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**WHAT DRIVES PERFORMANCE –  
DIVERSITY, SELECTIVITY,  
EXPERIENCE OR METHODOLOGY?**

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## **WHAT DRIVES PERFORMANCE – DIVERSITY, SELECTIVITY, EXPERIENCE OR METHODOLOGY?**

*Relegation is a serious concern for soccer clubs in the bottom echelons of a lucrative league such as the EPL. The key performance criterion for newly promoted clubs is to avoid relegation, and it is important for these clubs to invest in their squads and build up their resources. Previous International Business studies have studied the link between resource positions and firm performance in cross sectional data settings. However, a specific performance outcome such as relegation may not occur in one cross sectional snapshot, only to occur subsequently. This article explores the resource drivers of club performance in a time-to-event Cox regression framework, where the event is relegation; and compares the hypotheses testing results with results obtained from Logistic regression analysis. We find resources diversity is important in the Cox regressions whereas it is significant in only one particular definition of the observation time window in Logistic regressions, which is difficult to establish a priori. We call for a triangulation of cross sectional studies of performance events with an analysis in the time-to-event setting.*

Key Words: Soccer, Relegation, Resources diversity and performance, Cox proportional hazards regression, Logistic regression

### **INTRODUCTION**

The English Premier League (EPL) is perhaps the most popular soccer league in the world with players, managers and fans (viewed by 600 million people in 200 countries) from all over the world. It is an open league (Jasina and Rotthoff, 2012) where the bottom three teams in the league table are relegated (Koenigstorfer et al., 2010) to the English League 1 each season. Their place is taken by the top three finishers of League 1 in the previous season. Teams which finish at the top of EPL are rewarded with entry into the lucrative European continental tournaments, the Champions League and Europa. Promotion into the EPL and subsequently avoiding relegation has significant commercial ramifications for the soccer clubs, whose revenue streams of gate receipts, share of television contract revenue, endorsement deals and prize money are all much better in the EPL compared to the lower leagues in England.

The EPL provides an ideal setting to study the internationalization and diversity of resources and its impact on performance at the bottom echelons of a league competition. Richer player resources diversity can be acquired by newly promoted clubs by transferring-in players from a larger number of clubs, each with its own distinctive styles, structures and program strengths. The first success stage at the bottom echelons of the EPL is avoidance of relegation. The number of unique clubs from where the players are sourced by promoted clubs is a good indicator of the resource diversity of their acquisitions. Our research question is whether diversity of the resource acquired post promotion drives the club's soccer performance, that is, it reduces the hazard of relegation. This article is equally concerned about the impact of the methodology chosen to ascertain this linkage, and the choice's impact on our results and subsequent understanding of the resources diversity – performance linkage.

Our study uses historical information of EPL results ([www.statbunker.com](http://www.statbunker.com), [www.myfootballfacts.com](http://www.myfootballfacts.com)) and EPL player transfers ([www.transfermarkt.co.uk](http://www.transfermarkt.co.uk)). The historical data is available for the entire timeframe of the EPL, from the 1993-94 till date. The current season, 2012-13, is still in progress and is hence not included in our analysis. In the first two seasons, there were 22 teams in the EPL of which 3 were relegated each year. In the 1995-96 season, there were 20 teams and only 2 were relegated. In all subsequent seasons the EPL has had 20 teams which 3 teams facing relegation each year (reference). Our data source for player transfers includes information of the amount spent by a club on transfers in a particular season (summer signings together with the mid-season winter signings).

We find support for the resources diversity view (Barney, 1991; Richard and Johnson, 2001; Richard et al; 2007 Jiang et al, 2010). Promoted soccer clubs which source players from fewer clubs (lesser diversity) have a higher hazard of relegation. Our statistical analysis of the time-to-relegation in a Cox proportional hazards framework find statistical support for relegation hazard increasing with lesser number of unique clubs the promoted reference club sources its players from. This is in line with extant IB literature on the resources diversity – performance

linkage. We demonstrate how the choice of the statistical testing methodology, Cox proportional hazards (see Klein and Moeschberger, 1997) model versus a logistic regression approach, itself has a significant impact on the hypothesis testing results. We humbly submit that a time-to-event approach would give us useful insights into the causal effects of the explanatory variables, by see if they move the baseline hazard curve up or down.

In the following sections, we review the relevant literature, develop the hypothesis, describe the data and alternative hypothesis testing strategies, discuss the results and compare the results of the Cox proportional hazards tests with the Logistic regression results. We compare the hypotheses testing results using the two alternative testing strategies – Cox proportional hazards model and Logistic regression. We conclude by highlighting the problem with apriori specification of the time-window to carry out the event study in a logistic regression framework.

## **THEORY AND HYPOTHESES**

Jasina and Rotthoff (2012) and Koenigstorfer et al. (2010) bring out two fundamental and seemingly non-reconcilable aspects of open league sports competition such as the English Premier League (soccer). Let us note at the outset that open league sports competitions have many similarities to other businesses and markets – for example, firms' credit ratings. Jasina and Rotthoff (2012) develop a model that shows how player cost escalations in the open league make clubs less profitable (compared to closed leagues like the NBA), and transfer some of that welfare to the fans. Koenigstorfer et al. (2010) discusses how fans of soccer clubs relate strongly to their favorite clubs even during the bad days, that is, when they are relegated or are battling relegation.

The relegation – promotion dynamic of the EPL (just as in other open leagues across the world), provides a great opportunity to study the resources drivers (diversity, VRIN) of club performance most relevant in the lower echelons of the league. Lee et al. (2012) examines the survival of Korean SMEs and the positive impact of their internationalization has on the same, arguing how survival is the

most relevant metric for this group of firms. Lee et al. (2012) choose a time window and survival of firms in this time window as a binary outcome variable modeled as a function of various internationalization features of the firms. But survival, be it as an SME, in a particular credit rating level, or through a surgery, has an important feature in that it lends itself to study in a time-to-event framework (see Klein and Moeschberger, 1997).

International business, strategic management and organizational development literature has studied extensively the impact of diversity on performance. The focus on resources diversity in strategic management literature is rooted in the view that difficult to imitate resources and know-how of firms helps them build competitive advantage (Barney, 1991). Richard and Johnson (2001) discusses how diversity orientation helps configure diversity practices and has key role to play in firm performance. Richard et al. (2007) discusses the strong, linear and positive relationship between racial diversity and firm performance in munificent environments. It is a 6-year panel study whose intermediate term dependent variable for productivity is the per-employee revenue and that for the longer term is Tobin's Q.

Jiang et al. (2010) use 3-year time windows, first 2000 to 2002 and then 2005 to 2007, to show how portfolio diversity has a strong and positive effect on firm performance. Jiang et al. (2010) describes alliance portfolio diversity in terms of partner, industry, national and organizational diversities; and find a complex and strong link between portfolio diversity and firm performance in the cross sectional setting. The VRIN criteria used to determine which resources deliver sustainable competitive advantage, the selectivity of resources as well as experience are important (Barney, 1991). Anand et al. (2005) use a cross sectional survey of 248 multinational enterprises and show that acquisitions of firms with an access to heterogeneous resource footprint is valued better by the financial markets. The markets anticipate great value addition to occur when the target firm contributes a valuable and diverse resource footprint. Howard and Brakefield (2001) and Jehn

and Bezrukova (2004) are a couple of examples of a growing body of work dealing with the diversity – performance linkage in various HR settings.

Three significant threads emerge from this literature, namely the richness of resource diversity, the selectivity employed by the firm in investing and developing particular resource, and the current operational context and absorptive capacity position of the firm. The hypotheses tested in this article derive from these threads and are:

H1: Firms that are able to acquire key resources from a richer diversity are more likely to succeed

H2: Firms that are able to display greater selectivity in resources selection are more likely to succeed

H3: Firms that have a greater experience in the specified operational environment are more likely to succeed

## **METHOD**

### **Research Setting**

This article's setting is the Barclay's English Premier League (EPL) which is one of the most popular soccer leagues in the world. It attracts worldwide television and internet viewership, packed stadia as well as talented and marketable professional soccer players and managers from across the world. Except for small changes in the number of club teams (firm) in the early years of the EPL (pre 1993-94 season), the league structure remains intact for the past 20 years, particularly with respect to relegation rules. In the 1995-96 season, there were 20 teams and only 2 were relegated. In all subsequent seasons the EPL has had 20 teams which 3 teams facing relegation each year (reference). Our data source for player transfers includes information of the amount spent by a club on transfers in a particular season (summer signings together with the mid-season winter signings). The most important performance measure for the bottom echelon clubs, including those that were newly promoted, is the avoidance of relegation. Only five of the forty odd

soccer clubs that have played in the EPL over the past 20 years have never been relegated.

### **Data Source**

Our study uses websites which provide free online historical information of EPL results ([www.statbunker.com](http://www.statbunker.com), [www.myfootballfacts.com](http://www.myfootballfacts.com)) and EPL player transfers ([www.transfermarkt.co.uk](http://www.transfermarkt.co.uk)). The historical data is available for the entire timeframe of the EPL, from the 1993-94 till date. The current season, 2012-13, is still in progress and is hence not included in our analysis. In the first two seasons, there were 22 teams in the EPL of which 3 were relegated each year.

### **Sample Selection**

Our study is set in January 2013 when the 2012-13 season of the EPL is at the half way mark. We use data of seasons-to-relegation of newly promoted clubs from the 1993-94 to the 2011-12 seasons of the EPL (19 seasons). In each season, we have 3 promoted clubs and our dataset has 56 observations (Only 2 clubs were relegated/promoted in the 1994-95 season). Our dataset consists of 32 different clubs, and on average they have been promoted 1.75 times in the 19 seasons which constitute the study. Over the 19 years of this analysis, 46 of the 56 promoted clubs have been relegated – either in their very first season post promotion, or in subsequent seasons. Clubs not relegated since their promotion to the EPL include those that have reached the top echelons of the league and hence out of relegation risk (like Manchester City), as well as those clubs whose observations are censored. For instance, QPR was promoted in the 2011-12 season and have survived one full season, they may or may not be relegated in the 2012-13 season, their 2<sup>nd</sup> in the top-flight post their most recent, 2011-12, ascent to the EPL.

### **Objective**

The objective of this article is to

(1) Test hypotheses 1, 2, 3 dealing with the link between player resource diversity, selectivity and firm (club) context specific experience on one hand, and firm (club) performance, as measured by its propensity to be relegated on the other

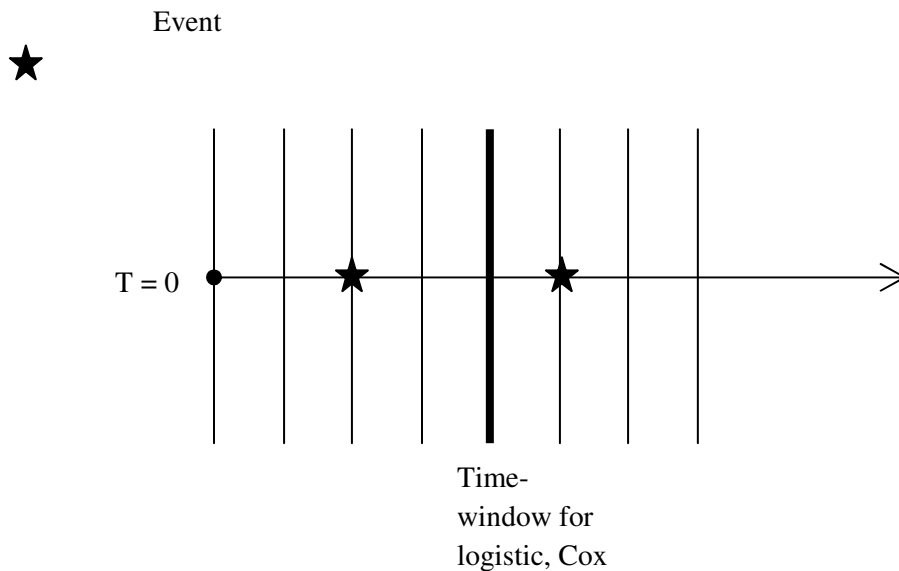
(2) To demonstrate how a change in the methodology can bring about significant change to the above hypotheses testing results.

### Methodologies

We examine the same research question, that is, do diversity and selectivity of resources, and context specific club experience significantly impact the hazard of a promoted club getting relegated. We discuss and compare the results of logistic regression and Cox proportional hazards regression approaches. Accordingly, the definition of the dependent variable will change in the following section (figure 1) but independent variables remain unchanged.

**Figure 1:** Time-to-event and Logistic regression

Cox Regression – 1<sup>st</sup> observation, time to event is 2, 2<sup>nd</sup> observation, time to event is censored at 4  
Logistic Regression – 1 event, 1 non-event





## Variables

### Dependent Variable

*Logistic Regression:* If a promoted club has been relegated a certain number of seasons within the observation time window, post promotion, the dependent variable takes the value ‘1’ and it takes the value ‘0’ otherwise. Table 4 shows the various time windows used to make alternative definitions of this event, which are 1, 2, 3, 5, 7, 9 and 11 years. Logistic regression results are shown in Table 4 under each of these definitions.

*Cox Proportional Hazards:* Here, the dependent variable is the time to relegation of a promoted club. The censoring variable takes the value ‘1’ when at the end of the observation window, the club remains un-relegated (that is, continues in the EPL), and it takes the value ‘0’ when the club is relegated within the observation time window (refer Table 1).

**Table 1:** Summary of clubs promoted to EPL – 1993-94 to 2011-12

# SEASONS SINCE PROMOTION	RELEGATED	NOT RELEGATED	TOTAL	% RELEG
1	24	3	27	89%
2 - 3	9	2	11	82%
4 - 7	8	3	11	73%
10 +	5	2	7	71%
<b>Grand Total</b>	<b>46</b>	<b>10</b>	<b>56</b>	<b>82%</b>

### Explanatory Variables

The explanatory variables in the model are player diversity of transfers-in, club selectivity of players and club level context-specific experience. Player diversity is measured in terms of the number of different clubs that the reference club is buying players from. Post the Bosman ruling (Simmons, 1997), the movement of professional soccer players within Europe is unhindered. Professional soccer players imbibe the culture, style and tactics of the clubs they play in. The club making the player acquisition (transferring-in of players) is cognizant of the strong

role played by the previous club in the player’s development. A club buying players from 10 different clubs would bring in more player diversity than a club transferring-in players from fewer club sources. We measure player diversity of a season’s acquisitions by the reference club using the number of clubs it transferred-in players from, in that particular season. We expect player diversity of a season’s acquisition to have an inverted ‘U’ relationship with performance. More than a threshold level of player diversity, squad management would be getting stretched and performance would actually suffer (H1).

Club selectivity of players is the number of players per source club that the reference club has acquired players from. If the reference club has transferred-in many players from the same source club, it could be filling out multiple playing positions. Sourcing multiple players from the same club means that for the same level of diversity of player resources, our reference club may be sacrificing on player quality. We expect sourcing multiple players from the same club to actually increase the hazard of relegation for the promoted club (H2).

In this study, the context is promotion into the EPL. Context specific experience refers to the number of times the reference club has been promoted into the EPL in the 19-year time window of the study. Clubs that have gathered more experience in navigating the ‘drop zone’ or the lower echelons of the league are likely to experience a lowered hazard of relegation (H3).

**Table 2:** Summary of Explanatory variables

	<b># CLUBS SOURCES</b>	<b>PLAYER TRANSFERRED IN PER CLUB SOURCE</b>	<b># PROMOTIONS</b>	<b>TRANSFER \$/ LEAGUE AVG</b>
Min	6	1.00	1.00	0.05
Q1	12	1.08	1.00	0.38
Median	17	1.17	1.00	0.58
Q3	23	1.29	2.00	0.90
Max	38	1.50	4.00	2.86

### **Control Variable**

The ratio of club spending on transferring-in players as a proportion of the league average is the key control variable. It controls for the relative financial strengths of the clubs in their journey from promotion to a secure spot in the league (like Manchester City), or to getting relegated. This measure reflects the relative financial clout of the club in the league. We expect those with higher clout to do relatively better, which translates into lower hazard of relegation (in Cox proportional hazards model) or a lowered log odds of relegation (in the logistic regression model).

## **RESULTS**

In this section, we discuss the results of the logistic regression and Cox proportional hazards models individually first. We compare the results from the two modeling approaches in the subsequent discussion section of the article.

### **Cox Proportional Hazards model**

The Cox Proportional Hazards model estimates a baseline non-parametric hazard curve (Table 3-b) along with the covariate betas (Table 3-a), whereby under the proportional hazards assumption, the ratio of the sum product of the covariate betas and covariate values to sum product of covariate betas and mean of covariates (Table 3-c) effects a parallel shift down or up of the hazard curve. If the covariate beta is positive, then it increases the hazard of relegation (see Klein and Moeschberger, 1997).

Player selectivity (H2) and context specific club experience (H3) have positive and negative betas respectively, but both are statistically not significant. Whereas an increase in the resource diversity (H1) does not have a significant impact on the hazard of relegation from the EPL, a decrease in diversity does increase the hazard of relegation from the league ( $p=0.09$ , Table 3-a). The control variable, the ratio of spend on transferring-in players to the league average, expectedly, decreases the hazard of relegation from EPL (refer Table 3).

**Table 3-a: Cox Proportional Hazards model of time to relegation**

<b>Cox Proportional Hazards model</b>						
	<b>B</b>	<b>SE</b>	<b>Wald</b>	<b>df</b>	<b>Sig.</b>	<b>Exp(B)</b>
CLUBS SOURCES < 10 (H1)	0.70	0.42	2.84	1.00	0.09	2.02
CLUBS SOURCES >= 21 (H1)	0.05	0.38	0.02	1.00	0.89	1.05
PLAYERS PER CLUB SOURCE (H2)	1.18	1.22	0.94	1.00	0.33	3.25
FIRST TIME PROMOTION (H3)	(0.22)	0.34	0.42	1.00	0.52	0.80
RATIO PURCHASE \$ TO LEAGUE AVG (Control)	(1.00)	0.41	6.13	1.00	0.01	0.37

**Table 3-b: Baseline Survival Tables**

<b>Time (seasons)</b>	<b>Survival Table</b>			
	<b>Baseline Cum Hazard</b>	<b>At mean of covariates</b>		
		<b>Survival</b>	<b>SE</b>	<b>Hazard</b>
1	0.249	0.597	0.049	0.516
2	0.383	0.452	0.056	0.795
3	0.441	0.400	0.059	0.915
4	0.548	0.321	0.060	1.136
6	0.723	0.223	0.056	1.500
7	0.897	0.156	0.051	1.860
10	1.032	0.117	0.049	2.142
11	2.028	0.015	0.011	4.207
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**Table 3-c: Covariate means**

<b>Covariate Means</b>	
CLUBS SOURCES < 10	0.196
CLUBS SOURCES >= 21	0.339
PLAYERS PER CLUB SOURCE	1.184
FIRST TIME PROMOTION	0.661
RATIO PURCHASE \$ TO LEAGUE AVG	0.674

### **Logistic Regression model**

Mimicking prior fixing of the time horizon to define the event of interest, we carry out the logistic regression exercises at different time-window definitions – 1, 2, 3, 5, 7, 9 and 11 years (Table 4). We find that only for an even time window of 3 years, the diversity hypothesis is supported (H1,  $p = 0.06$ , 36 events out of 56 observations). Similar to the Cox proportional hazards regression model, the control variable, ratio of spend on transferring-in players to the league average, expectedly, decreases the hazard of relegation from EPL. H2 and H3, player selectivity and club's context specific experience, are both not supported using the logistic regression model just as in the Cox model.



## DISCUSSION AND CONCLUSION

This article has important implications for practitioners and International Business researchers alike. Over the past decade there has been an increasingly international ownership of EPL clubs. Very recently the takeover of Blackburn Rovers by the Venky's group (from India) in 2011-12 was followed immediately by Blackburn Rovers' relegation. In their and other EPL hopefuls' journey it is very important for them to configure their playing resources (their squad) in order to maximize their chances of staying up. Our research, using the past 19 years data from the EPL, shows that Blackburn and others would do well by ensuring that they construct their EPL squads from a wider rather than narrower group of source clubs. This is in line with recent experience of EPL clubs such as Arsenal use smaller clubs in Belgium and elsewhere as a staging ground before player resources are brought into the media glare of the EPL.

There were 46 relegation events in the 19 year time window we study (Table 1). The time-window definition in the logistic regression model which yields a significant support for H1 is difficult to arrive at apriori because the event rate less than or equal to 3 years from promotion is only 36 out of 56 observations (Table 4). The prior fixing of the time-window in which we look for the event could be an important driver of the hypotheses testing results. Lee et al. (2012) and other studies which use a cross sectional event study are faced with this issue as well. IB researchers could use the Cox proportional hazards regression model to triangulate their findings from cross sectional studies.

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