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# On the Endogeneity of the Pay-Performance Relationship in Professional Soccer

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**Abstract:** In this reply we show that the Nüesch (2009) comment paper to our initial contribution (Torgler and Schmidt 2007) has several shortcomings. He suggests that professional soccer wages seem to buy talent rather than motivation. We therefore provide a larger set of talent proxies and estimations to check whether this assertion is correct. Our results indicate that his conclusion is problematic. We still observe a strong motivational effect, and in some cases the effect is even larger than the talent effect. A further key problem in Nüesch's contribution is the fact that he neglects to consider the relevance of the relative salary situation.

**Keywords:** Endogeneity, Professional Soccer, Motivational Effect and Talent Effect

## 1. Introduction

Stephan Nüesch (2009) has recently written a comment paper to our contribution Torgler and Schmidt (2007) published in *Applied Economics.* His main criticism is that in professional soccer wages seem to buy talent rather than motivation. He acknowledges that we controlled for time-constant talent but not time-varying talent. He uses appearances as a time-varying talent proxy and reports the results obtained using the same soccer league (*Bundesliga*) but adding more seasons (period between 1995/96 and 2006/07). He suggests that the wage effect disappears after controlling for appearances. In this reply we criticize several aspects of his contribution.

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## 2. Appearances as a Proxy for Talent

Appearance is not a clear proxy for talent as this variable not only covers talent but "opportunity". If a trainer gives a player the chance to appear more frequently (for whatever reason), the player also has a higher opportunity to perform better, regardless of talent. Nüesch (2009) somehow assumes that trainers have a limited utility function. Taking into account that in many cases players have a very similar talent profile (marginal differences can already lead to a superstardom) it is not fully clear why Nüesch's assumption should hold. Other factors beside talent may explain the level of appearances. In addition, trainers often behave strategically by, for example, making sure that key players are in shape for other even more important tournaments (e.g., Champions League), which may lead to less appearances in the national league.

Now, let us assume that we do in fact need to take appearances into account. A natural way would then be to correct the dependent variable by the level of appearances (goals per game, assists per game). We will present results that show the motivational effect does not disappear when using such an approach. Moreover, one can even go a step further by using minutes played instead of games played as an independent variable. This would more adequately show what trainers think of a player. Controlling for minutes played we also observe that the motivational effect does not disappear.

In addition, to better isolate talent, one could think of using lagged values of the variable appearances (e.g., number of games played in the previous season). This allows us to better isolate the "opportunity" effect. We therefore present evidence using such an approach yet we cannot conclude based on our results that wages seem to buy talent rather than motivation. Motivation remains a key issue in understanding performance.

## 3. What about the Relative Salary?

Nüesch (2009) also fails to discuss the importance of the *relative salary situation*. We originally argued and provided empirical support that individual salary position relative to that of other team-mates has an impact on performance (Torgler and Schmidt (2007)). The study used the difference between team-mates' average salaries and players' individual salaries as a proxy. Surprisingly, Nüesch (2009) does not discuss the relative salary position at all, although we show that this effect is even larger than the absolute salary one. This is a surprise insofar as he criticizes the absence of a motivational effect. However, without controlling for the relative income position it is questionable whether one may assert that there is no motivational effect at all.

## 4. Empirical Evidence

We present empirical evidence in *Table 1* and *2* indicating that Nüesch's conclusions are problematic. In line with our previous paper Torgler and Schmidt (2007) we present OLS

and FE estimations using the same control variables (see also Nüesch 2008). In Eq. (1) and (2) we present evidence using goals per game and assists per game as dependent variables. The results indicate that the absolute salary has an impact on performance. In Eq. (3) and (4) we extend the specification with the relative salary variables and here also observe that salary matters. Both absolute and relative salary position affect the goals and assists per game in almost all the cases. In a further step, we focus on overall goals and assists instead of goals and assists per game using minutes played as an independent variable. The results are presented in Eq. (5) and (6). In both cases we find that the relative salary position influences the performance. In Eq. (7) and (8) we switch to fixed effects estimations controlling not only for time and team effects (as used previously), but also for individual effects. In Eq. (9) and (10) we add the relative salary position. As can be seen the relative salary position is statistically significant in both equations and the absolute salary is also statistically significant in Eq. (7). Thus, using FE leads to a similar picture. We cannot conclude that motivational effects are not visible. In Eq. (11) and (12) we control for the minutes played. Eq. (12) also supports the results obtained previously, indicating that the relative salary is relevant.

**Table 1: Motivational Effect Versus Talent Effect**

| **Model:** | **OLS** | **OLS** | **OLS** | **OLS** | **OLS** | **OLS** |
|---|---|---|---|---|---|---|
| **Dependent Variable:** | **Goals per game** | **Assists per game** | **Goals per game** | **Assists per game** | **Goals** | **Assists** |
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** |
| **Salary/Motivation** | | | | | | |
| ABSOLUTE VALUE$_{(t-1)}$ | 0.550*** | 0.455*** | 0.227*** | 0.347*** | -0.017 | 0.010 |
| SQ ABSOLUTE VALUE$_{(t-1)}$ | -0.202*** | -0.155*** | -0.206*** | -0.156*** | 0.001 | 0.023 |
| RELATIVE SALARY | | | -0.278*** | -0.092 | -0.161*** | -0.112* |
| **Talent** | | | | | | |
| Minutes Played | | | | | 0.446*** | 0.505*** |
| **Further factors** | | | | | | |
| Socio-demographic | Yes | Yes | Yes | Yes | Yes | Yes |
| Changed team | 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 |
| Players | No | No | No | No | No | No |
| Prob > *F* | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| *R*-squared | 0.341 | 0.203 | 0.345 | 0.203 | 0.500 | 0.452 |

Notes: Number of observations is 2833. *, ** and *** denote statistical significance at the 10%, 5% and 1% level respectively. OLS estimations: beta coefficients.

**Table 1 continued**

| **Model:** | **FE** | **FE** | **FE** | **FE** | **FE** | **FE** |
|---|---|---|---|---|---|---|
| **Dependent Variable:** | **Goals per game** | **Assists per game** | **Goals per game** | **Assists per game** | **Goals** | **Assists** |
| | **(7)** | **(8)** | **(9)** | **(10)** | **(11)** | **(12)** |
| **Salary/Motivation** | | | | | | |
| ABSOLUTE VALUE$_{(t-1)}$ | 0.006** | 0.001 | -0.002 | -0.005 | -0.120 | -0.250*** |
| SQ ABSOLUTE VALUE$_{(t-1)}$ | -0.0004** | 0.0000 | -0.0004** | -0.0001 | -0.003 | 0.002 |
| RELATIVE SALARY | | | -0.009** | -0.007* | -0.103 | -0.183** |
| **Talent** | | | | | | |
| Minutes Played | | | | | 0.002*** | 0.002*** |
| **Further factors** | | | | | | |
| Socio-demographic | Yes | Yes | Yes | Yes | Yes | Yes |
| Changed team | 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 |
| Players | Yes | Yes | Yes | Yes | Yes | Yes |
| Prob > *F* | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| *R*-squared | 0.076 | 0.049 | 0.078 | 0.050 | 0.316 | 0.319 |

In *Table 2* we present further robustness tests. Instead of using minutes played to estimate Eq. (13) to (16), we use in line with Nüesch (2009) games played (number of appearances). The results also support our previous findings and tend to indicate that the relative salary is relevant. Eq. (13) even indicates that the relative salary effect is stronger than the talent (appearances) effect. In the final four estimations (Eq. (17) to (20)) we isolate the opportunity factor by focusing on lagged appearances (games played in the previous season). The previous results are also confirmed here. Motivation cannot be neglected. Eq. (17) and (18) also report a stronger relative impact of the relative salary position in relation to our talent proxy.

**Table 2: Further Robustness Tests**

| **Model:** | **OLS** | **OLS** | **FE** | **FE** | **OLS** | **OLS** | **FE** | **FE** |
|---|---|---|---|---|---|---|---|---|
| **Dependent Variable:** | **Goals** | **Assists** | **Goals** | **Assists** | **Goals** | **Assists** | **Goals** | **Assists** |
| | **(13)** | **(14)** | **(15)** | **(16)** | **(17)** | **(18)** | **(19)** | **(20)** |
| **Salary/Motivation** | | | | | | | | |
| ABSOLUTE VALUE$_{(t-1)}$ | 0.007 | 0.023 | -0.131 | -0.261*** | 0.222 | 0.268* | 0.036 | 0.079 |
| SQ ABSOLUTE VALUE$_{(t-1)}$ | -0.002 | 0.009 | -0.004 | 0.001 | -0.246*** | -0.229*** | -0.008 | -0.012** |
| RELATIVE SALARY | -0.323*** | -0.153** | -0.159 | -0.229*** | -0.310*** | -0.298*** | -0.090 | -0.276* |
| **Talent** | | | | | | | | |
| Games Played | 0.139*** | 0.474*** | 0.136*** | 0.132*** | | | | |
| Games Played Previous Season | | | | | 0.060** | 0.075*** | -0.001 | -0.020 |
| **Further factors** | | | | | | | | |
| Socio-demographic | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Changed team | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Position | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Team | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Season | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Players | No | No | Yes | Yes | No | No | Yes | Yes |
| Prob > *F* | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| *R*-squared | 0.477 | 0.440 | 0.272 | 0.288 | 0.394 | 0.292 | 0.118 | 0.138 |

Notes: *,** and *** denote statistical significance at the 10%, 5% and 1% level respectively. OLS estimations: beta coefficients.

## 5. Conclusions

In sum, we have shown that the comments by Nüesch (2009) are problematic. One cannot argue that wages seem to buy talent rather than motivation. Compared to the analysis conducted by Nüesch (2009) we present a larger set of specifications and proxies for appearances. Our findings are not in line with his results. Nüesch (2009) also fails to take into account that there is not only an absolute effect but also a relative one that cannot be neglected. It is also interesting to note that the motivational effect is also visible in other sports disciplines. Schaffner and Torgler (2008) explore the NBA focusing on 1733 players for the seasons 1979/80 till 2006/07 using three overall productivity measures and taking appearances into account. The results show that the absolute salary matters. The study also observes behavioral consequences of a relative salary position that is driven by job profile closeness and personal and daily interactions. Thus, this study also shows that the salary situation helps to understand the performance by acknowledging the importance of a motivational effect.

## References

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