

## Roles of Performance and Human Capital in College Football Coaches' Compensation

Yuhei Inoue, Jose M. Plehn-Dujowich, Aubrey Kent, and Steve Swanson

Despite the escalation of football coaches' salaries at National Collegiate Athletic Association (NCAA) Football Bowl Subdivision (FBS) institutions, little empirical investigation has been undertaken to identify the determinants of their compensation. As such, the purpose of this study is to explain how the level of coaching compensation is determined based on three theoretical perspectives in managerial compensation: marginal productivity theory, human capital theory, and managerialism. The analysis of compensation data of head football coaches at FBS institutions in 2006–2007 shows that the maximum total compensation of these coaches increases with their past performance. The results further reveal that coaches with greater human capital tend to receive a compensation package where bonuses account for a smaller proportion of the maximum total compensation. Overall, these findings mostly confirm the predictions drawn from managerial productivity theory, human capital theory and managerialism.

The compensation of head football coaches at National Collegiate Athletic Association (NCAA) Football Bowl Subdivision (FBS) institutions is on the rise. The average salary of these coaches exceeded \$1 million for the first time in 2007 (Upton & Wieberg, 2007). Just two years later, this value went up to \$1.36 million, with at least 25 head coaches making over \$2 million (Wieberg, Upton, Perez, & Berkowitz, 2009). In 2010, Mack Brown, head football coach at the University of Texas, became the first college football coach to be paid over \$5 million annually (Berkowitz, 2009). However, this rapid increase in coaching compensation is in contradiction with recent financial problems facing U.S. universities. For instance, the University of California, Berkeley paid \$2.8 million to its head football coach, Jeff Tedford, during the 2009–2010 season despite a \$150 million reduction in state funding that led to layoffs of faculty and staff and increased tuition (Zimbalist, 2010). Consequently, the escalation of football coaches' salaries at FBS schools has caused considerable concern in the greater academic community, as indicated by the results of the *Knight*

*Commission on Intercollegiate Athletics'* survey showing that over 85% of college presidents believe that college football coaches' pay is excessive (Wieberg et al., 2009).

Proponents of high coaches' salaries contend, however, that the increase in coaching compensation is a reflection of the value of coaches in the labor market (Upton & Wieberg, 2007; Wieberg & Berkowitz, 2009; Zimbalist, 2010). That is, college football coaches are rewarded because of their on-field success and contribution to increased revenues, and universities have to pay more for successful coaches if they wish to keep their programs competitive and profitable. Indeed, this perspective is supported by some examples. Most notably, Nick Saban led the University of Alabama football program to win the national championship in 2010 and further increased its revenue by \$9 million in the two years after he took over the head coaching job (Wieberg, 2010). Nevertheless, other examples suggest that this account may not always be valid. For example, Kirk Ferentz, head football coach at the University of Iowa, received a guaranteed salary of \$3 million in 2007, irrespective of a mediocre 6–6 regular season record for the same year and his 55% winning percentage during the previous six years. At Texas A & M University, former head coach Mike Sherman earned \$1.8 million in 2010 despite his 10–15 record over the past two years (Zimbalist, 2010). Furthermore, during the 2011 season, four of the 10 highest paid college football coaches at FBS schools did not finish in the Associated Press (AP) Top 25 poll (McMurphy, 2011).

These two conflicting views lead to a central question about what factors actually contribute to high compensation of college football coaches. Despite this, little empirical investigation has been undertaken to identify the determinants of college football coaches' compensation. Furthermore, while several extant studies have examined factors that influence the compensation of elite sport coaches in other settings, these studies primarily focused on narrow aspects, such as gender (Brook & Foster, 2010; Humphreys, 2000), race (Kahn, 2006), and managerial quality (Frick & Simmons, 2008), and failed to provide comprehensive theoretical frameworks for the determinants of coaching compensation.

As such, the purpose of this study is to explain how the compensation level of NCAA head football coaches is determined based on the implications drawn from three theoretical perspectives in managerial compensation: marginal productivity theory, human capital theory, and managerialism. Marginal productivity theory argues that the compensation of workers reflects the extent to which they contribute to the performance of their organizations (Gomez-Mejia, Tosi, & Hinkin, 1987; Roberts, 1956), thereby predicting a high congruence between pay and performance of college football coaches. Second, human capital theory explains that managerial compensation is influenced by the amount of one's skills and experience, which implies the high compensation of experienced coaches (Becker, 1964; Holcomb, Holmes, & Connelly, 2009). Finally, according to managerialism, compensation structures are influenced by the level of power individuals have on the governance of their organizations (Combs & Skill, 2003; Finkelstein & Hambrick, 1989; Grabke-Rundell & Gomez-Mejia, 2002). Thus, coaches with greater power may be more likely to exert their discretion in the contracting process.

Along with addressing an important and timely research question, the results of the current research can contribute to the literature by testing the effects of performance and human capital on managerial compensation in an ideal context where (1) individual performance can be clearly defined in terms of wins and (2) detailed data on compensation, performance and human capital characteristics are available to the public (Bloom, 1999; Frick & Simmons, 2008; Kahn, 2000; Smart, Winfree, & Wolfe, 2008; Smart & Wolfe, 2003; Wolfe et al., 2005). Moreover, the results of this study can advance the literature on managerial compensation by providing some of the first empirical evidence regarding the effect of managerial power on the structure of pay.

## **Theoretical Background and Hypotheses**

### **Positive Relationship Between Past Performance and Total Compensation**

In the managerial compensation literature, marginal revenue product (MRP) refers to the difference between the actual level of firm performance achieved by its current executive and the expected amount of that firm's

performance achieved by the next best alternative executive (Gomez-Mejia et al., 1987; Roberts, 1956). Under the assumption that perfect information and alternatives are continuously available for both the executive and the firm, the executive is thought to receive compensation equal to the value of his or her MRP (Gomez-Mejia et al., 1987; Roberts, 1956). However, since this assumption is unlikely to hold in reality, the actual compensation of executives tends to be lower than their MRPs (Gomez-Mejia et al., 1987; Roberts, 1956). Nevertheless, marginal productivity theory predicts that there is a positive linkage between executives' pay and their performance, which has been supported by extant empirical evidence (e.g., Bushman, Indjejikian, & Smith, 1995, 1996; Healy, 1985; Itner, Larcker, & Rajan, 1997; Lambert & Larcker, 1987; Sloan, 1993).

The concept of MRP has been extensively applied to the sport setting. In particular, a substantial literature examined the MRP of a player in terms of "the ability or performance that he contributes to the team" (Scott, Long, & Somppi, 1985, p.52), and tested whether players' salaries reflect their levels of MRPs (e.g., Krautmann, 1999; Scott et al., 1985; Scully, 1974). In addition, while less attention has been paid to the direct relationship between MRP and compensation of coaches, several researchers have shown that coaches can have a great effect on the performance of their teams, implying their high MRP in relation to team success (Frick & Simmons, 2008; Hadley, Poitras, Ruggiero & Knowles, 2000; Kahn, 1993). Kahn (1993), for example, demonstrated that the managerial quality of Major League Baseball (MLB) managers predicted by their past performance and experience significantly explained winning percentages of their teams, after controlling for the levels of player input. Hadley et al. (2000) also estimated that highly efficient National Football League (NFL) coaches could allow their teams to gain an additional three to four wins in a season. Similarly, Frick and Simmons (2008) examined the performance data of coaches in the Bundesliga (Germany's premier soccer league) over a 22 year period, finding that head coaches with better quality had the ability to improve the performance of their teams.

While the above studies (Frick & Simmons, 2008; Hadley et al., 2000; Kahn, 1993) highlighted the importance of coaches in professional sport contexts, college coaches may play a greater role in the success of their athletic programs. In particular, coaches can have a significant impact on the talent development of individual players, which can manifest itself in better team performance in current and future seasons. Another major effect that coaches have on team performance is through the acquisition of talent. Unlike the majority of professional sports, talent assessment and selection is ultimately the responsibility of the head coach at the intercollegiate level. As such, it might be suggested that the managerial responsibility and core competencies of a college head coach and its staff would exceed that of their professional brethren. In line with this view, the findings of Smart and Wolfe (2000) indicated that organizational resources developed among coaching staffs are the critical sources of sustainable competitive

advantage for intercollegiate athletic programs. Soebbing and Washington (2011) further found the significant effect of coaching succession on the subsequent performance of college football programs, confirming the important role coaches play in program success.

Given the aforementioned discussion, highly successful coaches are viewed as a valuable asset for intercollegiate athletics programs to achieve high on-field performance; universities are hence assumed to provide coaches with salaries that reflect their past performance to adequately reward their contributions to the program success. Consistent with this, Humphreys (2000) showed that NCAA basketball coaches with high career winning percentages tended to receive greater base salaries than those with lower winning percentages. This finding is replicated by Brook and Foster (2010) who examined the total compensation of NCAA men's basketball during the 2004–2005 season. Consequently, it is expected that the more successful a NCAA FBS head football coach has been in the past, the greater pay he receives. This leads to the following hypothesis:

*Hypothesis 1: The maximum total compensation of the NCAA FBS head football coach is positively associated with his past performance.*

### **Positive Relationship Between Human Capital and Total Compensation**

Although the positive linkage between pay and performance is predicted on the basis of marginal productivity theory, the several examples provided in the introduction section suggest that college football coaches may not necessarily be paid based on their performance. We thus turn our attention to human capital theory to identify an additional factor contributing to the high compensation of college football coaches. According to this theory, while managerial ability is unobservable, it is often manifested in the amount of human capital that managers possess, such as “knowledge, skills, and experience” (Becker, 1964; Holcomb et al., 2009, p.459). Consequently, a manager with a greater level of experience and knowledge is thought to be more capable of performing his or her job, and hence be qualified for receiving higher compensation (Agarwal, 1981; Becker, 1964; Spence, 1973).

Consistent with this proposition, Agarwal (1981), as one of the first to apply human capital theory to executive pay, found that work experience measured by the number of working years had a significant positive effect on the compensation of chief executive officers (CEO). Subsequent studies further supported the positive effect of human capital (e.g., Banker, Plehn-Dujowich, & Xian, 2010; Finkelstein & Hambrick, 1989; Fisher & Govindarajan, 1992). By examining the compensation of profit center managers (PCM), Fisher and Govindarajan (1992) showed that a PCM's compensation was positively associated with three measures of human capital: job tenure, firm tenure, and age. Banker et al. (2010) further found a positive relationship between human capital variables and the compensation of university presidents.

In the coaching context, Frick and Simmons (2008) showed that the level of the coach's human capital measured by experience positively affected the compensation of head coaches at the Bundesliga. Smart et al. (2008) also found that the compensation of MLB managers were positively correlated with experience related variables, such as age and number of years as a manager. The relationship between human capital and coaching compensation may be more apparent among college head football coaches, whose responsibilities include not only achieving high on-field performance but also other activities that would require high managerial ability, such as alumni and media relations, fundraising, the supervision of assistant coaches and staff, and program operations (Berman, 2008; Cohn, 2008). As a result, it is suggested that the greater amount of human capital a college football coach possesses, the greater level of total compensation he is likely to receive. Our next hypothesis is:

*Hypothesis 2: The maximum total compensation of the NCAA FBS head football coach is positively associated with his human capital.*

### **Negative Relationship Between Human Capital and Bonus Proportion**

Along with its positive effect on total compensation, human capital may affect the structure of coaching compensation, such that coaches with higher human capital tend to receive a lower percentage of their maximum total compensation as bonuses. This prediction can be explained from the following two perspectives. First, as discussed earlier, human capital variables serve as the signal of managerial ability (Agarwal, 1981; Becker, 1964; Spence, 1973). As such, athletic administrators may see little need to encourage an experienced football coach to reveal his ability by providing incentives because the ability of that coach to perform his job is manifested in his high human capital. Rather, they may choose to guarantee the coach a high level of fixed compensation, which is not affected by the achievement of specific goals, to show their trust in his ability and establish a favorable relationship with him.

Second, while human capital theory views human capital variables as indicators of managerial ability, an additional perspective, so called managerialism, exists to indicate that these variables may also reflect the amount of power executives have over corporate governance (Combs & Skill, 2003; Finkelstein & Hambrick, 1989; Grabke-Rundell & Gomez-Mejia, 2002). Combs and Skill (2003) and Finkelstein and Hambrick (1989), for example, argued that CEOs with longer tenure would likely have greater influence over their Boards of Directors, and hence would be more capable of “effectively dictating what their own pay will be” (Finkelstein & Hambrick, 1989, p.124). Moreover, Grabke-Rundell and Gomez-Mejia (2002) explained that the accumulation of knowledge and experience could allow an executive to gain expert power, which results in high dependence of board members on the executive in determining the best

allocation of organizational resources. Such dependence would likely place executives in a favorable position when they negotiate their contracts with the board, enabling them to use their discretion in the contracting process (Grabke-Rundell & Gomez-Mejia, 2002). In particular, assuming that most executives are risk averse, an executive is thought to prefer fixed compensation over incentive-based compensation (e.g., bonuses) to bear less personal risk, given a certain level of the total compensation (Mehran, 1995). Therefore, the compensation packages of executives who have great power over board members should likely include higher levels of fixed compensation.

The latter perspective may be especially applicable to the college football context in which several experienced coaches have been described to have great influence over the university administration. One notable example is Joe Paterno, the former head football coach of Pennsylvania State University. Until the sexual abuse scandal of his assistant forced his departure, Paterno had remained the head coach of Penn State despite numerous attempts by the university's senior administrators and athletic director to convince him to retire (Wieberg, 2011). The power of college football coaches at U.S. universities is further highlighted by the following statement of Gordon Gee, the president of The Ohio State University, in response to a question on the potential firing of the university's then head football coach Jim Tressel: "Let me be very clear. I'm just hoping the coach doesn't dismiss me" (Wieberg, 2011, para.31). These cases thus suggest that head football coaches with high human capital can gain power over university governance. In turn, such power may allow coaches to receive a compensation package where bonuses (i.e., variable compensation) account for a small proportion of the maximum total compensation. This leads to:

*Hypothesis 3: The proportion of maximum bonus in the maximum total compensation of the NCAA FBS head football coach is negatively associated with his human capital.*

## Methods

### Sample Data

To test the hypotheses, we examined compensation data of head football coaches at NCAA FBS institutions in 2006 and 2007. FBS is the most competitive football division in U.S. college football. It consists of 11 different conferences, each of which has 8–13 schools, and three independent schools that do not belong to any particular conferences. There were 119 FBS institutions in 2006 and 120 in 2007, resulting in a total of 239 university-year observations during this study period. From this initial pool, we restricted our study sample to coaches who served as head coach of any FBS football program at least one year in the past, to use career winning percentages at FBS as the measurement of past performance. This resulted in the

exclusion of 24 observations, leading to a final sample of 215 university-year observations.

### Measures

**Coaching Compensation.** We collected the compensation data of FBS head coaches from the *USA Today's* online database in 2006 and 2007. This database lists three types of compensation data: salary, other income, and maximum bonus (USA Today, 2007). Salary includes regular payment directly from the university, such as base salary, deferred payment, and annuity payment. Other income refers to incomes from other agreements that are not related to salary, such as media deals and shoes and/or apparel contracts. These two types of compensation capture the fixed aspect of compensation since the amount of pay does not vary with the achievement of specific goals in the current season. In contrast, maximum bonus represents the variable aspect of coach compensation, referring to the greatest amount of additional payment that the coach can receive if his team meets prescribed goals related to on-field performance and other criteria (e.g., academic performance of student athletes). For the first dependent variable used to test Hypotheses 1 and 2, we obtained the maximum total compensation value of each coach by summing the three types of compensation. In addition, to test Hypothesis 3, we included bonus proportion (i.e., the proportion of maximum bonus in maximum total compensation) as the second dependent variable.

**Past Performance.** Consistent with Brook and Foster (2010) and Humphreys (2000), past performance of the coach was measured as his career FBS winning percentage before the season examined.

**Human Capital.** The literature has suggested that human capital increases with the amount of experience that a person has in relation to his or her job (Agarwal, 1981). Furthermore, in the coaching context, Smart and his colleagues argued that experience of the coach can be divided into generic, industry (or league/division)-specific and firm (or program)-specific experiences (Smart et al., 2008; Smart & Wolfe, 2003). The coach's human capital was thus measured with three experience-related variables: age, past years as FBS head coach, and past tenure in the program. Age was a proxy for the coach's generic experience and was measured as the chronological age of the head coach at the beginning of the season. Past years as a FBS head coach was a proxy for the coach's FBS-specific experience and was operationalized as the number of years for which the coach has served as head coach for any FBS programs. Past tenure was a proxy for the coach's program-specific experience and was measured as the number of years for which the coach has served as the head coach of the current program. The results of exploratory factor analysis with the three variables showed that only one factor exceeded an eigenvalue of greater 1, which satisfies the Kaiser criterion (see Appendix). We thus used this factor (named "experience") as an indicator of coaches' human capital.

**Control Variables.** To take into account the possible effect of alma mater status of the coach on his compensation, the study included a dummy variable, *alma mater*, which had the value of 1 if the coach served as the head coach in his alma mater and 0 for otherwise. In addition, since previous research suggests that coaches working for larger programs tend to receive higher compensation (e.g., Humphreys, 2000), the following two variables were included as indicators of program size: the seating capacity of the home football stadium and a dummy variable, *BCS*, with 1 for football programs that belong to Bowl Championship Series (BCS) conferences and 0 for otherwise.<sup>1</sup> A dummy variable, *urban campus*, was also entered to control for the location effect on compensation (1 if the campus was located in either an urban or suburban area; 0 for otherwise).

The fifth control variable, *research university*, had 1 if the university was classified in the “Research Universities—Very High Research Activity” (RU/ VH) classification in the *Carnegie Classification of Institutions of Higher Education* and 0 if otherwise; whereas the sixth control variable, *public university*, had 1 for public universities and 0 for private universities. These two dummy variables were included to capture the effect of the institutional status of the university where the coach worked. In addition, consistent with Kahn (2006), the possible effect of the coach’s race on compensation was controlled by including a dummy variable (named “race”) that had 1 for Caucasian coaches and 0 for non-Caucasian coaches. To distinguish coaches who newly served as the head coach of their programs, we included a dummy variable named *new coach* (1 for coaches who were in their first year as head coach at the universities; 0 for otherwise). Finally, a year dummy (named “year 2006”) was included to control for any differences in compensation by year (1 for the 2006 season; 0 for the 2007 season).

## Analysis

For the main analysis, we performed two separate ordinary least squares (OLS) regression analyses. Our full empirical model can be expressed as:

$$\begin{aligned} \text{Total compensation (Bonus proportion)}_{i,t} = & \\ & \beta_0 + \beta_1 \text{Career FBS winning \%}_{i,t} + \\ & \beta_2 \text{Experience}_{i,t} + \beta_3 \text{Alma mater}_i + \\ & \beta_4 \text{Stadium capacity}_{i,t} + \beta_5 \text{BCS}_i + \\ & \beta_6 \text{Urban campus}_i + \beta_7 \text{Research university}_i + \\ & \beta_8 \text{Race}_i + \beta_9 \text{New coach}_{i,t} + \\ & \beta_{10} \text{Year 2006}_i + \varepsilon_i, \end{aligned}$$

Where the subscript *i* refers to the head coach and *t* refers to the year; *Total compensation* is measured as the natural logarithm of the coach’s annual maximum total compensation value; *Bonus proportion* is measured as the natural logarithm of the proportion of the coach’s

maximum bonus value in his maximum total compensation value; *Career FBS winning %* is the natural logarithm of the career winning percentage as a FBS head coach before the current season; *Experience* is a factor formed by age, past tenure, and years as FBS head coach; *Alma mater* has 1 for coaches who served as a head coach for their alma mater and 0 for otherwise; *Stadium capacity* is the natural logarithm of the maximum seating capacity of the home football stadium; *BCS* has 1 for football programs that belong to BCS conferences and 0 for otherwise; *Urban campus* has 1 if the university is located at either an urban or suburban area and 0 if otherwise; *Research university* has 1 if the university is classified in the RU/ VH classification in the Carnegie Classification of Institutions of Higher Education and 0 if otherwise; *Public university* has 1 for public universities and 0 for private universities; *Race* has 1 for Caucasian coaches and 0 for non-Caucasian coaches; *New coach* has 1 for coaches who newly served as the head coach of their programs, and 0 for otherwise; *Year 2006* has 1 for 2006 data and 0 for 2007 data.

## Results

### Descriptive Results

Table 1 illustrates the descriptive statistics of selected coach characteristics. On average, the FBS football coaches included in the analysis had maximum annual total pay of \$1,284,725, 19% of which was accounted for by maximum bonus compensation. With respect to their past performance, the coaches had an average career FBS winning percentage of 54%. As for the experience-related characteristics, the average age of the coaches was 53, and they on average had served as head coach of their current programs for about five years and for any FBS football programs for about eight years.

Table 2 shows the correlations among the variables included in the regression analysis. The results indicated that total compensation had a significant correlation with career FBS winning percentage ( $r = .47$ ) and experience ( $r = .26$ ), consistent with Hypotheses 1 and 2. Other control variables that had a significant correlation with total compensation include: stadium capacity ( $r = .82$ ), research university ( $r = .51$ ), BCS ( $r = .77$ ), and urban campus ( $r = .22$ ). As for bonus proportion, research university ( $r = .15$ ), public university ( $r = .34$ ), new coach ( $r = .17$ ), and Year 2006 ( $r = -.21$ ) had a significant correlation, but experience was not significantly associated with the outcome ( $r = -.11$ ). While this result was in conflict with Hypothesis 3, the negative effect of experience was further assessed through regression.

### Testing of Heteroscedasticity and Autocorrelation Issues

Before performing the regression analysis, we evaluated the assumptions of homoscedasticity and independence of errors that are essential for obtaining unbiased parameter estimates in OLS regression (Tabachnick & Fidell, 2006).

**Table 1 Descriptive Summary of the Individual Characteristics of FBS Head Coaches**

Variables	N	Mean	S.D.	Min	Max
Total compensation	184	1,284,724.82	918,504.05	130,000.00	4,365,000.00
Bonus proportion	184	0.19	0.14	0.00	.60
Career FBS winning percentage	215	0.54	0.17	0.08	1.00
Past years as FBS head coach	215	7.79	6.94	1.00	41.00
Past tenure in the program	215	5.10	5.41	0.00	41.00
Age	215	52.63	5.41	32.00	81.00

**Table 2 Descriptive Statistics and Correlations**

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12
1. Total compensation	13.76	0.85												
2. Bonus proportion	0.17	0.11	0.28											
3. Career FBS winning	0.43	0.11	0.47	0.14										
4. Experience	0.03	0.88	0.26	-0.11	0.35									
5. Alma mater	0.16	0.37	0.02	0.10	0.02	0.03								
6. Stadium	10.79	0.44	0.82	0.09	0.38	0.27	0.02							
7. Research	0.48	0.50	0.51	0.15	0.24	0.21	0.00	0.56						
8. BCS	0.57	0.50	0.77	0.14	0.29	0.16	0.01	0.75	0.62					
9. Urban campus	0.83	0.38	0.22	0.03	0.08	0.17	0.12	0.18	0.19	0.04				
10. Public university	0.95	0.22	0.05	0.34	0.15	-0.07	0.10	0.06	0.12	-0.04	-0.10			
11. Race	0.95	0.22	-0.07	-0.09	0.06	0.15	-0.18	-0.12	-0.08	-0.15	0.03	-0.05		
12. New coach	0.05	0.23	0.12	0.17	0.13	-0.12	-0.10	0.02	0.10	0.16	-0.02	0.05	0.05	
13. Year 2006	0.54	0.50	-0.14	-0.21	-0.10	-0.03	0.01	-0.05	-0.05	-0.02	-0.02	-0.21	0.05	-0.17

Note.  $N = 184$ ;  $p < .05$  for all  $|r|^3 .15$ ;  $p < .01$  for all  $|r|^3 .20$ ; <sup>a</sup> Natural logarithm values are used.

test,

First, to assess the assumption of homoscedasticity, we performed the Breusch-Pagan Lagrange Multiplier test (Breusch & Pagan, 1979). This test indicates the presence of heteroscedasticity if an associated chi-square value yields a significant result. In the current analysis, the two regression models did not have a significant chi-square value at the 5% level of significance, confirming the nonexistence of heteroscedasticity.

Second, the assumption of the independence of errors was evaluated using the Durbin-Watson (DW) statistic ( $d$ ) after arranging the data by conference membership<sup>2</sup> (Gujarati, 2003; Tabachnick & Fidell, 2006). The DW tests for the two regressions yielded a  $d$  value of 1.67 for the Total Compensation model and a  $d$  value of 1.66 for the Bonus Proportion model. These two values lie between a lower bound of 1.56 and an upper bound of

1.79 obtained from DW statistics tables for the current sample size (184) and number of exploratory variables (11).<sup>3</sup> According to decision rules used for the DW

the result that the two  $d$  values lie between the lower and upper bounds does not allow us to make a decision on whether spatial autocorrelation is present (Gujarati, 2003). In other words, while there is no conclusive evidence for autocorrelation, the possibility of autocorrelation cannot be rejected. Given this result, the following presents the results of the Newey-West procedure, robust estimation for the presence of autocorrelation, along with the results of the standard OLS regressions.

### Testing of Hypotheses

Table 3 presents the results of the OLS regression analysis. Due to the unavailability of compensation data for some coaches in the USA Today's database, the analysis included 184 observations for both models.

The results showed that the independent variables collectively explained a substantial proportion of the variance in total compensation ( $Adj. R^2 = .77$ ). Specifically,

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**Table 3 Results of OLS Regression Analysis**

Variables	Total compensation			Bonus proportion		
	<i>B</i>	$\beta$	<i>t</i>	<i>B</i>	$\beta$	<i>t</i>
Career FBS winning percentage	1.3	.17	4.08**	.11	.11	1.34
Experience	.00	.01	.11	-.02	-.18	-2.30*
Alma mater	-.02	-.01	-.20	.02	.07	.92
Stadium capacity	.90	.46	7.67**	-.03	-.12	-1.03
BCS	.72	.42	6.72**	.04	.19	1.62
Urban campus	.28	.12	3.20**	.03	.09	1.17
Research university	-.14	-.08	-1.65	.01	.04	.43
Public university	.09	.02	.57	.17	.32	4.31**
Race	.13	.03	.89	-.01	-.03	-.38
New coach	.03	.01	.21	.04	.08	1.08
Year 2006	-.16	-.09	-2.47*	-.03	-.12	-1.71
Adjusted <i>R</i> <sup>2</sup>	.77			.16		
<i>N</i>	184			184		
$\chi^2$	3.6			.62		
<i>d</i>	1.6			1.66		

Note. *B* = unstandardized coefficient;  $\beta$  = standardized coefficient;  $\chi^2$  = chi square value obtained for the Breusch-Pagan Lagrange Multiplier test; *d* = Durbin-Watson statistic; \* *p* < .05, \*\* *p* < .01. *N* = 184.

along with the significant positive effects of stadium capacity ( $\beta = .46$ ; *t* value = 7.67, *p* < .01), BCS ( $\beta = .42$ ; *t* value = 6.72, *p* < .01) and urban campus ( $\beta = .12$ ; *t* value = 3.20, *p* < .01), and the significant negative effect of Year 2006 ( $\beta = -.16$ ; *t* value = -2.47, *p* < .05), career FBS winning percentage was found to have a significant positive effect on total compensation ( $\beta = .17$ ; *F* value = 4.08, *p* < .01). This finding indicates that coaches with higher past performance received higher levels of compensation, consistent with Hypothesis 1. On the contrary, the results did not provide support for the positive effect of experience on total compensation ( $\beta = .01$ ; *t* value = .11, *p* = .91), which led to the rejection of Hypothesis 2.

In Hypothesis 3, we predicted that coaches with more experience would receive a lower proportion of bonus in the maximum total compensation. This hypothesis was tested by regressing bonus proportion on the same independent variables included in the first model. The overall model accounted for a small but significant proportion of the variance in bonus proportion (*F*-value = 4.21, *p* < .01; *Adj. R*<sup>2</sup> = .16).<sup>4</sup> Furthermore, in line with our prediction, experience had a significant negative effect on bonus proportion ( $\beta = -.18$ ; *t* value = -2.30, *p* < .05), supporting Hypothesis 3.

### Robustness Check

Although the assumption of homoscedasticity was confirmed for the current analysis, the assumption of independence of errors was not fully resolved based on the results of the DW test reported earlier. Therefore, to further address this concern, we performed a robust statistical procedure developed by Newey and West (1987) as additional regression analysis. The Newey-West

procedure is designed to handle both autocorrelation and heteroscedasticity by calculating the corrected standard errors, named HAC (heteroscedasticity- and autocorrelation- consistent) standard errors (Gujarati, 2003; Newey & West, 1987). The use of HAC standard errors has been shown to address the infl of *t* values attributed to both autocorrelation and heteroscedasticity, providing robust results for ordinary least squares (OLS) estimates, regardless of the presence of the two issues (Gujarati, 2003).

Table 4 provides results of the two regression analyses with the Newey-West procedure. Although changes in *t* values were observed, the results provided consistent support for the positive effect of FBS winning percentage on total compensation (*B* = 1.34; *t* value = 4.22, *p* < .01) and the negative effect of experience on bonus proportion (*B* = -.02; *t* value = -2.39, *p* < .05), while rejecting the positive effect of experience on total compensation (*B* = .00; *t* value = .13, *p* = .89). These results thus validated the robustness of the OLS parameter estimates discussed above.

### Discussion

This study investigated how the past performance and human capital of head football coaches at NCAA FBS institutions would influence their compensation by examining the compensation data of these coaches in 2006–2007. Consistent with marginal productivity theory, the results indicate that the maximum total compensation of football coaches increases with their past performance. On the contrary, the analysis does not identify a positive relationship between coaches' human capital and maximum total compensation after controlling for their past performance and other personal and



**Table 4 Results of Regression Analysis with the Newey-West Procedure**

Variables	Total compensation			Bonus proportion		
	<i>B</i>	<i>S.E.</i>	<i>t</i>	<i>B</i>	<i>S.E.</i>	<i>t</i>
Career FBS winning percentage	1.34	.32	4.22**	.11	.08	1.36
Experience	.00	.03	.13	-.02	.01	-2.39*
Alma mater	-.02	.10	-.18	.02	.03	.74
Stadium capacity	.90	.11	8.04**	-.03	.03	-.92
BCS	.72	.12	6.02**	.04	.03	1.55
Urban campus	.28	.07	4.23**	.03	.02	1.31
Research university	-.14	.08	-1.66	.01	.02	.46
Public university	.09	.14	.64	.17	.02	7.94**
Race	.13	.10	1.30	-.01	.03	-.48
New coach	.03	.13	.24	.04	.04	1.02
Year 2006	-.16	.06	-2.98*	-.03	.02	-1.78
Adjusted $R^2$	.77			.16		
<i>N</i>	184			184		

Note. *B* = unstandardized coefficient; *S.E.* = HAC standard error; \*  $p < .05$ , \*\*  $p < .01$ .  $N = 184$ .

institutional characteristics. While this rejects the prediction drawn from human capital theory, human capital is found to influence the structure of compensation; coaches with greater human capital are likely to receive a compensation package where fixed compensation accounts for a higher percentage of the total compensation, supporting the perspective of human capital theory and managerialism.

Despite the several cases indicating the absence of the pay-performance relationship in the college football context (e.g., McMurphy, 2011; Zimbalist, 2010), the current finding shows that past performance of FBS head football coaches positively affects their maximum total compensation, providing justification for the high compensation of these coaches at least to some extent. It should be noted that this finding is in conflict with the results of extant studies identifying no relationship between pay and performance of elite sport coaches (Frick & Simmons, 2008; Kahn, 2006; Smart et al., 2008). These studies, however, differ from the current study in that they examined the effect of performance on coaching compensation at professional sport settings, such as the National Basketball Association (NBA; Kahn, 2000), Major League Baseball (MLB; Smart et al., 2000), and Bundesliga (Frick & Simmons, 2008). In contrast, this study as well as Humphreys (2000) and Brook and Foster (2010), the other two studies finding a positive relationship between pay and performance, tested this relationship at college sport settings. Consequently, these conflicting results may support the notion discussed earlier that college coaches could play a more important role in the success of their teams due to their greater responsibilities for player development and the acquisition of talent than their professional counterparts. That is, given their greater levels of contributions to team performance, college coaches are more likely to

be compensated based on their past performance than coaches of professional teams.

It is also noteworthy that when compared with Tosi, Werner, Katz, and Gomez-Meija's (2000) finding that performance measures on average explained less than 5% of the variance in the compensation of CEOs, the results of the correlation analysis indicate that the variance of career winning percentage overlaps with that of the total compensation of college football coaches for over 20% ( $R^2 = .22$ ). This result appears to suggest that there is a greater congruence between pay and performance in the current setting than in the corporate setting.

However, while the above discussions highlight the important role of past performance in determining the compensation of college football coaches, the examination of the standardized regression results indicate that the two indicators of program size, stadium capacity ( $b = .46$ ) and BCS ( $b = .42$ ), had greater effects than did past performance ( $b = .17$ ). That is, universities that offer a similar level of institutional support for their football programs tend to provide their head football coaches with a similar level of compensation, regardless of past performance of the coaches. This implies the prevalence of benchmarking among collegiate athletic administrators in determining the compensation of their coaches, a practice that could lead to the further escalation of coaching compensation due to universities' efforts to keep up with their rival institutions. A reassessment of compensation practices thus may be necessary to provide coaches with more appropriate pay that better reflects their values in the labor market.

Although this study does not identify the positive effect of coaches' human capital on their maximum total compensation, the non-significant effect of human capital can be explained by the fact that the current context provides a clear performance measure. As noted,

athletic administrators are thought to align human capital measures with the coach's compensation since they may indicate his unobserved ability (Spence, 1973). However, it may not be necessary for the administrators to rely on human capital measures in the context of sport where measures of past performance can serve as a clearer indicator of the coach's ability to achieve on-field success. In addition, while the previous studies on coaching compensation found the significant effect of experience on compensation (Fricker & Simons, 2008; Smart et al., 2008), they failed to include a comprehensive set of control variables in their analyses. Indeed, the current analysis also shows a significant correlation between experience and maximum total compensation; this relationship, however, disappears when the factor is included with the other determinants. This may suggest that human capital is a less important factor in determining the level of coaching compensation than past performance.

Nonetheless, one notable finding regarding the effect of human capital is that it has a significant negative effect on bonus proportion. That is, coaches tend to receive a lower proportion of bonus in their total compensation if they have a greater level of human capital. As noted earlier, this relationship is consistent with the perspective derived from human capital theory that bonus compensation has little use for experienced coaches as their ability is manifested in their high human capital. Moreover, this finding may reflect a power imbalance between athletic administrators and head football coaches; the accumulation of knowledge, experience and skills increases the expert power of coaches, allowing them to have influence over athletic administrators in designing the structure of pay. While a number of examples indicate that experienced college coaches can possess great power in their institutions, the current research provides some of the first empirical evidence on how these coaches can exert their discretion in the contracting processes.

### Limitations and Future Research

We acknowledge the following limitations within the current research and suggest directions for future research based on these limitations. First, the current dataset includes compensation and other related data over a two year period. Since the use of the short-term observations limits our ability to examine the long-term relationships among performance, human capital, and compensation, future research can conduct more comprehensive investigation of these relationships by including multiple-year data. Second, our results are based on the data of one sector of the sport industry. Given that compensation and performance data of other sectors of the sport industry (e.g., college basketball) are readily available, future research should investigate the effects of performance and human capital on compensation using different sport samples. Third, while this study solely focused on the expert power of coaches manifested in their levels

of human capital, Grabke-Rundell and Gomez-Mejia (2002) identified other types of managerial power, such as structural and prestige power. Therefore, additional investigations should be conducted to examine how different types of power may influence the structure of coaching compensation. Finally, this study did not analyze the detailed contract structures of college football coaches. The USA Today's database lists the actual contracts of the majority of the coaches at public institutions, which provide detailed information regarding incentives, contract terms, and breach of contract. Therefore, in-depth content analysis of these contracts should provide a more comprehensive insight into the determinants of coaching compensation.

In conclusion, the results of this study make a significant contribution to the literature by identifying the positive relationship between past performance and compensation of FBS college football coaches. Furthermore, this study provides new insight into the extant body of knowledge by demonstrating that human capital can play an important role in determining the structure of coaching compensation.

### Notes

1. Of the 11 individual conferences constituting the NCAA FBS division, six conferences are collectively called "BCS conferences." These BCS conferences receive automatic bids for their conference champion to the Bowl Championship Series (BCS), and consist of schools that provide substantial support for their football programs.
2. Due to the use of panel data (i.e., longitudinal cross-sectional data), the current analysis may be subjected to spatial autocorrelation, or "correlation in space" (Gujarati, 2003, p.405). Since the analysis of spatial autocorrelation requires the ordering of data based on a spatial characteristic, we arranged the data by "conference membership." The use of conference membership is appropriate because schools in a given conference are often located in nearby regions and are assumed to use similar coaching compensation due to frequent interactions and communication among member schools, when compared with schools in another conference. That is, a systematic pattern in coaching compensation practice may exist depending on membership in different conferences. It should also be noted that while the Durbin-Watson test is mainly used for assessing autocorrelation in time series data, this test can serve as an assessment of spatial autocorrelation if the data are arranged by a categorical variable relating to spatial variation (van Stel, 2006).
3. Durbin-Watson statistics tables offer certain lower and upper bounds based on sample size and the number of explanatory variables used in a model, and these bounds are used to determine whether the model has autocorrelation (Gujarati, 2003). In particular, if a computed Durbin-Watson value ( $d$ ) is

less than a lower bound ( $d_L$ ), there is evidence of positive autocorrelation. If  $d$  is greater than an upper bound ( $d_U$ ) but smaller than  $(4 - d_U)$ , there is no evidence of positive autocorrelation. Finally, if  $d$  lies between  $d_L$  and  $d_U$ , there is

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inconclusive evidence regarding the presence or absence of positive autocorrelation.

4. The low adjusted R-squared value may suggest that this model is subjected to model specific errors (Gujarati, 2003). To address this concern, we performed Ramsey's RESET test (Ramsey, 1969; see Gujarati (2003) for detailed procedures). Results showed that the inclusion of additional regressors proposed by Ramsey (1969) did not significantly improve the model fit, providing support for the adequate specification of the original model.

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## Appendix

### Exploratory Factor Analysis Results for Experience-Related Variables

Variables	Factor Loadings
Age	.72
Past tenure in the program	.63
Years as a FBS head coach	.89
<i>Eigenvalue</i>	1.70
<i>% of variance explained</i>	56.60
<i>Number of observations</i>	215