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Neighborhood effects and social behavior: The case of irrigated and rainfed farmers in Bohol, the Philippines

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ABSTRACT

Artificial field experiments, spatial econometrics, and household surveys are combined in a single study to investigate the neighborhood effects of social behaviors. The dictator and public goods games are conducted among rice farmers in irrigated and non-irrigated areas in the Philippines. We find the neighborhood effects but the magnitude and statistical significance of endogenous social effects vary with the irrigation availability, type of social behavior, and type of neighborhood. Altruistic and cooperative behaviors are significantly influenced by the behaviors of neighbors only in the irrigated area, where social ties are strengthened through collective irrigation management. Through this effect, irrigated farmers' social behaviors become similar to those of one another. Neighborhood effects for cooperative behavior are stronger among farm plot neighbors than among residential neighbors, which may reflect their interactions in irrigation management. Although non-dynamic, these findings are consistent with the theory of social norm evolution through common pool resource management.

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1. Introduction

A growing number of studies have documented the existence of many types of social behavior, such as altruism, trust, and cooperation and punishment for public purposes, contrary to the predictions of the standard *Homo economicus* model (Bowles and Gintis, 2011; Fehr and Gächter, 2000; Henrich et al., 2001; Ostrom, 2000). Moreover, many empirical and experimental studies have observed variation in patterns of social behavior across different groups of subjects (Cardenas and Carpenter, 2008; Gächter et al., 2012; Henrich et al., 2010; Lamba and Mace, 2011). Understanding the determinants of social behavior is important because recent investigations insist that social behavior considerably affects key economic phenomena, including economic growth, poverty reduction, risk sharing, and collective action. Existing studies have focused on macro-level factors, such as market integration, ecology, and culture, as well as micro-level factors, such as group size and

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socioeconomic heterogeneity (Baland and Platteau, 1996; Gächter et al., 2012; Henrich et al., 2010; Ostrom, 2000; Rustagi et al., 2010).

Beyond the examination of the effects of these variables, interest in neighborhood effects has begun to grow. Anselin (2003) addresses the significance of neighbors' influence on economic decision making. Through neighborhood interactions, individuals (or households) affect each other's personal decisions, preferences, information sets, and behavioral outcomes directly rather than indirectly through markets. Hence, the decisions of neighboring individuals are likely to be interdependent. In the context of social behaviors, this type of neighborhood influence may be interpreted as the effect of social norms or community mechanisms.

Over the past decade, the development of spatial econometric techniques has made possible the statistical examination of the interdependent behaviors of individuals who share spatial, social, and economic milieus (Anselin and Griffith, 1988; Anselin, 2003, 2010). In addition, a recent theoretical development in the social network literature provides us with a strategy to solve the identification problem of endogenous and exogenous neighborhood effects that Manski (1993) noted in his landmark study (Bramoullé et al., 2009). Many studies have begun applying the spatial econometric techniques to understand interdependent economic activities such as technology adoption (Case, 1992; Bandiera and Rasul, 2006; Conley and Udry, 2010), economic growth (Pede et al., 2014; Abreu et al., 2005), recreational consumption (Bramoullé et al., 2009), and institutional choice (Kelejian et al., 2013), but, to the authors' knowledge, no attempts have been made to examine social behaviors.

Our research strategy combines artificial field experiments, spatial econometrics, and household surveys within a single study. Two experiments, a dictator game and a public goods game, are conducted to quantify the altruistic and cooperative behaviors, respectively, of farmers in Bohol, the Philippines. In the context of rural agrarian communities, day-to-day social interactions take place within these communities. Subsequently, the existence of neighborhood effects in social behaviors in these local communities is tested utilizing spatial econometrics controlling for socioeconomic and agro-ecological factors, which are collected through household surveys.

Particular attention is paid to the difference in the degree of neighborhood effects between irrigated and non-irrigated (rainfed) areas. The collective management of common pool resources is considered an opportunity to strengthen ties and generate social norms among local people (Aoki, 2001; Fujii et al., 2005; Hayami and Godo, 2005; Hayami, 2009; Ostrom, 2000). A gravity irrigation system, which must be managed collectively by users in geographical proximity, was newly introduced into a traditionally rainfed rice area within our study area two years before our survey. This change is expected to strengthen location-based ties and increase similarity in social behavior among geographical neighbors, which can be captured in neighborhood effects utilizing spatial economics (Nakano et al., 2015). This paper intends to show empirically how the increased importance of collective action among local people in the real world enhances interdependence in their general social behaviors (altruistic and cooperative behaviors) among geographical neighbors.

A key finding of the empirical analyses is that neighborhood effects on social behaviors are observed, but the degree of interdependence varies with the irrigation availability, type of social behavior, and type of neighborhood. Variations are summarized in two aspects. First, altruistic and cooperative behaviors are significantly influenced by the behaviors of neighbors only in irrigated areas, resulting in increased similarities in social behaviors in the irrigated area. Note that this finding implies that outcomes may not necessarily be pro-social because the neighborhood effect can reduce the level of high contributors' contributions to their neighbors' level. Vicious cycles in conformism norm dissemination are possible. Second, neighborhood effects for cooperative behavior are stronger among farm plot neighbors than residential neighbors, which may reflect their interactions in irrigation management in the real world. These findings are consistent with the theory of norm evolution through common pool resource management (Aoki, 2001; Hayami and Godo, 2005; Ioannides and Topa, 2010; Ostrom, 2000). The relevance of this interpretation is further strengthened by our supplementary finding; a dissatisfaction message (a type of costly punishment from group members) increases the subsequent contribution during the next round of the public goods game more effectively in irrigated areas. This supports the emergence of a stronger norm enforcement mechanism in the irrigated areas.

Our study contributes to several streams of literature. First, it joins a growing body of literature on social networks. Existing studies discuss the roles of networks in risk sharing (Fafchamps and Lund, 2003; Bramoullé and Kranton, 2007), agricultural marketing (Fafchamps and Minten, 2002), capital mobilization (Banerjee and Munshi, 2000; Fafchamps, 2000), acquisition of employment opportunities (Kajisa, 2007), and peer effects on economic behaviors (e.g., technology adoption, consumption, schooling, and microfinance take-up) (Case, 1992; Bandiera and Rasul, 2006; Conley and Udry, 2010; Kremer and Levy, 2008; Yamauchi, 2007; Bramoullé et al., 2009; Banerjee et al., 2012). We situate our paper within the literature on peer effects and emphasize that we examine such effects in social behaviors with field data.¹ Another unique contribution is that we used geographical neighbors to examine the effects of location-based ties. An advantage of this framework is that our estimation suffered little from the self-selection problem of network structure, which social neighbor factors (e.g., friendship) are likely to have. A disadvantage is that our analysis cannot contribute much to the literature on network formation and the differential performances of formed networks, as our neighbors are set according to distance and, thus, are practically given.²

¹ Gächter et al. (2013) detected peer effects in social behavior in an experimental setting, rather than field data.

² See Alatas et al. (2012), Jackson (2008), and Bramoullé and Kranton (2007) for recent progress.

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