BRIGHAM YOUNG UNIVERSITY

HONP 342
SECTION 001
MWF 9:00-9:50
PROFESSOR TYLER JARVIS

RESEARCH PAPER, SECTION ONE

EFFICIENCY IN SPORTS BETTING MARKETS

FEBRUARY 21, 2003

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The sports gambling market has grown into a significant industry, with official estimates of wagers growing from $1 million in 1972 to an excess of $2 billion in 1995 (Sauer 1998, 2022). However, illegal sports wagering exceeds these legal tallies significantly, with estimates between $80 and $380 billion per year (Weinberg 2003). Unlike other forms of gambling, sports betting is not subject to predetermined laws of probability that insure industry profits and expected losses for individual bettors. Given the uncertainty of sporting event outcomes, a theoretical possibility exists to develop a betting strategy with expected profits. Many have tried, positing systems relying on expert opinions, simple trends, or more complex statistical analyses. Due to the size of the sports betting industry and the possibility of exploitation, it is important to analyze the efficiency of the sports betting market relative to these myriad betting strategies. This study outlines a variety of betting strategies and demonstrates that none of the systems convincingly offers a means to consistently exploit market inefficiencies, although formal models appear most trustworthy because they provide the most accurate documentation.

What is efficiency?

The efficient market hypothesis (EMH) dictates that no system produce consistently abnormal positive returns. For the sports gambling market, a strict EMH implies that no betting strategy will yield significant profits over time. However, there exist varying degrees of efficiency that a market may exhibit. Fama classified three degrees of market efficiency: weak, semi-strong, and strong (Fama 1970). The weak form of efficiency requires that strategies based on past trends not yield consistent positive returns. The semi-strong form necessitates robustness against strategies based on publicly available information, and the strong form dictates non-abnormal returns even with

access to privately available information. In the case of sports betting, privately available information would imply some type of fixing a game, and thus the strong form of efficiency will not be analyzed here. However, many betting strategies rely on trend information or public information, such as player and team statistics. Consequently, the discussion herein will center on weak and semi-strong efficiency.

In order to exploit the market and gain positive returns over time, sports betting requires a success rate of over 50 percent. In a market with no entry costs, a success rate over 50 percent would be sufficient to produce a positive expected return. However, a bookmaker generally must coordinate bets, and bookmakers generally charge 10 percent for any bet. Bookmakers formulate odds so that their expected return from an event outcome is zero, ensuring a consistent profit of 10 percent for the bookmaker. In order to overcome this entry price for betting, bettors must accurately predict winners over 52.38 percent of the time. Thus market efficiency requires that no betting strategy consistently produce success rates in excess of 53 percent.

A Sampling of Betting Strategies

As noted previously, many have tried to formulate betting strategies that will "beat the odds" by successfully predicting event outcomes more than 53 percent of the time. Thousands of strategies exist, and thus it would be impossible to catalog all of them. Thus this section only details a few of the more commonly used strategies. The prominent strategies are divided into three groups: expert opinions, simple trends or statistics, and formal statistical models. The expert opinion and simple trend and statistical models often require users to purchase the information, and most of these generally assert unreasonable success rates. Consequently, only systems with free access

are included in this study. Admittedly this limits the thoroughness of the discussion, but a more complete analysis will be left to future researchers.

Expert Opinions

Expert opinions are perhaps the most common betting strategy. Bettors often rely on the advice of knowledgeable friends or public pundits when placing wagers. To demonstrate the relative efficiency of expert selections as a betting strategy, take the case of the CBS Sportsline staff. Over the course of the 2002 NFL season, three sportswriters for CBS Sportsline selected the team that would beat the spread for 257 games. The best result came from the consensus of the three, with 132 successful picks when two or more agreed on the outcome of a game. This yields a percentage of correct choices of 51.36 percent (CBS Sportsline 2003). Although they selected winners in more than half of all games, the rate does not yield sufficient success for profits in the long run.

Similarly, other expert's picks fail to produce a sufficiently high success rate. The seven experts for ESPN.com predicted the winner of NFL games with roughly 60 percent accuracy, but this figure does not reflect their picks to beat the spread. Adjusting for the spread, their picks yield a more pedestrian average more comparable with the experts on CBS Sportsline. Another pundit at <www.ultimatecapper.com> offers his picks for NBA basketball games, but to date this season he has only divined 51.38 percent of games. Other expert picks not based solely on trends and statistics exhibit similar success rates. Although a few anomalies may exist during a given season, this pattern generally holds and suggests that expert picks alone cannot generate a system that guarantees profits to a bettor.

One flaw with most experts' picks seems to be that experts often fail to distinguish between low risk and high risk bets. They forecast the outcome of every game, and thus their success rate is diminished by the fairly random outcomes of certain games. By identifying which games would yield fairly certain outcomes in their view, they might improve their betting accuracy. Other models based on simple trends or formal statistics generally incorporate more discretion as to the bets they recommend a bettor place, and thus seem to afford better results bettors, as will be shown. Regardless, it seems that the "gut feelings" of football experts generally leave much to be desired as a betting strategy in most cases.

Simple Models

Numerous models purport to "beat the odds" by utilizing fairly simple trends or statistical patterns to formulate betting strategy. Many of these strategies examine the location of the game or the outcome of the previous game in order to ascertain the victor of the upcoming contest. These systems are generally available only by paying a fee to the proprietor, and thus analysis of a significant number is somewhat difficult. However, a reasonable sampling shows that most of these systems assert unverifiable success rates or abnormally high success rates based on a small sampling of outcomes. Consequently, such strategies are an inconsistent and unreliable vehicle for sports betting success in the long run.

One such system available without charge is found at Green Pentacle. This system is among the more trustworthy systems, if only because it appears to accurately identify its success rate. The system uses a set of 19 factors to determine when and on which team bettors should make their bets. The system deals exclusively with the NFL, and relies on

factors such as the performance against the spread in the previous week and the location and timing of the game. For example, Green Pentacle recommends betting against "home favorites that gave up 40 or more points in its last game" while betting for a "home underdog that is coming in off a straight up win in the role of an underdog" (Green Pentacle 2002). Since these betting strategies incorporate such minute details, many might believe in the viability of this system. A sample of its predictions over ten weeks shows that the system furnished 30 correct bets out of 68 games. This horrible success rate would cause the bettor to lose significant money. At least Green Pentacle acknowledges its misfortunes over the ten-week span, although the site insists that the ten-week period of losses is merely an anomaly. Nonetheless, even in the more extended history the system cannot boast significant profits after the entry charge of 10 percent per bet.

Qoxhi provides a gambling system based on less specific factors. The Qoxhi system emphasizes betting on slight underdogs because underdogs win 51 percent of the time, and also betting against teams that beat the spread often in the previous year. Other factors are involved such as team momentum, but the primary predictors of a good betting opportunity are these two conditions. Using this model, Qoxhi reports that the successfully predicted winners more than half the time in 20 out of 21 seasons, and they forecast expected profits at 72 percent (Qoxhi 2003). However, in most of these seasons Qoxhi picks returned no profit or marginal profit when the 10 percent charge for placing each bet was factored in. Using Qoxhi does not result in such heavy losses as Green Pentacle, but it still cannot guarantee success consistently that would recoup the fees for placing bets.

Although only two systems are detailed here, they are representative of the simple trends and statistics sports betting systems. Most of these systems charge significant fees for use, and most of them boast of success rates in the 60-70 percent range. However, when tested in the long run, few systems actually achieve such accuracy for even a single season, much less over the course of several seasons. Consequently, it seems unreasonable to assert that simple betting rules like those described in the previous models could achieve reliable profits. These systems make money by charging for simple patterns that only "expert bettors" have access to, but in reality these trends are publicly available and do not hold when tested over extended time periods.

Formal Statistical Models

While formal models rely on virtually the same data as their informal counterparts, these models generally provide more precise predictions as to when bets should be placed, and are better documented. Nevertheless, even among formal models there exist differing opinions as to the possibility of exploiting market inefficiencies with gambling strategies. This discussion only highlights statistical models for NFL games because of limited space, but the patterns exhibited in the development of formal NFL models are indicative of other professional sports as well.

The first tests of market efficiency in the NFL concluded that the possibility existed for exploitation of the odds. Vergin and Scriabin (1978) developed betting strategies that yielded fairly consistent positive returns. However, these first tests lacked statistical refinement, though, and required later tests to enhance their accuracy. In addition, the betting strategies test did not directly test market efficiency, although it did suggest the possibility that the semi-strong EMH might not hold for the NFL betting

market. Zuber, Gandar, and Bowers (1985) followed up on Vergin and Scriabin's work with a more direct test of market efficiency. They tested the spreads directly and concluded that no consistent bias could be found in the spreads. Nevertheless, using betting strategies that limited bets to selected games in the second half of the season, they also concluded that their strategy could beat the odds with a 60 percent success rate. Still, their test was only conducted for a single season, and further study would be needed to confirm their hypothesis of market inefficiency.

A follow-up study by Sauer et al (1988) applied more rigorous methods to a larger data set and rejected the findings of Zuber, Gandar, and Bowers. They argue that the methods employed by the former study are misleading and that weak test test for inefficiency used by Zuber, Gandar, and Bowers did not accurately assess market efficiency. Dana and Knetter (1994) support these findings, showing no significant or predictable bias in oddsmaking, and thus no substantial market inefficiency. Their study includes data for the NFL from 1980-90 and uses a more sophisticated Kalman Filter test to distinguish between periods of significant noise in the regression. They conclude that bettors might exploit periods of white noise because oddsmakers cannot properly calculate spreads at these times, but since these periods can generally be distinguished only in hindsight, no strategy can consistently beat the spread.

Conclusion

The results of this survey of sports betting systems suggest that we cannot reject the weak and semi-strong efficient market hypotheses without more conclusive evidence. Although a few formal models purport to accurately determine winners against the spread, these models generally require further study because of limited samples or

contradictory evidence from later studies. Furthermore, most authors acknowledge that the even though a statistical system worked for a given data set in the past, the results may not hold for future betting strategies. With the less sophisticated, the few cases where experts and simple trend systems seem to afford sufficient degrees of accuracy also fail to endure with more strenuous testing. More comprehensive study should take place to determine whether the EMH holds for sports betting markets, but this study cannot reject the hypothesis with any measure of confidence.

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