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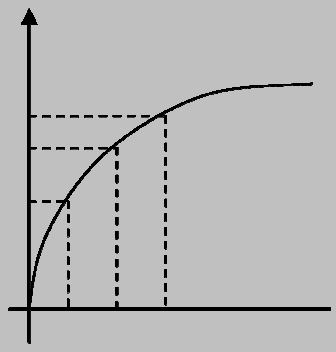

For the love of football? Using economic models of volunteering to study the motives of German football referees

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For the love of football? Using economic models of volunteering to study the motives of German football referees

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Abstract

Using data for a large sample of German football referees, we studied the motives for becoming a football referee. Based on a long modeling tradition in the literature on the economics of volunteering, we studied altruistic motives (public-goods model) versus non-altruistic (egoistic private-consumption motives and human-capital motives). We differentiated between self-attributed and other-attributed motives. We found that altruistic motives on average are less strong than other motives. Other-attributed altruistic motives are stronger than self-attributed altruistic motives, indicating the presence of a self-interest bias. We further found that referees who report strong altruistic motives have a higher willingness to quit refereeing when other referees would referee more matches, consistent with the public-goods model. In line with the human-capital model, altruistic motives are stronger for senior referees. Altruistic motives are also stronger for those referees who view refereeing as a volunteer activity.

Keywords: Football referees, motives, socioeconomics of volunteering, survey data, volunteerism

1. Introduction

Football is the most popular sport in Germany. The German Football Association (Deutscher Fußballbund) organizes official matches in three professional leagues, several regional leagues, and in numerous amateur leagues. Thousands of football matches take place on match days. Many tens of thousands of spectators watch the matches in the stadiums and on television, making football a large-scale industry. This industry could hardly prosper without a sufficiently large number of individuals who are willing to act on match days as a football referee. It is, therefore, not surprising that

much research has been done to study various facets of football refereeing like a potential home team favoritism of football referees (Boyko et al. 2007, Dawson et al. 2007, Buraimo et al. 2010), the influence of social pressure on football referees' decisions (Garciano et al. 2005, Dohmen 2008, Dawson 2012), and the psychological and physiological strains and stress under which football referees act (Teipel et al. 2001, Mascarenhas et al. 2009). Recent research has focused on facets including the social role of referees (Emrich and Papathanassiou 2003), prevalence of violence against football referees (Rullang et al. 2015a), the economic background of referees (Rullang et. al. 2015b report results for female referees), personality traits that football referees think are important for managing a game (Brand and Neß 2004), the meaning of different forms of authority (Rullang et al. 2015c), and match fixing (Emrich et al. 2015).

Our study focuses on the motives why individuals have become referees and, thereby, contributes to the growing literature that studies the motives why individuals become football referees. In this literature, Johansen (2015) reports, based on a sample of 44 Norwegian football referees, that passion-based motives are more prevalent among elite referees, while fitness-based motives are more prevalent among non-elite referees and social-based motives are equally important across the two groups of referees. Auger et al. (2010) report results based on a questionnaire survey of 469 officials of 16 Canadian sports federations. They find that the main motivation for being an official is the love and passion of sport, followed by the motive to participate in leisure-time activities, and by the motive to develop on a personal level (Figure 1, page 41). As for motivates for continuing as an official the findings indicate that a leading motive is to be satisfied, useful and integrated, followed by the motive to improve and surpass personally (Figure 2, page 42). Hancock et al. (2015), using data for 514 officials from 18 Canadian sports federations, report that officials begin officiating for intrinsic and for the sports reasons,

and that intrinsic and social motives help to explain why officials continue officiating. For two samples (80 and 227 participants) of French football referees, Phillippe et al. (2009) find that referees report that they are passionate about refereeing, and Friman et al. (2004), based on interviews with seven Swedish football referees, report that having fun to be a football referee is a main motive for refereeing.

In our research, we make use of the fact that the German Football Association asks football clubs to add a club-specific number of referees to an overall pool of referees which the association then uses to organize matches. Especially in lower-class leagues football refereeing, therefore, can be seen as a volunteer activity, where football referees make a contribution that football associations and football clubs can use more or less free of charge. Even more, refereeing football matches can be interpreted as the production of a public good because upon refereeing matches football referees make a fundamental contribution to run the entire league system. Because all football associations and all football clubs benefit from the league system non-excludability and non-rivalry in consumption are characteristic features of football refereeing.

Drawing on the analogy between volunteering, the production of a public good, and football refereeing, we organize our study of the motives of football referees using results reported in the large and significant literature on the economics of volunteering. In this literature, three broad classes of models of volunteering have emerged: the public-goods model (Roberts 1984, Bergstrom et al. 1986, Duncan 1999), the private-consumption model (Andreoni 1989, 1990, Harbough 1998), and the human-capital model (Menchink and Weisbrod 1987). The public-goods model stipulates that individuals contribute to and derive utility from the total provision of a public good, where individuals have altruistic preferences insofar as they derive utility when the utility of others due to the consumption of the public good increases. Because

individuals are only interested in the total provision of a public good, there should be a close substitutability between the voluntary services of individuals. In the private-consumption model, there is no such substitutability because individuals are assumed to have non-altruistic (egoistic) preferences. It is the act of volunteering from which they derive utility because volunteering, for example triggers a ”warm-glow" feeling and helps to spend leisure time in a worthwhile manner and to meet other people. The human-capital model, in turn, implies that individuals benefit from volunteering because it helps them to accumulate job-market skills and social capital (see Coleman 1988). Because the accumulation of social capital is easier in larger groups of individuals the voluntary services of different individuals are complements rather than substitutes (Ziemek 2006, Emrich and Pierdzioch 2015a).

Upon studying the motives why individuals have become football referees we could test empirically the public-goods model against its two competitors. For our empirical tests, we used a novel large micro dataset of German football referees. We used this large micro dataset to construct indexes of referee altruism that aggregate various motives for becoming a football referee. We found a substantial heterogeneity of the indexes across referees. According to our indexes, non-altruistic (private-consumption and human-capital) motives tend to be more important than altruistic motives for many football referees. In line with the human-capital model of volunteering, we found that senior football referees articulate stronger altruistic motives than younger referees. We also found that those referees who report strong altruistic motives have a higher willingness to quit refereeing when other referees would referee more matches, which is consistent with the kind of substitutability of referee services predicted by the public-goods model.

Our results were qualitatively unchanged when we controlled for a potential bias due to “motive talk”, a well-known phenomenon in research on volunteering (Smith 1981,

Bertrand and Mullainathan 2001, to name just a few; see also Musick and Wilson 2008, pages 69-70, and the references cited therein). Motive talk may give rise to a social-desirability bias, but it may also reflect a self-interest bias. A social-desirability bias (see, for example, Flatau et al. 2015, and the references cited therein) arises if a football referee reports that he or she mainly was motivated by altruistic motives because altruism is socially highly valued. We accounted for a social-desirability bias by asking football referees about their views on why other individuals have become a football referees. Our empirical findings do not show any evidence of a social-desirability bias. On the contrary, we find that self-attributed altruistic motives are on average weaker than other-attributed altruistic motives. This finding is consistent with a self-interest bias documented in research in social psychology (see Holmes et al. 2002, and the references cited therein). A self-interest bias arises if individuals do not want to appear as being overly altruistic because being a do-gooding-referee may pave the way for additional commitments and could threaten self-assertion.

We organize the remainder of this research as follows. In Section 2, we describe our data. In Section 3, we report our empirical results. In Section 4, we summarize our results and offer some concluding remarks.

2. The Instrument and the Data

The data were collected from July 12 to August 27, 2013 by means of an online questionnaire study that was part of a research project conducted by the authors for the German Football Association. A top-down approach was chosen to send referees the link to the online questionnaire study. In total 4,813 football referees (of which were 216 female referees) participated in the study.

In order to cover the spectrum of motives underlying the three classes of economic models of volunteering, a total of ten items were used to measure motives for becoming a football referee. The specification of the ten items was based on data collected by means of interviews with 12 football referees that had been conducted before the study was started. In the online questionnaire, referees could answer every item based on a 5-point Likert scale from "do not agree at all" to "totally agree". Table 1 summarizes the ten items and shows how the items were allocated across the classes of economic models of volunteering. Data on the ten items were collected for both self-attributed motives and the corresponding other-attributed motives ("When you think about other referees, why do you think did they become a football referee?", see Emrich et al 2013). Table 1 also shows the assignment of motives across economic models of volunteering, where the public-goods model represents altruistic motives and the other two economic models represent non-altruistic motives.

-- Please include Table 1 about here. --

The potential substitutability between one's own referee services and others' referee services was measured by means of a public-goods-model question "What would you do in case your football club could manage to supply the number of referees required by the football association without your help?", where the referees could choose between the answer "I would quit refereeing" and "I would continue refereeing". If a football referee answers that he or she would quit refereeing then such an answer is direct evidence of a substitution effect as an increased effort of other individuals is perceived to lead to a crowding-out of own effort. We found that only 155 football referees answered that they would quit refereeing in case other individuals would be willing "to do the job". This finding is a first informal hint that the type of altruism postulated by the public-goods model is not the dominating motive for becoming a football referee,

but also that the population of football referees studied in this research is not entirely homogeneous in this respect.

The population of football referees is also heterogeneous in another important respect. Because the economics of volunteering provide the theoretical foundation of our empirical research, we also asked football referees whether they interpret their refereeing as a volunteer activity. A total of 3,663 (76.12%) football referees answered "yes". Hence, there is some heterogeneity as to whether refereeing is interpreted as a volunteer activity. One would expect that the indexes of referee altruism differ across those football referees who interpret their refereeing as a voluntary activity and those how do not see themselves as volunteers. Table 8 summarizes the results. Those football referees who see themselves as a volunteer have on average a higher score with regard to the index of referee altruism, and this effect is significant.

-- Please include Table 2 about here. --

In addition, we collected several sociodemographic and sports-specific data. We asked for age (N=4,636, mean=36.69, SD=16.23), gender (4,399 males, only 216 female referees participated in the study), and experience as a referee (how many years a referee has refereed football matches, N=4,699, mean=13.95, SD=11.80). In order to capture potential path dependencies in a referee's career, we asked whether a referee was or has been an active football player (never=386, some time ago=3,195, currently active players=1,101) and whether he or she already had interrupted before his or her career as a referee (binary, yes=1,369, no=3,444).

As a proxy of opportunity costs of refereeing we asked how many hours per week a referee spends on training for his or her refereeing activities (N=4,547 mean=3.07, SD=2.95) and how many matches a referee referees per year (N=4,442, mean=42.34,

SD=24.08). Another measure of opportunity costs is income, which was measured using six broad classes to avoid a non-response bias (<1000€, [1000€; 2,250€), [2,250€; 3,500€), [3,500€; 4,500€), [4,500€; 5,500€), >=5,500€; observations: 849, 1246, 1061, 524, 217, 217).

As a measure of referee satisfaction, we asked (5-point Likert scale) referees whether they think that the experiences they have made during their career as a football referee are in line with their expectations at the time when they became a football referee (N=4,298, mean=4.09, SD=0.86). As a measure of professionalism, we asked the football referees to provide data on the league level at which they refereed matches at the time when the online questionnaire study was conducted (Table 3).

-- Please include Tables 3 and 4 about here. --

Finally, the decision to continue or quit refereeing may depend upon a referee's experiences with offences, threats, and even violence (Rullang et al. 2015a). Referees could rate their personal experiences with offences, threats, and violence on a 5-point Likert scale. Table 4 summarizes descriptive statistics of the data.

4. Empirical Results

4.1 Indexes of Referee Altruism

Equipped with data on the ten items for self-attributed and other-attributed motives, we summed up over model-class-specific items and divided by the number of items available for a model class. We also divided by a factor of five (because every item was measured using a five-point Likert scale) such that every sum could assume a maximum of unity. Thus, upon letting C_i, $i = \{PGM, PCM/HCM\}$, denote a model class, we formed

$$C^i = \frac{1}{5n}\sum_{j=1}^{n} I_{i,j}, \tag{1}$$

where $I_{i,j}$ denotes item j in model class i, and n denotes the number of items for the model class under consideration. We then formed an index of referee altruism defined in terms of the ratio

$$\frac{C^j_{PGM}}{C^j_{PCM/HGM}}, \tag{2}$$

where $j=\{s,o\}$, for both self-attributed, s, and other-attributed, o, motives. If the ratio in Equation (2) assumes a value larger than unity then altruistic motives (public-goods model) dominate the other motives (private-consumption model and human-capital model). We computed the ratio defined in Equation (2) separately for self-attributed and other-attributed motives.

We further formed an adjusted index of self-attributed motives as the ratio

$$\frac{\sum_{j=s,o} C^j_{PGM}}{\sum_{j=s,o} C^j_{PCM/HCM}} \tag{3}$$

to capture a potential social-desirability / self-interest bias. If, for example, a social-desirability bias is at work then other-attributed private-consumption and human-capital motives should outweigh other-attributed public-goods motives, resulting in a downward adjustment of the ratio given in Equation (3) relative to the ratio of self-attributed motives given in Equation (2). In contrast, if a self-interest bias is present in the data then the ratio given in Equation (3) should exceed the ratio of self-attributed motives given in Equation (2)

Figure 1 shows histograms of the index of self-attributed motives (N=3,821), the index of other-attributed motives (N=3,713), and the adjusted index of self-attributed motives (N=3,442). The histograms show that the extent of altruism substantially varies across referees, where altruistic motives dominate only for a minority of referees. For most football referees, the indexes assume values smaller than unity, indicating a dominance of private-consumption and human-capital motives.

-- Please include Figure 1 about here. --

We ran a principal-components analysis (PCA), estimated on the ten standardized (mean zero, unit variance) motive items, to check whether the data support the allocation of motives items across economic models of volunteering outlined in Table 1. The results of the PCA showed that the two first principal components explained a total of 47% of the self-attributed motives (with results being similar for other-attributed motives). The correlation between the score vector implied by the first principal component and the PGM nominator of the index of self-attributed motives turned out to be 0.90. The correlation with the second score vector was only 0.30. Similarly, the correlation of the PCM/HCM denominator with the first score vector was -0.44, and 0.88 with the second score vector. The results of the PCA, thus, showed that the nominator and the denominator of the index of self-attributed motives represent different dimensions along which the data vary, lending support to our assignment of the motive items to the economic models of volunteering.

The mean value of the index of self-attributed motives is 0.78 (SD=0.48). The mean value of the index of other-attributed motives is 0.92 (SD=0.29). The difference in means between the self-attributed and other-attributed motives is significant (t-test = -16.11, p-value < 0.01, two-sided test), where the adjusted index of self-attributed motives has a mean of 0.82 (SD=0.28). Other-attributed altruistic motives, thus, are

stronger (relative to the other motives) than self-attributed altruistic motives. This result is inconsistent with a social-desirability bias, but rather indicates the presence of a self-interest bias in the data.

The reason for why such a self-interest bias is present in the data can best be understood by noting that football clubs in Germany are asked by the German Football Association to add a club-specific number of referees to an overall pool of referees for the different leagues. Contributing refereeing services to this pool is of crucial importance because otherwise, if there are not enough referees in this pool, league games cannot take place. Hence, it is not surprising that, in case clubs are unable to contribute the requested number of referees to the pool, they must pay a penalty fee to the association. As a result, a referee who feels a strong loyalty to his or her club can refuse refereeing only at high social costs. In case of recurrent rejections of the implicit obligation to act as a referee, such an unwilling would-be referee even runs the risk of being suspended from the community of football. This creates a dilemma for a would-be referee because, given the public-goods nature of the pool of referees created by the association, it is not unusual that a referee has to refuse recurrent requests to extent a voluntary engagement as a referee for reasons of self-assertion and increasing opportunity costs. As a result, even if a referee is an altruist who feels a strong loyalty to his or her football club, it is advisable for a referee not to present himself or herself as an altruistic do-gooder referee to prevent overly frequent requests to referee league games. On the contrary, if a referee presents himself or herself as not too altruistic, the officials of a football club cannot take it for granted the a referee spends ever more time on a voluntary referee activity. In such a situation, the officials of a football club, in an attempt to avoid penalty fees, will intensify their efforts to enlarge the pool of club members who are able and willing to act as a referee.

4.2 Economic Correlates of Referee Altruism

Given the substantial heterogeneity of the indexes of referee altruism across referees, it is interesting to inspect the economic correlates of referee altruism. To this end, we used least-squares regression models. Because a gender effect has been documented in the literature on charitable giving (Emrich and Pierdzioch 2015b, and the references cited therein), we included gender in the list of regressors. Other researchers have reported that altruism may increase in income (Andreoni 2001, Hoffman 2011), so we included income in our regression model. Drawing on human-capital models (Glaeser et al. 2002), and earlier empirical evidence (Emrich and Pierdzioch 2014), we accounted for a possibly nonlinear dependence of referee altruism on age.

-- Please include Table 5 and Figure 2 about here. --

Table 5 summarizes the results (for indexes in natural logs). Results are similar for the index of self-attributed motives and the adjusted index of self-attributed motives, where the gender effect is only significant for the former index. The gender coefficient is positive for both models, implying that the index of referee altruism is on average somewhat larger for females than for males. Higher income classes have significant negative coefficients, indicating that the indexes of referee altruism are smaller than in the baseline case when income increases. Figure 2 shows the indexes of referee altruism by income groups. In contrast to the results given in Table 5, the indexes increase in income, in line with results reported in different contexts in recent research (Hoffman 2011). However, those referees who have a high income also tend to be senior referees and, as the regression results demonstrate, after controlling for age the sign of the correlation between income and the indexes of referee altruism turns negative.

-- Please include Figure 3 about here. --

Age has a significant effect on both indexes of referee altruism. Figure 3 illustrates the nonlinear positive association between the indexes of referee altruism and age, where the number of observations becomes small for referees who are older than about 65 years. The positive association between the indexes of referee altruism and referee age is in line with predictions made by human-capital models of volunteering (for an analysis of altruistic motives of elderly persons in a sport-specific context, see Emrich and Pierdzioch 2014). Similarly, models of human-capital formation predict that individuals invest in their stock of human (job-market skills) and social (building social networks) capital mainly in their younger years because for young individuals the returns on such investments are higher than for the elderly.

-- Please include Figure 4 about here. --

The degree of professionalism should increase in higher leagues and, as a result, one would expect that the indexes of referee altruism get smaller in higher leagues. In fact, Figure 4 shows that the indexes of referee altruism tend to exhibit a negative correlation with the league level. While the indexes decrease as expected on average in higher leagues, this effect is small in quantitative terms. Moreover, the interpretation of this result should not be pushed too far because the number of observations for the high-league levels is small. Moreover, when interpreting the results depicted in Figure 4, it should be kept in mind that the league level is likely to be endogenous with respect to the indexes of referee altruism because a stronger human-capital motive (for example, a referee is strongly heading for a career as a referee) is likely to result eventually in a higher league level.

4.3 Testing the Public-Goods Model

According to the public-goods model, there should be a close substitutability between one's own and others' referee services. Hence, those football referees who answered to the public-goods question ("What would you do in case your football club could manage to supply the number of referees required by the football association without your help?") in the affirmative should score higher with regard to the indexes of referee altruism than referees who negated this question.

-- Please include Table 6 about here. --

Table 6 shows that those football referees who answered in the affirmative have on average higher scores with regard to all three indexes (self-attributed motives, other-attributed motives, adjusted index of self-attributed motives) of referee altruism. A t-test of the null hypothesis that the mean index score for those football referees who would not continue in case other individuals would become a football referee is not larger than the index score for those referees who would continue refereeing in such a case is highly significant for all three indexes of referee altruism (self-attributed motives: $t=8.08$; other-attributed motives: $t=8.61$; adjusted index of self-attributed motives: $t=8.60$; t-tests are significant at the one percent level of significance).

-- Please include Table 7 about here. --

Estimation results (Table 7) for a multivariate logit model confirmed that a higher score with regard to the (adjusted) index of self-attributed motives increases the chance that a referee answers in the affirmative to the public-goods question, after controlling for the influence of a set of reasonable sociodemographic and sports-specific control variables. The coefficient of the index is positive for both the self-attributed motives and the

adjusted index of self-attributed motives, thus, indicating that the chance of getting an affirmative answer to the public-goods question increasing in the index score. In contrast, when a referee's career evolves according to expectations than a he or she is less likely to quit in case other individuals start a career as a referee. The predictive power of the league level is rather weak. In contrast, the chance of an affirmative answer increases in case a referee interrupted his or her career already in the past. An active player also is more likely to answer in the affirmative to the public-goods question than a referee who has never played football. The number of matches refereed per year leads to a lower chance of an affirmative question. While the effect of offences and violence are not significant, the frequency of threats increases the chance of quitting in case other individuals should decide to become a football referee.

As a further check, we performed a 2-means clustering analysis. We then computed the mean values of the indexes of referee altruism for the two classes (Table 8). The mean value of the index of self-attributed motives is substantially higher in the class to which the vast majority of those referees belong who gave an affirmative answer to the public-goods question (though, of course, this class also contains many referees who negated this question). The difference in index means is smaller for the index of other-attributed motives than for the index of self-attributed motives.

- Please include Table 8 about here. --

Given the positive association between age and the indexes of referee altruism (Section 3.2) it comes as no surprise that those referees who answer to the public-goods question in the affirmative are on average older than those referees who negate this question ($t = -4.89$, p-value < 0.01)

4. Summary and Concluding Remarks

This research has contributed to the growing literature on refereeing in sports. The specific aspect that this research has focused on concerns the motives of individuals to become a football referee. We have organized our research by drawing on the literature on the economics of volunteering. In this literature, three broad classes of models have been studied: the public-goods model, the private-consumption model, and the human-capital model. In order to analyze whether the motives of football referees are more in line with the public-goods model or its competitors, we have constructed indexes of referee altruism. Upon comparing the indexes of referee altruism computed from data on self-attributed and other attributed motives, we have found evidence of a self-interest bias rather than a social-desirability bias. Moreover, the indexes of referee altruism have shown that the private-consumption and the human-capital motive reported by the majority of football referees are on average stronger than the reported public-goods motives. We also have found, however, that the indexes of referee altruism show a relatively large dispersion across referees. We then have used a regression model to shed light on the sources of the cross-sectional dispersion of the indexes. Our results have shown that the extent of altruism depends in a positive nonlinear way on a referee's age, consistent with human-capital models of volunteering. League level exhibits a negative correlation with referee altruism. Finally, based on a specific public-goods question that captures the substitutability of volunteer activities predicted by the public-goods model, we have found evidence supporting the public-goods model.

In future research, it is interesting to study whether the motives of referees in other sports are similar to the motives of German football. It is also interesting to carry out a comparative study of the social-desirability / self-interest bias by confronting the motives we have reported for football referees with motives of volunteers in other

volunteer organizations. Finally, it is interesting to go beyond our analysis in future research by comparing our data on members of football clubs who act as a football referee with data on members of football clubs who, for whatever reasons, do not referee league games. Such a comparison would highlight in which respect football referees differ from other club members.

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Table 1: Motive dimensions

Panel A: Items and Models

I became a football referee because...	**Model**
I wanted to do something for football after my active career as a football player	PGM
representatives of my football club asked me	PGM
friends of mine asked me	PGM
because if I had not become a referee my football club would have had to pay a penalty	PGM
nobody else wanted to do the job	PGM
I wanted to help my local football club	PGM
because I was heading for a career as a football referee	PCM/HCM
because prospects for a careers as a referee were much better than the prospects for a career as a football player	PCM/HCM
I was interested in refereeing	PCM/HCM
I wanted to earn some money for refereeing football matches	PCM/HCM

Note: PGM: Public-goods model. PCM/HCM: Private-consumption/human-capital model.

to be continued

Panel B: Summary Statistics of Items

Motive dimension	Self-attributed motives N	Mean	SD	Other-attributed motives N	Mean	SD
interested in refereeing	4,358	4.5	0.80	4,181	3.97	0.83
help local football club	4,243	3.21	1.44	4,151	3.6	0.98
heading for a career as a football referee	4,118	3.08	1.41	4,145	3.54	1.00
do something for football after active career	4,293	2.96	1.68	4,172	3.55	1.00
better prospects for a careers	4,111	2.88	1.52	4,116	3.53	1.02
earn some money	4,123	2.76	1.34	4,151	3.63	1.02
representatives of football club asked	4,198	2.33	1.54	4,216	3.62	1.01
friends asked	4,063	1.99	1.39	3,943	2.74	1.13
football club would have had to pay a penalty	4,106	1.82	1.34	4,116	3.29	1.24
nobody else wanted to do the job	4,072	1.76	1.25	4,029	2.88	1.26

Table 2: Indexes of referee altruism and voluntarism

Statistic	Index of self-attributed motives	Adjusted index of self-attributed motives
Mean value of those who seem themselves not as a volunteer	0.69	0.75
Mean value of those who seem themselves as a volunteer	0.80	0.84
t-test (two sided)	-6.35	-8.91
p-value	<0.01	<0.01
Confidence interval	-0.15; -0.08	-0.12; -0.08

Note: < 0.01 denotes that a p-value is smaller than 0.01

Table 3: League level at the time the study was conducted

League level	Observations
1. District level League (Kreisniveau)	2,384
2. County Level League (Bezirksniveau)	1,167
3. Referee Pool Conference National League (Landesniveau)	771
4. Referee Pool Football League 2 (überregionale Liste)	144
5. Referee Pool Football League 1 (DFB-Liste)	116
6. FIFA-Referee Pool (FIFA-Liste)	11

Table 4: Referees' experiences with offences, threats, and violence

Panel A: Offences and threats

Category	Offences	Threats
Not at all	243	2,009
Hardly ever	1,166	1,467
Sometimes	1,957	968
Often	1,044	182
Very often	253	39

Panel B: Violence

Category	Violence
Never	3,751
On one occassion	774
On several occassions	140

Table 5: Socioeconomic correlates of referee altruism

Panel A: The Dependent variable is the index of self-attributed motives.

Regressor	**Coefficient**	**SE**	**p-value**
Intercept	-1.25	0.06	<0.01
Gender	0.09	0.04	0.03
Age	0.03	<0.01	<0.01
Age squared	>-0.01	<0.01	<0.01
Income			
<1000€	Baseline		
[1000€; 2,250€)	-0.03	0.02	0.23
[2,250€; 3,500€)	-0.05	0.03	0.06
[3,500€; 4,500€)	-0.087	0.03	0.01
[4,500€; 5,500€)	-0.07	0.04	0.08
>=5,500€	-0.12	0.04	<0.01
R^2	0.22	Degrees of freedom	3,259
F-test (8; 3,259)	118.4		<0.01

Panel B: The dependent variable is the adjusted index of self-attributed motives.

Regressor	**Estimate**	**SE**	**p-value**
Intercept	-0.85	0.04	<0.01
Gender	0.02	0.03	0.41
Age	0.03	<0.01	<0.01
Age squared	>-0.01	<0.01	<0.01
Income			
<1000€	Baseline		
[1000€; 2,250€)	-0.01	0.02	0.39
[2,250€; 3,500€)	-0.03	0.02	0.07

[3,500€; 4,500€)	-0.04	0.02	0.03
[4,500€; 5,500€)	-0.05	0.03	0.05
>=5,500€	-0.08	0.02	<0.01
R^2	0.24	Degrees of freedom	2,960
F-test (8; 2,960)	120.3		<0.01

Note: < 0.01 (>-0.01) denotes that an estimated coefficient is smaller (in absolute value) than 0.01

Table 6: Indexes of referee altruism and the public-goods question

Statistic	Would continue refereeing	Would not continue refereeing
N	3,673	116
	Index of self-attributed motives	
Mean	0.76	1.29
SD	0.45	0.70
	Index of other-attributed motives	
Mean	0.92	1.09
SD	0.29	0.34
	Adjusted index of self-attributed motives	
Mean	0.81	1.10
SD	0.28	0.33

Table 7: Estimation results for the logit model

TheDependent variable is the answer to the public-goods question.						
Regressor	**Coefficient**	**SE**	**p-value**	**Coefficient**	**SE**	**p-value**
Intercept	-3.71	0.90	0.00	-4.55	0.97	0.00
Index	1.22	0.16	0.00	2.14	0.33	0.00
Expectations						
not all all satisfied	baseline			baseline		
not really satisfied	0.49	0.66	0.46	0.33	0.69	0.63
in part satisfied	-0.69	0.60	0.25	-0.60	0.63	0.34
mostly satisfied	-1.43	0.59	0.02	-1.42	0.62	0.02
fully satisfied	-1.84	0.64	0.00	-1.71	0.67	0.01
Gender	0.38	0.56	0.49	0.48	0.57	0.40
League level						
1	baseline			baseline		
2	-0.66	0.34	0.05	-0.64	0.36	0.07
3	-0.54	0.47	0.25	-0.50	0.47	0.29
4	-0.58	1.07	0.59	-0.56	1.08	0.60
5	-14.04	672.80	0.98	-13.96	691.70	0.98
6	-14.13	1978.00	0.99	-13.93	2099.00	0.99
Interrupted	0.61	0.24	0.01	0.51	0.25	0.04
Active player	0.71	0.22	0.00	0.71	0.23	0.00
Matches per year	-0.03	0.01	0.00	-0.02	0.01	0.01
Training effort	0.02	0.03	0.63	0.01	0.03	0.74
Offended						
Never	baseline			baseline		
Hardly	-0.18	0.59	0.76	-0.20	0.60	0.74
Sometimes	-0.27	0.59	0.65	-0.29	0.59	0.62
Often	-0.20	0.62	0.75	-0.16	0.63	0.80
Very often	-1.31	1.02	0.20	-1.34	1.04	0.20
Threatened						
Never	baseline			baseline		
Hardly	0.58	0.30	0.05	0.41	0.32	0.19
Sometimes	0.67	0.36	0.06	0.61	0.37	0.10

Often	1.53	0.69	0.03	1.56	0.71	0.03
Very often	2.90	1.13	0.01	2.45	1.19	0.04
Victim of violence						
Never	baseline			baseline		
One time	-0.62	0.42	0.14	-0.73	0.44	0.10
Several times	0.07	0.64	0.91	-0.22	0.75	0.76
Degrees of freedom	3,151			2,850		
McFadden R^2	0.54			0.58		

Note: For league level, see Table 3.

Table 8: Results of the cluster analysis (N= 2,523)

Mean value of index	Class 1 = Negates	Class 2 = Affirmative answer
Index of self-attributed motives	0.67	0.79
Index of other-attributed motives	0.90	0.92
Adjusted index of self-attributed motives	0.77	0.84

Figure 1: Histograms of motive indexes

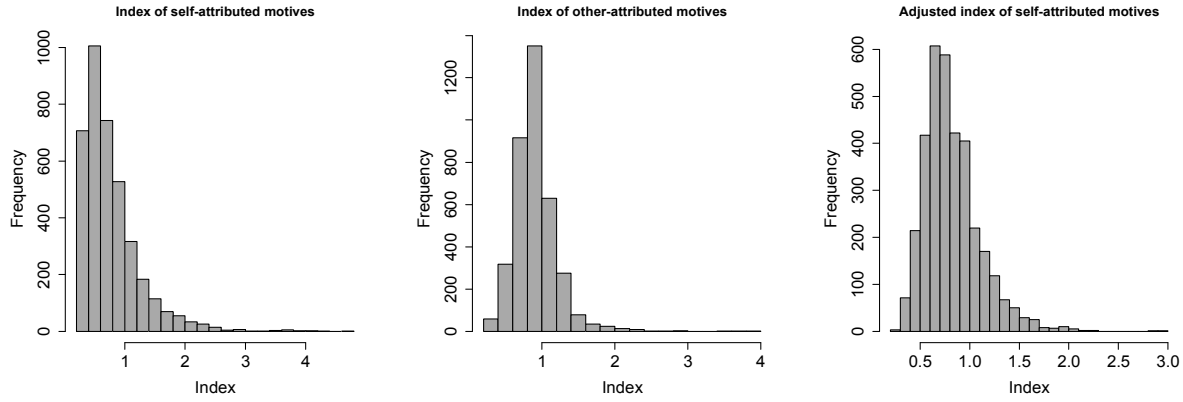


Figure2: Indexes of referee altruism by income groups

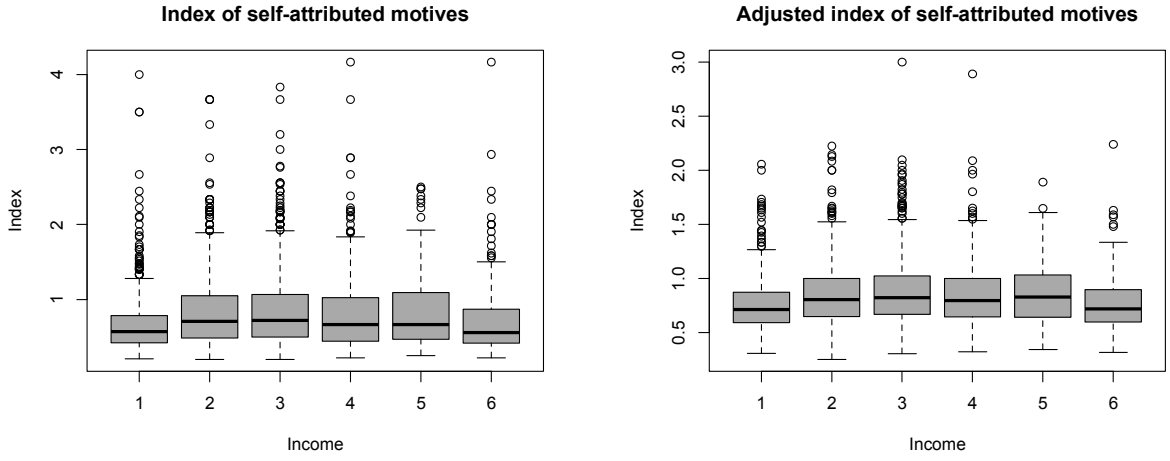
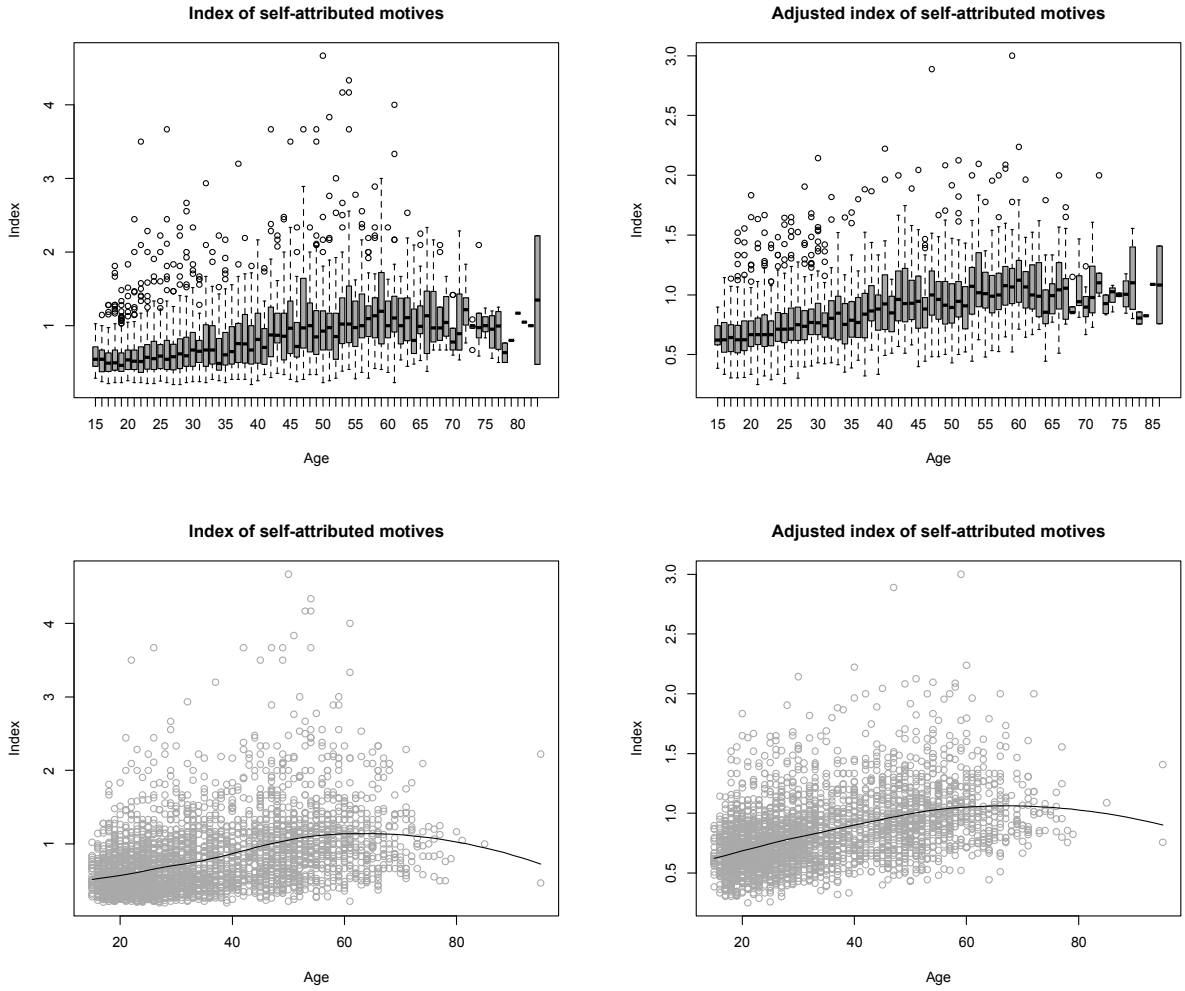


Figure 3: Indexes of referee altruism by age



Note: Smooth lines in the lower panels are local quadratic polynomial regressions.

Figure 4: Indexes of referee altruism by league level