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The Births of Leagues: An Ecological Analysis of Legitimation and Competition in Nine North American Professional Sports

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Abstract

Land, Davis, and Blau (1994) were the first to examine sport organizations using the perspective of organizational ecology when they conducted an analysis of minor league baseball teams. Dobbs, Stahura, and Greenwood (2005) examined competitive pressures, legitimation, and birth rates among professional sport leagues rather than teams and included more sports than simply baseball. We extend this work by examining birth rates of leagues within the same sport rather than the aggregate birth rates of leagues in all sports. We hypothesized that the relationship between organizational density levels (representing competition and legitimation) and birth rates of professional sport leagues in nine different sports would be that of an inverted u-shape. We tested that hypothesis using Poisson regression analysis techniques and found support for it and ecological theory regarding density, legitimation, and competitive processes in populations of sport organizations. We present our findings here, discuss the implications for practicing sport managers, and put forth ideas for future research.

The Births of Leagues: An Ecological Analysis of Legitimation and Competition in Nine North American Professional Sports

Organizational ecologists examine the dynamics of organizational structures using macro-empirical methodologies concentrating on the population level of analysis (Carroll, 1982; Hannan & Freeman, 1977). One of the organizational processes receiving attention has been how birth rates of organizations are affected by the process of legitimation and competitive pressures. Meyer and Rowan (1977) argued that organizations that adopt the practices and procedures of prevailing organizations increase their legitimacy and survival prospects. This, in turn provides a rationale for start-ups to "follow the leader" by forming organizations of a similar form. The result is increased competition, however, as more organizations of a similar nature are founded leading to an increasingly competitive landscape. We examine league birth rates within nine North American professional sports to test these ideas. Poisson regression techniques consistent with previous studies were used to test hypotheses and produced results consistent with previous research. In particular, legitimation and competition pressures act on professional sport leagues in a manner consistent with that of other organizational populations: Density (the number of leagues in existence in a given year) exhibits an inverted U-shaped relationship to founding birth rates.

During the 1990's there were more major professional sport leagues founded in North America than in any decade since World War II (Pollak, 1998). This very active climate of recent league emergence brings to mind two fundamental questions. Why have so many leagues been founded recently and what processes affect the birth rates of professional sport leagues? Some empirical examinations of these questions involve individual leagues and the micro-level detail of their formations. Another methodology, supplementing the first, involves the entire history of professional sport leagues in North America. One field of study that provides the latter perspective, enabling an examination of organizational birth rates and entire histories of organizational populations, is Organizational Ecology. Organizational Ecology (also known as Population Ecology) is a field in which entire populations of organizations are studied over extended periods of time (Hannan & Freeman, 1977; Hannan & Freeman, 1989). A particular analysis may examine hundreds of years of data. This more macro-level approach allows researchers to have a broader, longitudinal perspective regarding the processes that lead to the creation, growth, and even demise of organizations. Two of the observed processes that affect these organizational dynamics are competitive pressures and legitimation (Carroll & Hannan, 1989; Hannan & Carroll, 1992).

Sport Leagues and Organizational Birth Rates

The National Association of Professional Base Ball Players (NA), established in 1871, was the first North American professional sport league. Prior to that, professional athletes competed in either tournaments or as members of barnstorming teams (Reichler, 1985). The NA was the first organization to take on this new form of a group of teams from different cities made up of athletes who were paid to play – a professional sport league.

Would this new organizational form grow and thrive within its environment, or would it succumb to historical, social and economic pressures and subside? Although with the benefit of hindsight it is apparent this organizational form has thrived. In the 19th century at the time of the league's inception, however, its success was not a forgone conclusion. In fact, the NA faced significant obstacles, particularly with regard to player gambling, the subsequent distrust of players by fans (Reichler, 1985), and ceased operations after just five seasons (Pollak, 1998). In 1876 a new group of team owners, committed to addressing the moral and ethical issues raised by the NA, founded the National League (NL) – a league that endures to this day. Since then, the league has been the form of choice for most team sports in North America. It was legitimized first for baseball and then for other team sports.

A snapshot of this population is presented in Figure 1. With respect to the number of professional sport leagues over time, for the first 50 years there is a gradual increase in the number of leagues with the exception of the spike in the 1880's. This was due, interestingly enough, to the great number of roller hockey teams that were battling for preeminence at that time. From 1920 to World War II, the number of professional leagues was relatively stable. The number fluctuated between 10 and 16 leagues. At the conclusion of the war, the number of leagues reached its second biggest peak at 19 leagues. This success, however, was followed by a massive decline. The number of leagues dropped from 19 to

7 leagues, a reduction of more than 50 percent. From 1960 until 1997 there was a rebound in the number of leagues. In fact, when analyzing this longitudinally it is interesting to note that at the end of the observed period, there were more leagues in existence than at any time in the industry's history.

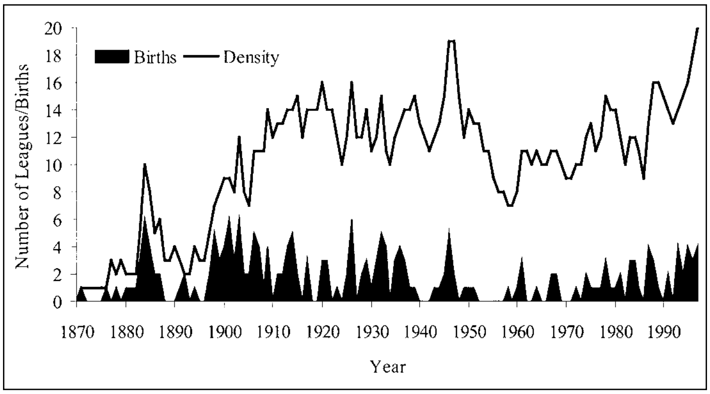

Figure 1. Density and births of professional sport leagues over time.

Density Dependence

Carroll and Hannan (1989), and Hannan and Carroll (1992) propose that the social processes of legitimation and competition are responsible for the relationship often observed between density and birth rates of organizations. More specifically, they argue that at low levels of population density, the organizational form is not yet perceived as being legitimate. As density increases, social legitimation of the organizational form occurs to the extent that the form is taken for granted (Meyer & Rowan, 1977). This prompts the birth of many similar organizations, thereby increasing the birth rate of additional leagues and teams. But at some higher level of population density, a saturation point, if you will, competition processes supersede any legitimation effects as the primary driver of league population size (i.e. density). As organizations battle for critical resources, this competition causes many organizations to fail and signals potential entrants that this is not a good time to compete against the existing population. Thus, competitive pressures supersede those of legitimation at higher density levels and fewer organizational births are observed. This is graphically expressed as an inverted U-shaped relationship between density and birth rates.

Many researchers have examined measures of density and density squared (used to test for the hypothesized curvilinear relationship) and their relationship to birth rates. The results have been remarkably consistent and supportive of Hannan and Carroll's original hypothesis (e.g. Aldrich, Zimmer, Staber & Beggs, 1994; Baum & Oliver, 1992; Carroll & Hannan, 1989; Dobbs, et al., 2005; Freeman & Lomi, 1994; Hannan & Carroll, 1992; Hannan, Carroll, Dundon & Torres, 1995; Hannan & Freeman, 1989; Land, Davis & Blau, 1994; Ranger-Moore, Banaszak-Holl, & Hannan, 1991). These studies involved a variety of organizational populations including newspapers, labor unions, financial institutions, automobile manufacturers, and sport organizations.

In only a few studies have there been insignificant relationships found between density and the birth rate (Delacroix & Solt, 1988) or in the opposite direction of that which was predicted (e.g., Hannan & Freeman, 1989; McCarthy, Wolfson, Baker, & Mosakowski, 1988). These studies have had methodological gaps, particularly with respect to truncated data that is especially problematic when using event history analysis techniques (Allison, 1984; Carroll & Hannan, 2000).

The analysis presented here extends the current understanding of density effects on birth rates of professional sport leagues by focusing on the effects of same sport density (i.e. the number of leagues in the same sport) rather than focusing exclusively on the density of all sport leagues combined (i.e. the aggregate number of leagues across all sports). For example, in a given year the overall density of leagues might be 15, but there might be two baseball leagues, one basketball league, etc. We examine the density levels within the individual sports. This is consistent with the work of others who have measured density in subpopulations (e.g., Barnett & Carroll, 1987; Baron, West, & Hannan, 1994; Baum & Mezias, 1992; Freeman, 1990; Hannan, 1997; Haveman, 1992; Rao & Neilsen, 1992; Wholey, Christianson, & Sanchez, 1992). Therefore, we expect to find the same relationship to be present between same sport density and same sport density squared as previous researchers. That is, within particular sports, we expect that when the number of leagues reaches a certain carrying capacity for the subpopulation, competition processes will drive the birth rate down. Therefore, the logical and linear statistical hypothesis proposed is the following: Same sport density will be positively related to the birth rate of professional sport leagues and same sport density squared will be negatively related to the birth rate of professional sport leagues.

Data, Measures, and Methods

The primary source of data on professional sport leagues used was Sports Leagues and Teams: An Encyclopedia, 1871 through 1996 (Pollak, 1998). The following characteristics and criteria describe the leagues included in the study. (1) Only team sport leagues in which competition takes place between teams rather than individuals were included. Organizations such as the Professional Golf Association (PGA) and the World Tennis Association (WTA) were not included. (2) Only professional leagues were included. Amateur and collegiate leagues were not simply because they cannot be operationally defined as professional. In addition, collegiate leagues in particular have substantially different organizational forms than professional leagues and therefore seemed inappropriate for inclusion. (3) Only North American leagues were included, and the vast majority of these were based in the United States. There were, however, a few Canadian-based leagues included in addition to the Canadian teams that were part of U.S.-based leagues. (4) Only major leagues were included. No "feeder" or minor leagues were included; that is, no leagues were included that had formalized ties with a major league through which players were provided to the major league level. (5) Multiple sports were used including baseball, basketball, American football, hockey, soccer, roller hockey, softball, volleyball, and lacrosse. Not only did these sports provide a richer picture of the evolution of professional sport leagues, but some of these sports (e.g., roller hockey in the late 19th century) were more popular at times in North American history than some of the "Big Four" sports of baseball, American football, basketball, and hockey that are the most popular team sports today. (6) The complete history of professional sport leagues was used. The time frame was 1871-1997, encompassing 127 years.

The data set included all 206 professional leagues that met the aforementioned criteria. This means that rather than sampling the population, the entire population was captured and its entire history was studied which provides for a powerful analysis. Of course, the data were right-censored (i.e. incomplete) because leagues still existed in 1997 and will into the future, but the models chosen for hypothesis testing addressed this issue appropriately (Allison, 1984).

Organizational Births

The number of births in a given year served as the dependent variable in this analysis, and data were arranged by year. The variation in yearly professional sport league births is shown in Figure 1 as already referenced. In the first year of this population's history, 1871, there was one birth. In 1884 and 3 other years; however, there were 6 leagues founded and this number was the highest of any given year throughout the years studied. Total births among professional sport leagues from 1871 through 1997 numbered 206 total leagues.

Density

The primary theoretical variables in this study were same sport density and its second order term, density squared. In order to calculate same sport density the data were organized so that each sport had its own yearly observations. Rather than having one observation per year for the entire history of the population (127 observations), there was one observation per year for each sport (743 observations). Observations for each sport began the year the first league was founded and continued until 1997. That is why there were 743 observations rather than 1,143 (nine sports times 127 years). When same sport density measures were used in a model, following the example of Hannan et al. (1995), measures of total density were not used; measures of other sport density were used instead.

Controls

Ecological models such as this require variables to be constructed at the population level of analysis rather than the organizational level of analysis (Hannan et al., 1995). Therefore, the number of possible control variables was quite limited, but there were several that were included. One such variable was the general population. Increases or decreases in the general population could mean increases or decreases in market potential for leagues. The populations of the U.S. and Canada were combined to serve as this variable. U.S. data were collected from various editions of The Statistical Abstract of the United States and Historical Statistics of the United States: Colonial times to 1970, while Canadian data were collected from Urquhart (1965), Statistics Canada (1997), and Moore (1999).

Also affecting potential market size may have been the amount of leisure time people had measured by the number of discretionary hours in their week. Perhaps, as the average number of hours worked in a week decreased, sport demand increased, creating a more inviting atmosphere for potential leagues. To control for this possible effect, the average U.S. working week in hours was included as a variable. Data were obtained from various editions of The Statistical Abstract of the United States and Historical Statistics of the United States: Colonial Times to 1970.

Using only a U.S. measure of working week and other control variables was less than ideal because of the inclusion of Canadian leagues and teams, too. However, because the data did not exist or were not compatible with U.S. data for working week and several other control variables, Canadian measures could not be included. This is a potential weakness of the investigation. However, traditional Canadian work weeks are similar to those of their American counterparts. Carroll and Delacroix (1982) encountered similar issues in their study of Argentinean and Irish newspapers, but they argued that those economies closely mirrored that of the United Kingdom – and those data were available. Therefore, they included a measure of British GNP in their models. Considering that Canadian data are likely to be highly correlated to U.S. data, particularly in those cities having major league teams, using the more comprehensive U.S. data seemed to be the more appropriate control strategy.

Positive media coverage of sporting events can create a greater interest among fans and the public at large. Heightened public interest may entice potential league owners to commit to establishing a new league. We controlled for possible effects of newspapers, radio, and television by including estimates of U.S. daily newspaper circulation, the percentage of U.S. households with radios, the percentage of U.S. households with televisions, and the percentage of U.S. households with cable television. We collected data from various editions of The Statistical Abstract of the United States and Historical Statistics of the United States: Colonial Times to 1970 to construct these measures.

Another control variable included in the models was the U.S. GNP growth rate. This measure served as a proxy for two ideas. First, a rising GNP can be associated with increased discretionary monies available to fans and potential fans. A high GNP growth rate would indicate to potential league owners that market conditions are favorable for the establishment of new leagues. Second, the GNP growth rate may also indicate the general level of resources available to potential league and team owners. A high GNP growth rate would indicate that potential league owners might be in a better economic position to launch a new league. GNP figures were obtained from the U.S. Department of Commerce back to 1890; and prior to that, the estimates of GNP were derived from Berry (1988).

We also included dummy variables to control for possible period effects, specifically periods of war and recession (Aldrich, et al., 1994; Land et al., 1994; Dobbs et al., 2005; Hannan, et al., 1995;Ranger-Moore, Banaszak-Holl, & Hannan, 1991;). We used dates from The World Book Encyclopedia to construct the war dummy variable (with the exception of the Gulf War occurring in 1991), and used the National Bureau of Economic Research definition of economic contraction to determine periods of recession (U.S. Department of Commerce, 1994). The war dummy variable was coded as 1 during periods of war, and the recession dummy variable was coded as 1 during periods of recession.

We controlled for any trend over time by including the age of the total population (Carroll & Hannan, 1989; Land et al., 1994; Dobbs et al., 2005). However, when measures of same sport density are included in models, the age of the sport population in question was used. In addition, following the lead of previous research (Aldrich et. al., 1994; Baum & Oliver, 1992; Land et al., 1994; Ranger-Moore, Banaszak-Holl, & Hannan, 1991), we included measures of prior births and prior deaths (lagged by one year).

Descriptive statistics and a correlation matrix of organization births, the density measures, and all of the control variables for the total population in aggregate are presented in Table 1.

Models

Because the dependent variable was a count, we used Poisson maximum likelihood regression to test the hypothesis. This is a framework that was utilized by others investigating similar phenomena (Aldrich, et. al., 1994; Baum & Oliver, 1992; Dobbs et al., 2005; Freeman & Lomi, 1994). In this model the birth rate for the jth observation was given by

$$r_j = e^{\beta 0+ \beta 1x1,j+ \dots + \beta kxk,j},$$

where β_0 was a constant, $\beta_1 \dots \beta_k$ were covariate coefficients, and $x_1 \dots x_k$ were values of covariates.

Some researchers have opted for a negative binomial model instead of a Poisson model (Land et al., 1994; Ranger-Moore, Banaszak-Holl, & Hannan, 1991. However, goodness-of-fit diagnostics available through STATA, verify that Poisson

Table 1. ***Means, Standard Deviations, Minimums, Maximums, and Bivariate Correclations***

Variable	Mean	S.D.	Min.	Max.	1	2	3	4	5	6	7	8	9	10
1. Birth count	1.76	1.40	.00	9.00	--									
2. Density	10.09	3.47	.00	19.00	-.25	--								
3. Population	178.60	69.95	44.63	298.01	-.16	.45	--							
4. Work week	43.97	7.67	34.60	60.00	.14	-.45	-.78	--						
5. Newspapers	45.71	17.46	2.60	63.15	-.17	.43	.91	-.89	--					
6. Radio	62.51	42.48	.00	99.00	-.18	.31	.88	-.88	.95	--				
7. Television	45.52	46.54	.00	98.30	-.19	.17	.92	-.62	.84	.83	--			
8. Cable television	12.37	20.84	.00	67.38	-.07	.41	.80	-.40	.51	.51	.67	--		
9. GNP	.03	.06	-.15	.18	-.02	-.14	-.07	.08	-.06	-.02	-.05	-.09	--	
10.Population age	77.52	31.82	.00	126.00	-.15	.49	.99	-.85	.95	.92	.88	.73	-.06	--
11.War	.26	.44	.00	1.00	-.00	.02	-.01	-.06	.12	.14	-.03	-.21	.23	.04
12.Recession	.23	.42	.00	1.00	.06	-.13	-.31	.27	-.30	-.35	-.29	-.24	-.39	-.32
13.Prior births	1.63	1.57	.00	7.00	.12	.18	-.15	.19	-.25	-.27	-.22	.07	-.14	-.17
14.Prior failures	1.51	1.50	.00	8.00	.04	-.01	-.16	.14	-.22	-.25	-.23	-.00	-.17	-.17
15.Baseball	.17	.38	.00	1.00	.35	-.35	-.18	.20	-.22	-.16	-.12	-.09	.02	-.21
16.Basketball	.13	.34	.00	1.00	.16	-.02	-.02	.00	-.00	-.02	-.03	-.04	.00	-.01
17.American football	.12	.33	.00	1.00	.21	-.01	.03	-.07	.06	.03	.01	-.02	-.01	.04
18.Ice Hockey	.13	.33	.00	1.00	-.11	.11	.01	-.04	.04	.01	-.01	-.02	-.01	.02
19.Soccer	.14	.35	.00	1.00	.08	-.03	-.04	.03	-.03	-.04	-.04	-.05	.00	-.04
20.Roller Hockey	.15	.36	.00	1.00	-.27	.03	-.11	.12	-.12	-.10	-.08	-.07	.01	-.11
21.Volleyball	.03	.17	.00	1.00	-.14	.15	.23	-.13	.16	.15	.20	.25	-.02	.21
22.Softball	.03	.17	.00	1.00	-.15	.16	.23	-.12	.15	.15	.20	.26	-.02	.21
23.Lacrosse	.09	.29	.00	1.00	-.33	.18	.14	-.19	.17	.19	.12	.05	.00	.15

	11	12	13	14	15	16	17	18	19	20	21	22
11.War	--											
12.Recession	-.18	--										
13.Prior births	-.25	.13	--									
14.Prior failures	-.18	.20	.46	--								
15.Baseball	-.04	.05	-.01	-.01	--							
16.Basketball	.02	.01	.03	.03	-.18	--						
17.American football	.04	-.00	-.02	-.01	-.17	-.15	--					
18.Ice Hockey	.03	-.00	-.00	.00	-.17	-.15	-.14	--				
19.Soccer	.01	.02	.02	.01	-.18	-.16	-.15	-.15	--			
20.Roller Hockey	-.01	.03	.02	.02	-.19	-.17	-.16	-.16	-.17	--		
21.Volleyball	-.09	-.06	.02	.00	-.08	-.07	-.07	-.07	-.07	-.08	--	
22.Softball	-.08	-.06	.02	.01	-.08	-.07	-.07	-.07	-.07	-.07	-.03	--
23.Lacrosse	.05	-.06	-.06	-.05	-.14	-.12	-.12	-.12	-.13	-.13	-.06	-.06

Note. Coefficients with absolute value >.07 are significant at p<.05. The sample contains 743 observations.

regression is preferable to a negative binomial model given this data set. We also constructed the models described below using a negative binomial model, but not all the variables were able to be estimated. It should be noted that Aldrich et al. (1994) used both types of models and found very similar estimates. Descriptive statistics, correlation coefficients, and regression model estimates were all obtained using STATA.

Table 2. ***Poisson Regression Estimates for Birth Rate Models***

VARIABLE	MODEL 1	MODEL 2
Same sport density	1.529***	1.458***
	(.188)	(.181)
Same sport density ^{2}	-.116***	-.111***
	(.024)	(.023)
Other sport density	-.016	
	(.117)	
Other sport density ^{2}	.004	
	(.006)	
Population	.019	.035
	(.038)	(.037)
Work week	-.086*	-.069*
	(.036)	(.034)
Newspapers	.029	.018
	(.039)	(.038)
Radio	.003	.003
	(.008)	(.007)
Television	.009	-.003
	(.015)	(.014)
Cable television	.027	.018
	(.024)	(.024)
GNP growth rate	.284	-.197
	(1.421)	(1.392)
Population age	-.113†	-.119†
	(.066)	(.063)
Period of war	-.250	-.301
	(.221)	(.219)
Period of recession	.091	.064
	(.190)	(.183)
Prior births	-.508***	-.490***
	(.106)	(.105)
Prior failures	.482***	.449***
	(.093)	(.091)
Basketball league	-1.877	-1.982
	(1.750)	(1.674)
American football league	-4.015†	-4.172†
	(2.346)	(2.251)
Ice hockey league	-3.256	-3.369
	(2.175)	(2.085)
Soccer league	-1.621	-1.731
	(1.518)	(1.448)
Roller hockey league	-.076	-.108
	(.799)	(.759)
Volleyball league	-9.403	-9.796
	(6.815)	(6.570)
Softball league	-9.479	-9.945
	(6.925)	(6.671)
Lacrosse league	-4.832	-5.050
	(3.921)	(3.768)
Constant	1.685	-.038
	(3.124)	(2.931)
Log-likelihood	-338.023	-339.420
N	743	743

Results

Table 2 presents the results of Poisson regression models designed to test the effects of density and density squared on birth rates. Model 1 included same sport density, same sport density squared, other sport density, and other sport density squared. Same sport density was significant and positive as predicted. Likewise, as predicted, same sport density squared was significant and negative. Neither other sport density nor its' squared term were significant, which was also anticipated. Model 2 removed other sport density and other sport density squared from the equation to ensure there was no interference with the measures of same sport density. The signs and significance levels found in Model 1 held in Model 2.

As for the controls, only a few were statistically significant. Prior births and prior failures were both significant and with the corresponding sign expected. Prior births had a negative sign indicating that if a league or leagues were founded in the previous year, a league birth in the year in question was less likely. Prior failures had a positive sign meaning that when leagues failed, the following year there was an increased likelihood of a new league being formed. This could very well be because in many cases of league failure not all the teams failed with the league. Team owners would often band together with the other members of the now defunct league, recruit new teams, and then start a new league.

The sport dummy variable for American football leagues was marginally significant at the .10 level; but no other dummy variables were significant. The only other control variable significant at the .05 level was work-week duration and it also had the expected sign. When work-weeks were shorter, more leagues were founded. This makes sense if league organizers were cognizant of their potential market and saw expendable, leisure time on the increase.

Discussion

Our hypothesis predicted a positive relationship between density and birth rates among leagues playing the same sport and a negative relationship between same sport density squared and the birth rate. This hypothesis was supported by the statistical tests employed and provides further evidence of the inverted U-shaped relationship between density and birth rates proposed by Carroll and Hannan (1989).

In many regards, the traditional view of how density reflects the forces of competition and legitimation forces and in turn, their effects on birth rates, was supported. As density within a subpopulation of leagues, in a given sport, increases and the legitimation of the form arguably rises, the birth rate also increases, but only to a certain point. Then, as density continues to increase and presumably competition is greater, birth rates decrease.

Figure 2 is a graphical depiction of this relationship based on the estimates of Model 2. Although the range of same sport density is zero to nine, most values from this data fell in the zero to three range. That is why most of the changes in the slope of the curve are in the initial zero to three range. Birth rates were marginally high when no other leagues existed in a particular sport. The birth rate was at its highest when there was one other league in existence. The birth rate was considerably lower when there were two leagues in existence. As one might expect, the birth rate drops to essentially zero when three or more leagues in the same sport were in existence.

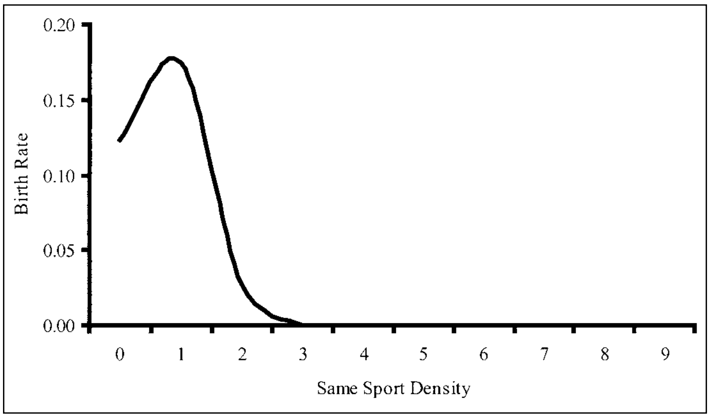

Figure 2. Relationship between same sport density and sport league birth rates.

The findings of this investigation have implications for both scholars and those in sport league management. As for researchers, this study of sport leagues from a macro-level perspective extends the ecological work of previous researchers (Dobbs et. al., 2005; Land et al., 1994) and provides a foundation upon which other researchers can build. Sport leagues in other regions of the world have yet to be investigated using ecological methodologies. Will the density dependence relationship be evident in sport organizations around the world? In other industries, support for ecological hypotheses has been found in studies of organizations in Europe, South America, and Asia (Carroll & Hannan, 2000). Organizational birth rates are only one of the processes organizational ecologists examine. Also of interest are mortality and growth rates of sport organizations around the world. These kinds of macro-level empirical investigations, in combination with micro-level analyses, will provide a much richer description of the mosaic that is worldwide sports.

As for those within the field, this analysis has suggested that, historically, leagues have not been founded when two or more leagues are already in existence in a particular sport. Just two leagues appear to be at the point of saturation. If there are two major professional basketball leagues and a group is thinking about adding a third, the potential organization should know that history does not appear to be on its side. However, in today's society, in which women's athletics are becoming much more prominent, perhaps starting a new women's league would be viable. Conceivably, in ten years, when more data become available, the models developed here will give us a new picture, and instead of subdividing league population by sport alone, it will be possible to divide the data into men's and women's sports. Unfortunately at this time, however, there are not enough observations regarding women's sport leagues to investigate this question.

Regardless of issues surrounding gender and others like it, what is abundantly clear is that birth rate density dependence existed in the population of major professional sport leagues in North America. In this study, subpopulation density effects had the significance levels expected and were in the directions expected. The controls, too, demonstrated the expected relationships. All in all, birth rates of professional sport leagues seemed to be very similar to those of other industries that have been studied by other ecological researchers.

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