

A Game-Theoretic Analysis of *Baccara Chemin de Fer*, II

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Abstract: Several models of the parlor game *baccara chemin de fer* have been addressed in the literature. In Model A cards are dealt with replacement and in Model B cards are dealt without replacement from a d -deck shoe. In Model 1 both Player and Banker see two-card totals. In Model 2 Player sees two-card totals and Banker sees two-card compositions. In Model 3 both Player and Banker see two-card compositions. Model A1 was solved by Kemeny and Snell (1957), Model B2 by Downton and Lockwood (1975), and Model B3 by Ethier and Gámez (2013). Our aim here is to extend these results to the casino game *baccara chemin de fer*. The parlor game is zero sum (a matrix game), whereas the casino game is non-zero sum (a bimatrix game) and depends on a continuous parameter α , the commission. A key tool for solving the matrix game under Model B2 was what we called Foster's algorithm. Here we generalize that algorithm to bimatrix games. This yields a unique Nash equilibrium for the casino game under Model B2 and a (not necessarily unique) Nash equilibrium for the casino game under Model B3.

Implications: This paper solves the game of *baccara chemin de fer* more generally than has been done before.

Key words: baccarat; chemin de fer; sampling without replacement; bimatrix game; Nash equilibrium; Foster's algorithm.