Oxera

Agenda

Advancing economics in business

At odds with reality? The economics of betting

Economic analysis of traditional high street bookmakers and Internet-based betting exchanges shows that it is the lower cost base of the latter that allows punters to be offered more favourable odds than those offered by high street bookmakers. However, for larger bets, which need to be executed immediately, bookmakers may offer better odds than exchanges, since large bets on the latter can change the market clearing price

Betting and gaming have changed substantially in recent years because of the influence of the Internet. New companies such as PartyGaming and 888 Holdings have made headlines because of their substantial initial public offerings (IPOs)—PartyGaming raising around £4.5 billion in its IPO in June 2005, with 888 Holdings raising around £550m in its IPO in October 2005.[1] More recently, Softbank, a Japanese investment bank, purchased 23% of Betfair's shares, a transaction which reportedly valued the betting exchange at around £1.5 billion.[2] Online gambling has clearly caught investors' imagination, but has there been a fundamental shift in the underlying economics in the provision of gambling services?

This article takes a step back from these headlines and examines the economic fundamentals of the betting industry. It identifies the costs associated with the betting platform as one of the key drivers of the odds available to punters. Traditional high street bookmakers with chains of shops have a higher cost base than betting exchanges, which operate exclusively on the Internet. However, there are limits to the instant liquidity available on exchanges, so for high-stakes punters, particularly on less popular events, high street bookmakers may be able to offer odds superior to those of exchanges.

Betting versus gaming

There is an important distinction between two broad classes of gambling—betting and gaming—in terms of their economics.

- *Betting*—this involves wagering money on the outcome of an external event, such as a horse race. There are three main forms: fixed-odds bookmakers (eg, Ladbrokes, Paddy Power); fixed-odds exchanges (eg, Betfair, BETDAQ); and totaliser betting (eg, The Tote in the UK). In the last of these three, the odds are determined at the start of the event, rather than when the bet is placed.

- *Gaming*—usually casino-style games, both beatable (eg, poker, where with sufficient skill a player can beat the house) and unbeatable (eg, roulette, where in the long run all players must lose unless they cheat). Companies operating in this area include 888 Holdings and PartyGaming.

Betting terminology

Back bet	**Wagering money on, for example, a particular horse/team winning an event.**
Decimal odds	**Bookmakers in Continental Europe and Canada and betting exchanges generally prefer decimal odds. The decimal odds equivalent of 2/1 is 3.0.**
Fractional odds	**In the UK, odds have traditionally been expressed as fractions, such as 2/1, which implies that if a punter bets £1, and the team/horse wins, the punter receives £2 in winnings, plus the £1 stake.**
Lay bet	**The opposite of a back bet, this involves wagering money on an outcome not occurring. Lay bets can usually only be placed on exchanges, and not at high street bookmakers.**
Overround	**Expresses how attractive the odds are on an event in aggregate by summing the probabilities for each team/horse winning an event implied by the odds available. Always greater than 100%, but the closer to 100%, the more attractive the odds.**
Wagering	**To bet money on the outcome of an event.**

This analysis focuses on fixed-odds betting. This allows the identification of parallels with trading markets, such as those for equities and commodities.

The economics of a bookmaker

What drives the odds on a particular event?

Bookmakers essentially act as the professional counterparty to all bets placed by punters. Punters need only identify the appropriate bookmaker, which will (generally) accept the bet the punter wishes to place. Bookmakers might be expected to assess the probability of an outcome happening, and then offer odds slightly less favourable than the probability to cover their costs. This is an entirely plausible approach, but it is not actually required. Indeed, in practice, it is likely to be very difficult to achieve, since the bookmaker would need to be able to predict the actual probability of outcomes of events—if it could do this consistently, it would be likely to find betting more lucrative than bookmaking.

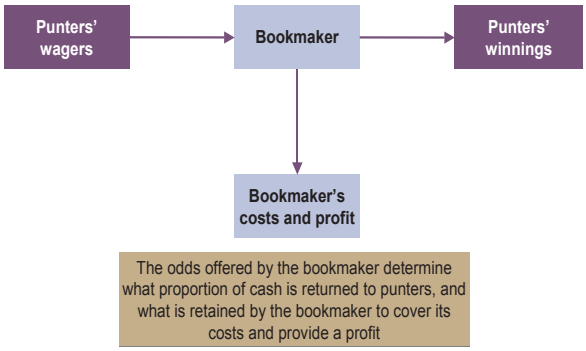
An alternative approach is for bookmakers to adjust the odds offered on the basis of the volume of bets received, such that they are indifferent to the outcome. This is referred to as achieving a balanced book. When the bookmaker has a balanced book, regardless of who wins an event, the stakes the bookmaker has received on the losing bets are on average larger than the payouts on the winning bets.

Under this approach, bookmakers do not need to know the probability of an outcome, just the money flowing in on bets for that particular outcome. Clearly, this is substantially easier for bookmakers to track, as no real predictive power is required. In order for this to work, bookmakers need to attract bets on all of the outcomes to enable them to balance their books and therefore be indifferent to the outcome.

In practice, bookmakers are likely to combine both approaches. In particular, when initially setting prices on an event, a degree of judgement about the likelihood of each outcome occurring will be important, since no bets will yet have been placed. However, once the initial prices are set and punters begin to place bets, the approach is then likely to focus on the volume of the bets placed on each of the outcomes, to enable the bookmaker to achieve a balanced book.

There are other factors that bookmakers need to take into account, such as the possibility that certain punters possess 'inside information' on a particular event, or that they could influence its outcome. Bookmakers' reactions to this particular issue may explain in part why empirical studies of bookmakers' odds have identified a consistent long-shot bias, where, for example, the odds on horses that have a low probability of winning (the long shots) tend to be less favourable (relative to the actual probability of winning) than those on horses with a high probability of winning.[3]

Figure 1 Bookmaker cash flows



Source: Oxera analysis.

A bookmaker's cash flows

At an aggregate level, betting with a bookmaker consists of three distinct cash flows (see Figure 1). Cash flows into a bookmaker in the form of punters' wagers on events. A portion of this cash then flows back out to punters in the form of winnings, while a portion is retained by the bookmaker to pay for its costs of operation and provide profits.

This relationship can be set out as an equation:

> Punters' wagers = total payouts received by punters + costs and profits of betting platform.

For an individual punter, the relationship between bets and payouts is as follows:

> Payouts received by punter = bets placed by punter * probability of winning * odds.

When summed across outcomes in a given event, the probability of winning = 1, which implies that:

> Costs and profits of betting platform = bets placed by punters – (bets placed by punters * aggregate odds on all outcomes).

This indicates that the aggregate odds offered by the bookmaker on any particular event are driven by the costs of operation—the higher the costs, the less favourable the aggregate odds.

The advent of betting exchanges

What drives their odds?

The widespread use of the Internet has enabled an alternative betting business model to develop: the betting exchange. Instead of being the counterparty to all back bets, as bookmakers are, the exchange brings together those who want to bet on an outcome happening (eg, team A to win), with those who want to bet on the outcome not happening (team A to lose). If there is a

range of odds where both parties think that the expected probability of their outcome is better than the odds acceptable to the other party, the bet will be executed. The result of an executed bet is that the stakes of both parties are paid to the winning party, minus any cut for the exchange.

Because, in effect, punters form both sides of the market, there is a key difference between a bookmaker and a betting exchange. On an exchange, it is possible to 'lay' an event, effectively betting against an outcome occurring. It is technically feasible to place a selection of back bets with a bookmaker to form a lay bet, but this is complicated and time-consuming, since different-sized bets need to be placed on each of the other possible outcomes, based on the back odds available, to yield a true lay bet.[4] Providing the ability to lay an event has generated concern that it could make it easier for those with inside knowledge to profit, or even encourage various forms of unsporting behaviour (eg, deliberately attempting to lose a race).[5]

Since the exchange simply acts as the matching agent, it takes no part in setting the odds. These are set by the market in response to the supply and demand of bets to win and bets to lose. The odds are, in effect, set by the flow of money into different possible outcomes. This is the same fundamental process as the cash-flow-based approach used by bookmakers described above. Indeed, this activity is analogous to the operation of other types of order-book-driven exchange markets. This similarity means that many of the findings from the literature on trading markets are applicable to betting exchanges—for example, Harris (1993) identifies that, in aggregate, trading on an exchange is in many ways a zero-sum game, as the gains made by one trader are necessarily the losses made by another.[6] Of course, many punters gamble not because they consider the expected value of their wagers to be positive (it usually is not), but because they are risk-loving individuals, or because they simply enjoy gambling.[7]

Unlike bookmakers, which effectively take their cut by adjusting the odds they offer, betting exchanges tend to take their cut from winnings in the form of a rake—eg, 5% of winnings are paid to the exchange. However, punters on both the back and lay sides of the market can be expected to factor this into the odds they are prepared to offer or accept. Therefore, while the exchange does not directly set the odds, its method of taking the rake does affect the actual odds in the market.

Similar cash flows to a bookmaker

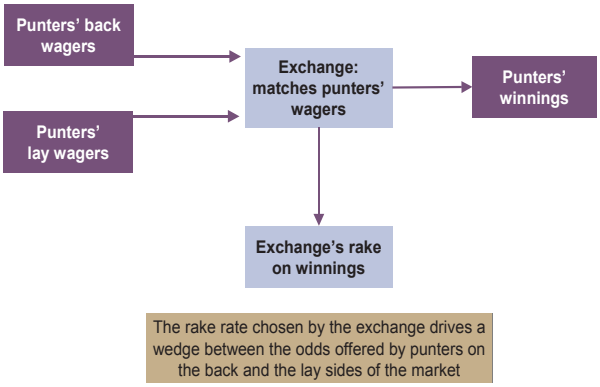
The organisational and technical structure of betting exchanges is similar to that of order-driven trading markets elsewhere. Furthermore, betting exchanges have the advantage of price revelation, since the outcome of each event is eventually known; for securities markets, the 'true' price of the security is, arguably, never known. While having a somewhat different structure to bookmakers—with exchanges effectively being order-driven trading markets, and bookmakers being quote-driven over-the-counter dealers—betting exchanges share similar patterns of cash flows with the traditional bookmaker. Punters' matched back and lay bets flow into the exchange, and winnings flow out, and the exchange takes a rake from the winning side of the bet, which pays for the costs of operating the exchange, and provides the operator with a profit (see Figure 2).

As the cash flows of the exchange are similar to those of the bookmaker, the same fundamental outcome occurs:

> Punters' wagers = payouts received by punters in total + costs of betting platform (includes profits).

As with the bookmaker, this leads to the conclusion that the aggregate odds (net of the rake in this case) on bets executed on the exchange are driven by the cost of operation—again, the higher the costs, the less favourable the aggregate odds.

Figure 2 Cash flows on a betting exchange



Source: Oxera analysis.

On whose future to bet?

As set out above, both the traditional bookmaker and the betting exchange share fundamental cash flows at an aggregate level, and therefore the aggregate odds are driven by the costs of operation (including the profit for the platform). The operating costs for high street bookmakers are likely to be substantially higher than those of betting exchanges, which operate exclusively on the Internet. This suggests that high street bookmakers may find it difficult to offer the same odds as can be made available on an exchange, because their costs of operation are much higher. Indeed, there is some evidence that, in general, exchanges offer significantly

better odds on events than those offered by traditional bookmakers; the box below provides an example, and analysis by the Australian Betting Exchange Task Force and researchers at UCLA have found similar results.[8] Unless traditional bookmakers can reduce their unit costs to those of an Internet exchange, there may be a persistent and significant wedge between the odds available from the high street bookmaker and those from the exchange.

However, this is not likely to herald the demise of traditional bookmakers. Punters may be willing to pay the higher odds since the experience of using a high street bookmaker is not the same as betting on the Internet. A similar type of coexistence is seen in other markets: beer purchased from a supermarket can often cost less than one-third of the price of the same product purchased from a bar, yet both markets continue to exist because of the different experiences associated with both types of consumption.

More generally, the betting exchange is a good example of the use of trading markets beyond the more traditional applications in stock and commodity markets. One of the interesting observations from the development of these markets is that, over time, users, and hence liquidity, tend to focus around one exchange for particular products rather than many. Thus, it might be expected that rival betting exchanges attempt to win punters betting on particular events away from one another, similar to the way in which the New York Mercantile Exchange attempted to win trading in Brent crude futures away from the International Petroleum Exchange in London in 2004 by setting up a base for trading in Dublin.

Betting exchanges raise interesting questions about the future structure of other trading markets. A bookmaker can be considered a professional counterparty, similar in some ways to brokers in financial and commodity markets, where punters/traders can place a bet/trade. The professional counterparty then aggregates that demand and, if it achieves a balanced book, nets its exposure to zero. Some of the potential exposure of the bookmaker may be offset via 'wholesale bets' with other bookmakers, in a manner similar to that seen in the inter-dealer markets elsewhere. The overall effect is to match all punters to each other, leaving the bookmaker to match bets—the equivalent of clearing and settling the trades (taking the money and paying out the winnings), but with no overall risk exposure to the event.

The Internet allows the direct matching of one punter to another on exchanges. This is a many-to-many structure, rather than the many-to-one structure seen with bookmakers, with the betting exchange providing the matching service and the processes of clearing and settlement of the trades. The general many-to-many structure is also observed in other trading environments, but the professional counterparty still exists in the form of the broker. This raises a question: if Internet-based betting exchanges can offer more favourable odds, could they disintermediate the professional counterparty by providing total end-user-to-end-user connectivity, and

The difference in odds available on exchanges and in the high street: World Cup case study

The table provides example odds available from one of the World Cup 2006 qualifying rounds. In all instances, the odds on the online exchange are substantially better than those from the high street bookmaker. This is reflected in the substantially lower overround for the exchange than for the high street operator.

Odds for team to win Group A during World Cup 2006 (decimal odds; the higher the better since this implies a larger payout)

Team	Online exchange (adjusted for the rake)	High street bookmaker (raw prices, converted from fractional odds)
Germany	1.48	1.44
Poland	4.71	4.50
Ecuador	10.50	7.50
Costa Rica	20.95	15.00
Overround	103.3%	111.5%

Note: The betting exchange prices have been adjusted to take into account the 5% rake that will be subtracted from punters' winnings if that team wins, thus making them comparable with the high street bookmaker's odds.
Source: Oxera research, odds collected on May 2nd 2006 from River Racing and Betfair.

Oxera has examined wider sets of odds that are available for the World Cup and other sporting events. In all of these cases, the overrounds for exchanges were significantly lower than for traditional bookmakers; in a small number of cases, somewhat better odds were available on a few teams/horses from bookmakers than from exchanges. However, these may represent deviations from the equilibrium. For example, a bookmaker may not have a balanced book and may therefore offer particularly attractive prices to incentivise betting and thereby balance its books.

could the same trend disintermediate the professional counterparty in other trading markets?

The importance of liquidity

At least in the near future, this sort of disintermediation may not occur because of the level of liquidity available. The example shown in the box above and evidence from the UCLA study show that, for small orders, betting exchanges generally outperform high street bookmakers, offering significantly more favourable odds. However, the level of liquidity (measured by the value of bets that can be placed) at the most attractive odds at any point in time is generally relatively limited on exchanges. Therefore, as the order size increases, the difference in odds disappears, and even becomes negative (with bookmakers offering superior odds), since the punter's bet changes the market clearing price, resulting in significantly worse odds. (Although, on an exchange, these significantly worse odds for one party are matched by significantly better odds for the punter taking the other side of the transaction.) In contrast, on many markets, bookmakers may be willing to accept relatively large (single) bets at the price currently quoted, thus offering a more liquid market to that specific punter. However, after the acceptance of a large bet, the bookmaker may alter the odds offered to help re-balance its books, and on an exchange the subsequent interaction of new punters is likely to result in the instant execution price drifting back to the previous level.

It is possible that both betting exchanges and bookmakers can continue to coexist, because of their social aspects, and the possibly deeper markets that bookmakers offer to high-stake punters. However, if liquidity were to increase substantially on exchanges such that they could accept high-stake bets that exceed those that bookmakers are prepared to accept, this remaining advantage for bookmakers may diminish over time.

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[1] Datastream.
[2] http://www.betfaircorporate.com/pdf/2006_02_27_softbank.pdf.
[3] Shin, H.S. (2001), 'Optimal Betting Odds against Insider Traders', *Economic Journal*, **101**, 408, finds that it is optimal for bookmakers to follow a 'square root rule' to combat the risk of insider trading, since this minimises their exposure to that information. If followed, the ratio of posted prices is given by the square root of the ratio of winning probabilities. One consequence of this rule is that the available odds understate the winning chances of the favourites (ie, the odds are good relative to the actual probability of winning) and exaggerate the winning chances of the long shots (ie, the odds are relatively poor).
[4] This is where a particular payment will be received by the punter irrespective of which of the other teams wins.
[5] For example, Lord McIntosh, in his capacity as UK Minister for Gambling Regulation, stated in 2003 that, 'Exchanges do present an opportunity for those with "inside information", acquired improperly, to make a profit from the uninformed punter'. UK Department for Culture Media and Sport (2003), 'Government Acts to Protect Consumers against Unfair Betting', press release, October. Similar concerns have been examined in detail in Australia: Australian Betting Exchange Task Force (2003), 'Report to the Australasian Racing Ministers' Conference', July, Volume 1.
[6] Harris, L. (1993), 'The Winners and Losers of the Zero-sum Game: The Origins of Trading Profits, Price Efficiency and Market Liquidity', paper presented to the Institute for Quantitative Research in Finance, Florida.
[7] See the following papers for analysis of risk-loving utility functions in the gambling context: Ali, M. (1977), 'Probability and Utility Estimates for Racetrack Bettors', *Journal of Political Economy*, **85**, 803–15; Walls, W.D., and Busche, K. (2002), 'Breakage, Turnover, and Betting Market Efficiency: New Evidence from Japanese Horse Tracks', in Vaughan-Williams, L. (2002), *The Economics of Gambling*, Routledge.
[8] Australian Betting Exchange Task Force (2003), op. cit., Volume 1, Appendix C1; and Ozgit, A. (2005), 'The Bookie Puzzle: Auction versus Dealer Markets in Online Sports Betting', Department of Economics, UCLA, mimeograph, September.

If you have any questions regarding the issues raised in this article, please contact the editor, Derek Holt: tel +44 (0) 1865 253 000 or email d_holt@oxera.com

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