Winning at Sports Betting Using Mathematics

A popular sports book's odds for the NBA match between Golden State Warrior and Los Angeles Laker are 1.6 for GSW and 2.3 for LAL. These odds mean you are paid 1.6 times or 2.3 times respectively the amount of your bet if you win. Hence the payout for a winning 100 dollar bet on GSW would be 180 dollars and 230 dollars for a winning 100 dollar bet on LAL. With these odds, we can now calculate the implied probability of either GSW or LAL winning. Note how we prepend these probabilities with word "implied" now. This is because they are not factual probabilities, but only one sports book's estimation.

This derives from the anti-proportional relation of the implies probability to odds

$$P_i = \frac{1}{odds}$$

We can write total implied probability now as

$$\frac{1}{1.6} + \frac{1}{2.3} \approx 0.625 + 0.435 = 1.06$$

And now you are asking 1.06? That is a 106%. How is that possible, and what does that mean? By setting the odds lower, the bookmaker implies a probability of either competitor winning that is higher than it should be, which results in a mathematically impossible total implied probability greater than one.

This is called the bookmaker's margin, and it ensures that bookmaker's expected value is positive because the total implied probability adds up to over a 100%. To conclude, the bookmaker is winning more than he has to pay out and makes a guaranteed profit about the margin's size which is determined by the odds, as long as enough bets are placed.

The amount above 100%, the extra 6%, represents the bookmaker's "over-round," which is the bookmaker's potential profit if the bookie accepts the bets in the right proportion. If you bet on both teams, you are actually risking $106 to get $100 back. From the implied probabilities, the book's "fair odds" (if margin equal to zero) would actually be

$$\text{GSW: } \frac{1}{\left(\frac{0.625}{1.06}\right)} = 1.695, \qquad \text{LAL: } \frac{1}{\left(\frac{0.435}{1.06}\right)} = 2.439$$

So the book cuts down payouts slightly compared to the fair odds, and that cut is its profit margin.