Factors Affecting the Probability That a NFL Head Coach Will be Fired

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I. Abstract

This study uses a logit model to analyze the factors affecting the probability that an NFL head coach will be fired. Our dataset is composed of fifty, randomly selected head coaches from the years 2004 to 2014. Explanatory variables included career experience, tenure, the previous year's winning percentage, career playoff wins, whether or not the coach was in the playoffs the prior year, and race. The previous year's winning percentage was found to significantly affect the probability a coach would be fired. The model's correct prediction rate is 80%.

II. Empirical Model and Variables

$$FIRED_{it} = f(EXP_{it}, TENURE_{it}, WIN100_{it}, PLAYOFFWINS_{it}, INPLAYOFFS_{it}, RACE_{it})$$

- $FIRED_{it}$= Whether or not the head coach was fired. 1 if fired, 0 if not fired
- EXP_{it}= How many years the coach has been a head coach in the NFL
- $TENURE_{it}$= How many years the coach has been with the team they are currently coaching
- $WIN100_{it}$= The ratio of wins to total games played in the previous year (multiplied by 100 to be represented as a percentage)
- $PLAYOFFWINS_{it}$= How many playoff wins a coach has in his career
- $INPLAYOFFS_{it}$= Dummy variable: whether or not a coach was in the playoffs the previous year. 1 if coach was in the playoffs, 0 if not
- $RACE_{it}$= Dummy variable for whether or not a coach is African American or not. 1 if coach is African American, 0 if other

(i indexes coaches, t indexes time)

III. Theory and Hypotheses

- EXP_{it} is hypothesized to have a negative relationship with $FIRED_{it}$. As NFL experience increases, the probability of being fired should decrease
- $TENURE_{it}$ is hypothesized to have a negative relationship with $FIRED_{it}$. As tenure increases, the probability of being fired should decrease. $WIN100_{it}$ is hypothesized to have a negative relationship with $FIRED_{it}$. As the winning percentage increases, the probability of being fired should decrease
- $PLAYOFFWINS_{it}$ is hypothesized to have a negative relationship with $FIRED_{it}$. As the number of playoff wins increases, the probability of being fired should decrease
- $INPLAYOFFS_{it}$ is hypothesized to have a negative relationship with $FIRED_{it}$. If a coach was in the playoffs the previous year, the probability of being fired should decrease
- $RACE_{it}$ is hypothesized to have a positive relationship with $FIRED_{it}$. History and supporting literature suggests that if a coach is African-American, the probability of being fired will increase

IV. Data

- N= 50 coaches (13 fired, 37 not fired)
  - To randomize sample, I alphabetized all 32 NFL teams and gave them corresponding numbers from 1-32. Using a random number generator to generate 5 random numbers for each year(2004-2014), I then found the team and corresponding coach for that year
- Sources:
  - Data Collection: pro-football-reference.com and thehuddle.com
  - Literature: Journal of Sports Economics and Managerial Decision Economics

V. Empirical Results

Dependent Variable: FIRED
Method: ML - Binary Logit (Newton-Raphson / Marquardt steps)
Date: 12/01/15 Time: 13:39
Sample: 1 55
Included observations: 55
Convergence achieved after 6 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.971262	1.210794	0.802169	0.4225
EXP01	-0.058200	0.165457	-0.351755	0.7250
TENURE	0.207914	0.143789	1.445962	0.1482
WIN100	-0.074056	0.034327	-2.157367	0.0310
PLAYOFFW	0.045057	0.168327	0.267679	0.7889
INPLAYOFFS	0.321475	1.607120	0.200032	0.8415
RACE	0.575730	0.811898	0.709116	0.4783

McFadden R-squared	0.249490	Mean dependent var	0.236364
S.D. dependent var	0.428764	S.E. of regression	0.395250
Akaike info criterion	1.075381	Sum squared resid	7.498676
Schwarz criterion	1.330859	Log likelihood	-22.57297
Hannan-Quinn criter.	1.174176	Deviance	45.14594
Restr. deviance	60.15372	Restr. log likelihood	-30.07686
LR statistic	15.00778	Avg. log likelihood	-0.410418
Prob(LR statistic)	0.020196		
Obs with Dep=0	42	Total obs	55
Obs with Dep=1	13		

Expectation-Prediction Evaluation for Binary Specification
Equation: UNTITLED
Date: 12/01/15 Time: 13:39
Success cutoff: C = 0.5

	Estimated Equation			Constant Probability		
	Dep=0	Dep=1	Total	Dep=0	Dep=1	Total
P(Dep=1)<=C	38	7	45	42	13	55
P(Dep=1)>C	4	6	10	0	0	0
Total	42	13	55	42	13	55
Correct	38	6	44	42	0	42
% Correct	90.48	46.15	80.00	100.00	0.00	76.36
% Incorrect	9.52	53.85	20.00	0.00	100.00	23.64
Total Gain*	-9.52	46.15	3.64			
Percent Gain**	NA	46.15	15.38			

	Estimated Equation			Constant Probability		
	Dep=0	Dep=1	Total	Dep=0	Dep=1	Total
E(# of Dep=0)	34.61	7.39	42.00	32.07	9.93	42.00
E(# of Dep=1)	7.39	5.61	13.00	9.93	3.07	13.00
Total	42.00	13.00	55.00	42.00	13.00	55.00
Correct	34.61	5.61	40.21	32.07	3.07	35.15
% Correct	82.39	43.12	73.11	76.36	23.64	63.90
% Incorrect	17.61	56.88	26.89	23.64	76.36	36.10
Total Gain*	6.03	19.48	9.21			
Percent Gain**	25.51	25.51	25.51			

VI. Conclusion

- The coefficient for WIN100 is statistically significant and has the expected sign
- The model's correct prediction rate is 80%
  - 46% of the fired coaches and 90% of the non fired coaches are predicted correctly
- Results must be analyzed with caution due to small sample size