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**Article — Published Version**

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Managerial and Decision Economics

**Provided in Cooperation with:**

John Wiley & Sons

*Suggested Citation:* Kleinknecht, Janina; Würtenberger, Daniel (2021) : Information effects of managerial turnover on effort and performance: Evidence from the German Bundesliga, Managerial and Decision Economics, ISSN 1099-1468, Wiley Periodicals, Inc., Hoboken, USA, Vol. 43, Iss. 3, pp. 791-812,  
<https://doi.org/10.1002/mde.3419>

This Version is available at:

<https://hdl.handle.net/10419/264473>

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## RESEARCH ARTICLE

# Information effects of managerial turnover on effort and performance: Evidence from the German Bundesliga

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Managerial turnover induces an information loss regarding managers' knowledge about subordinates' abilities that might increase subordinates' incentives to exhibit effort to impress the new manager. To identify how this affects short-term performance, we analyze within-season coach turnovers in the German Bundesliga and consider low and high information loss by differentiating between insider and outsider successors. We use a generalized version of the synthetic control method to construct an accurate counterfactual scenario ensuring that results are not simply due to regression-to-the-mean. We find performance improvements for insider and outsider successors, but only outsider successors induce players to exhibit higher effort.

## JEL CLASSIFICATION

D81; D83; D91; M51

## 1 | MOTIVATION

A bad performance of a firm often leads to the dismissal of the manager in charge (e.g., Denis & Denis, 1995; Gilson, 1989; Huson et al. 2004; Humphreys et al., 2011; Pieper et al., 2014).<sup>1</sup> Over the last years, this effect has been especially pronounced in the field of professional soccer (e.g., Frick et al. 2010), but still, the frequency of coach turnover seems to increase.<sup>2</sup> Aside from a performance that falls short of expectations, reasons for dismissals include, for instance, public pressure or scapegoating (Flores et al. 2012; Heuer et al., 2011).<sup>3</sup> Turnovers involve costs in form of indemnity payments as well as recruiting and contract enforcement costs. Albeit some success stories seem to justify these considerable costs, for instance,

cases where coaches improved the team performance about more than ten ranks in only five matches, the empirical evidence on performance effects is mixed (e.g., Giambatista et al., 2005; Karaevli, 2007). Apart from econometric difficulties, this might be due to the fact that there is little knowledge on factors that ultimately influence performance. For instance, the characteristics of the new coach go alongside with specific training methods, staffing decisions, or incentives for players to exhibit effort. As it has already been shown that effort in general positively impacts performance (Weimar & Wicker, 2017), it might well be that new coaches are effective exactly when they manage to increase players' effort. This raises the question about differentiated effects that are induced by a coach turnover, in particular, under which circumstances such a turnover is the right decision and whom to choose as a successor.

We contribute to answer this question by analyzing match-level data from five seasons of the German Bundesliga (2013/2014 to 2017/2018). In particular, we investigate (i) whether a turnover impacts players' effort, (ii) how performance is ultimately affected, and (iii) whether players' effort and performance levels depend on the

<sup>1</sup>Gilson (1989) finds that 52% of firms, which are in difficulties, experience turnovers.

<sup>2</sup>The average days as coach in the Bundesliga dropped from 1156 in 1991/92 to 548 in 2011/12 (John, 2012).

<sup>3</sup>Following de Dios Tena and Forrest (2007), relegation and the result of the last matches are strong indicators for firing. For an overview, see, for example, Frick et al. (2010) or van Ours and van Tuijl (2016).

successors' degree of information about players. Specifically, we focus on the information loss that goes alongside with a coach turnover. The new coach possesses less information about players than the old one (information is at least partially lost when he leaves the team) which induces two counteracting effects as theoretically modeled by Höffler and Sliwka (2003). The coach is usually responsible for the line-up of the team; thus, players' incentives to exhibit effort increase because the new coach will probably have no favorite line-up yet and players might seize the chance to impress the new coach (positive performance effects). On the downside, staffing decisions might be inferior as the new coach has less information about players' abilities (negative performance effects). In our analysis, we differentiate between turnovers with low and high information loss in that we investigate whether effort and performance differ when the new coach is insider (comes from the same team but held a different position) or outsider (comes from another team). Thus, we can uncover whether incentive effects are outweighed when the new coach has more information and, thus, how overall performance is affected.

We hence tie up to the literature that investigates the interplay of information and incentives, respectively effort provision. Apart from the decision to replace a manager, the results find application when information revelation is open for debate, for instance, in corporate settings. Distinct from previous literature that deals with how information about others is incorporated in own effort decisions (Abeler et al., 2011; Schneemann & Deutscher, 2017), we investigate how own effort is affected when others have (no) information about oneself.

Methodologically, we use and extend the synthetic control method introduced by Abadie et al. (2011) that enables us to approximate the counterfactual scenario most accurately. In contrast to existing approaches as probit or OLS regression, this method properly takes into account that assignment to treatment is not random in our setting.<sup>4</sup>

Our main findings indicate that under an outsider successor, players increase their effort which in turn results in higher performance. Although effort levels do not increase under an insider successor, we still find performance improvements that might be rooted in better information of insiders than outsiders.

In the next section, we focus on related research and subsequently derive our behavioral predictions. Afterwards, we present our data and empirical strategy, which is followed by the findings. We conclude by outlining our main results and implications.

## 2 | RELATED LITERATURE

Closest related to our work and the basis for our empirical analyses is the theoretical model of Höffler and Sliwka (2003). As mentioned above, the information loss may have a negative effect on

performance because staffing decisions, respectively the new line-up, might be less than ideal. Yet, the replacement of a coach can have a positive effect via changing incentives of players; particularly, the fight for the line-up position is reopened. Due to the loss of information, the new coach possibly weighs the players' past effort and performance less than the old coach did, and consequently, the new coach may put higher weight on present effort. Following from that, players may try to impress the new coach by exhibiting a higher effort (Höffler & Sliwka, 2003). This presumption is corroborated by statements of players, like the following:

When you get a new manager, you want to show him that you should be in the starting XI [...]. (Rio Ferdinand, 2013)

It will be another challenge now for all the lads to impress the new manager, whoever he may be. Even if he knows what you can do, you will still have to convince him you should be in his plans.<sup>5</sup> (Michael Owen, 2000)

Moreover, the existence of an incentive effect is also well in line with previous findings that effort is higher when there is information suggesting that a contest has not yet been decided (Schneemann & Deutscher, 2017).

In our study, we concentrate on short-term effects of a coach turnover because long-term effects also include the impact of new or modified (training) methods and the team composition.<sup>6</sup> In particular, we focus on within-season coach turnovers that occur in between two match days and analyze the consequences for the subsequent (four to six) match days. Modified training methods usually need more matches to become effective, and the player pool can only be changed during the transfer windows in the summer or winter break. By contrast, short-term effects include information effects as well as (short-term) strategic adjustments. Such strategic adjustments could, for instance, be a change in the line-up of the soccer team as the coach can decide whether to employ more offensive or defensive players. Yet, these adjustments are limited, because players can only be chosen out of the existing pool. Albeit none of these studies considers the impact of turnovers on players' effort, there exists a number of related studies that consider (short-term) performance effects of coach turnover in soccer.<sup>7</sup>

Positive short-term effects on the performance are found by Lago-Peñas (2011), who shows that a turnover is followed by a short-term improvement in performance, but subsequently, performance gradually worsens. González-Gómez et al. (2011) also found evidence for short-term improvements following midseason coach turnovers, but teams would benefit more from a neat planning (with respect to

<sup>4</sup>Teams rather change their coach when performance is bad. Directly comparing effort and performance in the preturnover and postturnover period can thus lead to biased estimates because performance improvements following a turnover might be due to regression to the mean.

<sup>5</sup>Also quoted in Höffler and Sliwka (2003).

<sup>6</sup>In line with existing literature, this means the replacement of the head coach as he is responsible for the line-up of the team (e.g., Muehlheusser et al., 2016).

<sup>7</sup>Most of the studies use match results as measure of performance, whereas few studies use the goal difference. Moreover, the studies use data from different countries' soccer leagues.

the team and specialists) before the start of the season. Moreover, there is evidence that improved performance is driven by an increase in the winning probability for home matches; that is, a new coach only improves performance when the team plays at home (de Dios Tena & Forrest, 2007; Madum, 2016). Interestingly, Madum (2016) finds that only teams that actually changed their coach would benefit from doing so; that is, soccer club with similar characteristics that did not change their coach would not have benefited from a turnover. Consistently, Balduck et al. (2010) find that a new coach improves the team quality of some teams and those teams also improve their ranking.<sup>8</sup> In line with these studies, Muehlheusser et al. (2016) find that turnovers improve performance only when teams are homogenous in terms of players' ability and attribute their findings to higher incentives to exhibit effort for homogenous than for heterogenous teams. Moreover, Koning (2003) finds that only defensive skills improve under the new coach because he rather tries to avoid losses than tries to win. Finally, Flint et al. (2014) find an increase in points per match after a coach turnover but this does not necessarily lead to a better final ranking.

On the contrary, Audas et al. (2002) find the short-term performance to decrease after a coach turnover, but the variance is higher than in the control group without turnover. Flores et al. (2012) confirm this finding, particularly, the performance in away matches, deteriorates when coaches are replaced.

In total, the majority of studies finds no significant performance changes following a coach turnover (Balduck & Buelens, 2007; Besters et al., 2016; Breuer & Singer, 1996; Bruinshoofd & Ter Weel, 2003; De Paola & Scoppa, 2012; Maximiano, 2006; van Ours & van Tuijl, 2016; Wirl & Sagmeister, 2008). In line with these studies, Heuer et al. (2011) conclude that the quality across coaches is either similar or does not impact the team quality. Closely related to our study, Flores et al. (2012) find no difference in performance between outsiders and trainer comebacks (who had exactly the same job before), but distinct from us, they do not focus on incentive effects.<sup>9</sup>

Conceptually related to our study is also the literature on corporate performance changes following a turnover, where theoretical predictions and existing evidence are ambiguous as well. The common sense theory predicts the performance to improve as soon as an ineffective manager is replaced by an effective one (Grusky, 1963), whereas the vicious circle theory suggests that the disruptive action of managerial turnover leads to a deterioration in performance (Grusky, 1960). Finally, the ritual scapegoating theory predicts no performance effects, because the dismissal is only a consequence from the need to do something (Gamson & Scotch, 1964). Yet, due to regression to the mean effects, firms are likely to recover after the turnover.

Albeit the existing evidence on performance effects of manager turnover is mixed (Giambatista et al., 2005; Karaevli, 2007), most studies agree that effects depend on the specific circumstances of the turnover event. For instance, forced turnovers lead to performance improvements, whereas usual retirements only lead to a small performance increase (Denis & Denis, 1995). Moreover, the reaction of shareholders as well as the characteristics of the departing and new CEO enter overall performance. Turnovers are no good news to the shareholders in case that the departing CEO is of high quality (Kind & Schläpfer, 2011). Consistently, also the successor seems to play a decisive role. When differentiating between insider and outsider successors, most studies find outsider successors to be more effective (Khurana & Nohria, 2000; Huson et al., 2004). In contrast, Furtado and Rozeff (1987) find inside appointments to be more effective than external replacements, whereas Khanna and Poulsen (1995) find no positive stock price reactions, neither for insiders nor outsiders. Aside from methodological approaches, industry or firm characteristics (e.g., firm size) might contribute to explaining the ambiguous findings (Reinganum, 1985).

Besides, there is little knowledge on the reasons for outsiders or insiders being more successful. We add to this question and show how the type of successor (insider or outsider) impacts employees' effort level because effort is in many settings decisive for overall performance. This provides the basis for investigating total performance effects, that is, to which extent the higher incentives compensate the negative effects of information loss.

To sum up, the literature on turnovers in a corporate setting as well as in professional soccer is ambiguous with respect to performance changes. Amongst others, this might be attributable to the econometric challenges.<sup>10</sup> Moreover, there is little knowledge about turnover effects on factors ultimately leading to performance changes. As mentioned above, Höffler and Sliwka (2003) model turnover effects as a trade-off between the increased incentives for players to exhibit effort (positive performance effects) against inferior staffing of positions (negative performance effects). Muehlheusser et al. (2016) lend support for the model by finding that turnovers improve performance only when teams are homogenous because incentives to exhibit effort are higher than for heterogenous teams. While Flores et al. (2012) find no differences between outsiders and trainer comebacks (who had exactly the same job before), there is, to the best of our knowledge, no study that investigates incentive effects. We thus extend previous research by investigating effects on players' effort provision as well as different degrees of information loss in the form of the successor being outsider or insider. This provides the basis for investigating total performance effects, that is, to which extent the higher incentives compensate the negative effects of information loss. Complementing previous research, our results lend practical advice not only for the question of whether to replace a manager but also for whom to choose as a successor. Moreover, the results might be transferred to corporate settings, that is, when it is at stake to increase subordinates effort.

<sup>8</sup>The team quality of 36 out of 45 teams in the Belgian Football League improved, but this improvement is only significant for eight teams.

<sup>9</sup>Apart from the consequential effects, regular coach dismissals make coaches aware of the ever-present danger of losing the job and are thus a useful method to provide *ex ante* incentives for coaches to exhibit high effort (Maximiano, 2006). Thus, the fans' optimism could be increased as soon as a new coach is employed. This leads to a higher crowd support, which again might influence performance positively (de Dios Tena & Forrest, 2007).

<sup>10</sup>This will be explained in more detail in the section about the identification strategy.

In comparison with firms, soccer offers a relatively constant environment and possible confounding factors can be controlled for.<sup>11</sup> Thus, first analyzing turnovers in soccer might ultimately provide a basis for transferring the results to a corporate perspective.

### 3 | HYPOTHESES

According to Höffler and Sliwka (2003), the information loss that goes alongside with a turnover leads to a change in players' incentives to exhibit higher effort. In particular, the former coach has more information about players' abilities than the new coach (because the old coach could observe players over the whole time as coach at this club). Hence, he can put a higher weight on players' ability than the new coach (who must first get to know the players). Following from that, the new coach weighs effort more than the old coach did. Consequently, after the coach turnover, players have an incentive to exhibit higher effort. Thus, we state the first hypothesis:

**Hypothesis 1:** After the turnover, players increase their effort level.

In order to test whether the increase in incentives is actually rooted in the information loss, we vary the degree of information loss by investigating outsider and insider successors. Since an outsider successor possesses at most as much information about players' abilities as an insider successor, incentives to exhibit effort are higher for outsider successors. Thereof, we state our second hypothesis:

**Hypothesis 2:** Under a new outsider coach, players increase their effort more than under a new insider coach.

When it comes to performance changes, Höffler and Sliwka (2003) model turnover effects as a trade-off between the increased incentives for players to exhibit effort (positive performance effects) and staffing of positions (negative performance effects). As insider successors possess more information than outsider successors, staffing decisions might be better, which might outweigh lower effort increases compared with an outsider successor. Thus, we state the third hypothesis:

**Hypothesis 3:** As an insider coach possesses more information about players' abilities, a lower effort increase than under an outsider coach is necessary to improve performance.

### 4 | DATA AND DESCRIPTIVE OVERVIEW

Our dataset includes match-level information of the German Bundesliga from five seasons, that is, from season 2013/2014 to

season 2017/2018.<sup>12</sup> We collected the data from the websites of *kicker* as well as *transfermarkt*.<sup>13</sup>

#### 4.1 | Structure of the data

The German Bundesliga is composed of 18 teams. Each team plays two matches against each other team (one at home, one away), which makes 34 matches per team per season, that is, 34 match days per season.<sup>14</sup> For each match, our dataset includes stadium attendance, a dummy for home match, whether the team won or lost the match as well as for both teams: final ranking, red cards and fouls, total distance run (in km), and whether the teams experienced a coach turnover.

Moreover, the dataset comprises coach-level data for the new and old coaches of all teams. First, this includes the points per match of the respective coach as a proxy of coach quality.<sup>15</sup> Second, the coach-level data include the number of former teams and the number of prior match days as a measure of experience and third, whether the new coach is an insider or outsider.

Because we focus on the short-term effects of coach turnover, we only consider within-season dismissals in our data. As a coach turnover occurred in between two match days<sup>16</sup>, the time span for the new coach to make adjustments prior to his first match is 5 to 9 days. Hence, effects of new training methods or new player acquisitions cannot play an important role (especially because we look at a fixed number of matches in the preturnover and postturnover period). All coach turnovers in our data set result out of a dismissal of the prevailing coach; thus, we do not further differentiate between dismissals and resignations.<sup>17</sup> An overview about the frequencies of within-season coach turnover is given in Table 1.<sup>18</sup>

As measure of effort, we use the running distance covered by the team per match. This is in line with previous studies that use running

<sup>12</sup>The running distance is only elicited from season 2013/2014 onwards.

<sup>13</sup><https://www.kicker.de>, respectively <https://www.transfermarkt.de>. The data set that supports the findings of this study is available from the authors upon request.

<sup>14</sup>This makes 306 matches per season and 1530 matches in total. The starting line-up of each team always consists of 11 players, and each team can change players during the match three times at maximum. A team receives 0 point if it loses the match, 1 for a draw, and 3 in case of winning. The team with the highest number of points (at the end of the season) wins the championship. Moreover, the best three (respectively four) teams qualify for the UEFA Champions League. Large monetary gains (the average gain of German Bundesliga clubs for participating in the UEFA Champions League in seasons 2013/14 to 2017/18 was 37,660,400 €) lead to high incentives for participating in the UEFA Champions League. Further, the worst two (respectively three) teams are relegated to the second Bundesliga and replaced by the best two (respectively three) teams of this division.

<sup>15</sup>The points per match are measured over the whole career of a particular coach who might be employed by different teams. Hence, a high (low) value means that on average, the teams of this coach were (un)successful indicating a high (low) quality of this particular coach.

<sup>16</sup>Note that one match day is equal to one league weekend, that is, Friday to Sunday.

<sup>17</sup>We focus on within-season turnovers and coaches' contracts usually end at the end of a season; that is, a turnover within-season indicates a forced turnover by itself. Moreover, all turnovers in our data set are either directly titled as forced or, in case that coach and management claimed a turnover as mutual decision, performance prior to the dismissal deteriorated, leaving no other option. This approach is in line with previous studies, for example, De Paola and Scoppa (2012).

<sup>18</sup>In Appendix A (Figure A1), we also provide the distribution of coach dismissals per match day and per ranking. Although coach turnovers seem to be uniformly distributed across match days, teams with a worse league position rather tend to change their coach, which is well in line with existing research (de Dios Tena & Forrest, 2007; Bachan et al., 2008; D'Addona & Kind, 2014).

<sup>11</sup>For instance, the data provide measures for the quality of the team and its opponents (e.g., (current) ranking) and the coaches (e.g., points per match during his previous career and total days as coach). Moreover, the German Bundesliga did not experience many changes in the last years and is an economically interesting sector. In the season 2016/2017, the total yield amounted to 3.4 billion euros.

**TABLE 1** Within-season dismissals

Season	Number of dismissals	Number of teams with dismissals	Number of insider (outsider) successors
2013/2014	9	6	4 (5)
2014/2015	9	8	6 (3)
2015/2016	7	6	4 (3)
2016/2017	10	9	4 (6)
2017/2018	10	8	5 (5)
Total	45	37	23 (22)

distance as a measure of effort (e.g., Schneemann & Deutscher, 2017; Weimar & Scharfenkamp, 2019; Weimar & Wicker, 2017). The distance covered depends, for instance, on the opponents' strength and actual score and increases when the team lags behind; that is, players increase their running performance in order to win (Siegle et al., 2012). Moreover, when a match is already decided, both teams reduce their running distance (Schneemann & Deutscher, 2017). Following from that, players occasionally seem to choose effort levels below their maximum, which leaves space for effort increases. The distance covered is not necessarily related to the ability of players (because each player can decide to run more or less in order to avoid, respectively achieve, a goal) and is thus an appropriate measure for effort.<sup>19</sup> On an individual level, the distance covered though depends on the position of the respective player; particularly, the literature agrees that central defenders cover a smaller distance (Mohr et al., 2003; Lago-Peñas et al., 2011; Siegle et al., 2012). Yet, most of the strategic line-up possibilities include two central defenders and, hence, the strategic line-up seems not to be of central importance for the total effort of a team.<sup>20</sup> Moreover, the number of players employed might impact the running distance. In our data set, the total number of employed players does not increase under the new coach (when comparing four days pre and post turnover), neither does it differ between insider and outsider successors. Thus, a change in the running distance cannot be explained by an increase in players. Finally, individual players reduce their running distance after signing a follow-up contract with a new club lending further support for the running distance as a good proxy for effort (Weimar & Scharfenkamp, 2019).

Following the main body of literature on performance effects in soccer (see, e.g., Flint et al., 2014), we use wins (3 points), draws (1 point), and losses (0 points) as a measure of performance. This measure does not include the superiority (inferiority) of the winner (loser), that is, whether a match is tight, for what reason some of the existing studies use the goal difference as measure of performance. Yet, a high goal difference could also be caused by some sort of discouragement effect when a team lags behind and, thus, does also not necessarily represent the extent of superior quality of the winner. Moreover, there is a growing body of literature that includes efficiency

considerations for performance measurements, for instance, scoring efficiency measured by data envelopment analysis (see, e.g., Amin & Sharma, 2014; Terrien & Andreff, 2020; Villa & Lozano, 2016). Complementing this literature, we focus on effort changes (distance covered) as well as performance changes measured in terms of the output (win, draw, loss) that go alongside with a coach turnover.

## 4.2 | Descriptive overview

Next, we compare preturnover and postturnover periods with respect to performance and effort. In particular, we focus on three (respectively five) match days in each period.<sup>21</sup> Figure 1 shows that effort and performance drop in the preturnover and increase in the postturnover period. In the following, we investigate the two measures in more detail.

First, Table 2 provides an overview about the effort for matches of turnover clubs in the preturnover and postturnover period (for three and five match days in each period) as well as for all matches (*Total*). In addition to the mean and standard deviation, we also present the standard deviation of the match days in that the investigated teams did not get a red card.<sup>22</sup> The table shows that the distance per team ranges between 99.03 and 129.11 km with a mean of 115.42 km and a standard deviation of 4.41 (respectively 4.26) km. Comparing the preturnover period to the postturnover period, we observe an increase in the mean of more than half the standard deviation.

Figure 2 illustrates the density for the overall effort of all five seasons as well as for five match days in the preturnover and five match days in the postturnover period (for turnover clubs), using a Gaussian kernel.<sup>23</sup> Apparently, the effort in the preturnover period is lower, whereas the effort in the postturnover period exceeds the overall effort.

Next, we focus on performance. Table 3 depicts the summary statistics of performance for the preturnover and postturnover period (for three and five match days in each period) of turnover clubs. The

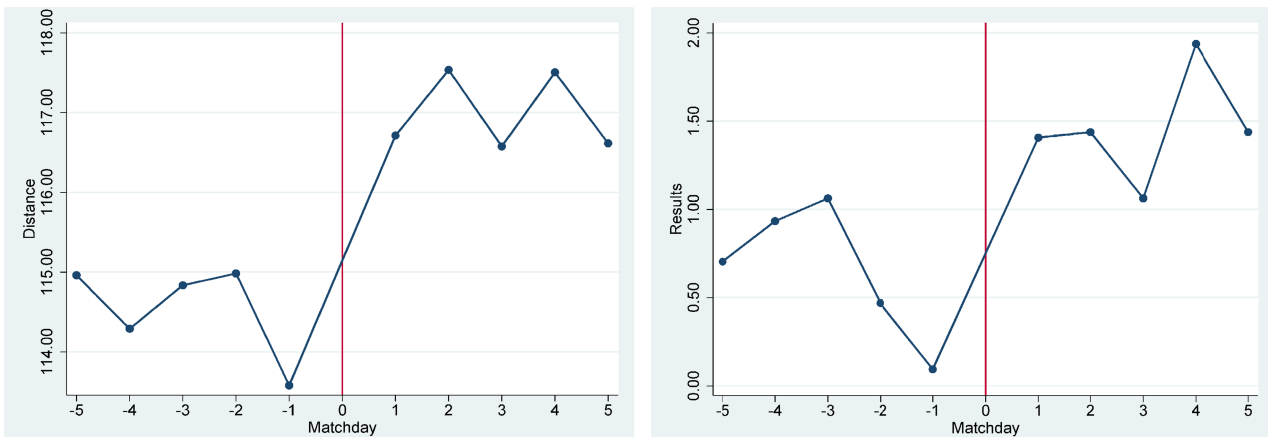
<sup>19</sup>In contrast to other measures such as intensive runs, the running distance as a measure of effort generally correlates positively with performance (Weimar & Wicker, 2017).

<sup>20</sup>Moreover, most players hold different positions. Muehlheusser et al. (2016) use data from 16 seasons of the German Bundesliga and find that only 26.2% of players are always staffed to the same position.

<sup>21</sup>The number of observations differs between preturnover and postturnover periods because we do not consider data from another season than the one of the corresponding turnover. For instance, when considering a turnover on the second match day, we do not take into account the last match day of the previous season, although it would be one of the 3 days before.

<sup>22</sup>Because a red card decreases the teams distance significantly, red cards might be seen as a multiplier of the standard deviation of distance.

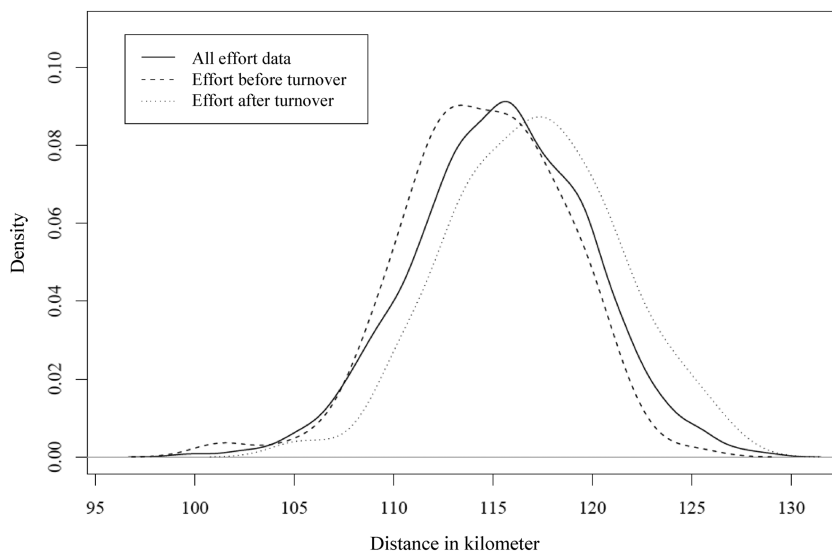
<sup>23</sup>In Appendix B.1 (Figure B1), we present the same densities for three match days.



**FIGURE 1** Effort and performance (pre- and post-turnover) [Colour figure can be viewed at wileyonlinelibrary.com]

Horizon		N	Mean	SD	SD (-R)	Min	Max
3 days	Pre	95	114.51	3.81	3.57	100.78	122.43
	Post	96	116.94	4.11	4.08	105.37	125.94
5 days	Pre	154	114.50	4.01	3.90	100.78	125.08
	Post	159	117.02	4.27	4.25	104.97	127.30
Total		3060	115.42	4.41	4.26	99.03	129.11

**TABLE 2** Summary statistics of effort



**FIGURE 2** Effort (five match days pre- and post-turnover)

table shows an increase in points of more than two thirds of standard deviation after the turnover. Interestingly, also the standard deviation seems to increase after the turnover.<sup>24</sup>

Figure 3 illustrates the performance for five match days in the preturnover and postturnover period.<sup>25</sup> In line with Table 3, it shows that performance improved after the turnover. In particular, the number of losses decreases, whereas the number of wins increases.

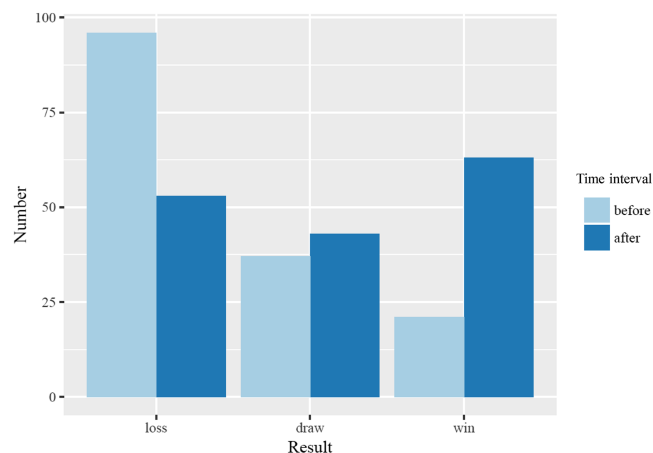
**TABLE 3** Summary statistics of performance

Horizon	Pre/post	N	Mean	SD
3 days	Pre	95	0.55	0.94
	Post	96	1.30	1.27
5 days	Pre	154	0.65	1.03
	Post	159	1.46	1.31

Although it seems that effort as well as performance increase following a turnover, one has to consider that teams rather change their coach when performance is bad. Thus, directly comparing the effort

<sup>24</sup>This finding is in line with Audas et al. (2002), who find a higher variance in performance following a coach turnover.

<sup>25</sup>In Appendix B.1 (Figure B1), we present the same plot for three match days.



**FIGURE 3** Performance (five match days pre- and post-turnover) [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

and performance in the preturndown and postturnover periods of one and the same club might result in biased estimates because the increased effort and improved performance after the turnover might be explained simply by regression to the mean. In order to properly take into account this econometric challenge, we use and extend the synthetic control method (Abadie & Gardeazabal, 2003; Abadie et al., 2010, 2011). The identification and empirical strategy is explained in more detail in the following sections.

## 5 | IDENTIFICATION STRATEGY

With respect to the method, choosing the appropriate counterfactual is of central importance. According to Kahneman and Tversky (1982), bad performance out of passive behavior looms larger than the same bad performance in connection with active behavior. Hence, relegation and the result of the last matches are strong indicators for firing (de Dios Tena & Forrest, 2007). Following from that, assignment to the treatment (replacing the coach) is not random, but teams rather change the coach when performance deteriorates, especially when the team runs into danger of relegation (Ashenfelter's dip). Because most of established methods (e.g., difference-in-difference) build on the assumption of an identical trend prior to treatment (randomization to treatment), they would lead to biased estimates in our setting as turnovers do not arise randomly. In particular, some studies find positive effects for the match results (following a coach turnover), but the effect disappears when employing an appropriate control group.

A number of studies employ ordered probit models of results (and often substantiate their findings with alternative dependent variables as goals or goals conceded). These studies address the econometric challenges by including team fixed effects (De Paola & Scoppa, 2012) or a measure of power for each team and controls for momentum in results and regression to the mean effects (Flores et al., 2012). In order to show that results are not only driven by mean reversion effects, de Dios Tena and Forrest (2007) use the teams' home and

away performance over a full season and an index of club performance over more than one season as controls in an additional model.

Some further studies use sophisticated models as propensity score matching to compare the teams' performance against the performance of a team that did not experience but had a similar probability of a coach turnover (e.g., Maximiano, 2006) or match the treated unit in different respects (e.g., Balduck & Buelens, 2007; Besters et al., 2016; Breuer & Singer, 1996; Bruinshoofd & Ter Weel, 2003; Madum, 2016; van Ours & van Tuijl, 2016; Wirl & Sagmeister, 2008). In particular, most of them use the nearest neighbor method. Some studies employ more than one method in order to check robustness of results. For instance, apart from ordered probit, De Paola and Scoppa (2012) substantiate their findings by using the nearest neighbor method with one to eight matches as controls for each treated unit.<sup>26</sup>

In sum, it has to be shown that the recovering of a team is not simply due to regression to the mean. In order to identify the average treatment effect on the treated (ATT), we thus need to estimate an appropriate counterfactual, which captures what would have happened in the absence of the turnover. More sophisticated methods like propensity score matching, especially nearest neighbor matching, address the problem of nonrandomized assignment to treatment and identify control(s) based on specific characteristics that should be similar in the control and the treatment unit. Yet, possible confounding factors that may drive the effort and performance of a specific control unit render nearest neighbor matching less useful in our setting.

Instead, we use a related approach, particularly, the synthetic control method (SCM) that ensures most similar pretreatment trends of controls by using a weighted average of multiple controls to construct the counterfactual scenario.<sup>27</sup> SCM offers a systematic way to choose the counterfactual scenario. Closely related to nearest neighbor, it picks up the idea of matching untreated to treated units. Additionally, it considers the preintervention data to assign (unequal) weights to the untreated units so that the resulting linear combination of untreated units mirrors the treated unit as closely as possible. In doing so, the synthetic control typically considers multiple matching variables and multiple time periods in the preintervention period and hence accounts for time variant effects of controls and the treated unit. Moreover, there is no restriction on the number of matched units (for each treated unit); instead, the number of control units (for each treated unit) is chosen in order to minimize deviations between the linear combination of controls and the treated unit. The advantage of SCM is thus that the characteristics of the treated unit can be proxied most accurately, especially in comparison with using controls that consist out of a single untreated unit or a linear combination of multiple units that uses equal weights.

Applied to our setting, for each turnover club, we construct a synthetic control club out of a linear combination of the nonturnover clubs that best approximates the actual turnover club. Consequently,

<sup>26</sup>This method even captures the possibility that players anticipate a subsequent turnover as players from comparable clubs that are used to construct the synthetic control club, might be concerned with the possibility of coach turnover as well.

<sup>27</sup>This method is according to (Athey & Imbens, 2017) 'arguably the most important innovation in the policy evaluation literature in the last 15 years (p.9)'.



turnover clubs and its synthetic control clubs are very similar with respect to important characteristics as previous performance (which is most likely correlated with expectations about coach turnover), within-team homogeneity as well as overall ability of teams. Hence, these variables should not drive our regression results, and further, we are able to exclude that regression results are due to regression to the mean. We present our empirical strategy in the following section.

## 6 | EMPIRICAL STRATEGY AND RESULTS

In a first step, we present SCM as introduced by Abadie and Gardeazabal (2003), Abadie et al. (2010, 2011). In order to apply SCM on our setting, we then extend it to the generalized synthetic control method (GSCM).

### 6.1 | SCM with one turnover

In SCM with one turnover, we define  $j = 1, \dots, J + 1$  clubs and consider  $t = 1, \dots, T$  time periods. Without loss of generality, let  $j = 1$  be the turnover club and  $j = 2, \dots, J + 1$  the nonturnover clubs. The first match day after the turnover takes place at time  $T_0 + 1$ . Thus, we consider preturndover periods and postturndover periods:

$$t = \underbrace{1, 2, \dots, T_0}_{\text{pre-turndover}}, \underbrace{T_0 + 1, T_0 + 2, \dots, T}_{\text{post-turndover}}$$

For the turnover club  $j = 1$ , we distinguish between the actual outcome (distance, respectively result)  $Y_{1t}^I$  and the outcome of the counterfactual  $Y_{1t}^N$  at time  $t$ , that is, the outcome which would have been observed in the absence of the turnover. Our aim is to estimate the difference  $\alpha_{1t} = Y_{1t}^I - Y_{1t}^N$  of these two possible outcomes that represents the actual effect of the coach turnover.

To estimate the counterfactual  $Y_{1t}^N$ , we define a synthetic control club as weighted average of nonturnover clubs. The weight for each nonturnover club is greater or equal to zero and all weights sum up to one. These requirements are summarized by the following definition:

**Definition 1 Weight vector.** For the linear combination characterizing the synthetic control club, we define a  $(J + 1)$  weight vector  $\Lambda = (\lambda_2, \dots, \lambda_{J+1})'$ , which satisfies

- (1)  $\lambda_j \geq 0$  for  $j \in \{2, \dots, J + 1\}$ ,
- (2)  $\sum_{j=2}^{J+1} \lambda_j = 1$ .

Moreover, we define a  $(T_0 \times 1)$  vector  $K = (k_1, \dots, k_{T_0})'$  to denote  $M$  linear combinations of preturndover outcomes  $\bar{Y}_1^K = \sum_{m=1}^{T_0} k_m Y_{im}$  to control for unobserved common factors with time-varying effects and set  $U_j$  as a  $(r \times 1)$  vector of  $r$  observed covariates for each club  $i$ .<sup>28</sup>

Empirically, we aim to select  $\Lambda^* = (\lambda_2^*, \dots, \lambda_{J+1}^*)' \in \mathbb{R}_{\geq 0}^{J \times 1}$  such that the conditions

- (i)  $\bar{Y}_1^{K_1} = \sum_{j=2}^{J+1} \lambda_j^* \bar{Y}_j^{K_1}, \dots, \bar{Y}_1^{K_M} = \sum_{j=2}^{J+1} \lambda_j^* \bar{Y}_j^{K_M}$
- (ii)  $U_1 = \sum_{j=2}^{J+1} \lambda_j^* U_j$

(approximately) hold.<sup>29</sup> Hence, we set  $\hat{\alpha}_{1t} = Y_{1t} - \sum_{j=2}^{J+1} \lambda_j^* Y_{jt}$  as an estimator of  $\alpha_{1t}$  for the postturndover period  $t = T_0 + 1, \dots, T$ .<sup>30</sup> In order to obtain the best approximation (with respect to the chosen covariates) of the synthetic control club for the turnover club, we state the following theorem:

**Theorem 1 Approximation.** With  $k = r + M$ , we define

$$X_1 = \begin{pmatrix} U_1' \\ \bar{Y}_1^{K_1} \\ \vdots \\ \bar{Y}_1^{K_M} \end{pmatrix} \in \mathbb{R}^{k \times 1} \quad \text{and} \quad X_0 = \begin{pmatrix} U_2' & \dots & U_{J+1}' \\ \bar{Y}_2^{K_1} & \dots & \bar{Y}_{J+1}^{K_1} \\ \vdots & \ddots & \vdots \\ \bar{Y}_2^{K_M} & \dots & \bar{Y}_{J+1}^{K_M} \end{pmatrix} \in \mathbb{R}^{k \times J},$$

where  $X_1$  represents the preturndover outcomes (respectively characteristics) of the turnover club and  $X_0$  represents the preturndover outcomes (respectively characteristics) of the nonturnover clubs. For the best approximation of the observations of the synthetic control club for the observations of the turnover club, we choose  $\Lambda^*$  such that

$$\Lambda^* = \begin{pmatrix} \lambda_2^* \\ \vdots \\ \lambda_{J+1}^* \end{pmatrix} = \underset{\Lambda \in \mathbb{R}_{\geq 0}^{J \times 1}}{\text{argmin}} \{ \|X_1 - X_0 \Lambda\|_V \},$$

where  $V \in \mathbb{R}^{k \times k}$  is the symmetric, positive definite and diagonal matrix that minimizes the mean square prediction error (MSPE) of the outcome variable over some set of preintervention periods.<sup>31</sup>

### 6.2 | Generalized SCM with multiple turnovers (GSCM)

As we have more than one turnover in our data set, it differs from the data presented in Abadie et al. (2011). In particular, we

<sup>28</sup>If  $(U_1, \bar{Y}_1^{K_1}, \dots, \bar{Y}_1^{K_M}) \notin \text{Conv}\{(U_2, \bar{Y}_2^{K_1}, \dots, \bar{Y}_2^{K_M}), \dots, (U_{J+1}, \bar{Y}_{J+1}^{K_1}, \dots, \bar{Y}_{J+1}^{K_M})\}$  holds, the identity of the synthetic control club and the turnover club cannot hold.

<sup>30</sup>Hence,  $\bar{Y}_{1t}^N = \sum_{j=2}^{J+1} \lambda_j^* Y_{jt}$  functions as an estimator for the counterfactual outcome  $Y_{1t}^N$  of the corresponding club in the absence of a turnover.

<sup>31</sup>For the measure used, it holds that  $\|X_1 - X_0 \Lambda\|_V = \sqrt{(X_1 - X_0 \Lambda)' V (X_1 - X_0 \Lambda)}$ . Further, for minimizing the MSPE, we choose  $V$  such that  $V^* = \underset{V \in \mathcal{V}}{\text{argmin}} \|Z_1 - Z_0 W^* (V)\|_2$  where  $Z_1 \in \mathbb{R}^{T_0 \times 1}$  is the vector of outcome variables for the preturndover period of the turnover club and  $Z_0 \in \mathbb{R}^{T_0 \times J}$  the corresponding matrix with outcome variables for the same period of the nonturnover clubs. The set  $\mathcal{V}$  refers to the set of all positive definite and diagonal matrices.

<sup>28</sup>For further details, see Abadie et al. (2010).

have multiple turnovers at different points in time. We address this issue by a season-wise estimation of synthetic control clubs, which extends the pool of possible control clubs and generalizes the model of Abadie et al. (2011) by allowing for more than one turnover per season.<sup>32</sup> Hence, without loss of generality, we set  $\mathcal{T}(s) = \{1, \dots, q\}$  as the set of turnover clubs and  $\mathcal{C}(s) = \{q + 1, \dots, J + 1\}$  as the set of nonturnover clubs in season  $s$ . Instead of estimating  $\hat{\alpha}_{1t} = Y_{1t} - \sum_{j=2}^{J+1} \lambda_j^* Y_{jt}$  as the effect of one particular turnover (of club  $j = 1$  at time  $t$ ), we estimate the ATT  $\alpha$ , that is, the average effect of a coach turnover on effort and performance. When creating the generalized synthetic control club (GSCC) for one specific turnover, we restrict the set of control clubs for the linear combination to those that did not experience a turnover in the respective season, that is,  $\Lambda_{\mathcal{C}(s)}^* = \{\lambda_j^* | \lambda_j = 0, \forall j \in \mathcal{T}(s)\}$ . If the same club has more than one turnover within  $T$  days in a specific season, we only consider the first turnover.<sup>33</sup> Further, in case of an interim solution, we only consider the actual successor. Based on the predictors  $U_i$  for the endogenous variable  $Y_i$  and for  $T_0$  preturndown periods, we first estimate the synthetic control club for each turnover club; that is, we assign  $\Lambda_{\mathcal{C}(s)}^*$  for each  $j \in \mathcal{T}(s)$ . For more predictive power, we further delete all GSCM matchings where the MSPE exceeds the standard deviation of the endogenous variable. The resulting dataset consists of turnover clubs and their corresponding GSCC with data  $(U_i, Y_i)$  for each postturnover period  $t = T_0 + 1, \dots, T$ . For estimating the ATT, we set dummies (1 = turnover) for each turnover club as well as one specific matching ID for each match of a turnover club with its corresponding GSCC. According to Equation (1), we regress the turnover dummies with other covariates and fixed effects on the endogenous variable:

$$Y_i = \alpha \cdot CT_i + \sum_{v=1}^m \beta_v \cdot CT_i \times Q_{iv} + \sum_{v=1}^n \gamma_v \cdot C_{iv} + f_s + f_M + \varepsilon_i. \quad (1)$$

The variable  $Y_i$  refers to the endogenous variable (distance, result),  $CT_i$  is a dummy for turnover (1 = turnover), and thus  $\alpha$  represents the ATT.<sup>34</sup> Characteristics of the new coach (in case of a turnover, i.e.,  $CT_i = 1$ ) are captured by  $Q_i$ . We further control for several covariates  $C_i$  with fixed effects  $f_s$  on season level to control for seasonal effects and fixed effects  $f_M$  on matching ID level to control for unobserved turnover specific effects. The variable  $\varepsilon_i$  describes the residual term.

<sup>32</sup>We do not restrict the control group to teams that experienced no turnovers over the whole time period for two reasons. First, there is only one team without a turnover in the observation period (SC Freiburg). Second, teams with a possibly worse future performance would be excluded (because these teams are more likely to experience a turnover). Thus, the control teams would be biased upwards. This approach is in line with few previous studies (e.g., Heuer et al., 2011). Further, we do not expect coach turnovers during the previous seasons to impact players' current behavior.

<sup>33</sup>Otherwise there might be a bias because effects appearing in the postturnover period of the first turnover might enter the preturndown period of the second turnover.

<sup>34</sup>More precisely, the parameter  $\alpha$  represents the ATT only if no interactions with the  $CT_i$ -variable are included in the regression.

TABLE 4 Predictors of endogenous variables

Predictor	Effort	Performance
StadiumAtt	×	×
DiffRanks	×	×
DistanceOpp	×	×
Red Cards	×	×
Final Rank	×	×
Distance		×
Result	×	

### 6.3 | Results of GSCM

We use the data presented in Section 4 to estimate the effect of a turnover on effort and performance. In order to estimate the GSCC for each turnover club, we choose the predictors  $U_i$  depicted in Table 4.

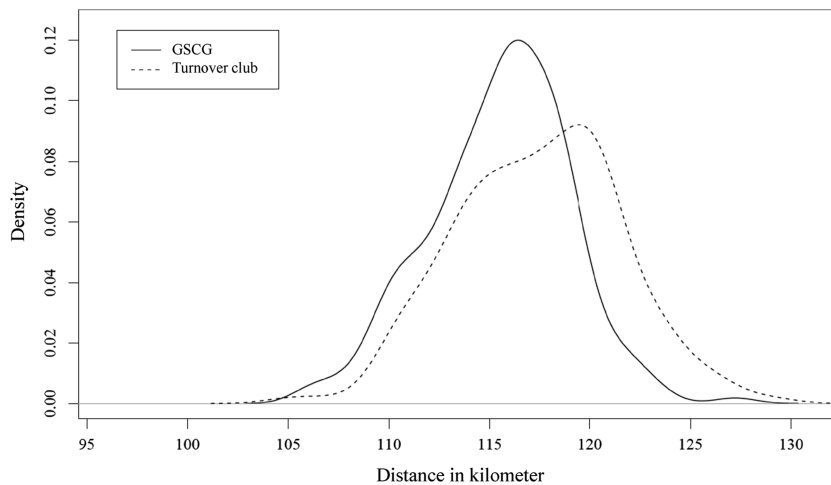
To account for the facts that the teams have different ability level and that the old and new coach play against different opponents, we control for the *final rank* and the difference in ranks ( $DiffRanks = rank\ opponent - own\ rank$ ) at the end of the current season. We further include *red cards*, because a reduction in the number of players most likely leads to a decrease in the distance covered per team. Because a higher crowd support could lead to an increase in motivation (de Dios Tena & Forrest, 2007), we also include the stadium attendance (*Attendance*, in thousand people). Finally, we include the running distance by the team of interest (*Distance*) and its opponent (*DistanceOpp*) as well as the performance (*Result*).

We consider  $T = 10$  match days and set  $T_0 = 4$ ; hence, we take four match days as preturndown period and six match days as postturnover period.<sup>35</sup> Figure 4 plots the density of the distance of the turnover club against the distance of the GSCM club in the postturnover period. As the density of the turnover club is shifted to the right, effort seems to be higher than it would have been in the absence of a turnover.

In order to estimate the ATT, we run OLS regressions with matching ID- and season-based fixed effects, as stated in Equation (1). In specification (1), we regress *Distance* on the *coach turnover*, the distance of the opponent, and the number of red cards. In specifications (2) to (5), we further control for the difference in ranks, whether the team plays at home (*Home*; 1 = home), the number of committed fouls of the opponent (*FoulsOpp*), the result of the previous match in points (*LastResult*) and the stadium attendance. Specifications (3) to (5) additionally include different coach characteristics, that is, whether the new coach is an insider or outsider (*Insider*; 1 =

<sup>35</sup>Out of 45 turnovers in total, we investigate 35 turnovers where the MSPE for effort (respectively 30 turnovers for performance) does not exceed the standard deviation of the corresponding endogenous variable.

<sup>36</sup>Out of 45 turnovers in total, we investigate 35 turnovers where the MSPE for effort (respectively 30 turnovers for performance) does not exceed the standard deviation of the corresponding endogenous variable.



**FIGURE 4** Effort of turnover club and GSCG (six match days after turnover)

insider), the prior points per match as proxy for the quality of the coach (*Prior PPM*), and the number of prior jobs as measure of experience (*Prior Jobs*).<sup>36</sup> The regression results are summarized in Table 5.<sup>37</sup>

The regressions show that a coach turnover seems to be a significant, positive predictor of effort in all specifications (around 35% of SD). This supports Hypothesis 1. As expected, red cards lead to a decrease in the distance covered per team and the distance of the opponent positively influences the own distance covered per match. In case that a team is better than the opponent (meaning that the difference in ranks is positive), the effort is lower (and vice versa). This is consistent with previous research on heterogeneous contestants that find lower effort provision of the ex ante favorite (Berger & Nieken, 2016). In case the respective team won the last match, the total effort seems to be lower. The stadium attendance appears to be no significant predictor of effort.

When including the characteristics of the new coach, neither the quality of the coach nor the experience seem to influence the team's effort. However, there is a significant discount on the positive effect of a coach turnover in case the new coach is an insider. In particular, positive and negative effects almost counterbalance each other, meaning that players only increase their effort in case that the new coach is an outsider. This confirms Hypothesis 2.

Despite the higher effort following a coach turnover, we are interested in whether the performance under the new coach also improves. We thus run OLS regressions with matching ID- and season-based fixed effects with *Result* as dependent variable (0–3

points). Again, specification (1) and (2) do not include coach characteristics, whereas specification (3) to (5) additionally include them. The regression results are summarized in Table 6.<sup>38</sup>

In all specifications, *coach turnover* is a significant positive predictor; that is, a coach turnover not only leads to a higher effort but also improves performance.<sup>39</sup> Contrary to the previous regressions of effort, the coefficient for insider is not significant (though negative). Thus, albeit the effort only increases for outsider successors, performance seems to improve for both, outsider as well as insider successors, lending support for Hypothesis 3. An outsider successor seems to provide incentives to exhibit a higher effort, which leads to a better performance. An insider successor does not provide stronger incentives and consistently does not induce players to exhibit a higher effort, but as he has superior information, performance improves as well.

Moreover, a higher distance covered by the opponent as well as receiving a red card lead to a lower performance; that is, in case the opponent exhibits a higher effort and in case that the team is outnumbered, winning the match becomes more difficult. In contrast, being the favorite team or playing at home improves team performance (which is in line with previous studies).

## 6.4 | Placebo tests

In order to substantiate our results, we run several placebo tests. For each treatment (the data set includes multiple treatments at different points in time), we estimate a placebo as the most similar club, that is, the club that GSCM assigns the highest weight  $\lambda$ . More precisely, for each treatment  $j \in \mathcal{T}(s)$ , we choose the placebo  $P$  with

<sup>36</sup>Appendix B.2 includes regressions (Table B1) that ensure no systematic pattern that drives the successor type (insider or outsider). Further, there is no significant difference in the quality (in terms of PPG) between insider and outsider successors ( $p = 0.42$ , Mann-Whitney  $U$  test). Moreover, the appendix includes regressions (Table B2 for effort and Table B3 for performance) that use prior match days instead of prior jobs as a measure of experience. However, this does not change our results.

<sup>37</sup>Appendix B.2 includes the same specifications of OLS regressions (Table B4) for the turnover clubs and its synthetic controls for a shorter postturnover period of four match days. Results are qualitatively the same; particularly, the significant effects of managerial turnover on effort (1.403\*\*\* ( $SD = 0.264$ ) in Table 5 and 1.413\*\*\* ( $SD = 0.342$ ) in Table B4) remain unchanged.

<sup>38</sup>Appendix B.2 includes regressions for  $T_0 = 4$  and  $T = 8$  (Table B5), which qualitatively confirm our results; particularly, the significant effect of managerial turnover on performance (0.606\*\*\* ( $SD = 0.109$ ) in Table 6 versus 0.515\*\*\* ( $SD = 0.141$ ) in Table B5) remains unchanged.

<sup>39</sup>Appendix B.2 includes regressions with *Distance* as additional explanatory variable (Tables B6 and B7 for four match days) and shows that a higher effort translates into an improved performance as *Distance* is a highly significant predictor of *Result* in all specifications.

**TABLE 5** OLS of effort (six match days after turnover)

	Dependent variable: Distance				
	(1)	(2)	(3)	(4)	(5)
Coach turnover	1.618*** (0.245)	1.277*** (0.259)	1.403*** (0.264)	1.344*** (0.272)	1.310*** (0.268)
Insider			-1.378** (0.620)		
Prior PPM				-0.265 (0.331)	
Prior jobs					-0.046 (0.097)
DistanceOpp	0.645*** (0.038)	0.641*** (0.037)	0.646*** (0.037)	0.641*** (0.037)	0.641*** (0.037)
Red cards	-1.911*** (0.520)	-2.103*** (0.511)	-2.049*** (0.509)	-2.088*** (0.512)	-2.107*** (0.512)
DiffRanks		-0.066*** (0.025)	-0.062** (0.025)	-0.063** (0.025)	-0.064** (0.026)
Home		0.291 (0.280)	0.256 (0.279)	0.262 (0.283)	0.275 (0.282)
FoulsOpp		-0.079** (0.037)	-0.083** (0.036)	-0.081** (0.037)	-0.081** (0.037)
LastResult		-0.340* (0.175)	-0.454** (0.182)	-0.382** (0.183)	-0.359** (0.180)
StadiumAtt (thousands)		0.011 (0.010)	0.012 (0.010)	0.011 (0.010)	0.011 (0.010)
Observations	412	412	412	412	412
R <sup>2</sup>	0.640	0.660	0.664	0.660	0.660
Adjusted R <sup>2</sup>	0.605	0.621	0.625	0.621	0.620
Residual std. error	2.454 (df = 374)	2.403 (df = 369)	2.390 (df = 368)	2.404 (df = 368)	2.405 (df = 368)

Note: Robust standard errors in parentheses.

\* $p < .1$ .

\*\* $p < .05$ .

\*\*\* $p < .01$ .

$\lambda_P = \max\{\Lambda_{C(s)}^*\}$ . Afterwards, we construct a GSCC for each placebo, using the same predictors as for the treatment. For the postturnover period, we define the following four endogenous variables: the variables  $Y^T$  and  $Y^P$  capture the actual outcome (of effort, respectively performance) of the treatment and placebo,  $Y^{ST}$  and  $Y^{SP}$  the outcomes of the corresponding GSCCs.

Thus, the difference between the outcome of the treatment and its corresponding GSCC ( $Y^T - Y^{ST} = \Delta T$ ) represents the actual effect of a coach turnover, whereas the difference between the outcome of the placebo and its corresponding GSCC ( $Y^P - Y^{SP} = \Delta P$ ) represents how the most similar club (that did not experience a turnover) differs from its GSCC. Following from that, there is no treatment effect if these differences are equal; that is, the hypothesis of no treatment effect is

$$H_0: \mathbb{E}[(Y^T - Y^{ST}) - (Y^P - Y^{SP})] = 0.$$

Figure 5 illustrates the distributions of  $\Delta T$  and  $\Delta P$  for effort and performance.

The figures already suggest that there is a difference between the distribution of  $\Delta T$  and  $\Delta P$  for both effort and performance. Indeed, we can reject  $H_0$  for both effort and performance ( $p < .01$ , two-sample Kolmogorov–Smirnov test).

Furthermore, effort as well as performance of placebos ( $Y^P$ ) and its respective GSCCs ( $Y^{SP}$ ) do not differ significantly ( $p = .36$  for effort,  $p = 0.38$  for performance, two-sided  $t$  test), respectively.  $\mathbb{E}[\Delta P]$  is not significantly different from zero ( $p = .34$  for effort,  $p = .39$  for performance, one-sample  $t$  test). Consequently, there is no positive effect on effort or performance for placebos in the postturnover period (i.e., the period following the point in time at that a coach turnover happened for the actual treatment club but not for the placebo).

Finally, we run regressions of effort and performance for the placebos (the results are included in Appendix C, Tables C1 [effort] and C2 [performance]). Neither do the coefficients of *coach turnover*

**TABLE 6** OLS of performance (six match days after turnover)

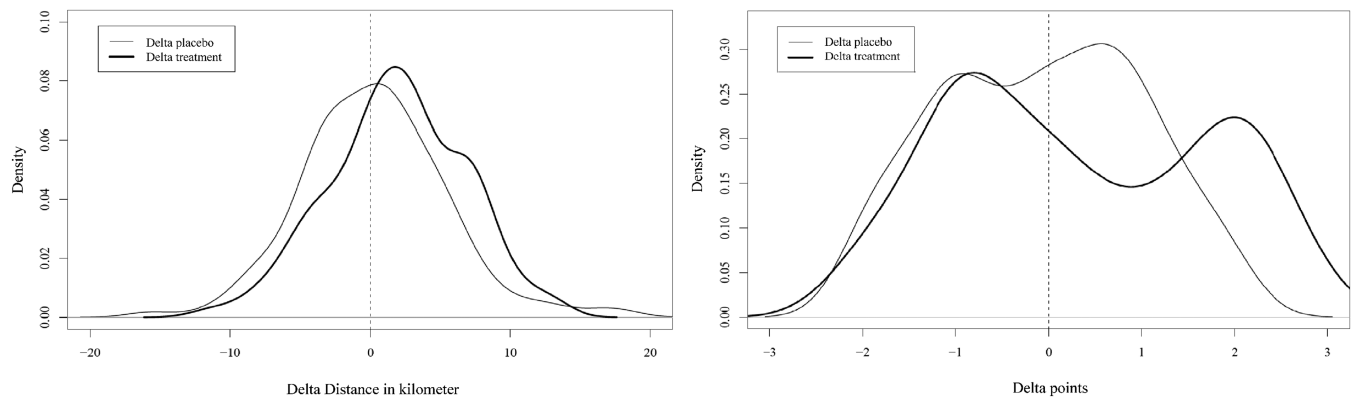
	Dependent variable: Result				
	(1)	(2)	(3)	(4)	(5)
Coach turnover	0.389*** (0.106)	0.585*** (0.106)	0.606*** (0.109)	0.611*** (0.111)	0.589*** (0.109)
Insider			-0.199 (0.250)		
Prior PPM				-0.121 (0.144)	
Prior jobs					-0.006 (0.039)
DistanceOpp	-0.031* (0.017)	-0.027* (0.016)	-0.026* (0.016)	-0.026* (0.016)	-0.027* (0.016)
Red cards	-0.562** (0.235)	-0.440** (0.222)	-0.430* (0.222)	-0.433* (0.222)	-0.441** (0.222)
DiffRanks		0.061*** (0.011)	0.062*** (0.011)	0.063*** (0.011)	0.061*** (0.011)
Home		0.380*** (0.119)	0.368*** (0.119)	0.369*** (0.119)	0.378*** (0.119)
FoulsOpp		0.018 (0.017)	0.017 (0.017)	0.017 (0.017)	0.017 (0.017)
LastResult		-0.108 (0.073)	-0.126* (0.076)	-0.124* (0.075)	-0.110 (0.074)
StadiumAtt (thousands)		0.003 (0.004)	0.003 (0.004)	0.003 (0.004)	0.003 (0.004)
Observations	352	350	350	350	350
R <sup>2</sup>	0.151	0.274	0.276	0.276	0.274
Adjusted R <sup>2</sup>	0.066	0.188	0.187	0.187	0.186
Residual std. error	0.988 (df = 319)	0.924 (df = 312)	0.924 (df = 311)	0.924 (df = 311)	0.925 (df = 311)

Note: Robust standard errors in parentheses.

\* $p < .1$ .

\*\* $p < .05$ .

\*\*\* $p < .01$ .



**FIGURE 5**  $\Delta T$  and  $\Delta P$  for effort and performance (pre- and post-turnover)

appear to be significant predictors of *Distance* ( $p = .31$ ) nor of *Result* ( $p = .38$ ). As the other covariates (*DistanceOpp*, *Redcards*, *FoulsOpp*) are still significant, the results seem to be plausible. Overall, the placebo tests corroborate our previous findings, and we conclude there are indeed positive effects of coach turnover on both effort and performance.

## 7 | CONCLUSION

Theoretically, a managerial turnover goes alongside with an information loss that induces two counterbalancing (short-term) effects: increased incentives for employees to exhibit effort, which is counteracted by inferior staffing of positions (that is higher for outsider successors). Depending on which effect is predominant, the overall performance effect is either positive or negative (Höfler & Sliwka, 2003).

We complement previous research on the interplay of information and incentives and investigate empirically whether coach turnover in the German Bundesliga leads to a higher effort provision and better performance by focusing on differentiated short-term effects. In particular, we uncover whether players increase their effort under a new coach and whether they do so more or less in case the new coach is insider, respectively outsider, to the club. In order to address the econometric challenges and to appropriately estimate the ATT of coach turnover, we apply the synthetic control method and extend it to multiple treatments at multiple points in time. In particular, we estimate a synthetic control club for each treatment club and compare their effort and performance following a coach turnover. Our results help to explain diverging findings (with respect to performance effects of turnovers) of previous research and lend advice for practical implementations such as whom to choose as a successor or whether to reveal specific information in order to increase employees' effort provision.

Our results suggest that a coach turnover induces players to exhibit higher effort, but the effect is more pronounced for outsider successors. More precisely, in case the new coach is insider, the effect is almost nonexistent. Moreover, a coach turnover also leads to better performance, independently from whether the new coach is insider or outsider. This means that under an outsider successor, players exhibit higher effort leading to improved performance, but an insider successor seems to possess the essential information to also improve performance.

The results are consistent with existing theory. First, a turnover leads to an increase in incentives because the race for being in the line-up on the favorite position is reopened. The new coach has less information and is possibly less prejudiced, respectively, he weighs present more than past effort. Thus, players aim to impress the new coach by exhibiting higher effort. Second, players might behave in a reciprocal way, particularly, in case the new coach puts a specific player in the line-up, he is thankful and thus exhibits higher effort. In case that the new coach is an outsider and thus has less information, players might be particularly thankful for being in the line-up and

hence exhibit a higher effort (see the literature on reciprocity, e.g., Brandts et al., 2006). Third, a coach turnover can result out of public pressure and the need to do something; hence, a new coach might raise hope of players as well as fans leading to a higher effort and improved performance. This again might be more pronounced for outsider successors because it is rather related to a major change (e.g., Helmich & Brown, 1972; Parrino, 1997).

Overall, in line with the common sense theory, clubs who experience a deteriorating performance can indeed benefit from replacing its coach. Transferred to a corporate perspective, our results suggest that the successor of the dismissed manager could play an important role. In case the firm aims to motivate employees, an outsider successor could fit the position better and in a setting where information is more relevant for performance, that is, when the employees' abilities have to fit exactly the requirements for a specific position (more difficult tasks), an insider successor might be the appropriate choice. Finally, when it is at stake to increase employees' effort, it seems to be advisable to carefully consider information revelation. In case that it appears as the employer has no ready-made opinion yet, this will increase employees' effort.

## ACKNOWLEDGMENTS

We would like to thank Gerlinde Fellner-Röhling, participants of the Bavarian Microday 2018 in Regensburg, participants of the SESM in Berlin 2019 for helpful comments and discussions. For providing the publicly available data set, we kindly thank *kicker.de* and *transfermarkt.de*.

## DATA AVAILABILITY STATEMENT

The data set that supports the findings of this study is available from the authors upon request.

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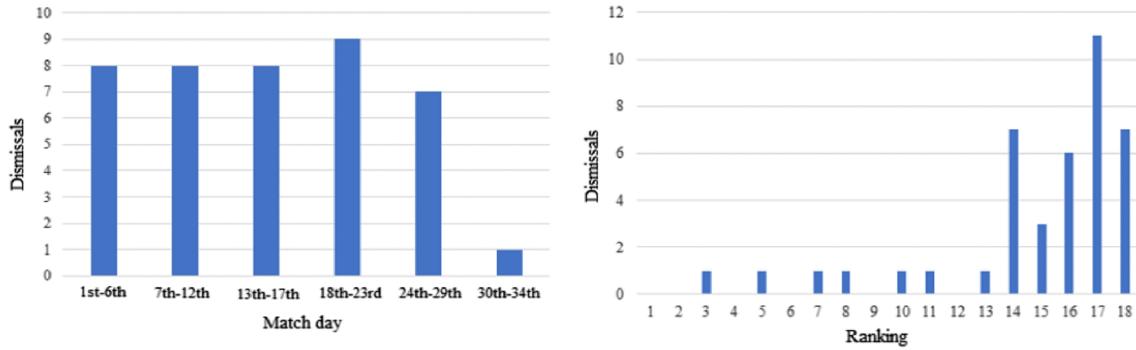
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**How to cite this article:** Kleinknecht, J., & Würtenberger, D. (2022). Information effects of managerial turnover on effort and performance: Evidence from the German Bundesliga. *Managerial and Decision Economics*, 43(3), 791–812. <https://doi.org/10.1002/mde.3419>

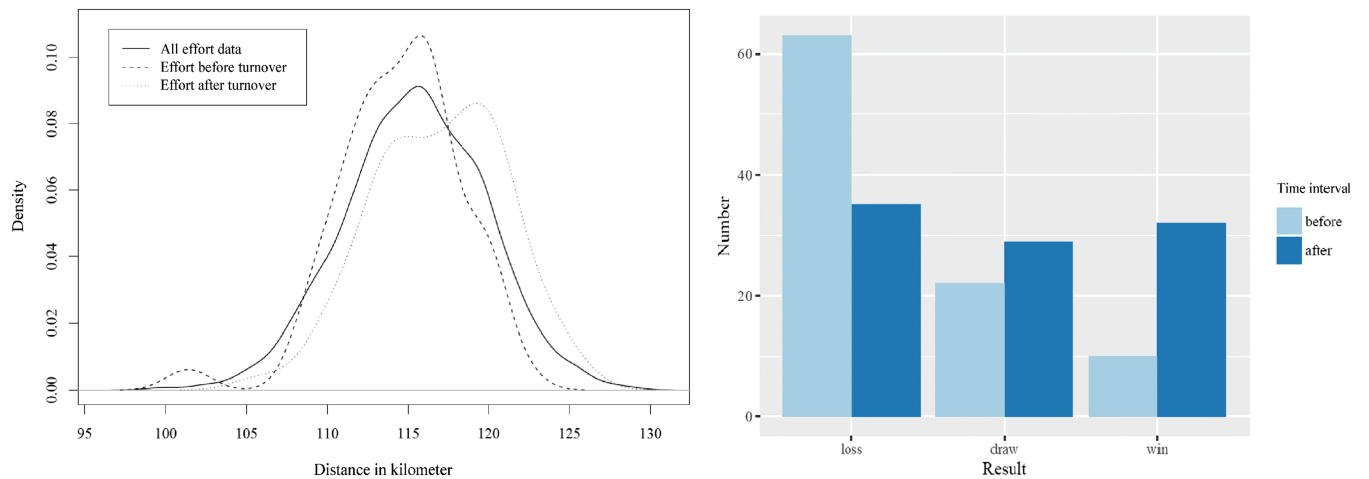
**APPENDIX A: OVERVIEW ON DISMISSALS**



**FIGURE A1** Dismissals per match day and ranking [Colour figure can be viewed at wileyonlinelibrary.com]

**APPENDIX B: DIFFERENT TIME HORIZON**

**B.1 | Descriptive overview**



**FIGURE B1** Effort and performance (three match days pre-turnover and post-turnover) [Colour figure can be viewed at wileyonlinelibrary.com]



## B.2 | Regressions

**TABLE B1** Determinants of insider successors (probit)

	Dependent variable				
	Insider (1 = Yes)				
	(1)	(2)	(3)	(4)	(5)
Match day	-0.006	-0.006	-0.007	-0.007	-0.007
	(0.010)	(0.010)	(0.010)	(0.011)	(0.011)
Final rank	-0.019	-0.019	-0.017	-0.019	-0.014
	(0.020)	(0.020)	(0.020)	(0.020)	(0.021)
Result		-0.023	-0.004	-0.015	-0.008
		(0.126)	(0.128)	(0.129)	(0.129)
Distance			0.003	-0.001	-0.001
			(0.021)	(0.022)	(0.022)
Red cards				-0.196	-0.193
				(0.257)	(0.257)
StadiumAtt (thousands)					0.004
					(0.006)
Constant	0.323	0.342	-0.031	0.507	0.264
	(0.295)	(0.311)	(2.436)	(2.536)	(2.562)
Observations	210	210	209	209	209
Log likelihood	-144.839	-144.823	-144.127	-143.836	-143.589
Akaike inf. crit.	295.679	297.645	298.253	299.672	301.178

Note: Robust standard errors in parentheses.

\* $p < .1$ .

\*\* $p < .05$ .

\*\*\* $p < .01$ .

**TABLE B2** OLS of effort (six match days after turnover)

	Dependent variable				
	Distance				
	(1)	(2)	(3)	(4)	(5)
Coach turnover	1.618***	1.277***	1.403***	1.344***	1.316***
	(0.245)	(0.259)	(0.264)	(0.272)	(0.268)
Insider			-1.378**		
			(0.620)		
Prior PPM				-0.265	
				(0.331)	
Prior days					-0.0001
					(0.0001)
DistanceOpp	0.645***	0.641***	0.646***	0.641***	0.641***
	(0.038)	(0.037)	(0.037)	(0.037)	(0.037)
Red cards	-1.911***	-2.103***	-2.049***	-2.088***	-2.112***
	(0.520)	(0.511)	(0.509)	(0.512)	(0.512)
DiffRanks		-0.066***	-0.062**	-0.063**	-0.063**
		(0.025)	(0.025)	(0.025)	(0.025)
Home		0.291	0.256	0.262	0.276
		(0.280)	(0.279)	(0.283)	(0.282)

TABLE B2 (Continued)

	Dependent variable				
	Distance				
	(1)	(2)	(3)	(4)	(5)
FoulsOpp		-0.079**	-0.083**	-0.081**	-0.081**
		(0.037)	(0.036)	(0.037)	(0.037)
LastResult		-0.340*	-0.454**	-0.382**	-0.361**
		(0.175)	(0.182)	(0.183)	(0.179)
StadiumAtt (thousands)		0.011	0.012	0.011	0.011
		(0.010)	(0.010)	(0.010)	(0.010)
Observations	412	412	412	412	412
R <sup>2</sup>	0.640	0.660	0.664	0.660	0.660
Adjusted R <sup>2</sup>	0.605	0.621	0.625	0.621	0.620
Residual std. error	2.454 (df = 374)	2.403 (df = 369)	2.390 (df = 368)	2.404 (df = 368)	2.405 (df = 368)

Note: Robust standard errors in parentheses.

\* $p < .1$ .

\*\* $p < .05$ .

\*\*\* $p < .01$ .

TABLE B3 OLS of performance (six match days after turnover)

	Dependent variable				
	Result				
	(1)	(2)	(3)	(4)	(5)
Coach turnover	0.389***	0.585***	0.606***	0.611***	0.595***
	(0.106)	(0.106)	(0.109)	(0.111)	(0.109)
Insider			-0.199		
			(0.250)		
Prior PPM				-0.121	
				(0.144)	
Prior days					-0.00002
					(0.0001)
DistanceOpp	-0.031*	-0.027*	-0.026*	-0.026*	-0.027*
	(0.017)	(0.016)	(0.016)	(0.016)	(0.016)
Red cards	-0.562**	-0.440**	-0.430*	-0.433*	-0.443**
	(0.235)	(0.222)	(0.222)	(0.222)	(0.222)
DiffRanks		0.061***	0.062***	0.063***	0.062***
		(0.011)	(0.011)	(0.011)	(0.011)
Home		0.380***	0.368***	0.369***	0.376***
		(0.119)	(0.119)	(0.119)	(0.119)
FoulsOpp		0.018	0.017	0.017	0.017
		(0.017)	(0.017)	(0.017)	(0.017)
LastResult		-0.108	-0.126*	-0.124*	-0.113
		(0.073)	(0.076)	(0.075)	(0.074)
StadiumAtt (thousands)		0.003	0.003	0.003	0.003
		(0.004)	(0.004)	(0.004)	(0.004)
Observations	352	350	350	350	350
R <sup>2</sup>	0.151	0.274	0.276	0.276	0.275

(Continues)

TABLE B3 (Continued)

	Dependent variable				
	Result				
	(1)	(2)	(3)	(4)	(5)
Adjusted $R^2$	0.066	0.188	0.187	0.187	0.186
Residual std. error	0.988 ( $df = 319$ )	0.924 ( $df = 312$ )	0.924 ( $df = 311$ )	0.924 ( $df = 311$ )	0.925 ( $df = 311$ )

Note: Robust standard errors in parentheses.

\* $p < .1$ .

\*\* $p < .05$ .

\*\*\* $p < .01$ .

TABLE B4 OLS of effort (four match days after turnover, i.e.,  $T - T_0 = 4$ )

	Dependent variable: Distance				
	(1)	(2)	(3)	(4)	(5)
Coach turnover	1.675*** (0.306)	1.229*** (0.333)	1.413*** (0.342)	1.288*** (0.359)	1.242*** (0.351)
Insider			-1.368** (0.663)		
Prior PPM				-0.161 (0.364)	
Prior jobs					-0.012 (0.105)
DistanceOpp	0.596*** (0.048)	0.591*** (0.047)	0.598*** (0.047)	0.591*** (0.047)	0.591*** (0.047)
Red cards	-2.724*** (0.622)	-2.868*** (0.610)	-2.826*** (0.606)	-2.863*** (0.611)	-2.871*** (0.612)
DiffRanks		-0.073** (0.032)	-0.066** (0.032)	-0.069** (0.033)	-0.072** (0.033)
Home		0.464 (0.352)	0.416 (0.350)	0.440 (0.357)	0.458 (0.356)
FoulsOpp		-0.075* (0.045)	-0.076* (0.045)	-0.075* (0.045)	-0.075* (0.045)
LastResult		-0.359 (0.229)	-0.506** (0.238)	-0.394 (0.242)	-0.365 (0.236)
StadiumAtt (thousands)		0.013 (0.012)	0.013 (0.012)	0.013 (0.012)	0.013 (0.012)
Observations	278	278	278	278	278
$R^2$	0.661	0.682	0.688	0.682	0.682
Adjusted $R^2$	0.609	0.625	0.630	0.624	0.624
Residual std. error	2.508 ( $df = 240$ )	2.454 ( $df = 235$ )	2.437 ( $df = 234$ )	2.458 ( $df = 234$ )	2.459 ( $df = 234$ )

Note: Robust standard errors in parentheses.

\* $p < .1$ .

\*\* $p < .05$ .

\*\*\* $p < .01$ .

**TABLE B5** OLS of performance ( $T - T_0 = 4$ )

	Dependent variable:				
	Result				
	(1)	(2)	(3)	(4)	(5)
Coach turnover (1 = turnover)	0.329** (0.132)	0.477*** (0.135)	0.515*** (0.141)	0.509*** (0.144)	0.471*** (0.141)
Insider (1 = insider)			-0.249 (0.269)		
Prior PPM				-0.101 (0.158)	
Prior jobs					0.007 (0.043)
DistanceOpp	-0.038* (0.021)	-0.031 (0.020)	-0.030 (0.020)	-0.030 (0.020)	-0.031 (0.020)
RedCards	-0.464* (0.274)	-0.362 (0.260)	-0.353 (0.260)	-0.358 (0.261)	-0.360 (0.261)
DiffRanks		0.044*** (0.014)	0.046*** (0.014)	0.046*** (0.014)	0.044*** (0.014)
Home (1 = home)		0.454*** (0.148)	0.436*** (0.150)	0.445*** (0.149)	0.457*** (0.149)
FoulsOpp		0.023 (0.021)	0.022 (0.021)	0.022 (0.021)	0.023 (0.021)
LastResult		-0.199** (0.094)	-0.225** (0.098)	-0.216** (0.097)	-0.196** (0.096)
StadiumAtt (thousands)		0.003 (0.005)	0.003 (0.005)	0.003 (0.005)	0.003 (0.005)
Observations	238	238	238	238	238
R <sup>2</sup>	0.164	0.275	0.278	0.277	0.275
Adjusted R <sup>2</sup>	0.033	0.141	0.141	0.139	0.137
Residual std. error	1.010 (df = 205)	0.952 (df = 200)	0.952 (df = 199)	0.953 (df = 199)	0.954 (df = 199)

Note: Robust standard errors in parentheses.

\* $p < .1$ .

\*\* $p < .05$ .

\*\*\* $p < .01$ .

**TABLE B6** OLS of performance (includes *Distance* as explanatory variable)

	Dependent variable: Result				
	(1)	(2)	(3)	(4)	(5)
Coach turnover (1 = turnover)	0.275*** (0.105)	0.503*** (0.100)	0.504*** (0.103)	0.515*** (0.105)	0.501*** (0.103)
Insider (1 = insider)			-0.007 (0.236)		
Prior PPM				-0.052 (0.136)	
Prior jobs					0.003 (0.037)

(Continues)

TABLE B6 (Continued)

	Dependent variable: Result				
	(1)	(2)	(3)	(4)	(5)
Distance	0.107*** (0.022)	0.135*** (0.020)	0.135*** (0.020)	0.135*** (0.020)	0.135*** (0.020)
DistanceOpp	-0.102*** (0.022)	-0.117*** (0.020)	-0.117*** (0.020)	-0.116*** (0.020)	-0.117*** (0.020)
Red cards	-0.354 (0.231)	-0.184 (0.211)	-0.184 (0.211)	-0.182 (0.211)	-0.184 (0.211)
DiffRanks		0.072*** (0.010)	0.073*** (0.011)	0.073*** (0.011)	0.072*** (0.011)
Home (1 = home)		0.399*** (0.111)	0.399*** (0.112)	0.394*** (0.112)	0.400*** (0.112)
FoulsOpp		0.022 (0.016)	0.022 (0.016)	0.022 (0.016)	0.023 (0.016)
LastResult		-0.066 (0.068)	-0.067 (0.072)	-0.074 (0.071)	-0.065 (0.070)
StadiumAtt (thousands)		0.003 (0.003)	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)
Observations	354	350	350	350	350
R <sup>2</sup>	0.203	0.366	0.366	0.366	0.366
Adjusted R <sup>2</sup>	0.121	0.289	0.286	0.287	0.286
Residual std. error	0.959 (df = 320)	0.865 (df = 311)	0.866 (df = 310)	0.866 (df = 310)	0.866 (df = 310)

Note: Robust standard errors in parentheses.

\* $p < .1$ .

\*\* $p < .05$ .

\*\*\* $p < .01$ .

TABLE B7 OLS of performance ( $T - T_0 = 4$ ; includes *Distance* as explanatory variable)

	Dependent variable: Result				
	(1)	(2)	(3)	(4)	(5)
Coach turnover (1 = turnover)	0.191 (0.127)	0.378*** (0.124)	0.379*** (0.131)	0.386*** (0.133)	0.364*** (0.130)
Insider (1 = insider)			-0.009 (0.249)		
Prior PPM				-0.025 (0.145)	
Prior jobs					0.014 (0.039)
Distance	0.137*** (0.027)	0.160*** (0.025)	0.160*** (0.026)	0.160*** (0.025)	0.160*** (0.025)
DistanceOpp	-0.125*** (0.026)	-0.132*** (0.024)	-0.132*** (0.025)	-0.132*** (0.025)	-0.133*** (0.024)
Redcards	-0.172 (0.265)	0.002 (0.245)	0.002 (0.245)	0.002 (0.245)	0.007 (0.246)
DiffRanks		0.056*** (0.013)	0.056*** (0.013)	0.057*** (0.013)	0.055*** (0.013)

TABLE B7 (Continued)

	Dependent variable: Result				
	(1)	(2)	(3)	(4)	(5)
Home (1 = home)		0.500***	0.499***	0.497***	0.505***
		(0.136)	(0.138)	(0.137)	(0.137)
FoulsOpp		0.026	0.026	0.026	0.027
		(0.019)	(0.019)	(0.019)	(0.019)
LastResult		-0.142	-0.143	-0.146	-0.136
		(0.086)	(0.091)	(0.090)	(0.088)
StadiumAtt (thousands)		0.001	0.001	0.001	0.001
		(0.004)	(0.004)	(0.004)	(0.004)
Observations	238	238	238	238	238
R <sup>2</sup>	0.257	0.397	0.397	0.397	0.397
Adjusted R <sup>2</sup>	0.137	0.282	0.278	0.278	0.278
Residual std. error	0.954 (df = 204)	0.871 (df = 199)	0.873 (df = 198)	0.873 (df = 198)	0.872 (df = 198)

Note: Robust standard errors in parentheses.

\* $p < .1$ .

\*\* $p < .05$ .

\*\*\* $p < .01$ .

## APPENDIX C: PLACEBO TEST REGRESSIONS

TABLE C1 Placebo regressions of effort ( $T - T_0 = 6$ )

	Dependent variable: Distance		
	(1)	(2)	(3)
Coach turnover	0.442	0.313	0.358
	(0.427)	(0.308)	(0.303)
DistanceOpp		0.654***	0.643***
		(0.049)	(0.049)
Red cards		-3.936***	-3.869***
		(0.730)	(0.720)
DiffRanks			-0.039
			(0.032)
Home			0.477
			(0.355)
FoulsOpp			-0.152***
			(0.044)
LastResult			-0.172
			(0.232)
StadiumAtt (thousands)			-0.004
			(0.012)
Observations	290	290	290
R <sup>2</sup>	0.282	0.632	0.654
Adjusted R <sup>2</sup>	0.213	0.594	0.611
Residual std. error	3.634 (df = 264)	2.609 (df = 262)	2.556 (df = 257)

Note: Robust standard errors in parentheses.

\* $p < .1$ .

\*\* $p < .05$ .

\*\*\* $p < .01$ .

**TABLE C2** Placebo regressions of performance ( $T - T_0 = 6$ )

	Dependent variable: Result		
	(1)	(2)	(3)
Coach turnover	-0.071	-0.082	0.025
	(0.081)	(0.078)	(0.071)
DistanceOpp		-0.032**	-0.032***
		(0.013)	(0.012)
Red cards		-0.845***	-0.650***
		(0.191)	(0.193)
DiffRanks			0.062***
			(0.007)
Home			0.308***
			(0.086)
FoulsOpp			0.003
			(0.011)
LastResult			-0.142***
			(0.053)
StadiumAtt (thousands)			-0.001
			(0.003)
Observations	338	338	334
$R^2$	0.052	0.117	0.321
Adjusted $R^2$	-0.041	0.024	0.236
Residual std. error	0.743 ( $df = 307$ )	0.720 ( $df = 305$ )	0.637 ( $df = 296$ )

Note: Robust standard errors in parentheses.

\* $p < .1$ .

\*\* $p < .05$ .

\*\*\* $p < .01$ .