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Coaching Decisions Influence over Potential Overtime Games in the NFL

by Rosemary L. Walker[1]

In the National Football League, it is important for a coach to use all information available when deciding, during the game, whether to attempt to win a game during regulation or to play for overtime. An incorrect decision may result in the team not making the playoffs and the coach losing his job. The probability the home team will win an overtime game depends upon pre-game statistics (winning percentage and winning streak), momentum going into overtime (points scored in the fourth quarter), and the overtime coin toss, which can dramatically increase the effectiveness of the decision of whether to play for overtime.

Key Words: football, overtime, strategy, prediction

I. Introduction

In 1974 the National Football League (NFL) added sudden death overtime to resolve ties in their regular season games. Since then there have been 376 overtime games and during the 2002 season there were more overtime games than any other single season with 25 games.

Since 1994, when the NFL instituted changes geared toward increasing offensive production, there has been a significant increase in the number of overtime games. With every team expecting to have, on average, one overtime game each season (16 overtime games per season), winning these close games becomes more important. In 2004, 4 teams made the playoffs by one win over 5 teams who just missed the playoffs. Of these 9 "on the bubble" teams, 7 of them were participants of overtime games: furthermore, of the 12 overtime games played during that season, 10 of them had at least one of the above "on the bubble" teams as one of the participants. Knowing before the game is over; the chance that the team will win in overtime will help coaches make the decision whether to play for overtime or the win at the end of regulation. Winning these close games may be the difference between the coach losing his job or his team going to the playoffs, thereby influencing future seasons.

In professional football the coaching staff makes these game-time decisions that will impact whether they will win, tie, or lose the game. Most of them occur during the fourth quarter, when they are on offense. Announcers and fans expect that the head coach will attempt to tie the game if possible when the team is behind. They expect the coach to attempt a field goal on fourth down when the team is behind by three points late in the fourth quarter and then attempt to win the game in overtime. They also expect the coach to attempt a one-point conversion after scoring a touchdown when the team is behind by seven points and only attempting a two-point conversion when the team is behind by 8, 11, or 16 points. Conventional wisdom in the NFL says that a team should play for overtime at home and the win when away. In an article following one anomalous game where Tampa Bay coach Jon Gruden, "...sneered at the book most in his conservative profession breathe chapter and verse, the book that says play for the

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tie at home, …" (Fennelly, 2005) Tampa Bay won using the two-point conversion. In a similar situation the week previous to the Tampa Bay game, Dick Vermeil and the Kansas City Chiefs faced a situation where they had one play to either kick a field goal to tie or score a touchdown to win. Vermeil decided to attempt the touchdown and succeeded; prompting another reporter in his post-game article to speculate, "Dick Vermeil was going to be the biggest fool or the shrewdest gambler in the NFL. Call this man shrewd" (Tucker 2005). Obviously going against conventional wisdom can be risky for a coach when it doesn't succeed, because a loss will upset the fans and such a "bad decision" could lead to their firing. However, a coach should know when it is worth taking that risk. The coach needs to be able to weigh the chance of winning the game outright (getting a touchdown instead of the field goal, or making a two-point conversion instead of a one-point conversion) against the chance of winning the game in overtime. For instance, of all of the overtime games played since the two-point conversion rule has been implemented, 46% of them were tied as a result of a touchdown followed by a one-point conversion kick.

Currently, coaches are letting conventional wisdom force them into playing for a tie during regulation. With this strategy, however, the overtime coin toss has a significant impact on the results of the game. Since the coin toss is random and has such a large effect on the probable outcome of the game, the coach is leaving his team's success to random chance. However, if the coach can determine his odds of winning in overtime based upon existing information about his team and the opposition, then he is making a rational decision that will maximize his team's opportunities for success.

II. The Literature

There is a wealth of academic literature relating to all the professional sports in the United States and in particular the National Football League. Most of this literature regarding the NFL centers on player productivity and wages, the efficiency of betting lines, and the social benefits of NFL stadiums. However, recently researchers have been analyzing the success of NFL teams, with some specifically analyzing overtime. Interestingly, there is a paper currently being researched whose focus, identical to this paper, is on predicting the outcomes of overtime games, but for hockey (Shmanske and Lowenthal 2005). Ultimately it's about winning and what influences this success.

To be successful, an NFL team must first be able to score. Using a Cobb-Douglas production function, Hofler and Payne (1996) found that rushing yards, passing yards, third down efficiency, punt return yards, and field goal success were significant at predicting scoring. Beyond predicting scoring, Romer (2003), and Sackrowitz and Sackrowitz (1996) determined that conservative strategies reduce scoring. Romer (2003) found that teams were too conservative in terms of fourth down opportunities and Sackrowitz and Sackrowitz (1996) found that teams were too conservative when using a ball control strategy.

The factors that influence winning in the NFL were analyzed by Hadley, et. al. (2000) and Richard, et. al. (2003). The quality of the head coach was found to be important by Hadley (2000) and the time of day was found to be an influence on West coast teams performance by Richard (2003). They found that West coast teams experienced a reduced chance of winning away games in another time zone during the day, but were more likely to win games at night regardless of location.

On the other hand, Boulier and Steckler (2003) looked at predictors of winning. They found that power scores, the home team, and the Vegas Line were statistically significant in predicting the wining team with the Vegas Line being the best predictor.

Recently the study of which team is likely to win an NFL game in overtime is becoming popular. Both Jones (2004) and Hawkins (2004) looked at the importance of receiving the ball first in overtime on winning. Jones (2004) built a theoretical model using Markovian chains to determine the probability that the receiving team would win a football game using the current NFL overtime rules and a proposed alternate system. He assumed that the probability of each team scoring, either a touchdown or field goal, was the same for both teams. He found the probability that the receiving team would win the game was higher under the current rules; however, both overtime systems result in higher probabilities that the receiving team would win. In Hawkins (2004) analysis of overtime games he used a binomial distribution, and found that before the 1994 season there was no significant difference in winning percentage for the receiving and kicking teams. However, after the 1994 season, the receiving team had a significantly higher chance of winning the game.

Finally, in research being conducted concurrent with this paper, Shmanske and Lowenthal (2005) studied overtime games for the National Hockey League. They used as the unit of observation the team that played an overtime game. They recorded two observations for each overtime game; one for each team that played. This allowed them to determine whether being the home team was significant; however, this causes the data to be duplicated in reverse for each team. For instance, home team's points for will be the away team's points for in the next record. They found that being in the same conference, being the home team, the team's goals for, the opponent's goals against, the opponent's goalie's save percentage, and days of rest were significant in determining whether the team would win the overtime game.

III. Rule Changes

The significance of the rule changes in 1994 cannot be overstated in an analysis of overtime games. Beginning that season, three rule changes altered the ability of teams to play for overtime and their chance of winning. These rule changes were the two-point conversion, the 5-yard chucking rule, and changing the spot of kickoffs. These changes seem to have had a significant impact on the game. "[Jim] Nantz [CBS NFL Today host] believes the NFL sorely needs an overhaul in the procedure for overtime games, which increasingly favors the team that wins the coin toss" (Martzke, 2002). Additionally, Hawkins (2004) found that the coin flip in overtime does make a difference in the outcome of an NFL game over the last ten years.

The NFL's adoption of the two-point conversion rule significantly increased the opportunity for overtime games. This occurred because teams that were behind or ahead by points that are not divisible by 3 or 7 use the 2-point conversion in order to bring the score to a point where a touchdown or field-goal will tie the game. Before the rule change, there were 200 overtime games in 20 seasons (10 games per season average) and after the rule change there were 176 overtime games in 11 seasons (16 games per season average).

The NFL also modified the chucking rules[2]. This rule was introduced in order to increase scoring by making it more difficult for defensive backs to defend against the pass. The rule change allowed defensive backs to only initiate contact with wide receivers within 5-yards of the line of scrimmage. This rule makes the team with the ball more likely to be able to move the ball or draw a penalty for illegal contact, moving the ball and giving the offense extra downs. Gaining an extra set of downs increases the chance that the team with the ball will be able to make the tying score or to score in overtime.

Finally, the NFL moved the starting position for kick-offs back 5 yards to the 30-yard line and started using a "K" ball. The "K" ball is a special ball that is only used for kick-offs, field goals, extra points, and punting. These balls have not been broken in by anyone. This makes the balls harder and less evenly inflated than they otherwise would be and more difficult to kick long distances. This rule change has two possible influences upon overtime games. The first is the impact of the "K" ball on the kicks. The second is that the team that receives the ball first during overtime receives the ball on average 5-yards closer to scoring range (field goal or touchdown). This makes it easier for the receiving team to win the game[3].

[2] The NFL allows a defender to impede the progress of a receiver as long as he is within 5-yards of the line of scrimmage. Any contact beyond 5-yards results in a penalty of either: 5-yards and an automatic first down if the ball has not yet been thrown or an automatic first down at the spot where contact was initiated if the ball has been thrown.

[3] Just as Hawkins (2004) concluded.

> "Getting the ball first is advantageous only if you can get the ball in a position where you're likely to score (or at least likely to drive far enough that if you punt, you'll pin your opponents deep on their own side of the field). Under current NFL rules the receiving team is essentially assured of advantageous field position…" (Smith, 2003).

Before 1994, 50.8% of the receiving teams won the game. However, since 1994, the receiving team has won 59.8% of their games. Additionally, the extra 5-yards makes it more likely that the teams will score a field goal. The data shows that before 1994, 67.0% of the overtime games were decided by a field goal. Since 1994, 72.7% of the overtime games have been decided by a field goal.

IV. The Model

The model is a probabilistic model, with respect to the home team, where the likelihood of winning an overtime game depends on pre-game information for both teams (winning percentage, scoring for and against, winning streak, and pre-game betting line), in-game results (momentum going into overtime and scoring), kicker accuracy, and the overtime coin toss.

$$Pr(WIN_H) = f(SC.LAST_H, REC_H, Dome, KICKER_i, QTR4_i, WIN.PER_i, PPG.F_i, PPG.A_i, STRK_i, LINE_H).$$

where i = A (away team) or H (home team). It is hypothesized that the coefficients on $STRK_H$, $KICKER_A$, $WIN.PER_A$, $PPG.F_A$, $PPG.A_H$, $QTR4_A$, and $LINE_H$ will be negative and the coefficients on REC_H, $KICKER_H$, $WIN.PER_H$, $PPG.F_H$, $SC.LAST_H$, $QTR4_H$, $PPG.A_A$, and $STRK_A$ will be positive.

Notation used in the paper

WIN_H	Home team won
$SC.LAST_H$	Home team scored last
REC_H	Home team received ball first in overtime
$KICKER_i$	Field goal percentage
$QTR4_i$	Points scored in 4th quarter
$WIN.PER_i$	Winning percentage
$PPG.F_i$	Previous points per game scored
$PPG.A_i$	Previous points per game given up
$STRK_i$	Winning streak (per game and number of games)
$LINE_i$	Pre-game line

As shown earlier, the team that wins the coin toss and receives the ball first in overtime is more likely to win the game. This is especially true since 1994; therefore an interaction term between post 1994 and receiving the ball first in overtime should be significant and positive. Further, the coefficient, for the home team winning, upon receiving the ball first in overtime should be positive.

Additionally, the abilities of the kicker should have a significant impact on who will win an overtime game. Because the NFL plays sudden-death overtime, the teams generally attempt to get in field-goal range first and then see if they can score a touchdown after they are in field goal range. Therefore, the accuracy of each kicker should have a significant impact on whether the team wins the overtime game; the better the kicker, the higher chance that team will win the game. Therefore, there should be a positive coefficient on the field goal accuracy of the home team and a negative coefficient on the accuracy of the away team.

Momentum going into the overtime period can be critical to winning an overtime game. The variables that measure momentum are fourth quarter points scored by each team and the team that scored last during regulation play. If the home team scored last during regulation play then they should have momentum going into the overtime period. This would increase the probability that they will win in overtime. Therefore, there should be a positive relationship between the home team scoring last and winning in overtime. Additionally, the team who scored the most points in the fourth quarter should have the momentum going into the overtime period and therefore, have the higher probability of winning the overtime period. This will result in a positive coefficient on fourth quarter scoring for the home team and a negative coefficient on fourth quarter scoring for the away team.

Momentum going into the overtime game can also impact whether a team wins a particular game. The longer the winning streak going into a game the more likely the team will have a "let down" game and lose the game. Therefore, the longer the home team's winning streak the less likely they will win the game. Which will result in a negative correlation between winning an overtime game and the home team's winning streak. The correlation will be negative between the home team winning an overtime game and the away team's winning streak.

The ability of the teams will have an impact on the results of an overtime game. The better team is more likely to win an overtime game than the worse team. The winning percentage of the team before the game, the Vegas Line, and points given up and scored in previous games can be used as proxies for the ability of the team. The better teams have higher winning percentages, score more points, and give up fewer points. Therefore, there should be a positive coefficient on the home team's winning percentage, points per game scored and a negative coefficient on the home team's points per game given up. The coefficients on the away team's ability proxies should be the opposite of the home team.

The line is the Vegas odds that the home team will win the upcoming game. These lines are negative for the team that is predicted to win the game by the odds makers and the betting public. Thus, as the line decreases for the home team, the home team is more likely to win the game and the coefficient on the line should be negative.

V. The Data

There have been 376 overtime games since the inception of overtime in 1974. The line was collected from www.covers.com for the years 1985 through 2004. For the earlier years, the line was not published in either the New York Times or the Chicago Tribune. Therefore, I was only able to obtain the line for the years 1985 through 2004. The box score information was collected from the NFL Record and Fact book for the years 1983 through 2004. For the earlier years, the box score information was collected from nflhistory.net.

Given that the overtime game did not result in a 15-minute period in which neither team scored, the probability that the home team won the overtime game is 51% since overtime was enacted and 50% since 1994 (see table 1). However, the chance that neither team was able to score during the 15-minute overtime period dropped from 6.50% of all overtime games before 1994 to 1.70% of overtime games since 1994. There have been a total of 376 overtime games in NFL history and 176 of them have been played since the 1994 season. Since 1994, the home team is a slightly weaker team as they have won an average of 3.32 games previously and the away team won 3.76 games previously. The ability of the weaker home team to play a tie game during regulation may be a result of home field advantage.

The home team being slight weaker team is consistent with a Vegas line of on average -2.136 since 1994 (see table 2). The conventional wisdom is that the home team receives 3 points for home field advantage. If the home field advantage were lost, then the away team would be predicted to win the game by on average 0.864 points.

The number of points that each team scored and gave up in their earlier contests and their record supports the assumption that the home team is the weaker team. After 1994 on average, the home team has scored 20.2 points per game and given up 20.5 points per game. However, the away team has scored 21.2 points per game and given up only 20.3 points per game. Therefore, the away team, on average, scores more points per game but only gives up the same number of points per game. They also have a better record (53.1% wins) than the home team (48.1% wins). All the statistical evidence suggests that the away team is the slightly better team. Yet they are no more likely to win the football game then the home team.

The home team has on average a losing streak going into the game, -.28 game losing streak on average post 1994, but the away team has on average a winning streak going into the game, .28 game winning streak. Since each team play an even number of home and away games each season, the home team has a higher probability that the game before the overtime game was away. Since the away team is more likely to lose, the home team is more likely to go into the game with a loss and the away team is more likely to go into the game with a win (because they are more likely to have played at home the previous game.

As one would expect, for a random coin toss, the coin toss is not correlated with any of the other independent variables (the pre-game rankings, pre-game expectations, and the momentum carried into overtime) in the model (see table 3). Additionally, it would be expected that the team that scored the most points during the fourth quarter would also likely be the team that scored last during regulation. This is born out with a significantly positive correlation coefficient between scoring last for the home team and fourth quarter points scored for the home team and a significantly negative correlation coefficient between scoring last for the home team and fourth quarter points scored for the away team.

For both the home team and the away team the winning streak (number of games or per-game) is significantly correlated with the winning percentage, points per-game scored, and points per-game given up (see table 3). Additionally, each of the per-game statistics are significantly correlated with each other. Therefore, eliminating this data singly will bring about a potential bias caused by multicollinearity. Therefore, the decision to keep or eliminate these variables must be made as a group.

VI. Regression Results

The model was estimated using logit regression analysis for all variables in the sample. However, since there was no pre-game information (points per game scored, points per game given up, winning percentage, winning streak, etc…) for an overtime game that occurred during the first week of the season, these games were omitted from the regression results.

Table 4 shows the logit regression results using overtime games from 1974 thru 2003, 1974 thru 1993, or from 1994 thru 2004. The regressions with all independent variables included in the model are I, III, and V. Additionally, models II, IV, and VI show the regression results for the restricted model with insignificant variables eliminated. The restricted models were tested to make sure that all independent variables eliminated from the full model were indeed insignificant. The p-values, for the test of the null hypothesis that all eliminated independent variable coefficients were zero, are .943 for model I and II, .973 for model III and IV, .755 for model V and VI. Therefore, the coefficients on the restricted models should not have specification bias caused by multicollinearity between omitted relevant independent variables and included independent variables.

When the home team received the ball in overtime, they were more likely to win the game. Model VI shows the log odds that the home team would win the game was .837 higher when they received the ball initially in overtime than if they didn't. This amounts to a 130.9% ($e^{.837} - 1$) increase in the odds that the home team will win when they receive the ball first in overtime. After 1994, the increase in the odds that the home team will win the game when they receive the ball first in overtime ranges 85.7% to 159.3%, using the results from models I, II, V, and VI.

Additionally, when the away team scored more points in the fourth quarter, then the home team was less likely to win the game. For model VI, a one-point increase in the points scored by the away team in the fourth quarter results in a .081 decrease in the log odds of the home team winning (a 7.8% reduction in the odds). The reduction in the odds of the home team winning ranges from 5.8% to 7.8% for a one-point increase in the number of points scored in the fourth quarter for the home team, depending on the version of the regression model used.

When the home team has a higher winning percentage, then the home team was more likely to win the game. Model II shows that a one-percent increase in the home team's winning percentage is associated with a 1.637 increase in the log odds that the home team will win. Therefore, each additional one-percent increase in the home team's winning percentage increases the odds of the home team winning by 414%.

Finally, when the home team's competition has more momentum going into the game, as measured by their per game winning streak, the log likelihood that the home team will win the game decreases by .812 or a 8.12% reduction in the odds of winning the game, see model II, when analyzing the full range of years.

Since the inception of overtime, the home team's winning percentage, fourth quarter points scored by the away team, the away team's per game winning streak, and the interaction between post 1994 and receiving the ball in overtime is able to increase the ability of coaches to predict who will win the overtime game by between 13.0% and 16.7%. Since 1994, receiving the ball in overtime and fourth quarter points scored by the away team can increase the ability of an individual to predict who will win an overtime game by between 28.4% and 32.0%. The models are more likely to accurately predict the winning team after 1994 and the coefficients on the significant independent variables, and many of the insignificant ones as well, had the predicted sign. The post two-point conversion models show that receiving the ball in overtime and fourth quarter points scored by the away team are significant. These variables show momentum and a little bit of luck going into the overtime period. If as predicted, the home team is the slightly weaker team, then receiving the ball first in overtime should significantly increase their chance of winning the game. The ability of the better (slightly) team to score points at the end of the game, is a measure of the home teams ability to stop the other team and the away teams ability to score. The more points the away team scores at the end of regulation, the less likely that the home team will be able to stop the away team from scoring during the overtime period.

These results are consistent with the findings of Shmanske and Lowenthal (2005) when they found that for the National Hockey League, home ice, team's goals for, opponent' goals against, opponent's goalie save percentage, and days of rest were significant in determining whether the team would win in overtime.

VII. Conclusion

Coaches must make decisions concerning whether to play for overtime or try to win the game during regulation. During the 2005 season, in two overtime games the team that tied the game at the end of regulation did so by scoring a touchdown and a one-point conversion. In both cases, the coaches had a choice between attempting a two-point conversion and winning or losing outright, or taking the game into overtime. Additionally, as mentioned in the introduction, there were two games in which the head coach decided to attempt to win the game without going into overtime. Did these coaches make the correct decision based upon the model?

In the fourth week of the 2005 season, the Washington Redskins played at home against the Seattle Seahawks. The Seattle Seahawks scored last during regulation. Using the regression results from the restricted models in table 4 and the team results for the 2005 season, before the coin toss[4], the Seahawks had a 50.5% to 59.8% chance of winning the overtime game. Even though the Seahawks lost this game, a coach making this decision between playing an overtime period and attempting a two-point conversion, would usually play for overtime.

In the second overtime game during the sixth week of the season between the Dallas Cowboys and the New York Giants, the Giants scored last and were the away team. Unlike the Seattle Seahawks, they had a below average chance of winning the overtime period before it began. The Giants had between a 47.8% and 50.5% chance of winning the overtime game, before they knew the results of the coin toss. Therefore, the Giants may have wanted to attempt a two-point conversion if they believed their chance of success for two-points was greater than 50%. In this game the Cowboys prevailed.

With two seconds remaining in the game, during the ninth week, the Kansas City Chiefs had the decision: attempt a short field goal to tie the game or a touchdown to win the game. With the game on the line, Dick Vermeil made the gutsy and correct decision. He decided to attempt to win the game with a touchdown. If he had attempted a last second field goal, the Chiefs would have had between a 36.2% and 38.6% chance of winning the game in overtime based on the model. By making the gutsy call, the Chiefs won a game they had little chance of winning in overtime. Even if they would have been lucky and won the coin toss, they only would have had about a 45.7% chance of beating the Oakland Raiders.

Few teams have attempted the two-point conversion in order to win the game outright since the inception of the two-point conversion rule in 1994. The Tampa Bay Buccaneers attempted such a play in order to win the game against the Washington Redskins in the tenth week of the season. In that game, assuming that the Buccaneers had tied the game, and only attempted a 1-point conversion after the touchdown and played for overtime, then the Buccaneers would have had between a 49.5% and 55.6% chance of winning the game. The Buccaneers were going

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[4] Assuming a 50% chance of winning the coin toss.

to attempt only a one-point conversion until the Redskins committed a penalty on the conversion attempt and the ball was moved to the one-yard line (instead of the two-yard line). This increased the Buccaneers chance of successfully making a two-point conversion and Jon Gruden couldn't resist.

In the NFL, where the results of a single game may make the difference between playing in the post-season or not, coaching decisions have much greater importance than other sports. When so much is riding on making the correct decision, using instincts may not be the wisest use of the coach's resources. They need to use all the information at their disposal in order to make the correct call. They need to be able to assess their chance of scoring during the game and their chance of winning in overtime in order to make the correct call. This paper has shown that previous points scored, winning percentage, for the quarter scoring, winning streak, and receiving the ball in overtime all influence who will win the game if it is taken into overtime.

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Table 1: Descriptive Statistics

	Games played 1974 – 2004		Games played 1974 – 1993		Games played 1994 – 2004	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Home team won, given not tie	.51	.501	.520	.501	.500	.501
Overtime tie	.0426	.20212	.065	.247	.017	.130
Week	8.65	4.677	8.700	4.741	8.590	4.616
Number of wins, home team	3.59	2.820	3.810	3.009	3.320	2.571
Number of wins, away team	3.83	2.965	3.890	3.073	3.760	2.845
Sample Size	376		200		176	

Table 2: Independent Variables in Model

	Games played 1974 – 2004		Games played 1974 – 1993		Games played 1994 – 2004	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
$LINE_H$ (Actual)	-2.215	5.4257	-2.322	5.803	-2.136	5.147
REC_H	.49	.501	.510	.501	.480	.501
$SC.LAST_H$	.50	.501	.470	.501	.530	.500
$QTR4_H$	6.92	5.211	6.410	5.177	7.510	5.202
$STRK_H$ (games)	-.14	2.349	-.010	2.236	-.280	2.470
$PPG.F_H$	20.3079	5.93083	20.441	6.295	20.154	5.496
$PPG.A_H$	20.3905	5.97490	20.268	5.631	20.531	6.363
$WIN.PER_H$	.4995	.26609	.516	.267	.481	.265
$QTR4_A$	6.60	5.499	6.630	5.254	6.570	5.779
$STRK_A$ (games)	.26	2.649	.250	2.732	.280	2.559
$PPG.F_A$	21.1369	5.56772	21.070	5.644	21.214	5.495
$PPG.A_A$	20.2321	5.95511	20.208	6.572	20.260	5.173
$WIN.PER_A$	.5253	.26058	.520	.269	.531	.251
Sample Size	376		200		176	

Table 3: Selected[5] Correlations for Independent Variables

	LINE	$QTR4_H$	$STRK_H$ (games)	$PPG.F_H$	$PPG.A_H$	$QTR4_A$	$STRK_A$ (games)	$PPG.F_A$	$PPG.A_A$
$SC.LAST_H$		.363 (.000)				-.386 (.000)			
$STRK_H$ (games)	-.271 (.000)								
$PPG.F_H$	-.405 (.000)		.382 (.000)				.095 (.073)		
$PPG.A_H$	.305 (.000)		-.339 (.000)						
$WIN.PER_H$	-.432 (.000)		.596 (.000)	.618 (.000)	-.583 (.000)				
$STRK_A$ (games)	.297 (.000)								
$PPG.F_A$	.389 (.000)	.090 (.092)					.353 (.000)		
$PPG.A_A$	-.313 (.000)				.147 (.006)		-.387 (.000)	-.103 (.052)	
$WIN.PER_A$	.438 (.000)				-.118 (.027)		.615 (.000)	.574 (.000)	-.647 (.000)

[5] All correlations between independent variables that are significant at the 10% or lower level of significance.

Table 4: Probability the home team wins

	1974 – 2004		1974 – 1993		1994 – 2004	
Model	I	II	III	IV	V	VI
Post 1994	-.593					
	(.135)					
Post 1994 by REC_H (+)	* .953	** .619				
	(.071)	(.028)				
REC_H (+)	-.063		-.126		** .861	** .837
	(.873)		(.765)		(.017)	(.011)
$SC.LAST_H$ (+)	.263		-.274		.544	
	(.390)		(.595)		(.185)	
Dome	-.330		-.180		-.747	
	(.319)		(.733)		(.141)	
LINE (–)	-.022		.019		-.087	
	(.546)		(.749)		(.106)	
$KICKER_H$ (+)	.005		-.001		.012	
	(.727)		(.973)		(.619)	
$QTR4_H$ (+)	-.001		.040		-.025	
	(.959)		(.360)		(.477)	
$STRK_H$ (per game) (–)	-.502		-.868	** -1.283	-.072	
	(.407)		(.378)	(.051)	(.936)	
$STRK_H$ (games) (–)	-.054		-.092		-.072	
	(.550)		(.563)		(.566)	
$PPG.F_H$ (+)	.010		-.001		.017	
	(.792)		(.993)		(.718)	
$PPG.A_H$ (–)	-.034		-.016		-.048	
	(.282)		(.789)		(.279)	
$WIN.PER_H$ (+)	.587	** 1.637	2.553	** 2.429	-1.448	
	(.601)	(.036)	(.157)	(.031)	(.383)	
$KICKER_A$ (–)	.002		-.015		.027	
	(.880)		(.478)		(.276)	
$QTR4_A$ (–)	** -.060	*** -.070	-.048		** -.078	*** -.081
	(.029)	(.003)	(.312)		(.038)	(.008)
$STRK_A$ (per game) (+)	-.017	* -.812	1.211		-1.188	
	(.977)	(.057)	(.217)		(.148)	
$STRK_A$ (games) (+)	.043		-.036		.162	
	(.596)		(.815)		(.150)	
$PPG.F_A$ (–)	.026		.053		.017	
	(.451)		(.434)		(.693)	
$PPG.A_A$ (+)	-.018		-.013		-.038	
	(.581)		(.805)		(.464)	
$WIN.PER_A$ (–)	-1.115		** -3.964	* -1.405	.877	
	(.316)		(.038)	(.068)	(.585)	
Constant	.433	-.510	1.736	-.507	-1.830	.126
	(.825)	(.242)	(.549)	(.478)	(.571)	(.670)
Chi-Squared[6]	25.715	17.526	15.123	8.778	26.645	14.800
	(.175)	(.002)	(.654)	(.032)	(.086)	(.001)
Nagelkerke R^2	.117	.081	.162	.096	.202	.116
% predicted correctly	57.7	59.5	65.8	60.7	66.0	64.2
Sample size	279	279	117	117	162	162

[6] Test of significance of the overall model.