

論文の内容の要旨

論文題目 Choosing Rules for Cooperation: A Case Study of the
Rotating Savings and Credit Association (ROSCA) in China
(互助慣行のルール選択：中国における回転型貯蓄信用講 (ROSCA) の
事例研究を通して)

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The study of the evolution of cooperation has attracted attention from a wide range of academic disciplines. Humans tend to cooperate in various ways and the evolutionary process of human cooperation has been discussed. Nowak and Sigmund (2005) stated that in human society, once cooperation is established, “a complex evolution takes place, which depends on the size of the population, the cost-to-benefit ratio, the average number of rounds, and the probability of errors.” Among many factors affecting this evolution process, it is widely acknowledged that reciprocity is of great significance, leading to the establishment of cooperation (especially indirect cooperation). In this study, I consider the rotating savings and credit association (ROSCA) as a case to study cooperation, which ROSCA is considered by many people as one of the most prevalent forms of informal mutual financial aid in developing countries. The discussion of ROSCAs in the previous literature has focused on three main dimensions. First, ROSCAs work as a substitute for insurance, especially in developing countries where markets for insurance do not function well (Ambec, 2007; Klöpper, 2003). Second, ROSCAs enable the purchase of durable goods: the model of Besley, Coate, and Lounsbury (1993) shows that, in comparison with autarky, ROSCAs enable participants to buy durable goods sooner. Third, ROSCAs can help people to cope with their self-control problems and serve as a commitment device (Ambec, 2007). However, limited research has focused on evolutions in ROSCA rules. As a traditional method for cooperation, ROSCAs demonstrate huge rule disparities both temporally and geographically. It has been observed that in China, normally only one type of ROSCA, with a given set of rules,

is dominant in each region although some other types with different rules do coexist. This observation has stimulated my research into how and why these rule disparities occur and what parameters affect people's choices among various rules in a ROSCA.

In this research, an agent-based model within an evolutionary imitation game is established. An important part of game theory, evolutionary imitation game theory tries to explain how a new behaviour or a new rule is diffused among the whole society by assuming that people adopt new things when they encounter others who have already adopted them. I follow this theory and, to imagine the trajectory of rule preference changes, propose an imitation game which allows participants to learn about new ROSCA types by encountering and learning from others. The basic assumption is that when adopting a new ROSCA rule, each individual makes a rational choice to select a ROSCA type that maximizes his or her payoff as compared to the last choice according to his/her degree of reciprocity. The results show that each ROSCA rule evolves as if it finds its niche formed by people's different levels of reciprocity and time discounting rates. Different ROSCA rules directly influence participants' monetary benefits. The simulation results show that the value placed on reciprocity has a significant effect on people's rule preferences. The simulation also reproduced the social states where different ROSCAs coexist with others in an equilibrium, even when some rules clearly dominate others. In the more heterogenous societal settings there is a dominant ROSCA type, but other types may coexist. These results can explain some aspects of the current ROSCA situation in China where there are four types of ROSCA having a long history and yet, even with the passage of time, these types still coexist in different areas (societies).

Chinese ROSCAs are affected foremost by the country's long history of informal finance. Moreover, the influence of cultural dimensions and specific Chinese habits, beliefs and values should not be underestimated. Interviews were conducted in five Chinese villages to directly measure economic characteristics of individuals and investigate how these parameters correlate with their ROSCA rule preferences. A particular focus was given to the role of the discounting rate. Results show that ROSCA rules are different in the villages where the time discounting rates are distributed diversely, as compared to those where they are uniform. People who participate in

random ROSCA are more patient and have higher discount rates, whereas participants in fixed (negotiation) ROSCA are more impatient and have lower discount rates. By comparing ROSCA operating situations in different villages, it was found that signing a contract in advance and holding face-to-face meetings are essential for sustaining cooperation. Although sanctions in the contract are sometimes difficult to enforce, social connections (deepened by regular meetings) and the fear of punishment are important factors influencing people's cooperative behaviours. Additionally, a leader's ability and responsibility are critical factors for the group's success.

I conclude that the evolutionary fitness of a certain ROSCA rule can be explained by needs, patience, reciprocity and their distributive compositions. Apart from the factors discussed here, there are still many other factors which can also affect people's rule preferences. Simulation and mathematical models are effective for exploring possible dynamisms of social interactions when there are large numbers of people involved. These results provide a new insight into the theory of collective rule choice that triggers the evolution of cooperation and they supply advice for the design of informal financial mechanisms.

References

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