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Determinants of Professional Sports Firm Values in the United States and Europe: A Comparison Between Sports over the Period 2004-2011

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Abstract

Since the beginning of the nineties, professional sports firm values have been estimated by American newspapers. In 2004, *Forbes* proposed for the first time a list of the most valuable European soccer teams. In this article, we compare the determinants of firm values in MLB, the NBA, NFL, NHL, and European soccer over the period 2004-2011. The results show only one variable for which the sign and significance are the same for all the leagues: historical sports performance, with a significantly positive impact in each league. The comparison between the United States and Europe reveals that a majority of differences seem to indicate that the determinants of team values in the United States are not the same as those in Europe. Lastly, we proposed avenues for future research: integrating an international dimension that could be measured through the number of fans on social media and player values.

Keywords: professional sports firms, value, United States, Europe, *Forbes*

Introduction

The theme of firm value is a classical topic in economic and managerial sciences. Since the beginning of the nineties, it has been studied in professional sports. Indeed, American economic and financial newspapers, first *Financial World* and then *Forbes*, have published each year since 1990 a list of professional sports clubs according to their value for the four American major leagues (Major League Baseball, MLB; National Basketball Association, NBA; National Football League, NFL; National Hockey League, NHL). These data allow researchers in professional sports economics and finance to test explanatory factors of American club values (Alexander & Kern, 2004; Büschemann & Deutscher, 2011; Humphreys & Lee, 2010; Humphreys & Mondello, 2008; Miller, 2007, 2009). Such a possibility did not exist previously, American clubs being almost absent in the stock market, contrary to European soccer clubs, which are more numerous in this market, although this is still not the general case; neither, what is more, are the stock-exchange valuations representative of the clubs' fundamental value (Aglietta, Andreff, & Drut, 2008). In 2004, *Forbes* proposed for the first time a list of the 20 most valuable European soccer teams. The fact that the valuation of European teams is recent doubtless explains why there was no study of the determinants of European team values until 2011 (Helleu, Scelles, & Durand, 2011; Scelles, Helleu, & Durand, 2012). It also explains the lack of works concerning both American and European teams. In this article, we compare the determinants of professional sports firm values in MLB, NBA, NFL, NHL, and European soccer over the period 2004-2011. The principal objective is to observe common points and differences between American and major European soccer clubs. A central question is the following: does the comparison of the determinants of professional sports firm values in United States and Europe contribute to a better understanding of the differences between American and European models? The paper consists of five parts. First, we present its theoretical basis. Second, we specify our empirical model and describe our data. Third, we present our results. Fourth, we discuss them. Fifth, we conclude.

Theoretical Basis

To our knowledge, there are only seven articles that deal with the determinants of professional sports firm values. These can be separated into two groups: those concerning real transaction prices (Humphreys & Lee, 2010; Humphreys & Mondello, 2008), in which the oldest data dates back to the 1960s and leagues are not distinguished (except via dummies) and those concerning the values determined by *Financial World* and *Forbes* (Alexander & Kern, 2004; Büschemann & Deutscher, 2011; Miller, 2007, 2009; Scelles, Helleu, & Durand, 2012), for which data continue or begin in the 1990s or even the 2000s, and each league is analyzed separately.

The literature review highlights several determinants of professional sports firm values. In their seminal study, Alexander and Kern (2004) use real, per-capita income to control for differences in ticket demand that will affect a team's revenue and, hence, franchise profitability. The authors also use a city's population to control for market-size effects on franchise profitability. Large-market teams have a larger potential fan base to support their franchises and are in a better position to negotiate lucrative cable television contracts. Alexander and Kern use teams' final standings from the previous season. They expect a negative sign because as team performance worsens (e.g., first to

fourth), revenue will likely decrease (diminution of the team's reputation or of the renewal of season tickets by holders). They also use regional identity and expect a positive effect because of an appeal to a larger geographic fan base. They use an indicator variable called *new facility* that equals 1 if the team is playing in a new stadium or arena, and 0 otherwise. They anticipate a positive impact because it affords owners additional revenue-generating means such as luxury suites and enhanced concession revenues.

The variables used by Alexander and Kern are partially chosen by Miller (2007, 2009). He extends sports performance to the current year and replaces standings by winning percentages. He also replaces *new facility* with *facility age* as he considers it a more accurate measure of the "newness" of a facility. He includes *franchise age*, *years in city*, and an *ownership dummy* equal to 1 for teams playing in stadiums or arenas owned by the team and expects a positive effect on franchise profitability from private ownership instead of public ownership. Humphreys and Mondello (2008) incorporate competing teams in the market. Their idea is that professional teams in the same metropolitan area are competitors, and the presence of more competitors reduces the franchise sale price, holding other market characteristics like metropolitan population constant. They also include team winning percentage during the previous five years, whereas Humphreys and Lee (2010) integrate this percentage over the previous ten years.

Büschemann and Deutscher (2011) include attendees per game. They assume that since each attendee generates revenue for the franchise, the higher the number of attendees, the greater the team value. To measure this revenue stream, they use the team marketing annual reports from the fan cost index (FCI), which is constructed for each franchise and year. The FCI tracks the cost of attending a sporting event for a family of four. The more a franchise is able to charge for their tickets and other amenities, the more revenues they generate. Thus, the authors presume that the coefficient for the FCI would also be positively related to the team value. They incorporate the team payroll and assume that a team with high payroll expenses would offer superior team quality and, therefore, would provide a better utility to fans. Due to this assumption, they anticipate that higher team expenses would positively influence team value. Scelles, Helleu, and Durand (2012) use historical sports performance, measured by the percentage of champion titles since the beginning of the competition. They measure both national sport performances (in domestic championships) and continental sport performances (in the Champions League).

Table 1 sums up the previous results. We indicate the sign of the coefficient for the variables.

Empirical Model and Data Description

Empirical model

The empirical model that we examine takes this form:

$$F_{ti} = X_{ti}\beta + \varepsilon_{ti} \quad (1)$$

F_{ti} is the logarithm of the franchise value of team i in year t, X_{ti} is a matrix of independent variables that affect the team's value, β is a vector of parameters to be estimated, and ε_{ti} is a vector of random error terms. We chose the logarithm of the franchise values because these are not equally distributed (Büschemann & Deutscher, 2011).

Table 1: Literature Review About Determinants of Professional Sports Firm Values

Authors	Periods	Variables	MLB	NBA	NFL	NHL	American major leagues	European soccer
Alexander & Kern (2004)	1991-1997	Income	+	(-)	(+)	(-)		
		Population	+	+	(+)	+		
		SP[1] t-1	+	+	+	+		
		New facility	+	(+)	(+)	+		
		Identity	(+)	(-)	(-)	(-)		
Miller (2007)	1990-2002	Income	(+)					
		Population	+					
		SP t	+					
		SP t-1	+					
		Facility age	-					
		Franchise age	(-)					
		Years in city	(+)					
		Private ownership	(+)					
Humphreys & Mondello (2008)	1969-2006 (MLB is the reference)	NBA					(+)	
		NFL					+	
		NHL					-	
		Population					+	
		Private ownership					+	
		Franchise age					+	
		Competition					-	
		SP last 5 years					(-)	
		Facility age					(-)	
Miller (2009)	1991-2005 (1991-2004 for NHL because of lockout)	Income		+	+	(+)		
		Population		(+)	(-)	(+)		
		SP t		(+)	(-)	(+)		
		SP t-1		+	(+)	+		
		Facility age		(-)	-	(-)		
		Years in city		(-)	(-)	(-)		
		Private ownership		(-)	(-)	+		
Humphreys & Lee (2010)	1960-2009	Facility age					(+)	
		SP last 10 years					+	
		Historical SP					(-)	
		Population					+	
Büschemann & Deutscher (2011)	2000-2009 (except season 2004-2005)	Population			+			
		Payroll				+		
		Fan Cost Index				(+)		
		Years in the league				(-)		
		SP t-1				(+)		
		Facility age				-		
		Attendance				+		

table continued on page 285

The X_{ti} matrix includes variables already chosen by Alexander and Kern (2004), Miller (2007, 2009), Humphreys and Mondello (2008), Humphreys and Lee (2010), Büschemann and Deutscher (2011) and Scelles, Helleu, and Durand (2012):

- the logarithms of standard metropolitan statistical area (SMSA) annual real per capita income and population and the number of other clubs ranked in *Forbes* lists in the urban area (competition);

Table 1: Literature Review About Determinants of Professional Sports Firm Values, continued

Authors	Periods	Variables	MLB	NBA	NFL	NHL	American major leagues	European soccer
Scelles, Helleu & Durand (2012)	2004-2011 (England is the reference)	Income						+
		Population						(-)
		Competition						(+)
		National SP t						+
		National SP t-1						+
		Historical national SP						+
		Continental SP t						+
		Continental SP t-1						+
		Historical continental SP						+
		Facility age						-
		Private ownership						(+)
		France						-
		Germany						-
		Italy						-
		Netherlands						-
		Portugal						-
		Scotland						-
		Spain						-

[1] SP = Sports Performance.
The result is significant at the 5% level if the sign is not into brackets; the result is not significant at the 5% level if the sign is into brackets.

- facility age (difference between the season of the observation and the season in which it first opened), a dummy for private ownership (1 if private, 0 if public), and annual average attendance;
- sports performance in t, t-1 and historically (percentage of champion titles) in the league (for American teams) or in the Champions League (for European teams).

Sports performance in t and t-1 corresponds to a measure with a predetermined code:

- 6 for a champion title;
- 5 for final;
- 4 for semi-final;
- 3 for quarter-final;
- 2 for eighth-final or elimination in regular season with at least 50% in MLB;
- 1 for elimination in regular season with at least 40% in the NBA, 25% in NFL, 42.5% in NHL, and between 45 and 50% in MLB (we take into account competitive balance and the number of games to determine the percentages) or the first round in the Champions League;
- 0 for elimination in regular season without obtaining the previous percentages in American leagues or no participation in the Champions League.

Data description

The sample consists of a pooled, cross-sectional, time-series panel of team-specific data for each of the four American major leagues and European soccer. Each sample spans the period from 2004 to 2011 (except for the NHL because of the lockout in 2004-2005). This corresponds to 1130 observations (240 in MLB, 239 in the NBA, 256

Table 2: Summary Statistics

	MLB		NBA		NFL		NHL		European soccer	
Variable	**Mean**	**SD**[1]	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Value ($mil)	425.84	220.23	358.13	101.42	943.50	207.08	207.14	80.53	514.34	381.84
Income ($)	43,838	6,657	42,411	6,514	42,904	6,995	43,176	6,295	29,468	7,066
Population (mil)	7.30	5.51	6.50	5.83	5.53	4.96	6.97	6.52	5.76	3.88
Competition	3.27	1.80	2.68	2.12	2.74	1.92	2.89	2.30	0.96	1.07
Facility age	22.76	25.05	13.91	9.97	20.34	18.52	15.33	10.94	70.41	41.63
Private ownership	0.34	0.47	0.47	0.50	0.13	0.33	0.50	0.50	0.68	0.47
Attendance	30,945	8,674	17,340	2,139	67,478	8,036	17,052	2,220	50,872	14,417
SP[2] t	1.77	1.56	1.80	1.55	1.78	1.39	1.96	1.40	1.61	1.73
SP t-1	1.80	1.55	1.80	1.54	1.79	1.38	1.95	1.40	1.61	1.70
Historical SP	2.86%	4.78%	2.69%	5.66%	2.66%	3.33%	3.05%	5.50%	3.23%	4.53%
Number of observations	239		238		256		210		185	

[1] SD = Standard Deviation.
[2] SP = Sports Performance.

in NFL, 210 in the NHL, and 185 in European soccer). Franchise value and competition data were generated by *Forbes*. SMSA per capita income data were obtained from the Bureau of Economic Analysis for American teams, Statistics Canada for Canadian teams, and Eurostat for European teams. SMSA population data was available on Population Data. Facility age, ownership, and sports performance data were available on Wikipedia. Annual global attendance data were obtained from ESPN for American and Canadian teams and European Football Statistics for European teams. We integrate dummies for years with 2011 the reference. Table 2 shows summary statistics for the variables used in the regressions.

If we consider the means, NFL franchise values are the highest, ahead of European soccer values, whereas NHL franchise values are the weakest. European soccer team values have the highest standard deviation, ahead of MLB values, which are higher than NFL values in spite of average franchise values that are more than twice as weak. Income is comparable between American leagues, whereas European soccer income is 31.6% weaker, although with a higher standard deviation. Population is the weakest in NFL, which seems surprising in view of the fact that NFL optimizes economic markets, but it includes small areas with less than 2 million inhabitants (obviously Green Bay, but also Buffalo, Jacksonville, New Orleans, and Nashville). The number of other clubs in the SMSA (competition) is generally weaker in European soccer but this is because only teams that are ranked in *Forbes* lists are taken into account. By contrast, facility age is considerably higher in European soccer (at least more than three times higher than in the American leagues and more than five times higher than in the NBA).

Also surprising, given that NFL optimizes economic possibilities, is that it has the smallest number of teams in private ownership, whereas European soccer has the highest. On the other hand, the NFL has the greatest attendance, whereas the NBA and

Table 3: Correlation Between Attendance and Population

Sport	Correlation coefficient
MLB	0.474***
NBA	0.164**
NFL	0.165***
NHL	-0.211***
European Soccer	0.144*

Note: * significance at 10%, ** significance at 5%, *** significance at 1%.

NHL suffer from lower-capacity arenas compared with stadiums. We do not offer any particular comments about sports performance.

Results

Before presenting our results, two comments must be made. First, our dataset contains 33 European teams. Nevertheless, only 14 of them were evaluated by *Forbes* during the eight periods. Consequently, the number of observations is too weak to estimate a panel regression and measure a possible individual effect. As we wanted to compare European and US sports during the period 2004-2011, we decided to take into account panel regression with fixed and random time effects. The Haussman test concluded in favor of the fixed time effects. This model is identical with the standard regression model incorporating dummies associated to years.

Second, population and attendance could have a close relationship (see Table 3). Thus, attendance per game can be endogenously determined by population (or by other variables, like income, for example). Theoretically, we can take into account this potential endogeneity by finding an instrument variable that has a significant effect on the attendance (or its logarithm) and no significant effect on club value (or its logarithm). Unfortunately, our dataset does not contain this instrument. Consequently, we assume that attendance is exogenous. Significance and values for the estimated parameters are not sensitive to the presence of attendance.

Table 4 presents the results obtained by GLS regressions with time fixed effects. Income has a significantly positive impact only for European soccer (no significant impact in MLB, NFL, and NHL, and a significantly negative impact in the NBA). An interpretation is that for European clubs, it is better to be in a rich area because of limited revenue sharing between teams and countries in comparison with American leagues (Andreff, 2007; Hoehn & Szymanski, 1999; Szymanski, 2003). Indeed, there are large differences in national television rights between countries and, within a domestic league, there are large differences in the national television rights that are allocated to teams. Consequently, London offers better opportunities than Liverpool (in 2011, the annual real per capita income in London was more than $45,000 versus less than $25,000 in Liverpool). By contrast, American leagues share revenues more equally than European ones. This suggests that it is more important to be in a league that generates high revenues than in an area where population incomes are high. For example, in 2011, the Arizona Cardinals (NFL, income less than $35,000) is generally better esti-

Table 4 Estimates of the Log-Value Equation

Variable	MLB Coef.[1]	MLB se	NBA Coef.	NBA se	NFL Coef.	NFL se	NHL Coef.	NHL se	European soccer Coef.	European soccer se
Intercept	8.804***	(1.26)	13.968***	(1.28)	13.142***	(1.20)	6.349***	(1.63)	10.874***	(2.31)
Log-income	0.161	(0.11)	-0.413***	(0.10)	-0.001	(0.06)	-0.065	(0.11)	0.817***	(0.16)
Log-population	0.187***	(0.03)	0.112***	(0.04)	0.127***	(0.02)	0.115***	(0.04)	-0.127**	(0.05)
Competition	-0.015	(0.01)	0.009	(0.01)	-0.046***	(0.01)	0.007	(0.02)	0.129***	(0.04)
Facility age	0.001**	(0.000)	0.001	(0.001)	-0.003***	(0.000)	0.002*	(0.001)	-0.003***	(0.000)
Private ownership	0.056**	(0.02)	-0.034	(0.02)	0.103***	(0.02)	0.109***	(0.03)	0.160**	(0.06)
Log-attendance	0.635***	(0.05)	0.859***	(0.10)	0.520***	(0.08)	1.195***	(0.12)	0.186	(0.16)
SP[2] t	-0.018**	(0.008)	0.015**	(0.007)	0.001	(0.004)	0.013	(0.01)	0.100***	(0.02)
SP t-1	-0.012	(0.009)	0.007	(0.008)	0.004	(0.004)	0.001	(0.01)	0.108***	(0.002)
Historical SP	2.504***	(0.28)	1.199***	(0.20)	2.682***	(0.24)	1.575***	(0.40)	6.047***	(0.65)
2004	-0.522***	(0.05)	-0.291***	(0.04)	-0.347***	(0.03)	-0.374***	(0.056)	-0.018	(0.12)
2005	-0.437***	(0.05)	-0.220***	(0.04)	-0.227***	(0.03)	-	-	-0.081	(0.12)
2006	-0.318***	(0.04)	-0.122**	(0.04)	-0.152***	(0.03)	-0.261***	(0.05)	-0.262**	(0.12)
2007	-0.221***	(0.03)	-0.063	(0.04)	-0.081***	(0.03)	-0.157***	(0.05)	-0.315***	(0.11)
2008	-0.125***	(0.03)	-0.014	(0.04)	0.007	(0.03)	-0.095**	(0.05)	-0.126	(0.10)
2009	-0.065*	(0.03)	-0.065	(0.04)	0.016	(0.03)	-0.099**	(0.05)	0.022	(0.09)
2010	-0.046	(0.04)	-0.048	(0.04)	-0.009	(0.03)	-0.057	(0.05)	0.073	(0.10)
2011	ref.		ref.		ref.		ref.		ref.	
R^2	0.842		0.674		0.775		0.708		0.698	
Number of observations	240		239		256		210		185	

[1] Coefficient, the standard errors (se) are given in parenthesis.
[2] Sports Performance.

Note: * significance at 10%, ** significance at 5%, *** significance at 1%.

mated than Washington Capitals (NHL, income nearly $57,000) with a value of $901 million versus $225 million.

Population has the expected significantly positive impact for each league except for European soccer, for which the impact is significantly negative. Even if American leagues share equally national TV rights, it is preferable to be in a large area rather than a small one. The fact that population has a significant impact whereas income does not seems to indicate that American clubs must affect many people rather than rich ones. The impact of competition is significantly positive for European soccer, significantly negative in MLB and NFL, and not significant in the NBA and NHL. Scelles, Helleu, and Durand (2012) find an insignificant impact of population and competition over

the same period for European soccer when integrating dummies for countries. The authors explain this insignificant impact of population and competition by the fact that all the clubs classified by *Forbes* are located in markets with more than one million inhabitants, which could constitute a threshold beyond which the market allows enough fans to be attracted whenever the number of inhabitants or other clubs, so confirming Durand, Ravenel, and Helleu (2005). Scelles, Helleu, and Durand (2012) reveal that the country effect is the worst for the Netherlands and Ajax Amsterdam, whereas Randstad—where Amsterdam is located—is rather a large urban area (with a number of inhabitants above the average for European soccer clubs ranked by *Forbes*). A limit of their study—and of our present article in the specific case of European soccer clubs—is the inability to incorporate all local rival clubs, but only those ranked in *Forbes* lists. In England, there are many clubs in London, but only those that are classified by *Forbes* for a given season are taken into account to evaluate competition. In the same way, in Germany, numerous clubs are located in the Rhine-Ruhr urban area but only Borussia Dortmund, Schalke 04, and Bayer Leverkusen (only for one year – 2006—for this latter) are taken into account.

Facility age has the expected significantly negative impact in NFL and European soccer, no significant impact in the NBA, and a surprising significantly positive impact in MLB and NHL (only at the 10% level for NHL). In MLB, clubs with old facilities are historical ones (Boston Red Sox, Chicago Cubs, and New York Yankees, even if the Yankees have had a new stadium since 2009), what could explain the positive impact of facility age. If we put aside the situation of MLB, we notice that sports with stadiums present a significantly negative impact of facility age, whereas sports with arenas present an insignificant impact. Perhaps the difference in commercial opportunities that a new stadium offers in comparison with an old one is stronger than the difference in opportunities that a new arena offers in comparison with an old one. This could explain the difference in significance of impact between sports with stadiums and sports with arenas.

Private ownership has the expected significantly positive impact in MLB, NFL, NHL, and European soccer (no significant impact in the NBA). This is consistent with the interpretation of Miller (2007, p. 449) for whom a "team playing in a stadium that it owns will be able to capitalize the value of the stadium in the team's franchise value and will thus have a higher franchise value."

Attendance has the expected significantly positive impact for all the American leagues, but it has no significant impact in European soccer. This result in NHL is consistent with Büschemann and Deutscher (2011). For European soccer, it can be put in perspective with the significantly positive impact of income: for generating revenue and thus optimizing value, a club needs to be in a rich area within which people are able to expense a lot of money rather than having a stadium full of people but eventually without maximizing gate receipts.

Sports performance in t has the expected significantly positive impact in the NBA and European soccer, no significant impact in NFL and NHL, and a surprising, significantly negative impact in MLB. It is important to note that team values in MLB for a year are given the day before the beginning of the regular season. In other words, sports performances in t are not known when the values in t are published. A potential explanation for the negative impact of sports performances in t in MLB could be that sports perform-

Table 5: Sign and Significance of the Determinants of Team Values in the United States and Europe over the Period 2004-2011

Variable	United States	Europe
Income	No significant (- in NBA)	+
Population	+	-
Competition	No significant (- in NFL)	+
Facility age	No significant (+ in MLB and - in NFL)	-
Private ownership	+ (no significant in NBA)	+
Attendance	+	No significant
Sports performance in t	No significant (+ in NBA and - in MLB)	+
Sports performance in t-1	No significant	+
Historical sports performance	+	+
Year dummies	- (difference for significant number of years between leagues) with estimates decreasing	No significant (except for 2006 and 2007 but with estimates increasing from 2006 to 2007)

ances in t are correlated with payroll, which can be seen as a factor diminishing profit and, consequently, value. Beyond the case of MLB, team values are published before the beginning of the season in NFL, during the first part of the season in the NBA and NHL, and during the second part of the season in European soccer. Consequently, it is necessary to relativize the difference between the United States and Europe.

Sports performance in t-1 has the expected significantly positive impact only in European soccer (no significant impact in the other leagues). Team values in t are correlated with revenues in t-1 (coefficient of correlation equal to 0.85) and the correlation between revenues and sports performance in t-1 is higher in Europe (coefficient of correlation equal to 0.58) than in the United States (coefficient of correlation equal to 0.37 in MLB, 0.32 in the NBA, 0.07 in NFL, and 0.20 in NHL). It can be explained by the limited revenue sharing and large revenue bonus linked with good sports performances in European soccer (Andreff, 2007).

For each league, historical sports performance has the expected significantly positive impact. This variable seems a good measure to capture the historic potential of a club, which appears an obvious factor to explain team value.

The time dummies 2004 to 2009 are significantly negative in MLB and NHL, to 2007 in NFL and 2006 in NBA with a decrease of the absolute value of the estimates for each league (except for NHL between 2008 and 2009). Because 2011 is the reference year, the results suggest that team franchise values increased at first but then leveled off. In European soccer, only the time dummies 2006 and 2007 are significantly negative with an increase of the absolute value of the estimates between 2006 and 2007. Our hypothesis is that the overall European soccer club value depends in particular on clubs belonging to the top domestic league. Contrary to American clubs in major leagues, European soccer clubs are not sure to participate to the top domestic league because of possibility of relegation (Andreff, 2007; Hoehn & Szymanski, 1999; Noll, 2003; Szymanski, 2003). Several clubs ranked by *Forbes* were relegated during the studied period: Leeds United, Newcastle United, West Ham United, and Juventus FC, the most prestigious and valuable of these clubs. Juventus FC was relegated in 2006 because of the Calciopoli scandal (Juventus FC was one of the five clubs linked to a Serie A match fixing scandal) and promoted in 2007, that is to say, the two years concerned by a significantly negative impact. It depreciated from 2005 to 2008: $837 million in 2005, $687 million in 2006, $567 million in 2007 and $510 million in 2008 (increase in 2009: $600 million). AC Milan was also concerned by the Calciopoli scandal (no relegation but point deduction) and depreciated from 2006 to 2008: $921 million in 2006, $824 million in 2007, and $798 million in 2008 (increase in 2009: $990 million).

Finally, we can state that there is an overall difference between the United States and Europe except for private ownership and historical sports performance when we observe the sign and the significance of determinants for team values (Table 5). The interpretations that we give in this section can be put in perspective with previous studies for a better understanding of differences between American and European models (Andreff, 2007; Hoehn & Szymanski, 1999; Noll, 2003; Szymanski, 2003).

Discussion

Comparison with previous studies about American major leagues

How do the present results described above compare with those found in other studies about American major leagues?

The absence of a significant impact for income in NHL is consistent with previous studies whereas, for MLB, it is consistent with Miller (2007) but not with Alexander and Kern (2004), and for NFL, it is consistent with Alexander and Kern (2004) but not with Miller (2009). The significantly negative impact of income in the NBA is in opposition with previous studies and in particular Miller (2009) who finds a significantly positive impact.

The significantly positive impact of population in MLB is consistent with Alexander and Kern (2004) and Miller (2007). For the NBA and NHL, it is consistent with Alexander and Kern (2004) but not with Miller (2009). For NFL, it is not consistent with Alexander and Kern (2004) and Miller (2009).

The significantly negative impact of facility age in NFL is consistent with Miller (2009). The absence of a significant impact in the NBA is also consistent with Miller (2009). The significantly positive impact in MLB and NHL is contrary to Miller (2007, 2009) for the two leagues and Büschemann and Deutscher (2011) for NHL.

We find that private ownership has the expected significantly positive impact in MLB, NFL, and NHL and no significant impact in the NBA. The results in NHL and the NBA are consistent with Miller (2009), but it is not the case for the results in MLB with Miller (2007) and NFL with Miller (2009). Nevertheless, Miller (2007, pp. 462-463) writes for MLB:

When the stadium age–private ownership interaction is included linearly (regression 2), its coefficient is negative but insignificant. When the quadratic term is entered into the regression (regression 3), the linear term becomes positive and highly significant, suggesting that an omitted variables problem existed in regression 2 with respect to the linear term.

It suggests that if a team owns a stadium, all else equal, the team's franchise value increases. Miller (2009) finds the same result for NFL.

The significantly positive impact of sports performance in t in the NBA is not consistent with Miller (2009). The absence of a significant impact in NFL and NHL is consistent with Miller (2009). The significantly negative impact in MLB is in opposition with Miller (2007).

The absence of a significant impact of sports performance in t-1 in the American leagues is inconsistent with previous studies except Miller (2009) for NFL and Büschemann and Deutscher (2011) for NHL.

Avenues for future research

Most of the variables chosen in this article to explain team values can be either significant or insignificant depending on the league. This suggests that it is not essential to save all the variables among the explanatory factors of team values, whatever the league. It is preferable to adapt the choice of variables according to the previous results for a league, even if their significance may evolve over time. Beyond this majority of variables, one has a significantly positive impact whatever the league: historical sports performance. This suggests that this variable must be automatically taken into account in future value models.

There is a particular case for population, which has a significantly positive impact in American leagues but a significantly negative impact in European soccer. For this latter, it would be interesting to extend the number of teams evaluated so as to observe if the impact of population remains negative. Indeed, *Forbes* is based on only 20 or 25 soccer clubs, whereas there are 114 teams for the first divisions alone of the six major European leagues (England, France, Germany, Italy, Portugal, and Spain). We can anticipate that the sign of the impact for population will change with a larger number of teams.

Interestingly, R^2 is better for MLB and NFL (respectively more than 84% and 77.5%) than for the NBA, NHL, and European soccer (between 67% and 71%). We think that this could be due to the omission of a key variable: the international dimension of firms. Indeed, soccer is the most widespread sport in the world (Desbordes, 2007). Consequently, it attracts people everywhere, which gives it a greater commercial

potential. North American sports are more contained within their own borders, except basketball and ice hockey, for which a large number of players come from abroad. The international dimension of European soccer could explain the absence of a significantly positive impact of population and attendance (local variables).

How can we measure the international dimension of firms? One avenue consists in incorporating social media in value models. The hypothesis is that the number of fans on Facebook or the number of followers on Twitter can be a measure of an international dimension. Thus, the average number of fans on Facebook is greater for NBA clubs than for NFL clubs (at the beginning of 2012 year, more than 1.3 million versus less than 1.25 million) for which the values are nevertheless generally higher. This is considerably greater for the European soccer clubs evaluated by *Forbes* than for the American clubs (nearly 6 million versus fewer than 1 million). Facebook and Twitter are recent, which probably explains why they have not been integrated in value models. However, particular attention to this could be useful. Scelles, Helleu, Durand, and Bonnal (2013) incorporate social media in their communication. A problem is that the authors are not able to distinguish between foreign and domestic followers. However, they suggest that the great differences between major European soccer and American clubs are the consequence of a better European soccer clubs' ability to attract foreign followers.

Sports performance in t is not a convincing variable, except for European soccer. Nevertheless, we have explained above the limit of this measure in the American context. It could be substituted by another factor: player values. In European soccer, a German website gives data about player values since 2005: www.transfermarkt.de. Players are part of a team's assets and must be incorporated among the determinants of value. A research about European soccer incorporating player values could be envisaged.

Conclusion

In this article we have estimated value equations for MLB, the NBA, NFL, NHL, and major European soccer teams over the period 2004-2011 based on *Forbes* data. We included variables proposed in the literature as explanatory factors and focused our attention on the common points and the differences between American leagues and European soccer. The results show only one variable for which the sign and significance are the same for all the leagues: historical sports performance, with a significantly positive impact in each league. We find contradictory results for population, which has a significantly positive impact in American leagues but a significantly negative impact in European soccer. Nevertheless, the fact that only 20 or 25 teams are evaluated by *Forbes* in European soccer indicates a need to relativize the significantly negative impact of population.

The comparison between American leagues and European soccer reveals a majority of differences that seem to indicate that the determinants of team values in the United States are not the same as those in Europe. However, in the United States, some determinants are different between leagues. Consequently, we can debate the opportunity to group American leagues together.

Lastly, we proposed avenues for future research: integrating an international dimension that can be measured through the number of fans or followers on social media (Facebook and Twitter), and player values. The incorporation of these variables could allow a better specification of the model and a better understanding of the determinants of team values in the United States and Europe.

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