

The favourite–longshot bias in parimutuel betting: A clarification of the explanation that bettors like to bet longshots

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Abstract

One explanation of the favourite–longshot bias in parimutuel betting is that bettors derive utility from betting longshots. The purpose of this paper is to explore the conditions where such an explanation makes sense. We posit a simple two-horse race where there are two groups of bettors: one group always bets the longshot; the other bets on the basis of expected value. The model yields two results. In the absence of transactions costs (track take), there is no favourite–longshot bias. However, if the track take is positive, we would expect to observe the bias. The primary reason is that there is no short-selling mechanism in parimutuel betting markets. Hence, the explanation that bettors like to bet longshots also requires transactions costs and no short-selling.

Keywords: Gambling; Parimutuel; Transactions cost; Short-selling

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1. Introduction

Financial economists have had more than a passing interest in the ability of financial market participants to incorporate information into prices. In general, there are few instances of market failure when the number of traders is large. One such instance appears to be in parimutuel betting markets. A regularity in empirical studies of these markets is that favourites are underbet and longshots overbet. This phenomenon is termed the *favourite–longshot bias* and has been elevated to the stature of an ‘intellectual curiosum’ by Asch and Quandt (1986).

We have presented data taken from Asch et al. (AMQ, 1982) in Table 1. On the basis of a

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Table 1
The Asch–Malkiel–Quandt data

Class	Number of horses in group	Objective probability	Subjective probability
Favourites	729	0.361	0.325
Class 2	729	0.218	0.205
Class 3	729	0.170	0.145
Class 4	724	0.115	0.104
Class 5	692	0.071	0.072
Class 6	598	0.050	0.048
Class 7	431	0.030	0.034
Class 8	289	0.017	0.025
Longshots	165	0.006	0.018

large number of races, AMQ group horses into nine classes ranging from favourites to longshots. Note that horses in the favourite class actually won with frequency 0.361, yet the subjective probability of that class winning (inferred from the betting) was only 0.325. However, examining the longshot class, its subjective probability of winning is three times greater than its objective probability of winning.

Theorists have offered a number of explanations. One mentioned by Thaler and Ziemba (1988) is that bettors derive utility from calling longshots. This explanation is the focus of this paper. In particular, we examine conditions where such an explanation makes sense. We study a simple two-horse race where there are two groups of bettors: one group always bets the longshot; the other bets on the basis of expected value. The model yields two interesting results. In the absence of transactions costs (track take), there is no favourite–longshot bias. However, if the track take is positive, we would expect to observe the bias. As we will show in the paper, the primary reason is that *there is no short-selling mechanism in parimutuel betting markets*. Hence, the explanation that bettors like to bet longshots only makes sense if there are positive transactions costs and no short-selling mechanism.

2. The model

Consider a horse race where there are only two horses – a favourite and a longshot. The true probability that the favourite wins is p_F ; the probability that the longshot wins is $p_L = 1 - p_F$.

There are two groups of bettors. One group always bets the longshot; the other makes bets on the basis of expected value. Assume that the group betting the longshot wagers an amount L_0 . In addition, assume that there are n bettors in the second group who each determine a Nash bet.

It is easy to show that these Nash bettors will prefer to put their money on the favourite. Given that bettor i makes a bet of size x_i , his or her expected profit is

$$\pi_i = \frac{\sum_j x_j + L_0}{\sum_j x_j} x_i p_F - x_i. \quad (1)$$

Taking the first-order conditions and imposing the condition for a symmetric Nash strategy, gives the following solution:

$$x_i^*(n) = x^*(n) = \frac{p_F}{1 - p_F} \frac{n - 1}{n^2} L_0. \quad (2)$$

Suppose now that the number of Nash bettors is large. Then the amount placed on the favourite by these bettors is $F^*(n) = nx^*(n)$, and we can show that

$$F^* = \lim_{n \rightarrow \infty} F^*(n) = \frac{p_F}{1 - p_F} L_0. \quad (3)$$

Given a large number of Nash bettors, what, then, is the subjective probability on the favourite? The subjective probability on the favourite is defined as the total wager on the favourite divided by the total amount wagered. Denoting this probability by θ_F , we have

$$\theta_F = \frac{L_0 p_F / (1 - p_F)}{L_0 + L_0 p_F / (1 - p_F)} = p_F. \quad (4)$$

Thus, the subjective probability on the favourite is equal to the objective probability on the favourite. There is no favourite–longshot bias. But this is not very surprising. In a competitive market, with many traders, we would not expect a bias to persist.

However, if there is a limited supply of Nash betting capital, then to the extent that $F^*(n) < F^*$, we get $\theta_F < p_F$. That is, if there is a shortage of Nash capital, the bias results.

3. The effect of transactions costs

Now suppose that there is a positive track take. In the real world, most racetracks keep between 10% and 20% of a betting pool. Again, we consider the same two-horse race except that the track will take a percentage t of the total win pool. Thus, if L_0 is bet on the longshot, and F on the favourite, the track will take $t(L_0 + F)$. This leaves $Q(L_0 + F)$ to be distributed to winning bettors, where, for convenience, we have defined $Q = 1 - t$.

Going through the same calculation as in the previous section, we have the symmetric Nash strategy:

$$x_i^*(n) = x^*(n) = \frac{Q p_F}{1 - Q p_F} \frac{n - 1}{n^2} L_0. \quad (5)$$

Assuming a large number of Nash bettors, we have that

$$F^* = \lim_{n \rightarrow \infty} F^*(n) = \frac{Q p_F}{1 - Q p_F} L_0. \quad (6)$$

And given this F^* , we calculate the subjective probability on the favourite to be

$$\theta_F = \frac{L_0 Q p_F / (1 - Q p_F)}{L_0 + L_0 Q p_F / (1 - Q p_F)} = Q p_F. \quad (7)$$

Thus, if $Q < 1$, then $\theta_F < p_F$, or, in other words, if there are transactions costs, there will be a bias.

But what is interesting is that, at this equilibrium, the profit of a marginal bet on the longshot is negative. Now in everyday, garden-variety capital markets this could not persist. Investors would short-sell the security to the point where expected profit on all securities would go to 0. *However, there is no way to short-sell in parimutuel betting markets.* Thus, the institutional structure of racetrack betting does not allow Nash bettors to take advantage by short-selling the longshot.

Hence, if the preference for calling longshots is to explain the favourite–longshot bias, then there must also be transactions costs and incomplete markets (no short-selling).

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