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Voluntarily Separable Prisoner's Dilemma*

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Extended Abstract

(Full paper is available at <http://www.econ.keio.ac.jp/staff/takakofg/papers.html>)

We consider a model of endogenous relationships in which one can unilaterally end a relationship and start with a randomly-assigned new partner. In particular, we focus on the no-information-flow case such that when a pair of players start a new relationship, neither player knows the past actions of the other. Many transactional relationships fit our model. Workers can shirk, quit, and find a new employer without telling the past, and borrowers can move to another city after defaulting and find a new lender.

In order to make a cooperative relationship, it is necessary to reduce the payoff of a defector. However, ordinary trigger strategies do not work because of the endogeneity of relationships, and contagion of defection (Kandori (1992) and Ellison (1994)) does not work in a large population with replacement of players by deaths. In the literature, matching friction (unemployment) and gradual cooperation (trust building) have been introduced and analyzed extensively.

In this paper, we introduce a third disciplining device: strategic diversity. Potential exploitation by a future partner provides an incentive to keep the current partnership and facilitates cooperation. Focusing on evolutionary stability under two-person, two-action Prisoner's Dilemma games, we show that (i) any *monomorphic* equilibrium, in which all players play the same strategy, requires some periods of trust-building (don't cooperate but keep the partnership), but (ii) there are *polymorphic* equilibria consisting of a variety of trust-building periods, among which some are shorter than the shortest trust-building period of any monomorphic equilibrium. Therefore polymorphic equilibria are more efficient than monomorphic equilibria.

The evolutionary stability of polymorphic distributions in a homogeneous population provides a foundation of incomplete information models such as Ghosh and Ray (1997) and Rob and Yang (2005). The logic of a stable polymorphic distribution with early cooperators and late cooperators (who can be viewed as defectors by early cooperators) is as follows. Early cooperators benefit by matching with each other and early cooperation itself, while deviations are prevented by the potential exploitation by late cooperators in future matches. Late cooperators benefit by matching with early cooperators, while deviations are prevented by the delayed cooperation with late cooperators.

Key words: voluntary separation, prisoner's dilemma, evolution, trust.

JEL classification number: C 73

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