

論文の内容の要旨

論文題目 : Irrigation, Community, and Poverty

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氏名 : 會田 剛史

It is estimated that the world population will reach 9.1 billion by 2050. In contrast to this rapid population growth, agricultural land has been expanding much slower, which can result in serious food shortage. However, the Malthusian trap has been avoided because of agricultural productivity growth. And in this productivity growth irrigation has played an important role because improving irrigation access not only enhances land productivity directly, but also is a necessary condition for the Green Revolution. In addition, efficient usage of irrigation water is becoming more and more important issue because frequent droughts due to climate change result in water scarcity whereas demand for water in both agricultural and non-agricultural sector is rising.

This dissertation investigates the nexus among irrigation, community, and poverty by employing modern approaches in economics. Chapter 2 focuses on the effectiveness of community-based irrigation management among heterogeneous players. Though community-based irrigation management is considered to achieve efficient resource extraction, its effectiveness is unclear when there is heterogeneity among resource users. Chapter 3 focuses on the impact of irrigation access on poverty alleviation. In spite of the growing demand for investment in irrigation, few quantitative impact evaluations have been conducted because of the difficulty in handling endogeneity problem. Chapter 4 focuses on risk sharing network, which is an informal consumption smoothing mechanism within a community to mitigate idiosyncratic income shocks and transient poverty. Since the poor are more vulnerable to risks, which are inevitable for agriculture, understanding the structure of risk sharing networks is important for not only academic purpose but also designing an effective policy intervention.

Chapter 2 investigates the effect of social capital between irrigation canal upstream and downstream farmers on their water allocation problem. The water allocation problem between upstream and downstream is a serious problem in irrigation management. Using a combination of unique natural and artefactual field experiment data and general household survey data, this study finds that farmers with higher social capital, especially trust toward their downstream farmers, optimize their water demand, showing consideration for their

downstream farmers. Since the incentive structure of irrigation water allocation for upstream farmers closely resembles that of the dictator and trust games, this finding also supports the validity of experimentally measured social capital. Additionally, this study deals with the simultaneity bias between satisfaction level and experimentally measured social capital and finds that the OLS estimators are downward biased, which is consistent with the hypothesis that scarcity of resources enhances social capital.

Chapter 3 combines a livelihoods approach in sociology with a micro-econometric approach to quantify the effectiveness of irrigation infrastructure investment on improving people's livelihood strategies. Using a unique dataset based on households in southern Sri Lanka, and a natural experimental setting, we estimate from a two-stage income regression model to show that irrigation access has a positive effect on income through livelihood choices. We also show through qualitative approaches that factors not linked to irrigation infrastructure may contribute to changes in livelihood portfolios. In addition, we highlight factors that result in certain households being unable to move out of poverty despite access to the improved irrigation infrastructure.

Chapter 4 analyzes the effectiveness of risk sharing in spatial and social networks. Although much research has been conducted on informal consumption smoothing within either village or social clusters such as family and friends, few studies compare the effects of these spatial and social networks. Employing spatial panel econometric models, this study extends the empirical tests of full risk sharing hypothesis to incorporate spatial and social network effects and quantifies the diffusion of income shocks in each network. The estimation results from the household survey data in southern Sri Lanka show that consumption smoothing in spatial network performs better than in social network in the sense that income shocks defuse better among neighboring households. This study also shows the limitation of the conventional test when it is regarded as a special case of a spatial econometric model.

Though the topics of each chapter are rather traditional ones, this dissertation aims to shed a new light on these classical themes by employing modern experimental and econometric approaches.