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ABSTRACT

Contracts as Rent Seeking Devices: Evidence from German Soccer*

Recent theoretical research has identified many ways how contracts can be used as rent seeking devices vis-à-vis third parties, but there is no empirical evidence on this issue so far. To test some basic qualitative properties of this literature, we develop a theoretical and empirical framework in the context of European professional soccer where (incumbent) clubs and players sign binding contracts which are, however, frequently renegotiated when other clubs (entrants) want to hire the player. Because they weaken entrants in renegotiations, long term contracts are useful rent seeking devices for the contracting parties. From a social point of view, however, they lead to allocative distortions in the form of deterring efficient transfers. Since incumbent clubs tend to benefit more from long term contracts in renegotiations than players, these must be compensated ex ante by a higher wage when agreeing to a long term contract. Using data from the German "Bundesliga", our model predictions are broadly confirmed. In particular, our analysis supports the concerns expressed in the theoretical literature about detrimental effects of strategic contracting on allocative inefficiency.

JEL Classification: L14, J63, L40, L83

Keywords: strategic contracting, rent seeking, empirical contract theory, long-term contracts, breach of contract, sports economics

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1 Introduction

Recent theoretical research has identified a variety of possibilities how contracts can be used as rent seeking devices vis-à-vis third parties. Examples include breach penalties, exclusivity clauses, retroactive rebates or, in the context of labor markets, long-term contracts and non-compete clauses. As a result of such rent seeking incentives, various forms of inefficiencies may arise, for example with respect to entry decisions (Aghion and Bolton, 1987; Chung, 1992), investment incentives (Spier and Whinston, 1995; Segal and Whinston, 2000; Feess and Muehlheusser, 2003), or the allocation of workers (Posner, Triantis, and Triantis, 2004).

As detailed below, the frameworks considered in these papers differ along a variety of important dimensions, but they all share two common properties. First, while potentially detrimental from a social point of view, the rent seeking devices are *jointly beneficial* for the contracting parties. Second, not only outsiders, but also some of the contracting parties themselves may be harmed in the course of the contractual relationship and must hence be compensated when signing the contract. For example, when a buyer is likely to breach in the future, she might accept a stiff penalty clause only when being compensated ex ante by paying a low price.[1]

To the best of our knowledge, all existing research in this area is purely theoretical, and there is no empirical evidence so far. We provide a theoretical and empirical framework to test some of the main properties of strategic contracting models. Thereby, we consider the context of European professional soccer where clubs and players sign binding contracts which are, however, frequently renegotiated when other clubs want to hire the player. We suggest that *long-term contracts* may serve as rent seeking devices, as the incentive structure exhibits all the general properties described above. First, we show that long-term contracts tend to induce an inefficiently low number of player transfers. Second, in renegotiations, the *incumbent* club receives a transfer fee from the new club (the *entrant*) which is increasing in the remaining duration of the player's contract due to its veto power when holding a valid contract with the player. Hence, in case of a transfer, the

[1] The issue of ex ante compensation is usually not explicitly analyzed in the literature when the focus is on investment incentives which are not affected by the ex ante division of surplus (see e.g. Hart and Moore, 1988; Spier and Whinston, 1995). The same is true for other contexts such as asset ownership where incomplete contracting frameworks are used (see e.g. Hart and Moore, 1990; Roider, 2004).

longer the player's remaining contract duration, the lower the entrant's payoff, and the higher thus the *joint* payoff of the contracting parties (i.e. player and incumbent club). Third, the player alone, however, might be worse off in renegotiations under a long-term contract which calls for compensation ex ante in form of a higher wage in the incumbent club.

Specifically, we develop a model where a player and the incumbent club bargain over the duration of their contract and the player's wage. After the contract is signed, a new club may want to hire the player. Thereby, this club first decides on acquiring information about the player's value, and it will then trigger a renegotiation process with the contracting parties whenever the player is more valuable in the new club. Hence, *given* that renegotiation occurs, the contract terms will only affect the distribution of the surplus, but not the transfer decision itself which is ex post efficient.[2]

Therefore, the social cost of long-term contracts is an inefficiently low *frequency* of renegotiations, because the new club reaps only part of the renegotiation surplus, while fully covering the (privately known) cost of information acquisition. Thereby, the new club's investment incentive is the lower, the lower its renegotiation payoff. As this payoff is decreasing in the remaining duration of the player's contract with the incumbent club, long-term contracts reduce the frequency of renegotiation. As a result, the contracting parties are facing the following trade-off: the longer the duration of the contract, the higher their joint renegotiation payoff when a transfer occurs, but the lower the transfer probability as the renegotiation stage is reached less often.

Our theoretical framework leads to the following predictions: *First*, as just pointed out, a player's transfer probability is decreasing in the remaining duration of his current contract which reduces allocative efficiency. *Second*, transfer fees (i.e. the incumbent clubs' renegotiation payoff) are increasing in the remaining duration of the player's contract and decreasing in the player's wage in the incumbent club. Both results are intuitive and are driven by the impact of the initial contract terms on the veto power of the incumbent club.[3]

[2] This is a standard feature of incomplete contracting models with renegotiation, see e.g. Hart and Moore (1990), Spier and Whinston (1995), or Segal and Whinston (2000).

[3] Note that allocative distortions only arise when renegotiation does not occur (resulting in no transfer) although the player would be more valuable in the new club. Because the renegotiation process itself is efficient, a transfer is never agreed upon when the player is more valuable in the incumbent club.

Third, a player's wage in his new club (i.e. his renegotiation payoff) is increasing in his wage in the incumbent club, but ambiguous in the remaining duration of his initial contract. The first property is again intuitive, and the second result is due to the fact that a player may benefit from a long remaining contract duration when his wage in the incumbent club is sufficiently high.

Regardless of whether the player or not benefits in renegotiations, our *fourth* result is that the *joint* renegotiation payoff of the incumbent club and the player (i.e. transfer fee plus wage in the new club), is increasing in the remaining duration of the player's initial contract. This confirms the role of contract durations as rent seeking devices.

Fifth, when a player is ex post harmed by long term contracts or benefits less in the renegotiation process than the incumbent club, then he is *compensated* ex ante by the incumbent club by receiving a higher wage.

To test our results, we have compiled a data set from Germany's top professional soccer league ("Bundesliga"). All in all, we have information about 543 contracts including duration and (base) wages, player specific data such as performance, position and experience, and team specific data such as final league position and budgets. To test the impact of remaining contract durations on transfer probabilities, we estimate a multinomial logit model where, at the end of each season, players may either change clubs, re-new their contracts with their current clubs or have no contract change at all. We find that on average, one additional remaining contract year reduces the probability of a transfer by about 30 percent which clearly supports the view of contract durations affecting player mobility.

Our predictions about renegotiation payoffs are also broadly supported by data: First, one additional year of remaining contract duration increases the average *transfer fee* by about 120 percent. Second, a player's wage in his new club is increasing in the wage in his previous club. Third, we do not find a significant impact of the remaining duration of the player's previous which is consistent with the ambiguity derived in the theoretical framework. Fourth, one more year of remaining contract duration increases the *joint renegotiation payoff* of a player and his old club by more than 50 percent which suggests that long term contracts are indeed useful rent seeking devices. Finally, we find that incumbent clubs indeed benefit more from long term contract than players which, according to our theory, calls for player compensation in form of a higher wage in the incumbent club. In fact, controlling for ability, one more year of contract duration on average increases a player's annual wage by 24 percent.

The role of contracts as rent seeking devices has been stressed in the economic literature since Diamond and Maskin (1979) who analyze a search model where parties contract with each other but continue to search for better matches. They show that there is an incentive to stipulate high damages in the initial contract as this will increase the payoff in the new partnership. As they note, "the rationale for these contracts is solely to 'milk' future partners for damage payments".

Aghion and Bolton (1987) stress the close relationship between breach penalties, contract durations and an entrant's "waiting" costs, as the penalty determines the *effective* duration of a contract. They show how excessive breach penalties tend to deter efficient market entry.[4] However, as pointed out by Spier and Whinston (1995), these inefficient entry decisions are driven by the absence of renegotiation, and they show that ex post efficiency can be restored once renegotiation is possible. Similarly, Posner, Triantis, and Triantis (2004) analyze the role of non-compete clauses in labor contracts which disallows workers to work for certain alternative employers. Again, the inefficiencies caused depend on whether or not renegotiation is permitted.[5]

Our framework is in-between these two polar cases: we do allow for renegotiation, and it is also efficient when it occurs. However, the *likelihood* of renegotiation is endogenous and depends on the terms of the contract. Another difference to Spier and Whinston (1995) is that they consider renegotiation between the initial contracting parties only, while also the entrant participates in our framework.

Furthermore, Spier and Whinston (1995) show that inefficiencies of strategic contracting may arise even when ex post efficiency is ensured by renegotiations because the contract terms lead to inefficient levels of relation-specific investment.

Segal and Whinston (2000) analyze how the efficiency properties of exclusive dealing clauses depend on the type of investments. Also focussing on investment incentives,

[4] In similar vein, Chung (1992) shows that contracting parties have an incentive to choose socially excessive damage clauses which also leads to ex post inefficiencies.

[5] A related issue is the controversy whether parties to a contract are able to commit not to renegotiate (see e.g. Hart and Moore, 1999; Maskin and Tirole, 1999). Carbonell-Nicolau and Comin (2005) design and implement an empirical test which, using data from the Spanish soccer league, leads them to reject the commitment hypothesis.

Feess and Muehlheusser (2003) compare the impact of different legal regimes in European professional soccer on clubs' incentives to invest in the training of young players. While long-term contracts are also jointly beneficial for the contracting parties in renegotiation, allocative inefficiencies are not taken into account.

2 The model

Consider a player whose total career horizon lasts from date 0 until date 1. The game starts at date -3 when this player bargains with his club i (the *incumbent*) over a contract stipulating a duration T and a wage W per unit of time. The player's productivity in club i is $Y > 0$ per unit of time.[6]

At date -2, after the contract has been signed but before the player starts playing for club i at date 0, a new club e (the *entrant*) may be interested in hiring him. The player's productivity in club e is $Y + \gamma$ per unit of time where γ is a random variable distributed on $[-\infty, \infty]$ with density $f(\gamma)$. However, to find out the true value of γ, club e must make an investment decision $I \in \{0, 1\}$.[7] The investment cost z is club e's private information, and from the viewpoint of club i and the player at the contracting stage, it is distributed on $[0, \infty]$ with density $h(z)$. As in Aghion and Bolton (1987), assuming private information with respect to a cost parameter of the entrant is a convenient way of modeling the basic idea that rent-seeking motives might lead to unwarranted and inefficient entry deterrence.[8]

After the investment decision, club e decides whether or not to start a renegotiation process with the contracting parties which takes place at date -1. We assume that the expected value of γ is negative which ensures that club e will never do so without having invested.[9] As our focus is on inefficiencies created through strategic contracting even

[6] As is standard in the literature, this productivity is meant to capture the marginal revenue that can be attributed to a player such as, for example, increases in TV money, merchandizing sales or premia from international competitions.

[7] For instance, it may need to collect information about the player himself, it must figure out how well he fits in its tactical system, or it must decide about alternative candidates.

[8] This assumption is not crucial for our analysis; all we need is that, at the date of contracting, the contracting parties are facing some uncertainty concerning future entrants' willingness to hire the player.

[9] A similar assumption is made in Aghion and Tirole (1997) in the context of taking uninformed investment decisions with respect to projects of unknown profitability.

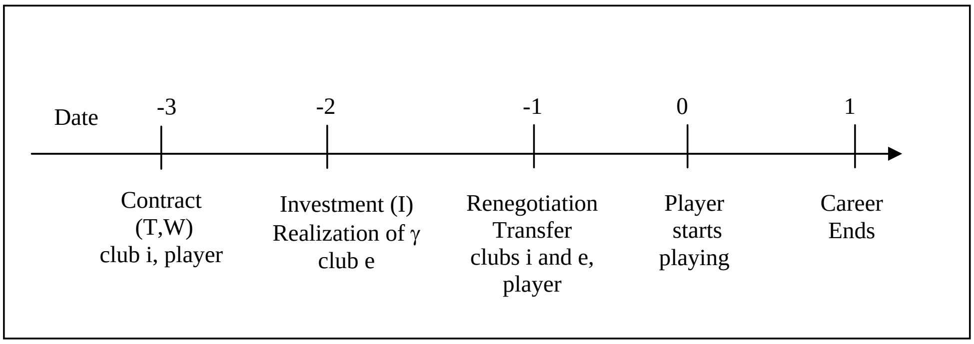

Figure 1: Sequence of Events

when renegotiations are ex post efficient, we furthermore assume that γ becomes common knowledge in the renegotiation process.

In line with the literature, we assume throughout that at each stage, multi-party decisions are taken cooperatively by all parties involved *at that stage*, while (single-party) investment decisions are individually optimal:[10] That is, the contract signed at date -3 maximizes the expected *joint surplus* of the player and club i, while at date -2, club e will invest whenever the cost (z) is lower than its *own* expected renegotiation payoff. Finally at date -1, given that club e has invested and triggered the renegotiation process, the player is transferred whenever it is efficient to do so (i.e. when $\gamma \geq 0$), regardless of his contractual situation. The sequence of events is summarized in Figure 1.

Two additional remarks are in order with respect to our assumption that γ is learned before date 0, so that the player will play for one club only throughout his total career horizon.

First, while not uncommon in US sports, this is not a typical pattern in European soccer where most players play for several clubs. However, we wanted to follow as closely as possible the literature on strategic contracting where trade occurs only after the arrival of new potential trading partners. Moreover, our results can also be derived in an extended framework where productivity shocks can occur at any time and where the player might thus play for multiple clubs.

Second, when the player is transferred, the *remaining* duration of his contract with

[10] As for our context, see e.g. Aghion and Bolton (1987), Spier and Whinston (1995) and Segal and Whinston (2000). Moreover, also in the broader context of incomplete contracting models, canonicals frameworks such as Grossman and Hart (1986) and Hart and Moore (1990) exhibit this feature.

club i coincides with the *total* contract duration T agreed upon. While convenient from a modeling point of view, in the empirical part we need to distinguish carefully between these two variables.

2.1 Benchmark

As for the efficient investment decision, a transfer takes place if and only if club e invests and learns that $\gamma \geq 0$. Therefore, expected social welfare $SW(I)$ is given by

$$SW(I) = \begin{cases} Y & \text{if } I = 0 \\ Y + \int_0^\infty \gamma f(\gamma)\, d\gamma - z & \text{if } I = 1 \end{cases} . \tag{1}$$

Without investment, the player will play for club i with productivity Y throughout his whole career. With investment, a transfer takes place when $\gamma \geq 0$, so that his productivity is Y for all $\gamma \leq 0$ and $Y + \gamma$ otherwise. This leads to a threshold $\widetilde{z}^f := \int_0^\infty \gamma f(\gamma)\, d\gamma$, such that it is efficient for club e to invest for all $z \leq \widetilde{z}^f$.

2.2 Date -1: Renegotiation

Assume that club e has invested at cost z and has learned that $\gamma \geq 0$. Then, a change of clubs takes place, and the division of the renegotiation surplus γ per unit of time depends on each party's veto power. Consistent with the legal environment in European professional soccer since 1995, club i can credibly threaten to veto the transfer as long as the player has a valid contract, but it has no more veto power after the contract has expired.[11] Hence, there is nothing like a reserve clause as known in US sports, and long term contracts are in fact binding.[12]

To capture this crucial aspect, we use the Shapley value concept to determine the surplus division at each point in time, such that all three parties are involved as long as the player's contract is still valid (from date 0 until date T), while club i becomes

[11] This legal regime was implemented by the so-called "Bosman judgment" of the European Court of Justice in 1995, see Court of Justice of the European Communities, Case C-415/93. The data used in the empirical part are all taken from this period.

[12] One might argue that players can reduce the incumbent club's veto power simply by threatening not to perform well on the pitch. However, all we need is the realistic assumption that holding a valid contract with a player increases a club's veto power in the renegotiation process.

irrelevant after it has expired (for the remaining period $1-T$) so that bargaining then occurs between the player and club e only.

Denoting by $\pi_j^c(\gamma, W) \geq 0$ the renegotiation payoff of party $j = i, e, p$ per unit of time depending on whether the player has a valid contract with club i or not, $c = V, N$, we get the following result (see Appendix A for details):

Lemma 1 *Using the Shapley value concept, the renegotiation payoffs per unit of time are as follows:*

(i) For the period $[0, T]$ where the player's contract is still valid:

$$\pi_i^V = Y - W + \frac{1}{3}\gamma, \quad \pi_p^V = W + \frac{1}{3}\gamma, \quad \textit{and} \quad \pi_e^V = \frac{1}{3}\gamma.$$

(ii) For the period $[T, 1]$ where the player's contract has expired:

$$\pi_i^N = 0, \quad \pi_p^N = \frac{1}{2}(Y + \gamma), \quad \textit{and} \quad \pi_e^N = \frac{1}{2}(Y + \gamma).$$

Clearly, $\pi_i^V > \pi_i^N = 0$ as club i benefits from its veto power as long as the contract is still valid. Since club i becomes irrelevant after the contract has expired, club e and the player then each reap half of the renegotiation surplus.[13] Note carefully, however, that the player may nevertheless benefit from a valid contract when his wage in club i is sufficiently high as $\pi_p^N > \pi_p^V$ if and only if $W < \frac{1}{2}Y + \frac{1}{6}\gamma$.[14]

Total renegotiation payoffs over time are given by simply adding up over the periods with and without valid contract:

$$\Pi_j(\gamma, T, W) = T \cdot \pi_j^V(\gamma, W) + (1 - T) \cdot \pi_j^N(\gamma, W) \ \forall j = i, e, p. \tag{2}$$

Result 1 *Total renegotiation payoffs have the following properties:*

[13]These features emerge naturally also for alternative specifications of the renegotiation process; see e.g. Segal and Whinston (2000), Burguet, Caminal, and Matutes (2002), Feess and Muehlheusser (2003) and Terviö (2006).

[14]Note that this feature of the Shapley value is quite intuitive in our context. For instance, assume that $Y = 100$ and $\gamma = 50$ so that the player gets 75 per unit of time for period $(1-T)$ where his contract has expired. Hence, whenever $W > 75$, he will clearly get more than 75 in renegotiations as long as his contract is valid; otherwise he would prefer to veto the transfer. Clearly, for smaller values of W, the opposite might hold so that the player benefits from being out of contract.

(i) with respect to the player's wage in club i (W), it is (weakly) decreasing for club i, neutral for club e, and (weakly) increasing for the player. The joint of renegotiation payoff of the player and club i is independent of W.

(ii) with respect to the remaining contract duration (T), it is increasing for club i, decreasing for club e, and ambiguous for the player. The joint of renegotiation payoff of the player and club i is increasing in T.

All properties follows directly from Lemma 1. The player's wage in club i increases his payoff when staying with club i, and this also increases his payoff when a change of club occurs. The opposite holds for club i. As these two effects offset each other, W is neutral for their joint renegotiation payoff and thus also for club e. This is an important result as it ensures that W is a purely distributive matter and hence not influenced by strategic considerations on rent seeking.

The crucial point in *part (ii)* is that, even in cases where when the player's payoff alone is decreasing in T, the *joint* payoff of the player and club i is always increasing in T. This follows simply from the fact that club e's payoff is decreasing in T.[15]

Of course, in our context the renegotiation payoffs of club i and the player can be naturally interpreted as the transfer fee and the player's annual wage in club e, respectively.[16]

2.3 Date -2: Investment

Given the outcome of the renegotiation process, club e will invest whenever its expected renegotiation payoff net of investment costs z is non-negative. It follows that there exists a threshold $\widetilde{z}(T) := \int_0^\infty \Pi_e(\gamma, T) f(\gamma)\, d\gamma$ such that the investment occurs for all $z \leq \widetilde{z}(T)$. Moreover, club e's investment incentives are *decreasing* in T as

$$\widetilde{z}'(T) = \int_0^\infty \frac{\partial \Pi_e(\gamma, T)}{\partial T} f(\gamma)\, d\gamma < 0. \tag{3}$$

Finally, since $\Pi_e(\gamma, T) < \gamma$ for all $\gamma \geq 0$, it follows that $\widetilde{z}(T) < \widetilde{z}^f$ for all $T \geq 0$. As a result, compared to the efficiency benchmark, there is under-investment even for

[15] To see this, simply note that $\Pi_p(\cdot) + \Pi_i(\cdot) \equiv \gamma - \Pi_e(\cdot)$, and $\frac{\partial \Pi_e}{\partial T} < 0 \ \ \forall T, \gamma$.

[16] Since the player's career horizon is normalized to one, his total renegotiation payoff equals his "average" renegotiation payoff per unit of time.

$T = 0$, because club e bears the full cost of the investment (z), but gets only part of the social gain in case of a transfer (γ). And as $\widetilde{z}'(T) < 0$, the under-investment problem is aggravated by longer contract durations.

From the viewpoint of the contracting parties who do not observe z, the probability of a transfer is then given by $\Pr(z \leq \widetilde{z}(T)) \cdot \Pr(\gamma \geq 0)$ which is, again due to $\widetilde{z}'(T) < 0$, also strictly decreasing in T. We summarize as follows:

Result 2 *The probability that the player will be transferred is decreasing in the remaining duration of his contract.*

2.4 Date −3: Contracting

The duration of the contract agreed upon by the player and club i maximizes their expected joint payoff:

$$J(T) = Y + \Pr(z \leq \widetilde{z}(T)) \left[\int_0^\infty (Y + \gamma - \Pi_e(\gamma, T)) f(\gamma) \, d\gamma \right]. \tag{4}$$

The player and club i get at least Y with certainty. When a transfer takes place (i.e. when club e invests and when $\gamma > 0$), then *in addition* they get the total renegotiation surplus γ minus club e's share of it. Recall that club e's (renegotiation) payoff is independent of W, so that W does also not enter $J(T)$.

If interior, the optimal contract duration T^* trades off at the margin the expected costs from increasing the contract duration because of a lower transfer probability versus the expected gain from rent seeking in case a transfer occurs. Note again that the contract duration can be interpreted as a breach penalty in the framework of Aghion and Bolton (1987) as it influences the contracting parties' decisions and payoffs in a similar way: the higher the breach penalty (or the longer the contract duration), the lower is the entrant's profit when entry occurs (rent-seeking), but the probability of entry is inefficiently low.

In our model, we focus on the rent seeking motive when determining the contract duration. In reality, however, there are also other factors influencing the contract length with differing impacts across players and clubs. For example, short term contracts may be superior when the incumbent club is planning to hire a new coach who prefers a different tactical system. Moreover, contract durations may also be driven by risk preferences or by the private information of players about their expected future productivity. For similar reasons, contracts may be extended or renewed before expiry and before another club attempts to hire the player.

Summing up, there are many reasons why the optimal contract duration varies from case to case, and we will hence observe different durations for reasons beyond the rent seeking motive. We do not want to model these different motives explicitly, but it is interesting to see how changes in the contract duration affect the player's wage W in club i. As for this, let us assume that W is determined such that the total expected joint surplus under the optimal contract $J(T^*)$ is shared equally between the contracting parties.[17] Delegating the formal analysis to Appendix B, we get the following result:

Result 3 *When an increase in the contract duration decreases the expected renegotiation payoff for the player or increases it by less than for club i, the player gets compensated by a higher wage W.*

The intuition for the result is straightforward, but it has important consequences for the empirical part. Assuming that the division of the player's and club i's *expected* joint surplus in the whole game is driven by their relative bargaining positions at the contracting stage, it is clear that the party who benefits more from a longer contract duration in the renegotiation process must compensate the other party ex ante. In Appendix B, we show that the outcome depends on the interplay of three effects, and that it is in principle possible that the player must compensate the incumbent club. However, the reverse case where the player is compensated seems much more intuitive and is also supported by the empirical analysis below: Recall that in renegotiations, club i clearly benefits from a longer (remaining) contract duration, while the effect on the player is ambiguous. Therefore, for compensation of club i to occur, the effect on the player's renegotiation payoff would have to be strongly positive, which is neither intuitive nor supported by our empirical analysis.

3 Data

Our data set covers four consecutive seasons in the German top professional soccer league ("Bundesliga") from 1996/97 to 1999/2000. Using the leading German soccer magazine

[17] Our argument does not depend on the 50:50 split, but holds whenever the wage is determined by the relative bargaining power of the player and club i the contracting stage.

"Kicker", we have compiled a data set with detailed information on contract durations, player remuneration and transfer fees. In total there are 415 players with at least one contract observation, and we will refer to the first observation per player in our data set as *first contract*.[18] Furthermore, in 128 out of these 415 cases, a *second contract* is signed during the observation period, with 66 renewals and 62 in the course of a transfer. For these players, we have the necessary information about the previous (i.e. first) contracts and new (i.e. second) contracts, and these 62 transfers will therefore be used for the analysis of the renegotiation game. Furthermore, the information about the previous contract will turn out to be useful when dealing with selection issues.

At the end of each season, a player either *(i)* changes clubs, *(ii)* re-signs with his current club, or *(iii)* does not change his contractual status. To capture this third possibility, we generated one observation for each year where no change occurred. As control variables, we use team characteristics such as the yearly budget and final league position in the previous season as well as player characteristics such as position and the number of league resp. international games. Player performance in the previous season is measured by a dummy variable indicating whether a player performed better than the average player on his position. This dummy is based on a composite index considering both position-specific factors such as the number of assists per match for a striker, and team specific factors as the result of a match.

Table 1 gives the descriptive statistics of the variables for the 62 transfers used in the empirical analysis and for the other two possibilities for comparability reasons. Overall, the proportion of club changes is 9% which can be interpreted as the probability of a club change.

Note first that, compared to the annual wage under the previous contract, a new contract is on average associated with an increase of about 50%, and this holds for both, transfers and renewals with the old club. Second, these players have higher average wages than players who do not change their contracts. This suggests that high ability players have a higher probability of changing their contract, which is also reinforced by the higher number of international games, the higher percentage of players who performed above average in the previous season, and a higher number of league games played.[19]

[18] In 253 cases, these first contracts were signed following a transfer, while in the remaining 162 cases, players renewed their contract with their current clubs.

[19] Furthermore, while not shown in the table, the mean wage in the new club is twice as large for

Variable	Club change Obs	Club change Mean	Club change Std. Dev.	Renew contract Obs	Renew contract Mean	Renew contract Std. Dev.	No change Obs	No change Mean	No change Std. Dev.
wage (in million)	62	1.626	1.312	67	1.662	1.317	565	0.938	0.851
fee (in million)	52	2.664	3.520		-			-	
joint = wage + fee (in million)	52	4.205	4.629		-			-	
contract duration (in years)	62	2.94	0.96	67	3.09	1.19	565	3.25	0.94
remaining contract duration (in years)	62	1.49	1.22	67	1.38	1.13	565	1.92	0.94
zero remaining contract duration	62	0.27		67	0.22		565	0	
league games	62	132.03	99.97	67	152.61	112.56	565	101.22	101.57
international games	62	18.61	27.47	67	22.12	28.92	565	11.30	19.78
Budget (in million)	62	43.05	15.76	67	44.78	13.58	565	36.51	10.88
wage previous contract (in million)	62	1.118	0.943	67	1.175	1.119	565	0.938	0.851
performed above average last season	62	0.50		67	0.42		565	0.27	
final league position last season (1-18)	62	9.48	5.05	67	7.55	4.81	565	8.26	4.97
Sample proportion	0.09			0.10			0.81		

All monetary variables are measured in German Marks (DM), where 1DM ≈ 0.5 Euro ≈ 0.65 US $.

There are 10 cases with missing observations for the transfer fee.

Table 1: Descriptive Statistics

4 Results

4.1 Transfer probability

For all of our hypotheses concerning wages and transfer fees, we need to take into account that players who are transferred may systematically differ from those who are not. As explained above, at the end of each season, players either change clubs, re-sign with their current clubs, or do not change their contracts, and we model this decision as a multinomial logit model with three outcomes. Based on the estimates of the multinomial model, we compute selection correction terms which are included correspondingly in the outcome equations for wages and transfer fees. This extension of the standard selection model has first been proposed by Lee (1983) and was further developed by Dubin and McFadden (1984) and Dahl (2002). Bourguignon, Fournier, and Gurgand (2007) carry out a Monte Carlo analysis of these estimators and some extensions of them. Based on their findings for small samples, we use a generalization of the Dubin and McFadden estimator. More details are provided in Appendix C.

Note that we must deviate from the chronological order of the theory part because the multinomial logit model is also needed to correct for a potential selection bias when testing our hypotheses. We hence start by testing our theoretical result about the transfer probability:

Hypothesis 1 *A player's transfer probability is decreasing in the remaining duration of his contract.*

Table 2 presents the estimated marginal effects of the variables that have significant coefficients in the multinomial logit estimation.[20] These marginal effects measure the expected change in the transfer probability when the corresponding variable increases. The transfer probability decreases by approximately 3 percentage-points per year of remaining contract duration. As the overall transfer probability is only 9 percent, this means that each additional remaining contract year reduces the transfer probability by about one third, and thus has a considerable impact. Furthermore, the transfer probability is

players with positive remaining contract duration compared to players whose contracts were expired. This suggests that only high ability players are likely to change clubs when having valid contracts, whereas low ability players are transferred mainly after their contracts have expired.

[20]The multinomial logit estimation results are presented in table 6 in Appendix C.

	(1)
	Change club
remaining duration at end of season	-0.029*** (0.010)
performed above average last season	0.100*** (0.032)
final league position last season	0.006*** (0.002)

**** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.*
Only significant marginal effects are shown.
Evaluated at sample means based on estimates shown in Table 6.

Table 2: Transfer probability, marginal effects

significantly higher for players who performed above average which confirms the basic intuition that new clubs are more willing to initiate a renegotiation process for high potential players. Finally, players are less likely to be transferred when their club performed well during the last season (i.e. had a lower rank position).

4.2 Transfer fees

We now turn to the empirical analysis of the renegotiation payoffs. Starting with transfer fees, our theory leads to the following Hypothesis:

Hypothesis 2 *Transfer fees are (i) increasing in the remaining duration of a player's previous contract, and (ii) decreasing in the player's wage in his previous club.*

Of course, transfer fees are zero for expired contracts as the initial club no longer plays an active role in the renegotiation process. In fact, in our data, the relationship between remaining contract duration and transfer fee is deterministic in these cases. We therefore restrict the analysis to the 36 cases with positive remaining contract durations.

The dependent variable is the log of the transfer fee, and as controls we use the number of league resp. international games, and the budget of the new club. The exclusion restrictions for the selection model are imposed by not using tenure in the old club, above average performance in the past season, and final league position in the past

	(1)	(2)
	Selection Model	***OLS***
remaining duration previous contract	0.783***	0.460***
	(0.163)	(0.122)
wage previous contract (ln)	-0.0158	0.154
	(0.183)	(0.183)
league games	-0.00281	-0.000516
	(0.00258)	(0.00152)
international games	0.0502***	0.0572***
	(0.0148)	(0.0157)
international games squared	-0.000589***	-0.000591***
	(0.000188)	(0.000192)
budget	0.0170**	0.0186**
	(0.00614)	(0.00698)
$\lambda(\Gamma_1)$	-0.579**	
	(0.220)	
$\lambda(\Gamma_2)$	-5.529**	
	(2.232)	
$\lambda(\Gamma_3)$	-3.634	
	(3.906)	
Constant	9.396**	10.35***
	(4.541)	(2.454)
Observations	36	36
R-squared	0.751	0.638

Dependent variable: ln(fee)
**** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.*
Column (1) displays the estimates of the selection model. The estimation results of the selection multinomial logit are presented in the appendix (table 6). Column (2) displays the OLS estimates based on all contracts signed after the first contract. Only observations with strictly positive remaining contract duration are used because a zero remaining duration perfectly predicts a zero transfer fee.

Table 3: Transfer fees

season in the ln(fee) regression.[21]

Both regressions show a highly positive significant impact of the remaining contract duration. As the significance of two of the selection terms indicates that the OLS estimates are biased, we rely on the selection model which estimates a coefficient of approximately 0.8. This implies that each additional year of remaining contract duration increases the transfer fee by 120 per cent.This confirms part (i) of Hypothesis 2. [22]

The wage in the previous contract has no significant impact on transfer fees which, at first glance, contradicts part (ii) of Hypothesis 2. However, the wage in the previous contract is also a good proxy for the players' quality so that the insignificance of the previous wage can be attributed to the following countervailing effects: On the one hand, higher previous wages weaken the bargaining position of the incumbent club, thereby reducing the transfer fee as suggested in our model. But on the other hand, players with higher previous wages are of higher quality which ceteris paribus increases transfer fees.

4.3 Wages

Before presenting the estimation results for wages, we need to deal with a methodological issue which did not arise when considering transfer fees. The reason is that a player's wage in his new club is driven by the terms of *two* different contracts: First, as shown in Result 1 above, the *remaining duration* and the *wage* of the player's *previous* contract affect the wage in the new club via the renegotiation process. Again, relying on players' second contracts only ensures availability of this information from their first contracts, thereby also allowing to better control for selection effects.

Second, the *actual duration* of his contract in the new club will again be driven by a rent seeking motive vis a vis future entrants. While we do not explicitly model this additional contracting stage in the theoretical part, it is clear that our model applies. Again, when deciding on the contract duration, the contracting parties (now the player and club e instead of club i) are facing the same trade-off between transfer probability and joint renegotiation payoff. Therefore, the player's wage in his new club will follow the same logic so that our estimations can also be used to address the issue of compensation.

[21]While not a formal test the fact that none of these variables is significant in an OLS regression suggests that the exclusion restrictions are satisfied.

[22]The exact computation for the percentage increase is given by $100 \cdot (\exp(\beta) - 1))$.

In considering these two questions, we start with analyzing the impact of the previous contract terms on the player's renegotiation payoff, while the issue of compensation is discussed in subsection 4.5 below.

Recall from Result that a higher previous wage should increase a player's new wage, whereas the impact of the remaining duration in the previous contract turned out to be ambiguous due to countervailing effects. We thus test the following Hypothesis:

Hypothesis 3 *A player's annual wage in his new club is increasing in his annual wage in his previous club.*

The results in Table 4 confirm Hypothesis 3 by showing that wages in previous contracts have a highly significant and positive impact on new wages. This is true for all estimated specifications. Again, we are aware that we might not be able to fully control for the players' quality with other control variables, so that the strong impact may partly be due to quality affects expressed by higher wages in the old club. Nevertheless, it is reasonable to attribute at least part of the effect to the renegotiation channel as this is perfectly consistent with our findings: The previous wage is highly significant for new wages but insignificant for transfer fees. If the impact of previous wages were driven by quality effects alone, then it should also have a significant (positive) effect on transfer fees.

Interestingly, the remaining contract length has no significant impact on the wage in the new contract which holds regardless of whether we exclude players with expired contracts or not. This result supports our theoretical finding that there are countervailing effects: on the one hand, new clubs need to pay large transfer fees when the remaining contract duration is high, and they are not willing to pay large transfer fees *and* high wages. But on the other hand, players may be worse off after contract expiration when their wage in the incumbent club is sufficiently high (see Part (ii) of Result 1).

4.4 Joint renegotiation payoff

While the effect of the remaining duration of a player's old contract on his wage in the new wage alone is ambiguous, our theoretical framework suggests that long term contracts may serve as rent seeking devices which leads to a clear prediction concerning the *joint* renegotiation payoff of incumbent clubs and players:

	(1)	(2)	(3)	(4)
	Selection Model	***Selection Model***	***OLS***	***OLS***
remaining duration previous contract	0.0348	0.0188	0.0734	0.0504
	(0.105)	(0.140)	(0.0578)	(0.0876)
wage previous contract (ln)	0.413***	0.458***	0.392***	0.471***
	(0.0966)	(0.114)	(0.0913)	(0.113)
contract duration	0.245***	0.177	0.215***	0.137
	(0.0916)	(0.130)	(0.0795)	(0.116)
league games	0.00157*	0.00190	0.00117	0.000692
	(0.00085)	(0.00145)	(0.00071)	(0.00103)
international games	0.00667	0.00676	0.00517	0.00828
	(0.00797)	(0.00913)	(0.00729)	(0.00877)
international games squared	-3.44e-05	-4.57e-05	-2.34e-05	-6.04e-05
	(8.51e-05)	(9.47e-05)	(8.22e-05)	(9.45e-05)
budget	0.017***	0.0124**	0.017***	0.013***
	(0.00413)	(0.00470)	(0.00412)	(0.00469)
$\lambda(\Gamma_1)$	-0.200	-0.253		
	(0.138)	(0.157)		
$\lambda(\Gamma_2)$	-0.307	-1.254		
	(1.237)	(1.553)		
$\lambda(\Gamma_3)$	-2.313	-4.468*		
	(1.610)	(2.348)		
Constant	5.024**	2.841	6.987***	6.425***
	(1.983)	(2.464)	(1.220)	(1.479)
Observations	62	45	62	45
R-squared	0.654	0.616	0.634	0.574

Dependent variable: ln(wage)
**** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.*
Columns (1) and (2) display the estimates of the selection model. Column (1) is based on all observations, column (2) is based on observation with strictly positive remaining contract duration only. The estimation results of the selection multinomial logit are presented in the appendix. Columns (3) and (4) are OLS estimates based on the same data selection rule as in columns (1) and (2).

Table 4: Wages

Hypothesis 4 *The joint renegotiation payoff of the incumbent club and a player (transfer fee plus wage in new club) is increasing in the remaining duration of player's previous contract.*

Again, we report results for the selection model and for OLS regressions using the same sample selections as in the analysis of wages.[23]

Again, in columns (1) and (3), we consider all transfers, i.e. also those following expired contracts. In these cases, the joint renegotiation payoff is just the wage because transfer fees are zero. In columns (2) and (4) attention is confined to those cases where the remaining contract duration was positive. Given that some of the selection correction terms are significant, we suspect that the OLS estimates in columns (3) and (4) are biased and we hence rely on the selection models where the effect of the remaining contract duration is significantly positive and almost identical for the samples with and without expired contracts: on average, one more year of remaining contract duration increases the joint renegotiation payoff of the contracting parties by more than 50 per cent.

4.5 Compensation

As for the issue of compensation, recall from the theoretical part (Result 3) that when clubs benefit more than players from long term contracts in renegotiation s, players will be compensated ex ante through higher wages. According to the empirical evidence presented so far, clubs indeed seem to strongly benefit from long term contracts as remaining contract durations have a highly significant positive impact on transfer fees, while there is no significant impact on wages. Based on our compensation argument, this leads to the following Hypothesis:

Hypothesis 5 *A player's wage in his current club is increasing in the duration of his contract.*

Resorting again to table 4 shows that the contract duration has a significant positive effect on the wage when all second contracts are used (columns 1 and 3). When we use the subsample with strictly positive remaining contract durations only (columns 2 and 4), the effects go in the right direction, but are insignificant which may be due to the smaller

[23]Note that sample sizes are different because there are several missing observations for transfer fees.

	(1)	(2)	(3)	(4)
	Selection Model	***Selection Model***	***OLS***	***OLS***
remaining duration previous contract	0.454***	0.471***	0.423***	0.212
	(0.128)	(0.162)	(0.0781)	(0.129)
wage previous contract (ln)	0.256**	0.164	0.237*	0.230
	(0.123)	(0.136)	(0.123)	(0.142)
contract duration	0.234**	0.0519	0.194*	0.156
	(0.114)	(0.158)	(0.108)	(0.175)
league games	0.00102	-0.000956	0.000745	2.24e-05
	(0.00106)	(0.00205)	(0.000907)	(0.00123)
international games	0.0299***	0.0367***	0.0327***	0.0443***
	(0.0106)	(0.0108)	(0.0110)	(0.0115)
international games squared	-0.00028**	-0.0004***	-0.00032**	-0.0005***
	(0.000131)	(0.000139)	(0.000140)	(0.000141)
budget	0.0204***	0.0169***	0.0218***	0.0178***
	(0.00475)	(0.00450)	(0.00512)	(0.00515)
$\lambda(\Gamma_1)$	-0.522***	-0.479***		
	(0.166)	(0.161)		
$\lambda(\Gamma_2)$	-1.614	-4.119**		
	(1.552)	(1.657)		
$\lambda(\Gamma_3)$	-4.854**	-4.534		
	(1.894)	(2.861)		
Constant	5.220**	7.111**	9.011***	9.947***
	(2.429)	(3.319)	(1.630)	(1.813)
Observations	52	36	52	36
R-squared	0.825	0.800	0.780	0.705

Dependent variable: ln(joint)
**** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.*
Columns (1) and (2) display the estimates of the selection model. Column (1) is based on all observations, column (2) is based on observation with strictly positive remaining contract duration only. The estimation results of the selection multinomial logit are presented in the appendix. Columns (3) and (4) are OLS estimates based on the same data selection rule as in columns (1) and (2).

Table 5: Joint renegotiation payoff

sample size. Note however that, for testing Hypothesis 4, there is no need to exclude players with expired previous contracts as the impact of current contract durations on current wages should be independent of the terms of the previous contract.

An important point is the potential endogeneity of the contract duration. At the end of the theoretical model, we have pointed out that the contract length is influenced by factors that are unobservable in our data set such as the relative degree of risk aversion between players and clubs or the informational environment. As these factors may well be correlated with the error term, the contract duration may be endogenous. We test for endogeneity by using a regression-based version of the Hausman test.[24] We use the *total duration of the previous contract* and the quality indicator "above average performance in the last season" as instruments for the actual contract duration. As detailed in Appendix D (table 7), the validity of these two instruments cannot be rejected by the Sargan overidentifying test. The null hypothesis of exogeneity of contract duration, however, cannot be rejected by the Hausman test. Therefore, we treat contract duration as an exogenous variable.

5 Conclusion

We have developed a framework in the context of European soccer to test some of the central hypotheses on the issue of strategic contracting. Using a data set from the German "Bundesliga", we show that contract durations are useful rent seeking devices vis a vis non-contracting parties. All in all, the empirical analysis broadly supports our model predictions according to which the terms of a contract have both, allocative (likelihood of transfers) and distributional (transfer fees, wages) effects, thereby also providing first empirical evidence for analogous predictions derived in the more general buyer-seller frameworks in previous research on strategic contracting.

An important point we wish to address is how to interpret our finding that longer (remaining) contract durations reduce the transfer probability. In our theory, a lower transfer probability clearly reduces allocative efficiency, and contracting parties deliberately accept such inefficiencies to extract rents from third parties. In the empirical part, however, we can only test for the impact of remaining contract durations on transfer

[24]See, e.g. Wooldridge (2002, p. 119),

probabilities, but clearly we can neither measure the efficiency gain of a realized transfer nor the efficiency loss of a deferred transfer.[25] Hence, there is no hope to establish a causal link from contract durations to allocative efficiency in the empirical part.

Nevertheless, we believe that our findings support the view that long-term contracts do lead to allocative inefficiencies in our context, and we provide two arguments: First, let us assume for the moment that the causation indeed goes from remaining contract duration to transfer probability. In this case, we can safely argue that allocative efficiency is monotone increasing in the number of transfers as inefficiencies only arise from deterred (efficient) transfers, but not from actual (inefficient) ones. Note that the latter type of transfer would imply that, in renegotiations, all parties involved agree on a transfer even though it is known that the player is less valuable in the new club, which seems implausible. In addition, it would lead to a potentially beneficial role of long-term contracts and other rent seeking devices in *deterring inefficient entry* which would clearly run completely against the spirit of all existing literature on this issue.

Second, when not assuming a causal link from remaining contract duration to transfer probability, one would then have to find an alternative theory to explain our finding of a strongly negative relationship between these two variables. Under the alternative assumption that transfer probabilities are *exogenous* (i.e. independent of the terms of a player's contract), this amounts to arguing why low-probability players should systematically sign longer contracts. However, it emerges clearly from our empirical analysis that the contracting parties do benefit from long term contracts in case of a transfer, which suggests that high-probability players should sign longer contracts, resulting in a *positive* relationship between contract duration and transfer probability. Of course, as discussed in section 2.4 above, there certainly are reasons for long term contracts other than the rent-seeking motive (e.g. risk aversion), but these motives could also not explain the observed negative relationship. In summary, even though we cannot directly measure the efficiency of transfers themselves, we believe that our results can be interpreted in the sense of long-term contracts inducing allocative inefficiencies.

Last but not least, because the driving forces in our framework are not only relevant

[25]Even if we could asses a player's productivity directly by comparing his performance before and after a transfer, this would not solve the problem as efficiency must refer to a player's *expected* performance when the transfer is agreed upon, and not to his *actual* performance which, in reality, is a random variable.

for contracting in the sports sector, our results might also be of interest for other contexts where long term contracts are used: For instance, there is a recent debate in the European Commission (EC) about how to deal with long term contracts in the electricity sector.[26]

On the one hand, the EC emphasizes that long term contracts might be helpful in promoting investment incentives as firms are facing uncertainty, e.g. concerning future legislation with respect to interstate grids. Moreover, with respect to the final allocation, it acknowledges that long term contracts are not necessarily fully pre-determining as there is the possibility of "secondary trade" (see p. 183), i.e. entry by another firm (as a result of renegotiation with the incumbent firm) which tends to improve efficiency. However, on the other hand it also emphasizes that long term contracts "...raise search cost (transaction costs) for any player interested.... This raises barriers to entry.... Hence, both the Court and the Commission has concluded that long-term contracts should, with certain exceptions, be disqualified..." (see p. 183). Obviously, this latter argument is analogous to the one made and empirically confirmed in our context.

[26]See European Commission, "DG Competition Report on Energy Sector Inquiry", January 10, 2007, http://ec.europa.eu/comm/competition/sectors/energy/inquiry/full_report_part2.pdf

Appendix

A Derivation of Lemma 1

Using the Shapley value, the renegotiation payoffs per unit of time as stated in Lemma 1 are computed as follows:[27]

Valid contract: Division of surplus between player, club i and club e

Permutation		Marginal Contribution	
	Club i	Club e	Player
i, e, p	$Y - W$	0	$W + \gamma$
i, p, e	$Y - W$	γ	W
e, i, p	$Y - W$	0	$W + \gamma$
e, p, i	$Y - W + \gamma$	0	W
p, e, i	$Y - W + \gamma$	0	W
p, i, e	$Y - W$	γ	W
Σ Payoffs	$6Y + 2\gamma - 6W$	2γ	$6W + 2\gamma$
Shapley Value ($= \frac{1}{6}\Sigma$)	$Y - W + \frac{1}{3}\gamma$	$\frac{1}{3}\gamma$	$W + \frac{1}{3}\gamma$

Note that as long as the contract is valid, club i has full veto power over the player and can unilaterally force exertion of the contract.

Contract expired: Division of surplus between player and club e only

Permutation	Marginal Contribution	Marginal Contribution
	Club e	Player
e, p	0	$Y + \gamma$
p, e	$Y + \gamma$	0
Σ Payoffs	$Y + \gamma$	$Y + \gamma$
Shapley Value ($= \frac{1}{2}\Sigma$)	$\frac{1}{2}(Y + \gamma)$	$\frac{1}{2}(Y + \gamma)$

[27]The Shapley value is the standard cooperative bargaining concept for $N \geq 2$ players. For $N = 2$, it coincides with the Nash-Bargaining solution, see e.g. Mas-Colell, Whinston, and Green (1995, p. 680ff).

B Derivation of Result 3

In a first step, recall that the player earns wage W in club i only when the transfer does *not* occur, which happens with probability

$$\begin{aligned} g(T) &:= 1-\Pr\left(z \leq \widetilde{z}\,(T)\right)) + \Pr\left(z \leq \widetilde{z}\,(T)\right) \cdot \Pr\left(\gamma \leq 0\right) \\ &= 1 - H(\widetilde{z}\,(T))(1-F(0)) > 0, \end{aligned}$$

where $g'(T) = -h(\cdot)\widetilde{z}'\,(T)\,(1-F(0)) > 0$.

It follows that for any T, W^* is then implicitly given as follows:

$$g(T)W^* + H(\widetilde{z}\,(T))\left[\int_0^\infty \Pi_p(\gamma, T, W) f\,(\gamma)\,d\gamma\right] \equiv \frac{1}{2}J(T), \tag{5}$$

where the first and second term on the LHS reflect the player's expected wage in club i and e, respectively. Moreover, since $\Pi_i(\cdot) + \Pi_p(\cdot) \equiv Y + \gamma - \Pi_e(\cdot)$, the RHS of Eqn. (5) can be re-written as

$$\frac{1}{2}Y + \frac{1}{2}H(\widetilde{z}\,(T))\left[\int_0^\infty \Pi_i(\gamma, T, W) + \Pi_p(\gamma, T, W) f\,(\gamma)\,d\gamma\right] \tag{6}$$

Combining Eqn. (5) and (6) then yields

$$g(T)W^* - \frac{1}{2}Y - \frac{1}{2}H(\widetilde{z}\,(T))\left[\int_0^\infty \Pi_i(\gamma, T, W) - \Pi_p(\gamma, T, W) f\,(\gamma)\,d\gamma\right] \equiv 0 \tag{7}$$

To determine the derivative $\frac{dW^*}{dT}$, define the LHS of Eqn. (7) as $X(W^*, T)$ so that, by the implicit function theorem, $\frac{dW^*}{dT} = \frac{\frac{\partial X}{\partial T}}{-\frac{\partial X}{\partial W^*}}$.

More specifically, using the results for the renegotiation payoffs from Lemma 1, we get

$$\begin{aligned} \Pi_i(\gamma, T, W) &= T \cdot (Y - W + \frac{1}{3}\gamma) + (1-T) \cdot 0 \\ \Pi_p(\gamma, T, W) &= T \cdot (W + \frac{1}{3}\gamma) + (1-T) \cdot \frac{1}{2}(Y + \gamma) \end{aligned}$$

and it will be useful to define the following differences:

$$\begin{aligned} \Delta &:= \Pi_i(\cdot) - \Pi_p(\cdot) = T \cdot (Y - 2W) - \frac{1}{2} \cdot (1-T)(Y+\gamma) <> 0 \\ \Delta_W &:= \left[\frac{\partial}{\partial W}\Pi_i(\cdot) - \frac{\partial}{\partial W}\Pi_p(\cdot)\right] = 0 \\ \Delta_T &:= \left[\frac{\partial}{\partial T}\Pi_i(\cdot) - \frac{\partial}{\partial T}\Pi_p(\cdot)\right] = Y - 2W + \frac{1}{2}(Y+\gamma) <> 0 \end{aligned}$$

Making use of these differences and going back to Eqn. (7), we get

$$-\frac{\partial X}{\partial W^*} = -g(T) + \frac{1}{2}H(\widetilde{z}(T))\left[\int_0^\infty \Delta_W f(\gamma)\, d\gamma\right] = -g(T) < 0, \tag{8}$$

since $\Delta_W = 0$. Moreover,

$$\frac{\partial X}{\partial T} = g'(T) - \frac{1}{2}\left[H(\widetilde{z}(T))\int_0^\infty \Delta_T f(\gamma)\, d\gamma + H'(\cdot)\widetilde{z}'(T)\int_0^\infty \Delta f(\gamma)\, d\gamma\right] <> 0 \tag{9}$$

Clearly, for $\frac{dW^*}{dT} > 0$ to hold, we need $\frac{\partial X}{\partial T} < 0$. Thereby, the first term in Eqn. (9) is positive, while the sign of the bracket term is ambiguous and depends on the signs of Δ_T and Δ (which are both ambiguous as well) and the properties of the distribution $H(\cdot)$.

Intuitively, whether or not the player is compensated by club i as T increases depends on the interplay of the following three effects: First, the impact on the transfer probability $1 - g(T)$, which is decreasing in T. Second, the difference of the absolute renegotiation payoffs (Δ) for a given T. Clearly, Δ becomes negative for low values of T as $\Pi_i(T = 0) = 0$. On the other hand, as T increases, $\Delta > 0$ is also possible. Third, the *rate* at which the difference of the total renegotiation payoffs changes as T increases (Δ_T), where we know from Result 1 that the total renegotiation payoff for club i increases in T, while the effect is ambiguous for the player.

Result 3 then simply says that if the net effect leads to $\frac{\partial X}{\partial T} < 0$, then it is the case that club i benefits more than the player from an increase in the contract duration. Since the total joint surplus is to be shared equally, this calls for player compensation in the form of a higher wage.

C Selection model with multiple outcomes

C.1 Model specification

The selection model with three outcomes $j = 1, 2, 3$ can be written as follows

$$\begin{aligned} y_j^* &= z\gamma_j + \eta_j && (10)\\ y &= 1 \text{ if } y_1^* > \max_{j\neq 1}(y_j^*) && (11)\\ w_1 &= x\beta_1 + u_1 \text{ if } y = 1 && (12) \end{aligned}$$

Let us denote the option club change with $j = 1$, hence the wage equation refers to the wage in case of a club change. As is well known OLS of the second part will be biased if u_1 and the η_j are correlated. The first part is a latent variable model which is used to derive the probabilities of each option. The probability of a club change is given by

$$P(y=1) = P[y_1^* > \max_{j \neq 1}(y_j^*)]$$

Assuming an extreme value distribution for η_j yields the well-known logit probabilities, e.g. for the first option as (assuming that option 3 is the reference option)

$$P(y=1) = \frac{\exp(z\gamma_1)}{1 + \sum_{i=1,2} \exp(z\gamma_i)}$$

Estimates of γ can be used to generate control functions that take account of the potential correlation between u and η. Denote these control functions as $\Gamma_j = f(\widehat{p}_1, \widehat{p}_2, \widehat{p}_3)$, where $\widehat{p}_i$ are the estimated choice probabilities, and write the second stage as

$$w_1 = x\beta_1 + \lambda\Gamma_j + \varepsilon_1,$$

where ε_1 is mean-independent of x. The different methods discussed in Bourguignon, Fournier, and Gurgand (2007) differ in the construction of the control functions Γ.The method we use following the suggestion in Bourguignon, Fournier, and Gurgand (2007) in case of small samples defines the control functions as

$$\begin{aligned} \Gamma_3 &= \ln(\widehat{p}_3) \\ \Gamma_i &= \widehat{p}_i \ln(\widehat{p}_i)/(1-\widehat{p}_i), i = 1,2 \end{aligned}$$

where we assume that choice number 3 is the reference category. The estimated coefficients $\widehat{\lambda}$ correspond to $\sigma_u \rho_{iu}$, where σ is the standard deviation of u_1 and ρ_{iu} is the correlation coefficient between u_1 and $\eta_i, i = 1,2,3$.

C.2 Multinomial logit estimation results

	(1)	(2)
	Change club	Renew contract
remaining duration at end of season	-0.498***	-0.605***
	(0.161)	(0.163)
wage previous contract	0.358	0.338
	(0.260)	(0.257)
league games	0.00125	0.000611
	(0.00165)	(0.00149)
international games	-0.00893	0.0176
	(0.0155)	(0.0148)
international games squared	0.000112	-8.47e-05
	(0.000173)	(0.000163)
Tenure	-0.0646	0.0751**
	(0.0504)	(0.0354)
performed above average last season	1.240***	0.377
	(0.325)	(0.317)
budget old club	-0.0130	-0.0280*
	(0.0159)	(0.0155)
final league position last season	0.0849**	-0.0309
	(0.0335)	(0.0317)
Constant	-6.900**	-5.161
	(3.253)	(3.209)
Observations	694	694

**** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.*
"No change"of contract status serves as reference category. Note that there are 694 observations because, starting with the 415 first contracts in the data, we take into account all subsequent outcomes (transfer / renewal / no change) for each subsequent year until contract expiration.

Table 6: Multinomial logit of contract status at end of season

D Endogeneity of contract duration

	2SLS
remaining duration previous contract	0.00820
	(0.0816)
wage previous contract (ln)	0.387***
	(0.0962)
contract duration	0.408**
	(0.181)
international games	0.00753
	(0.00792)
international games squared	-2.89e-05
	(8.67e-05)
budget	0.0144***
	(0.00488)
Constant	6.638***
	(1.316)
Observations	62
R squared	0.595

Dependent variable: ln(wage)
**** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.*
Contract duration is instrumented with contract duration in previous contract and the dummy performed above average last season". F-test of joint significance of instruments is 7.25 with a p-value of 0.002. The Sargan overidentification test statistic is 0.260 with a p-value of 0.61. The Hausman-Wu test statistic for exogeneity is 1.618 with a p-value of 0.21. Hence the validity of the instruments and exogeneity of contract duration cannot be rejected.

Table 7: Wages (2SLS)

References

AGHION, P., AND P. BOLTON (1987): "Contracts as a Barrier to Entry," *American Economic Review*, 77(3), 388–401.

AGHION, P., AND J. TIROLE (1997): "Formal and real authority in organizations," *Journal of Political Economy*, 105(1), 1–29.

BOURGUIGNON, F., M. FOURNIER, AND M. GURGAND (2007): "Selection Bias Corrections Based On The Multinomial Logit Model: Monte Carlo Comparisons," *Journal of Economic Surveys*, 21(1), 174–205.

BURGUET, R., R. CAMINAL, AND C. MATUTES (2002): "Golden Cages for Showy Birds: Optimal Switching Costs in Labour Markets," *European Economic Review*, 46(7), 1153–1186.

CARBONELL-NICOLAU, O., AND D. COMIN (2005): "Testing out Contractual Incompleteness: Evidence from Soccer," *NBER Working Paper No. 11110.*

CHUNG, T.-Y. (1992): "On the Social Optimality of Liquidated Damage Clauses: An Economics Analysis," *Journal of Law, Economics & Organization*, 8(2), 280–305.

DAHL, G. (2002): "Mobility and the Return to Education: Testing a Roy Model with Multiple Markets," *Econometrica*, 70(6), 2367–2420.

DIAMOND, P., AND E. MASKIN (1979): "An Equilibrium Analysis of Search and Breach of Contract, I: Steady State," *Bell Journal of Economics*, 10, 282–316.

DUBIN, J., AND D. MCFADDEN (1984): "An Econometric Analysis of Residential Electric Appliance Holdings and Consumption," *Econometrica*, 52(2), 345–362.

FEESS, E., AND G. MUEHLHEUSSER (2003): "Transfer fee regulations in European football," *European Economic Review*, 47(4), 645–668.

GROSSMAN, S. J., AND O. D. HART (1986): "The Costs and Benefits of Ownership - A Theory of Vertical and Lateral Integration," *Journal of Political Economy*, 94(4), 691–719.

Hart, O., and J. Moore (1988): "Incomplete contracting and renegotiation," *Econometrica*, 56, 755–785.

——— (1990): "Property Rights and the Nature of the Firm," *Journal of Political Economy*, 98(6), 1119–1158.

——— (1999): "Foundations of Incomplete Contracts," *The Review of Economic Studies*, 66(1), 115–138.

Lee, L. (1983): "Generalized Econometric Models with Selectivity," *Econometrica*, 51(2), 507–512.

Mas-Colell, A., M. D. Whinston, and J. R. Green (1995): *Microeconomic theory.* Oxford University Press, New York.

Maskin, E., and J. Tirole (1999): "Unforeseen contingencies and incomplete contracts," *Review of Economic Studies*, 66(1), 83–114.

Posner, E. A., G. G. Triantis, and A. J. Triantis (2004): "Investing in Human Capital: The Efficiency of Covenants Not to Compete," *University of Chicago Law School, Olin Working Paper No. 137.*

Roider, A. (2004): "Asset Ownership and Contractibility of Interaction," *The RAND Journal of Economics*, 35(4), 787–802.

Segal, I., and M. Whinston (2000): "Exclusive Contracts and Protection of Investments," *RAND Journal of Economics*, 31(4), 603–633.

Spier, K., and M. Whinston (1995): "On the efficiency of privately stipulated damages for breach of contract: entry barriers, reliance, and renegotiation," *RAND Journal of Economics*, 26(2), 180–202.

Terviö, M. (2006): "Transfer Fee Regulations And Player Development," *Journal of the European Economic Association*, 4(5), 957–987.

Wooldridge, J. (2002): *Econometric Analysis of Cross Section and Panel Data.* MIT Press.