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# Social Preferences and Agricultural Innovation: An Experimental Case Study from Ethiopia

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**Summary.** — We run an experiment in Ethiopia where farmers can use their own money to decrease the money of others (money burning). The data support the prediction from an inequality aversion model based on absolute income differences; but there is no support for an inequality aversion model based on comparison with mean payoff of others. Experimentally measured money burning on the village level is negatively correlated to real-life agricultural innovations. This result is robust even when data from another independent survey than the current research are used. This underscores the importance of social preferences in agricultural innovations in developing countries.


*Key words* — social preferences, money burning, agricultural innovations, Ethiopia

## 1. INTRODUCTION

Research on social preferences in economics has by now amply demonstrated that the welfare of individuals is affected not only by the goods and services they consume but also by the position and actions of others with whom they compare themselves. Most of the literature on social preference focuses on pro-social behavior where cooperation and other regarding behavior lead to better socially beneficial outcomes than predicted by the standard economic model. For example, when punishment is introduced in public good games, people are willing to punish those that free-ride, even at their own expenses, and are reluctant to punish those that cooperate (Ertan, Page, & Putterman, 2009). In trust games, players give substantial proportion of their money to others with the expectation that they will get it back even though they have no control on the decision of the recipients (Cox, 2004). The literature on reciprocity emphasizes mainly its role in strengthening pro-social behavior. One of the celebrated books in this area, Henrich *et al.* (2004), summarizes results of many experimental games and ethnographic studies from fifteen small-scale societies in different parts of the world. The main thrust of this strand of literature is toward understanding how pro-social behavior helps overcome social dilemmas and improve social outcomes. [1]

In contrast, a growing body of literature focuses on the negative aspects of social preferences where the destruction of potential surplus (value) is emphasized. Earlier work by Kirchsteiger (1994) suggested that envy is an equally plausible underlying motive as fairness for rejection of offers in the ultimatum game. Experimental work suggests that people are willing to devote their resources to decrease the welfare of better-off people (Zizzo, 2003; Zizzo & Oswald, 2001) – specifically, they are willing to destroy ('burn') other people's earnings at a cost to themselves. Laboratory experiments also show that subjects are willing to harm for little reason or no self-interest (Abbink & Herrmann, 2009, 2011). Experiments conducted in India show that spiteful preferences – the desire to reduce another's material payoff for the mere purpose of increasing one's relative payoff – are widespread (Fehr, Hoff, & Kshetramade, 2008).

In contrast to the papers cited above that used experimental games, research using survey methods also looked at positional concerns – whether the relative position of people matters. Some of the papers argue that positional concerns become important only at higher levels of income; they argue people in low-income countries are mainly concerned about their absolute positions rather than their relative standing compared to others (Akay, Martinsson, & Medhin, 2012; Clark, Frijters, & Shields, 2008; Frey & Stutzer, 2002). In contrast, others found just the opposite. For example, Corazzini, Esposito, and Majorano (2011) found positional concerns in fact are higher in developing compared to rich countries. Other studies in developing countries also show relative positions matter. A recent study on India (Fontaine & Yamada,

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2014) found three interesting results that support positional concerns are important in developing countries. First, within-caste comparisons reduce well-being; expenditure by others from the same caste triggers stronger envy than providing a positive signal about one's future prospects. Second, between-caste comparisons have a stronger effect than within-caste comparisons. Third, high castes' economic successes are detrimental to low castes' well-being but the reverse is not true. In a different context, a study from Jordan (El-Said & Harrigan, 2009) found strong envy between the Jordanian and Palestinian (immigrant) communities – while Jordanians envy the Palestinians' dominance in the higher wage private sector, Palestinians envy the Jordanians because of the latters' dominance in the public sector. Theesfeld (2004) discusses how distrust and envy creates a formidable constraint for collective action required to maintain irrigation in Bulgaria.

This paper mainly falls within the second strand of literature that focuses on the negative effects of social preferences. To capture this aspect, we employ a money burning experimental design (Zizzo, 2003; Zizzo & Oswald, 2001) in rural villages of Ethiopia, with additional sessions with university students in an urban area. To our knowledge, this is the first study that uses money burning games in a rural setting of a developing country. Our money burning game has two parts: in the first, an unequal distribution of resources is induced by varying initial endowments after which participants play a lottery. In the second round, people are given a chance to use their own money to decrease ('burn') others' money. In addition to exploring the existence and variations of money burning behavior, one of the main objectives of this paper is to understand the underlying motives. Our experimental design provides data for testing the deeper motives for money burning behavior. In particular, we test whether inequality aversion and/or reciprocity/retaliation play a role. There is evidence that players burn money due to inequality aversion based on absolute income differences as suggested by the Fehr and Schmidt (1999) model.

The money burning behavior of participants in the game is likely a reflection of similar behavior in reality. Our particular interest in this regard is to link our experimental results with real-life agricultural innovations. There are many anecdotal evidences in a number of countries of sabotaging behavior which targets better-off individuals. There is at least a potential case that this likely discourages entrepreneurship (Schoeck, 1966). Mui (1995) gives examples from reforming East European countries and China of how sabotaging may have constrained the emergence of entrepreneurs. Caplan (2005) discusses the 'cargo system' in rural Latin America where successful individuals expected to hold offices are required to self-fund and that this may result in an informal tax as high as 80%. He notes how this may discourage innovation and growth. Earlier sociological and psychological work on Ethiopia also emphasizes the pressure toward conformity and the zero-sum nature of social interactions in the country (Korten, 1972; Levine, 1965, 1974).

Agricultural innovations are complex processes that are affected by many factors – there is voluminous theoretical and empirical literature on agricultural innovations in developing countries. Feder and Umali (1993) and Sunding and Zilberman (2001) are good reviews of the literature on agricultural innovations. Ward and Singh (2014) is a recent paper that relates experimental games with agricultural innovations in a developing country.[2] Providing an exhaustive review of the literature is beyond this paper but highlighting some recent findings on agricultural innovations on Ethiopia is instructive.

Most farmers in rural Ethiopia live in a highly unpredictable environment facing such significant environmental shocks like draught; smoothing consumption across time is a real challenge. Dercon and Christiaensen (2011) showed lower consumption due to harvest failure is an important constraint in fertilizer adoption, implying that consumption smoothing is an important determinant of innovation. The influence of social networks in encouraging the spread of information and knowledge and consequently enhancing innovations has been emphasized in the recent literature. Krishnan and Patnam (2013) compared learning from government extension agents and from neighbors in the adoption of fertilizer and improved seeds in Ethiopia. They found that, while the initial impact of extension agents was high, the effect wore off after some time, in contrast to learning from neighbors underlining the importance of social networks. Abebe, Bijman, Pascucci, and Omta (2013) emphasized the market-related quality attributes in the choice of new crops such as improved variety potatoes in Ethiopia – the spread of improved variety potato was constrained by the preference of people for the taste of the local variety.

The growing empirical literature increasingly shows the complex nature of agricultural innovations. Yet the role of social preferences in agricultural innovations is still not well-understood. This paper contributes toward this by linking behavior observed in experimental games with real-life agricultural innovations. For that purpose, this project deliberately uses subjects that were previously covered by a panel household survey to utilize already available data on agricultural innovations. Multi-level mixed effects models that control for village- and session-level random effects are used to identify the link between agricultural innovations and money burning behavior observed in the experimental games. The empirical results show a robust negative correlation between social money burning and agricultural innovations – observed agricultural innovations as captured by an independent previous survey are lower in communities with high rates of money burning. We further use information on three innovations – fertilizer, improved seeds, and rain water harvesting – on which the current research collected data and also found robust and negative correlation between social money burning rates and agricultural innovations. These results imply that the money burning behavior captured by the game in the laboratory most likely captures an unobservable social preference that is inimical to real-life agricultural innovations. The link created between the behavior of participants in the game and their real-life agricultural innovations is the other important contribution of this paper. This is supported by qualitative data coming from sociological reports prepared as part of our project, for example with one of the farmers surveyed reporting that "using better technology might be good in terms of increasing yields. But it also increases the number of enemies one might have. You will be targeted by enemies including wild animals and those who possess the power of the evil eye; they will affect your cattle's fertility as well as the fertility of the soil permanently" (Dessalegn, 2009).

The rest of the paper is organized as follows. Section 2 describes the experimental design and the inequality aversion models predictions. While results are discussed in Section 3, Section 4 provides the conclusions.

## 2. EXPERIMENTAL DESIGN AND INEQUALITY AVERSION MODELS PREDICTIONS

### (a) *Design*

Thirty individuals participate in a session of the experimental game. At the start, players are randomly given large (Birr 15) or small (Birr 7) amounts of money to induce inequality.[3]