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The house doesn't always win: Evidence of anchoring among Australian bookies☆

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ABSTRACT

We examine Australian horseracing bookmakers' responses to late scratches, instances in which a horse is abruptly withdrawn after betting has commenced. Our observed bookies exhibit anchoring on the original odds and fail to re-adjust odds fully on the remaining horses after a scratch, thereby earning lower profit margins and occasionally creating nominal arbitrage opportunities for bettors. We also examine which horses' odds bookies adjust after a scratch and demonstrate diminished profit margins even after controlling for these endogenous adjustments. Our results indicate that bookies' adjustments recover approximately 80% of lost profit margin but that bookies forgo the remaining 20% due to systematic under-adjustments.

Individuals often form an estimate by starting with an initial value which is then adjusted to yield a final answer. These judgments may be susceptible to *anchoring* effects, whereby individuals make insufficient adjustments from the initial value. Different initial values may therefore yield different final estimates, with final evaluations biased in the direction of the initial starting values. A substantial psychology literature has documented the existence of anchoring effects. Tversky and Kahneman (1974) employed a wheel of fortune that gave subjects random numbers before asking factual questions, demonstrating that subjects anchored on these obviously arbitrary and uninformative numbers. A more recent colorful example is Ariely et al. (2003), which asked subjects for their valuations of a bottle of wine after recalling the last two digits of their Social Security numbers.

The bulk of psychology research on the anchoring effect has employed laboratory experiments with inexperienced subjects. Many economists question whether individual anomalies identified in laboratory experiments would survive in a marketplace, given the opportunities for learning and expertise and the disciplining rigors of real financial stakes (Levitt and

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List, 2007). We address this question by considering how Australian bookmakers respond to changes in the field of horses shortly prior to races. In particular, late scratches, the withdrawal of horses after the posting of early odds but before the close of betting, offer a near-ideal natural experiment to shed light on the matter of anchoring and expertise. Though previous research in the economics literature has utilized horse wagering data (see Sauer, 1998, for an excellent survey of economics and gambling), most attention has been paid to the favorite-longshot bias, in which empirical losses increase as one wagers on less-favored outcomes (see Ottaviani and Sorensen, 2008). Neoclassical explanations for the favorite-longshot bias have focused on risk preferences (e.g., Weitzman, 1965; Ali, 1977) and partially informed bettors (Ottaviani and Sorensen, 2010), while behavioral explanations (e.g., Griffith, 1949; Snowberg and Wolfers, 2010) have considered issues such as probability misperception. Work in this vein has focused primarily, though not entirely, on the pari-mutuel system as found in the U.S., in which bookies are absent. Although there is a notable body of theoretical and empirical work on how bookmakers address potential insider trading (Shin, 1991, 1992, 1993; Cain et al., 2003), this paper is, to the best of our knowledge, the first to use bookmaker data to address the prevalence and persistence of anchoring.

A perfect data set for this application would include money wagered with each bookmaker on each horse at each set of odds, but we, like most of the literature, are limited to observe only odds (reciprocal prices).[2] It is nevertheless instructive to imagine what an ideal data set without quantities would contain. In a typical race, no late scratches occur and a racetime field of K distinct horses generates equilibrium odds and the implied profit margin to the bookie. In scratching races, we would observe various original fields of $K+1$ horses, each of which includes the aforementioned K-horse field and an additional horse of varying ability. Bookmakers would set initial odds for the horses of this $K+1$-sized field. The $K+1$th horse would then be late-scratched at various times prior to race time, so that at race time all races have the original K-horse field, and the bookmaker would adjust odds for the remaining field of horses. The analyst could then compare racetime odds and see whether implied profit margins vary systematically with whether a late scratch occurs (and, if so, how many), the initial odds of the scratched horse(s), and the time between the late scratch and race time.

Our empirical strategy closely mimics the above, and we find systematic downward bias of races' profit margins consistent with anchoring, despite the potentially substantial financial stakes and bookmaker expertise. Australian bookmakers do not sufficiently adjust the odds on the remaining horses' odds after a late scratch. In fact, the odds adjustment is sometimes so insufficient as to permit arbitrage opportunities. In such cases, punters (as bettors are termed in Australia) who placed wagers on all remaining horses after a particularly poor odds re-adjustment to a late scratch could have earned a riskless profit. We address and rule out the alternative explanations of bookie risk aversion and bounded rationality. We also demonstrate that our results are not entirely due to partial adjustments, in which bookies adjust odds on only a portion of the field due to time pressure or costly adjustment. Finally, for each individual horse we calculate what the optimal updated odds should have been under the assumption that bookies should have proportionately re-distributed scratched horses' odds. We demonstrate that the odds on horses that were adjusted are significantly under-adjusted relative to these optimal odds, consistent with anchoring on the original odds. Our results indicate that bookies' adjustments recover approximately 80% of the profit margin lost by a scratch, but that bookies forgo the remaining 20% due to systematic under-adjustments.

The primary contribution of this paper is to provide evidence of the anchoring bias "in the wild." Previous research on anchoring has successfully demonstrated differences in laboratory experiments between the inexperienced and experienced for real estate evaluations (Northcraft and Neale, 1987) and stock return estimates (Kaustia et al., 2008). Other research has utilized real market data to document anchoring in online auctions (Dodonova and Khoroshilov, 2004), art auctions (Beggs and Graddy, 2009), and sportscards trading (Alevy et al., 2010), as well as to consider dissipation of anchoring effects over time for real estate purchases (Simonsohn and Loewenstein, 2006). The contribution of our paper is that, for the first time, we integrate all of these conditions and concerns within a single market. That is, we observe experienced market participants in their day-to-day profession where they face potentially substantial financial incentives as they make adjustments under time pressure.

In Section I, we describe bookmaking decisions and other horserace institutions in Australia. We specifically discuss assumptions under which observed odds can yield bookmakers' profit margin and then show how bookies must respond to late scratches if they wish to maintain their margins. We describe our data in Section II and our analysis and results in Section III. Section IV concludes and discusses the implications for the behavioral economics literature.

1. Fixed odds gambling in Australian racecourses

Fixed odds gambling in horse racing (as found in Australia, Ireland, the United Kingdom, and several other countries) offers to the empirical analyst several advantages over the pari-mutuel format. Under the pari-mutuel format (the only legal option for horserace wagering in the U.S. and Japan), odds are determined entirely by the relative allocation of wagers when wagering ends. Any pre-race odds are therefore preliminary, and final payouts are not determined until after the betting period is closed. The organization operating the pari-mutuel format garners revenue by deducting a fixed percentage (the takeout rate or take) of money wagered; payouts are calculated by subtracting the fixed take from the total betting pool and distributing the remainder to the winning punters. Fixed odds gambling differs from pari-mutuel gambling in several ways. The most prominent distinction is the existence of the bookmaker, an individual who actively sets odds. As the format's

[2] Coffey and Maloney (2010) is a notable exception.