Contributions of Managerial Levels: Comparing MLB and NFL*

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Abstract
Sports differ according to the number of players, interdependencies among them, complexity of strategy, and other dimensions. For example, baseball has been described as "an individual game in which a team score is kept." These differences suggest differences in the relative importance of managerial inputs: owners, general managers, and managers (or head coaches). Using panels over 1970-2011, I estimate performance production regressions for Major League Baseball and the National Football League that permit the relative importance of these managerial inputs to be assessed within and across sports while taking explicit account of the hierarchical structure of management levels. In addition, based on predicted individual effects, I present rankings of best and worst managers, general managers, and owners.

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I. Introduction

Writers and analysts in popular media outlets frequently compare managerial achievements and productivity in both explicit and implicit ways for publicly-traded firms as well as sports organizations.[1] In sports, comparisons of general managers and owners, while less common, also appear with some regularity.[2] The difficulty with these comparisons is that they do not adequately control for other important input to performance, including the input of other managers. In contrast, the sports economics literature includes many empirical studies of managerial performance, particularly for baseball managers and head coaches in football and basketball, where the impacts of other variables are taken into account. Zak, Huang, and Siegfried (1979) and Porter and Scully (1982) are two of the seminal works of this type. However, most studies, including more recent ones, do not explicitly account for the contributions of different levels of management or make direct cross-sport comparisons.

The purpose of this study is to assess the impact of different levels of managerial inputs including managers (the term used for baseball "manager" or football "head coach"), general managers, and owners for both Major League Baseball (MLB) and the National Football League (NFL). Are there differences in the relative importance of different managerial inputs across sports?

Section II lays out the empirical model used for estimation. Section III presents the results of these estimates, including rankings of top managers, general managers, and owners. Section IV provides concluding remarks.

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[1] For example, see "Best NFL Coaches" available at http://www.forbes.com/2005/09/01/sports-football-coaches_05nfl_cz_kb_0901bestcoaches.html or for baseball "Ranking the Game's Best Managers" available at http://sportsillustrated.cnn.com/2009/writers/jon_heyman/05/06/manager.rankings/index.html

[2] For example, see "The NFL's Best General Managers" available at http://www.forbes.com/2010/08/24/football-best-GM-business-sports-nfl-football-valuations-10-managers.html and Baseball's Best General Manager available at http://www.forbes.com/2010/06/15/cincinnati-reds-GM-business-sports-walt-jocketty.html.

II. Empirical Model

Past studies of managerial impact such as Hadley et al (2000) consider such impacts in the context of a model for win production for team i in year t (W_{it})

(1) $W_{it} = \delta_{it} f(X_{it})$

where δ_{it} represents managerial input given the impact of player quality, f(X). In this framework, the reserch question centers on how efficiently does manager i utilize the player resources at hand – the "technical efficiency" of managers. Although differing in specifics of estimation, empirical studies by Zak, Huang, and Siegfried (1979), Porter and Scully (1982), and Ruggiero et al (1996) follow this general strategy of indentifying the technical efficiency of managers.[3] In this paper my interest rests in a broader inquiry that takes account of all levels of management, not just "managers" or "head coaches" given player quality. In this broader context, the quality of players on a team is, itself, a function of a managerial decision. Adapting the framework from equation (1), I consider the managerial influences on player producitivty for a given team in year t:

(2) $f(X_{it}) = g(\delta_{it})$,

so that

(3) $W_{it} = g(\delta_{it})$.

[3] In possibly the most advanced treatments of this sort Hadley et al (2000) employ Poisson regression and Sexton and Lewis (2003) use two-stage data envelopment analysis to estimate MLB managerial efficiency.

I let g take a constant-returns, Cobb-Douglas form dependent on human capital (h) and non-human capital (nh):

(4) $W_{it} = A(K^h)^{\theta} (K^{nh})^{1-\theta}$.

Even though there are differences in non-human capital such as stadiums or city location that may influence revenue, and therefore winning, or player preference for location, I ignore these items below and focus on the different human capital inputs of managers (m), general managers (gm), and owners (o) in sport s:

(5) $K^h = (K^m)^{a1s}(K^{gm})^{a2s}(K^o)^{a3s}$

where $a_{1S}+a_{2S}+a_{3S} = \theta$. These values need not be equal across sports. In fact, differences across sport are likely. For example, the jobs of MLB managers and NFL head coaches, while hierarchically similar from an organizational standpoint, involve some similarities but also differences in types of job skills applied. Managers in both leagues determine which players go out on the field, and in what sequence substitutions occur. They both make decisions with respect to positioning. With regard to strategy, however, the roles differ considerably. Baseball strategy, for the manager, revolves primarily around lineup and substitution decisions along with whether to pitch to particular batters, "hit and run," attempt a steal, bunt, or throw to first. The Football coaches design plays and make calls during the game that are more numerous and complex than their baseball counterparts.[4] In both settings, managers deal with players, providing teaching and incentives. The number of players and the degree of coordination

[4] Decisions of top managers in both sports are aided by assistant coaches.

between them differs to a great extent between leagues. In baseball, a huge amount of the action takes place between the pitcher-catcher and the hitter. Every play in football involves a coordination of most, if not all, eleven players on a side. These differences suggest not only a difference between the impact of managers/head coaches across sports but also of manager/general manager within sport.

The hierarchical structure of management presents a key issue in estimating the impact of different levels of management. At least implicitly, most discussions consider the impact of owners or general managers (GMs) given the contributions of a manager. However, one can view the owner (or GM) as responsible for all aspects of the team, including hiring lower level managers (or GM). Conversely, the impact of a given manager is nested within the framework of a given owner and GM. This 3-level hierarchy can be represented as:

$$(6) \qquad W_{it} = W_{(ogm)t} = \mathbf{Z}_{(mgo)t}\boldsymbol{\beta} + X_{(mgo)t}\,\alpha_o + X_{(mgo)t}\,\alpha_{og} + X_{(mgo)t}\,\alpha_{ogm}\,.$$

Here, the observation for team i indexed by the combination of owner (o), general manager (g), and manager (m) for , and owner (o) in year t. The fixed effects of non-managerial influences on winning, **Z**, are captured by **Zβ**. In terms of the managerial inputs, the hierarchical model is equivalent to a random effects model in which each α represents the random effect with the manager effect, α_{ogm} , nested within the GM-owner effect (α_{og}) and the owner effect α_o .[5] The nesting also addresses the issue of interdependence of managerial levels. With the nesting, a

[5] Hierarchical models are equivalent to nested random effects models and are common in educational research with a variety of other economic applications. See Greene (2011, Chapter 11), Trevedi and Cameron and Trevedi (2005, Chapters 21-22). Rabe-Hesketh and Skrondal (2008) illustrate the hierarchical perspective. Although equivalent, the random effects literature and hierarchical literature reverse the labeling order of the levels. Here, I follow the convention of the random effects literature, listing (manager) as a "higher" level nested in the general manager and owner.

separate effect is estimated for each manager-GM-owner combination. Managerial efforts at different levels are frequently interdependent. For example, in an NFL setting, both the general manager and head coach may be involved in the assessment and acquisition of players in the annual draft. Some managers work better with some general managers than others.[6]

To estimate (6), non-managerial influences on winning need to be specified. The two influences that I take into account are population of the market in which the team operates and the "endowment" left to the current managers by the previous ones. Team market size affords differential resources with which to acquire players. However, revenue-sharing and salary limitations can mitigate market size differentials. These limits have been more significant in the NFL than MLB. I use the following operational version of (6) to estimate managerial effects:

$$(7) \quad W_{it} = a_0 + a_1 Owner_{ito} + a_2 GM_{itogm} + a_3 Manager_{itogmm} + a_4 Endow\text{-}M_{ji} + a_5 Endow\text{-}GM_{ji} + a_6 Endow\text{-}O_{ji} + a_7 Pop_{it} \; a_8 Expansion_{it} + \varepsilon_{it}$$

where

W_{it} = winning percentage for team i in year t;

$Owner_{it}$ = Owner o for team i in year t;

GM_{it} = General Manager ogm nested within owner i for team i in year t;

$Manager_{itogmm}$ = Manager m nested within general manager gm and owner o for team i in year t;[7]

$Endow(k)\text{-}O_{io}$ = winning percentage inherited by owner o for team i (centered on 0.5 and converging to 0.5 in Owner season k);

[6] Hayes, Oyer, and Schaefer (2005) examine these inter-managerial complementarities, while Chapman and Southwick (1991) find evidence of the importance of manager matching.

[7] Season 1 for a owner, GM, or manager starts with the first full season. Partial seasons are attributed to the prior manager.

Endow(k)-GM_{iogm} = winning percentage inherited by general manager ogm for team i converging to 0.5 in GM season k;

Endow(k)-M_{iogmm} = winning percentage inherited by manager ogmm for team i converging to 0.5 in Manager season k;

Pop_{it} = metropolitan area population where team perform; values reflect Census value with shift in value at mid-point between Census;

$Expansion_{it}$ = 1 if team i in year t is a first year expansion team and equals 0 otherwise.

The owner, GM, and manger terms capture the random effect of individuals in these different managerial roles. The other variables estimate fixed effects. The Endow variables are constructed to capture the conditions of the team upon arrival of the given Manager, GM, or Owner but allowing for this effect to diminish over k seasons so that the long run endowment equals the league average winning percentage (0.5). Specifically, I define Endow(0) as the winning percent of team in year prior to manager, GM, or owner and s as the number of seasons for manager, GM, or owner with team i.

Endow(k) is computed as follows:

(8) Endow(k) = 0.5, if $s \geq k$,

Endow(k) = Endow(0) + (s-1)*[(0.5 - Endow(0)]/k, if $s < k$

For example, if manager m takes over a team with a winning percentage of 0.2 in the year prior to his arrival, then Endow(k=2) = 0.2 + (s-1)*[(0.5 – 0.2)]/2, which would equal 0.2 for s =1

and 0.5 for s=2 and subsequent years. If manager m takes over a team with a winning percentage of 0.7 in the year prior to his arrival, then Endow(k=2) = Endow(0) + (s-1)*(0.5 – 0.7) which would equal 0. I estimated exploratory regressions with k=2, 3, 4, 5 for manager, GM, and owner endowments. In the estimates below, value for k producing the largest coefficient for each level is chosen.[8]

III. Data and Results

Annual (season) data are used for each MBL and NFL team for 1970-2011.[9] The NFL data includes 1220 teams-seasons with 402 football head coaches with mean tenure with a given team of 3 years, 230 football GMs with mean tenure of 7.2 years and median of 5 years, 77 football owners with mean tenure of 15 years.

The results of hierarchical/random effects estimation for winning percentage in MLB over the entire time frame appear in Table 1 with correction for autocorrelation of residuals over time within each team.[10] In the table, the percent of the variance attributable to the random effect for managerial level is reported along with the estimated coefficient and standard errors for the fixed effects. Table 1 presents four specifications of the model. The first includes all the managerial effects and related endowments. The other three specifications exclude one of the managerial fixed effects and its associated endowment. Wald Chi-Square values are reported for each specification.

In terms of the managerial levels in the full model, 8.5 percent of the variance in winning is attributable to variation between MLB managers with the GM effect nearly the same at 6 percent. Variation among owners exhibits essentially no impact on the overall model and

[8] The difference in coefficient values for MLB is very slight for values of k=2 or k=3 and for NFL for k=3 and k=4..
[9] Team winning percentages are available from http://www.baseball-reference.com/ and http://www.pro-football-reference.com/. The information on Managers, GMs, and Owners is collected from these sources as well as team websites, Wikipedia entries for teams, and other internet searches.
[10] The estimation is by maximum likelihood.

removing the owner random effect and endowment variable lowers the Chi-Square only slightly from 133 to 129. In contrast, dropping manager effect and endowment variables lowers the Chi-Square to 98.

Among the fixed effects, the coefficient on population is positive and significant while the first year expansion variable is negative and significant. The endowment variables for each level of management are positive and significant. The manager and GM endowment coefficient are nearly equal in magnitude with the owner coefficient only about 60 percent of their size. In addition, there is considerable year to year correlation of the residuals. This autocorrelation effect is more than a mere econometric correction – success (or failure) one year has a carryover effect likely due to the pool of players remaining somewhat intact from year to year.

Table 2 reports the same hierarchical/random effects regressions using the NFL data. In the full model over 21 percent of the variation in winning is attributable to variation between managers while variation among owners accounts for 4 percent and GMs only 1 percent. Dropping the manager effect and endowment variable cuts the Chi-Square in half while dropping owners raises it, and dropping GMs lowers it. among the fixed effects, first year expansion has a significant negative impact but population does not. Also, among the endowment variables, both manager and GM endowments matter but not owners. The managers endowment coefficient is nearly double that of the GM.

Cross-Era and Cross-Sport Comparisons

Did the relative impact of different managerial levels change over time? Changes to rules of the game, institutions and governance structures, and innovation in managerial methods all

evolved extensively over the time frame in both sports. For example, free agency for players emerged in the 1970s in baseball and expanded in the late 1980s. In football, free agency, to a lesser extent, came about in the 1990s. In baseball, the late 1990s ushered in the "Moneyball" era of expanded use of statistical methods to evaluate players in baseball and to some extent in football suggesting more. All of these changes suggest a bigger role for GMs and possible differences in skills in applying them. Changes in the NFL in the late 1970s altered the relative importance of passing offenses and the technologies associated with them, suggesting increased value of managers.

Table 3 presents estimates that address whether the impact of managerial levels has varied over time. I displays the full model specifications for MLB and NFL estimated over two time-based sub-samples, 1970-89 and 1990-2011. In baseball, winning percentages attributable to managers substantially declined from 13 percent to 5 percent between the two eras. In contrast, the inter-GM impact, which was near zero before 1990, is estimated to be 14 percent after 1990 and much larger than the manager effect. The NFL data show much less impact for GMs. Although the intra-GM effect grew, it is nearly offset by a decline in the intra-owner impact. The intra-manager effect, however, grew from 19 percent to almost 24 percent.

Table 3 along with the earlier estimates also serves to highlight the cross-sport differences. In the 1990-2011 time frame, intra-manager impacts in the NFL are nearly five times larger than in baseball while GM effects in baseball are five times greater than those in football. For the NFL these same magnitudes show up in the initial endowment effects, with managerial endowment differences of 20 percent making about a 5 percent impact on subsequent winning. The baseball, the impact is roughly the same for managers, but the GM impact is about the same size, whereas it is much small in football. In addition, population exhibits a significant

impact across baseball teams but not football. There is not equivalent of the New York Yankees in football, and no equivalent of the Green Bay Packers in baseball. However, the impact, even in baseball is relatively small. A 5 million person difference in population translates into only about a 1 percent advantage in winning percentage across MLB cities. Winning, at least initially, has been more difficult for NFL franchises in the more recent era.

One marked difference in the later time frame appears in the autocorrelation of residuals. In MLB, winning one year carries over momentum of about 0.3 to the next year. This impact is roughly the same as the earlier time frame. However, while such an effect appears in the 1970-89 era for football, there is essentially no correlation of residual winning in football after 1990.

Performance of Specific Managers

The estimates supplied in the preceding tables permit the impact of inter-managerial differences at different levels to be assessed. These estimates also permit the contributions of specific managers to be computed. The descriptive statistics supplied in the Appendix provide information about how much of an effect the best and worst managers at different levels have. For example, the difference between the best and worst MLB owner or the best and worst NFL GM is very slight. In contrast, the best NFL head coach raises winning percentage by over 15 percent while the worst lowers it by 12 percent. Among NFL owners, the best and worst differ by about 9 percent (5 percent to -4 percent). The differences among the best and worst MLB managers and GMs are very similar and much smaller than these impacts for the NFL.

Table 4 lists the top 15 MLB managers and GMs by their average lifetime random effect (owners are omitted because of very small differences). Each GM or manager who served under a single owner has a single lifetime coefficient. For managers whose tenured crossed different

GMs and owners, a separate estimate is generated for each combination. The weighted average across all seasons for the manager is then computed. The same is true for any GM who combined with different owners. The names on the list of managers are not surprising in that their teams were successful. The ordering of the names, however, reflects adjustments for other managerial inputs. Brian Cashman, the Yankees general managers from the mid 1990s onward, receives considerable credit for his contributions. These estimates take account of the population advantage held by the Yankees.

Table 5 lists the top head coaches and owners for the NFL (GMs are omitted because of very small differences). As with the MLB managers, the head coach list includes recognizable names because of their success. There are surprises, however. For example, George Seifert appears on the list whereas his predecessor, Bill Walsh does not. While highly successful, Walsh's early years were not highly successful, and much of his notice comes about because of Super Bowl victories, which are not weighted in these estimates. Likewise, while Bill Belichik appears on the list, he is not at the top in spite of a stellar record with the Patriots. Three factors diminish his estimated coefficient. He inherited a New England team with an above average managerial endowment, (8 and 10 wins in the two prior years) and an owner with a positive impact. Also, in his earlier tenure with the Cleveland Browns, Belichick inherited a team with that had one 9 games two years prior and enjoyed only one winning season during his five years. The owners' list includes both those widely liked by fans and media such as well as others viewed less favorably.

Table 6 looks at the other end of managerial performance by listing the worst performing managers with at least 7 seasons of experience. Of course, many managers don't last seven years because of poor performance. This list is interesting in that, somehow, in spite of relatively poor

outcomes, these coaches lasted well beyond the average tenure of managers. Bart Starr holds the lowest winning percentage on either the MLB or NFL list. In his case, his longstanding relationship with the team and successful career as the team's quarterback likely extended his coaching tenure far beyond what a coach with less reputational capital in Green Bay would be permitted.

Corporate Owners

One final exploration is into whether corporate ownership matters for performance. In the NFL, aside from a small number of observations where teams passed through an estate trust from a deceased owner before final disposition, the only corporate ownership has been by the not-for-profit Green Bay Packers. In MLB, several teams have been owned by for-profit corporations including the Braves (Time-Warner; Liberty Media), Cubs (Tribune), Angels (Disney), Dodgers (Fox Entertainment), Yankees (CBS), NY Mets (Doubleday), Seattle (Baseball Club of Seattle; Nintendo), Cardinals (Anheuser Busch), and Toronto (Labatt, Interbrew, and Rogers Communications).

The impact of corporate ownership on winning percentage is of interest within sports economics in that there is a question as to the degree to which the profit motive drives owners in sports. One view is that sports owners buy teams for non-monetary utility – the "fun" or stature of owning a professional sports team The relatively low reported annual income and high franchise sales values is sometimes cited as evidence.[11] If this view holds, then teams owned by for-profit corporate owners should exhibit different performance than teams owned by non-monetary-utility seeking proprietors and partners. Another view, sometimes held by the media

[11] Scully (1988) finds that reported income in MLB is kept low for strategic purposes the creative transfer pricing mechanisms.

and public, is that corporate owners care only about money and not about winning. By this view, corporate ownership should be associated with lower winning percentages.

When a fixed effect for corporate ownership is added to the model above for MLB, the effect is near zero and not near usual levels of statistical significance. The same holds true when a fixed effect for the not-for-profit Green Bay Packers is added to the NFL model. These results are available on request.

IV. Concluding Remarks

The preceding empirical analysis permits insight in to relative managerial contributions across different levels of management as well as comparisons over time within sport and across sports. While manager and general manager contributions matter in both baseball and football, manager contributions relative to general managers are higher in football as might be expected based on the complexity of the job. These differences are reflected in salaries, even when adjusted for revenues. In 2007, NFL head coaches made an average salary of $3.25 million while MLB managers made about $1.4 million.[12] As a percent of revenues, these figures are 1.2% (NFL) and 0.8% (MLB). General manager salaries are much more difficult to obtain, particularly in the NFL, so that comparing ratios of manager to GM salaries across sports is not very reliable.

[12] These data are from Sports Business Daily, November 1, 2007 available at http://www.sportsbusinessdaily.com/article/116188 and from Fox Sports, May 6, 2010 available at http://msn.foxsports.com/mlb/story/Billy-Beane-other-MLB-GMs-are-underpaid-050510

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Table 1. MLB Hierarchical/Random Effects Regressions 1970-2011

	Managerial Input			
	All	**w/o Owner**	**w/o GM**	**w/o Manager**
Pct of Variance Due to Random Effect				
Owner	0		0	0
General Manager	6.0	3.7		11.0
Manager	8.5	9.5	14.0	
Fixed Effect Coefficient/(s.e.)				
Endow-O (k)	0.16/(0.08)		0.17/(0.08)	0.24/(0.08)
Endow-GM(k)	0.26/(0.07)	0.27/(0.07)		0.44/(0.06)
Endow-M (k)	0.29/(0.05)	0.31/(0.05)	0.40/(0.05)	
Population	0.001/(0.0005)	0.002/(0.005)	0.002/(0.005)	0.002/(0.005)
First Year Expansion	-0.04/(0.03)	-0.05/(0.03)	-0.04/(0.03)	-0.04/(0.03)
AR(1)	0.33/(0.06)	0.31/(0.05)	0.34/(0.05)	0.37/(0.04)
Constant	0.14/(0.04)	0.20/(0.03)	0.21/(0.04)	0.15/(0.05)
Summary Statistics				
Log Likelihood	1603	1599	1603	1602
Chi-Square (v.linear)/ (p-value)	133/(<0.01)	129/(<0.01)	115/(<0.01)	98/(<0.01)
N	1144	1144	1144	1144

Note: Convergence (k) is in season 4 above.

Table 2. NFL Hierarchical/Random Effects Regressions, 1970-2011

	Managerial Input			
	All	**w/o Owner**	**w/o GM**	**w/o Manager**
Pct of Variance Due to Random Effect				
Owner	4.1		3.0	0.8
General Manager	0.9	3.9		9.1
Manager	21.5	17.1	20.4	
Fixed Effect Coefficient/(s.e.)				
Endow-O (k)	-0.04/(0.11)		-0.01/(0.11)	-0.01/(0.12)
Endow-GM(k)	0.18/(0.07)	0.22 /(0.07)		0.35/(0.06)
Endow-M (k)	0.30/(0.05)	0.30/(0.06)	0.36/(0.05)	
Population	0.001/(0.001)	0.001/(0.001)	0.001/(0.001)	0.001/(0.81)
First Year Expansion	-0.16/(0.08)	-0.16/(0.08)	-0.17/(0.08)	-0.18/(0.08)
AR(1)	0.27/(0.05)	0.17/(0.05)	0.15/(0.05)	0.30/(0.04)
Constant	0.27/(0.06)	0.24/(0.03)	0.31/(0.06)	0.33/(0.07)
Summary Statistics				
Log Likelihood	402	400	403	398
Chi-Square/(p-value)	80/(<0.01)	88/(<0.01)	69/(<0.01)	42/(<0.01)
N	1220	1220	1220	1220

Notes: Convergence (k) is in season 3.

Table 3. MLB & NFL Hierarchical Regression Time Frame Sub-Samples

	MLB		**NFL**	
	1970-1989	**1990-2011**	**1970-1989**	**1990-2011**
Random Effect Variance				
Owner	0	0	5.4	4.8
General Manager	0	14.2	1e-11	2.8
Manager	13.0	5.2	19.3	23.9
Fixed Effects Coefficient/(s.e)				
Endow-O (k)	0.27/(0.11)	0.01/(0.13)	0.11/(0.14)	-0.20/(0.20)
Endow-GM(k)	0.29/(0.09)	0.20/(0.09)	0.26/(0.10)	0.083/(0.09)
Endow-M (k)	0.34/(0.07)	0.22/(0.07)	0.38/(0.08)	0.23/(0.07)
Population	0.001/(0.001)	0.002/(0.001)	-0.001/(0.003)	0.001/(0.002)
First Year Expansion	-0.004/(0.04)	-0.062/(0.03)	-0.073/(0.12)	-0.207/(0.10)
AR(1)	0.33/(0.13)	0.30/(0.07)	0.25/(0.08)	-0.03/(0.07)
Constant	0.05/(0.05)	0.27/(0.07)	0.12/(0.08)	0.43/(0.09)
Summary Statistics				
Log Likelihood	723	885	196	217
Chi-Square/(p-value)	109/(<0.01)	38/(<0.01)	60/(<0.01)	25/(<0.01)
N	506	638	547	673

Notes: Convergence (k) for Endow is 4 for MLB and 3 for NFL.

Table 4. MLB Best Managers and GMs - Minimum 5 Years

Managerial Input	
Manager	**GM**
Bobby Cox (TOR, ATL) 0.018	Brian Cashman (NYY) 0.020
Danny Murtaugh (PIT) 0.015	Bob Howsam (CIN) 0.013
Walter Alston (LAN) 0.014	John Schuerholz (ATL) 0.014
Earl Weaver (BAL) 0.014	Theo Epstein (BOS) 0.013
Danny Ozark (PHI) 0.013	Joe Burke (KC) 0.012
Tony LaRussa (STL et al) 0.010	Joe Brown (PIT) 0.012
Davey Johnson (NYN et al) 0.009	Paul Owens (PHI) 0.009
Sparky Anderson (CIN, DET) 0.009	Walt Jocketty (STL) 0.009
Joe Torre (NYY et al) 0.009	Al Campanis (LAN) 0.007
Jerry Manuel (CHA, NYN) 0.009	Haywood Sullivan (BOS) 0.007
Tony LaRussa (ST 0.006	Dan Duquette (BOS, MON) 0.007
Ron Gardenhire (MIN) 0.008	Ron Scheuler (CHA) 0.007
Dick Williams (OAK et al) 0.008	Joe Garagiola (ARI) 0.006
Terry Francona (BOS) 0.007	Pat Gillick (TOR, SEA) 0.006
Dusty Baker (SF et al) 0.007	Dick O'Connell (BOS) 0.006

Notes: Rankings based on regressions with Manager, GM, and Owner effects and endowments. Owner rankings omitted because of small values and little variability

Table 5. NFL Best Owners and Head Coaches - Minimum 5 Years

Managerial Input	
Head Coach	**Owner**
John Madden (OAK) 0.128	Joe Robbie (MIA) 0.046
Tom Landry (DAL) 0.108	Carroll Rosenbloom (LA, BAL) 0.036
Sean Payton (NO) 0.104	Dan Rooney (PIT) 0.033
Mike McCarthy (GB) 0.104	Robert Kraft (NE) 0.032
Tony Dungy (IND, TB) 0.102	Pat Bowlen (DEN) 0.031
George Seifert (SF, CHA) 0.097	Clint Murchinson (DAL) 0.029
Bill Belichick (NE, CLE) 0.096	Vikings Group 1 0.026
Don Shula (BAL, MIA) 0.087	Jim Irsay (IND) .025
Marty Schottenheimer (CLE et al) 0.085	Eddie DeBartolo (SF, CLE) 0.023
John Harbaugh (BAL) 0.079	Jack Kent Cooke (WAS) 0.023
Joe Gibbs (WAS) 0.067	Virginia McCaskey (CHI) 0.021
George Allen (LA, WAS) 0.074	Scott Biscotti (BAL) 0.020
Bill Cowher (PIT) 0.073	Jerry Jones (DAL) 0.017
Mike Tomlin (PIT) 0.071	Red McCombs (MIN) 0.015
Chuck Noll (PIT) 0.065	Art Rooney (PIT) 0.015

Notes: Head Coach rankings based on regressions with Manager, GM, and Owner effects and endowments. GM rankings based on regressions with GM and Owner effects and endowments. Owner rankings based on Owner effects and endowments.

Table 6. Long-Tenured Coaches with Poor Records – Min 7 Years

MLB	NFL
Darrell Johnson (7) -0.007	Bart Starr (9 years) -0.060
Phil Garner (13) -0.005	Bruce Coslet (8 years) -0.048
Buddy Bell (8) -0.005	Dom Capers (8 years) -0.045
Jim Riggleman (7) -0.005	Dan Henning (8 years) -0.044
Jim Fregosi (12) -0.005	Marion Campbell (9 years) -0.044
Tom Kelly (15) -0.005	Norv Turner (9 years) -0.029
Rene Lacheman (7) -0.003	Ray Perkins (8 years) -0.026
Ralph Houk (12) -0.003	John McKay (9 years) -0.020
Wedg (7) -0.002	Clark (8 years) -0.024
Pat Corralis (8) -0.002	Dave Wannsted (11 years) -0.015)

Appendix. Descriptive Statistics

	MLB				NFL			
	Mean	**S.D.**	**Min**	**Max**	**Mean**	**S.D.**	**Min**	**Max**
Wpct	0.50	0.07	0.27	0.72	0.50	0.19	0.0	1.0
Pop	5.4	4.5	1.3	18.8	4.4	4.4	0.2	18.8
Endow-O	0.5	0.03	0.32	0.67	0.5	0.05	0	0.92
Endow-GM	0.49	0.04	0.34	0.64	0.47	0.10	0	0.87
Endow-M	0.48	0.05	0.32	0.64	0.44	0.12	0	0.87
RE-O	2e-19	3e-18	-5e-18	7e-18	-0.001	0.021	-0.04	0.05
RE-GM	9e-4	0.006	-0.018	0.021	7e-4	0.004	-0.009	0.011
RE-M	0.002	0.007	-0.016	0.028	-0.001	0.056	-0.122	0.153