Mispricing of Rules and Regulations: The College Football Wagering Market

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January 18, 2004

Abstract

This paper uses college football betting line data to examine if known constraints are appropriately priced in markets. Regulations or the threat of regulation has been argued to impact security prices. The equity markets provide a difficult environment to test such a hypothesis. This paper examines the restrictions imposed on college football teams when the teams travel and the possible mispricing associated with these restrictions. College football teams routinely travel with less than the entire football roster. This results in fewer marginal players being available to play in games when games become one sided when the winning team in the road team. This potentially results in larger winning margins when the road team is a large favorite and smaller winning margins when the large favorites are the home team. This paper examines the possibility of exploiting this publicly known constraint and potential mispricing in the college football betting market. Using the log likelihood ratio the results indicate that when implementing the strategy and ignoring transaction costs a fair bet is rejected. When considering the vigorish, the strategy is marginally profitable.

Introduction

Regulations have been argued to have an impact on asset prices. For example, antitrust attacks on corporations have been shown by Bittlingmayer (1992) to be a possible cause of more volatility in the stock market and to cause a drop in the Dow for each antitrust case filed in the period from 1904 to 1944. McGratten and Prescott (2001) link the rise in corporate equity prices relative to GNP in the 1960s to 2000 to changes in tax laws. Investors consider the law/regulation and potential regulation; adjust expectations and ultimately the asset prices. In this paper the focus is on constraints imposed on an organization and the impact of prices of assets in which the constrained organization is a participant. I test if the constraint imposed on college football teams when traveling is appropriately priced in the college football point spread betting market. The asset consists of the wager placed on a football game and the teams involved represent potential investments made by gamblers.

Sports betting markets have been used in many studies to test market efficiency. Avery and Chevalier (1999) use the betting market to examine investor sentiment. The sports betting market is similar to equity markets as bettors (investor) wager (invest) under conditions of uncertainty. However, in the betting market true values are revealed in relatively short time period.[1] These markets consist of a large number of participants and professional gamblers who should eliminate mis-pricing if observed resulting in an efficient market. The book maker (market specialist) sets a betting line

[1] For most college football games the time from the setting of the line (price) to the close of betting (trading) is less than a week. Opening lines typically become available the Sunday before the following Saturday's games; however, the betting lines are not typically widely published in newspapers until the Monday prior to the game. The lines may change if bettors bet more heavily on a particular team. When the line is first published, they may be different than the line initially set by the bookmaker.

(price) and bettors use available public and possibly private information in order to determine which bet (investment) to make; investors in equities operate in a similar manner to determine which investment to make. The true value of equity investments is not typically revealed and has an indefinite life. However, in the sports wagering market, payoffs are known with certainty in advance and the realized payoffs are known shortly after the wager is made. In the betting market, the games are settled at the end of a short period (usually a week in football) of "trading" and the true value is observed.

Betting lines represent the point differential set by the bookmaker which attempts to balance wagers on the two teams. If Team A if favored by 3 points (size of the point spread) to beat Team Z and a wager is placed on Team A, the better would win the bet if Team A wins by 4 or more points. In this case Team A is the favorite and Team Z is the underdog. If a wager were place on Team Z, the bettor would win the bet if Team Z loses by 2 or less points or wins the game. If the game is decided by three points the game is considered a "push". The bookmaker collects the vigorish[2] (historically 10 percent of the wager) on losing bets and pushes.

A number of studies have examined market efficiency in the betting markets, technical trading rules and various other strategies and biases. The gambling markets have generally been found to be efficient although some exceptions have been noted. Pro football has been widely studied, but the college football market has not been studied as frequently. Studies of the college football betting market have been performed by Golec and Tomarkin (1991), Dare and McDonald(1996) and Rodney et al (2003).

[2] Vigorish is the fee paid to the bookmaker for taking the bet (similar to commission charged by a broker).

Golec and Tomarkin studied college and pro football betting lines from 1973 to 1987 and document that pro football gamblers are biased towards favorites and in particular road favorites. They did not find this bias in the college football market. Dare and McDonald examined the college football market from 1981 through 1993 and did not reject efficiency of the college football betting market. A strategy of betting on the home underdog has been identified as being consistently profitable. Paul et. al. (2003) examine college football from 1976 through 2000 and find in general the market is efficient although they find betting on large home underdogs (28 point betting line) to violate a fair bet but this rule does not reject the no profitability null hypothesis. There is an apparent over betting of favorites which has been found in other betting markets as well.

Woodland and Woodland (1994) find over-betting of favorites in the baseball market and Woodland and Woodland (2001) find evidence of over betting in the hockey market. Other examples include over-betting the over market[3] in professional football by Paul and Weinbach (2002).

The National Football League (NFL) point spreads have been analyzed in various studies. Profitable betting rules have been documented. However, statistical significance has not always been found in these studies. Sauer (1998) states "The Vergin and Scriabin paper and its extension by Tryfos et al. established a pattern that would be repeated: sightings of profitable wagering rules are occasionally reported, but they often disappear on subsequent investigation." Borghesi (2003) finds a profitable

[3] Wagers can also be made on the total number of points scored by each team and placing a bet on whether the total points scored in the game will be over or under the set over/under line. For example, the over/under line could be 35 points for a game between Teams B and C. If the final score of the game was Team B 21 and Team C 17; the total number of points is 38 and an over bet would be a winning bet.

betting rule in the pro football market by exploiting the home underdog in the NFL particularly in December which is another example of over-betting of favorites.

This paper extends the wagering market literature by considering the college football market and the potential impact of constraints and rules on traveling teams due to smaller rosters. Unlike the NFL where both teams have the same roster size for a given game, road college teams have fewer players on the sideline than the home team. This restriction is imposed by various governing bodies (league rules[4]) as well as budget constraints potentially imposed by athletic departments. The rule is known and if the market is efficient and constraints are appropriately priced, exploiting the constraint should not lead to a profitable betting strategy. In this sense, the college football betting market provides an unique opportunity to examine the impact of a regulation and market prices.

The paper is organized as follows. Section I provides a brief description of the betting market. Section II describes the data and Section III describes the methods and provides the results. Section IV applies the betting strategy and Section V presents concluding remarks..

I. College Football Betting Market

The information conveyed by the betting market consists of identifying the home team, visiting team and point spread. The point spread indicates the point differential at which the book makers believe that the total amount wagered will be split between the favorite and the underdog. Open and current spreads are usually provided.

[4] For example, the current Big XII Conference rule is 70 players

The open and current lines provide information regarding the movement of the line which indicates which team has received most of the betting dollars (volume). The bookmakers attempt to match the buyers to the sellers by establishing a betting line which encourages half of the gamblers to bet on the favorite and half to bet on the underdog. These betting lines are available from numerous outlets are and published in many daily newspapers.

Betting lines are set by casinos to attempt to balance the betting on each team. With balanced betting the casinos are assured of making money on a particular contest from the vigorish. Lines can change during the week. Lines and changes are listed in half point increments[5]. Point spreads will move based on the dollars bet on one side of the a game in order to adjust the handle by encouraging betters to take the other side. Examples of information which may move lines includes information regarding injuries and weather.

Not unlike the stock market, there are various sources of information regarding the sports betting market. Sports talk radio shows routinely have experts who discuss the best bets of the week. Experts offer their services through the use of 1-900 phone lines for gamblers to call and receive advice for a fee. Television shows which discuss games also convey information to gamblers about possible good bets and often times to market the experts 1-900 service. Newspapers routinely publish experts picks. Avery and Chevalier (1999) investigate a sample of experts and the expert's picks of NFL games and document that none of the experts that picked at least 100 games beat the spread 52.4 percent of the time which is required to be profitable. The highest winning

[5] Although teams can not score a half point, betting lines can and are often price in half point increments such as 3 ½ points.

percentage against the spread of an expert who had selected at least 100 games was 51.1 percent.

Publications are also available which summarize various statistics gamblers may find useful. *Inside Players' College Football Guide 2003* provides historical information on how teams have performed in categories such as: Straight Up, ATS, Home Fav, Home Dog, Away Fav, Away Dog, Favorite, Dog, Grass, Artificial, Vs. Conf, Non-Conf, Off SU Win, and Off SU Loss.[6]

These publications will sometimes provide various profitable technical betting rules. For example:

"Play on a double-digit away favorite in a non-conference game if they are off back-to-back straight up losses. 1990 – 2002 = 11-4 (73%)"[7]

"Play on a non-conference revenging away underdog with a winning record if their opponent has a losing record. 1990 – 2002 = 8-4-1 (67%)"[8]

These rules provide winning results but these examples have very small samples. Profitability may be questionable and strategies which provide one game a year in which to gamble may not be attractive to gamblers. These types of betting rules are similar to technical rules regarding such ideas as "head and shoulders" patterns and breakouts from the technicians in the equity markets.

A typical college football betting line as published in the newspaper is:

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[6] Straight up is a win not considering the point spread, ATS – against the spread, Home Dog – Home underdog, Away Fav – Away Favorite, Away Dog – Away Underdog, Favorite – Favorite regardless of game location, Dog – underdog regardless of game location, Grass – natural grass playing surface, Artificial – artificial playing surface, vs. Conf – Games against conference teams, Non-Conf – Games against non conference teams, Off SU Win – Off straight up win which is the weak after a victory, Off SU Loss – Off straight up loss which is the weak after a loss.

[7] *Inside Players' College Football Guide*. 2003. Insiders Sports Publishing Corp. Avon, Ohio.

[8] Ibid

Favorite	O	C	Underdog
Nebraska	1½	2½	COLORADO

The home team is listed in capitol letters. The positive line indicates that the favorite is favored by that number of points. In this example Nebraska opened as a 1½ point favorite. Apparently, the market felt Nebraska was under priced and represented value at the opening line. In order to entice other bettors to wager on Colorado the betting line adjusted up to 2 ½ points. Alternatively, the same line could be published as Nebraska minus 2 ½ at Colorado which indicates Nebraska is a road favorite of 2 ½ points.

Betting in the college football market occurs by a better placing a bet on the team the better believes will win (lose) by more (less) than the betting line point spread. For example, for the Nebraska vs Colorado game referenced above, if bettor placed a $10 bet on Nebraska, the bettor would win if Nebraska won the game by a margin of victory of greater than 2 ½ points provided the bet was made when the line was 2 ½ points. When a bet is placed, the gambler places the bet at the current line and the line the bettor received does not change. In the example above, some gamblers received Nebraska and only gave up 1 ½ points.

Book makers charge a 10 percent commission known as the vigorish (juice) on losing bets in lieu of a bid ask spread. The vigorish is the portion of the loser's bet not returned to the winner. A $10 dollar bet is actually an $11 bet to win $21 or $0. To break even gamblers must win 52.4 percent of their bets in order to cover transaction costs. Any technical rule which wins more than 52.4 percent of the time should not be possible if the betting market is efficient.

II. Data

Data was obtained from ProSportsEdge.com which provides online betting software and historical data on the betting market for the NFL, NBA and college football. For this study the data used consisted of betting line, outcome, home team, visiting team and college football. Other data items obtained include the season and the week of the season. The college football season varies from team to team. Traditionally, college football has consisted of an 11 game season plus a bowl game for the teams that had a good season.[9] In addition some teams play in special preseason games during week one of the season. In the analysis, the first week of the season was not used due to a number of games which are special preseason games which are played on neutral sites. (i.e. Kickoff Classic, Pigskin Preview, Eddie Robinson Classic). The second and last weeks of the season were also removed from the data set. These weeks include conference championships and in the last week bowl games both of which are played on neutral sites. The bowl games are played on neutral sites and the roster restrictions are different than the regular season. For the 2001 season the second to last week was included in the data set. A number of games scheduled for September 16, 2001 were rescheduled for the second to last week of the season and are included in the data set.

The data set includes the years 1997 through 2002. Games which listed "Div II Team" as a participant were removed. After removing certain weeks as described

[9] The number of games played by NCAA Division I football teams has varied. In 2003, teams may play 12 games plus any exempt games which include special preseason games, conference championships and bowl games. Conference championships are a relatively new phenomena; For example the first Big XII conference championship game was played in 1996. In the 2003 season it is possible for a team to play as many as 15 games while some teams may play only 11 or 12.

above, there are a total of 3561 games. The mean betting line is 5.11 points, the mode is 3 and the median is 5.5. Betting lines are listed as both positive and negative numbers and by simply using the lines as given the larger betting lines would tend to average out. Therefore, I also consider the absolute value of the betting lines in order to determine the magnitude of a large betting line. The mean of the absolute value of the betting line is 12.6, the mode is 3 and the median is 10. Summary statistics of game scores and betting lines are represented in Table 1 Panel A. Panel B provides summary statistics by year. Over the time period investigated, the results of t-tests indicate that other than the visiting team score there are no differences.

[Insert Table 1 about here]

III. Methods and Results

College football teams are limited to roster size when the teams travel. Coaches are constrained to the number of players that are available to play when they are the visiting team. The objective is to win; therefore, it is reasonable to assume that the travel roster includes the better players. However, the restriction does not apply to home teams. Therefore, the marginal players are available to play in games where the outcome has been determined prior to the end of the game. This rule is known and should be priced in the betting markets. However, the constraint is a factor in one-sided games. An indication of a potential one-sided game would be games with large betting lines. To examine the potential mispricing of the constraint, a determination of a large betting line was needed.

To examine a large betting line, the mean of the absolute value of the betting line was calculated. The mean of the absolute value of the betting line (MAVBL) is 12.61 points and the standard deviation is 9.59 points. I defined possible large betting lines as MAVBL plus 1, 1.25, 1.5, 1.75, and 2 standard deviations which correspond to betting lines of 22.200, 24.598, 26.995, 29.393 and 31.794 points. Paul et al. (2003) identify a strategy of wagering on large home underdogs and use 28 points as the cutoff. I consider 28 points in my analysis as well.[10]

By definition, these games should be different. To document, the differences, summary statistics were calculated for the sample of large point spreads and the remaining games in order to document that these games are statistically different. These results are summarized in Table 2 Panel A and Panel B. Panel A uses the addition of one standard deviation and Panel B uses the addition of 1.75 standard deviations. The test statistics reject that the means are equal and demonstrate the games do have differences and the use of the betting line as an indicator of games with different properties is appropriate.[11]

[Insert Table 2 about here]

My proposed strategy consists of two separate components. The first component is to bet on large road favorites. When traveling, the roster is reduced and more of the marginal players are not available to play in the game. Better players play

[10] Paul et al identify betting on large home underdogs as being a profitable betting strategy. The strategy employed here would bet on large road favorites. They identify only 37 games in the 1996-2000 time period which meet their criteria. The strategy investigated here averages 29.6 games per year over a 22 year period. I use 27.9 points so that games in which the line is 28 points are included in the sample.
[11] The large point spreads pick the winner straight up 92 percent of the time when using the one standard deviation rule and 96 percent of the time when using 1.75 standard deviations. The favorite for the sample of 3561 games wins straight up 76 percent of the time.

throughout the game and the large road favorite is more likely to cover the betting line. The second component consists of betting against large home favorites. At home, the marginal players are available and if the game becomes one-sided, these players are available and the betting line is hypothesized to be less likely to be covered. Therefore, the strategy indicates to bet on road teams (favorite or underdog) in games where the point spread is large as defined using the above methods for defining a large point spread. The travel roster restrictions are known and the potential impact on the price of the game should be anticipated although my hypothesis is that the market does not properly consider the constraint.

Table 3 provides a breakdown of the two components of the betting strategy; betting on large road underdogs and large road favorites. Winning percentages for the strategies is provided for the entire sample and the two components which create the strategy. Column A provides the winning percentages for the entire sample of games which meet various large point spread criteria. At point spreads above 26.998, the winning percentage is above 52.4 percent. Column B provides winning strategies for betting on the visiting underdog. Winning percentages are above 52.4 percent for each of the large lines except 22.2 points. The wager on the visiting favorite indicates mixed results with the winning percentage above 52.4 percent when using a large line defined as 28 points or 29.4 points.

[Insert Table 3 about here]

Gander (1988) and Sauer (1988) used simple regression models to test for market efficiency. The form of these models was:

$$PS = a + bVL + e \quad (1)$$

Where PS is equal to the point spread outcome and VL is the betting line. When rational expectations are met, a = 0, b = 1, and E(e/F) = 0. As argued by Even and Noble (1992) this is not the proper definition of efficiency in the gambling market. This definition implies that if bookmakers have rational expectations of the outcome of the game then the point spread should be unbiased estimates of the actual outcome. However bookmakers are attempting to balance the dollars wagered on the game so that they do not have a position in the game. The amount by which a team beats the spread is not relevant, the questions are whether a bet is fair and if a betting strategy can be profitable.

An Efficient market in the sports gambling market is defined by the presence of fair bets. Ignoring vigorish, a test of market efficiency is a test if there is a probability of 0.5 of winning a bet. Including vigorish the probability is 0.5238 for a profitable bet.

Using a sample of college football games, Paul et. al. document that in the college football betting market the simple regression models exhibited skewness and non-normality and therefore, argue that the regression models and significance tests are not valid. To test market efficiency, the likelihood ratio test proposed by Even and Noble (1992) is used by Paul and in this paper as well. The likelihood ratio tests if the observed winning percentage is statistically different than the expected ratio.

The likelihood ratio test has the form:

$$L^{tor} = n [\ln(q^*)] + (N-n) \ln (1-q^*), \quad (2)$$

where L^{tor} is the team of record, N is the total number of observations, n is the number of observations which are successful using the betting strategy and q* is the observed

proportion from implementing the strategy. As indicated previously, an efficient market excluding the vigorish implies q = 0.5 and the test for profitability including the standard 10 percent vigorish implies q = 0.5238.

A restricted log likelihood ratio results from substituting the appropriate value of q into equation (2) for both a fair bet and profitable bet. The respective likelihood ratio statistics are:

$$2(L^{tor} - L^{r}) = 2\{ n [\ln(q^*) - \ln(0.5)] + (N-n) [\ln(1-q^*) - \ln(0.5)]\} \quad (3)$$

$$2(L^{tor} - L^{r}) = 2\{ n [\ln(q^*) - \ln(0.5238)] + (N-n) [\ln(1-q^*) - \ln(0.4762)]\} \quad (4)$$

Table 4 provides the winning percentage and log likelihood test results for both a fair bet and profitable betting strategy for each of the six large betting lines examined. The hypothesis of a fair bet is rejected using the 28 and 29.4 point cutoffs. Profitability is not statistically significant for any of the decision rules.

[Insert Table 4 about here]

To further investigate the 28 point and 29.4 point rules, I identify the games which meet the 28 and 29.4 point decision rules for the period 1982 through October 2003. The winning team of record is noted and the larger sample tested for fair bet and profitable strategies. Table 5 provides the results using the 29.4 (1.75 standard deviations rule) points rule and Table 6 uses the 28 point rule as identified by Paul et al. For each of the games identified, bets would be placed on road favorites and road underdogs when the betting line meets the established criteria.

[Insert Table 5 about here]

Table 5 includes a sample of 653 games with 358 of the games being winning bets using the rule. The null hypothesis of a fair bet is violated for the whole sample. No profitability is not rejected at typical probabilities.[12] Different time intervals are also examined in Table 5. Three year increments and the time period used to develop the cutoffs (1997 through 2002).

Table 6 which uses the 28 point rule includes a sample of 762 games with 409 games being winners. Again, the null hypothesis of a fair bet is violated and the profitability of the strategy is not statistically significant at typical levels. There are time periods where the strategy does generate a profit.

[Insert Table 6 about here]

VI. Application of the Rule

In this section I apply the rule to determine what the economic impact of applying the strategy would be. The rule is applied by placing a wager of $100 on each of the contests which meet the criteria. The rule generates a profit in 16 of the 22 seasons (1982 through October 2003). Over the time entire time period, the strategy would generate a profit of $3,350. To earn this profit a better would have put at risk $71820.00. (653 games x (100 +10)). Results of the application of the strategy are provided in Table 7.

[12] I tested the strategy of betting on only underdogs. Of the sample from 1997 through 2002 there are 3494 games excluding pushes (ties). Underdogs cover the line 1728 out of 3494 games or 49.5 percent of the time. The likelihood ratio is 0.4132 indicating a fair bet. The winning percentage is below the necessary 52.4 percent for profitability.

[Insert Table 7 about here]

V. Conclusion

College football teams are constrained when they travel but routinely suit up more players when the team plays at home. In this paper, I examined the impact of the constraint and potential mispricing in the sports betting market due to the constraint. A number if the games bet on using the strategy involve betting on underdogs. The preference to favorites has been documented in other work. The overbetting of favorites is documented by Woodland and Woodland (1994) for the baseball market and Woodland and Woodland (2001) for the hockey market.

Paul et. al. (2003) find that large underdogs in the college football market violate fair bets and offer information asymmetry as a possible explanation due to the heavy favorites generally consisting of the best teams and big-name football schools while the underdogs are may be smaller schools which are not as closely followed. Bettors bet on the familiar teams and drive the line to a point where the underdogs cover.

Another possible explanation is presented in this paper and argues that the constraint and lack of a constraint impact the games with large betting lines. When teams play at home and have more players available they are less likely to cover the point spread and on the road when the marginal players are not an option, teams are more likely to cover the point spread.

Using the log likelihood ratio suggested by Even and Noble (1992) and the betting line of 28 and 29.4 points, the strategy implemented here violates a fair bet. The strategies do not violate the no profitability null at typical statistical limits. Based on the results, the constraint is generally properly priced in the gambling market although there are time periods when the strategy does generate profits and the constraint is not properly priced by the market.[13]

[13] On line gambling is changing the amount of the vigorish. There are many web site where the vigorish is now 5 percent of web sites that offer half price "juice" on Fridays. With the half price vigorish the strategies provide profitable betting strategies and the travel roster constraint provides a profit opportunity.

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TABLE 1

Panel A

Statistic	Mean	Standard Deviation	Max	Min
Winning Score	34.64	12.012	82	3
Losing Score	16.96	10.04	58	0
Favorite Score	32.13	13.53	82	0
Underdog Score	19.48	11.76	66	0
Home Score	28.64	14.30	82	0
Visitor Score	22.96	13.44	70	0
Betting Line	5.15	14.98	76	-48
Abs Value of Line	12.61	9.59	76	0

Sample is from 1997 through 2002 but excludes week 1 and the last two weeks of the season.
The exception is 2001. A number of games scheduled for September 16, 2001 were rescheduled the second to last week of the season; therefore, that week was included in the sample.

Panel B

		Absolute Value of Betting Line		Home Team Score		Visiting Team Score		Favorite Team Score		Underdog Team Score		Total Points Scored	
Year	N	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
1997	561	13.4	10.0	27.8	14.24	22.82	13.88	31.33	14.19	19.12	11.71	50.65	17.65
1998	559	12.6	9.2	27.7	14.17	22.54	12.93	31.53	13.18	18.64	11.24	50.27	17.35
1999	579	12.2	9.7	28.9	14.06	21.87	12.85	30.77	13.76	19.39	11.84	50.73	16.45
2000	585	12.9	10.3	29.1	14.63	22.47	13.42	32.17	14.1	19.19	11.74	51.58	17.53
2001	614	12.2	9.2	28.9	14.43	23.94	13.86	32.41	14.06	20.14	12.1	52.84	18.24
2002	663	12.3	9.2	29.3	14.27	23.92	13.54	32.81	13.49	20.02	11.94	53.19	17.45
F		1.32		1.26		2.38		1.83		1.42		2.98	
p		0.25		0.28		0.036		0.103		0.215		0.011	

Summary statistics for games in the indicated year. ANOVA was performed to identify if differences occur across years.
Sample is the same as described for Panel A

TABLE 2

Big line summary statistics versus games which do not meet the requirement for a big line

		Absolute Value of Betting Line		Home Team Score		Visiting Team Score		Favorite Team Score		Underdog Team Score	
Year	N	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Big Line >22.4	575	29.89	10.04	35.60	16.92	17.69	14.87	41.05	13.27	12.23	8.72
Other line	2986	9.28	9.16	27.31	13.34	23.98	12.90	30.40	12.90	20.88	11.76
F		5938.00		169.63		108.79		325.48		281.24	
p		0.000		0.000		0.000		0.000		0.000	

		Absolute Value of Betting Line		Home Team Score		Visiting Team Score		Favorite Team Score		Underdog Team Score	
Year	N	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Big Line >29.4	247	35.82	6.43	38.94	17.70	16.17	15.46	44.48	13.15	10.63	8.02
Other line	3314	10.88	7.26	27.88	13.72	23.47	13.14	31.20	13.11	20.14	11.73
F		2756.28		142.95		69.05		235.64		157	
p		0.000		0.000		0.000		0.000		0.000	

Sample is from 1997 through 2002 but excludes week 1 and the last two weeks of the season.
The exception is 2001. A number of games scheduled for September 16, 2001 were rescheduled the second to last week of the season; therefore, that week was included in the sample.

Table 3

Winning Percentage Breakdown for Betting Strategy

	Column A			Column B			Column C		
Definition of Big Line	All Games that meet Criteria			Wager on Visiting Underdog Only			Wager on Visiting Favorite		
	Wins	Losses	Win Pct.	Wins	Losses	Win Pct.	Wins	Losses	Win Pct.
>22.2	296	279	51.48%	237	222	51.63%	59	57	50.86%
>24.6	223	205	52.10%	185	165	52.86%	38	40	48.72%
>26.998	187	169	52.53%	157	138	53.22%	30	31	49.18%
>28	154	120	56.20%	129	102	55.84%	25	18	58.14%
>29.4	141	106	57.09%	118	91	56.46%	23	15	60.53%
>31.745	97	81	54.49%	86	69	55.48%	11	12	47.83%

Due to roster constraints when traveling, the rule indicates to bet on large road favorites and large road underdogs. This table provides the winning percentages for the entire sample implementing the strategy and the two components of the strategy. Column A is the entire sample, Column B presents the winning percentage of betting on visisting underdogs and Column C presents the winning percentage from wagering on large visiting favorites.

Table 4

Winning Percentage and Log Likelihood Ratio test for each Big Line

Definition of Big Line	n	Wins	Losses	Win Pct.	Log Likelihood Fair Bet	Log Likelihood No Profitability
>22.2	575	296	279	51.48%	0.5027	na
>24.6	428	223	205	52.10%	0.7572	na
>26.998	356	187	169	52.53%	0.9105	0.0023
>28	274	154	120	56.20%	4.2299 **	1.5954
>29.4	247	141	106	57.09%	4.9762 **	2.1834
>31.745	178	97	81	54.49%	1.4401	0.3135

Log likelihood test statistics have a chi-squared distribution with one degree of freedom.

	Critical Values	Alpha
*	2.706	0.10
**	3.841	0.05
***	6.635	0.01

Table 5

Winning Percentages and Log Likelihood Ratio Tests for 29.4 point rule

Year	n	Wins	Losses	Win Pct.	Log Likelihood Fair Bet	Log Likelihood No Profitability (10 pct vig)
1982	12	4	8	33.33%	1.3592	na
1983	5	3	2	60.00%	0.2014	0.117
1984	8	3	5	37.50%	0.5053	na
1985	15	10	5	66.67%	1.6990	1.253
1986	21	16	5	76.19%	6.0595 **	5.051 **
1987	24	16	8	66.67%	2.7184 *	2.005
1988	27	12	15	44.44%	0.3340	na
1989	36	19	17	52.78%	0.1112	0.002
1990	36	19	17	52.78%	0.1112	0.002
1991	36	21	15	58.33%	1.0047	0.511
1992	23	13	10	56.52%	0.3924	0.157
1993	28	12	16	42.86%	0.5734	na
1994	28	18	10	64.29%	2.3179	1.614
1995	34	18	16	52.94%	0.1177	0.004
1996	42	16	26	38.10%	2.4040	na
1997	45	26	19	57.78%	1.0933	0.525
1998	34	21	13	61.76%	1.9001	1.210
1999	48	22	26	45.83%	0.3337	na
2000	48	28	20	58.33%	1.3396	0.682
2001	29	18	11	62.07%	1.7065	1.101
2002	43	25	18	58.14%	1.1446	0.571
2003 thru Oct	31	18	13	58.06%	0.8100	0.414
Totals	653	358	295	54.82%	6.0876 **	1.801
1997-2002	247	140	107	56.68%	4.4221 **	1.923

82-84	25	10	15	40.00%	1.0068	na
85-87	60	42	18	70.00%	9.8739 ***	7.737 ***
88-90	99	50	49	50.51%	0.0101	na
91-93	87	46	41	52.87%	0.2875	0.041
94-96	104	52	52	50.00%	0.0000	na
97-99	127	69	58	54.33%	0.9540	0.240
00-03	151	89	62	58.94%	4.8539 **	2.673

Log likelihood test statistics have a chi-squared distribution with one degree of freedom.

	Critical Values	Alpha
*	2.706	0.10
**	3.841	0.05
***	6.635	0.01

Table 6

Winning Percentages and Log Likelihood Ratio Tests for 28 point rule

Year	n	Wins	Losses	Win Pct.	Log Likelihood Fair Bet	Log Likelihood No Profitability
1982	16	8	8	50.00%	0.0000	0.0369
1983	8	6	2	75.00%	2.0930	1.7273
1984	12	4	8	33.33%	1.3592	na
1985	20	13	7	65.00%	1.8280	1.2977
1986	24	18	6	75.00%	6.2790 **	5.1815 **
1987	29	20	9	68.97%	4.2787 **	3.2888 **
1988	30	14	16	46.67%	0.1334	na
1989	44	24	20	54.55%	0.3641	0.0813
1990	42	21	21	50.00%	0.0000	na
1991	40	21	19	52.50%	0.1000	0.0002
1992	27	14	13	51.85%	0.0370	na
1993	31	14	17	45.16%	0.2908	na
1994	33	18	15	54.55%	0.2731	0.0610
1995	41	20	21	48.78%	0.0244	na
1996	54	22	32	40.74%	1.2357	na
1997	48	28	20	58.33%	1.3396	0.6817
1998	38	22	16	57.89%	0.9513	0.4626
1999	50	22	28	44.00%	0.7217	na
2000	51	29	22	56.86%	0.9638	0.4089
2001	34	22	12	64.71%	2.9851 *	2.1028
2002	53	27	26	50.94%	0.0189	na
2003 thru Oct	37	22	15	59.46%	1.3323	0.7612
	762	409	353	53.67%	4.1192 *	0.7941
1997-2002	311	172	139	55.31%	2.4709	0.7140

82-84	36	18	18	50.00%	0.0000	na
85-87	73	51	22	69.86%	11.8445 ***	9.264 ***
88-90	116	59	57	50.86%	0.0345	na
91-93	98	49	49	50.00%	0.0000	na
94-96	128	60	68	46.88%	0.5003	na
97-99	136	72	64	52.94%	0.4709	0.068
00-03	175	100	75	57.14%	3.5837 *	1.658

Log likelihood test statistics have a chi-squared distribution with one degree of freedom.

	Critical Values	Alpha
*	2.706	0.10
**	3.841	0.05
***	6.635	0.01

Table 7

Betting results if the 29.4 point cutoff us used as decision rule.

Year	N	Wins	Losses	Winning Percentage	Dollars Won	Dollars Lost	Annual Result	Cummulative Gains (Losses)
1982	12	4	8	33.33%	$ 400	$ 880	$ (480)	$ (480)
1983	5	3	2	60.00%	$ 300	$ 220	$ 80	$ (400)
1984	8	3	5	37.50%	$ 300	$ 550	$ (250)	$ (650)
1985	15	10	5	66.67%	$ 1,000	$ 550	$ 450	$ (200)
1986	21	16	5	76.19%	$ 1,600	$ 550	$ 1,050	$ 850
1987	24	16	8	66.67%	$ 1,600	$ 880	$ 720	$ 1,570
1988	27	12	15	44.44%	$ 1,200	$ 1,650	$ (450)	$ 1,120
1989	36	19	17	52.78%	$ 1,900	$ 1,870	$ 30	$ 1,150
1990	36	19	17	52.78%	$ 1,900	$ 1,870	$ 30	$ 1,180
1991	36	21	15	58.33%	$ 2,100	$ 1,650	$ 450	$ 1,630
1992	23	13	10	56.52%	$ 1,300	$ 1,100	$ 200	$ 1,830
1993	28	12	16	42.86%	$ 1,200	$ 1,760	$ (560)	$ 1,270
1994	28	18	10	64.29%	$ 1,800	$ 1,100	$ 700	$ 1,970
1995	34	18	16	52.94%	$ 1,800	$ 1,760	$ 40	$ 2,010
1996	42	16	26	38.10%	$ 1,600	$ 2,860	$ (1,260)	$ 750
1997	45	26	19	57.78%	$ 2,600	$ 2,090	$ 510	$ 1,260
1998	34	21	13	61.76%	$ 2,100	$ 1,430	$ 670	$ 1,930
1999	48	22	26	45.83%	$ 2,200	$ 2,860	$ (660)	$ 1,270
2000	48	28	20	58.33%	$ 2,800	$ 2,200	$ 600	$ 1,870
2001	29	18	11	62.07%	$ 1,800	$ 1,210	$ 590	$ 2,460
2002	43	25	18	58.14%	$ 2,500	$ 1,980	$ 520	$ 2,980
2003*	31	18	13	58.06%	$ 1,800	$ 1,430	$ 370	$ 3,350
	653	358	295	54.82%	$ 35,800	$ 32,450	$ 3,350	

* through October of 2003 season

Results are based on a $100 wager on each game which meets the 29.4 point big line cutoff.

Detailed analysis was performed on the period 1997 through 2002.