes, the lower the performance is. The respective coefficients are highly statistically significant for all six dependent variables, controlling for the absolute level of the salary. This finding is consistent with the *first hypothesis* that the relative income level has an impact on performance and the theories proposing that larger income differences worsen performance. We also test the joint hypothesis that none of the income variables has a coefficient that differs from zero. The results reported in *Table 1* indicate a clear rejection of this hypothesis, which supports the importance of the income variables. In order to test the relative income hypothesis against the absolute income hypothesis, we conduct an F-test on the difference between the two relevant coefficients after each regression. In all cases, the F-test rejects the null hypothesis of equal coefficients of the two variables, which supports the view that it is the relative income position that matters.

4. Robustness Tests

In this subsection, we run several robustness tests. Usually, the available studies on the relative income position evaluate the *distance* between a person's situation and the respective reference group calculating the *difference*. As a further robustness test, we also use the *ratio* of teammates' income to players' own income, instead of the difference between the two, as

proxy for the relative income position (the higher the value, the stronger the disadvantage in the relative income position). Why is it interesting to use the ratio? Let us assume the following situation: A player has an average annual income of $100'000 in a soccer team where his teammates earn on average $200'000 per year. The team management decides to double the salaries of all the team members. In the new constellation, the player now receives $200'000 while his teammates get $400'000 on average. The ratio value remains constant (value 2), but the difference has changed from $100'000 to $200'000. The regression results support the previous findings. In all cases, the F-test rejects the null hypothesis of equal coefficients, which suggests that the relative income position matters.

We also perform pooled estimations with team and time dummy variables, using the number of minutes played as the weighted variable. Additionally, we take into account unobservable players' specific characteristics, with standard error adjusted for the clustering on individuals. The relative income coefficient is always statistically significant at the 1 % level and the F-Test rejects the null hypothesis of equal coefficients in all cases, even at the 1 % level. In general, least squares estimations are not free of problems when there are certain deviations, i.e. cases that differ substantially from the other observations. The slope and intercept react sensitively to outliers. Therefore, we also run specifications that resist the pull of outliers, giving them, according to Hamilton (2004), a "better-than-OLS efficiency" using "iteratively reweighted least squares with Huber and biweight functions tuned for 95% Gaussian efficiency" (pp. 239-240). As a consequence, more extreme outliers are less heavily weighted in the regression calculations, or even dropped altogether for very extreme cases. The results of the six regressions indicate that both the relative and absolute income position have a statistically significant impact on players' performance, with a positive sign for the absolute income and a negative sign for the relative income variable (see *Table 2*). However, the F-Test rejects the hypothesis of equal coefficients, which supports the importance of the relative income position.

Furthermore, instead of pooling the different years together, we also investigate each year in a cross-sectional analysis. In 34 out of 45 cases, the joint hypothesis that neither of the two income variables has a coefficient that differs from zero was rejected, supporting, along with the F-test of equal coefficients, the importance of the relative income position.

5. Causality

The direction of the link between income and performance is unclear and has rarely been investigated in detail in the literature. Hall et al. (2002) stress that such a link "plays a central role in the theory of team sports but is seldom investigated empirically" (p. 149). In general, looking at the empirical research available today, most soccer studies investigate players' income or teams' income as the dependent variable and search for factors that shape it (Eschweiler and Vieth 2004, Garcia-del-Barrio and Pujol 2004, Huebl and Swieter 2002, Lehmann and Weigand 1999, Lucifora and Simmons 2003, Lehmann and Schulze 2005). For the German soccer league, Eschweiler and Vieth (2004), Huebl and Swieter (2002), Lehmann and Schulze (2005), as well as Lehmann and Weigand (1999), confirm a positive pay-performance relationship. Only a couple of studies investigate the pay-performance relationship the other way round, taking *team* performance as the dependent variable (see Forrest and Simmons 2002, Szymanski and Kuypers 1999). Investigating whether club expenditures have a positive impact on the team's success within the English soccer league, Szymanski and Kuypers (1999) find a significant correlation between teams' pay and performance. Using data from Italian, English, and German soccer leagues, Forrest and Simmons (2002) find a strong team pay-performance relationship for the leagues in Italy and England. On the other hand, only a marginal significant wage-performance relationship has been found for the German *Bundesliga*. However, as mentioned by Hall et al. (2002), the causality has seldom been investigated. Do teams really get what they pay for? Some studies focusing on baseball doubt whether this is the case, suggesting that payrolls are not useful in

explaining the won-lost records in baseball (Quirk and Fort 1999, Zimbalist 1992). On the other hand, Hall et al. (2002) show with their data that, while there is no evidence that causality runs from payroll to performance over the period 1980 to 2000, the cross-section correlation between payroll and performance increased significantly in the 1990s. They furthermore found support that the relationship runs from payroll to performance, and not vice versa, when investigating the relationship between teams' pay and performance with English soccer data using the Granger causality test. Such differences can be explained by institutional differences affecting causality between different sports or sport periods. In English soccer, players are hired on relatively short-term contracts, ranging from one to five years, and players' trading and mobility are key parts of the league. The mobility costs are also lower due to the relative geographic proximity to each other. Furthermore, young stars at the beginning of their career demonstrate higher mobility, which is comparable to the stars of the league, where trade clauses are "virtually unheard of in English soccer" and "leading teams regularly trade their top stars in search of a better lineup, whereas players frequently express their ambition to play for a variety of clubs in a variety of leagues during their career" (p. 158). All these factors are also visible in the German *Bundesliga*. Our data indicates that the number of active seasons in the league per player varies between one and eight, with an average of 2.7 seasons per player. A change of team has been observed in 12.7% of the cases. Similarly, Carmichael, Forrest and Simmons (1999) report that, in the English league, 12.3% of the players changed teams in the seasons 1993-1994.

In addition to institutional factors, suggesting that pay affects the performance of a player, experts' salary estimations *before* the new season starts are used as a proxy of players' income. Furthermore, experts' evaluations try to measure the market value of a player rather than the contract salary, which might remain constant for more than one year. Testing for endogeneity, a Hausman specification test is performed (see Hausman 1978). The test identifies whether there is sufficient difference between the coefficients of the instrumental

variables regression and those of the standard OLS. The Prob>chi2 statistics[9] clearly indicate that we cannot reject the hypothesis that OLS is an inconsistent estimator for our equation, which supports the argument that we do not have an endogeneity problem in our estimations. However, it can be criticized that the Hausman test depends on the quality of the instruments. Therefore, we report in *Table 2* the 2SLS estimations together with several diagnostic tests. First, the Anderson canonical correlations LR test for the relevance of the instruments is presented, checking the relevance of the excluded instruments. A rejection of the null hypothesis indicates that the model is identified and that the instruments are relevant (see Hall, Rudebusch and Wilcox 1996). We use the lagged values of three income variables (relative and absolute income and the squared term of absolute income) as instruments. In our case, the number of instruments does not exceed the number of endogenous regressors. Thus, the equation to be estimated is exactly identified. *Table 2* also reports the three first-stage regression results of the instrumental variables. The F-tests of the exclusion of the instrument set in the first-stage regression were statistically significant at the 1% level in all three cases. However, such a diagnostic has important limitations when there is more than one endogenous regressor. Thus, we also report the partial R2 to overcome such a problem (Shea 1997). The Shea's partial R-squared is a test of the individual explanatory power, accounting for correlation among the instruments. The results obtained (closeness of the Shea's R-squares) indicate that there is enough separate variation in the instruments.

We also test the joint hypothesis that none of the income variables has a coefficient that differs from zero and conduct an F-test on the difference between the relative and absolute income variables. In general, the 2SLS results support the previous findings, stressing the relevance of the positional concerns.

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[9] Estimations: goals as dependent variable (Prob>chi2=0.2093); assists (Prob>chi2=0.8535); shots (Prob>chi2= 0.9613); ball contacts (Prob>chi2= 0.1532; duels (Prob>chi2= 0.6579); duels won (Prob>chi2= 0.6756).

In the next step, we perform a Granger-causality test to investigate the link between pay and performance (see Granger 1967). The notion of Granger causality suggests that, if lagged values of players' income help predict current performance values in a forecast (formed from lagged income and lagged performance values), then income Granger cause performance. On the other hand, if the same lagged values help to predict the current income, we argue that performance Granger cause players' pay. To conclude that one of the two came first, we must find unidirectional causality from one to the other. To perform the Granger causality test, we use symmetric regression tests, including the six performance variables and the absolute and relative income position independently. *Table 3* shows that we are not able to reject the noncausality of performance on pay, nor the noncausality of pay on performance (and vice versa). The test results indicate a clear rejection of the hypothesis that the relative and the absolute income position do not Granger cause players' performance. On the other hand, we also observe a rejection of the hypothesis that players' performances do not Granger cause players' absolute income and positional concerns. In sum, the results show that both are dependent on each other, so that the question remains unanswered when applying the Granger causality test.

Table 1: The Effect of Positional Concerns on Performance

	1 Dep. V.: Goals FIXED EFFECT		2 Dep. V.: Assists FIXED EFFECT		3 Dep. V.: Shots FIXED EFFECT		4 Dep. V.: Ball Contacts FIXED EFFECT		5 Dep. V.: Duels FIXED EFFECT		6 Dep. V.: Duels Won FIXED EFFECT	
Independent Variables	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
SALARY												
RELATIVE VALUE$_{(t-1)}$	-0.326***	-2.99	-0.397***	-4.03	-3.753***	-5.26	-73.858***	-2.85	-36.166***	-4.47	-17.768***	-4.37
ABSOLUTE VALUE$_{(t-1)}$	-0.112	-0.92	-0.247**	-2.25	-1.330*	-1.67	-19.929	-0.71	-2.432	-0.27	-0.877	-0.19
SQ ABSOLUTE VALUE$_{(t-1)}$	-0.011**	-2.46	-0.005	-1.35	-0.062**	-2.16	-1.592*	-1.83	-1.276***	-3.91	-0.653***	-3.98
PLAYER CHARACTER.												
AGE	1.283***	3.93	1.154***	3.92	12.318***	5.78	380.978***	4.68	124.833***	5.17	61.427***	5.07
AGE SQ	-0.024***	-5.44	-0.022***	-5.37	-0.218***	-7.45	-7.370***	-5.49	-2.162***	-6.52	-1.116***	-6.70
POSITION	Yes		Yes		Yes		Yes		Yes		Yes	
TEAM	Yes		Yes		Yes		Yes		Yes		Yes	
SEASON	Yes		Yes		Yes		Yes		Yes		Yes	
F-Test equal coeff.	8.88		5.30		26.59		11.90		40.21		39.92	
Prob > F	0.000		0.021		0.000		0.00		0.000		0.000	
F-Test joint significance	7.81		9.65		23.79		8.75		26.67		26.17	
Prob > F	0.00		0.00		0.00		0.00		0.00		0.00	
R-Squared	0.098		0.083		0.210		0.142		0.193		0.190	
Prob > F	0.000		0.000		0.000		0.000		0.000		0.000	
Groups (Players)	1040		1040		1040		774		1040		1040	
Number of Observations	2833		2833		2833		1869		2833		2833	

Notes: *,** and *** denote statistical significance at the 10%, 5% and 1% level.

Table 2: Robustness Analysis

	Dep. V.: Goals		Dep. V.: Assists		Dep. V.: Shots		Dep. V.: Ball Cont		Dep. V.: Duels		Dep. V.: Duels Won	
Robust regressions (outliers)	POOLED		POOLED		POOLED		POOLED		POOLED		POOLED	
Independent Variables	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
RELATIVE VALUE$_{(t-1)}$	-0.193***	-3.42	-0.167**	-2.55	-4.272***	-7.2	-81.414***	-3.12	-46.818***	-6.12	-22.777***	-5.79
ABSOLUTE VALUE$_{(t-1)}$	0.315***	5.04	0.346***	4.77	3.040***	4.62	142.602***	5.09	43.462***	5.12	22.521***	5.16
SQ ABSOLUTE VALUE$_{(t-1)}$	-0.017***	-7.75	-0.013***	-5.16	-0.263***	-11.45	-8.398***	-10.87	-3.508***	-11.85	-1.758***	-11.55
PLAYER CHARACTER.	Yes		Yes		Yes		Yes		Yes		Yes	
POSITION	Yes		Yes		Yes		Yes		Yes		Yes	
TEAM	Yes		Yes		Yes		Yes		Yes		Yes	
SEASON	Yes		Yes		Yes		Yes		Yes		Yes	
Prob > F (F-Test equal coeff.)	0.000		0.000		0.000		0.000		0.000		0.000	
	2SLS		2SLS		2SLS		2SLS		2SLS		2SLS	
RELATIVE VALUE$_{(t-1)}$	-0.432*	-1.66	-0.092	-0.41	-6.459***	-3.79	60.609	0.57	-31.973*	-1.68	-17.527*	-1.78
ABSOLUTE VALUE$_{(t-1)}$	0.338	1.44	0.186	0.91	2.257	1.47	279.050***	3.30	47.697***	2.79	23.247***	2.62
SQ ABSOLUTE VALUE$_{(t-1)}$	-0.015	-0.80	0.019	1.17	-0.332***	-2.75	-8.777**	-1.98	-3.305**	-2.46	-1.665**	-2.39
PLAYER CHARACTER.	Yes		Yes		Yes		Yes		Yes		Yes	
POSITION	Yes		Yes		Yes		Yes		Yes		Yes	
TEAM	Yes		Yes		Yes		Yes		Yes		Yes	
Instruments first stage regr.:												
RELATIVE VALUE$_{(t-2)}$ F-test	0.400***	9.54	0.400***	9.54	0.400***	9.54	0.365***	7.56	0.400***	9.54	0.400***	9.54
ABSOLUTE VALUE$_{(t-2)}$	0.731***	13.93	0.731***	13.93	0.731***	13.93	0.604***	9.83	0.731***	13.93	0.731***	13.93
SQ ABSOLUTE VALUE$_{(t-2)}$	0.094*	1.83	0.094*	1.83	0.094*	1.83	0.058	0.31	0.094*	1.83	0.094*	1.83
P-value (Anderson LM test)	0.000		0.000		0.000		0.000		0.000		0.000	
Shea partial R2: REL. VALUE	0.130		0.130		0.130		0.042		0.130		0.130	
Shea partial R2: ABS. VALUE	0.189		0.189		0.189		0.079		0.189		0.189	
Shea partial R2: SQ ABS.VAL.	0.058		0.058		0.058		0.033		0.058		0.058	
Prob > chi2 (equal coeff.)	0.001		0.152		0.000		0.000		0.000		0.000	
Prob >chi2 (joint signif.)	0.003		0.327		0.000		0.000		0.000		0.000	
Centered R2	0.362		0.217		0.398		0.285		0.231		0.235	
Observations	1599		1599		1599		1348		1599		1599	

Notes: *,** and *** denote statistical significance at the 10%, 5% and 1% level.

Table 3: Granger Causality Test

Granger Causality	**relative income**		**absolute income**	
	Beta	**t-value**	**Beta**	**t-value**
Did the Performance Come First?				
H0: Performance does not Granger cause the position concerns/salary				
Dependent Variable: Relative or Absolute Income Position				
Independent Variables				
Lagged Goals	-0.349***	-12.98	0.283***	11.85
Lagged Relative or Absolute Income Position	0.468***	13.95	0.633**	19.40
Did the Positional Concerns or Salary Come First?				
H0: Positional concerns or salary do not Granger cause the performance				
Dependent Variable: Goals				
Independent Variables				
Lagged Goals	0.573***	17.69	0.572***	14.56
Lagged Relative or Absolute Income Position	-0.111***	5.51	0.131***	5.76
Dependent Variable: Relative or Absolute Income Position				
Independent Variables				
Lagged Assists	-0.255***	-9.95	0.225***	9.85
Lagged Relative or Absolute Income Position	0.513***	14.38	0.657***	19.34
Dependent Variable: Assists				
Independent Variables				
Lagged Assists	0.395***	14.40	0.394***	14.56
Lagged Relative or Absolute Income Position	-0.166***	-4.85	0.186***	5.76
Dependent Variable: Relative or Absolute Income Position				
Independent Variables				
Lagged Shots	-0.320***	-11.54	0.247***	10.33
Lagged Relative or Absolute Income Position	0.455***	12.40	0.638***	18.40
Dependent Variable: Shots				
Independent Variables				
Lagged Shots	0.615***	22.71	0.613***	23.73
Lagged Relative or Absolute Income Position	-0.067***	-2.82	0.087***	3.87
Dependent Variable: Relative or Absolute Income Position				
Independent Variables				
Lagged Ball Contacts	-0.129***	-5.67	0.348***	12.46
Lagged Relative or Absolute Income Position	0.560***	14.57	0.119***	4.56
Dependent Variable: Ball Contacts				
Lagged Ball Contacts	0.356***	13.09	0.135***	6.61
Lagged Relative or Absolute Income Position	-0.108***	-4.18	0.672***	17.84
Dependent Variable: Relative or Absolute Income Position				
Independent Variables				
Lagged Duels	-0.285	-12.93	0.234	13.26
Lagged Relative or Absolute Income Position	0.497	13.92	0.666	19.68
Dependent Variable: Duels				
Independent Variables				
Lagged Duels	0.447	18.33	0.447	19.24
Lagged Relative or Absolute Income Position	-0.058	-2.59	0.079	3.83
Dependent Variable: Relative or Absolute Income Position				
Independent Variables				
Lagged Duels Won	-0.257***	-12.03	0.223***	12.78
Lagged Relative or Absolute Income Position	0.519***	14.63	0.674***	19.96
Dependent Variable: Duels Won				
Independent Variables				
Lagged Duels Won	0.492***	21.73	0.486***	22.21
Lagged Relative or Absolute Income Position	-0.035*	-1.65	0.065***	3.24

Notes: Robust standard errors. *,** and *** denote statistical significance at the 10%, 5% and 1% level.

6. Effects of Social Integration and Team Performance

Table 4 shows the estimates referring to the behavioral consequences of positional concerns of newcomers in a team compared to players already integrated into the team (for at least one season). The sample of players is split between newcomers and integrated players. Due to many team changes in our data set, we are able to empirically investigate this question. In line with *Table 1*, the regressions are run with individual fixed effects. For simplicity, only the coefficient of the relative salary position is reported in *Table 4*. The 12 regressions show that, in line with *hypothesis 2*, newcomers are less driven by positional concerns. In none of the cases is the relative income coefficient statistically significant. In contrast, in the sub-sample of integrated players, the coefficients are always statistically significant, with a negative sign. This result is consistent with the hypothesis that integrated players resent differences in income more intensely than newcomers, diminishing their performance accordingly.

Table 4 investigates possible differences between domestic and foreign players. The sample is now split into domestic and foreign players. The table reports only the coefficient referring to the relative salary position. The results of the regressions suggest that positional concern differences between domestic and foreign players are less obvious. There is, however, a tendency for German players to be somewhat more sensitive to the relative position. Nevertheless, the respective coefficient among foreign players is still statistically significant in many cases, although not as statistically significant as for the German players. The results are therefore only partially consistent with *hypothesis 3*.

Table 4 finally reports the results referring to *hypothesis 4*, proposing that high performing teams experience stronger relative income concerns than low performing teams. In order to split the sample, the mean team performance over the investigated period (the rank at the end of each season) was calculated. The teams ranked above average were placed in a group labeled “top team”, and the remaining teams were placed in the other group. The results suggest that players in top teams are indeed more vulnerable to the negative consequences of

income differences than players in less successful teams. In all cases, the respective coefficient is statistically significant, with a negative sign, so the performance of the players declines. On the other hand, players' performance in teams with lower performance levels is essentially unaffected by relative income position. Only in 1 out of 6 cases is the coefficient statistically significant.

Table 4: Test of Further Hypotheses

Dependent Variable	**Coefficient**	**t-value**	**N**	**Dependent Variable**	**Coefficient**	**t-value**	**N**
Not Changed Teams				**Changed Teams**			
Goals	-0.361***	-3.01	2448	Goals	-1.191	-1.60	385
Assists	-0.357***	-3.21	2448	Assists	-1.125	-1.65	385
Shots	-3.212***	-4.15	2448	Shots	-8.741	-1.57	385
Ball Contacts	-63.125**	-2.20	1591	Ball Contacts	-280.877	-1.34	278
Duels	-28.105***	-3.18	2448	Duels	-51.586	-0.85	385
Duels Won	-13.536***	-3.03	2448	Duels Won	-26.033	-0.92	385
German Players				**Foreigners**			
Goals	-0.424***	-3.06	1564	Goals	-0.159	-0.88	1269
Assists	-0.372***	-2.79	1564	Assists	-0.295*	-1.94	1269
Shots	-3.702***	-3.90	1564	Shots	-3.608***	-3.20	1269
Ball Contacts	-55.911	-1.47	902	Ball Contacts	-76.243**	-2.11	967
Duels	-35.996***	-3.43	1564	Duels	-29.213**	-2.21	1269
Duels Won	-17.581***	-3.30	1564	Duels Won	-14.652**	-2.23	1269
Top Team				**Not a Top Team**			
Goals	-0.271*	-1.87	1568	Goals	-0.170	-0.79	1265
Assists	-0.500***	-3.80	1568	Assists	-0.011	-0.05	1265
Shots	-3.333***	-3.58	1568	Shots	-3.193**	-2.14	1265
Ball Contacts	-77.032**	-2.46	1047	Ball Contacts	-52.403	-0.99	822
Duels	-34.781***	-3.56	1568	Duels	-16.739	-0.87	1265
Duels Won	-17.487***	-3.52	1568	Duels Won	-8.448	-0.89	1265

Notes: Robust standard errors. *,** and *** denote statistical significance at the 10%, 5% and 1% level.

V. CONCLUSIONS

The empirical results presented suggest that not only the absolute, but also the *relative income position* has an impact on individuals' performance: The larger the income differences are, the *lower* is the performance. *More integrated members* of a (reference) group react *more negatively* than newcomers by diminished performance.

To what extent can these findings on soccer players' behavior be transferred to business practice? What can managers learn from them? First of all, the results are relevant for the design of incentive mechanisms. Positional concerns are important in areas where measurable performance is directly linked to salary (pay-for-performance). For instance, in many sales organizations it is common practice that sales commissions make up a large part of the total salary. Thus, insurance agents or financial advisors are paid according to key sales performance indicators, such as net new money, return on assets, and the number of products or policies sold within a certain period. In order to increase internal competition among the sales force and to push individual performance, transparency is increased by comparative performance rankings that are shared among the sales force. Given that performance directly translates into personal income, such rankings run the risk of diminishing, rather than improving, performance. The example of soccer suggests that the higher the differences between teammates' average salaries are, the lower is overall performance. The most successful sellers, who dominate the rankings and earn much more than their colleagues, may well weaken the performance of the entire sales team.

Pay-for-performance schemes are usually linked to output measures neglecting process- or context-specific factors. Accordingly, sales people at the lower end of the ranking may perceive that higher ranked colleagues are not performing better, but simply benefit from lucky punches or advantageous context factors (e.g., the districts they cover have a higher number of potential clients). Although pay-for-performance schemes are helpful to identify low performers, they tend to lower the average performance of the team. A positional arms

race through a process of rivalry may be provoked (Landers et al. 1996). This downside risk is even bigger for top performing teams, just as individuals playing in top soccer teams are more vulnerable to the negative consequences of a relative income disadvantage. Top performing sales teams may already have ambitious and self-motivated team members so that further stimulation of internal team competition leads to negative motivational effects. Thus, management is faced with the difficult task of finding the right amount of 'healthy competition' within a team.

Pay-for-performance schemes address extrinsic motivation, and leave intrinsic motivation aside. According to Frey and Osterloh (2005), such schemes tend to reinforce selfish extrinsic motivation, crowding out intrinsic motivation. Managers need to consider the motivational aspects of the transparency of relative income positions in terms of corresponding benefits and downside risks. Negative effects of output-oriented financial incentives, such as pay-for-performance schemes, should be complemented with process-oriented non-financial incentives, such as awards for the best team player, best rookie, or most innovative team member of the year. This takes into account the individual's need for social distinction, using a non-material extrinsic reward (see Frey 2005). The empirical results are also relevant for the treatment of new employees joining an established team. The findings suggest that newcomers are less driven by positional concerns than existing team members. Newcomers' performance is less affected by a disadvantage in the relative position. Conformism, adaptation, adjustment and short-time satisfaction due to the change (which is often connected with an absolute salary improvement) may account for these differences. In business practice, managers often switch jobs in order to increase their salary (e.g., in investment banking). Employees joining a new firm are therefore less affected by a disadvantage in their relative income position. However, over time, newcomers get used to their new situation and start comparing their performance/income relation with the new reference group. Management needs to take into consideration that, after an initial adaptation

period, newcomers base their income expectations on their relative position in the team. As a result, a perceived disadvantage in the performance/income relationship tends to lead to behavioral changes.

APPENDIX

Table A1

Football's Richest Players (March 2004)

Player	Club	€ Millions Per Year
Beckham	Real Madrid	22.2
Zidane	Real Madrid	14.05
Nakata	Bologna	11.8
Ronaldo	Real Madrid	11.09
Raul	Real Madrid	11.09
Vieri	Inter	10.35
Owen	Liverpool	9.6
Keane	Manchester United	8.87
Figo	Real Madrid	8.87
Del Piero	Juventus	7.4

Source: www.soccer-europe.com

REFERENCES

Abowd, J. M. (1990). Does Performance-Based Managerial Compensation Affect Corporate Performance? *Industrial and Labor Relations Review*. 43: 52S-73S.

Akerlof, G. A. and J. L. Yellen (1990). The Fair Wage-Effort Hypothesis and Unemployment, Quarterly Journal of Economics. 105: 255-284.

Alpizar, F. F. Carlsson and O. Johansson-Stenman (2005). How Much Do We Care About Absolute Versus Relative Income and Consumption? *Journal of Economic Behavior and Organization*. 56: 405-421.

Asch, B. J. (1990). Do Incentives Matter? The Case of the Navy Recruiters, *Industrial and Labor Relations Review*. 43: 89S-105S.

Becker, B. E. and M. A. Huselid (1992). The Incentive Effects of Tournament Compensation Systems, *Administrative Science Quarterly*. 37: 336-350.

Becker, G. S. (1974). A Theory of Social Interaction, *Journal of Political Economy*. 82: 1063-1093.

Boskin M. and E. Sheshinski (1978). Optimal Redistribution Taxation When Individuals Welfare Depends Upon Relative Income, *Quarterly Journal of Economics*. 92: 589-601.

Breusch, T. and A. Pagan (1980). The Lagrange Multiplier Test and Its Applications to Model Specification in Econometrics, *Review of Economic Studies*. 47: 239-253.

Carmichael, F., D. Forrest and R. Simmons (1999). The Labour Market in Associate Football: Who Gets Transferred and for How Much? *Bulletin of Economics Research*. 51: 1-26.

Clark, A. and A. Oswald (1996). Satisfaction and Comparison Income, *Journal of Public Economics*. 61: 359-81.

Dorn, D., J. A. V. Fischer, G. Kirchgässner and A. Sousa-Poza (2005). *Is It Culture or Democracy? The Impact of Democracy, Income, and Culture on Happiness, University of St. Gallen,* Department of Economics Working Paper Series 2005-12, St. Gallen, Switzerland.

Duesenberry, J. S. (1949). *Income, Saving and the Theory of Consumer Behavior*. Harvard: University of Harvard Press.

Easterlin, R. (1974). Does Economic Growth Improve the Human Lot? Some Empirical Evidence, in: P. A. David and M. W. Reder (eds.), *Nations and Households in Economic Growth: Essays in Honor of Moses Abramovitz*. New York: Academic Press: 89-125.

Easterlin, R. (1995). Will Raising the Incomes of All Increase the Happiness of All? *Journal of Economic Behavior and Organization*. 27: 35-47.

Easterlin, R. A. (2001). Income and Happiness: Towards a Unified Theory, *Economic Journal.* 111: 465-484.

Ehrenberg, R. G. and M. L. Bognanno (1990a). Do Tournaments Have Incentive Effects? *Journal of Political Economy*. 98: 1307-1324.

Ehrenberg, R. G. and M. L. Bognanno (1990b). The Incentive Effects of Tournaments Revisited: Evidence from the European PGA Tour, *Industrial and Labor Relations Review*. 43: 74S-88S.

Elster, J. (1991). Envy in Social Life, in: R. J. Zeckhauser (ed.), *Strategy and Choice*. Cambridge, Mass.: The MIT Press: 49-82.

Eschweiler, M. and M. Vieth (2004). Preisdeterminanten bei Spielertransfers in der Fußball-Bundesliga. *Zeitschrift für Betriebswirtschaft*. 64: 671-692.

Fernie, S. and D. Metcalf (1999). It's Not What You Pay it's the Way that You Pay it and that's What Gets Results: Jockeys' Pay and Performance, *Labour*. 13: 385-411.

Ferrer-i-Carbonell, A. (2005). Income and Well-Being: An Empirical Analysis of the Comparison Income Effect, *Journal of Public Economics*. 89: 997-1019.

Festinger, L. (1954). A Theory of Social Comparison Processes, *Human Relations*. 7: 117-140.

Forrest, D. and R. Simmons (2002). Team Salaries and Playing Success in Sports: A Comparative Perspective, *Zeitschrift für Betriebswirtschaft*. 62: 221-237.

Frank, R. (1985). *Choosing the Right Pond: Human Behaviour and the Quest for Status*. Oxford: Oxford University Press.

Frank, R. H. (1991). Positional Externalities, in: R. J. Zeckhauser (ed.), *Strategy and Choice*. Cambridge, Mass.: The MIT Press: 25-47.

Frank, R. H. and P. J. Cook (1995). *The Winner-Take-All Society*. New York: Free Press.

Frank, R. H. and C. R. Sunstein (2001). Cost-Benefit Analysis and Relative Position, *University of Chicago Law Review*. 68: 323–374.

Frey, B. S. (2005). Knight Fever: Towards an Economics of Awards. CREMA Working Paper 2005-12, Basel, Center for Research in Economics, Management and the Arts.

Frey, B. S. and S. Meier (2004). Pro-Social Behavior in a Natural Setting**,** *Journal of Economic Behavior and Organization*. 54: 65-88.

Frey, B. S. and M. Osterloh (2005). Yes Managers should be Paid like Bureaucrats, *Journal for Management Inquiry*. 14: 96-111.

Frey, B. S. and A. Stutzer (2002a). *Happiness and Economics*. Princeton: Princeton University Press.

Frey, B. S. and A. Stutzer (2002b). What Can Economists Learn from Happiness Research? *Journal of Economic Literature*. 40: 402-435.

Frey, B. S. and B. Torgler (2004). Taxation and Conditional Cooperation. CREMA Working Paper 2004-20, Basel, Center for Research in Economics, Management and the Arts.

Friedman, M. (1962). *Capitalism and Freedom*. Chicago: University of Chicago Press.

Galbraith, J. K. (1958). *The Affluent Society*. Boston: Houghton-Mifflin.

Garcia-del-Barrio, P. and F. Pujol (2004). Pay and Performance in the Spanish Soccer League: Who Gets the Expected Monopsony Rents? Working Paper No. 05/04, Universidad de Navarra.

Gibbons, R. and K. Murphy (1990). Relative Performance Evaluation for Chief Executive Officers, *Industrial and Labor Relations Review*. 43: 30S-51S.

Granger, C. W. (1969). Investigating Causal Relations by Econometric Models and Cross-Spectral Methods, *Econometrica*. 37: 424-438.

Greene, J. R. and N. L. Stokey (1983). A Comparison of Tournaments and Contracts, *Journal of Political Economy*. 91: 349-365.

Groot, W. and H. M. van den Brink (1999). Overpayment and Earnings Satisfaction: An Application of an Ordered Response Tobit Model, *Applied Economics Letters*. 6: 235-238.

Hall, A., G. Rudebusch and D. Wilcox (1996). Judging Instrument Relevance in Instrumental Variable Estimation, *International Economic Review*. 37: 283-298.

Hall, S., S. Szymanski and A. Zimbalist (2002). Testing Causality Between Team Performance and Payroll: The Cases of Major League Baseball and English Soccer, J*ournal of Sports Economics*. 3: 149-168.

Hausman, J. A. (1978). Specification Tests in Econometrics, *Econometrica*. 46: 1251-1271.

Hübl, L. and D. Swieter (2002). Der Spielemarkt in der Fußball-Bundesliga. *Zeitschrift für Betriebswirtschaft*. Special Issue 72: 105-123.

Jensen, M. C. and K. J. Murphy (1990). *Performance Pay and Top-Management Incentives, Journal of Political Economy*. 98: 225-264.

Kern, M. and B. Süssmuth (2003). Managerial Efficiency in German Top League Soccer, Discussion Paper No. 5, University of Munich, Germany.

Kingdon, G. and J. Knight (2004). Community, Comparisons and Subjective Well-being in a Divided Society, June 2004 CSAE WPS/2004-21, Oxford.

Kirchsteiger, G. (1994). The Role of Envy in Ultimatum Games, *Journal of Economic Behavior and Organization*. 25: 373-389.

Johansson-Stenman, O., F. Carlsson and D. Daruvala (2005). Measuring Future Grandparents' Preferences for Equality and Relative Standing, *Economic Journal*. 112: 362-383.

Landers, R. M., J. B. Rebitzer and L. J. Taylor (1996). Rat Race Redux: Adverse Selection in the Determination of Work Hours in Law Firms, *American Economic Review*. 86: 329-348.

Layard, R. (2003). Income and Happiness: Rethinking Economic Policy, Lecture 2, London School of Economics, London (see cep.lse.ac.uk/events/lectures/layard/RL040303.pdf).

Lazear, E. P. (2000). Performance Pay and Productivity, *American Economic Review*. 90: 1346-1361.

Lazear, E. P. and S. Rosen (1981). Rank-Order Tournaments as Optimum Labor Contracts, *Journal of Political Economy*. 89: 841-864.

Lehmann, E. E. and G. G. Schulze (2005). What Does it Take to Be a Star? The Role of Performance and the Media for German Soccer Players, unpublished manuscript.

Lehmann, E. E. and J. Weigand (1998). Wieviel Phantasie braucht die Fußballaktie? *Zeitschrift für Betriebswirtschaft*, Ergänzungsheft. 68: 101-119.

Lehmann, E. E. and J. Weigand (1999). Determinanten der Entlohnung von Profifußballspielern – Eine empirische Analyse für die deutsche Bundesliga, *Betriebswirtschaftliche Forschung und Praxis*. 51: 124-135.

Lucifora, C. and R. Simmons (2003). Superstar Effects in Sport: Evidence From Italian Soccer, *Journal of Sports Economics*. 4: 35-55.

Luttmer, E. F. P. (2005). Neighbors As Negatives: Relative Earnings and Well-Being, *Quarterly Journal of Economics*. 120: 963-1002.

Lynch, J. G. and J. S. Zax (1998). Prizes, Selection and Performance in Arabian Horse Racing, Working Paper No. 98-26, University of Colorado at Boulder.

Lynch, J. G. and J. S. Zax (2000). The Rewards to Running: Prize Structure and Performance in Professional Road Racing, *Journal of Sports Economics*. 1: 323-340.

Lyubomirsky, S. (2001). Why Are Some People Happier Than Others? The Role of Cognitive and Motivational Processes in Well-Being. *American Psychologist*. 56: 239-249.

Maloney, M. and R. E. McCormick (2000). The Response of Workers to Wages in Tournaments: Evidence from Foot Races, *Journal of Sports Economics*. 1: 99-123.

Marshall, A. (1961). *Principles of Economics*. London: Macmillan.

Marx, K. (1849). Wage Labour and Capital, in: K. Marx and F. Engel, *Selected Works*. Vol.1, Moscow: Progress Publishers.

McAdams, R. H. (1992). Relative Preferences, *The Yale Law Journal*. 102: 1-104.

McBride, M. (2001). Relative-Income Effects on Subjective Well-Being in the Cross-Section, *Journal of Economic Behavior and Organization*. 45: 251-278.

McLaughlin, K. J. (1988). Aspects of Tournament Models: A Survey, in R. G. Ehrenberg (ed.), *Research in Labor Economics*. Vol. 9. Greenwich, CT: JAI: PP. 225-256.

Melton, M. and T. S. Zorn (2000). An Empirical Test of Tournament Theory: The Senior PGA Tour, *Managerial Finance*. 26: 16-32.

Nalebuff, B. J. and J. E. Stiglitz (1983). Prizes and Incentives: Towards a General Theory of Compensation and Competition, *RAND Journal of Economics*. 14: 21-43.

Neumark, D. and A. Postlewaite (1998). Relative Income Concerns and the Rise in Married Women's Employment, *Journal of Public Economics*. 70: 157-183.

O'Keefe, M., W. K. Viscusi and R. J. Zeckhauser (1984). Economic Contests: Comparative Reward Schemes, *Journal of Labor Economics*. 2: 27-56.

Orszag, J. M. (1994). A New Look at Incentive Effects and Golf Tournaments, *Economics Letters*. 46: 77-88.

Pollak, R. A. (1976). Interdependent Preferences, *American Economic Review*. 66: 309-320.

Prendergast, C. (1999). The Provision of Incentives in Firms, *Journal of Economic Literature*. 42: 7-63.

Rees, A. (1992). The Tournament as a Model for Executive Compensation, *Journal of Post Keynesian Economics*. 14: 567-571.

Rosen, S. (1981). The Economics of Superstars, *Journal of Political Economy*. 79: 1302-1319.

Rosen, S. (1988). Promotion, Elections, and Other Contests, *Journal of Institutional and Theoretical Economics*. 144: 73-90.

Schelling, T. C. (1978). *Micromotives and Macrobehavior*. New York: W. W. Norton.

Schoeck, H. (1966). *Envy*: *A Theory of Social Behavior*. Indianapolis: Liberty Fund.

Scitovsky, T. (1976). *The Joyless Economy: An Inquiry Into Human Satisfaction and Consumer Dissatisfaction*. Oxford: Oxford University Press.

Senik, C. (2004). Revitalizing Relativizing Income, Delta Working Paper 2004-17, Paris.

Shea, J. (1997). Instrument Relevance in Multivariate Linear Models: A Simple Measure, *Review of Economics & Statistics*. 79: 348-352.

Smith, A. (1759/1976). *Theory of Moral Sentiments*. Oxford: Clarendon Press.

Solnick, S. J. and D. Hemenway (1998). Is More Always Better?: A Survey on Positional Concerns, *Journal of Economic Behavior and Organization*. 37: 373-383.

Stouffer, S. A. (1949). *The American Soldier*. Princeton: Princeton University Press.

Stutzer, A. (2004). The Role of Income Aspirations in Individual Happiness, *Journal of Economic Behavior and Organization*. 54: 89-109.

Sunde, U. (2003). Potential, Prizes and Performance: Testing Tournament Theory with Professional Tennis Data. IZA Discussion Paper Series, No. 947, Bonn, Germany.

Szymanski, S. and T. Kuypers (1999). The English Football Industry: Profit, Performance and Industrial Structure, *International Review of Applied Economics*. 11: 135-153.

Tsou, M. W. and J. T. Liu (2001). Happiness and Domain Satisfaction in Taiwan, *Journal of Happiness Studies*. 2: 269-88.

Tversky, A. and D. Griffin (1991). Endowment and Contrast in Judgments of Well-Being, in R. J. Zeckhauser (ed.), *Strategy and Choice*. Cambridge, Mass.: The MIT Press: 297-318.

Veblen, T. (1899). *The Theory of the Leisure Class*. New York: MacMillan.

Walker, I. and T. F. Pettigrew (1984). Relative Deprivation Theory: An Overview and Conceptual Critique, *British Journal of Social Psychology*. 23: 301-310.

Watson, R., D. Storey, P. Wynarczyk, K. Keasey and H. Short (1996). The Relationship Between Job Satisfaction and Managerial Remuneration in Small and Medium-Sized Enterprises: An Empirical Test of 'Comparison Income' and 'Equity Theory' Hypotheses, *Applied Economics*. 28: 567-76.

Zeckhauser, R. J. (ed.) (1991). *Strategy and Choice*. Cambridge: The MIT Press.

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