Biases in Assessments of Probabilities: New Evidence from Greyhound Races

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Abstract

This paper investigates biases in the perceptions of probabilities using data from the 1989 and 1994 seasons at the Woodlands greyhound park in Kansas City, Kansas. Results reveal consistent evidence that the gambler’s fallacy exists. The results also reveal that gamblers overestimate the probability of a win by the favorite and the dog in the “lucky” seven position. However, the comparison also suggests some learning by bettors between the first season of operation in 1989 and the 1994 season.

Key words: Pari-mutuel game, uncertainty, gambler’s fallacy

JEL Classification: L83, D81, G14

The assumption that economic agents can correctly process information to calculate probabilities of events plays a crucial role in countless studies examining the behavior of agents under uncertainty. However, experiments and empirical evidence suggest several common biases in the assessments of probabilities. This paper examines the perceptions of probabilities by bettors at the Woodlands greyhound park in Kansas City, Kansas over two years, 1989 to 1994.

The previous literature suggests three biases among bettors. First, bettors tend to overestimate the probability of a win by the longshot and underestimate the probability of a win by the favorite. Second, bettors appear to suffer from the gambler’s fallacy and underestimate the probability of repeat wins by a dog or horse in the same pole position. Finally, superstition affects the perceptions of bettors.

The primary objective of this paper is to search for consistent deviations of bettor’s perceived (subjective) probabilities from actual probabilities. Using two years of data supplies a strong test of whether irregularities persist over time. Because 1989 was the first year of operation at the Woodlands and the amount wagered grew substantially over time, the data also allows some statements on how learning and total pool affect patterns of wagers.

Using Ali’s (1977) methodology, we translate observed market odds into the subjective probabilities by assuming the market is characterized by expected utility maximizing agents with equal information.¹ The methodology then requires comparing average actual probabilities to subjective probabilities over many races. For example, we can compare the average number of wins by the longshot over a season of races to the average subjective
probability of a win by the longshot implied by the market odds. A deviation of subjective probabilities from objective probabilities indicates an inaccurate assessment of probabilities by bettors or alternatively that agents fail to maximize the expected value of the wager.

Our results find evidence of all three biases. The strongest evidence confirms the gambler’s fallacy, which asserts that gamblers underestimate the probability of an event that has recently occurred. In particular, our results show that bettors underestimated the probability of a win by the dog in the position which won the last race both in 1989 and 1994. The results also provide consistent evidence that bettors at the Woodlands overestimate the probability of a win by the longshot. However, the data provides little support for Ali’s (1977) finding that bettors underestimate the probability of a win by the favorite. Bettors also appear to be influenced by superstition. In both years, the subjective probability of a win by the dog in the “lucky” seven position substantially overstates the actual probability. Finally, a comparison of 1989 results to 1994 results reveals that Woodland’s bettors made more accurate assessments of probabilities in 1994 than in 1989, the first year of operation.

The results are inconsistent with the hypothesis that the greyhound racing market consists of expected value maximizers with accurate assessments of all probabilities. Viscusi’s (1989) prospective reference theory provides one plausible explanation of our results. In this model, agent’s perceptions are based on a combination of prior beliefs and actual probabilities. In the context of Viscusi’s theory, our results simply indicate that prior perceptions of probabilities include biases such as the gambler’s fallacy. With regard to the longshot bias, Terrell and Farmer (1996) suggest another possible explanation. If bettors can purchase information on the race at a cost, the odds can be distorted by informed bettors to create the longshot bias. Combining Viscusi’s theory and this idea suggests priors greatly influence opinions of pleasure bettors, but are much less important for those who purchase better information on true probabilities. We return to this discussion in the conclusion.

This article begins with a more detailed description of the three common misperceptions of probabilities by bettors. Section 2 describes the methodology, including a new method of allowing for rounding in odds when calculating subjective probabilities. Section 3 describes the data, variable construction, and the rules governing races at the Woodlands. Section 4 contains the empirical results examining biases among bettors.

1. Common errors in assessments of probabilities by bettors

The strategies and biases of gamblers are best described using several gambling terms. Throughout the paper the term odds refers to the market odds which define the payout to a winning wager on an event. For example, if the odds are four to one (4:1), a wager of $1 yields $4 if the event occurs. The event with the lowest odds is the favorite, while the event with the highest odds is the longshot. The pool is the total amount wagered on an event. Pari-mutuel games split the pool (less a portion reserved for the track) between all bets on the winner. Suppose $4 is wagered on event one and $2 on event two. If the tract