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Review

Are Sports Bettors Biased toward Longshots, Favorites, or Both? A Literature Review

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Abstract: A large body of literature on the favorite–longshot bias finds that sports bettors in a variety of markets appear to have irrational biases toward either longshots (which offer a small chance of winning a large amount of money) or favorites (which offer a high chance of winning a small amount of money). While early studies in horse racing led to an impression that longshot bias is dominant, favorite bias has also now been found in a variety of sports betting markets. This review proposes that the evidence is consistent with both biases being present in the average sports bettor. Sports betting markets with only two potential outcomes, where the favorite therefore has a probability >0.5 of happening, often produce favorite bias. Sports betting markets with multiple outcomes, where the favorite’s probability is usually <0.5, appear more consistent with longshot bias. The presence of restricted odds ranges within any given betting market provides an explanation for why single studies support, at most, one bias. This literature review highlights how individual sports bettors might possess biases toward both highly likely, and highly unlikely, events, a contradictory view that has not been summarized in detail before.

Keywords: favorite–longshot bias; betting markets; sports betting; betting biases



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1. Introduction

The risk–return trade-off is a common theme in financial scenarios, implying that riskier securities, with a higher probability of not paying out, should provide a higher rate of return if they do not default. This statement is also consistent with recent psychological theorizing, where the proposed “risk–reward heuristic” links expectations of probabilities and payout so that expected return remains constant (Pleskac and Hertwig 2014). However, empirical studies of sports betting markets have frequently found results inconsistent with a constant risk–return trade-off, as implied by the risk–reward heuristic. That is, some sports bets lose more in expectation than others. This literature review brings together a wide variety of empirical studies on sports betting in support of a novel interpretation.

The next section of this paper begins by defining the structure of a betting market, including the mathematics underpinning sports betting markets. This is followed by an explanation as to why sports betting can be treated as financial decisions. We then collate our findings and compare this interpretation to other views expressed in the literature. This interpretation can explain empirical findings and inform theoretical models of sports betting biases. We conclude by providing potential explanations for these biases.

2. Sports Betting Markets: Setting Odds and Preferences

Consider a soccer match between England (currently ranked 4th in the world) and minnows Malta (currently ranked 176th in the world). The profit on successfully betting on England to win would be very low—usually summarized by calling England the *favorite*. Betting on Malta would be a *longshot*, an unlikely event with high possible returns. Sports bettors are expected to make losses that contribute to the bookmaker’s profit, as explained

later on. However, both standard economic theory and the risk–reward heuristic should imply that bettors' expected long-term losses are constant for all types of bets within a given betting market.

A large body of literature on the favorite–longshot bias¹ in sports betting asks one question, which has so far eluded a cross-sport consensus: are bettors biased toward (willing to suffer higher expected losses) on longshots, which offer a small chance of big wins, or are bettors biased toward favorites?

While the existence of either bias implies that sports bettors fall short of rational performance (Cortis et al. 2013; Vaughan Williams 1999), the literature has not come to a clear consensus on explaining why these biases emerge as they do across all sports betting markets. This lack of consensus has important implications, given that sports betting markets are often studied as simplified prediction markets, relevant to more complex and more high-stakes financial markets (Vaughan Williams 1999). Contrasting observations of both longshot and favorite biases in sports betting are unlike most judgmental biases, such as overconfidence, where systematic biases tend to occur in one direction only.

Here, the favorite–longshot bias literature is reviewed, and a new interpretation is offered: the average sports bettor is biased toward both longshots and favorites. Although intuitively contradictory, these biases can simultaneously exist as regions of overestimation in bettors' subjective probability distributions, with the range of probabilities from any given sport determining which bias will appear. The range of probabilities in any given sports betting market tending is itself linked to the number of potential outcomes in that market. In horse racing, for example, there are many horses competing in any one race, such that it is unlikely that any individual horse will have a predicted probability of more than 0.5 of winning that race (Dowie 1976). If that is the case, then no bet will feel like a “sure-thing” in terms of being more likely to win than not, and so bettors will tend to look instead to maximize their potential return by betting on longshot competitors. If this is the case, then bets on longshot horses may have the highest expected losses. However, in sporting events with a clear predicted winner with a probability of >0.5, for example in the soccer match between England and Malta, bets on Malta may appear unlikely to pay off and a waste of money. Bets on England, by comparison, may appear to be a low-risk way of making some money. If enough bettors think this way, then the odds may end up being set in such a way that, in fact, bets on England have the highest expected losses. Therefore, the number of potential outcomes in any given sporting event and the likely range of implied probabilities are predicted to be key factors in whether favorite or longshot biases emerge. Our focus here is on the standard bets that bettors predominantly make to take on risk rather than the few bets sports bettors sometimes make to hedge or reduce risk (Axén and Cortis 2020).

Sports bookmakers offer odds on outcomes depending on the likelihood and popularity of an outcome, which should be related to the probability of that outcome. Using the analogy of an England versus Malta soccer match, if the true probability of a win for England is 80% and those of a draw or a Malta win are 10% each, then the fair odds in a European format would be the inverse of the probability; that is, 1.25 on an England win and 10 on any other outcome. This means that anyone betting €10 on England winning would receive €12.50, being a €10 wager and €2.50 in profit. As this should occur 80% of the time, the bettor would break even after ten matches: England with eight England wins, one draw, and one win for Malta.

Bookmakers, in fact, offer lower odds to make a profit. For example, they might offer odds of 1.2 on an England win and 9.5 on a draw or a win. In this scenario, the sum of probabilities of the implied odds adds up to more than one hundred percent ($\frac{1}{1.2} + \frac{1}{9.5} + \frac{1}{9.5} = 104.38\%$).

¹ The term “favorite-longshot bias” was originally used to describe what is termed “longshot bias” here: longshot bets with large potential wins but a low probability of winning tended to have above-average expected losses. The opposite bias, where favorite teams have above-average expected losses, was originally termed “reverse favorite-longshot bias.” The simpler terms “longshot bias” and “favorite bias” are used here to describe the individual biases, while “favorite-longshot bias” will be used in reference to either bias.

It can be shown that the sum of probabilities implied by the market should sum up to more than 100% for a bookmaker to make profits and evade being subject to arbitrage (Cortis 2015). This discrepancy (from 100%), usually called the bookmaker margin or the spread, should result in bettors losing in the long run. For example, at an odd of 1.2, a bettor placing €10 on England winning for ten repetitions of the same match would have wagered €100 but wins only eight times. By receiving €12 per win, they would have lost €4 (4%) overall². The larger the bookmaker margin or the discrepancy between true fair odds and odds offered on the market, the larger the profit for the bookmaker and hence the loss for the bettor. In order to ensure solvency and liquidity, bookmakers would also adjust odds according to bettor preferences rather than apply the same spread (Cortis 2019; Stark and Cortis 2017). If sports betting markets are efficient or if sports bettors use a risk–reward heuristic (Pleskac and Hertwig 2014), then the percentile losses on favorites and longshots should be the same.

3. Sports Betting Decision Making

Sports betting is just one example of decision making under risk. Therefore, any theoretical explanation of sports betting behavior should ideally be consistent with more general theories of decision making under risk. In prospect theory, the dominant descriptive model of decision making under risk (Kahneman and Tversky 1979), small probabilities are typically overweighted, giving a natural explanation for why bettors would gamble on longshots, despite these bets having high expected losses. However, prospect theory is sufficiently flexible to be consistent with both favorite and longshot biases: “[T]he simplification of prospects in the editing phase can lead the individual to discard events of extremely low probability and to *treat events of extremely high probability as if they were certain.*” (Kahneman and Tversky 1979, emphasis added, p. 282). Favorite bias may also occur as a natural consequence of the representativeness heuristic, where formal calculations of probability are replaced with notions of similarity or salience (Tversky and Kahneman 1974). Strong favorites often go on long winning streaks, and this could easily create the impression that they almost always win, providing a plausible mechanism for why sports bettors might also be attracted to bets on favorites.

Sport is varied enough to create compelling narratives capable of reinforcing the overestimation of both longshots and favorites. Greece winning the 2004 European soccer championships, or Leicester winning the 2016 English Premier League (odds of 5000 were being offered at the start of the tournament; Newall and Cortis 2019), are recent examples of a rank outsider winning not only a single match but an entire competition. Similar memories may entice bettors to back too many longshots. Brazil in the 2014 soccer World Cup may be one example of a betting favorite with high expected losses. Brazil is the most successful nation in soccer history and hosted the tournament on home soil, where they had not lost a competitive game since 1975 (Smith 2013). Brazil were large favorites for the 32-team tournament but suffered the most extreme defeat of modern soccer in a high-profile game, losing 7–1 to Germany in the semifinal. The Brazilian team’s flaws were obvious in hindsight but not appreciated by many in advance of the tournament. Brazil’s high probability of winning the World Cup, as implied by betting odds, failed to sufficiently adjust after each poor performance (Cortis and Briguglio 2017).

4. Horse Racing

Early studies on horse racing in the US found evidence of longshot bias (Ali 1977; Asch et al. 1982, 1984; Griffith 1949; Rosett 1965; Snyder 1978; Weitzman 1965). Similar evidence has been found in UK horse racing (Dowie 1976; Vaughan Williams and Paton 1997) and in Finland (Kanto et al. 1992), Australia (Bird and McCrae 1987), and Germany (Winter and Kukuk 2006). This is not a universal finding, however. Studies using data from Hong Kong (Busche and Hall 1988), Hong Kong, and Japan (Busche 1994), in a small

² Cortis (2015) and Newall (2015) show how the expected profit can be calculated.

Texas racetrack (Swidler and Shaw 1995), found evidence that is more consistent with favorite bias.

Although studies on horse racing tend to find longshot bias, this may be due to the restricted range of odds typically found in horse racing. With many horses competing in a single race, and relatively small skill differences, “true” favorites, defined as a horse with an implied probability of over 0.5 of winning the race, almost never exist (Dowie 1976). This may help to explain why the predominant pattern in horse racing studies supports longshot bias.

5. Soccer

Soccer matches are played between only two teams, meaning that any team that is the favorite to win the match will also be a “true” favorite with a higher likelihood of winning a match than any other outcome (draw, loss). Because of home advantage in soccer, the favorite is more likely to be the team playing at home rather than the team playing away (Marek and Vávra 2020). Large skill differentials between teams can occur in soccer; however, in most matches between professional teams, the longshot will have a better chance of winning than the worst horse in a horse race. Evidence for favorite bias has been found in studies of both UK club soccer (Cain et al. 2003; Dixon and Pope 2004; Forrest and Simmons 2001) and World Cup soccer (Gil and Levitt 2012). Other studies of UK club soccer have found evidence for longshot bias (Cain et al. 2000; Constantinou and Fenton 2013; Deschamps and Gergaud 2012; Graham and Stott 2008; Vlastakis et al. 2009), including two large dataset studies over several European leagues (Buhagiar et al. 2018; Constantinou and Fenton 2013).

6. Other Sports

This probability range account of favorite–longshot bias would predict similar results in sports involving exactly two competitors in a single match. Favorite bias has been found in baseball (Woodland and Woodland 1994; Woodland and Woodland 2003) and ice hockey (Woodland and Woodland 2001), with longshot bias appearing to predominate in tennis (Forrest and McHale 2007), although more sophisticated betting strategies may reveal other biases in tennis (Candila and Palazzo 2020).

The range of probabilities on offer to a bettor is affected by the number of competitors in a single sporting event but also by the particular betting system used. American football uses a spread betting system that aims to correct for skill differentials between the two teams. Therefore, both the favorite and the longshot team should, in theory, be equally likely to “beat the spread.” True longshots bets, which offer a small chance of a large win, are therefore eliminated with this betting system. However, in this case, where the implied probabilities of both events should be equally likely, bettors appear to have a preference for betting on the team that is most likely to win the match (Avery and Chevalier 1999; Golec and Tamarkin 1991; Simmons and Nelson 2006), which can lead to economically significant losses for bettors (Levitt 2004), although this bias is possibly becoming smaller over time (Gray and Gray 1997). However, this bias actually increased over the course of a season-long experiment, suggesting that this mistake is difficult to correct (Simmons et al. 2011). It is much easier to imagine a favorite winning by a large margin rather than a longshot winning by a small margin, and so this may be a case of representativeness producing biased estimates of likely events (Tversky and Kahneman 1974). While this bias in American football is not formally equivalent to favorite bias in other sports, it shows that a strong bias toward favorites is measurable when there are no true longshots available to bet on. Australian football and rugby use hybrid win/spread systems where longshot bias appears to dominate (Brailsford et al. 1995).

We only know of one previous study that has pooled data from multiple sports betting markets together in order to combine a wide range of probabilities together into a single study (Cain and Peel 2004). That study combined odds from horse racing, which tends to involve low probabilities, and from baseball, which tends to involve higher probabilities.

The study found that, consistent with longshot bias, low-probability horses tended to have the largest expected losses. However, expected losses did not uniformly decrease with odds. A turning point occurred above $p = 0.4$, implying that bets on the biggest favorites from the baseball part of the dataset had larger expected losses than lower probability outcomes. This is consistent with our proposed interpretation of the range of probabilities from a sports betting market determining whether longshot or favorite bias appears.

7. Conclusions and Discussion: Explaining These Biases

The persistence and variety of favorite–longshot biases have produced a large theoretical literature, aiming to explain why these biases occur as they do.³ Here, these theories will be discussed in the context of whether they provide potentially complementary or contrasting views of sports bettors' biases.

Institutional factors of bookmaker markets have often been discussed. One influential example argues that bookmakers generate longshot bias as a natural hedge against informed insiders (Shin 1992). The restricted number of odds levels offered by bookmakers, in some regions due to legal restrictions, has also been introduced as a cause of longshot bias (Koch and Shing 2012)⁴. The persistence of these biases, despite much public knowledge, is potentially due to bookmakers' margins preventing informed bettors from eliminating betting biases (Paton and Williams 1998), while small parimutuel markets potentially do not provide sufficient monetary incentive for informed bettors to eliminate biases (Busche and Walls 2000). While these factors may lead to increased bias in bookmaker markets (Bruce and Johnson 2000; Sung et al. 2009), they cannot explain bias often found in parimutuel markets, without an odds-setting bookmaker (except for Busche and Walls 2000, as a potential explanation of the persistence of parimutuel biases). Ultimately, bettors must possess psychological biases at baseline before other factors can magnify them. If bettors were on average totally unbiased, then they would not accept any bets at above-average losses, and therefore nobody would volunteer to bet at biased odds.

Early psychological analyses of longshot bias in horse racing concluded that bettors must be risk-loving, providing an intuitive reason why horses with high potential payouts, but low expected returns, are often selected by sports bettors (Ali 1977; Weitzman 1965). However, the lottery-type payout structure of longshot horses, which usually provides nothing, but has a small chance of very high payouts, has been more recently attributed to a preference for skewness rather than variance (risk) (Golec and Tamarkin 1998). However, any theory that alerts sports bettors' global utility function for money predicts that sports bettors will act similarly in all domains of life. A risk-loving sports bettor should, therefore, avoid taking out insurance, which is not highly plausible. It has been proposed that betting provides a unique source of utility, enough to make an otherwise risk-averse individual willing to bet (Thaler and Ziemba 1988).

Bettors could be motivated by nonmonetary reasons (Scott and Gulley 1995). Biases could also be based on what feels to be a good story (Hausch et al. 1981). For example, seeing Brazil win the soccer World Cup at home as investigated by Cortis and Briguglio (2017) or a longshot horse winning (Hausch et al. 1981) could be considered a gratifying outcome to many bettors. This is analogous to some investments in corporations with strong sustainable or corporate social responsibility goals despite their higher perceived risks or potential lower return (Popescu and Popescu 2019).

Alternatively, Paul and Weinbach (2012) argue that betting is an act of consumption, not investment. Bettors tend to prefer placing bets on teams or participants from the same country (Chincarini and Contreras 2010) in a similar fashion, as investors tend to

³ Given that the initial empirical papers tended to support longshot bias, some theoretical accounts explore causes of only the longshot bias, e.g., (Snowberg and Wolfers 2010).

⁴ For example, considers outcomes with probabilities of 90% and 0.3%, respectively. With no profit margins, the odds should be 1.1111 and 333.33. Typically, a betting company may have possible odds grids such that odds are offered at rounded figures. In this case, the odds offered could be at 1.1 and 300. The discrepancy in the likely outcome is 1% while it is 10% for the unlikely outcome. Here, it is less than 1%. Since grid levels are wider for unlikely outcomes, there is a wider discrepancy between subjective and objective probabilities for these cases.

be more biased toward selecting securities that are close to home (Coval and Moskowitz 1999). Therefore, a bookmaker in England may offer lower (unfairer) odds on England winning a match than a bookmaker in Italy. This discrepancy should be slowly diminishing as it is easy to compare odds online, and most firms would have a license to operate in multiple jurisdictions. Braun and Kvasnicka (2013) extend this bias into two elements: perception bias (domestic bettors overestimating their team/player's chance to win, leading to lower perceived odds) and loyalty bias (the betting population would only wager on their team/player). Past studies found conflicting results, ranging from more favorable odds on more popular teams in the Spanish La Liga (Forrest and Simmons 2008) to finding that losses on popular NFL teams are abnormally high (Avery and Chevalier 1999).

However, any model of average bettor behavior suggests that bettors will display similar biases no matter the type of sport they are betting on. The diversity of empirical findings, as reviewed in the previous section, has led to the construction of more diverse models of bettor behavior.

The simplest way to begin explaining the diversity of empirical findings is to split sports bettors into two groups: uninformed and informed bettors. Uninformed bettors bet for fun and are subject to biases, while informed bettors attempt to exploit (and therefore reduce the presence of) market inefficiencies. It has been argued that longshot bias in horse racing is due to uninformed bettors, and studies finding no clear evidence of longshot bias are consistent with informed bettors dominating an efficient market (Coleman 2004; Hurley and McDonough 1995; Terrell and Farmer 1996). However, these models are only capable of explaining how a sports betting market moves from longshot bias to efficiency. As algorithmic trading is becoming more prevalent in sports betting markets, one would expect such biases to diminish.

Something extra is needed to explain the empirical observations that some sports betting markets, such as soccer, can display both favorite and longshot biases. It has been hypothesized that, in a horse racing context, longshot bias occurs if uninformed bettors dominate, and vice versa favorite bias if informed bettors dominate (Sobel and Raines 2003). Vaughan and Williams and Paton (1998) provide a model with two groups of bettors, transaction costs, and an added utility benefit if informed bettors win on favorites. Longshot bias occurs if transaction costs dominate, favorite bias if the utility from winning on favorites dominates, and no bias if the two forces approximately cancel (Vaughan Williams and Paton 1998). Peel and Law (2009) model a scenario where two groups of bettors hold longshot and favorite biases, respectively, which is most consistent with the view articulated in this literature review, thereby explaining why markets can display opposite patterns of bias (Peel and Law 2009).

The studies selected for this review suggest that sports bettors may be biased toward both longshots, in markets with many potential outcomes and few competitors who are more likely than not to win, and genuine favorites, with implied winning probabilities >0.5 . Any narrative review is limited, however, so this hypothesis requires further investigation, and any analysis of the literature may be limited by publication bias. Big data, including the further use of pooling data together from multiple sports (Cain and Peel 2004), could be another path to increasing understanding since small sample sizes may lack the required precision to simultaneously measure both biases.

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