Chapter 5: Expected Value

Combinatorics and equity define the parameters of the theoretical framework. **Expected value (EV)** and game theory are the tools used to construct winning strategies within those parameters. Chapter 5 is where we take the raw material of Chapters 1-4 and begin to make something directly useful of it by integrating into the framework the range of betting options available to players. Without betting, all of the data on how likely different hands are, which beat which, and by how much is meaningless. Combinatorics and equity are descriptions of a level playing field - deal out random hands and a random board and everyone has the same chance of winning. What determines winners and losers is how they translate knowledge of combinatorics and equity into betting strategies. Expected Value is the metric by which to determine if a betting decision is correct or incorrect, profitable or unprofitable.

Basic Calculations

These next paragraphs quickly review the basic one-decision EV calculations before the chapter moves on to more interesting things. These calculations share in common the simplicity that comes from no future action. One main case is facing a river bet where raising (for value or as a bluff) is barely an option. These are polarized river scenarios, and there will be plenty more to say about them later.[1] The math that governs them is extremely simple. There are two variables that affect the profitability of a call – the opponent's bet size as a percentage of the pot and the frequency we estimate that we have the best hand. One of these is specified for us, the other has to be deduced from the sequence of actions, the board development, and knowledge of our opponent's tendencies and his view of us. Those deductions are not the primary subject of this chapter – here the goal is to review how to do the math assuming we have already made good assumptions.

EV (call)

If the bet is pot-sized, a call risks 1 unit to win 2 units, meaning that we are being laid 2:1 pot odds and need to be good 1 time in 3 (33.3%) to break even. In the more general case, if the bet is less than pot-sized (B<P) we are calling B to win (B+P), meaning we are being laid (B+P):B and need to be correct B/(2B+P) to break even.[2] For example, if an opponent bets 75 into 100, we need to be good 75/250 or 30% of the time.

These examples are of a river scenario, but whether to call a flop or turn allin shove requires the exact same calculation, with the difference that calculating our estimated equity is a bit more complex than evaluating how often we have the best hand. We have different amounts of equity against different pieces of our opponent's shove range and have to call or fold based on our ability to weigh his range and calculate those equities. In some cases it will be a pure equity decision – for example, if we have nut outs and no chance of winning without hitting one of them. In others it will be largely a frequencies decision – on a very dry, static board our opponent may be representing a hand we have 5-10% equity against, and our decision to call is based almost entirely on assessing how his range is weighted between bluffs and value. Most situations fall in the middle, with both players having blended ranges, including made hands, semi-bluffs, and occasional pure bluffs.[3]

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[1] Particularly in Chapters 6 and 12

[2] Odds laid when B<P are always better than 2:1 and we need to be good some frequency less than one-third

[3] On some boards a true bluff (i.e. with no equity) will be extremely rare –it is the nature of PLO both that there aren't too many spots where hands have no equity and that because there are so few it rarely is necessary to use those situations for flop and turn bluffs. This is least true on dry boards like AK6r, 965r, monotone, and paired boards, but even in those cases bluffing decisions should often be made based on interaction with the board, such as minor and backdoor draws or blockers.

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