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Zentrum für Europäische
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Non-technical summary

In many situations, applicants compete for a limited number of positions, and selection is based on *perceived* skill or talent, for example in hiring and promotion procedures or in nominations of election candidates by political parties.

Our paper provides a theory of agents' effort incentives in such situations and tests the predictions of this theory versus alternative theories by means of a quasi-experiment in professional soccer. Our theory introduces signal jamming as in career concerns models in rank-order tournaments, allowing for asymmetries between agents. We show that incentives are strongest in close contests, i.e., when several agents have similar ex ante winning probabilities. Moreover, the accuracy of the nomination committee's information about a candidate's ability at the beginning of the selection process may also affect her incentives. As we show, the predicted relation between a candidate's optimal effort and the precision of the information the decision-maker has about her is non-monotonic.

We test these predictions using a panel data set on the German Soccer League in the seasons 2006/07 and 2007/08. A subset of players belong to nations that qualified for the Euro Cup in summer 2008, the most prestigious international soccer Cup alongside the World Cup, and thus participated in the *nomination contest*.

We find a large positive effect of nomination contest participation on several output measures, for example the number of shots on the goal, for players with intermediate chances of being nominated. For players whose nominations chances are very high, however, the effect of contest participation is negative. That means that players whose uncertainty over their (non-)nomination is highest will exert the most effort in order to positively influence the decision of being nominated. Players who are certain of (not) being nominated do not have any incentive to exert extra effort since it will have no impact on the decision. Much rather do these players reduce effort in club games in order to avoid injuries that may jeopardize their Euro Cup participation.

Finally, by showing that younger players react more strongly to their countries' Euro Cup qualifications, we provide evidence consistent with career concerns. That is, participating in a Euro Cup has much higher relevance to the career prospects of a younger player than to those of a players who is at the very end of his career.

Das Wichtigste in Kürze

In vielen Situationen konkurrieren mehrere Bewerber um eine begrenzte Anzahl an Positionen und die Auswahl wird aufgrund von *wahrgenommenem* Können oder Talent getroffen. Diese können zum Beispiel Bewerbungsverfahren, interne Beförderungen, oder auch die Nominierung eines zur Wahl anzutretenden Kandidaten einer politischen Partei sein.

Unser Papier entwickelt eine theoretische Erklärung für die Anreize von Agenten in solchen Situationen und testet die implizierten Schlussfolgerungen dieser Theorie gegenüber anderen Theorien anhand eines Quasi-Experiments aus dem professionellen Fussball. Unsere Theorie erweitert die Theorie zu Turnieren durch das Einführen von *signal jamming*, wie in *career concerns*-Modellen, und das Zulassen von Asymmetrien zwischen Agenten. Wir zeigen, dass die Anreize am stärksten für ex-ante ebenbürtige Wettbewerberinnen sind. Darüber hinaus kann die Genauigkeit der Information des Nominierungsausschusses über die Management-Fähigkeiten der Kandidatin zu Beginn des Auswahlprozesses auch ihre Anreize beeinflussen. Wir zeigen, dass die vom theoretischen Modell implizierte Beziehung zwischen der optimalen Anstrengung der Kandidatin und der Präzision der Information, die der Entscheidungsträger über sie hat, nicht-monoton ist.

Wir testen diese theoretischen Implikationen anhand eines Panel-Datensatzes über die Saisons 2006/2007 und 2007/2008 der deutschen Fussball-Bundesliga. Ein Teil der Spieler gehört Nationen an, deren Nationalmannschaften sich fr die Fussball-Europameisterschaft 2008 qualifizierten, und nahmen dadurch am *Nominierungswettbewerb* teil.

Wir finden einen stark positiven Effekt auf verschiedene Leistungsmaße, zum Beispiel Torschüsse, für Teilnehmer am Nominierungswettbewerb mit mittleren Nominierungswahrscheinlichkeiten. Für Spieler, deren Nominierungswahrscheinlichkeiten sehr hoch sind, finden wir dagegen einen negativen Effekt des Nominierungswettbewerbs. Dass heißt, dass Spieler, deren Unsicherheit über ihre (Nicht-)Nominierung am höchsten ist, am meisten Anstrengung aufbringen, eben diese Nominierungsentscheidung positiv zu beeinflussen. Spieler, die sich ihrer (Nicht-)Nominierung sicher sind, haben dagegen kaum Anreize sich überdurchschnittlich anzustrengen, da sie die Entscheidung kaum beeinflussen können. Viel mehr halten sich Spieler, deren Nominierung sicher ist, eher zurück um Verletzungen zu vermeiden und damit ihre Euro-Teilnahme nicht zu gefährden.

Ausserdem zeigen wir, dass junge Spieler stärker auf die Euro-Qualifikation ihrer Nationalmannschaft reagieren, und bieten mit *career concerns* konsistente empirische Evidenz. Die Bedeutung einer Euro-Teinahme ist für die Karriere eines jungen Spielers sehr viel höher als für die eines Spielers, der am Ende seiner Karriere steht.

Nomination Contests: Theory and Empirical Evidence from Professional Soccer*

Jeanine Miklós-Thal† Hannes Ullrich‡

Abstract

This paper develops a theory of contests based on perceived abilities, and provides evidence for the predictions of this theory using panel data from professional soccer. We examine how soccer players perform in club matches during the (informal) nomination contests for national teams prior to an important international Cup, the *Euro 2008*. Our differences-in-differences analysis uses players from non-qualified nations who play in the same league as a control group. We find a large positive effect of nomination contest participation on several output measures for players with intermediate chances of being nominated, as proxied by past national team participations. For players with no prior national team experience there is no significant effect. We also find support for the theory that players whose nomination is close to certain reduce their effort in order to avoid injuries or exhaustion prior to the Cup. Finally, any positive reaction is strongest for young players.

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1 Introduction

Imagine an outsider vacancy occurs on the board of directors of a major corporation. The board typically sets up a nomination committee in this case, whose task is to identify, investigate, and evaluate candidates.[1] (Ideally) the committee's goal is to select the most able of all available outside managers. The difficulty the committee faces in making this decision is that managerial ability is not directly observable and hard to measure. Any observable performance measure, e.g., the stock market performance of the company the manager runs, is bound to be a noisy signal of the manager's ability: unobservable managerial effort, unobservable outside factors, and luck all affect company performance.

To form opinions about the potential candidates' abilities, the committee will combine information about candidates' qualifications and past achievements with data on their performances between the day the vacancy occurs and the final decision. Kaplan and Reishus (1990) provide evidence that top executive of companies that recently performed well are more likely to receive additional outside directorships.[2] The unobservability of managerial effort and the fact that current performance may influence the committee's decision imply that managers who are aware of being possible candidates for the lucrative directorship may attempt to improve their chances by "jamming" the signal about their ability that the committee observes.[3] In particular, a manager may find it profitable to increase her unobservable effort during what we will call the nomination period in order to improve her company's performance and thereby her *perceived* ability.

A candidate's incentives to do so may however critically depend on her nomination chance. Economic theory predicts that a candidate should exert high effort in a close race, i.e., if she expects to have a realistic chance of being nominated but is not too confident either. A candidate who expects to be nominated with a very high or a very low probability, on the other hand, may not have much incentive to change her behavior, since any improvement in her observed performance in unlikely to affect the final outcome. We derive these insights in a situation where decision are based on perceived abilities,[4]

[1]Formally, decision rights rest with the shareholders. In practice, however, shareholders almost always vote for the proposed candidate or slate. See Hermalin and Weisbach (1998).

[2]Kaplan and Reishus (1990) use dividend-cuts and industry-adjusted stock returns as performance measures. They also report that more than 80% of Fortune 500 managers hold either none, one, or two outside directorships, which suggests that an additional directorship is an important event for a manager.

[3]The term signal jamming goes back to Holmström (1982) who analyzes the dynamic career concerns of a single worker.

[4]Höffler and Sliwka (2003) derive the same result under the assumption that the precision of the

but the relationship between ex ante winning chances and effort incentives is qualitatively similar in rank-order tournaments where *observed* performances rather than perceived abilities determine payoffs (Lazear and Rosen (1981), Meyer (1992), Baik (1994)), or if a single agent competed against a fixed standard.

The main difference with respect to tournaments based on observed performances is that the accuracy of the nomination committee's information about a candidate's ability at the beginning of the selection process may also affect her incentives now. As we show, the predicted relation between a candidate's optimal effort and the precision of the information the decision-maker has about her is non-monotonic. If the committee already has a very clear idea of the manager's qualification for the post, incentive are weak because any change in her performance is unlikely to affect the final decision.[5] Moreover, a candidate's incentives will also be weak when only little is know about her ability: due to the high variance of beliefs in this case, it is unlikely that the perceived ability of the candidate will lie close to that of one of the other candidates at the end of the nomination period. Thus, an increase in effort is unlikely to affect the final decision even if the agent's observed current performance could have a strong effect on perceptions about her ability.

Similar incentives arise in other situations where several applicants compete for a limited number of positions, and selection is based on *perceived* skill or talent, in particular other hiring or promotion procedures,[6] or nominations of election candidates by political parties.

This paper provides a theory of agents' incentives in such situations and tests the predictions of this theory versus alternative theories by means of a quasi-experiment in professional soccer. When a nation qualifies for a major international tournament, such as the Soccer Euro Cup, the national coach is responsible for selecting the players who will be on the national team that plays in the Cup.[7] Our theory then predicts that players who

decision-maker's information about all agents is identical.

[5]The intuition for this result goes back to the career concerns literature, building on Holmström (1982), where uncertainty about the agent's skill is necessary for him or her to find it profitable to exert effort.

[6]In firms, an interesting tension may arise between two possible goals of hiring and promotion systems: motivating internal agents by the prospect of a future promotion, and selecting the most promising candidate out of a pool of both internal and external candidates. Chan (1996) analyzes this conflict. In the example we consider no such tension arises, since the principal cannot contract with the agents prior to the nomination decision.

[7]National team composition is flexible in friendly matches between nations or qualification matches for international Cups, but not for Cups.

expect they have a chance of being nominated by the national coach, but about whose skill the national coach has less then perfect information, should increase their effort during the nomination period so as to jam the signal the national coach will receive about their ability. We would therefore expect that the performances of these players in club matches should improve (relative to their colleagues) during the "nomination season".

We test this prediction using a panel dataset on the German Soccer League (*1. Bundesliga*) in the seasons 2006/07 and 2007/08. A subset of players belong to nations that in summer 2008 participated in the Euro Cup, the most prestigious international soccer Cup alongside the World Cup.[8] The national team coaches announced which players would participate in the so-called *Euro 2008* at the end of the 07/08 season. In our differences-in-differences analysis, the treatment group consists of all players who are nationals of a country qualified for the *Euro 2008*, and the treatment period is taken to start on the day the player's nation qualified. In players from nations that do not participate in the *Euro 2008* we have an exceptionally good control group, since these players work in exactly the same environment as players from qualified nations but do not face the additional career opportunity of the upcoming Cup.

Our data contain a variety of individual output measures, such as goals, shots on goal, duels won, passes received, and cross passes, as well as player substitutions during the game. In addition, data are available to control for several factors that should affect performance, such as whether the match takes place 'at home', the player's field position in a match, the player's current club, and the opponent team. Further controlling for constant quality differences between players, we find only weak evidence for a positive *average* impact of Euro Cup qualification on individual output. A likely cause for the absence of a strong average effect is that only a subset of players in the treatment group have a realistic chance of being nominated for their national teams.

To distinguish between players with different nomination chances, we construct a time-varying variable measuring a player's recent national team exposure, equal to the number of the player's national team participations divided by the total number of national team matches, both counted since the 2006 World Cup. A differences-in-differences-in-differences analysis using this variable shows that the impact of the Euro Cup treatment

[8]The Euro Cup and the World Cup each take place every four years. The last World Cup was in 2006. There are some other international cups, such as the *Copa America* or the *Africa Cup of Nations*, but these are not close to being as important (in terms of media coverage, premia paid by national teams, etc.) as the Euro and the World Cup.

is strongest (and positive) for players with an intermediate nomination chance, which is consistent with our nomination contest theory. Moreover, our results also lend support to what we call the 'injury theory': for several output measures, the effect of nomination contest participation is negative for players with an expected nomination probability close to one. This makes sense given that professional soccer carries a high injury risk, which can be reduced by a more passive style of play. This effect should be strongest for top players, for whom Cup participation is basically a certainty but conditional on avoiding an injury prior to the Cup. For players with no past national team exposure, we find no significant impact of the Euro Cup treatment on performance in club matches.

Next, we test for differential effects of the Euro Cup treatment by age, which we interpret as a measure of the accuracy of information national team coaches have about a player's skill. Our nomination contest theory predicts that very young players (possibly younger than any player in the League) should exert less effort than somewhat older players. Beyond a certain age threshold, however, effort to win the nomination contest should be lower the older a player. There is another reason to believe that older players will have lower incentives: the job market aspect of a Euro Cup should be more important for younger players who are less well-known and have longer careers ahead of them. Again using a differences-in-differences-in-differences analysis, we find evidence that participation in a nomination contest affected younger players more strongly than older players. This is compatible with the nomination contest theory for sufficiently high levels of precision, but also with predictions based on post Euro Cup career concerns.

Related Literature On the theoretical side, our paper introduces signal jamming as in Holmström's (1982) career concerns model in the theory of rank-order tournaments of Lazear and Rosen (1981). Höffler and Sliwka's (2003) basic model is similar to ours, but we allow for more asymmetries between agents and derive several additional comparative statics results that we then test empirically.

The theoretical predictions concerning the relation between anticipated winning probabilities and effort incentives would be the same in tournaments, where relative observed performances instead of perceived abilities determine payoffs. The empirical literature on tournaments focuses largely on the impact of higher prizes or prize differentials however; see Ehrenberg and Bognanno (1990) as well as Orszag (1994) for evidence from golf tournaments, Becker and Huselid (1992) for evidence from auto racing, Knoeber and Thurman (1995) for an examination of the impact of tournament-style contracts in the broiler industry, and Garicano and Palacios-Huerta (2005) for evidence on the effects of higher prize differentials on both creative and destructive effort in soccer.

The only paper we are aware of that provides (indirect) evidence that anticipated winning chances affect effort is Brown (2008),[9] who investigates the impact of superstar Tiger Woods' presence in golf tournaments using panel data. Her main result is that Tiger Woods' tournament participations had adverse effects on the performances of his competitors. Our paper's contribution to her study is threefold. First, we are able to construct a variable capturing each player's individual national team nomination chance. This allows us to test predictions concerning the relation between expected winning chances and effort incentives not only more directly but also more completely than Brown (2008). Second, we provide evidence in a situation where payoffs depend on perceived abilities, which is very common in (external and internal) labor markets but has received little attention in the empirical literature so far. Finally, the institutional characteristic that players of many different nationalities work for the same clubs but only some nations participate in the Euro Cup allows us to conduct an analysis akin to a randomized experiment, which strengthens causal interpretations.[10][11]

The literature testing the predictions of career concerns theory is small. Gibbons and Murphy (1992) find evidence that the sensitivity of contracted pay to performance for US executives increases as retirement approaches, which is consistent with optimal incentive contracting in the presence of career concerns. Chevalier and Ellison (1999a) find that younger fund managers are more likely to be fired for poor performance than more senior fund managers, and that younger managers are less likely to take unusual or bold actions. Hong, Kubik and Solomon (2000) reach similar conclusions examining security analysts. Chevalier and Ellison (1999b) also provide evidence that older managers perform worse than younger managers. They conclude that "younger managers are likely to work harder because they have a longer career ahead of them and because, as we show, they are more

[9]Sunde (2003) finds a negative correlation between the heterogeneity of opponents and the number of games in tennis matches. Interpreting these results in terms of effort incentives is problematic, however, since the same correlation would be expected even if effort played no role in tennis.

[10]Miguel, Saiegh and Satyanath (2008) also exploit the fact that the top soccer teams employ players of many different nationalities to test whether there is a relation between violence on the soccer field and cultural background.

[11]Brown (2008) deals with the problem of unobserved heterogeneity due to superstar Tiger Woods's decision to enter only certain tournaments by narrowing the sample to golf courses on which Tiger Woods has competed in some years only.

likely to be fired for poor performance".

By showing that younger players react more strongly to their countries' Euro Cup qualifications, we provide additional evidence consistent with career concerns. Importantly, the situation we consider allows us to compare not only young and old players, but also players of the same age in the treatment and the control group. This adds confidence to the conclusion that findings are due to age, and not driven by an unobserved factor correlated with age (such as systematic differences in educational backgrounds).

The next section develops a theory of nomination contests and derives comparative statics results that will provide the background for our empirical tests. Section 3 describes the data, our choice of output measures, and the institutional context. Section 4 explains and discusses our empirical strategy. Section 5 contains the empirical results, and section 6 concludes.

2 Theory

This section develops a simple model of nomination contests. Suppose that there are two agents (for example, soccer players of the same nationality) and that exactly one of them will be selected for an attractive post at the end of the nomination period. The nomination decision is taken by a principal (the national team coach) whose objective is to select the most skillful agent. Hence, unlike in a tournament à la Lazear and Rosen (1981), it is not the agents' relative performances but rather the principal's beliefs about the agents' skills that determine which agent wins the contest. The principal's prior beliefs about the agents' skills will have an important impact on expected winning probabilities and on incentives.

In modeling each agent's reputation formation we follow Holmström's (1982) seminal paper on career concerns. Let η_j denote agent j's ($j \in \{1, 2\}$) skill level, which is assumed to be fixed. At the beginning of the nomination season, the agents and the principal share the same prior beliefs about each η_j. Specifically, we assume that the prior of η_j follows a normal distribution with mean m_j and precision (equal to the inverse of the variance) h_j. The prior distributions of η_1 and η_2 are independent. Over time, learning about η_j will occur through the observation of j's performance. For simplicity, we consider learning in a single time period, called the nomination period. Agent j's output in the nomination period is given by

$$y_j = \eta_j + a_j + \varepsilon_j,$$

where $a_j \in [0, \infty)$ is j's effort in the nomination period, unobservable for the principal and agent $k \neq j$. ε_j is a stochastic noise term, and we assume that ε_1 and ε_2 are independently and normally distributed with zero means and precision h_ε.

We focus on the agents' efforts aimed at winning the nomination contest here, abstracting from the incentives generated by their work contracts and other career concerns. It would be straightforward to integrate this analysis into a richer model. Agent $j \neq k \in \{1, 2\}$ maximizes

$$\Pi_j \left(a_j; a_j^e, a_k, a_k^e\right) = P_j \left(a_j; a_j^e, a_k, a_k^e\right) W_j - c(a_j),$$

where $P_j \left(a_j; a_j^e, a_k, a_k^e\right)$ is the probability of j's nomination as a function of j's anticipated effort a_j^e as well as k's actual and anticipated effort levels a_k and a_k^e. $c(\cdot) : \mathbb{R}_0^+ \to \mathbb{R}_0^+$ is an increasing and strictly convex function measuring the disutility of effort. We treat W_j as exogenous here, but at the end of this section we will discuss ways in which W_j may be expected to depend on j's characteristics, in particular h_j.

The principal's objective is to nominate the most skillful agent; after observing y_1 and y_2 he will hence select j if and only if[12]

$$E[\eta_j \mid y_j] > E[\eta_k \mid y_k]. \tag{1}$$

Denote by (a_1^*, a_2^*) the equilibrium effort choices. In equilibrium, each agent's effort choice must be optimal given the other agent's effort choice and beliefs, and the principal must correctly anticipate effort choices, i.e., $a_j^e = a_j^*$ for $j = 1, 2$.

Given our normality and independence assumptions, the learning process about each agent's skill is well-known. For $a_j^e = a_j^*$, the posterior distribution of η_j will be normal with mean

$$\frac{h_j m_j + h_\varepsilon (y_j - a_j^*)}{h_j + h_\varepsilon} \tag{2}$$

and precision $h_j + h_\varepsilon$.

Let us now consider j's effort decision at the beginning of the period. From (2) it follows that, given $a_k = a_k^*$, if j chooses a_j then he will be nominated with probability

[12]We implicitly assume here that the principal is risk-neutral, and that the cost of incentive provision once the agent is nominated, i.e., during the Euro Cup in our soccer example, is unrelated to the agent's preceived ability. If $h_1 = h_2$, then there exists a biased tournament as in Meyer (1991, 1992) that is equivalent to the principal's decision rule. In this biased tournament, the contestant with the lower prior reputation has to outperform the other agents by a given amount in order to win. For $h_1 \neq h_2$, the rates at which the principal updates his beliefs about the agents' skills as a function of observed outputs differ, and therefore there is no such direct equivalence.

$$P_j(a_j; a_j^*, a_k^*, a_k^*) = \Pr\left\{\frac{h_j m_j + h_\varepsilon(\eta_j + a_j + \varepsilon_j - a_j^*)}{h_j + h_\varepsilon} > \frac{h_k m_k + h_\varepsilon(\eta_k + \varepsilon_k)}{h_k + h_\varepsilon}\right\}$$
$$= \Pr\left\{\frac{h_\varepsilon}{h_j + h_\varepsilon}(a_j - a_j^*) > \frac{h_k m_k + h_\varepsilon(\eta_k + \varepsilon_k)}{h_k + h_\varepsilon} - \frac{h_j m_j + h_\varepsilon(\eta_j + \varepsilon_j)}{h_j + h_\varepsilon}\right\}.$$

Define the random variable

$$\zeta_j \equiv \frac{h_k m_k + h_\varepsilon(\eta_k + \varepsilon_k)}{h_k + h_\varepsilon} - \frac{h_j m_j + h_\varepsilon(\eta_j + \varepsilon_j)}{h_j + h_\varepsilon}.$$

Our independence and normality assumptions imply that the *prior* distribution of ζ_j is normal with mean

$$z_j \equiv m_k - m_j \tag{3}$$

and variance[13]

$$\sigma^2 \equiv \left(\frac{h_\varepsilon}{h_k + h_\varepsilon}\right)^2 \left(\frac{1}{h_k} + \frac{1}{h_\varepsilon}\right) + \left(\frac{h_\varepsilon}{h_j + h_\varepsilon}\right)^2 \left(\frac{1}{h_j} + \frac{1}{h_\varepsilon}\right) \tag{4}$$

We denote this distribution by $\varphi_j(\cdot)$ with c.d.f. $\phi_j(\cdot)$. The probability of j's nomination given $a_k = a_k^*$ is then

$$P_j(a_j; a_j^*, a_k^*, a_k^*) = \Pr\left\{\zeta_j < \frac{h_\varepsilon}{h_j + h_\varepsilon}(a_j - a_j^*)\right\} = \phi_j\left(\frac{h_\varepsilon}{h_j + h_\varepsilon}(a_j - a_j^*)\right). \tag{5}$$

The marginal impact of a_j on j's expected payoff given $a_k = a_k^*$ is

$$\frac{\partial \Pi_j(a_j; a_j^*, a_k^*, a_k^*)}{\partial a_j} = \varphi_j\left(\frac{h_\varepsilon}{h_j + h_\varepsilon}(a_j - a_j^*)\right)\frac{h_\varepsilon}{h_j + h_\varepsilon} W_j - c'(a_i).$$

Note that if $c'(0) \geq \varphi_j(0)\frac{h_\varepsilon}{h_j + h_\varepsilon} W_j$, then $a_j^* = 0$.[14]

The first-order conditions for an equilibrium with $a_1^*, a_2^* > 0$ are

$$c'(a_1^*) = \varphi_1(0)\frac{h_\varepsilon}{h_1 + h_\varepsilon} W_1, \tag{6}$$
$$c'(a_2^*) = \varphi_2(0)\frac{h_\varepsilon}{h_2 + h_\varepsilon} W_2. \tag{7}$$

Note that each of these conditions is a function of only one of the effort levels: in equilibrium the principal correctly anticipates effort levels, which implies that given k indeed chooses a_k^*, j's nomination probability is independent of the *level* of a_k^*. Our assumptions

[13]Since the prior distributions of ζ_1 and ζ_2 have the same variance, we can simply denote this variance by σ^2, not using any subscript.

[14]Since a_j is j's effort *additional to* the effort he would have exerted in the absence of the nomination contest, it may well be that $c'(0) > 0$.

on $c(\cdot)$ imply that if $c'(0) < \varphi_j(0)\frac{h_\varepsilon}{h_j+h_\varepsilon}W_j$ for $j = 1, 2$, then each first-order condition has a unique and positive solution.[15] Note also that if $h_1 = h_2$ and $W_1 = W_2$, then $a_1^* = a_2^*$.

Assuming from now onwards that an interior equilibrium indeed exists, we are interested in the comparative statics of the equilibrium effort levels with respect to the model parameters. Evidently, $\frac{da_j^*}{dW_j} > 0$: the higher the prize of wining the nomination contest, the higher the incentive to provide effort. With respect to the parameters characterizing the prior belief distributions, we obtain the following results (the proof is relegated to the appendix):

Proposition 1 *(i) For every $j \neq k \in \{1, 2\}$, a_j^* depends on $\Delta = |m_1 - m_2|$ but not on m_1 and m_2 individually, and*

$$\frac{da_j^*}{d\Delta} < 0 \text{ if } \Delta > 0,$$
$$\frac{da_j^*}{d\Delta} = 0 \text{ if } \Delta = 0.$$

(ii) Given $(m_j, m_k, h_k, h_\varepsilon)$, there exists for every $j \neq k \in \{1, 2\}$ a threshold $\widehat{h}_j > 0$ such that

$$\frac{da_j^*}{dh_j} \gtreqless 0 \text{ if and only if } h_j \lesseqgtr \widehat{h}_j.$$

Similarly, given $(m_j, m_k, h_j, h_\varepsilon)$ there exists for every $j \neq k \in \{1, 2\}$ a threshold $\widehat{h}_k > \widehat{h}_j$ such that

$$\frac{da_j^*}{dh_k} \gtreqless 0 \text{ if and only if } h_k \lesseqgtr \widehat{h}_k.$$

Moreover, $lim_{h_j \to 0}\frac{da_j^*}{dh_j} = \infty$, and $lim_{h_j \to \infty} a_j^* = 0$.

Figures 1 and 2 illustrate how a_1^* varies with m_1 and h_1, respectively, in an example. The intuition for part (i) of the Proposition is straightforward. Ceteris paribus a smaller difference Δ between the mean prior reputations means that the race is closer in terms of the expected winning probabilities being more equal. For each agent, a small increase in effort is then more likely to affect the contest outcome and therefore more attractive.

[15] The second-order equilibrium conditions are

$$\varphi_j'(0)\left(\frac{h_\varepsilon}{h_j + h_\varepsilon}\right)^2 W_j < c''\left(a_j^*\right) \text{ for all } j \neq k \in \{1, 2\}.$$

If $m_j = m_k$, then $\varphi_j'(0) = 0$ for $j = 1, 2$, so the second-order conditions always hold in that case. In what follows, we will assume that the second-order conditions are always satisfied.

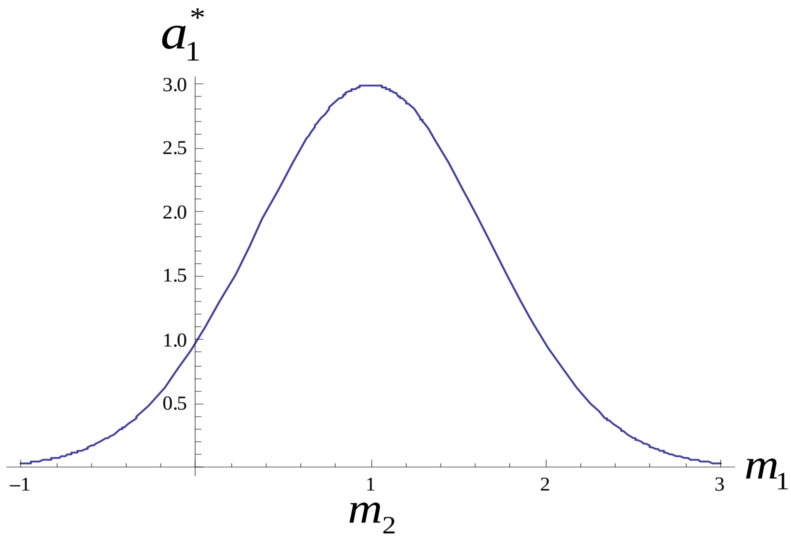

Figure 1: 1's equilibrium effort if $c(a) = \frac{a^2}{2}$, $m_2 = 1,\ h_1 = 1,\ h_2 = 2, h_\varepsilon = 1, W_1 = 10$.

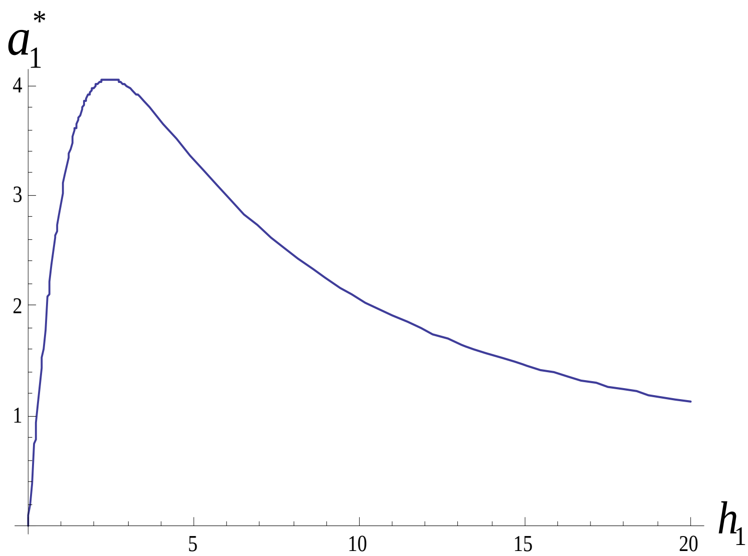

Figure 2: 1's equilibrium effort if $c(a) = \frac{a^2}{2}, m_1 = m_2 = 1,\ h_2 = 2, h_\varepsilon = 1, W_1 = 10$.

The intuition for (ii) is more involved. An increase in the precision h_j of the prior distribution of beliefs about η_j has two effects on the first-order condition that determines a_j^* (conditions (6) and (7), respectively). First, it lowers the rate $\frac{h_\varepsilon}{h_j+h_\varepsilon}$ at which a marginal increase in $y_j - a_j^*$, and hence a marginal increase in a_j given anticipated effort a_j^*, improves j's posterior reputation as given in (2). This is a standard effect in learning models, which ceteris paribus predicts that higher precision leads to less effort. Second, an increase in h_j makes the distribution $\varphi_j(\cdot)$ more precise and thereby also affects $\varphi_j(0)$, the (prior) density of identical posterior reputations; $\varphi_j(0)$ captures the anticipated probability that the contest will have a close outcome at the end of the nomination period. Since a marginal change in effort is more likely to alter the contest outcome if posterior reputations are similar with a higher probability, any increase in $\varphi_j(0)$ raises effort incentives. A priori the sign of this second effect is ambiguous however. If prior reputations are identical ($\Delta = 0$), then $\varphi_j(0)$ is the density at the mean $z_j = 0$, which indeed rises as (the normal distribution) φ_j becomes more precise.[16] For $\Delta > 0$, the sign of the second effect depends on the size of the difference between the prior reputations relative to the variance σ^2 of φ_j. If m_k and m_j are sufficiently close given σ^2, or σ^2 is sufficiently large given Δ, then the sign of the second effect is positive; otherwise it is negative. Since $\frac{\partial\sigma^2}{\partial h_j} < 0$ and $\lim_{h_j\to 0}\sigma^2 = \infty$, the effect is always positive for h_j sufficiently close to 0; it also always dominates the first effect in this case. For large enough h_j, however, the first effect always dominates, as the rate of updating approaches zero.

Höffler and Sliwka (2003) use a similar model to analyze the incentives of a firm owner to replace an incumbent manager by someone with less information about the agents' past performances. The manager's task is to select the most skillful of two agents for a promotion at the end of every period. Replacing the manager can increase the agents' effort incentives by starting a fresh race for the valuable promotion. Unlike the analysis presented in this section, Höffler and Sliwka (2003) do not allow for heterogeneity in the levels of precision of the prior distributions about agents' skills, nor do they any derive comparative statics results with respect to these parameters.

So far we treated the nomination prize W_i as an exogenous parameter in order to

[16] Rosen (1986) identifies a similar effect in ladder tournaments, where winning probabilities at each stage are a given function of talents and effort levels, and players form opinions about their own and their opponents' talents. In equilibrium the prior reputations of two players meeting for a match are always identical. When there are only two possible talent levels, the marginal effect of effort on winning is then increasing in the precision with which players assess their talents.

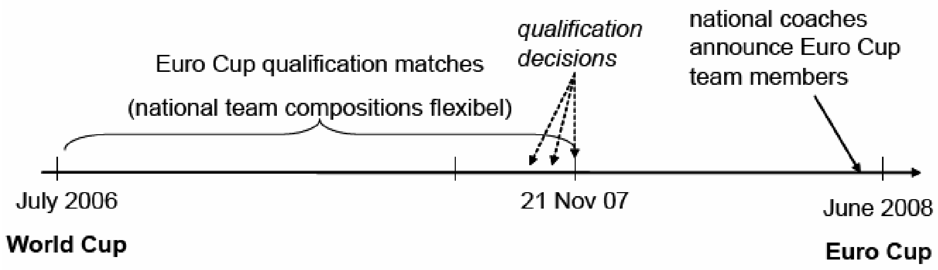

Figure 3: Timeline

simplify the analysis and focus on the rivalry between agents for nomination, but it makes sense to think of W_i as a function of i's reputation. In the nomination contests for national Euro Cup soccer teams that we will analyze, W_j includes the expected monetary (premia for cup participation, possible endorsement revenues, improved career prospects) and non-monetary (honor and fame) returns from participation in a prestigious international Cup. One would expect the following relationships due to post Cup career concerns. First, the higher the prior precision h_i (and hence also the posterior precision, $h_i + h_\varepsilon$), the lower W_i. An international Cup is likely to make the biggest difference in terms of future career prospects for players about whose ability the market is still rather uncertain. Related to this, h_i is also likely correlated with the seniority of a player, which means that players with low h_i typically also have a longer career ahead of them and therefore more to gain from Cup participation. Second, a superstar, i.e., a player with a very high reputation relative to other players, *may* not have as much to gain as less famous players. Last, in a model with more than two agents one would expect W_i to depend more explicitly on i's rank within the set of nominated players. In national soccer teams, the "last" players to be nominated are likely to spend most or even all of their time in reserve, and hence have few opportunities to shine.

3 Data and Institutional Characteristics

3.1 *Euro 2008* qualifications and player nominations

Our empirical analysis focuses on the time period between the end of the World Cup 2006 on July 9, 2006, and the end of the 2007/08 soccer season on May 17, 2008. As illustrated by the timeline in Figure 3, the qualification matches for the *Euro 2008* started shortly after the World Cup. All eligible nations, fifty in total for the *Euro 2008*, usually participate in the qualification matches. The sixteen participating countries were officially announced on November 21, 2007, but several countries already *de facto* qualified before that date. Using the outcomes of the qualification matches, we found the de facto qualification dates for all Euro Cup participants; a group of four countries (Germany, Greece, Romania and the Czech Republic) qualified about one month before the official date, on either the 13th or 17th of October, while ten other nations qualified on the 17th or 21st of November. The two remaining participants were Austria and Switzerland, the host nations, which traditionally participate automatically. We exclude players with citizenship of these two countries from the empirical analysis.

National coaches can select different players for every non-Cup national match if they wish to do so, and as we will document there is indeed considerable variation over time in national team compositions for non-Cup matches. The coaches have to nominate a fixed team of 23 players for the Cup, however. The deadline for the coaches' announcements of their *Euro 2008* teams was May 28, 2008, eleven days after the end of the German soccer season. There were some differences between qualified countries regarding the date and procedures according to which national coaches announced their nomination decisions, but most coaches made their final statements either between the last but one and the last, or after the last game day of the season.

A number of other international tournaments took place in the relevant time period: the *Copa America* in July 2007, the *Africa Cup of Nations* in January 2008, and the 2008 Olympic games in August 2008. These Cups could potentially interfere with our analysis by creating similar incentives as the *Euro 2008* but for different groups of players. However, in soccer these other international tournaments are much less important in terms of media coverage and endorsement opportunities than Euro Cups, and some clubs do not even allow their players to miss club activities in order to participate.[17] Formally testing for an incentive effect of the *Copa America*, using the same empirical strategy as described below for the *Euro 2008*, we found no evidence of such an effect whatsoever. We therefore feel that it is safe to ignore these other international Cups in the analysis.

[17]For example, Bundesliga clubs Schalke 04 and Werder Bremen clashed with the Brazilian national team over the participation of their players in the 2008 Olympic games. Similarly, Guy Demel of Hamburger SV forwent playing for his home country Ivory Coast in the *Africa Cup of Nations* in 2008 to have more time available for his club.

3.2 Data and output measurement

We use a panel dataset that contains player-game day level information on the German Soccer League (*1. Bundesliga*) in the seasons 2006/07 and 2007/08.[18] For each of the 216 matches in each season, we have information about all players who participated in the match - either on the field or on the reserve bench -, and about various dimensions of their performances. In addition, we gathered data on national team matches of the same players between the World Cup 2006 and the *Euro 2008* using publicly available sources;[19] the latter data we used exclusively for constructing a variable summarizing a player's past national team exposure.

We keep only those players in the dataset for whom we have observations in the German Soccer League both before and after the official *Euro 2008* qualification date in November 2007, and in Season 06/07, and who were on the field at least once in the two seasons. Moreover, we exclude goalkeepers as they have very different tasks than field players, and most of the performance measures we will use are not applicable to them.

Table 1 provides an overview of the players' nationalities. The treatment group "Euro 2008" consists of all players whose nations participated in the *Euro 2008* (except for those of Austrian or Swiss nationality), and the control group consists of all other players. About half the players are of German nationality, but the others originate from all over the world. Incidentally, the German Soccer League was the best represented in the *Euro 2008*, with active players in fourteen out of sixteen teams. Tables 2 and 3 present descriptive statistics for players from participating and non-participating nations, respectively; all statistics refer to club matches in the German League. On average *Euro 2008* - Europeans are younger, occupy midfield positions more frequently, and have lower outputs than players in the control group. Several of these comparison would be reversed if Germans were excluded from the sample.

We think of unobservable effort as choices such as training intensity and lifestyle (nutrition, sleeping habits,...), as well as concentration and motivation on the soccer field. To measure observable individual output, we rely on the following measures:[20]

[18]The data was kindly provided by *Impire*, a company specialized in collecting and selling sports data.

[19]We relied on the following websites: ESPNsoccernet.com, FIFA.com, Kicker.de, and Worldfootball.net.

[20]In addition, we also have information on the fouls committed and suffered by each player. Fouls suffered could be interpreted as a positive performance measure, the idea being that stronger players are harder to stop. Fouls committed can be viewed as a measure of destructive effort. This is the approach

Table 1: Number of players by nationality

Group	Nationality	Players
Euro 2008	Czech Republic	8
	Croatia	7
	France	3
	Germany	121
	Greece	3
	Netherlands	5
	Poland	7
	Portugal	3
	Romania	2
	Russia	1
	Sweden	2
	Turkey	3
	All Euro 2008	165
non-Euro 2008	Albania	2
	Algeria	1
	Argentinia	5
	Australia	2
	Belgium	3
	Bosnia-Herzegovina	3
	Brazil	17
	Cameroon	2
	Canada	1
	China	1
	Congo DR	1
	Denmark	7
	Egypt	1
	Finland	1
	Georgia	1
	Ghana	3
	Guinea	1
	Hungary	2
	Iran	2
	Ivory Coast	3
	Japan	1
	Macedonia	2
	Mexico	2
	Namibia	1
	Nigeria	1
	Paraguay	2
	Peru	1
	Serbia	3
	Slovakia	3
	South Africa	1
	Tunesia	2
	Uruguay	2
	USA	1
	All non-Euro 2008	81
	All players	246

Notes: The sample excludes goalkeepers, players of Austrian or Swiss nationality, or players for whom we have observations in one season only or only either after or before the official *Euro 2008* qualification date.

Table 2: Summary statistics for players from nations participating in the *Euro 2008* (number of players = 165)

Variable	Mean	Std. Dev.	Min	Max	N
Age	26.866	4.021	19.43	38.58	7875
Forward (dummy)	0.351	0.477	0	1	7875
Midfield (dummy)	0.465	0.498	0	1	7875
Minutes played	61.952	36.902	0	96	7875
Goals	0.096	0.329	0	4	7875
Goals per minute played	0.001	0.006	0	0.13	6603
Shots on goal	1.000	1.387	0	10	7875
Shots on goal per minute played	0.017	0.024	0	0.33	6603
Passes received	19.105	15.097	0	83	7875
Passes received per minute played	0.308	0.153	0	1.33	6603
Ball contacts	38.427	26.783	0	132	7875
Ball contacts per minute played	0.612	0.206	0	2	6603
Duels won	8.326	6.230	0	33	7875
Duels won per minute played	0.135	0.071	0	1	6603
Cross passes	0.860	1.384	0	12	7875
Cross passes per minute played	0.014	0.023	0	0.33	6603
Fouls suffered	1.129	1.430	0	10	7875
Fouls suffered per minute played	0.018	0.023	0	0.33	6603
Fouls committed	1.150	1.364	0	11	7875
Fouls committed per minute played	0.019	0.023	0	0.5	6603

Notes: The sample excludes goalkeepers, players of Austrian or Swiss nationality, or players for whom we have observations in one season only or only either after or before the official *Euro 2008* qualification date. Output per minutes measures are calculated using only observations associated with a positive number of minutes on the field.

Table 3: Summary statistics for players from nations not participating in the *Euro 2008* (number of players = 81)

Variable	Mean	Std. Dev.	Min	Max	N
Age	28.691	3.352	19.90	36.69	3946
Forward (dummy)	0.390	0.488	0	1	3946
Midfield (dummy)	0.403	0.491	0	1	3946
Minutes played	64.733	35.117	0	96	3946
Goals	0.100	0.334	0	3	3946
Goals per minute played	0.002	0.008	0	0.25	3450
Shots on goal	1.056	1.389	0	9	3946
Shots on goal per minute played	0.018	0.026	0	0.5	3450
Passes received	20.427	15.283	0	85	3946
Passes received per minute played	0.313	0.150	0	1.06	3450
Ball contacts	41.261	26.936	0	130	3946
Ball contacts per minute played	0.626	0.208	0	1.6	3450
Duels won	8.986	6.107	0	34	3946
Duels won per minute played	0.140	0.073	0	2	3450
Cross passes	0.841	1.378	0	11	3946
Cross passes per minute played	0.014	0.023	0	0.5	3450
Fouls suffered	1.291	1.521	0	11	3946
Fouls suffered per minute played	0.020	0.024	0	0.5	3450
Fouls committed	1.297	1.401	0	10	3946
Fouls committed per minute played	0.021	0.030	0	1	3450

Notes: The sample excludes goalkeepers, players of Austrian or Swiss nationality, or players for whom we have observations in one season only or only either after or before the official *Euro 2008* qualification date. Output per minutes measures are calculated using all observations associated with a positive number of minutes on the field.

Goals - The ultimate objective of a soccer team is to shoot goals and prevent goals by the opponent so as to win the match. Goals are a good measure of individual output for forward players in particular.

Shots on goal - This output measure includes goals, but also shots kicked at the opponent's goal that were eventually blocked by an opponent, a teammate, the goal post or crossbar. The advantage of shots on goal as an output measure compared to goals is that they occur at a much higher frequency, and are less subject to luck. Shots on goal are again most pertinent as an output measure for forward players.

Passes received - This measure counts the number of passes a player receives from his teammates. It is a good indicator of how active the player is on the field, which in turn is related to his fitness, and second, his teammates' current trust in his ability to make a valuable contribution to the game.

Ball contacts - Ball contacts is a more aggregate measure than passes received of how involved a player is, and also reflects a player's success in obtaining the ball.

Duels won - A duel is a situation where two players fight for the ball in direct confrontation. A duel counts as won if the player himself or one of his teammates finally obtains the ball. Duels won measures physical fitness, and dedication.

Cross passes - Long and usually high pass played from the sidelines intended for attacking players close to the opponent's goal. This a measure of running effort and offensive motivation.

Minutes played - Our data also include detailed information on player substitutions during a match. The rules of the game specify that the coach can make at most three substitutions per match, and in the majority of matches coaches make two or three substitutions, in 80% of cases in the last 30 minutes of a match (total match length is 90 minutes plus a few minutes extra time). It makes sense to view a player's number of minutes played as a relevant output measure. First, a player's performance on the field will influence the coach's substitution decisions.[21] Second, the club coach's decision to let a player be one of players starting the match or stay on the field for a long time depends

taken by Garicano and Palacios-Huertas (2005), who provide empirical evidence for Lazear's (1989) prediction that relative performance evaluations can lead to undesirable sabotage. Once we control for constant differences between players by means of player fixed effects, our regressions show no significant effects of nomination contest participation on either fouls suffered or fouls committed.

[21] This implies that an endogeneity problem would arise if we tried to control for the number or minutes played by using it as an explanatory variable for say a player's number of shots on goal.

on the player's effort and performance during training activities, observable by the club coach but typically not by the national coach.[22]

The fact that some players spend much more time on the field than others implies that comparing total outputs such as number of goals of different players could be misleading. Not surprisingly, the correlations between some per match output measures and minutes played reported in Table 4 are strong. A way out of this would be to exclude observations of players who were substituted (out or in), but in the many matches with three substitutions this would make us lose 6 out of 14 observations (with field appearance) per team.

To disentangle the two performance dimensions 'time spent on the field' and 'performance while on the field', our approach will be the following. First, we run regressions with minutes played as the dependent variable. Second, we run regressions for various outputs *per minute played*; one issue with per minute played measures is however that, as reported in the lower half of Table 4, for outputs such as shots on goal there is a negative correlation between output per minute and minutes played. This can be attributed to physical exhaustion as well as associated energy management strategies. Interestingly, though, the correlation tends to be positive for output measures more strongly related to team play. This points to the fact that players need some time to get involved into the team's game.

To rule out that our findings are driven by differences in minutes played via such correlations, we keep only observations associated with at least 71 minutes, the median substitution time for starters conditional on being substituted out.[23] The average number of shots on goal per minute is about 0.022 for players who play 71 minutes or less, but only 0.014 for players who play more than 71 minutes. The difference between the averages for players who play more than 71 and those who play more than 90 minutes is very small on the other hand: 0.014 versus 0.013. By adding the condition that minutes played exceed the median substitution time for starters, we can hence substantially alleviate the problem of comparing observations based on appearances of different lengths without losing too many observations.

[22]Even famous players may have to work hard to convince the coach to let them play. A point in case is Lukas Podolski, a star of the German national team during World Cup 2006, who had just five league starts between August 2007 and September 2008 at the Bayern München team.

[23]The results would be very similar if instead we kept only observation of starters. If we adopted the stricter conditions of no substitutions, some but fewer of our results would be significant.

Table 4: Correlations between different output measures

	Variables	Minutes played	output per game: Shots on goal	Goals	Passes received	Ball contacts	Duels won	Cross passes	output per minute played: Shots on goal	Goals	Passes received	Ball contacts	Duels won
per game	Shots on goal	0.227	1.000										
	Goals	0.082	0.385	1.000									
	Passes received	0.587	0.247	0.050	1.000								
	Ball contacts	0.761	0.158	0.003	0.882	1.000							
	Duels won	0.672	0.196	0.065	0.435	0.622	1.000						
	Cross passes	0.194	0.199	0.049	0.345	0.294	0.133	1.000					
per minute played	Shots on goal	-0.141	0.708	0.279	-0.007	-0.116	-0.062	0.082	1.000				
	Goals	-0.060	0.250	0.756	-0.035	-0.083	-0.035	0.008	0.341	1.000			
	Passes received	0.014	0.129	0.005	0.729	0.488	0.060	0.260	0.111	0.013	1.000		
	Ball contacts	0.115	0.014	-0.068	0.653	0.655	0.238	0.222	0.009	-0.051	0.809	1.000	
	Duels won	-0.032	0.033	0.005	0.023	0.086	0.524	-0.003	0.050	0.015	0.079	0.266	1.000
	Cross passes	-0.101	0.096	0.015	0.113	0.033	-0.063	0.766	0.134	0.012	0.239	0.181	0.020

Notes: The sample excludes goalkeepers, players of Austrian or Swiss nationality, or players for whom we have observations in one season only or only either after or before the official *Euro 2008* qualification date. Output per minutes measures are calculated using only observations associated with a positive number of minutes on the field.

4 Empirical Strategy

Our empirical analysis investigates the impact of a nation's qualification for the *Euro 2008* on the club match outputs of players from that nation. Assuming for now that the effect of the Euro treatment is a constant, denoted δ, the basic regression equation we estimate is:

$$Y_{int} = \gamma_i + \alpha_t + \delta qualified_{nt} + X'_{int}\beta + \varepsilon_{int}, \tag{8}$$

where Y_{int} is the output of player i of nationality n on game day t. The treatment dummy $qualified_{nt}$ equals 1 if and only if nation n is qualified for the *Euro 2008* at time t, and X_{int} is a vector of covariates. None of the covariates depends directly on a player's nationality, so in fact $X_{int} = X_{it}$; it includes a dummy variable indicating whether player i's club plays at home or as a visitor on day t, player i's club on day t, player i's opponent club on day t, and player i's position on game day t.[24] The player fixed effects γ_i pick up any (time-invariant) differences between players, both before and after the Euro Cup qualifications decisions.[25] The game day dummies α_t pick up any changes in conditions affecting all players in the German league. The coefficient of $qualified_{nt}$ estimates the average effect of Euro Cup qualification on the output in club matches of players from the qualified nations.

The identifying assumption is that in the absence of the Euro Cup treatment, players from qualified countries and players from non-qualified countries would have evolved similarly over time (given controls), i.e., that $\delta = 0$ in that case. Since players in the treatment and the control group work in the same environment and are subject to similar incentive systems in the absence of international Cups, we think that there is little reason to doubt this. A player's *eligibility* for the Euro Cup treatment, i.e., his nation's participation in the qualifications, is determined exogenously by geography.[26] Within the

[24]It is relatively common for players to move between midfield and forward positions, or between defense and midfield positions, in different matches.

[25]The reader may wonder why age is excluded from the list of covariates. This is because in order to avoid that the age variable picks up a time trend, we use a time-invariant age variable (age on May 17, 2008). In unreported regressions without player fixed effects, we find an inverted U-shape relationship between most output measures and age.

[26]In some cases players can legally change nationality. Formerly Brazilian player Deco's adopted Portuguese citizenship for example, mainly to participate in the Euro 2004 and World Cup 2006. Authorities and the FIFA have a critical attitude to such steps, however, which are therefore very rare. Nationality changes by players who grew up in a country other than their country of origin, such as Ghanaian-born Gerald Asamoah who adopted German citizenship, are naturally more common.

group of Europeans, the assignment of the treatment, i.e., a nation's qualification, should depend on the skills of players who participated in the qualification matches, so for some European players selection into the treatment is not completely random at this stage; however, even if some players' outputs are indeed positively correlated with treatment status, it seems reasonable to assume these are no longer correlated once we control for constant skill/output differences between players by means of player fixed effects.

Our differences-in-differences analysis is based on the underlying assumption that de facto qualification dates are relevant for determining the beginning of the treatment for *Euro 2008* - Europeans. One may argue though that even earlier on players from countries likely to qualify already exerted additional effort to increase their individual nomination chances. We believe that our analysis is pertinent nonetheless. On the de facto qualification date, there is a discrete upward jump in qualification probability (to 1) for qualified nations, associated with a permanent increase in treatment intensity.[27] The theory predicts a positive reaction to such a permanent discrete change even if players were already concerned with the nomination contest previously. In principle, we could estimate pre-qualification treatment intensities combining the outcomes of completed qualifications matches with national team ratings that determine winning probabilities for upcoming qualification matches. A difficulty when using such intensities would be that once we consider a longer time horizon, discounting, an issue we neglect in the present analysis,[28] should be quite important. Finally, it is unlikely that knowing more about pre-qualification treatment intensities would allow us to yield additional insights concerning what will be our main interest, the comparison of effects on players with different characteristics.

As mentioned in the introduction, there are several possible explanations for why an upcoming international Cup may have affect the outputs of players from qualified nations. In order to discriminate between the nomination contest theory and alternative explanations, we construct, as a proxy for player i's anticipated nomination chance, the following time-varying variable in $[0, 1]$ measuring i's national team exposure since World

[27]Similarly, for all non-qualified nations there is a downward jump to zero at some point in time, in many cases already long before the official qualification date. The group of players from these nations in our sample is somewhat small ($n = 23$) to identify significant effects. Most Europeans from non-qualified nations are from nations highly unlikely to participate in a Euro Cup; in particular, our sample contains no players from England, a nation that was expected to qualify but in the end failed.

[28]Testing for trends in the reaction to the Euro Cup treatment revealed no clear picture.

Cup 2006 (WC06):

$$natteam_{it} = \frac{\text{number of } i\text{'s national team appearances since WC06}}{\text{number of national team matches of } i\text{'s nation since WC06}}$$

National team matches include friendly matches as well as qualification matches for the *Euro 2008* or other international tournaments. In the sample containing all players active both in 06/07 and 07/08 (and after Nov. 07), $natteam_{it} = 0$ at all dates t for 109 out of the 165 players of *Euro 2008* nationalities, and for 20 of the 81 players of other nationalities. Figure 4 depicts the distribution of $natteam_{it}$ for players of *Euro 2008* nationalities in the 07/08 season, conditional on $natteam_{it} > 0$. The Figure shows much variation in $natteam_{it}$ for those players with some national team exposure since World Cup 2006.[29]

Table 9 in Appendix 2 shows that the values of *natteam* at the time of final nomination decisions (at the end of the 07/08 season) are closely related to the actual nominations for the *Euro 2008* German national team. For all other *Euro 2008* nationalities, the player(s) in our sample with the highest end of season values of *natteam* were nominated, i.e., nomination decisions were perfectly in line with the rankings of final *natteam* values.

The nomination contest theory predicts a non-monotonic effect of $natteam_{it}$ on the effort of players from *Euro 2008* nations during the nomination contest period. Players who believe they will be nominated with an intermediate probability should exert high effort to convince the national coach of their skill. Players with $natteam_{it}$ close to 0 or 1, on the other hand, expecting that small performance changes will not affect the national coach's decision, should not alter their effort much or at all. To capture the uncertainty of a player's nomination we construct the variable $natteam_{it}\,(1 - natteam_{it})$; the nomination contest theory predicts strong effects for high $natteam_{it}\,(1 - natteam_{it})$, and no effect for $natteam_{it}\,(1 - natteam_{it}) = 0$.

The 'training theory' instead predicts higher output the higher *natteam*. Ceteris paribus, a player who thinks he will be nominated with a higher probability has more to gain from increasing his training intensity to be in good shape for the Cup. Moreover, players with high *natteam* may receive more (or different) training at the national team level. The 'injury theory', on the other hand, predicts lower club output the higher $natteam_{it}$, because players who expect to be on the national team have a higher incentive to avoid injuries in the months before the Cup, which could adversely affect their output.

[29] The total number of national team matches was similar for the treatment and the control group, and the analogue to Figure 4 for players in the control looks similar.

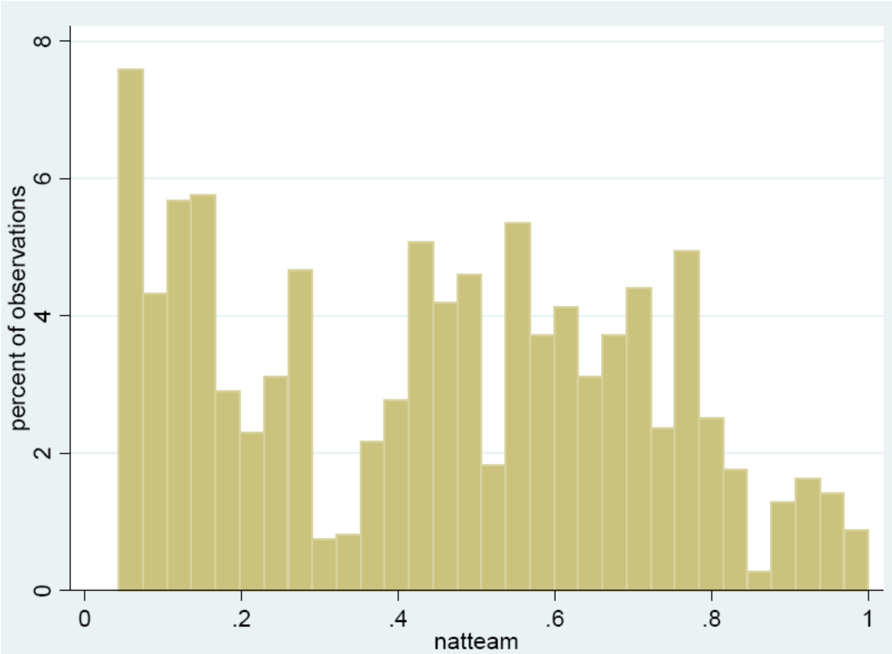

Figure 4: Histogram of $natteam_{it}$ for players from *Euro 2008* nations in season 07/08, conditional on $natteam_{it} > 0$. The sample excludes goalkeepers, and players of Austrians or Swiss nationality. The number of players is 56, and the number of player-gameday observations 1478.

Of course, several of these theories may matter at the same time; for instance, a player with an intermediate nomination chance may increase training intensity with two objectives in mind: improving his nomination chance, and, conditional on being nominated, performing well in the Cup.

To discriminate between these different theories, we estimate the following differences-in-differences-in-differences regression equation:

$$\begin{aligned} Y_{int} = \; & \alpha_t + \gamma_i + \delta_0 qualified_{nt} \\ & + \delta_1 qualified_{nt} natteam_{it} + \delta_2 qualified_{nt} natteam_{it} \left(1 - natteam_{it}\right) \\ & + \eta_1 natteam_{it} + \eta_2 natteam_{it} \left(1 - natteam_{it}\right) \\ & + \rho_1 euro_n natteam_{it} + \rho_2 euro_n natteam_{it} \left(1 - natteam_{it}\right) \\ & + \pi_1 after_t natteam_{it} + \pi_2 after_t natteam_{it} \left(1 - natteam_{it}\right) \\ & + X'_{int}\beta + \varepsilon_{int}. \end{aligned} \tag{9}$$

All three theories predict that δ_0, the effect on players from *Euro 2008* nations who have no realistic chance of being nominated, should be zero. The nomination contest theory moreover predicts a positive coefficient δ_2. The 'training theory' predicts a positive δ_1, but the 'injury theory' a negative δ_1.

The covariates $natteam_{it}$ and $natteam_{it}(1 - natteam_{it})$ also enter the regression equations interacted with the variable $euro_n$, indicating whether n is a *Euro 2008* participant, and $after_t$, which indicates the time period after the official qualification date (November 21, 2007). These interactions are introduced to make sure that the estimates of δ_1 and δ_2 capture the effect of national team exposure in combination with Cup qualification rather than differential effects for different nationalities or in different time periods.

We see two main reasons why $natteam_{it}$ may affect player performance even in the absence of concerns related to participation in an international Cup. On the one hand, playing for the national team may wear out a player, but on the other hand, the national team may provide a player with additional training or experience useful for his club matches. When using $natteam_{it}$ as an explanatory variable, however, we face the following potential problem: although we control for time-invariant quality differences between players, both $natteam_{it}$ and Y_{it} may be driven by unobservable variation in i's ability (temporary ups and downs in his physical shape for example). What makes the problem less severe conceptually is that $natteam_{it}$ is based on past observations, while Y_{it} depends only on the current shape of the player. The results in the next section indicate that we have no such simultaneity problem: the estimated coefficient of $natteam_{it}$ turns out to be insignificant in all regressions.

Another prediction of the nomination contest theory is that the precision about a player's ability should affect his effort to win the contest. Roughly speaking, the incentive effect should be low for both very unknown players and well-known players, but high for players about whom the national trainer has some yet limited information (see Figure 2 for this in an example). However, we would expect a decreasing relationship if there is sufficient information about all professional soccer players so that the area of precision close to zero in the theory can be ignored. In addition, post Euro Cup career concerns should be stronger for less known players, which implies that those players should have a higher incentive to make it into the national team.

We use age as a proxy for the precision of beliefs about a player's ability. A possible alternative measure would be seniority, a good measure of which would probably be the number of years a player has played in one of the top soccer leagues (essentially the Italian, English, Spanish, French, and German leagues).[30] We decided to use age instead, since

[30] Using a player's seniority in the German league alone would not be very meaningful, since players often move between different leagues, and the number of years played in the German league does not

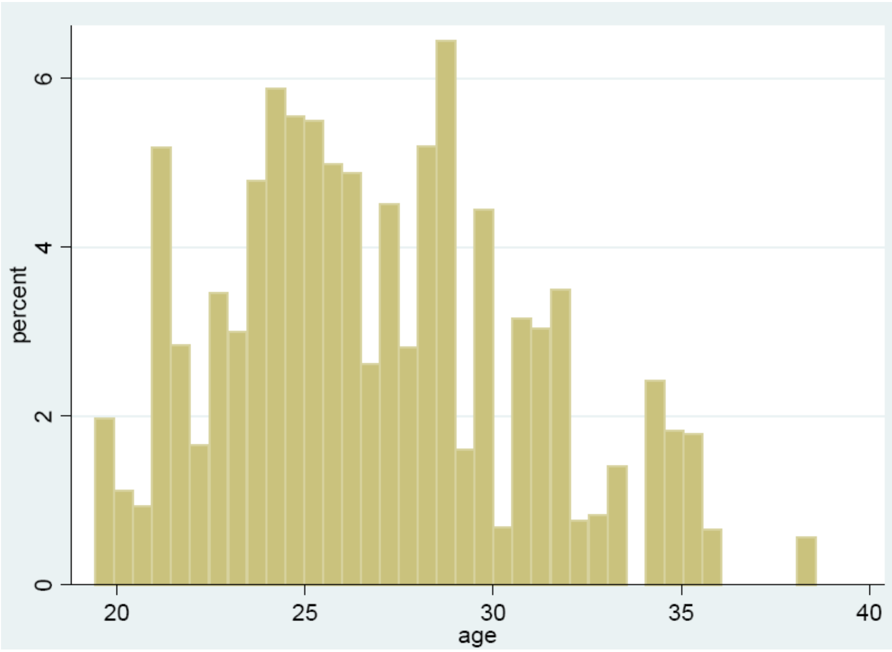

Figure 5: Distribution of age (on May 17, 2008) of players from nations that qualified for the *Euro 2008*. The sample excludes goalkeepers, and Austrian or Swiss players. The number of players is 165.

this information is more readily available, and the starting age for a professional career in soccer, as in most other sports, does not seem to differ much across players. Figure 5 shows the distribution of age for players in the treatment group.

The basic regression equation we will use to test for differential effects as a function of age is

$$\begin{aligned} Y_{int} = \quad & \alpha_t + \gamma_i + \delta_0 qualified_{nt} + \delta_1 qualified_{nt} \left(age_i - \overline{age_i}\right) \\ & + \mu_1 after_t \left(age_i - \overline{age_i}\right) + X'_{int}\beta + \varepsilon_{int}, \end{aligned} \tag{10}$$

where an upper bar denotes the mean over players in the treatment group. To capture the possible non-monotonicity predicted by the nomination contest theory, we also estimated regressions including interactions terms with the (demeaned) square function of age_i and other more complex functions, or dummies for different age groups based on percentiles of the age distribution. None of these analyses yielded significant results, however, which is why we will focus on the results obtained using a simple linear interaction term as in (10). The coefficient δ_0 estimates the treatment effect for a treated player of average age, while δ_1 tests for differential effects by age. Since the regression equations already

seem relevant for determining how well, say, Italy's national coach knows an Italian player.

includes player fixed effects, we do not include separate age covariates, or interactions between $euro_n$ and the age variables. The interactions with $after_t$ pick up any particular relationship between age and output after the qualification date but not specific to players from qualified nations.

Because our data on minutes played take on nonnegative integer values (between 0 and 96), a count model is appropriate for regressions with minutes played as the dependent variable; we will use the negative binomial model, since the Poisson model is rejected at high degrees of confidence.[31] For all other dependent variables, which are outputs (shots on goal,...) per minute played and hence continuous, we use OLS estimation. While all the stated regression equations in principle allow error terms to depend on n, within-group correlations at the nationality level are low.[32] This is not surprising, since as already argued it is difficult to come up with any reason - unrelated to the national team - for why nationality should matter in an established player's professional life. Standard errors are robust and clustered at the individual player level so as to take into account serial correlation, which could be due for example to injuries.[33]

5 Results

5.1 Average Effects

Before turning to the regression results, we present graphical evidence of trends in the raw data. Figure 6 tracks the average numbers of minutes played per match of players in the treatment group, i.e., of *Euro 2008* nationalities, and the control group comprising all other nationalities. For each season and each group the Figure includes a fitted linear trend, with a 95% confidence interval around it. The two vertical lines indicate the period during which nations, other than the host countries Austria and Switzerland, de facto qualified for the *Euro 2008*. The data exhibit a clear positive trend for players of *Euro*

[31] Allison and Waterman (2002) as well as Guimarães (2008) show that for the negative binomial model the estimator proposed by Hausman et al. (1984) is a conditional fixed effects estimator under very specific assumptions only. As suggested by Allison and Waterman (2002), player fixed effects can be included by means player dummies, however, which is the approach we follow.

[32] For all the output measures we use, the intraclass correlation if class is nationality lies below 0.1, in many cases even below 0.05.

[33] If class is player identity, the intraclass correlations for the various output measures we empoy lie between 0.2 and 0.4.

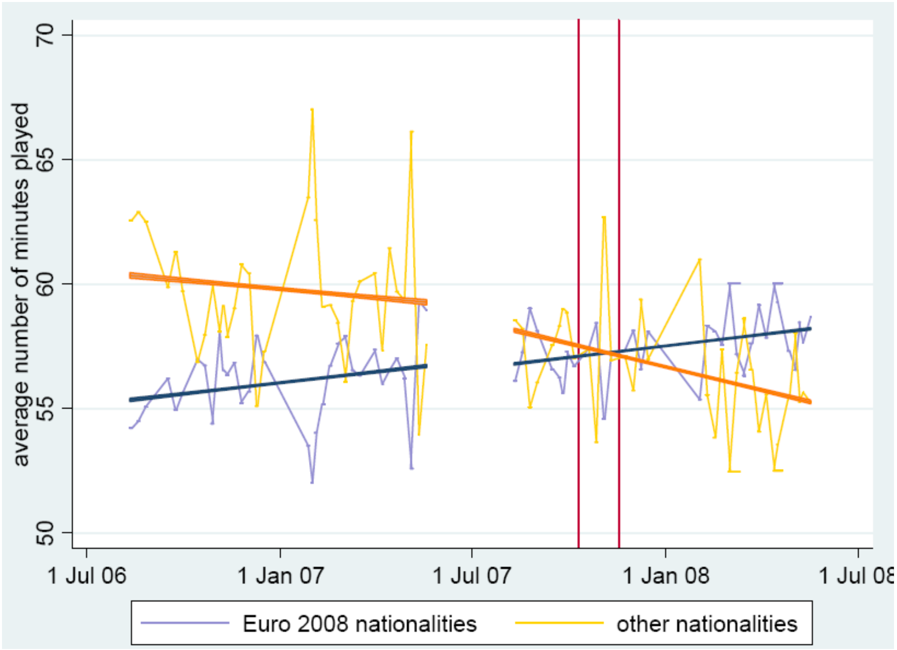

Figure 6: Development of the average number of minutes played (per match) for *Euro 2008*-Europeans and players of other nationalities. All observations except those of goalkeepers, and Austrian or Swiss nationals are included.

2008 nationalities and an associated negative trend for players from other nations.[34] This development is apparent in both seasons but considerably stronger in the 07/08 season, when players in the treatment group also overtake players in the control group.

Figure 7 shows the evolutions of the average numbers of goals per match of players in the treatment group and the control group. Figure 8 tracks the developments of goals per minute played for observations associated with more than 71 minutes on the field, the threshold used for the regression analyses with per minute output measures as dependent variables. As before, each Figure includes linear fitted trends in each season, and vertical lines indicating the period of final qualification decisions.

Figure 7 shows that the average number of goals per match increased for both groups over the course of the 06/07 season. The two trend lines are approximately parallel although, as illustrated in Figure 6, players in the treatment group on average gained minutes relative to players in the control group. In the 07/08 season preceding the *Euro 2008*, on the other hand, players in the treatment group dramatically improved relative

[34]We will discuss substitution effects between different subgroups of player, which suggest that such opposite trends are natural, in more detail below.

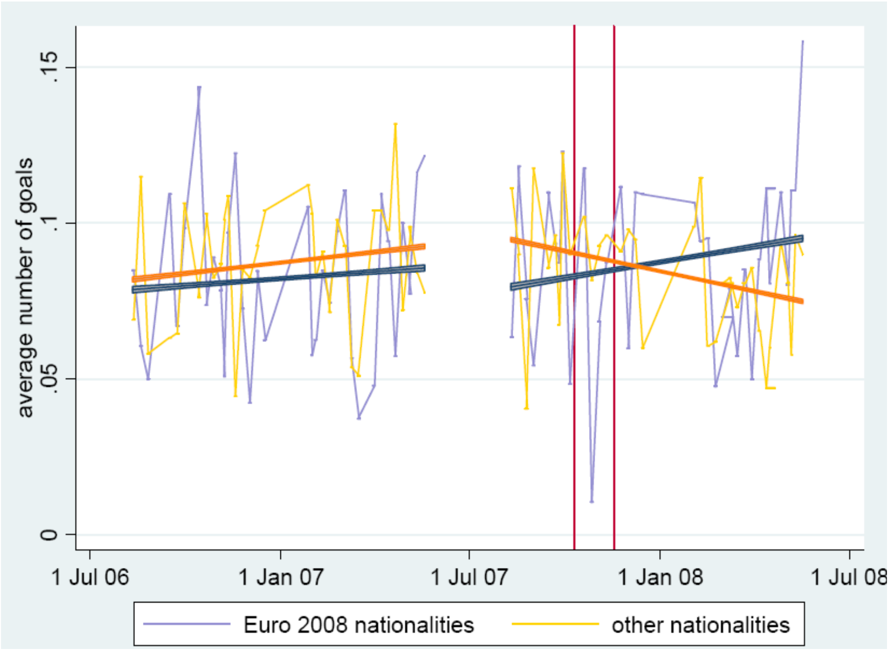

Figure 7: Development of the average numbers of goals shot (per match) for *Euro 2008*-Europeans and players of other nationalities. All observations except those of goalkeepers, and Austrian or Swiss nationals are included.

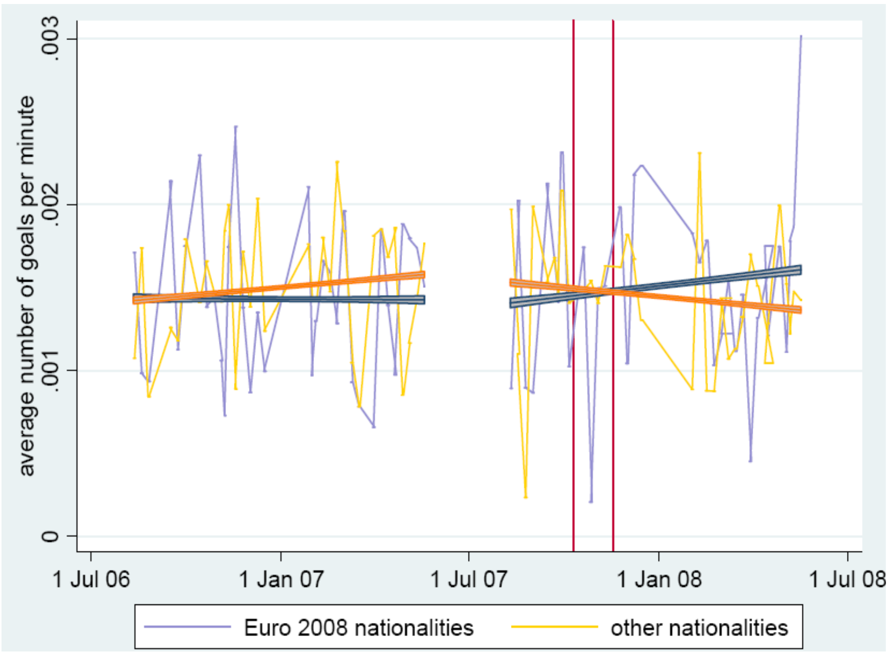

Figure 8: Development of the average numbers of goals shot per minute played for *Euro 2008*-Europeans and players of other nationalities. All observations associated with more than 71 minutes played, except those of goalkeepers, and Austrian or Swiss nationals, are included.

to players in the control group.

Figure 8 illustrates that once we consider the average number of goals per minute played, players in the control group even slightly improved relative to players in the treatment group in the 06/07 season. In the 07/08 season, on the other hand, players of *Euro 2008* nationalities again improved substantially over the course of the season, while the goal-shooting performance of players of other nationalities worsened.

It is useful to note that for some output measures, minutes played most notably but also measures like passes received per minute, there is a substitution effect between different players. Since the length of each match is limited and there is only one ball in the game, not all players can simultaneously be on the field or play the ball. If the average number of minutes played of a subset of players goes up, we would therefore expect the average number of minutes played of the remaining players to decrease for example.[35] Indeed, the correlation between the minutes played observations of players in the control group and those of players in the treatment group is about -0.55. For other output measures, such as shots on goal per minute, the correlation is much closer to zero but remains negative. We will come back to this when interpreting some of the regression results.

In spite of the apparent trends in Figures 6 to 8, the regression results in Tables 5 and 6 provide only very weak support for the hypothesis that *on average* Euro Cup qualification positively affected the club match outputs of players from qualified nations. For minutes played, the estimated coefficient of $qualified$ is positive but insignificant, as reported column 1 of Table 5. For the various output per minute measures we employ, Table 6 shows that again we find only weak support for an average effect of the Euro Cup treatment. For shots on goal per minute played, the effect is insignificant in the sample including observations for all field positions, but significant once only observations of forward players are considered. In the latter case, the effect is about 0.00680 shots on goal per minutes, which corresponds to a 21% increase in the number of shots on goal per minute for forward players in the treatment group. We also do not find any significant effects of $qualified$ on the other reported output measures in regression including all field positions.

[35] One needs to be careful with too quick conclusions however. First, in the full sample the proportions of players from the two different groups need not be constant over time. Second, if we keep the proportions of player from different groups constant by excluding players who are active for a subperiod only (a balanced panel), then minutes can be lost to or gained from players outside of the sample.

Table 5: Regression results for minutes played

VARIABLES	Minutes played			
	(1)	(2)	(3)	(4)
$qualified$	0.061	0.057	0.042	0.041
	(0.062)	(0.088)	(0.062)	(0.086)
$qualified * natteam$		-0.621***		-0.586***
		(0.200)		(0.201)
$qualified * natteam(1 - natteam)$		1.512**		1.394**
		(0.646)		(0.652)
$qualified * (age - \overline{age})$			-0.012	-0.010
			(0.016)	(0.016)
$forward$	-0.510***	-0.513***	-0.511***	-0.515***
	(0.129)	(0.129)	(0.129)	(0.130)
$midfield$	-0.328***	-0.329***	-0.331***	-0.332***
	(0.090)	(0.089)	(0.089)	(0.089)
$natteam$		0.176		0.165
		(0.109)		(0.107)
$natteam(1 - natteam)$		-0.116		-0.129
		(0.353)		(0.351)
$after * natteam$		0.620***		0.628***
		(0.169)		(0.172)
$after * natteam(1 - natteam)$		-1.074*		-1.065*
		(0.588)		(0.588)
$euro * natteam$		-0.251*		-0.265*
		(0.145)		(0.143)
$euro * natteam(1 - natteam)$		0.121		0.086
		(0.376)		(0.375)
$after * (age - \overline{age})$			-0.005	-0.007
			(0.012)	(0.012)
Gameday dummies	YES	YES	YES	YES
Club dummies	YES	YES	YES	YES
Opponent dummies	YES	YES	YES	YES
Player fixed effects	YES	YES	YES	YES
Constant	5.181***	5.142***	5.278***	5.231***
	(0.583)	(0.569)	(0.569)	(0.553)
Observations	11821	11821	11821	11821

Notes: The table reports negative binomial regression estimates. Values between parentheses are robust standard errors clustered at the player level. Only observations from players who are neither goalkeepers nor Austrian or Swiss are included. Moreover, the sample includes only players who were active in both the 06/07 and the 07/08 season, and before and after 21 Nov 2007, and with at least one strictly positive observation of minutes played in the two seasons. *** p< 0.01, ** p< 0.05, * p < 0.1

Table 6: Differences-in-differences regression results for outputs per minute played

VARIABLES	per minute played							
	shots on goal	goals	passes received	ball contacts	duels won	cross passes	shots on goal (only forwards)	cross passes (only forwards)
qualified	0.0001	0.0002	-0.0094	-0.0138	-0.0023	0.0006	0.0068 **	0.0047 *
	(0.0009)	(0.0002)	(0.0091)	(0.0110)	(0.0026)	(0.0010)	(0.0032)	(0.0025)
homegame	0.0035***	0.0004***	0.0295***	0.0373***	0.0048***	0.0038***	0.0062 ***	0.0054 ***
	(0.0003)	(0.0001)	(0.0031)	(0.0038)	(0.0011)	(0.0004)	(0.0010)	(0.0010)
forward	0.0080***	0.0017***	-0.0115	-0.1220***	0.0088*	-0.0033		
	(0.0024)	(0.0005)	(0.0125)	(0.0199)	(0.0052)	(0.0024)		
midfield	0.0071***	0.0009***	0.0067	-0.0841***	0.0099***	-0.0009		
	(0.0010)	(0.0002)	(0.0102)	(0.0173)	(0.0037)	(0.0014)		
Gameday	YES	YES	YES	YES	YES	YES	YES	YES
Club	YES	YES	YES	YES	YES	YES	YES	YES
Opponent	YES	YES	YES	YES	YES	YES	YES	YES
Player FE	YES	YES	YES	YES	YES	YES	YES	YES
Constant	0.0165***	0.0611***	0.0044**	0.311***	0.723***	0.113***	-0.0144 ***	0.0214 ***
	(0.0026)	(0.0135)	(0.0018)	(0.0307)	(0.0315)	(0.0135)	(0.0038)	(0.0049)
Obs.	7104	6389	7107	7107	7107	6785	1052	1051
R^2	0.443	0.156	0.491	0.546	0.297	0.415	0.273	0.375

Notes: The table reports OLS estimates. Values between parentheses are robust standard errors clustered at the player level. Only observations associated with more than 71 minutes played and of players who are neither goalkeepers nor Austrian or Swiss are included. Moreover, the sample includes only players who were active in both the 06/07 and the 07/08 season (before and after 21 Nov 2007), and with at least one strictly positive observation of the respective dependent variable in these two seasons. The last two columns contain results for observations of players on forward positions only.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The fact that the majority of players in the treatment group never played for the national team before suggests that many players in the treatment group know they have no realistic chance of playing in the *Euro 2008*. This seems a likely explanation for the absence of any significant *average* effect of the Euro treatment.

5.2 Differential Effects: Nomination Chance and Age

Table 7 reports results of regressions concerned with differential effects as a function of a player's nomination chance, as proxied by his national team participations since the last World Cup. The estimates for shots on goal per minute reported in the first column of Table 7 supports the prediction of the nomination contest theory that players with uncertain nomination chances should react most strongly. The coefficient of $qualified * natteam(1 - natteam)$ is positive and significant at the 5% level, while the direct effects of $qualified$ and all other regressors that involve $natteam$ are insignificant. Interpreting $natteam$ as a player's current nomination probability, the prediction is a symmetric inverse U-shaped relationship between a player's national team nomination probability and the effect of his nation's Euro Cup qualification on his club match output. For players with nomination probabilities around 50% the predicted size of the effect is maximal and equals about 0.00605; this corresponds to 27% of average pre-treatment shots on goal per minute for players in the treatment group with $natteam$-values between 0.4 and 0.6. The coefficients of the $homegame$, $forward$ and $midfield$ dummies are all positive, as expected, and highly significant.

For goals per minute, the coefficient of $qualified * natteam(1 - natteam)$ is positive again but insignificant. There is some evidence, however, that uncertainty about being a regular player on the national team affected *Euro Cup 2008* - nationals differently than other players: while the coefficient of $euro * natteam(1 - natteam)$ is positive, that of $natteam(1 - natteam)$ is negative. A possible explanation would be that even prior to the de facto qualifications for the *Euro 2008*, forward players from likely Cup participants already started competing for the rare spots on their national teams.

The results for passes received and ball contacts confirm the predictions of both the nomination contest and the injury theory. For both output measures, the estimated impact of the Euro Cup treatment is positive for players with intermediate values of $natteam$, but negative for players with $natteam$ close to 1. Overall, the results in Table 7 provide a coherent picture in support of the nomination contest and the injury theory:

although the relevant coefficients lack significance for some of the output measures, the signs of the relevant coefficients in all the regressions are in line with these two theories.

For minutes played, negative binomial regression results are reported in column 2 of Table 5.[36] The coefficient of $qualified * natteam(1 - natteam)$ is positive and significant at the 5% level. The coefficient of $qualified * natteam$ is negative and significant at the 1% level. Interestingly, the interactions of $natteam$ and $natteam(1 - natteam)$ with the variable $after$ that indicates the treatment period are significant as well, but have the opposite signs of the interactions with $qualified$. We interpret this as a consequence of the substitution effect between different player groups described above: for the total number of minutes to remain constant, some players in the treatment group must be affected. Our results suggest that the impact on players in the control group depends on their ability which in turn is correlated with $natteam$; teams seem to substitute minutes between players in treatment and the control group of roughly similar abilities.

Given the non-linear nature of the estimator, marginal effects depend on the values of all variables, and interpreting interaction terms is more difficult than before. The ratio of the marginal effects of any two regressors are constant, however, and equal to the ratio of the estimated coefficients. This property permits us to evaluate the sign of the impact of the Euro Cup treatment on a player, given his value of $natteam$. The relative sizes of the estimated coefficients of $qualified * natteam$ and $qualified * natteam(1 - natteam)$ imply that if $0 < natteam < 0.59$ then the effect of the Euro Cup treatment is positive, but it is negative for higher values of $natteam$. Hence, the results again confirm the nomination contest theory as well as the injury theory.

Table 8 reports results of regressions on output per minute played that test for differential treatment effects depending on age. For several output measures, we find that ceteris paribus the treatment effect is stronger the younger a player, and that the average effect is positive for players of below-average age but negative for older players. For minutes played, reported in the third column of Table 5, the estimated coefficient is again negative but insignificant. Results of regressions using age dummies for different percentiles of the age distribution instead of the (demeaned) age variable exhibit similar patterns: the effect is weaker and often even negative for older players than for younger players. We found no consistent evidence of a stronger effect for players of median age as compared to the youngest players, as the theoretical results illustrated in Figure 2 would

[36]OLS estimates of the same regression equations with $\ln(\text{minutes played } + 1)$ as the dependent variable are qualitatively similar.

Table 7: Regression results: differential effects by past national team exposure

VARIABLES	per minute played shots on goal	goals	passes received	ball contacts	duels won	cross passes
$qualified$	-0.0007	0.0004	-0.0180	-0.0230	0.0006	0.0006
	(0.0013)	(0.0003)	(0.0123)	(0.0163)	(0.0040)	(0.0015)
$qualified * natteam$	-0.0053	-0.0014	-0.0936**	-0.1070**	-0.0167*	-0.0039
	(0.0037)	(0.0010)	(0.0430)	(0.0535)	(0.0093)	(0.0039)
$qualified * natteam(1 - natteam)$	0.0242**	0.0005	0.3300***	0.3710***	0.0082	0.0107
	(0.0119)	(0.0037)	(0.1140)	(0.1400)	(0.0349)	(0.0117)
$homegame$	0.0035***	0.0004***	0.0296***	0.0374***	0.0048***	0.0038***
	(0.0003)	(0.0001)	(0.0031)	(0.0038)	(0.0011)	(0.0004)
$forward$	0.0082***	0.0016***	-0.0101	-0.1200***	0.0088*	-0.0033
	(0.0024)	(0.0005)	(0.0124)	(0.0198)	(0.0052)	(0.0024)
$midfield$	0.0071***	0.0008***	0.0064	-0.0843***	0.0100***	-0.0009
	(0.0010)	(0.0002)	(0.0102)	(0.0174)	(0.0037)	(0.0014)
$natteam$	0.0005	0.0002	-0.0045	0.0071	-0.0020	-0.0007
	(0.0021)	(0.0006)	(0.0198)	(0.0230)	(0.0057)	(0.0017)
$natteam(1 - natteam)$	0.0045	-0.0032*	0.0705	0.0899	-0.0163	0.0056
	(0.0056)	(0.0019)	(0.0538)	(0.0654)	(0.0174)	(0.0059)
$after * natteam$	-0.0009	-0.0002	0.0407	0.0501	0.0045	0.0032
	(0.0031)	(0.0008)	(0.0273)	(0.0351)	(0.0081)	(0.0032)
$after * natteam(1 - natteam)$	-0.0022	0.0033	-0.1630*	-0.2050*	0.0074	-0.0126
	(0.0090)	(0.0025)	(0.0847)	(0.1050)	(0.0291)	(0.0093)
$euro * natteam$	0.0023	-0.0003	0.0580**	0.0667**	0.0053	0.0028
	(0.0028)	(0.0008)	(0.0267)	(0.0325)	(0.0086)	(0.0032)
$euro * natteam(1 - natteam)$	-0.0047	0.0041*	-0.0726	-0.0947	0.0106	-0.0084
	(0.0070)	(0.0024)	(0.0654)	(0.0884)	(0.0247)	(0.0095)
Gameday dummies	YES	YES	YES	YES	YES	YES
Club dummies	YES	YES	YES	YES	YES	YES
Opponent dummies	YES	YES	YES	YES	YES	YES
Player fixed effects	YES	YES	YES	YES	YES	YES
Constant	0.0165***	0.0043**	0.315***	0.731***	0.113***	-0.0141***
	(0.0025)	(0.0019)	(0.0327)	(0.0307)	(0.0130)	(0.0040)
Observations	7104	6389	7107	7107	7107	6785
R^2	0.444	0.157	0.493	0.548	0.298	0.416

Notes: The table reports OLS estimates. Values between parentheses are robust standard errors clustered at the player level. Only observations associated with more than 71 minutes played and of players who are neither goalkeepers nor Austrian or Swiss are included. Moreover, the sample includes only players who were active in both the 06/07 and the 07/08 season (before and after 21 Nov 2007), and with at least one strictly positive observation of the respective dependent variable in these two seasons.

*** p < 0.01, ** p < 0.05, * p < 0.1

Table 8: Regression results: differential effects by age

	per minute played					
VARIABLES	shots on goal	goals	passes received	ball contacts	duels won	cross passes
$qualified$	-0.0000	0.0001	-0.0053	-0.0094	-0.0017	0.0009
	(0.0010)	(0.0002)	(0.0091)	(0.0112)	(0.0026)	(0.0010)
$qualified * (age - \overline{age})$	0.0000	0.0000	-0.0055***	-0.0066***	-0.0005	-0.0005**
	(0.0002)	(0.0000)	(0.0017)	(0.0022)	(0.0006)	(0.0002)
$homegame$	0.0035***	0.0004***	0.0295***	0.0373***	0.0048***	0.0038***
	(0.0003)	(0.0001)	(0.0031)	(0.0038)	(0.0011)	(0.0004)
$forward$	0.0080***	0.0016***	-0.0118	-0.1220***	0.0089*	-0.0034
	(0.0024)	(0.0005)	(0.0123)	(0.0196)	(0.0052)	(0.0024)
$midfield$	0.0071***	0.0008***	0.0046	-0.0869***	0.0098***	-0.0011
	(0.0010)	(0.0002)	(0.0100)	(0.0170)	(0.0037)	(0.0014)
$after * (age - \overline{age})$	-0.0002	-0.0000	0.0010	0.0005	0.0003	0.0000
	(0.0002)	(0.0000)	(0.0015)	(0.0019)	(0.0005)	(0.0002)
Gameday dummies	YES	YES	YES	YES	YES	YES
Club dummies	YES	YES	YES	YES	YES	YES
Opponent dummies	YES	YES	YES	YES	YES	YES
Player fixed effects	YES	YES	YES	YES	YES	YES
Constant	0.0165***	0.0044**	0.3100***	0.7210***	0.1130***	-0.0145***
	(0.0025)	(0.0018)	(0.0314)	(0.0283)	(0.0134)	(0.0038)
Observations	7104	6389	7107	7107	7107	6785
R^2	0.443	0.156	0.493	0.547	0.297	0.416

Notes: The table reports OLS estimates. Values between parentheses are robust standard errors clustered at the player level. Only observations associated with more than 71 minutes played and of players who are neither goalkeepers nor Austrian or Swiss are included. Moreover, the sample includes only players who were active in both the 06/07 and the 07/08 season (before and after 21 Nov 2007), and with at least one strictly positive observation of the respective dependent variable in these two seasons.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

suggest.

One may worry that the results of the regressions with age interactions (or *natteam* interactions) could be driven by an underlying relationship between age and nomination chance. We therefore also ran regressions including interactions with *natteam* as in (9) and age interactions as in (10). The qualitative results concerning both interactions remained unchanged; see the last column of Table 5 for this when minutes played is the dependent variable.

Results are also be similar to those in Table 8 if we include only observations with $natteam_{it} > 0$, thereby restricting the treatment group to players with a realistic nomination chance. For passes received per minute as the dependent variable, the coefficient of $qualified * (age - \overline{age})$ would be -0.0082 in that case (p-value $= 0.011$), and for ball contacts per minute -0.0114 (p-value < 0.001). For both output measures, the effect is hence stronger once players with no national team experience are excluded. Ideally, we would like to investigate the effect of age for different nomination chances in more detail, but unfortunately our data contains a too limited number of treated players with a national team history for this.

To summarize our findings on the differential effects of the Euro Cup treatment:

1. Players from qualified countries with intermediate national team nomination chances perform better in club matches (relative to players of other nationalities with similar national team experience) after their nations' qualifications for the *Euro 2008* than before.

2. Players from qualified countries with very high national team nomination chances perform worse in club matches (relative to players of other nationalities with similar national team experience) after their nations' qualifications for the *Euro 2008* than before.

3. Along some dimensions, young players from qualified countries perform better in club matches (relative to players of similar age from other nations) after their nations' qualifications for the *Euro 2008* than before, but old players from qualified countries perform worse in club matches (relative to players of similar age from other nations) after their nations' qualifications for the *Euro 2008* than before.

6 Conclusion

Tournament-style rivalry between agents, whether based on specified performance criteria or perceived talent and ability as in the nomination contests for national soccer teams, arises in many contexts. Firms often explicitly choose relative performance evaluation schemes akin to tournaments in order to provide incentives to employees. In other situations, the principal's only goal is to select the most suitable agent, but this may create similar incentives. In both cases, economic theory predicts that agents should exert higher effort the closer the race. This paper provides empirical evidence for this prediction. We show that players from nations qualified for the *Euro 2008* who had been called upon by the national coach in some but not too many recent national team matches improved their performance, relative to players of other nationalities with a similar standing in their national teams, after their countries' qualifications. For players without any recent national team nominations, on the other hand, there is no evidence of any improvement relative to players of other nationalities.

Moreover, our evidence suggests that players who were already quite certain of their Euro Cup participations actually performed worse along several dimensions than they would have in the absence of the upcoming Cup. The likely cause is that these players want to avoid injuries and more generally preserve their strength and fitness for the Cup. Hence, while the clubs often benefit from the national team nomination contests, they may actually suffer losses in the case of top players. Similar effects can occur in other situations where agents compete for a position that requires effort in the future instead of for a monetary prize. Consider promotion contests in firms for example. An employee who expects an almost certain promotion into a different unit may be inclined to work less hard in his current position not only because of "last-round" effects but also because the employee wants to preserve energy for his/her new position. Such behavior clearly inflicts a loss on the employee's current unit.

Finally, this paper adds to the empirical literature testing the predictions of career concerns models by providing evidence that the effect of the *Euro 2008* qualification on individual performance was stronger for younger players than for older players. There are two possible theoretical explanations for this. First, the national coach may have a less firmly established opinion of younger players than of older player, who may therefore have greater chances of influencing the coach's decision by their performances. Second, post Euro Cup career concerns may be more important for younger players, who hence have more to gain from being nominated.

A number of issues remain open for future research. First, we were not able to find any evidence for the theoretical prediction of our nomination contest theory that effort is increasing in information precision when little is known about the agent's ability at the outset. This may be either because no such effect exists here, or because the data do not contain sufficiently many observations of young players with a realistic nomination chance to test the prediction satisfactorily. We hope that adding data from other European soccer leagues will help us to illuminate this question further.

Second, another interesting question is whether the Euro Cup treatment affects not only mean performance but also style of play, in particular whether players adopt more creative or riskier strategies. A preliminary investigation of our data suggests that players with an intermediate nomination chance adopt riskier strategies, as measured by the variance of output during the nomination period, than players with a very low or high nomination chance.

A Appendix 1: Proofs

Proof of Proposition 1. Let us denote by $\sigma(h_j, h_k, h_\varepsilon)$, equal to the square root of σ^2 defined in (4), the standard deviation of the distributions $\varphi_1(\cdot)$ and $\varphi_2(\cdot)$. Making use of the normality of $\varphi_j(\cdot)$, the first-order condition defining a_j^* can then be rewritten as

$$\frac{1}{\sqrt{2\pi}\sigma(h_j, h_k, h_\varepsilon)} \exp\left(-\frac{(m_k - m_j)^2}{2\sigma^2(h_j, h_k, h_\varepsilon)}\right) \frac{h_\varepsilon}{h_j + h_\varepsilon} W_j = c'\left(a_j^*\right), \tag{11}$$

which is equivalent to

$$\frac{1}{\sqrt{2\pi}\sigma(h_j, h_k, h_\varepsilon)} \exp\left(-\frac{|m_k - m_j|^2}{2\sigma^2(h_j, h_k, h_\varepsilon)}\right) \frac{h_\varepsilon}{h_j + h_\varepsilon} W_j = c'\left(a_j^*\right), \tag{12}$$

which depends on $\Delta \equiv |m_1 - m_2|$ but not on m_1 and m_2 individually.

Applying the implicit function theorem yields

$$\frac{da_j^*}{d\Delta} = \varphi_j(0)\left(\frac{-2\Delta}{2\sigma^2(h_j, h_k, h_\varepsilon)}\right)\frac{\frac{h_\varepsilon}{h_j+h_\varepsilon}W_j}{c''\left(a_j^*\right)}. \tag{13}$$

Since $c'' > 0$, (13) implies that $\frac{da_j^*}{d\Delta} < 0$ if $\Delta > 0$, and $\frac{da_j^*}{d\Delta} = 0$ if $\Delta = 0$.

Next, we consider the impact of a change in h_j on a_j^*. Applying the implicit function theorem to (11) and rearranging terms yields

$$\frac{da_j^*}{dh_j} = \underbrace{\frac{\exp\left(-\frac{(m_k-m_j)^2}{2\sigma^2(h_j,h_k,h_\varepsilon)}\right)}{\sqrt{2\pi}\sigma(h_j, h_k, h_\varepsilon)}\frac{W_j\frac{h_\varepsilon}{h_j+h_\varepsilon}}{c''\left(a_j^*\right)}}_{>0} \tag{14}$$

$$\times\left[-\underbrace{\frac{\frac{\partial\sigma(h_j,h_k,h_\varepsilon)}{\partial h_j}}{\sigma(h_j, h_k, h_\varepsilon)}}_{>0}\left(1 - \frac{(m_k - m_j)^2}{\sigma^2(h_j, h_k, h_\varepsilon)}\right)\underbrace{-\frac{1}{h_j + h_\varepsilon}}_{<0}\right]. \tag{15}$$

It is easy to see from (4) that $\frac{\partial\sigma(h_j,h_k,h_\varepsilon)}{\partial h_j} < 0$. This implies that whenever $(m_k - m_j)^2 \geq \sigma^2(h_j, h_k, h_\varepsilon)$, then $\frac{da_j^*}{dh_j} < 0$. However, the sign of $\frac{da_j^*}{dh_j}$ is ambiguous if $(m_k - m_j)^2 < \sigma^2(h_j, h_k, h_\varepsilon)$. This inequality always holds if $m_k = m_j$; moreover, since $\lim_{h_j\to 0}\sigma(h_j, h_k, h_\varepsilon) = \infty$, it also always holds for h_j close enough to 0, even if the difference between m_k and m_j is large.

Lemma A1 below tells us that $\lim_{h_j\to 0}\frac{da_j^*}{dh_j} = \infty$. Moreover, since $\lim_{h_j\to\infty}\frac{\partial P(a_j,a_k^*)}{\partial a_j} = 0$, we have $\lim_{h_j\to\infty}\frac{da_j^*}{dh_j} = 0$.[37] Given continuity, this implies that $\frac{da_j^*}{dh_j} < 0$ for some h_j. It remains to show that there exists a unique $\widehat{h}_j$, such that $\frac{da_j^*}{dh_j} > 0$ if and only if $h_j < \widehat{h}_j$.

[37] An interior solution exists for arbitrarily large h_j if $c'(0) = 0$. Otherwise, for all h_j bexond a certain threshold, j's profit maximization problem has the corner solution $a_j^* = 0$.

Since $c'' > 0$, $\frac{da_j^*}{dh_j}$ has the sign of the sum between square brackets in (14). Using the expression for σ in (4) and simplifying we find that

$$
\begin{aligned}
&-\frac{\frac{\partial \sigma(h_j,h_k,h_\varepsilon)}{\partial h_j}}{\sigma(h_j,h_k,h_\varepsilon)}\left(1-\frac{(m_k-m_j)^2}{\sigma^2(h_j,h_k,h_\varepsilon)}\right)-\frac{1}{h_j+h_\varepsilon} \\
&=\frac{h_k(2h_j+h_\varepsilon)(h_k+h_\varepsilon)\left(1-\frac{(m_k-m_j)^2}{\sigma^2(h_j,h_k,h_\varepsilon)}\right)-2h_j\left[h_j(h_j+h_\varepsilon)+h_k(h_k+h_\varepsilon)\right]}{2h_j(h_j+h_\varepsilon)\left[h_j(h_j+h_\varepsilon)+h_k(h_k+h_\varepsilon)\right]}. \qquad (16)
\end{aligned}
$$

$\frac{da_j^*}{dh_j}$ has the same sign as the numerator in (16). The partial derivative of the numerator in (16) with respect to h_j is

$$
\begin{aligned}
&-2h_k(h_k+h_\varepsilon)\frac{(m_k-m_j)^2}{\sigma^2(h_j,h_k,h_\varepsilon)}+h_k(2h_j+h_\varepsilon)(h_k+h_\varepsilon)\frac{(m_k-m_j)^2}{\sigma^2(h_j,h_k,h_\varepsilon)}\underbrace{\frac{\partial\sigma^2}{\partial h_j}}_{<0} \\
&-2h_j(h_j+h_\varepsilon)-2h_j(2h_j+h_\varepsilon),
\end{aligned}
$$

which is clearly negative. Since $\lim_{h_j\to 0}\frac{da_j^*}{dh_j}=\infty$ and $\lim_{h_j\to\infty}\frac{da_j^*}{dh_j}=0$, it follows from this that given the other parameters there exists a unique $\widehat{h}_j>0$ such that $\frac{da_j^*}{dh_j} \gtreqless 0$ if and only if $h_j \lesseqgtr \widehat{h}_j$.

Finally,

$$
\frac{da_j^*}{dh_k}=\underbrace{\frac{\exp\left(-\frac{(m_k-m_j)^2}{2\sigma^2(h_j,h_k,h_\varepsilon)}\right)}{\sqrt{2\pi}\sigma(h_j,h_k,h_\varepsilon)}\frac{W_j\frac{h_\varepsilon}{h_j+h_\varepsilon}}{c''\left(a_j^*\right)}}_{>0}\underbrace{\left(-\frac{\frac{\partial\sigma(h_j,h_k,h_\varepsilon)}{\partial h_k}}{\sigma(h_j,h_k,h_\varepsilon)}\right)}_{>0}\left(1-\frac{(m_k-m_j)^2}{\sigma^2(h_j,h_k,h_\varepsilon)}\right). \qquad (17)
$$

From (17) it is easy to see that $\frac{da_j^*}{dh_k}>0$ if and only if $(m_k-m_j)^2<\sigma^2(h_j,h_k,h_\varepsilon)$. Since $\lim_{h_k\to 0}\sigma^2=\infty$ and $\sigma^2(h_j,h_k,h_\varepsilon)$ is strictly decreasing in h_k (see (4)), there exists a unique threshold $\widehat{h}_k$ such that $\frac{da_j^*}{dh_k}\gtreqless 0$ if and only if $h_k \lesseqgtr \widehat{h}_k$. Observe that $\widehat{h}_k>\widehat{h}_j$. ■

Lemma 1 (Lemma A1) $\lim_{h_j\to 0}\frac{da_j^*}{dh_j}=\infty$

Proof. First note that both $\lim_{h_j\to 0}\sigma=\infty$ and $\lim_{h_j\to 0}\frac{\partial\sigma}{\partial h_j}=\infty$. To determine $\lim_{h_j\to 0}\frac{da_j^*}{dh_j}$, we first simplify the limit of (14) as follows:

$$
\begin{aligned}
\lim_{h_j\to 0}\frac{da_j^*}{dh_j}&=\frac{\lim_{h_j\to 0}\left\{\exp\left(-\frac{(m_k-m_j)^2}{2\sigma^2(h_j,h_k,h_\varepsilon)}\right)\right\}}{\sqrt{2\pi}}\frac{W_j\frac{h_\varepsilon}{h_j+h_\varepsilon}}{c''\left(a_j^*\right)} \\
&\times\left[\lim_{h_j\to 0}\left\{-\frac{\frac{\partial\sigma(h_j,h_k,h_\varepsilon)}{\partial h_j}}{\sigma^2(h_j,h_k,h_\varepsilon)}\right\}\lim_{h_j\to 0}\left(1-\frac{(m_k-m_j)^2}{\sigma^2(h_j,h_k,h_\varepsilon)}\right)-\lim_{h_j\to 0}\left(\frac{1}{(h_j+h_\varepsilon)\sigma(h_j,h_k,h_\varepsilon)}\right)\right] \\
&=\frac{W_j}{\sqrt{2\pi}c''\left(a_j^*\right)}\lim_{h_j\to 0}\left(-\frac{\frac{\partial\sigma(h_j,h_k,h_\varepsilon)}{\partial h_j}}{\sigma^2(h_j,h_k,h_\varepsilon)}\right).
\end{aligned}
$$

Using the expression for σ^2 in (4) and simplifying leads to

$$-\frac{\frac{\partial\sigma(h_j,h_k,h_\varepsilon)}{\partial h_j}}{\sigma^2\left(h_j,h_k,h_\varepsilon\right)}=\frac{\frac{h_\varepsilon(2h_j+h_\varepsilon)}{2h_j^2(h_j+h_\varepsilon)^2}}{\left(\frac{h_\varepsilon[h_j(h_j+h_\varepsilon)+h_k(h_k+h_\varepsilon)]}{h_jh_k(h_j+h_\varepsilon)(h_k+h_\varepsilon)}\right)^{\frac{3}{2}}}.$$

Taking limits yields

$$\begin{aligned}\lim_{h_j\to 0}\frac{\frac{h_\varepsilon(2h_j+h_\varepsilon)}{2h_j^2(h_j+h_\varepsilon)^2}}{\left(\frac{h_\varepsilon[h_j(h_j+h_\varepsilon)+h_k(h_k+h_\varepsilon)]}{h_jh_k(h_j+h_\varepsilon)(h_k+h_\varepsilon)}\right)^{\frac{3}{2}}}&=\lim_{h_j\to 0}\frac{\frac{1}{2}\left(\frac{h_\varepsilon}{h_j(h_j+h_\varepsilon)}\right)^2}{\left(\frac{h_\varepsilon}{h_j(h_j+h_\varepsilon)}\right)^{\frac{3}{2}}}\\&=\lim_{h_j\to 0}\frac{1}{2}\left(\frac{h_\varepsilon}{h_j\left(h_j+h_\varepsilon\right)}\right)^{\frac{1}{2}}=\infty.\end{aligned}$$

■

B Appendix 2: Additional Tables

Table 9: German Euro 2008 team nominations and values of *natteam*.

Bold letters indicate nominated players.

player	*natteam*		World Cup 06
	end of 07/08 season	two-year average	
Thomas Hitzlsperger	80.00%	72.79%	Yes
Bastian Schweinsteiger	70.00%	82.21%	Yes
Arne Friedrich	70.00%	80.74%	Yes
Philipp Lahm	70.00%	76.75%	Yes
Lukas Podolski	70.00%	71.30%	Yes
Marcell Jansen	65.00%	67.09%	Yes
Torsten Frings	60.00%	86.72%	Yes
Miroslav Klose	60.00%	65.27%	Yes
Clemens Fritz	60.00%	48.40%	-
Per Mertesacker	60.00%	31.93%	Yes
Piotr Trochowski	55.00%	40.26%	-
Kevin Kuranyi	55.00%	30.65%	-
Bernd Schneider	50.00%	63.71%	Yes
Manuel Friedrich	45.00%	68.56%	-
Simon Rolfes	45.00%	20.03%	-
Mario Gomez	45.00%	19.31%	-
Roberto Hilbert	40.00%	19.01%	-
Tim Borowski	25.00%	33.28%	Yes
Mike Hanke	25.00%	30.66%	Yes
Gonzalo Castro	25.00%	14.30%	-
Marco Engelhardt	15.00%	22.82%	-
Jan Schlaudraff	15.00%	18.60%	-
Malik Fathi	10.53%	25.75%	-
Gerald Asamoah	10.00%	18.89%	Yes
Andreas Görlitz	10.00%	16.49%	-
Alexander Madlung	10.00%	13.34%	-
Christian Pander	10.00%	5.09%	-
Heiko Westermann	10.00%	1.87%	-
Stefan Kießling	5.00%	4.24%	-
Paul Freier	5.00%	4.09%	-
Jermaine Jones	5.00%	2.04%	-

Notes: The table includes all German players with positive average values of *natteam*, except for goalkeepers. No German player without any national team nominations during the sample period (i.e., with *natteam* = 0 at all times) was nominated.

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