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Informal lending networks in rural Ethiopia

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ABSTRACT

Economic development in emergent nations is tied to smallholder subsistence populations whose livelihoods are vulnerable to exogenous shocks. When shocks occur, individuals often rely on resources embedded within informal insurance networks. Resource access is related to network position and reflected in properties such as centrality and reachability. We analyze a complete informal lending network (188 nodes, 295 ties) among the Sidama, an agro-pastoralist population in southwestern Ethiopia. Results indicate that culturally salient indicators of wealth, such as cattle ownership and gender, largely account for network structure. Analysis of a complete network further allows us to discuss the impact of global network properties, such as overall typology, on a communities response to different types of shocks (covariate and idiosyncratic). These findings extend our understanding of how individuals and communities engage informal lending networks in response to exogenous shocks.

1. Introduction

Throughout the world, millions of individuals continue to rely on self-sufficient subsistence livelihoods, including subsistence agriculture, horticulture, and pastoralism. The majority of these individuals live in or near poverty and so their fate is intimately tied with advances in economic development and human welfare (Nagayets, 2005; Pretty et al., 2003). Poverty levels characteristic of subsistence populations, however, ensure these livelihoods are vulnerable to shocks, such as drought and sickness. Faced with a general lack of formal insurance options (e.g., banks) and often undependable safety net programs, individuals rely on informal sources of insurance, including livestock/labor exchanges, gifts, and loans to maintain consumption levels (Coate and Ravallion, 1993; Dercon, 2002; Fafchamps, 1992; Townsend, 1994). These informal sources operate across social networks (Dercon, 2002; Fafchamps and Lund, 2003; Townsend, 1994; Udry, 1994). An individual's location within these networks, as well as global network properties (e.g., degree distribution), affects the ability of individuals and communities to respond to shocks and maintain resilience (Janssen et al., 2006).

The current study, to our knowledge the first of its kind, analyzes a complete informal lending network among the Sidama, a population of subsistence agro-pastoralists in southwestern Ethiopia. Ethiopia is an instructive location to study informal lending networks. Ethiopia has more subsistence agriculturalists (including agro-pastoralists) than any other sub-Saharan nation but also some of the lowest agricultural outputs per capita in the world (Jayne et al., 2002). Outputs have exhibited large-scale variation due to severe covariate shocks, such as regional droughts (1983–1985, the early 1990s, 2002, and 2011) and civil conflicts stemming from three regime changes in the last 50 years (Marcus, 2002; Santos and Barrett, 2006). Consequences of climate change and population growth (the 5th fastest rate in the world) are expected to depress crop yields further and produce per capita decreases in resource availability, including arable land and water sources (Pretty et al., 2003; Wiggins et al., 2010). These broader factors combine to impact the ability of individuals to respond to idiosyncratic shocks, disturbances affecting a single household (e.g., sickness). Idiosyncratic shocks are endemic across much of Ethiopia (Dercon, 2002).

The informal insurance network we examine identifies relations based on whom individuals have borrowed money from in times of need (e.g., crop failure or sickness). Several basic network properties that influence the ability to obtain a loan, including centrality and homophily, are considered. These properties are examined alongside individual attributes (i.e., demographic, wealth, and status markers) to determine the correlates of: (1) the frequency of being identified as a lender by others, (2) the number of lenders identified by an individual, and (3) whether an individual is within a subgroup especially sensitive to exogenous shocks. We conclude

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by considering how attributes of the lending network, measured at individual and community levels, impact lending behavior and response to exogenous shocks.

2. Informal insurance networks

Smoothing consumption in the face of shocks is challenging for subsistence populations given the low productivity characteristic of rain-fed agriculture in emerging nations, such as Ethiopia. To insure against and cope with these shocks, individuals often rely on social and economic resources embedded within a network of informal and interpersonal links with family, friends, and neighbors. Traditionally, network ties were guided by a principle of solidarity and were governed by delayed reciprocity (each having consequences for network structure, discussed further below). These networks operate around the transfer of labor, gifts, monetary loans and non-monetary loans of food, land and livestock (Fafchamps, 1992; Platteau, 1997; Scott, 1977). Monetary loans have become increasingly common as a consequence of modernization. For example, payments for formal schooling, healthcare, and modern agricultural resources (e.g., fertilizer) often require cash. Informal loans tend to be zero interest, offer flexible repayment plans that are context dependent (e.g., health of the borrower), and may ultimately be forgiven (Fafchamps, 1999; Ligon et al., 2002; Townsend, 1994; Udry, 1994). Informal insurance networks have been documented in subsistence populations in sub-Saharan Africa, India, and Southeast Asia and are likely to operate in any population, regardless of economic type (e.g., post-industrial), when formal sources of loaning are inaccessible (Comola, 2007; Fafchamps and Lund, 2003; Rahman and Haque, 2011; Santos and Barrett, 2006; Townsend, 1994; Udry, 1994; Udry and Conley, 2004).

Studies describing informal insurance networks have been largely reliant on egocentric data (see Fafchamps and Lund, 2003; Hoddinott et al., 2009; Udry and Conley, 2004). Egocentric networks are usually derived from a representative sample of individuals and provide information on only those alters *directly* tied to respondents (Wasserman and Faust, 1994). Here, we consider a complete informal insurance network where *all* (direct and indirect) ties in a geographically bounded population are identified. Complete network data provide a more accurate representation of an individual's embeddedness within a particular network (Granovetter, 1985), as well as more reliable attribute data because all individuals within the population are interviewed. Accurate specification of attributes and location provide an estimate of resource potential (e.g., access to loans) and should correlate with the ability of an individual to cope with shocks. A number of attributes have been found to underlie the properties of informal lending networks, including sociocultural (e.g., clan membership, religious affiliation, common friendships, wealth), biological (e.g., kinship, gender) and physical factors (e.g., geographic location) (see review in De Weerdt and Dercon, 2006). As ties in the current network represent the flow of money, it seems likely that attributes of wealth will be related to the likelihood that an individual will either ask, or be asked, to provide a loan. Manifestations of wealth vary cross-culturally so we begin with a broad review of the Sidama.

3. Study population: the Sidama

The Sidama are a Cushitic-speaking people inhabiting areas between the Rift Valley lakes of Awassa and Abaya in southwestern Ethiopia (Hamer, 1987). Most Sidama reside in the Sidama Zone of the Southern Nationalities, Nations, and Peoples Region (SNNPR), one of the nine federally recognized regions in the Federal Democratic Republic of Ethiopia (Aalen, 2011; CSA, 2007). Census figures estimate the population at almost three million, making the Sidama the fifth largest ethnic group in Ethiopia (CSA, 2007). The majority of Sidama are subsistence agro-pastoralists although migration to urban areas is increasing (Asfaw and Ågren, 2007; CSA, 2007). Staple crops are ensete, or the "false banana" (*Ensete ventricosum*), maize, wheat, and barley. Major cash crops include coffee (*Coffea arabica*), and chat (*Chata edulis*), a perennial bush whose leaves are chewed for stimulation. Cattle are primarily used for dairy products and fertilizer. Smaller livestock, including goats, sheep, and chickens are also kept but largely for consumption (Asfaw and Ågren, 2007; Hamer, 1987).

Several sociocultural characteristics of the Sidama likely correlate with location in informal lending networks. Patrilineal and patrilocal, the Sidama exhibit high levels of gender stratification with males wielding most economic power (i.e., access and decision-making) (Hailu and Regassa, 2008; Hamer, 1987, 2009). Economic power within the Sidama, as with other subsistence agro-pastoralists, is tied to livestock ownership, specifically cattle (Hamer, 1987; Herskovits, 1926). Bridewealth payments are traditionally made in cattle and, due to polygyny, herd size continues to be positively related to family size. Herd size is associated with crop outputs as dung is used to fertilize the crops, especially ensete, while crops are used as fodder to feed the cattle, especially in the dry season (Hamer, 1987). Maintenance of the relationship between cattle and ensete represents a central risk coping strategy of the Sidama and is critical to their livelihoods. Indeed, historical reports indicate that Ethiopian populations that grow ensete as their primary crop rarely experience famine (Lee, 2000).

Cattle represent the foundation for other reservoirs of wealth in Sidama society (i.e., size of family and farm lands), and given the continued existence of high levels of gender stratification, we predict that Sidama males who own cattle are more likely to be nominated as lenders. Further, cattle owners are more *reliable* sources of loans as their capacity to cope with shocks and maintain resilience is relatively higher (Dercon, 1998; McPeak, 2004). Sidama individuals lacking access to wealth (i.e., females and males with few or no cattle), are more susceptible to shocks and thus are more likely to borrow money to maintain consumption levels. However, if the structure of the lending network is similar to other types of informal insurance networks guided by a principle of solidarity, then it is unclear whether these attributes will be associated with structural disadvantage in the network. To examine whether the proposed attributes are associated with network location the following section discusses the network properties of centrality and homophily.

4. Network characteristics

4.1. Centrality

Measures of centrality within a lending network hold clear implications for the likelihood that an individual will secure or provide a loan in a time of need. A straightforward measure of centrality is degree centrality, or the number of ties an individual possesses (Freeman, 1979). In directed networks (e.g., lending networks) an important distinction exists between indegree and outdegree. In the current network, indegree is the number of *individuals nominating ego* as a lender while outdegree is the number of *lenders ego nominates*. As the number of lending nominations an individual receives increases their prestige within the network increases (Wasserman and Faust, 1994). Sidama individuals who receive many nominations as lenders will be referred to as a "prestigious lenders".

Network centrality holds different consequences for the probability of securing a loan. Individuals with higher outdegree simply have more lending options and, all else equal, should be more likely