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ABSTRACT

In-season head-coach dismissals and the performance of professional football teams*

This paper studies the causes and consequences of in-season changes of the head-coach of association football teams. We exploit data from the highest level of Dutch professional football during 14 successive seasons. An in-season change of the head-coach depends on recent match results and the difference between actual results and expectations as measured using bookmaker data. We find that, after the head-coach has been replaced, teams perform better than before. However, the performance is also better than before for a control group of coach replacements that did not occur. From this we conclude that replacement of head-coaches does not improve team performance.

JEL Classification: J44 and L83

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1 Introduction

Clear analogies exist between sports economics and labor economics. According to Szymanski (2003), sports may provide information about labor market behavior. Kahn (2000) also states, that professional sports offer a fruitful area for labor market research. For example, the sports sector facilitates examining the effects of incentives on behavior. One may develop incentive schemes to stimulate the performance of players. An alternative route to foster the level of performance may consist of the hiring of better quality management. Kuper and Szymanski (2010) are rather skeptical about the impact of football managers on team performance. They consider ‘the obsession with football managers’ as a version of the ‘Great Man Theory of History’. According to them, historians have abandoned this line of thought long ago. However, Anderson and Sally (2013) state that the ‘perfectly good hypothesis’ of the ‘Great Person Theory’ has recently been revived by experts from the fields of business and economics. Thus, it is hardly surprising that they argue that the influence of football managers is non-negligible. Accordingly, Bridgewater et al. (2011), for example, show that, in British football, managers with a strong record as an active player tend to raise the team performance. Thereby, lesser skilled teams benefit more than highly skilled teams. Much research has already been done with respect to the effects of management replacement on company results (see Ter Weel (2011)). In general, the outcomes turn out to hinge strongly on the performance measures applied. The results are mostly significant from a statistical viewpoint, but fairly small from a business viewpoint.¹

Professional (association) football presents a fruitful soil for the analysis of major management changes. As shown in Table 1, in-season changes of coach frequently occur in European football. In the six European football leagues (the so-called Big Five, viz. England, France, Germany, Italy and Spain, plus Belgium, a league comparable to the Netherlands) represented in Table 1, the frequency of manager-change fluctuates considerably over time. A number of reasons make the examination of football data attractive (Ter Weel (2011)). First, match results are straightforward, unlike financial statements. Moreover, the in-season measurement frequency is high, viz. on a weekly or even half-weekly basis, as compared to companies (on a quarterly or even annual basis). Evidently, this should make it easier to determine the impact of the manager on the performance of the club. Second, the result of a football club is well-defined (win, draw, loss), although sometimes a draw or even a (small) loss may also be a satisfactory result. However, one should note that the appreciation of a result will depend on the discrepancy between ac-

¹Following alternative approaches, Bennedsen et al. (2007, 2011) find effects that are strong from a business point of view as well. They examine the consequences of the death of CEOs themselves or their life partners (Bennedsen et al. (2007)) and of hospitalization of CEOs (Bennedsen et al. (2011)).

tual result and expected result (Bridgewater (2010)). As we explain in more detail below, we follow Stadtmann (2006), and calculate expected results using odds that bookmakers apply. Third, most decisions of football management (e.g., buying, selling, borrowing, and lending players) are immediately observable, while they often exert direct influence. One should note that the United Kingdom-style manager carries full responsibility for all transactions (transfers, loans, etc.). Yet, the continental-style head-coach mostly must leave this decision-making to a sporting director. We will elaborate upon this crucial difference in section 3, while ignoring it until then. Fourth, a football league is fairly homogenous, unlike many other branches. Therefore, inter-firm comparisons are relatively simple. Fifth, nowadays data on the personal characteristics of football managers are all over the internet, in sharp contrast with the availability of data on the personal features of CEOs. These data include their past performance in football management, their track record as an active player, consisting of the number of matches played and an honor's list. The latter may include victories in major contests (domestic and international leagues and cups) as well as the number of appearances in national teams (including in the youth teams).

Sackings and resignations of football managers are not just interesting owing to these analogies with business life (Bridgewater (2010)). First, they attract a lot of media attention. Both dismissed and quitting managers in the highest tier of professional football regularly reach the 'headlines', not only in the domestic media, but sometimes also worldwide. Second, the financial consequences for the club may be huge in case of a dismissal. Notably, funds tend to be scarce for many professional football clubs. Third, a separation sometimes damages the reputation of both the club, as a future employer, and the manager, as a future employee.

In our paper, we investigate the reasons for in-season changes of the head-coach of association football teams. We also examine the within-season effects of such changes. We use data from the highest tier of Dutch professional football, the so-called 'Eredivisie', from the 2000/01 season up to and including the 2013/14 season. During this period, 59 in-season changes of the head-coach occurred: 17 were voluntary, whereas 42 were involuntary.

We find that the probability of an in-season change of the head-coach depends on the team performance, as measured by two within-season performance indicators. First, the cumulative number of points in the previous four matches. Second, the cumulative surprise indicator which measures the discrepancy between actual results and expected results. The calculation of this 'surprise indicator' is based on the comparison of the actual and the expected result, based on bookmaker odds. Team performance tends to be better after the dismissal of a head-coach than before. To establish whether this is

a causal effect, we create a control group of club-seasons in which a sequence of bad results does not lead to a coach dismissal. We find that team performance after ‘coach-dismissals that did not happen’ is also better than before. Apparently, sequences of bad results are followed by recovery due to regression to the mean. When performing a difference-in-differences approach, in which we compare results prior to and posterior to a coach-dismissal with the counterfactual results of a coach dismissal that did not happen, we find no significant causal effect of coach dismissal on team performance.

This leaves the question why coach dismissals occur. After all, firing a coach can be quite expensive. We speculate that the management of clubs may be subject to a kind of ‘hot-hand fallacy’ (Rabin and Vayanos (2010)) in which they misinterpret a sequence of bad results as a signal of poor coach performance. Alternatively, it may be the case that management gives in to the pressure of media, owners, supporters and sponsors to ‘do something’ to improve the performance. Risk averse management might replace a coach because if a team keeps failing to perform according to expectations and, for example, is relegated, the management has done at least something to avoid this.

Our contribution to the literature on coach dismissals in professional association football is twofold. First, we use bookmaker data to analyze the determinants of coach dismissals. Second, also using bookmaker data, we create a control group of coach dismissals that did not happen. This allows us to investigate whether there is a causal positive effect of coach replacement on team performance or just a regression to the mean.

The set-up of our paper is as follows. First, in Section 2 we present an overview of previous studies. Next, Section 3 is devoted to a discussion about the Continental-style head-coach versus the UK-style manager. Moreover, we briefly discuss the most notable in-season changes, both in and out of sample. Subsequently, in Section 4, we provide a description of our data. In Section 5 we consider the determinants of coach replacements, including coach dismissals. Subsequently, we discuss the results of empirical research in Section 6. Finally, we offer some concluding remarks in Section 7.

2 Previous studies

In this section, we give a brief overview of previous studies distinguishing between studies on the determinants of coach dismissals and studies on the effects of coach dismissals on the performance of teams.

2.1 Literature review

Audas et al. (1999) use a hazard rate approach to study the determinants of coach turnover in English professional football over a 25-year period. They distinguish between involuntary and voluntary coach turnover and find that past performance is an important determinant of involuntary turnover. The age of the coach is important as well. Voluntary turnover is also sensitive to past performance but to a lesser extent. Salomo and Teichmann (2000) study the relationship between performance and change of coach in the German football top division. They find that past performance in relation to the goals set at the beginning of the football season is an important determinant of the decision to replace a coach. They also find that board turnover and media intensity – in particular intensive interest of local media – are important.

According to Dobson and Goddard (2001), one of the most enduring characteristics of the football manager's position is its chronic insecurity. They measure the tenure duration of English managers both through the number of seasons and the number of matches. When analyzing the durations in seasons, the authors make a distinction between voluntary and involuntary separations. For this, they have 843 spells the duration of which they explain through an efficiency score (residuals of a league position regression), the difference between league position current season and league position preceding managers' appointment, wins in FA cup, the age and experience of the manager, previous experience in Scotland or abroad, international caps and a time trend. Their hazard rate analysis of the duration measured in matches builds on Audas et al. (1999). For 981 managerial spells the duration is related to previous match results, the quality of the opponent, FA Cup participation, age and experience of the manager and a time-trend. Dobson and Goddard (2001) find that involuntary separations are more frequent with bad results in recent matches, the change in league position since the start, and the age of the manager (negative effect above age 37). Other manager's human capital characteristics are not important. For voluntary separations recent match results are not very important but voluntary separations are more likely with bad results, a change in the league position and a higher age of the manager (maximum age 48).

De Dios Tena and Forrest (2007) study within-season dismissals of 18 coaches in the top division of the Spanish Football League during the seasons 2002/03 to 2004/05. They find that past performance is important in particular when a team is in the relegation zone. The relegation threat is more important than a sequence of poor results. Bachan et al. (2008) use hazard rate analysis to study coach turnover in English Football league during the seasons 2001/02 to 2003/04. They find that the league position is the most important determinant of coach turnover whereas personal characteristics such as age,

experience of length of service are unimportant.

Barros and Passos (2009) focus on head-coach career length in the ‘Bundesliga’ from 1981/82 to 2002/03 using information on head-coach salaries. They estimate a conditional risk-set model in gap time developed by Prentice et al. (1981). Event time is defined as time elapsed since the previous event. The authors use unbalanced team-season observations featuring 39 teams, of which six have appeared over the whole sample period; 114 different coaches are observed. The explanatory variables are the relative salary of the head-coach, the relative wage bill of the team, a dummy variable for the “Bosman effect”, the performance and the experience of the head-coach in the Bundesliga. The results are quite similar in the main effects: the relative wage bill has a positive effect in the hazard implying that coaches of more expensive teams tend to be fired earlier, the Bosman dummy and the sporting performance have negative effects. Frick et al. (2010) use the same data as Barros and Passos (2009) now using a mixed logit model applied to 115 involuntary dismissals and 27 voluntary dismissals. The explanatory variables are the position in the league at the time the coach is fired, a dummy if team has lost the three last matches, a time trend, a dummy for seasons with East-German teams, the career win percentage of the head-coach, relative points won, the relative salary of the head-coach, the relative wage bill of the team, and the experience of head-coach in Bundesliga. Despite the big overlap between Barros and Passos (2009) and Frick et al. (2010) some conclusions are very different.² Apparently, the applied technique is very important. Finally, De Schryver and Eisinga (2011) use data from the Dutch ‘Eredivisie’ during the seasons 1990/91 to 2004/05 to study the determinants of coach dismissal finding that past performance is important. If current performance falls below past performance the probability of coach dismissal increases.

2.2 Effects of in-season head-coach changes

Poulsen (2000), studying coach dismissals in the English Premier League and Division One over the seasons 1993/94 to 1997/98, finds that effects of these dismissals may be present if a team performs really bad before the dismissal occurred. However, on average a coach dismissal does not improve team performance. Salomo and Teichmann (2000), studying the effects of coach turnover in the German Bundesliga, find no evidence of improvement of team performance. Dobson and Goddard (2001) study the effect of managerial departure on team performance during the season after the change takes

²Barros and Passos (2009) mention on page 3309: “head-coaches themselves should take into account that although their salary reflects talent, it has no statistical influence on the probability of surviving in the present position.” Frick et al. (2010) on page 158, conclude on the probability of separation: We find that both, the salary of the head-coach as well as the team wage bill are statistically significant.

place. They measure the effect of managerial departure on team performance in the matches played immediately after the change takes place using the following explanatory variables: home match, performance in matches played during 12 months prior to current match, the total matches played during 12 months prior to current match, the same for matches played 12-24 months before, accounting for relegation or promotion. The effects of a change of manager on the results of the next 20 matches (within the same season) following the change are investigated. The authors find that the estimated effect on the match immediately following a change of manager is negative and significant, which suggests that a within-season managerial change is disruptive in the very short term. The estimated cumulative effect is uniformly negative. For the first two matches the effect is significant at the 1 per cent level, up to 13 matches the effect is negative at the 5 per cent level.

Koning (2003) studies five seasons (1993/94 to 1997/98) of the Dutch 'Eredivisie'. His dependent variable is the goal difference, while the rankings of both teams prior to the match are among the explanatory variables. Thus, he controls for quality differences between the opponents faced by the recently sacked manager and by the newly hired manager. This study makes clear that the results, corrected for quality of the opponents, do not always improve after the exit of the former manager. In most cases, the new men in charge even perform worse than their sacked predecessors.

Bruinshoofd and ter Weel (2003) investigate the short-run effects of sackings of managers of Dutch football clubs. They examine twelve seasons in the 'Eredivisie' (1988/89 to 1999/2000) and find that a worsening of the team performance regularly precedes a sacking, while the exit of a head-coach is frequently followed by better results. However, they also show that for a control group the results would have improved even quicker than under the sacked manager. Bruinshoofd and ter Weel (2003) conclude that the dismissal of a manager seems to be 'neither effective nor efficient' to boost the results. De Dios Tena and Forrest (2007) who study within-season coach dismissals in the top division of the Spanish Football League find that new coaches cause a modest positive effect on team performance. This is driven entirely by improvement of performance during home matches while there is no improvement in away performance. Balduck and Buelens (2007) extend the analysis of Koning (2003) using data from seven seasons of the Belgian football competition, i.e. from 1998/99 to 2004/05. They find that, on average, team performance increases after coach dismissal. Ter Weel (2011) uses data from the highest division of Dutch professional association football ('Eredivisie') from 1986/87 to 2003/2004. He investigates the effects of the turnover of head-coaches on the performance of professional football clubs. Both difference-in-difference and instrumental variable estimates do not hint at performance improvements that are statistically significant following head-coach

turnover. In addition, Ter Weel suggests that the quality of the head-coach is irrelevant for forecasting changes in management. De Paola and Scoppa (2011) study the effects of coach turnover in Italian football using data from Serie A over the seasons 1997/98 to 2008/09 and find that coach replacement has no statistical significant effects on team performance.

Hentchel et al. (2012) analyze 17 seasons of German Bundesliga data relating in-season dismissals to performance taking heterogeneity of teams into account. They find that in heterogeneous teams in which the performance grades of individual players differ a lot, coach replacement has no effect. For homogenous teams a coach replacement has a positive effect. According to the authors in homogenous teams a coach replacement triggers competition between players while in heterogeneous teams the differences between players are too large to trigger competition.

Bell et al. (2013) do not study the effects of a coach replacement but the performance of coaches. They analyze four seasons of English Premier League football during which 48 managers lost their position, 21 through resignation while 27 were sacked. They estimate a model that relates performance in terms of the number of points scored to characteristics of the team and coach fixed effects. They then use the coach fixed effects, which are indicative of the quality of the coach, to determine whether a coach outperformed or underperformed. Their main conclusion is that there is a lot of persistence in coach performance during the season.

3 Head-coaches

In the United Kingdom, the manager is the central figure in a professional football club.³ First, he compulsorily communicates with the media prior to the match. Second, he picks the squad, determines the line-up and decides about the strategy. During the match, the manager is responsible for interventions, such as, substitutions. Third, he is responsible for the post-match communication with the media. However, the manager mostly leaves training sessions to other staff members, for example, the first-team coach. In continental association football, all of these tasks belong to the realm of the head-coach. Of course, the continental-style head-coach actively supervises training sessions. Thereby, he strongly cooperates with his staff, including an assistant-trainer coach, as well as special trainers for goalkeepers and (recently) strikers. However, the long-term policies are often the responsibility of a so-called sporting director. In contrast, the UK-style manager is also responsible for transfer market policies and scouting. Thus, the latter monitors both the short-run and the long-run policies of the club.

³en.wikipedia.org

In our paper, we confine ourselves to Dutch football. One should note that some head-coaches have simultaneously performed the job of technical director. Remarkably, in our fourteen-season sample, the eventual Dutch title winners changed the head-coach during the season no less than three times. First, Ajax fired Adriaanse in the middle of the 01/02 season. After that, the team captured the ‘Double’ (the Dutch title plus the Dutch cup) under his successor Ronald Koeman. Second, the same Ronald Koeman left PSV in the fall of 2007, in order to earn a higher salary at Valencia CF. He was succeeded, first, by assistant Wouters as caretaker and, second, from January 1, 2008, by Vergoossen. The latter guided PSV to the fourth Dutch title in a row. This achievement was unique: the title was won by a club supervised by three head-coaches in one season. Third, in December 2010, the ways of Ajax and Jol separated. Frank de Boer took over, leading Ajax to four Dutch titles in a row (2011-2014).

Figure 1 provides a first impression on the potential effects of a coach change. This figure compares the position in the league table at the time of the coach change with the position in the league table at the end of the season. It is not immediately obvious that a coach replacement leads to a big improvement in the league table.

4 Data

4.1 Cumulative surprise

We assume that the decision of clubs to replace the head-coach is based on the actual in-season performance of a club as compared to the expected in-season performance. First, the odds that bookmakers apply can be used to calculate the expected number of points per match for each club. The difference between the actual number of points - based on the match results - and the expected number of points - based on the odds of the bookmakers - is the so-called ‘match surprise’ (see Stadtmann (2006)).⁴ The cumulative surprise in a particular season is simply the sum of all ‘match surprises’ since the start of the season. If this cumulative surprise sinks below a certain threshold, then continuation of the cooperation between club and head-coach might become doubtful. Alternatively, one may simply look at the number of points in recent matches. Evidently, this does not take account at all of the strength of the opponents that the club has faced. However, the rationality of boards of football clubs in this respect may not be ‘beyond a reasonable doubt’. Therefore, we will analyze the effects of using this, admittedly, rather rudimentary measure as well. Because we want to study the difference in performance of a team before and after a coach replacement we ignore coach replacements in the first

⁴In Appendix B, we present three illustrative examples of calculating the ‘match surprise’.

four and the last four matches in every season.

Figure 2 shows Kernel densities for the cumulative surprise and the cumulative number of points. The top graph shows the Kernel densities for all matches, distinguishing between seasons in which no coach change occurred, seasons with a coach dismissal and seasons with another type of coach change. Clearly, at the end of seasons in which a coach was dismissed there is a more negative cumulative surprise. At the end of seasons in which a coach left for a different reason the cumulative surprise is not so different from seasons in which no coach change occurred. However, for quite a few observations at the end of seasons with a non-dismissal coach replacement the cumulative surprise is negative. The bottom graph of Figure 2 shows Kernel densities for the cumulative number of points at the end of every season. Here the difference between matches in seasons with a coach dismissal and other matches is even larger than in the top graph. There are two explanations for this. First, a coach dismissal may leave a scar in terms of cumulative surprise until the end of the season. Second, a coach dismissal occurs mainly at clubs that do not perform very well. If a dismissal occurs towards the end of the season there is no time to recover sufficiently to wipe out the negative cumulative surplus.

4.2 Other characteristics

We collected our data from various internet sources making a distinction between coach dismissals and other reasons for a coach change. Table 2 provides information about the number of coach dismissals and other coach changes per season.⁵ The number of dismissed coaches ranges from one in season 2006/07 to six in season 2008/09. The number of other types of coach replacement never exceeds two per season. Table 2 shows that over our sample period Willem II is the club which fired a coach most frequently (five times).

Table 3 provides information about the mean, minimum and maximum value of each of the variables used in our analysis. Clearly, home matches are by definition on average equal to 0.5. The average rank of the opponent at the end of the previous season (1-18) is not equal to 9.5 because in some seasons more than one team was promoted; the number of promoted teams varies from one to three. The average number of points per match is 1.17 for the seasons in which there was a coach substitute and 1.08 in seasons where there was a coach dismissal. In the seasons with a coach change the performance of the teams involved was not so great; the average probability of a victory was about 30 percent, and the goal difference was negative as was the average cumulative surprise.

⁵Ignoring coach changes before match 5 and after match 30; see also Table 7.

5 Duration until coach dismissal

To get an impression about the potential determinants of coach dismissal we start our empirical analysis by investigating the duration until coach dismissal measured as the number of matches within a particular season up to dismissal. We use information for seasons for which bookmaker data are available. Thus we use 252 durations in our analysis. Figure 3 gives an indication of the timing of coach changes. The top graph shows the (hazard) rate by which coaches were replaced. There is a clear peak mid-season when the rate at which coaches are replaced or dismissed is about 3.5 percent per match. The bottom graph of Figure 3 shows the survivor rates related to the hazard rates presented in the top graph. The bottom graph also shows that after 34 matches on average about 15-20 percent of the coaches is dismissed while about 10 percent have left their club in-season on an apparently voluntary basis.

A coach dismissal is likely to depend on the performance of a team during the season. Therefore, when analyzing the determinants of the coach dismissal rates we include two time-varying variables representing team performance, the cumulative surprise and the cumulative number of points in the previous four matches. Because of the latter variable we ignore coach changes if they occurred before the fifth match of the season. Similarly, because we want to compare the performance before a coach change with performance after the coach change we ignore coach changes if they occurred after the thirtieth match of the season.

To estimate the duration until coach change – measured in terms of the number of matches – we use a mixed proportional hazard (MPH) model. The rate at which coaches are replaced at duration t , conditional on time-invariant observed characteristics x and time-varying characteristics z_t and time-invariant unobserved characteristics u , is specified as

$$\theta_j(t \mid x, z_t, u) = \lambda_j(t) \exp(x' \beta_j + z_t' \gamma_j + u_j) \quad \text{for } j = 1, 2 \quad (1)$$

where $j = 1, 2$ indicates the type of coach replacement (1 = coach dismissal, 2 = other coach change), $\lambda_j(t)$ represents individual duration dependence represent vectors of parameters. We model flexible duration dependence by using a step function:

$$\lambda_j(t) = \exp(\sum_k \lambda_{j,k} I_k(t)) \quad \text{for } j = 1, 2 \quad (2)$$

where k ($= 1, \dots, 3$) is a subscript for duration interval and $I_k(t)$ are time-varying dummy variables that are one in subsequent duration intervals. We distinguish three duration intervals over the season: 1–16, 17–22, 23–34 matches. Since we also estimate constant

terms, we normalize $\lambda_{j,1} = 0$. The conditional density functions of the completed coach spell durations can be written as

$$f(t | x, z_t, u_1, u_2) = (\theta_1(t | x, z_t, u_1) + \theta_2(t | x, z_t, u_2)) \exp\left(-\int_0^t (\theta_1(s | x, z_t, u_1) + \theta_2(s | x, z_t, u_2)) ds\right) \quad (3)$$

We assume that the random effects u_1 and u_2 come from a discrete distribution G with four points of support $(u_1^a, u_1^b, u_2^a, u_2^b)$, related to two groups of coaches. The first group has a positive dismissal rate and a positive other coach-change rate, the other has a zero dismissal rate and a zero other coach-change rate ($u_1^b = u_2^b = \infty$). The associated probabilities are denoted as follows: $\Pr(u_1 = u_1^a, u_2 = u_2^a) = p_1$, $\Pr(u_1 = u_1^b, u_2 = u_2^b) = p_2$, where the p 's are assumed to be from a logit specification: $p_1 = \frac{\exp(\alpha)}{1 + \exp(\alpha)}$ and $p_2 = 1 - p_1$.

We remove the unobserved heterogeneity distribution through integration:

$$f(t|x, z_t) = \int_{u_1} \int_{u_2} f(t | x, z_t, u_1, u_2) dG(u_1, u_2) \quad (4)$$

In the analysis we assume that for all seasons in which a coach stayed on, including the final match, the duration until coach dismissal at the 34th game is right-censored. We estimate the parameters of the coach-replacement rate using the method of Maximum Likelihood.

Table 4 presents the parameter estimates for both types of transition. The first two columns show the parameter estimates. The number of points in the last four matches has a significant negative effect on the coach dismissal rate but not on the rate of other coach changes. The cumulative surprise has significant negative effects on both the coach dismissal rate and the rate of other coach changes although for the latter rate the significance is only at the 10 percent level. Duration dependence is not important, while the parameter of unobserved heterogeneity is significantly positive at the 10 percent level. In columns (3) and (4) of Table 4 we show parameters if we impose absence of duration dependence and unobserved heterogeneity. Now, the number of points in the last four matches and the cumulative surprise only have significant (negative) effects on the coach dismissal rate.⁶ Clearly a negative performance of a team has a positive effect on the rate of coach dismissal but not on the rate of other coach changes.

We performed different types of sensitivity analysis to investigate the robustness of

⁶A comparison of the log-likelihoods generates a Likelihood-Ratio statistic of 8.6. For 4 degrees of freedom (two duration dependence parameters and two unobserved heterogeneity parameters) this is not significant at a 5% level (critical $\chi_{0.05}^2 = 9.5$) although it is significant at a 10% level (critical $\chi_{0.05}^2 = 7.8$).

our findings. First, we tried to find more than two mass points in the distribution of unobserved coach heterogeneity. This was not possible. In addition to team performance it may be the case that coach characteristics affect coach dismissal. It could be that more experienced coaches, older coaches or coaches with experience as a player in the national team are less likely to be dismissed. Therefore, we also included the number of international matches, the age of the coach and the experience of the coach at the current team, measured as the number of matches at the start of the season, as explanatory variables. However, we found that none of these variables had a significant effect on the rate of coach dismissal or the rate of other types of coach replacement.

6 Effects of a coach change on team performance

6.1 A naive approach

To determine the effects of a coach change on team performance we estimate linear models in which the performance indicator y for every match within a season depends on the position of the opponent in the league table of the previous season⁷, whether or not the match is played at home and a dummy variable indicating whether there has been a coach change:

$$y_{ijk} = \eta_{ik} + r'_{ijk}\beta + \delta d_{ijk} + \varepsilon_{ijk} \quad (5)$$

in which y_{ijk} represents the performance indicator of club i in match j of season k . We use three performance indicators: the number of points, whether or not the match was won and the goal difference. Furthermore, to account for the (unobserved) quality of a team in a particular season, we use fixed effects for club-season, represented by the η_{ik} . This is especially important since we are interested in the within-season effects of a coach replacement. If we do not account for unobserved quality differences between clubs or between seasons of the same club our estimates will be biased. The vector r_{ijk} represents the determinants of the performance and d_{ijk} indicates whether or not there has been a coach change. Finally, β represents the vector of parameter estimates, ε_{ijk} the error term and δ is the parameter of main interest indicating whether a coach change influences performance. Without further analysis, even if parameter δ is significantly different from zero, we cannot conclude that this is a causal effect. Only if an effect would be absent for a control group and present for the treatment group can we distinguish a causal effect from a regression-to-the-mean effect.

⁷For clubs that were promoted we assume this position to be equal to 18.

Table 5 presents linear regression parameter estimates of this naive approach in which the control group is ignored.⁸ The top of the table presents the parameter estimates for all coach changes, the bottom part of the table focuses on coach dismissals. All parameter estimates for the all coach changes analysis are significantly different from zero. Teams are more likely to win a match from a team that held a low position in the league table in the last season. For every position lower on the league table the club wins 0.06 points, while the probability to win increases with two percent and the goal difference increases with 0.11. If a team plays at home it is expected to receive 0.64 more points than in an away game against the same opponent while the team has a 21 percent higher probability to win and has a goal difference that is 1.03 higher. After a coach change team performance is better than before a coach change. The number of points per match is 0.25 higher, the probability to win is nine percent higher and the goal difference is 0.37 larger. The parameter estimates for coach dismissals are very much the same.

6.2 Treatment and control groups

To establish a counterfactual control group for coach changes we use the cumulative surprise information in the last match before a coach change, CS_p , where subscript p indicates the last match of a coach. For every coach change in a particular season for a particular club we searched for the same club but in a different season a match with closest cumulative surprise, CS_c , where subscript c refers to a counterfactual observation, i.e. the control group. It is not possible to find a counterfactual coach change that did not happen for every actual coach change as sometimes the club with a coach dismissal was present in the ‘Eredivisie’ for just one season. Sometimes none of the matches of the same club in a different season had a CS_c close to the CS_p , where we allowed for a maximum difference between the two of 0.5.⁹ So, where possible an actual coach change was matched with a counterfactual coach change that did not happen. The basic idea of matching is to use the available data so as to achieve a balance between treated and control groups. The identifying assumption is that conditional on the observables, there is no remaining unobserved heterogeneity affecting coach dismissals. Then, whether or not an observation is part of the treatment group or the control group is random and a coach change is exogenous.¹⁰ Hentchel et al. (2012) argue that matching on the basis

⁸Note that to account for the discrete character of our dependent variables we also used probit models and ordered probit models. However, this did not affect the nature of our conclusions.

⁹A different maximum difference between CS_c and CS_p leads to a slightly different number of matches but does not affect the main conclusions.

¹⁰As an alternative to this approach we used the coarse exact matching algorithm that matches observations from treated and non-treated individuals in strata, i.e. groups with the same covariate values (see Blackwell et al. (2009)). The matching algorithm searches for situations in which coaches were eligible

of observed characteristics like we do is not enough since there might be unobserved differences between treatment and control group. However, we take these unobserved differences into account by using club-season fixed effects.

Figure 4 shows how well the matching of treatment and controls is. The top graph shows that for all coach changes there is a close relationship between the cumulative surprise in the last match before the change occurred and the cumulative surprise of the counterfactual representing the last match before a coach ‘was not replaced’. The bottom graph of Figure 4 shows that the close relationship also occurs for coach dismissals.

6.3 Feyenoord – a case study

To illustrate the set-up of our analysis, we present a particular coach dismissal and the related counterfactual in more detail. The 2006/2007 season was rather disappointing for Feyenoord, as the club failed to obtain a European ticket. As a result, the board decides to go all out in the summer 2007 transfer window. The club purchases (former) international players like De Cler, Hofland, Lee and Makaay. Meanwhile, they welcome the return from Barcelona of all-rounder Van Bronckhorst. Finally, Van Marwijk, who has guided Feyenoord to UEFA Cup victory in 2002, starts his second spell as head-coach at the club. In the winter 2008 transfer window, Feyenoord buys yet another Dutch international, Landzaat. The board targets three UEFA Champions League participations in a row, in order to balance the budget. However, at the end of the 2007/2008 season only a Dutch Cup victory is celebrated. After that, Van Marwijk leaves Feyenoord to become Holland manager.

The board of the Rotterdam club appoints Gert-Jan Verbeek as his successor. Verbeek has worked wonders at SC Heerenveen, leading the club to four European tickets in a row between 2005 and 2008. However, he is quite unorthodox, both regarding training methods – very tough – and his attitude towards players – rather straight. The experienced players in his squad do not appreciate these two characteristics of their new boss. In January 2009, the board fires Verbeek, after heavy pressure from the players. His record then reads, as far as the Eredivisie is concerned: 17 matches, five wins, four draws, eight losses, 19 points, with 30 goals scored and 26 goals incurred. Feyenoord then holds the twelfth position in the Dutch league, just five points above the relegation zone. Leon Vlemmings, the assistant of Verbeek, is promoted to the role of caretaker-

to be dismissed. Any observation whose stratum does not contain at least one treated and one control unit is dropped from the sample. We use the k2k-routine which drops multiple control observations from the same stratum such that every stratum has one treatment observation and one control observation. The matching was done on club, cumulative surprise and results in the last four matches. Using this alternative approach the results are very much the same.

head-coach. Seventeen matches under his supervision yield seven wins, five draws, five losses, leading to 26 points, with 24 goals scored and 20 goals incurred. Thus, Vlemmings leads Feyenoord to the seventh spot, earning a ticket for the Europa League play-offs.

Feyenoord already reaches an agreement at the end of January 2009 with former player Mario Been, who has been successful with Excelsior (promotion) and NEC (European ticket). In his first season, Feyenoord finishes as number four of the Eredivisie, while the team reaches the finals of the Dutch Cup. However, Ajax wins both (home and away) matches of this final. In the summer of 2010, Van Bronckhorst, Makaay, Landzaat, and Hoffland leave the club. The Feyenoord squad now clearly lacks experience. At the winter break, Feyenoord has played 18 matches in the Dutch league, with five wins, five draws, eight losses, leading to 20 points, with 23 goals scored and 33 goals incurred. This negative goal surplus is primarily attributable to just one match: PSV - Feyenoord 10 - 0, 24 October 2010, perhaps the most disastrous match in the club's 106 year history. At the end of the season, Feyenoord has reached the tenth position. Nevertheless, Been is not dismissed. The final 16 matches have resulted in seven wins, three draws and six losses. In fact, the 2010/2011 season does not bring any success at all. Nevertheless, Been is not fired. Even in the closed season, he keeps his job. However, a majority of the squad votes in favor of ending Been's term as Feyenoord's head-coach, at the beginning of the 2011/2012 training sessions. This leaves the board no other option than to fire the coach.

The case study of Feyenoord is illustrated in Figure 5. Panel *a* shows the evolution of the cumulative surprise over the season for two seasons of Feyenoord. As discussed before, in the treatment season 2009/10 Ger-Jan Verbeek was dismissed after 17 matches. In the control season 2010/11 Mario Been was not dismissed. The evolution of the cumulative surprise is very similar for both seasons. A few matches after the real and the fictitious coach dismissal, the cumulative surprise increases showing an improvement of the performance of Feyenoord. Panel *b* of Figure 5 shows that the evolution of the cumulative number of points in the treatment season and the control season are also very much the same. Both graphs show that after the actual coach dismissal and after the coach dismissal that did not happen, performance improves suggesting that the coach dismissal did not have a causal effect on team performance.

6.4 Actual coach changes and coach changes that did not happen

Table 6 contains parameter estimates for our team performance measures if introduce a control group in the analysis. The top part of the table is on all coach changes, the

bottom part on coach dismissals. As the parameter estimates of the position of the opponent on the league table of the previous season and the effect of a home match are very similar to those in Table 6 we focus on the effects of a coach change – real or fictitious – on team performance. For reasons of comparison we repeat the relevant parameter estimates from Table 5 in panel *a* and *c*. Panels *b* and *d* show the parameter estimates if we include counterfactual observations in the estimates. As shown of the 59 coach changes, 50 could be matched to a control group. Of the 42 coach dismissals 35 could be matched to a control group. There are as many counterfactual coach changes as there are matched actual coach changes. However, due to overlapping team-seasons, the counterfactual observations are from 40 different team-seasons for all coach changes and 32 team-seasons for coach dismissals. For the reduced number of actual coach changes and dismissals the parameter estimates are very much the same as for all coach changes and dismissals. For the control group of counterfactual coach changes that never happened we also find significant positive effects on team performance. In fact, as the F -tests show, we cannot reject the hypothesis that the parameter estimates of real coach changes and dismissals are identical to those of the fictitious coach changes. This suggest that the estimated effects of a coach change are the result of a regression to the mean phenomenon.

In a sensitivity analysis, we also investigated whether there is heterogeneity in the treatment effects in the treatment group and control group. We distinguished the effects for the top 6 teams from the effects of lower ranked teams. We also distinguished between the effects later on in the season from earlier in the season. In both cases, the baseline estimates do not change.

7 Conclusions

This paper examines, whether an in-season change of the head-coach influences the results of football teams. In our analysis, we exploit data from the highest level of Dutch professional football, the ‘Eredivisie’ over a period of fourteen successive seasons. During this time period, 59 head-coach were replaced during the season. Of these head-coach changes 17 were voluntary and 42 were involuntary. We find that the probability of an in-season dismissal of a head-coach depends on the performance of the team, as measured by the cumulative number of points in the last four matches before dismissal and the cumulative surprise indicator in the last match before dismissal. The calculation of the cumulative surprise is based on the comparison of actual results and expected results, based on bookmaker odds. Bad performance increases the likelihood of head-coach dismissal. Team performance after the dismissal of a head-coach is better than team performance before the dismissal. To establish whether this is a causal effect we created

a control group of observations of teams which had a sequence of bad results that did not lead to a coach dismissal. We find that also team performance after ‘coach dismissals that did not happen’ is better than before that dismissal that did not happen.

In conclusion, we find no positive performance effects for a club dismissing the head-coach. This raises the question why clubs decide to fire a coach during a season anyway. First, this may be a response to the dissatisfaction of stakeholders. A non-exhaustive list of the latter includes the owners or shareholders, the main sponsors, other holders of business seats as well as the hoi polloi of the supporters. Whenever this mass of supporters starts waving white handkerchiefs the head-coach is likely to face dismissal soon afterward. This signal often functions as the introduction of the ‘ritual sacrificing’ (Bridgewater, 2010). Second, the media, viz. radio and television, internet, newspapers and sports magazines may exert heavy pressure. Nowadays, the impact of the social media should also not be underestimated. Third, despite results that are in line with expectations, there may be conflicts between the head-coach and the board, with other members of the technical staff, with the squad or with other employees of the club. Fourth, when results lag behind expectations, the board may be subject to a hot-hand fallacy or may think that doing something is better than doing nothing at all.

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Appendix A: History and characteristics of the Dutch ‘Eredivisie’

Professional football in the Netherlands started as late as the fall of 1954. In the first decade, many head-coaches of professional clubs at the highest level (‘Eredivisie’, since 1956) were foreigners (Verkamman and Van den Nieuwenhof (2004)). They had been ‘imported’ from countries with long-standing traditions in top football, such as Austria, (pre-war) Czechoslovakia, England, (pre-war) Hungary and (pre-war) Yugoslavia. The Netherlands did not possess such a tradition. Therefore, the number of experienced Dutch head-coaches was low. Hardly surprising, ten out of eleven Dutch titles between 1955 and 1965 went to teams supervised by a foreign head-coach. The proverbial exception was PSV, Dutch champions in 1963, coached by former national center-forward Appel. From 1954 until 1974, the national team (‘Oranje’) was always supervised by a foreign head-coach, amongst others Merkel (Austria), Hardwick (England), Schwartz (France/Romania), Kessler (Federal Republic of Germany) and Fadrhonic (Czechoslovakia).

Clubs were hesitant to fire within-season a head-coach who had moved in from abroad. Moreover, a certified head-coach was a well-respected person. Dismissing such an employee was not in line with the norms and values at the time. Nevertheless, national coach Merkel was fired in 1956, due to a conflict with his employer, the Royal Dutch football association (KNVB), regarding other duties than training and coaching the national squad.

PSV head-coach Brodic dared to send CEO Otten of Philips, the main sponsor of the club, out of the dressing room in the spring of 1960 (Van den Nieuwenhof and Aben (2002)). Inevitably, club and coach went separate ways a few days later. The substitution of Buckingham as Ajax manager by Michels is the most important in-season change of a head-coach in Dutch football history. According to The Times (2007), Michels has been the best head-coach ever, leaving Busby and Happel in the second and third place. In the first season, Michels succeeded in avoiding relegation. After that, he led Ajax to one European Champion’s cup (1971), four Dutch titles (1966, 1967, 1968 and 1970) and three Dutch cups (1967, 1970 and 1971).

Following the track of Michels, a generation of Dutch head-coaches started to take over positions at the highest level. Rijvers first replaced the Austrian Donenfeld at FC Twente (1966) and then the German Linder at PSV (1972), while Coerver took over from the Austrian Happel at Feyenoord (1973). Both won (the) Dutch title(s) and the UEFA Cup with their clubs. A steadily higher number of former active players followed suit in striving for a career in coaching and management, which put an end to the previous scarcity.

The Dutch ‘Eredivisie’ is one of the smaller European leagues. Nevertheless, the clubs from this league currently take the ninth position in the UEFA country ranking (www.uefa.com, retrieved 14-7-2014). Obviously, the ‘Big Five’, viz. England, France, Germany, Italy and Spain, are ahead of the Netherlands. Portugal, Russia and Ukraine, too, hold a position superior to the ‘Eredivisie’ in this ranking. Second, the ‘Eredivisie’ has been the breeding ground for a national team that has won an international tournament (Euro 1988), reached the FIFA World Cup final three times (1974, 1978 and 2010) and reached the semi-finals in 1998 and 2014. ‘Oranje’ has been among the top-three at the two previous FIFA world cups (2010, 2014), which makes the team only second to Germany in this respect.

Details of the in-season head-coach changes are presented in Table 7.

Appendix B: Calculating match surprises

In this Appendix, we present three examples of the calculation of ‘match surprises’.

A regular victory

On March 11, 2012, Ajax played an ‘Eredivisie’ match at home against RKC Waalwijk, in the 25th round of the 2011/2012 season. At Ladbrokes, the odds were 1.2 for a home victory, 5 for a draw and 11 for an away victory. The harmonic sum, thus, equaled 1.12. Therefore, the probability of a home win was equal to 74 per cent, the probability of a draw equaled 18 per cent, while the probability of an away win was equal to 8 per cent. Consequently, the expected number of points for Ajax equaled 2.4, while the expected number of points for RKC Waalwijk was equal to 0.4. Ajax won 3-0. The match surprise thus equaled 0.60 for Ajax, whereas it was equal to -0.4 for RKC Waalwijk.

A smashing sensation

Also on March 11, 2012, NAC Breda played an ‘Eredivisie’ match at home against PSV (Eindhoven) in the 25th round of the 2011/2012 season. NAC Breda were still fighting to avoid relegation, whereas PSV were still considered as title contenders at the time. At Ladbrokes, the odds were 5.5 for a home victory, 4 for a draw and 1.44 for an away victory. The harmonic sum, thus, equaled 1.13. Therefore, the probability of a home win was equal to 16 per cent, the probability of a draw equaled 22 per cent, while the probability of an away win was equal to 62 per cent. Consequently, the expected number of points for PSV equaled 2.1, while the expected number of points for NAC Breda was equal to 0.7. NAC Breda beat PSV by three goals to one (3-1). The match surprise thus equaled 2.3 for NAC Breda, whereas it was equal to -2.1 for PSV. March 12, 2012, PSV fired head-coach Fred Ruiten.

A coincidence

On February 20, 2012, ADO Den Haag played an ‘Eredivisie’ match at home against Feyenoord, in the 24th round of the 2010/2011 season. ADO Den Haag were in the race for a place in the play-offs, whereas Feyenoord had been struggling all season. At Ladbrokes, the odds were 1.8 for a home victory, 3.4 for a draw and 3.6 for an away victory. The harmonic sum, thus, equaled 1.13. Therefore, the probability of a home win was equal to 49 per cent, the probability of a draw equaled 26 per cent, while the probability of an away win was equal to 25 per cent. Consequently, the expected number of points for ADO Den Haag equaled 1.7, while the expected number of points for Feyenoord exactly equals one. The match ended 2-2; the surprise thus equaled -0.7 for ADO Den Haag, whereas it was precisely equal to zero for Feyenoord.

TABLE 1: IN-SEASON TRAINER CHANGES IN SEVEN EUROPEAN FOOTBALL LEAGUES AND 14 SEASONS; 2000/01-2013/14

	Mean	Minimum	Maximum
Belgium (Jupiler League)	6.9	3	9
England (Premier League)	5.6	3	9
France (Ligue Un)	4.7	3	10
Germany (Erste Bundesliga)	6.6	4	10
Italy (Serie A)	8.4	5	12
Netherlands (Eredivisie)	4.2	2	7
Spain (La Liga)	6.7	4	9

TABLE 2: COACH REPLACEMENTS BY SEASON AND CLUB; 2000/01 – 2013/14

Season	D	O	T	Clubs
2000/01	3	1	4	AZ, De Graafschap, Fortuna Sittard, Sparta Rotterdam
2001/02	3	1	4	Ajax, Fortuna Sittard, Roda JC, Vitesse
2002/03	3	1	4	AZ, FC Groningen, RBC Roosendaal, Vitesse
2003/04	2	2	4	ADO Den Haag, FC Volendam, FC Zwolle, Willem II
2004/05	3	1	4	Ajax, FC Den Bosch, NEC, RBC Roosendaal
2005/06	3	2	5	FC Twente, NAC Breda NEC, RBC Roosendaal, Willem II
2006/07	1	2	3	ADO Den Haag, RKC Waalwijk, Roda JC
2007/08	3	2	5	Ajax, Heracles Almelo, PSV, Sparta Rotterdam, Willem II
2008/09	6	1	7	De Graafschap, FC Utrecht, Feyenoord, PSV, Roda JC, Vitesse, Willem II
2009/10	4	1	5	ADO Den Haag, AZ, NEC, SC Heerenveen, Willem II
2010/11	2	1	3	Ajax, Vitesse, VVV-Venlo
2011/12	3	2	5	De Graafschap, FC Twente, FC Utrecht, PSV, VVV-Venlo
2012/13	2	0	2	FC Twente, NAC Breda
2013/14	4	0	4	ADO Den Haag, AZ, Cambuur, Roda JC
Total	42	17	59	

Note: D = dismissals, O = other changes, T = total coach changes; see for details Table 7

TABLE 3: VARIABLES USED IN THE ANALYSIS; 2000/01-2013/14; MEANS, MINIMUM, MAXIMUM

	Mean	Min	Max	N
All coach changes				
Home	0.50	0	1	2006
Rank opponent	9.51	1	18	2006
Points	1.17	0	3	2006
Victory	0.32	0	1	2006
Goal difference	-0.32	-9	7	2006
Cumulative surprise	-2.64	-17.41	10.28	2005
Dismissals				
Home	0.50	0	1	1428
Rank opponent	9.47	1	18	1428
Points	1.08	0	3	1428
Victory	0.29	0	1	1428
Goal difference	-0.47	-9	6	1428
Cumulative surprise	-3.44	-17.41	10.28	1427

Note: All coach changes: 59; coach dismissals: 42

TABLE 4: PARAMETER ESTIMATES DETERMINANTS OF COACH DISMISSAL; 2000/01-2013/14; MPH MODEL

	Dismissals		Other changes		Dismissals		Other changes	
	(1)		(2)		(3)		(4)	
Point last 4 matches	-0.29	(3.3)**	0.00	(0.0)	-0.34	(4.1)**	-0.03	(0.2)
Cumulative surprise	-0.25	(4.5)**	-0.15	(1.7)*	-0.16	(4.4)**	-0.10	(1.2)
Dur. dep. 18-24 matches	0.39	(1.2)	0.07	(0.1)	–		–	
Dur. dep. 25-34 matches	0.10	(0.2)	-0.31	(0.5)	–		–	
Constant	-4.02	(8.9)**	-5.32	(6.5)**	-4.01	(11.0)**	-5.69	(8.3)**
α_1	0.75	(1.7)*		–				
-Loglikelihood			347.9				352.2	

Note: Based on 252 observations (18 clubs in 14 seasons); in parentheses absolute t statistics; ** (*) indicates significance at 5% (10%).

TABLE 5: NAIVE PARAMETER ESTIMATES EFFECTS OF COACH CHANGE ON TEAM PERFORMANCE; 2000/01-2013/14

	Points		Win		Goal diff.	
	(1)		(2)		(3)	
All coach changes						
Position _{k-1}	0.06	(12.9)**	0.02	(10.3)**	0.11	(13.8)**
Home match	0.64	(13.0)**	0.21	(12.8)**	1.03	(12.2)**
Coach change	0.25	(4.7)**	0.09	(4.5)**	0.37	(4.2)**
N	2006					
n	59					
Coach dismissals						
Position _{k-1}	0.06	(12.5)**	0.02	(9.6)**	0.11	(13.3)**
Home match	0.66	(11.9)**	0.22	(11.5)**	1.09	(11.8)**
Coach dismissal	0.29	(4.9)**	0.10	(4.9)**	0.48	(4.8)**
N	1428					
n	42					

Note: All estimates contain club-season fixed effects; N = number of matches; n = number of seasons; absolute t-statistics in parentheses based on robust standard errors; ** (*) indicates significance at 5% (10%).

TABLE 6: EFFECTS OF COACH CHANGE ON TEAM PERFORMANCE – TREATMENT AND CONTROL GROUPS; 2000/01-2013/14

	Points (1)		Win (2)		Goal diff. (3)		N	n
All coach changes								
a. Actual changes	0.25	(4.7)**	0.09	(4.5)**	0.37	(4.2)**	2006	59
b. Matched – treatment	0.24	(4.3)**	0.09	(4.5)**	0.34	(3.7)**	3060	50
Matched – control	0.23	(2.8)**	0.07	(2.3)**	0.32	(2.5)**		40
F-test equality of parameters	0.03		0.42		0.02			
Coach dismissals								
c. Actual changes	0.29	(4.9)**	0.10	(4.9)**	0.48	(4.8)**	1428	42
d. Matched – treatment	0.26	(4.2)**	0.10	(4.4)**	0.42	(4.0)**	2278	35
Matched – control	0.26	(3.0)**	0.08	(2.6)**	0.38	(2.6)**		32
F-test equality of parameters	0.00		0.28		0.06			

Note: All estimates contain club-season fixed effects; N = number of matches; n = number of seasons; absolute t-statistics based on robust standard errors in parentheses; ** (*) indicates significance at 5% (10%).

TABLE 7: DETAILS OF IN-SEASON HEAD-COACH CHANGES; 2000/01-2013/14

All	D	Club	Leaving Coach	M	St	Arriving Coach	St	S
2000/01								
1		AZ	Van der Lem	27	MC	Van Stee	N	VI
2	1	De Graafschap	McDonald	15	F	Koolhof	AC	VI
			Koolhof	19	AI	Marsman	TD	VI
3	2	Fortuna Sittard	Duut	14	F	De Koning	AI	
			De Koning	15	AI	Thijssen	N	VI
4	3	Sparta Rotterdam	Roks	22	F	Van Hanegem	N	VI
2001/02								
5	4	Ajax	Adriaanse	15	F	Koeman, R.	N	VI
6	5	Fortuna Sittard	Verel	17	F	De Koning	AC	LD
7	6	Roda JC	Van Dijk	5	F	Leekens	N	LD
8		Vitesse	Koeman, R.	15	RP	Sturing	AC	LD
2002/03								
9	7	AZ	Van Stee	10	F	Haar	AC	VI
			Haar	11	AI	Adriaanse	N	
10		FC Groningen	Lodeweges	9	RN	Jans	N	LD
11	8	RBC Roosendaal	Dekker	18	F	Maaskant	N	LD
12	9	Vitesse	Snoei	26	F	Sturing	YA	LD
2003/04								
13		ADO Den Haag	Israel	12	RP	Schoenmaker	AC	LD
14	10	FC Volendam	Wisman	19	F	Steur, Joh.	AC	LD
15	11	FC Zwolle	Boeve	6	F	Nijkamp	TD	LD
			Nijkamp	8	AI	Spijkerman	N	
16		Willem II	Wotte	17	RP	Wetzel	AC	LD
2004/05								
17		Ajax	Koeman, R.	23	RN	Krol	AI	
			Krol	25	AI	Blind	YA	LD
18	12	FC Den Bosch	Wisman	24	F	Van Grinsven	AC	VI
19	13	NEC	Neeskens	17	F	Lok	AC	VI
20	14	RBC Roosendaal	Van Dijk	29	F	Meppelink	MC	VI
			Meppelink	30	AI	Roks	N	

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Table 7 – continued from previous page

All	D	Club	Leaving			Arriving		
			Coach	M	St	Coach	St	S
2005/06								
21		FC Twente	Coolen	22	RN	Van Staa	AC	VI
22	15	NAC Breda	Lokhoff	18	F	Lok	N	
			Lok	34	F	Karelse	AC	VI
23		NEC	Lok	17	R	De Groot	AC	VI
24	16	RBC Roosendaal	Roks	19	F	Maaskant	N	VI
25	17	Willem II	Maaskant	13	F	Zwamborn	MC	VI
2006/07								
26		ADO Den Haag	Adelaar	14	RN	Schoenmaker	AC	VI
		Feyenoord	Koeman, E.	34	RN	Beenhakker	AI	VI
27	18	RKC Waalwijk	Koster	15	F	Bogers	AC	VI
			Bogers	17	AI	Wotte	N	
28		Roda JC	Stevens	23	RP	Atteveld	AC	VI
2007/08								
29		Ajax	Ten Cate	8	RP	Koster	YA	VI
30	19	Heracles Almelo	Brood	17	F	Krüzen	AC	
			Krüzen	18	AI	Heerkes	N	VI
31		PSV	Koeman, R.	10	RP	Wouters	AC	VI
			Wouters	18	AI	Vergoossen	AI	
32	20	Sparta Rotterdam	Aandewiel	12	F	Van Tiggelen	AC	VI
			Van Tiggelen	13	AI	Booy	N	
33	21	Willem II	Van Wijk	11	F	Jonker	TD	VI
2008/09								
		ADO Den Haag	Wetzel	31	TD	Atteveld	N	VI
		Ajax	Van Basten	33	RN	Van 't Schip	AC	VI
34	22	De Graafschap	Van Stee	25	F	Kalezic	AC	VI
35	23	FC Utrecht	Van Hanegem	17	F	Du Chatinier	AC	VI
36	24	Feyenoord	Verbeek, G-J.	18	F	Vlemmings	AC	VI
37	25	PSV	Stevens	20	F	Lodeweges	AC	VI
38	26	Roda JC	Atteveld	6	F	Koopman	AC	VI
			Koopman	13	AI	Van Veldhoven	N	
39	27	Vitesse	Westerhof, H.	18	F	Bos	AC	VI

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Table 7 – continued from previous page

All	D	Club	Leaving			Arriving		
			Coach	M	St	Coach	St	S
40		Willem II	Jonker	24	TD	Groenendijk	N	VI
2009/10								
41	28	ADO Den Haag	Atteveld	30	F	Steijn	AC	
42	29	AZ	Koeman, R.	17	F	Advocaat	N	VI
43		NEC	Lodeweges	12	RN	Brookhuis	YA	VI
			Brookhuis	14	AI	Vloet	N	
44	30	SC Heerenveen	Sollied	6	F	De Jonge	YA	VI
			De Jonge	22	AI	Everse	N	
		Sparta Rotterdam	Adelaar	31	F	De Mos	N	VI
45	31	Wilem II	Groenendijk	24	F	Schenning	AC	VI
			Schenning	24	AI	Pijpers	N	
			Pijpers	24	RP	De Jong, T	RN	
2010/11								
46		Ajax	Jol	18	RN	De Boer, F.	YA	VI
		NAC Breda	Maaskant	3	RP	Karelse, J	AC	VI
47	32	Vitesse	Bos	10	F	Van Arum	AC	
			Van Arum	15	AI	Ferrer	N	VI
48	33	VVV Venlo	Van Dijk	19	F	Boessen	AC	VI
		Willem II	Heerkes	31	F	Feskens	AC	VI
2011/12								
49	34	De Graafschap	Ulderink	22	F	Roelofsen	AC	VI
50	35	FC Twente	Adriaanse	18	F	McLaren	N	VI
51		FC Utrecht	Koeman, E	10	RN	Wouters	AC	VI
52	36	PSV	Rutten	26	F	Cocu	AC	VI
53		VVV Venlo	De Boeck	16	RN	Boessen	AI	VI
			Boessen	18	AI	Lokhoff	N	VI
2012/13								
54	37	NAC Breda	Karelse	10	F	Bogers	AC	VI
			Bogers	14	AI	Gudelj	N	VI
55	38	FC Twente	McClaren	25	F	Schreuder	N	VI
2013/14								

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Table 7 – continued from previous page

All	D	Club	Leaving		Arriving		St	S
			Coach	M	St	Coach		
56	39	ADO Den Haag	Steijn	23	F	Fraser	AC	VI
57	40	AZ	Verbeek	9	F	Haar	AI	VI
			Haar	10	AI	Advocaat	N	VI
58	41	Cambuur Leeuwarden	Lodeweges	30	F	De Jong, H	AC	VI
		NEC	Pastoor	4	F	De Groot	AI	
			De Groot	5	AI	Janssen	N	VI
59	42	Roda JC	Brood	18	F	Plum	AI	
			Plum	19	AI	Tomasson	N	VI

Note: All = relevant coach changes used in the analysis: first change within the season after match 4, before match 31. D = subset of relevant coach dismissals;

even if interim coaches operated as a duo we only report 1 name.

AC = assistant as caretaker, AI = ad interim, F = fired, N = new, RN = resigned,

RP = resigned – promotion, TD = technical director, YA = youth academy,

M = after match, St= status, S = source, VI = Voetbal International, LD = daily newspapers

FIGURE 1: COMPARISON OF THE POSITION IN THE LEAGUE TABLE AT THE TIME OF COACH REPLACEMENT AND AT THE END OF THE SEASON IN WHICH THIS OCCURRED; 2000/01–2013/14

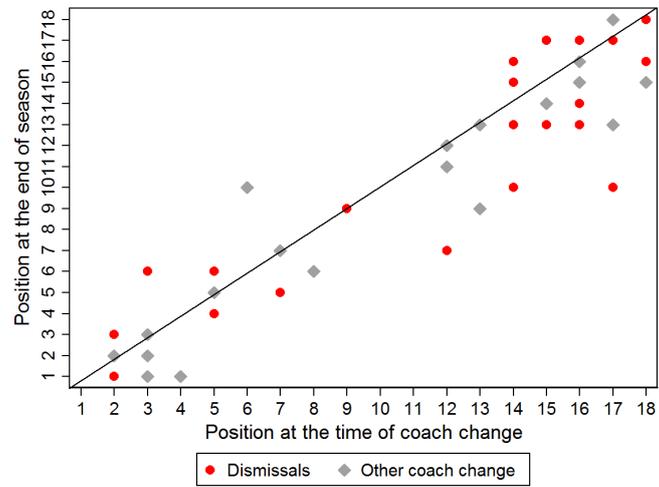
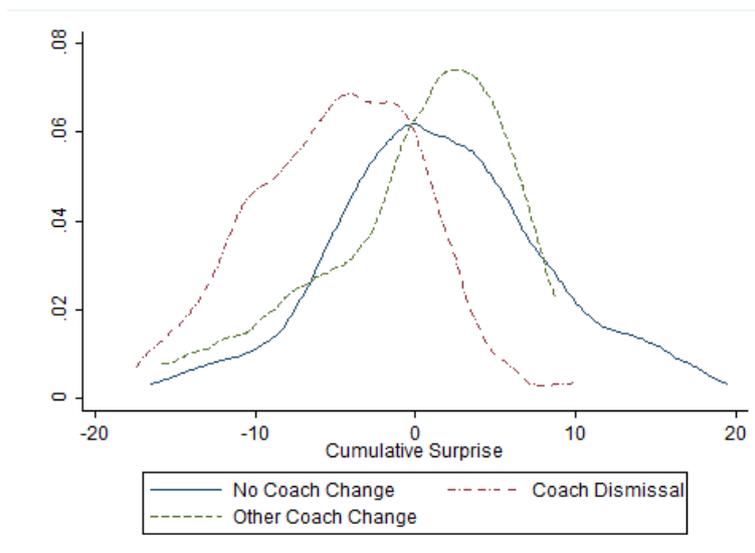


FIGURE 2: KERNEL DENSITIES CUMULATIVE SURPRISE AND CUMULATIVE POINTS BY TYPE OF COACH CHANGE; LAST MATCH OF THE SEASON

A: CUMULATIVE SURPRISE



B: CUMULATIVE POINTS

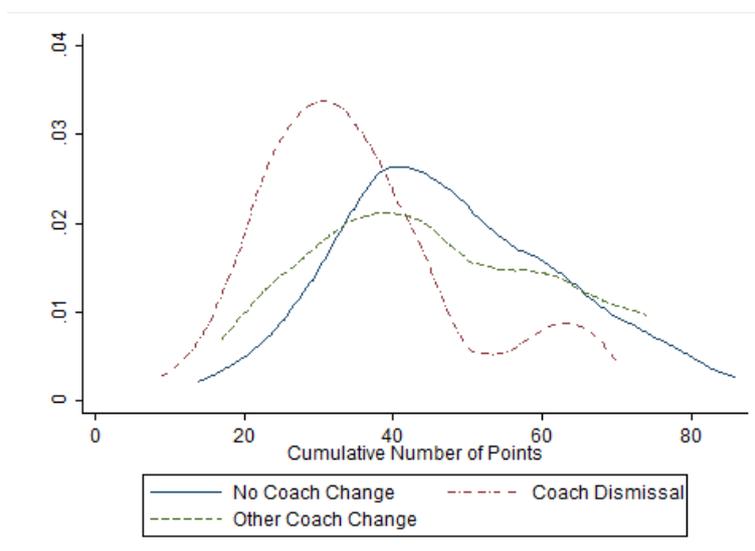
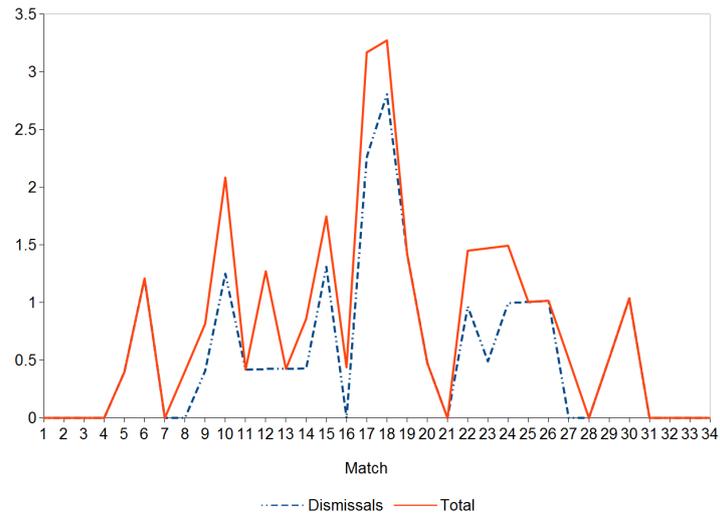


FIGURE 3: RATES OF COACH CHANGE

A: DISMISSAL RATES AND TOTAL RATES COACH CHANGES (PERCENTAGE/MATCH)



B: SURVIVOR RATES (PERCENTAGES)

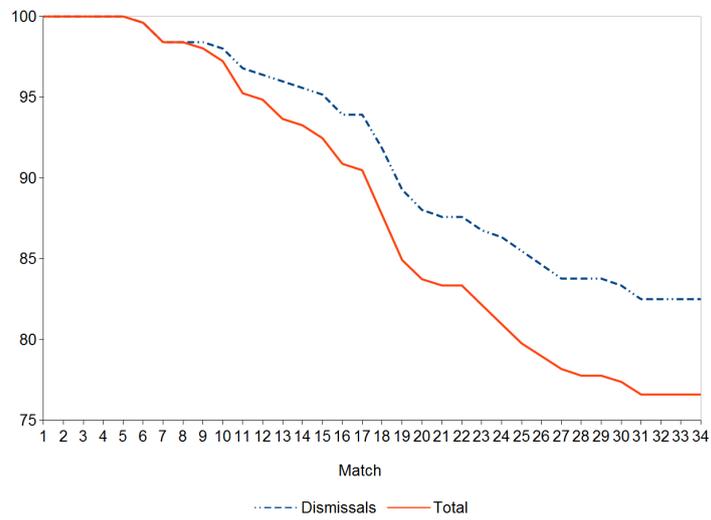
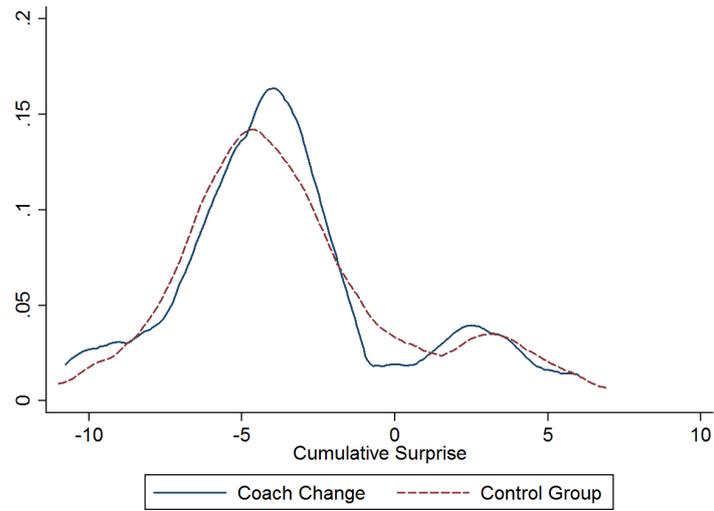


FIGURE 4: KERNEL DENSITIES CUMULATIVE SURPRISE LAST MATCH OF THE COACH; ACTUAL COACH CHANGES AND COUNTERFACTUALS

A: ALL COACH CHANGES



B: COACH DISMISSALS

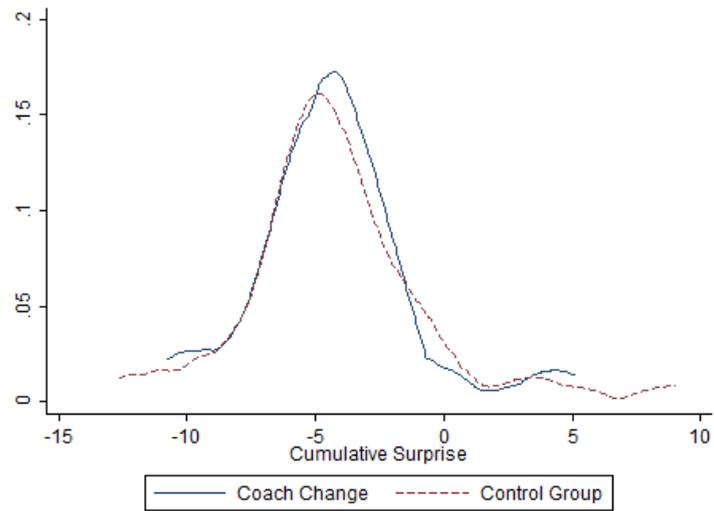
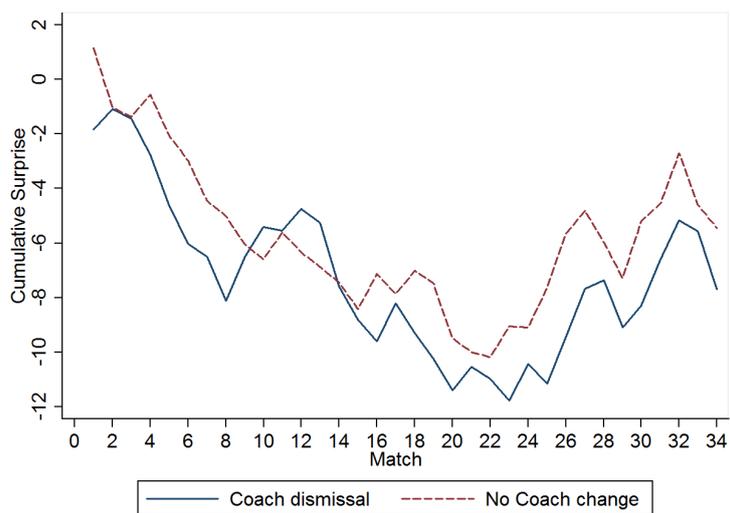
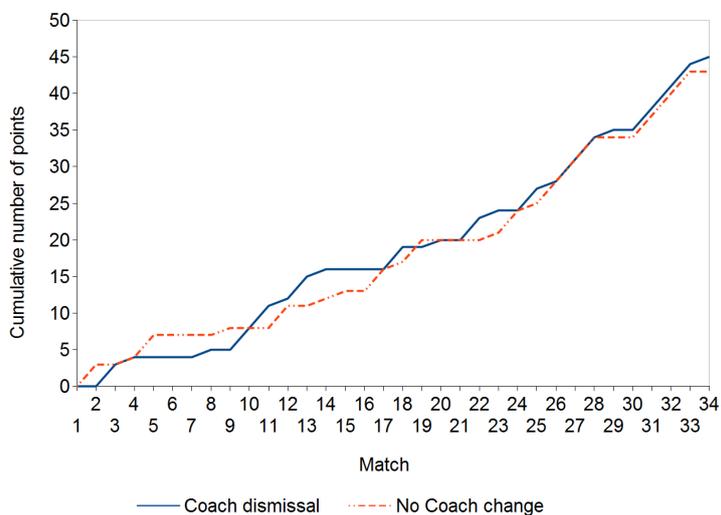


FIGURE 5: CUMULATIVE SURPRISE AND CUMULATIVE NUMBER OF POINTS OVER THE SEASON FEYENOORD; ACTUAL COACH CHANGE AND COUNTERFACTUAL

A: CUMULATIVE SURPRISE



B: CUMULATIVE NUMBER OF POINTS



Note: Treatment: Coach G.J. Verbeek was replaced after 17 matches; counterfactual: coach Been was not replaced.