



## Informational Efficiency and Wagering Markets

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From an economist's point of view, a market is the tool through which agents acting in an economy exchange information and reach consensus with respect to fundamental decisions. Few would disagree that the basic function of a market is to reveal the collective opinion of market participants, through the process of price discovery. Therefore, the key factor that determines how successfully markets operate is the efficient dissemination of information, also called informational efficiency. Research on the informational efficiency of various financial markets has been extensive. Nevertheless, over the past years, an increasing amount of research concentrates on the informational efficiency of wagering markets. This fact is certainly not the result of chance. It is common knowledge that bets are in essence simple, short-lived, financial securities. Vecer, Ichiba and Laudanovic (2006) underline the similarities between betting contracts and credit derivatives, whereas Ruhm (2003) shows how positions in financial options can be viewed as simple bets. Moreover, as Thaler and Ziemba (1988) explain, betting markets are better suited for the testing of market efficiency than other financial markets. The main advantage of betting markets is that the bets have a well defined period of life, at the end of which their value becomes certain. This makes the pricing problem and, consequently, the testing of market efficiency much less complicated (for a review see Sauer, 1998; Vaughan Williams, 1999 and the collection of papers in Vaughan Williams, 2005). In fact, Thaler and Ziemba suggest that due to the conditions of quick and repeated feedback in wagering markets, they have better chances of being efficient than other financial markets.

Wagering on the outcome of sports events has a long history and is probably as old as society. However, reports on organized forms of betting in England, for example, date as early as the 19th century. In the 1840s, for instance, there were over 400 "list houses" that accepted bets on the outcomes of horse and greyhound races, at prices posted publicly (Jones, Clarke-Hill and Hillier, 2000). For a large part of the 20th century betting was illegal in many European countries, including the United Kingdom, where it became legal in 1961. Nowadays, betting shops are a common characteristic of the retail geography of most European countries.

Sports betting markets are experiencing an unprecedented growth for the past few years. The catalyst that brought about this chain reaction is undoubtedly the advent of the internet and online gambling. The betting industry has evolved, from a segmented, localized business, to a highly competitive global market. Unsurprisingly, the seed of innovation is flourishing where the ground is fertile, and that can only mean where regulation is least restrictive. The first online betting firms were based on tax and regulatory paradises, such as Gibraltar or the Channel Islands. Seeing millions of gambling tax slipping from its hands, the UK government executed a major reform of the regulatory environment for betting. The abolishment of the gambling tax (substituted by a tax on the gross income of bookmakers) and the extensive deregulation of the UK betting industry (including the legitimization of online betting) lead to the relocation of major online bookmakers to the UK. This is the main reason for the uncontested leadership of the UK in the European betting industry, with an annual turnover estimated at £2.5 billion for 2003. Bookmakers saw their profits skyrocketing and their clientele growing without borders. An interesting new development has been the emergence of betting exchanges. A betting exchange operates similarly to a stock exchange, by matching prices of buyers and sellers of bets, through a double auction procedure. The profits of the exchange come from a small commission of the earnings, which is negligible compared to traditional bookmakers' take. More importantly, the price setting mechanism is now in the hands of market participants. Bookmakers face fierce competition from betting exchanges and are forced to offer competitive prices.

The evidence provided by academic research in betting markets efficiency is somewhat controversial. Informational efficiency requires that the market successfully combines information from different sources, so that the prices represent the best forecast on the outcome of future events. This implies that the expected return of any given stake is zero, in the absence of transaction costs. In real-world conditions, the expected return of all bets should be a loss equal to the bookmaker's take, or margin.

A relevant strand in the literature on betting concentrates on the development of econometric models to predict the outcome of sports events. Obviously, study of the relationships in these models may reveal or exploit information related to the existence of biases and their possible exploitation by bookmakers. Invariably, the economic value of the predictions resulting from such models is evaluated using betting strategies on historical data. For example, Pope and Peel (1989) developed a linear probability model to capture the relationship between objective probabilities of outcome occurrence and subjective probabilities implied in quoted odds. They used this model as a basis of several betting strategies in order to test weak-form efficiency. The authors also examined a betting strategy based on other publicly available information (semi-strong form efficiency test), namely predictions of specialists published in the press. They concluded that the market is efficient, as no strategy yielded positive expected after tax returns. However, they were able to substantially decrease the expected losses, a fact that they explained as evidence that the odds do not meet the criteria of rational expectations. Cain, Law and Peel (2000) developed a model in which the goal scoring processes of the home and away teams follow a Poisson and a Negative Binomial distribution, respectively, but found very few profitable opportunities. On the contrary, Dixon and Coles (1997) and Goddard and Asimakopoulou (2004), reported substantial out-of-sample profits from strategies based on Poisson and ordered probit models, respectively. Both these papers test for semi-strong market inefficiency since they incorporate information on past match results and other publicly available explanatory variables.

Despite the largely inconclusive empirical evidence, wagering markets have served and will continue to serve as a unique laboratory for studying the behavior of agents facing risky decisions. This research has led to interesting questions and findings which have enriched our understanding of informational efficiency and the functioning of financial markets.

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