

Two-person Pairwise Solvable Games

Takuya Iimura,¹ Toshimasa Maruta,² and Takahiro Watanabe¹

January 21, 2016

ABSTRACT: A game is solvable if the set of Nash equilibria is nonempty and interchangeable. A pairwise solvable game is a two-person symmetric game in which any restricted game generated by a pair of strategies is solvable. We show that the set of equilibria in a pairwise solvable game is interchangeable, that a pairwise solvable game is solvable if it is quasiconcave at the diagonal, and that if in addition the game is finite then the iterated elimination of weakly dominated strategies converges precisely to the set of all Nash equilibria. In particular, the game is dominance solvable, in that every player's surviving strategies are equivalent. Applying these results to relative payoff games, we establish simultaneous existence of Nash equilibrium and evolutionary equilibrium in a class of pairwise solvable games. All the results are applicable to symmetric contests, such as the rent-seeking game and the rank-order tournament, which are shown to be pairwise solvable.

KEYWORDS: Zerosum games, quasiconcavity, interchangeability, iterated dominance, dominance solvability, Nash equilibrium, evolutionary equilibrium.

Journal of Economic Literature Classification Numbers: C70, C72.

¹Tokyo Metropolitan University, 1-1 Minami Ohsawa, Hachioji, Tokyo, 192-0397, Japan.

²Corresponding Author. University Research Center and Population Research Institute, Nihon University, 12-5 Gobancho, Chiyoda, Tokyo, 102-8251, Japan.