

Non-Zero-Sum Blotto Games

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Abstract

Two players compete in a number of simultaneous races in different locations. The players have limited resources and must decide how to allocate these to the different races. At each location the player who allocates more resources wins the prize corresponding to that location. As an example, consider two candidates for election who must allocate their campaign budgets to different states. Alternatively, consider an R&D race in which multiple patents can be won.

Such games correspond to budget constrained multiple-object all-pay auctions and constitute non-zero-sum counterparts of Colonel Blotto type games introduced by Borel. I analyze a class of such games with complete information. Budget-constrained bidders simultaneously submit vectors of bids from a convex set of pure strategies, and the highest bidder at each location wins that item. The presence of the budget constraint leads to the indirect “substitutability” among the objects: a higher bid for one object leaves less resources for others.

I fully characterize the mixed-strategy equilibria in the case of two bidders and three objects for the following cases (i) identical values for the objects and identical budgets; (ii) different common values but identical budgets; (iii) identical values but different budgets. The results for the symmetric case may be generalized for an arbitrary number of objects.