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Fergie Time and the Allocation of Additional Time: Evidence from the English Premier League 2009 to 2013

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Abstract

This paper examines the impartiality of referee decision making when applying Law 7 of FIFA's *Laws of the Game*. We investigate decision making relating to the allocation of additional time for 1,515 English Premier League matches from 2009 to 2013. The research finds no evidence of home favoritism and limited evidence of a bias towards "big" clubs, a phenomenon commonly known as *Fergie Time*. However, an examination of close matches finds *Fergie Time* is not present, suggesting its ability to alter tight matches is negligible.

Keywords: additional time, referee decision making, favoritism

Introduction

This paper examines the impartiality of English Premier League (EPL) referees when allocating additional time at the end of EPL matches. Specifically, we question whether favoritism exists towards "big" clubs, as defined by their financial and football performance, in the allocation of second-half additional time over 1,515 EPL matches from August 2009 to May 2013. In recent years referee decision making has been explored from a number of angles. Empirical studies have examined physiological effects (Helsen & Bultynck, 2004), psychological aspects (Jones et al., 2002), crowd and stadium influences (Nevill, Balmer, & Williams, 2002), and principal-agent dynamics (Sutter & Kocher, 2004). We do not intend to explain the causal effects of favoritism as discussed in previous research; instead, the aim of this paper is to determine if referees displayed home favoritism or a bias towards big clubs over the course of four seasons. The paper is the first to test *Fergie Time*, an English concept, in the EPL. It is also the first to define both a "big" club and "small" club using the dual criterion of football success and financial strength.

This study is motivated by three factors. First, while extensive research has been conducted into home favoritism, there is limited research that considers big club favorit-

ism. Studying big club favoritism in football can provide insight to a practice that is relevant to many organizational contexts where principals commonly have differential standings. As is often the case with sport, novel field data of individual decision making (commonly inaccessible in an organizational context) can be collected. Furthermore, addressing the status of different principals and asking whether favoritism is shown toward specific clubs can produce important findings concerning the effects of reputation on agent decision making, a practice previously identified as significantly influencing football referees in an experimental setting (Jones, Paull, & Erskine, 2002).

The second motivation for this study derives from extensive media coverage of the research question. This paper tests a popular claim propagated by the media and provides empirical answers to whether the widespread perception of *Fergie Time* is factual or a myth. This follows a similar theme to that of Lenten (2012) and Fort and Winfree (2013). Many media outlets have made explicit claims that EPL referees allocate different amounts of additional time when faced with different incentive structures.[1] Favoritism to one principal in this context was dubbed *Fergie Time*, in reference to the former Manchester United manager Sir Alex Ferguson, who memorably sought greater amounts of additional time at the end of matches during his tenure from 1986 to 2013. When considered abstractly, *Fergie Time* suggests that certain principals are awarded excessive additional time, providing them an opportunity to change the outcome of a match. The existence of *Fergie Time* can be considered a form of favoritism toward one principal participating in a football match that is a product of an agent's discretion.

A third reason for this study is to enhance our understanding of favoritism in sport. Pollard's (2008) reiteration of the sentiment originally expressed in Pollard (1986) is indicative of the need for further research in this domain. Despite more than two decades passing, he argues that "there is still much to be learnt about the complex mechanisms that cause home advantage, both in soccer and other sports" (Pollard, 2008, p. 13). In light of this, we forward a hypothesis that addresses these complex mechanisms and test for systematic referee impartiality in a similar tradition to previous football favoritism research (Boyko, Boyko, & Boyko, 2007; Buraimo, Forrest, & Simmons, 2010; Dawson & Dobson, 2010; Dawson, Dobson, Goddard, & Wilson, 2007; Garicano, Palacios-Huerta, & Prendergast, 2005; Sutter & Kocher, 2004). This paper, however, is unique as we focus not just on home advantage but on a club size regardless of match venue.

Background

Although the idea of favorably allocating additional time to particular clubs can be considered unjust, the introduction of additional time to account for stoppages in play was established to ensure a sense of justice. A match in 1891 involving English clubs Aston Villa and Stoke City was the catalyst for this. Prior to this fixture, all matches had been 90 minutes in duration—consisting of two 45-minute halves. Once the second 45 minutes had elapsed the match immediately ended. In this match, however, Aston Villa was leading 1–0 with two minutes remaining when Stoke was awarded a penalty kick. Infuriated by the referee's decision, the Aston Villa goalkeeper kicked the only football out of the stadium. Unfortunately for Stoke, the football could not be retrieved in time. The remaining two minutes of playing time elapsed, resulting in a

victory for Aston Villa. As a consequence of these events the Football Association (FA) introduced the concept of additional time to allow referees to allocate more time at the end of each half of a match, when deemed appropriate, for stoppages judged excessive or unnecessary (Nawrat & Hutchings, 1998). Further transparency to the allocation of additional time occurred at the 1998 World Cup in France when FIFA introduced the use of an electronic board to display the minimum amount of time left in a match at the end of each half. Both the original decision to allocate additional time and the use of electronic boards to disclose information were introduced to promote fairness and transparency in the sport.

It is important to note that the decision of how much additional time to allocate is at the discretion of the match referee alone. Minimal explicit direction is given by football authorities regarding how to calculate the amount of additional time at the end of each half. An incremental time allowance usually applies to compensate for excessive stoppages. Law 7 – The Duration of the Match of FIFA's *Laws of the Game* outlines the rules associated with additional time and states that:

> "Many stoppages in play are entirely natural (e.g., throw-ins, goal kicks). An allowance is to be made only when these delays are excessive. The fourth official indicates the minimum additional time decided by the referee at the end of the final minute of each period of play. The announcement of the additional time does not indicate the exact amount of time left in the match. The time may be increased if the referee considers it appropriate but never reduced. The referee must not compensate for a timekeeping error during the first half by increasing or reducing the length of the second half." (FIFA, 2014, p. 104)

Further direction regarding Law 7 is provided in the *Laws of the Game* and states that the amount of additional time required is at the discretion of the referee and an allowance is only made for time lost due to "substitutions, the assessment of injury to players, removal of injured players from the field of play for treatment, wasting time [or] any other cause" (FIFA, 2014, p. 29). Natural stoppages such as offside decisions, free-kicks, thrown-ins, and the restarting of play from a goal kick are not cited in the rules as reasons to allocate additional time.

Referee Decision Making

Referee decision making is now being examined from a variety of perspectives. Much of the previous work into this area has been motivated by the perception that favoritism exists within sport, and that a referee can be influenced by a range of factors related to this. Although favoritism in sports is general, the causes and occurrences of these advantages are highly variable both between and within sports.[2]

As the pace of professional football increased over the past 20 years, the task of officiating has become increasingly challenging and has been matched by dramatic changes in the way referees are trained (Nevill, Webb, & Watts, 2013). This challenge has been intensified by technological improvements, such as goal-line video analysis, subjecting referees' decision making to greater scrutiny. Referees are increasingly required to demonstrate enhanced physical, technical, and psychological strengths in order to effectively administer the rules of the game (De Oliveira, Orbetelli, & De Barros Neto,

2011; Helsen & Bultynck, 2004; Palacios-Huerta, 2014). A growing body of research has considered whether these demands have led to systematic biases in referees' decision making, with particular focus on whether the "home-away" dynamic causes home team favoritism (Buraimo et al., 2010; Clarke & Norman, 1995; Nevill et al., 2002; Reilly & Witt, 2013; Scoppa, 2008).

Investigations into home favoritism have involved studying travel effects (Pollard & Pollard, 2005), psychological factors (Jones et al., 2002), territorial factors (Pollard, 2006; Pollard & Pollard, 2005), crowd and stadium effects (Nevill et al., 2002), and officiating favoritism (Boyko et al., 2007; Sutter & Kocher, 2004). Both crowd and stadium effects and referee favoritism are now explored further.

Of the factors cited, the issue of crowd and stadium effects has been thoroughly examined. Nevill, Newell, and Gale (1996) address crowd size in the context of English and Scottish football and find that a higher percentage of home wins is positively correlated with larger attendances. Home clubs are less likely to be penalized for ambiguous tackles in the presence of greater supporter intensity (Nevill et al., 2002) and receive fewer yellow and red cards the closer spectators are to the pitch (Buraimo et al., 2010). Matches played in stadiums with a running track act as a deterrent to home bias, with greater impartiality in decision making prevalent among referees (Scoppa, 2008). Notably, recent evidence suggests that home advantage in football is becoming less likely in smaller stadiums and that improved training for referees[3] may not immunize their decision making completely from environmental factors (Nevill et al., 2013).

A second causal factor that has been subject to significant study is referee decision making. Sutter and Kocher (2004) investigate the behavior of referees and find a systematic bias toward home teams that are significantly more likely to be awarded penalty kicks. An examination of both the EPL and five seasons of European football found that referees *favor* home teams when issuing yellow and red cards, with visiting teams more likely to be punished by referees (Dawson et al., 2007; Dawson & Dobson, 2010). Boyko et al., (2007) confirm this officiating bias by examining 5,244 EPL matches involving 50 referees. They find that instances of home bias differ between individual referees, with some more biased than others. Factors such as crowd noise and density are proposed as possible explanations for this difference.

A number of studies address the amount of additional time allocated by referees at the end of a match. Sutter and Kocher (2004) find a systematic bias in the *Bundesliga*, with home teams receiving favorable treatment (e.g., playing less time when required, when winning, and playing more time when drawing and losing). Research by Dohmen (2008) supports these results and finds that more additional time is played in the *Bundesliga* when home spectators are closer to the field of play. Garicano et al., (2005) apply a similar analysis to Spain's *La Liga* and confirm the existence of a systematic advantage in favor of home teams. The results of Garicano et al., (2005) indicated that referees shorten matches with close scores in *La Liga* in which the home team is winning, and extend close matches in which the home team is losing. Scoppa (2008) examines the allocation of additional time by referees in *Seria A* and confirms a bias in favor of home teams, with significantly more time played if the home team is losing at the end of 90 minutes across two seasons in *Seria A*. Most recently, Riedl, Strauss, Heuer, and Rubner (2015) examine 10 seasons of data from the *Bundesliga* and confirm

the presence of favoritism in the allocation of additional time when one team leads another, when compared to a tie game. The results of these papers will be discussed in light of the results of this work in the discussion section.

Empirical Framework and Descriptive Statistics

To investigate whether EPL referees display favoritism towards certain clubs when applying Law 7 at the end of each match we collected data for the EPL from August 2009 to May 2013. May 2013 is used as the end point, as it coincides with the retirement of Sir Alex Ferguson. The dataset includes four complete EPL seasons. Two hypotheses are tested. The first is the incidence of home favoritism in the allocation of additional time. The second is the presence of "big" club favoritism (*Fergie Time*) in the allocation of additional time. To test the second hypothesis, a classification system is required to differentiate between clubs. Big clubs are defined by the following criteria:

1. The club must appear in the list of top 20 clubs worldwide by revenue generation in the Deloitte Football Money League Report for every year under analysis (2009–2013).[4]
2. The club must have participated in the Group Stages of the UEFA Champions League and won a major domestic competition in the past decade.[5]

Fulfilling a dual criterion ensures that big clubs are defined not only by their relative financial performance but also by their success on the field of play and presence in the elite club competition in Europe. While these two criteria hold a causal relationship, we believe it is important to judge a club's size as a consequence of both its commercial and sporting exploits. This classification system has the added benefit of being flexible and can be applied to alternative European leagues to test the second hypothesis of *Fergie Time*. Six EPL clubs meet this criterion and are hereafter known as big clubs. They are Arsenal, Chelsea, Liverpool, Manchester City, Manchester United, and Tottenham Hotspur. These clubs are not just defined as "big" for the sample period considered, but are also the only clubs to fulfil this criteria in any season from 2003 to 2016. This ensures that the empirical results are not biased by the four seasons examined, as the clubs defined as big fulfill the dual criteria over an extended 14-year period. The remaining 22 clubs that appeared in the EPL between August 2009 and May 2013 are hereafter referred to as small clubs.[6,7]

The dataset includes 1,515 EPL matches that took place between August 2009 and May 2013 and is available from the respected British Broadcasting Corporation (BBC). Data is inaccessible for five matches during the sample period as the BBC did not report the number of seconds of additional time played. Data is collected for each individual match on the total number of seconds of additional time played at the end of the second half, the venue and score at the end of 90 minutes of play, the number of goals between the teams at the end of 90 minutes of play (margin), games in which a single goal can alter the outcome of a match (close matches), the total number of goals, yellow cards, second yellow cards and red cards in the second half of each match, the number of serious injuries[8] in the second half of each match, and the number of years each match referee has been officiating in the EPL. It was neither possible nor necessary to control for all stoppages in each match. For example, it is not required to control

for the total number of fouls, throw-ins, corner-kicks, or offside decisions as these are considered "natural" stoppages. Law 7 states that additional time is only required when a stoppage is "excessive."

Over the four seasons, the home team led 44.3% of matches entering additional time while the away team led 27.3% of the time. In 28.4% of EPL matches from 2009 to 2013, the score was tied at the end of 90 minutes of play. In 65% of matches (987 of 1,515) the match was either tied or had just one goal separating the teams as the match entered second-half additional time. Nearly 7% of matches experienced a change in outcome between the start and end of second-half additional time (e.g., a goal scored in additional time that changed the outcome from a draw to a home win or from a home loss to a draw, etc.). Additional descriptive statistics are presented in Table 1. Table 2 tabulates the mean number of seconds of additional time played across the 1,515 EPL matches. The data is presented for the home team with the three possible outcomes as the match enters second-half additional time. It is of note that these descriptive statistics are subject to little variation over the sample period.

Table 1. EPL 2009–2013 Descriptive Statistics

Variable	**Mean**	**St. Dev.**	**Min**	**Max**
Additional Time (seconds)	265	79	78	772
Goals per Match	2.79	1.71	0	10
Margin after 90 minutes	1.32	1.26	0	8
Close Matches	0.65	0.48	0	1
Substitutions	5.25	0.91	0	6
Yellow Cards	3.15	1.86	0	12
Red Cards	0.16	0.42	0	3
Serious Injury	0.02	0.15	0	1
Referee Experience (Years)	5.94	3.17	0	11

Table 2. Additional Time Means in Seconds

Home Team	**Winning**	**Drawing**	**Losing**
1. All Games	263.09	267.02	267.36
2. Big Clubs	253.54	296.97	294.82
3. Small Clubs	259.72	269.23	264.78
4. Big Clubs vs. Small Club	245.43	298.62	308.03
5. Big Club vs. Big Club	291.28	297.2	282.1
6. Small Clubs vs. Big Club	266.4	267.46	247.84
7. Small Clubs vs. Small Club	256.38	269.21	279.89

Empirical Results

Table 3 presents a club fixed-effects regression for the 1,515 EPL games. The amount of additional time in seconds is used as the dependent variable. As expected, many of the independent variables included to explain the determinants of additional time prove to be statistically significant. The number of second-half goals, close matches, substitutions, yellow cards, red cards, and serious injuries all positively impact the amount of additional time across all three regressions. The number of goals between the teams (margin) is statistically significant across all regressions and negatively affects the amount of additional time. Regression (1) presents results on home club favoritism in the allocation of additional time. As indicated by the descriptive statistics in Table 1, no such advantage exists in the EPL from 2009 to 2013 when considering all 1,515 matches. Significantly more additional time is played, regardless of whether the home team is winning or losing, when compared to a drawn game. This result confirms the impartiality of match referees when allocating additional time but does suggest that referees add significantly more additional time when the score is non-neutral, regardless of which team is winning.

Regression (2) isolates home matches involving the six big clubs and compares these to all other matches in the sample. Dummy variables are included for big clubs when winning, drawing, and losing at home. No significant differences are found for big clubs when winning or losing at home across all regressions, confirming referee impartiality. Regression (3) considers the opposite relationship and examines matches when small clubs are at home. Unlike Regression (2), small clubs do receive significantly more additional time when both winning and losing at home compared to a drawn match at the end of 90 minutes. However, similar to Regression (1), non-neutral matches at the end of 90 minutes of play are subject to significantly more additional time.

Table 3. The Determinants of Additional Time in the EPL 2009–2013

Regression	**(1)**	**(2)**	**(3)**
Constant	157.80***	160.28***	157.70***
	(7.56)	(8.24)	(7.85)
Goals	7.05***	6.50***	6.94***
	(0.93)	(0.90)	(0.94)
Margin	-17.70***	-11.18***	-16.79***
	(2.47)	(2.73)	(2.57)
Close Matches	24.11***	27.42***	24.70***
	(4.82)	(5.12)	(4.89)
Substitutions	9.37***	10.09***	9.79***
	(1.58)	(1.58)	(1.58)
Yellow Cards	7.81***	8.00***	7.75***
	(0.89)	(0.87)	(0.87)

Table 3. (Cont.) The Determinants of Additional Time in the EPL 2009–2013

Regression	**(1)**	**(2)**	**(3)**
Red Cards	12.38**	12.78**	12.93**
	(3.72)	(3.87)	(3.85)
Serious Injury	271.03***	271.06***	270.70***
	(21.95)	(21.57)	(21.59)
Referee Experience	-0.45	-0.44	-0.37
	(0.52)	(0.50)	(0.52)
Home Winning	19.85***		
	(4.59)		
Home Draw	-		
Home Losing	25.31***		
	(4.50)		
Big Club Winning		-5.31	
		(6.74)	
Big Club Drawing		-	
Big Club Losing		11.91	
		(8.48)	
Small Club Winning			24.32***
			(5.49)
Small Club Drawing			-
Small Club Losing			25.87***
			(5.35)
N	1,515	1,515	1,515
Prob > F	0.000	0.000	0.000
VIF, Uncentered	5.41	4.67	4.75
R^2 Overall	0.446	0.437	0.428

Statistically significant: ***at 0.1% level; **at 1% level; *at 5% level.

† Results include club-fixed effects and are presented with robust standard errors.
†† The log of the dependent variable produces results that do not differ statistically from those presented and demonstrate robustness in the dependent variable.

Regressions (1), (2), and (3) require further examination. In order to check the robustness of these results and the possible presence of *Fergie Time,* which fundamentally addresses disparities between big and small clubs, the four possible match scenarios must be considered: big club versus big club, big club versus small club, small club versus big club, and small club versus small club. The fixed-effects results are presented in Table 4. In each regression the original dataset is restricted so that the four match scenarios can be tested individually and confirm the robustness of the first set of regressions.

Regression (4) presents results for matches played between Arsenal, Chelsea, Liverpool, Manchester City, Manchester United, and Tottenham Hotspur. The margin, yellow cards, and the serious injuries are reported as statistically significant, explaining the amount of additional time. The home team also plays significantly more additional time, whether winning or losing, when compared to a drawn match. Regression (5) considers big clubs when at home to small clubs only. Big clubs do not play more additional time whether they are winning or losing at home to small clubs, supporting the referee impartiality found in earlier regressions. Regression (6) examines the opposite of Regression (5) and considers matches between big clubs and small clubs when the latter is at home. Unlike big clubs, small clubs play significantly more time (over half a minute; $p < 0.007$) when winning against a big club at home, and is evidence of *Fergie Time*. Regression (7) considers matches only involving small clubs. Significantly more additional time is played when the home team is winning and losing at the end of 90 minutes when compared to a tied match between two small teams.

It could be argued interpreting Regressions (6) as evidence of *Fergie Time* is premature and that these results can be explained by time-wasting tactics or increased foul play by small clubs. The following, however, should be noted. There is no evidence (other than anecdotal) to suggest small clubs increase their rate of foul play when winning at home or away to big clubs. Nor is there any evidence (again other than anecdotal) that small clubs increase their rate of foul play as a match progresses. In order to account for this argument, interaction variables are created between the number of yellow cards in each match, a proximate measure of foul play, and the match outcome at the beginning of additional time (e.g., big club winning, big club losing, small club winning, etc.). In all instances, the interaction variable is not statistically significant.

Table 4. The Determinants of Additional Time—Club Size 2009–2013

Regression	**(4)**	**(5)**	**(6)**	**(7)**
Constant	267.34***	152.51***	134.42***	160.48***
	(12.27)	(21.46)	(15.96)	(12.21)
Goals	2.50	8.35**	6.33**	8.29***
	(2.52)	(1.75)	(2.23)	(1.84)
Margin	-42.91*	-16.89**	-14.85***	-15.18***
	(14.43)	(3.40)	(3.98)	(3.73)
Close Matches	-14.60	20.19	30.11***	22.25***
	(18.56)	(11.07)	(6.89)	(5.60)

Table 4. (Cont.) The Determinants of Additional Time—Club Size 2009–2013

Regression	**(4)**	**(5)**	**(6)**	**(7)**
Substitutions	7.11	11.53*	12.18***	22.25***
	(7.50)	(4.05)	(2.80)	(5.60)
Yellow Cards	9.21**	6.79**	8.01***	7.28***
	(2.85)	(1.42)	(1.36)	(1.23)
Red Cards	17.5	25.35**	18.51	4.34
	(7.56)	(8.21)	(9.80)	(5.38)
Serious Injury	274.62***	315.00**	215.85**	260.24***
	(38.42)	(53.40)	(63.58)	(18.04)
Referee Experience	-6.86	2.35	-0.85	-1.14*
	(3.44)	(1.01)	(0.67)	(0.47)
Big vs. Big Win	53.93**			
	(13.04)			
Big vs. Big Draw	-			
Big vs. Big Loss	52.18*			
	(19.96)			
Big vs. Small Win		-10.50		
		(7.23)		
Big vs. Small Draw		-		
Big vs. Small Loss		17.49		
		(12.72)		
Small vs. Big Win			27.32**	
			(9.09)	
Small vs. Big Draw			-	
Small vs. Big Loss			18.52	
			(10.15)	
Small vs. Small Win				17.42***
				(6.54)
Small vs. Small Draw				-
Small vs. Small Loss				29.91***
				(6.88)

Table 4. (Cont.) The Determinants of Additional Time—Club Size 2009–2013

Regression	**(4)**	**(5)**	**(6)**	**(7)**
N	118	336	336	725
Prob > F	0.000	0.000	0.000	0.000
VIF, Uncentered	8.24	4.97	5.68	5.64
R^2	0.542	0.555	0.395	0.416

Statistically significant: ***at 0.1% level; **at 1% level; *at 5% level.

† Results include club-fixed effects and are presented with robust standard errors.
†† The log of the dependent variable produces results that do not differ statistically from those presented and demonstrate robustness in the dependent variable.

Additionally, the use of the multi-ball system at most EPL matches allows for the immediate resumption of play. This has dramatically limited opportunities for time-wasting and diminishes the likelihood that the differences in additional time can be explained by time-wasting tactics.

A second interaction variable between a referee's years of experience officiating in the EPL, for all 20 referees in the sample, and the match outcome entering additional time is also created. In all instances no statistically significant results are found. This shows that more (or less) experience in the EPL does not alter a referee's decision when deciding how much additional time to allocate. While the regressions presented in Tables 3 and 4 indicate the existence of *Fergie Time* in limited circumstance for the games examined, an important question remains: does it actually matter? Additional time at the end of a match is important only insofar as it can help alter the outcome. While there are instances of teams scoring two or more goals in additional time—the 1999 Champions League Final between Manchester United and Bayern Munich being one of the most high profile examples—this scenario is very much an exception. Further regression analysis is conducted on the EPL between August 2009 and May 2013 in matches that were tied or those in which just one goal separated the teams entering second-half additional time (close matches). This analysis establishes if home advantage or *Fergie Time* exists in close games, and provides a method to analyze the sensitivity for the results presented in Tables 3 and 4. The results of these regressions are presented in Tables 5 and 6.

Regression (8) considers home advantage for games with one goal or less between teams. Regressions (9) and (10) examine home advantage for big clubs and small clubs, respectively. Table 5 finds no evidence of home advantage for the 985 games examined from 2009 to 2013, confirming the results presented in Table 3. The number of goals, substitutions, yellow and red cards, and serious injuries all remain statistically significant across the three regressions. Furthermore, non-neutral matches entering additional time are not subject to significantly more additional time. An analysis of both big clubs (9) and small clubs (10) reports no significant effects, indicating that no referee bias is present. In order to investigate this further, Table 6 provides a breakdown of close matches into the same four scenarios presented in Table 4 and explores the possibility of *Fergie Time* in the various match scenarios. Similar to Regressions (4)

and (5), Regressions (11) and (12) consider the close matches in the sample. Again no evidence of *Fergie Time* is found in close games when a big club is winning or losing at home to either another big club or a small club. This is consistent with earlier findings.

Table 5. Determinants of Additional Time—Close Matches 2009–2013

Regression	**(8)**	**(9)**	**(10)**
Constant	173.67***	172.32***	173.57***
	(9.32)	(9.38)	(9.36)
Goals	6.99	7.00***	7.03***
	(1.26)	(1.23)	(1.22)
Margin	13.78	9.89	1.41
	(13.23)	(5.30)	(6.52)
Substitutions	10.31***	10.55***	10.23***
	(1.95)	(1.91)	(1.94)
Yellow Cards	8.17***	8.14***	8.18***
	(1.14)	(1.13)	(1.14)
Red Cards	17.24**	17.62**	16.95**
	(5.17)	(5.13)	(5.03)
Serious Injury	247.63***	247.71***	247.32***
	(21.72)	(21.51)	(21.54)
Referee Experience	-0.33	-0.24	-0.31
	(0.52)	(0.53)	(0.53)
Home Winning	-11.50		
	(12.12)		
Home Draw	–		
Home Losing	-2.45		
	(13.70)		
Big Club Winning		-17.03	
		(8.39)	
Big Club Drawing		–	
Big Club Losing		-11.16	
		(13.95)	
Small Club Winning			3.61
			(7.16)
Small Club Drawing			–

Table 5. (Cont.) Determinants of Additional Time—Close Matches 2009–2013

Regression	**(8)**	**(9)**	**(10)**
Small Club Losing			11.61
			(7.71)
N	985	985	985
Prob > F	0.000	0.000	0.000
VIF, Uncentered	5.99	3.06	4.75
R^2	0.370	0.363	0.352

Statistically significant: ***at 0.1% level; **at 1% level; *at 5% level.

† Results include club-fixed effects and are presented with robust standard errors.
†† The log of the dependent variable produces results that do not differ statistically from those presented and demonstrate robustness in the dependent variable.

Table 6. Determinants of Additional Time—Close Matches and Club Size

Regression	**(11)**	**(12)**	**(13)**	**(14)**
Constant	252.26***	149.22***	156.60***	168.49***
	(39.07)	(20.62)	(23.95)	(13.22)
Goals	6.17	8.47*	4.96	8.57***
	(2.74)	(3.04)	(2.42)	(2.32)
Margin	-14.00	5.76	-14.70	22.39
	(73.13)	(36.90)	(25.96)	(16.12)
Substitutions	4.49	16.54*	14.57**	10.65***
	(7.95)	(5.98)	(4.10)	(2.37)
Yellow Cards	11.12	5.84*	9.07***	7.58***
	(4.64)	(1.92)	(1.75)	(1.62)
Red Cards	27.39	32.86**	21.72	9.46
	(14.35)	(8.09)	(13.30)	(6.52)
Serious Injury	265.13**	272.32**	179.74**	249.77***
	(59.58)	(60.31)	(70.13)	(17.45)
Referee Experience	-7.59*	2.51	-1.46	-0.58
	(2.58)	(1.34)	(1.02)	(0.64)
Big vs. Big Win	28.02			
	(64.41)			
Big vs. Big Draw	–			

Table 6. (Cont.) Determinants of Additional Time—Close Matches and Club Size

Regression	**(11)**	**(12)**	**(13)**	**(14)**
Big vs. Big Loss	21.12			
	(71.29)			
Big vs. Small Win		-30.45		
		(32.52)		
Big vs. Small Draw		-		
Big vs. Small Loss		-11.93		
		(41.92)		
Small vs. Big Win			24.02	
			(20.25)	
Small vs. Big Draw			–	
Small vs. Big Loss			20.5	
			(26.37)	
Small vs. Small Win				-19.7
				(14.12)
Small vs. Small Draw				–
Small vs. Small Loss				-4.63
				(6.16)
N	78	171	224	512
Prob > F	0.000	0.000	0.000	0.000
VIF, Uncentered	11.02	5.72	6.94	
R^2	0.514	0.417	0.285	0.523

Statistically significant: ***at 0.1% level; **at 1% level; *at 5% level.

† Results include club-fixed effects and are presented with robust standard errors.
†† The log of the dependent variable produces results that do not differ statistically from those presented and demonstrate robustness in the dependent variable.

Regression (13) considers close games in the sub-sample where evidence of *Fergie Time* is found (Regression [6]). Considering only close games, we find no evidence of *Fergie Time* present when small clubs are winning at home to big clubs. Regression (14) indicates small clubs receive significantly more additional time when losing at home to other small clubs. While not evidence of *Fergie Time*, Regression (14) does suggest

some level of questionable decision making when allocating additional time at the end of close games.

Discussion and Conclusion

This analysis considers the determinants of additional time in the EPL from August 2009 to May 2013 and questions whether home club and big club favoritism exist when referees allocate additional time at the end of each match. The number of goals scored, close matches, the number of yellow and red cards, the number of substitutes all in the second half, the number of goals between the teams at the end of 90 minutes, and second half serious injuries are all significant factors when explaining the amount of additional time referees allocate. We find no evidence of a bias favoring home teams when winning or losing, compared to drawn matches. Significantly more additional time is played when either team is winning. This result supports the recent findings of Riedl et al. (2015).

This investigation does confirm limited evidence of a bias towards big clubs over small clubs when additional time is allocated at the end of 90 minutes, a concept more commonly referred to as *Fergie Time*. Small clubs play significantly more time when winning at home against big clubs. No favoritism is found when considering matches between big clubs only and small clubs only. Referees officiating games involving big clubs only and small clubs only play significantly more additional time when one team leads at the end of 90 minutes of play. These findings again support by the work of Riedl et al. (2015). An examination of close matches confirms that neither home advantage nor *Fergie Time* are significant factors prevailing in these EPL matches.

In line with Riedl et al. (2015), we report the presence of a bias, in some instances, towards the visiting team as reported in Regression (6). Both the *Bundesliga*, in the case of Riedl et al. (2015), and the EPL in this study do not report findings consistent with widespread home favoritism in the allocation of additional time. The results presented here are also consistent with the work of Rickman and Witt (2008), whose study addresses referee decision making during a timeframe of professional officiating in the EPL. The lack of evidence supporting home bias when allocating additional time supports the view that referee professionalism decreases the likelihood of home favoritism occurring. Further inspection of the data, differentiating between games in which margins are close (Reidl et al., 2015), or in which clubs of differential sizes compete (this study), can unearth alternative biases that are not visible from solely looking at home advantage. Thus, having professional officials may not absolve decision makers completely from what are arguably unconscious biases.

We are cognizant of the limitations of this study. We collect data for only one European competition. This limits the inferences that can be made from the results to football in general.[9] Second, we realize that our instrument that establishes a taxonomy for club size is limited in its descriptive power as it establishes a strict dichotomy. We do not doubt that football club dominance occurs on a spectrum but believe the classification system adopted provides researchers a degree of empirical practicality and an efficient means to distinguish football club size.

Despite these limitations, the findings imply that further efforts could be made to eliminate any bias in the allocation of additional time. Several solutions could be considered to protect referee impartiality, ranging from greater information disclosure from FIFA to operational adjustments and rule changes. First, to ensure greater transparency regarding exactly how additional time is allocated, FIFA could clarify Law 7.

This law currently states that "an allowance [for additional time] is to be made only when these [stoppages] delays are excessive" (FIFA, 2014, p. 104).

This explanation is vague. All stakeholders could be provided with specific guidelines for the additional time allocated for yellow cards, red cards, goals, and other excessive stoppages. While we do not doubt that all of the instances warranting the inclusion of additional time will last for different time periods, disclosing more information of how officials are instructed to calculate additional time or the explicit statement of rules of thumb relating to the allocation of time could increase transparency.

While the empirical evidence presented here confirms only a limited problem, the issue of any bias related to additional time could be reduced further by more fundamental operational changes. Stopping the match clock for events such as serious injuries (as is the case in other sports such as rugby union) or other lengthy stoppages (e.g., substitutions) would eliminate the need for additional time. Upon reaching 90 minutes, the match would end once the final phase of play concluded. A more fundamental change could involve taking the task of timekeeping away from the referee. As an officiating task timekeeping is an accident of history. Allowing referees to officiate without the pressure of timekeeping or allocating additional time could reduce the pressure they are under from players, managers, and spectators. If an anonymous timekeeper were appointed, the potential influence that would be exerted by external parties such as players and managers on timekeeping decisions could be reduced. Given the limited evidence of referee bias such operational changes may not be required unless authorities wished to reduce the existence of any favoritism, however limited.

The introduction of additional time in 1891 and the 1998 innovation of the fourth official displaying the allocation have contributed greatly to a sense of fairness and transparency within football. Both were grounded-breaking decisions when first introduced. We suggest that future research should focus on acquiring subsamples from competitions throughout Europe to test the hypotheses here.10 We purposefully apply a flexible criterion to allow future research to address the hypotheses under investigation here in alternative European competitions.

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Endnotes

[1] In particular, writers for *The Guardian* newspaper in the United Kingdom have featured the issue (Taylor, 2009; Campbell, 2013).

[2] A review of the central findings from studies considering a range of sports is provided by Carron, Loughhead, and Bray (2005) and Pollard and Pollard (2005). For a review of the variations in home advantage for football see Pollard (2006).

[3] See Rickman and Witt (2008) for an outline of the reforms in the EPL for referee training ahead of the 2001–2002 season.

[4] This is an annual report produced by financial services firm Deloitte that profiles the highest earning clubs in world football.

[5] Three competitions are considered "major"; the Premier League, FA Cup, and League Cup.

[6] The 22 small clubs are Aston Villa, Birmingham City, Blackburn Rovers, Blackpool, Bolton Wanderers, Burnley, Everton, Fulham, Hull City, Newcastle United, Norwich City, Portsmouth, Queens Park Rangers, Reading, Southampton, Stoke City, Sunderland, Swansea, West Bromwich Albion, West Ham United, Wigan Athletic, and Wolverhampton Wanderers.

[7] Some may argue Everton, Aston Villa, and Newcastle United should be classified as "big" clubs. A cumulative league table of the Premier League from 1992 to 2013 could support this view with Everton (6th), Aston Villa (7th), and Newcastle United (8th). However, this is deemed inappropriate as Manchester City, champions twice since 2012, is only 10th in the cumulative table, behind Championship club Blackburn Rovers. Alternatively, it could be argued that success at the European level could have been used to determine club size. Aston Villa (1982 European Cup) and Everton (1985 European Cup Winners Cup) both enjoyed this success. Again, however, this approach is not used as success 30 or more years prior is not a relevant indictor of club performance today, and due to the fact that Nottingham Forest, Ipswich Town, and West Ham United have all won European competitions, and suffered repeated relegations from the top division since. Furthermore, it has been more than 20 years since Everton or Aston Villa won a domestic trophy, and 60 years since Newcastle won a major honor.

[8] A serious injury is deemed to have occurred if the BBC match report cites a player sustaining a broken limb, receiving oxygen on the pitch from the medical staff, or a player unable to leave the field of play without assistance (e.g., stretcher required) following a period of medical attention.

[9] Our results are in contrast to Scoppa (2008), who does provide evidence of home team favoritism in the allocation of additional time for *Serie A*. Therefore, findings may differ across leagues and individual referees.

[10] Replications of studies that address favoritism in football have produced results that do not corroborate original findings (Johnston, 2008).

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