Abstract

For at least 100 years “poker” game analysis has drawn the attention of game theorists, mathematicians, and economists. Two clear branches of game design grew from this long-term infatuation: the Borel (1938) model and the von Neumann/ Morgenstern (1944) model. The theorists produced numerous variations of these two models (Bellman and Blackwell (1949), Goldman and Stone (1959), Kuhn (1950), Nash and Shapley (1950), Cutler (1975), etc.), however few investigated a poker design with asymmetric ante amounts paid in by the players. Below we examine a two-person zero-sum “Blind Stealing” poker model. The Blind Stealing model differs from most poker models in that players pay different ante amounts prior to receiving hands. We begin by describing equilibrium values for both discrete and continuous hands. We then locate the optimal prescribed bet size for both cases. Finally, we place our model in the large literature where surprisingly only one recent paper also considers a setting with different antes. This paper- by Van Essen and Wooders (2015) - analyzes a particular case of our discrete model for $B = 3$.

Discrete Hands.

The discrete model describes cards distributed from a card deck consisting of $(X, Y) = \{A, K, K, K\}$, where $A > K$.

Continuous Hands

The continuous model distributes cards independently from a deck with I receiving his card $X \in [0, 1]$ where $X$ has a distribution function $F$ over the interval $[0, 1]$; and II, $Y$ which is distributed according to a distribution function $F$ on the interval $[0, 1]$.

Betting

Two players, I and II, ante prior to receiving their cards. In both the discrete and continuous hand value cases, I antes 1 unit and II antes 2 units. Nature simultaneously delivers one card hands
to our players. I begins the game with a decision between: (1) folding his card and (2) betting a prescribed bet amount $(1+B)$ to II. II decides between choices: (1) calling $(1+B)$ or (2) folding his card. The game ends when either player folds or when II calls the bet and the players show down cards, the winner is he who holds the highest card.

If Player I bets amount $(1+B)$, then Player II decides whether to call or to fold. If Player II folds, Player I wins $2$ (the ante) from Player II. If Player II calls, the hands are compared and the player with the higher hand wins an amount $(B + 2)$ from the opponent, where $B > 0$ represents the amount of the bet. If cards are the same (discrete hands), then each player gets back her ante.

In a recent paper, Van Essen and Wooders (2015) consider a discrete blind-stealing game where $B = 3$.

**Extensive Form of the Discrete Game:**

![Extensive Form of the Discrete Game Diagram]

**Related literature**

The study of two-person zero-sum poker models started from Borel (1938) and von Neumann and O. Morgenstern (1944). Both of these root models use symmetric antes paid by the players. The
large literature growing from these two models continues along the same symmetric ante. See, for example, Ferguson and Ferguson (2003, 2007), for an excellent explanation of the two model structures. Our paper follows Van Essen and J. Wooders (2015), in the line of the Borel-type game, differing in that Player I and Player II pay asymmetric ante amounts prior to receiving cards. Van Essen and J. Wooders (2015) “Blind Stealing Game” is a particular case, \( B = 3 \), of our discrete model.

References


