

Social Networks and Micro Finance

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Introduction

The study of how network structures influence economic activity is increasingly becoming the subject of interest within Development Economics (see e.g. Jackson 2008b, 2009a, b). It has been known for a while now that patterns of social interaction influence an individual's economic behaviour including employment, career choice, consumption, investment, risk sharing and participation in microfinance. For instance, information regarding jobs is often disseminated through social networks. This is although more true in the lives of the poor, who often do not have access to formal institutions. While formal work on social networks within Economics is still nascent, tools from decision theory and game theory arguably, could allow us to better analyse networks. On the whole, the growing literature in the field has captured the interest of many researchers in Economics. In this summary, we would like to present some of our contributions to this literature.

The Social Networks project constitutes a set of studies that use an empirical dataset from 75 villages in rural Karnataka, India. The data collected as part of the project includes a household census with all basic information of the households in all the villages. From the census data a randomly selected group of individuals were asked detailed questions of their relationship with others in the village. The information provided by the selected individuals was used to generate network graphs for each village. The studies discussed below all use this network data for theoretical, econometric and lab experiments such that they throw light on the role of networks on economic behaviour.

The studies themselves are pertaining to very specific questions within specific areas of analysis – whether it is theory, econometrics or empirical understanding of network analysis. However, they can be placed within broader categories of analysis namely; social networks and finance, the role of informal institutions within networks and lastly, econometrics of studying social networks. This summary is structured into three sections based on these three categories. Each section contains one or more studies within it. The summary is structured as described below.

The studies under networks and finance section examine the relationship between network structures and individuals' decisions pertaining to finance. The first study in this section is a natural experiment that analyzes how information and adoption of an innovation spreads in a society. The innovation here is the introduction of micro-loans through NBFCs. The second study uses a framed field experiment to understand how joint investments are carried out. The study uses the data on the characteristics of the individuals involved in the experiment to understand how social relationships determine investment decisions made by two individuals and how the returns on investment shared among the two parties. A variant of the experiment also involves the use of third party punishers and their impact on joint investment decisions by the two parties. The last study observes the impact of introducing savings in a village on interpersonal risk-sharing informal

insurance. We know that in the context of a village there exist a set of informal insurance systems that are at work in order to smoothen consumption. The study examines whether the introduction of savings into such a context allow the individual to depart from an existing informal contract there by crowding out the benefits of informal insurance.

In the second section, the study concerns the role of informal institutions within a given network. The study looks to understand an individual's optimal decision between belonging to a given network and meeting several informal favours. It looks at how two individuals who interact too infrequently to sustain an exchange of favours often do so because of social pressure or the possible loss of several relationships. Another study examines the use of two different models of social learning; Bayesian and DeGroot that are often used in the literature. The purpose of the study is to demonstrate using a lab experiment which of the models performs better at describing how social learning takes place.

Given social networks is a field in its infancy there are numerous questions pertaining to the use of the appropriate econometric methods required to study them. The study discussed in our last section highlights, examines and addresses the econometric problems that may arise when using sampled network data to study network effects.

What is common to each of these studies is the manner by which they analyse specific questions that concern the role of social networks in making economic decisions. This is the primary motivation behind the project. Thus we conclude with a few remarks on other possible areas of research within this field.

Section 1: Social Networks and Finance

Diffusion of Microfinance

The primary purpose behind this study is to understand the impact of network related characteristics on the decision made by individuals within a village to participate in microfinance. The study uses a rich data set from rural Karnataka on the 75 villages which includes detailed information on the various possible connections each individual shares with others in the village along with the basic household and individual characteristics. This information was collected before the entry of our partner organisation an NBFC Microfinance institution called Baratha Samukta Samstha (BSS) into some of the possible villages for their operations. This provided a unique opportunity to study how the information regarding microfinance diffused within these 43 villages and how the participants of microfinance made their decision. BSS provided us client details at regular intervals after they had finally entered 43 of the 75 villages.

The study looks at the role of three specific aspects of network characteristics and their impact on the individuals' decision to participate in microfinance. The first is the impact of injection points or those individuals who were first informed and approached by BSS before beginning their operations within the village. The study finds that the eigen vector centrality (extent of importance in the network sense) of the individuals is important determinant of microfinance take-up for a given village. Secondly, several structural models of diffusion are measured against empirical data to study the roles of simple information transition against peer influence. The study finds that participants are more likely to spread the information when compared with informed non-participants. However,

once informed the individuals decision to participate is not dependent on participation of their acquaintance.

Mobilizing Investment through Social Networks: Evidence from a Lab Experiment in the Field

With the absence of formal contracting institutions within developing countries and a weak law and order system, the reliance on social networks in order to enforce and sustain efficient outcomes becomes important. The common examples of network based economic relationships include social collateral in microfinance arrangements, Self-help Groups and risk sharing arrangements made within family firms. However it is still not certain as to what an optimal contract structure would entail given network characteristics. For example, does decreasing social distance between individuals improve efficiency? For which types of relationships does monitoring yield better outcomes? Which members of society serve best as monitors with minimum costs and highest realised outputs?

The study involves a lab experiment conducted in the field within 35 villages of rural Karnataka. Each of the participants are randomly allotted into groups of two where they get to play simple sender-receiver investment games which involve making investment decision that can be equally beneficial for both parties involved. However it is left completely to the individuals to decide how they share the benefits from their joint investment. Some of the variations also involve having a third party judges who can levy punishment costs on the receivers for their unfair play. The results from the experiment are then combined with household survey responses and village survey data. In this manner it can be examined as to how investment behaviour can be influenced by demographic and network characteristics.

The study examines three villager characteristics in particular which includes the closeness of bond between the two participants, the importance of an individual to a network when compared with the partner and finally demographic characteristics of caste and whether the person is a village leader. The findings from the study suggest that social proximity improves the two partners' investment decisions. Secondly, while having third party punishers can decrease the amount of investment, having punishers who are central to a network can improve efficiency. Thirdly, demographic characteristics like caste and village leaders, does seem to influence investment decisions. Higher caste individuals and leaders often receive higher transfers. However, these individuals do not use their status to get higher surplus when they are senders in the game.

Informal insurance, Social Networks and Savings Access: Evidence from a Lab Experiment in the Field

There is now lot of literature to show that village economies have achieved significant but imperfect risk-sharing as documented by Rosenzweig (1988), Udry (1994), Murdoch (1995) and Suri (2005) to name a few. This form of risk sharing involves individuals in a village making interpersonal transfers that compensate either party when faced with adverse shock. The literature informs us however, that the consumption smoothing through this process is not complete suggesting limited commitment between parties. The purpose of this particular study is to understand the effect of introducing a savings product into such a context. It is possible that savings allows smoothing of uninsured risk. But it could also possibly crowd out interpersonal transfers by making it more palatable to leave such informal agreements.

In order to address the issue the study utilises a unique lab experiment conducted in rural Karnataka where the individual participants share real-life risk-sharing amongst them. The experiment was designed to study a variety of controlled risk-sharing insurance environments between individuals including limited commitment, complete commitment, without saving instruments and with savings instruments. There are two interesting results that arise from the study. Firstly, limited commitment seems to have a crucial impact on consumption smoothing. However, it is dependent on the social distance between individuals. The closer the bond between them, the less important it is if the commitment is limited or not. Secondly, the introduction of savings instruments does not seem to crowd out risk-sharing arrangements for the average participant.

Section 2: Role of Informal Institutions in Social Networks

Social Capital and Social Quilts: Network Patterns of Favour Exchange

Human beings often rely on cooperation for survival. Even while some forms of cooperation and behaviour are enforced by formal institutions the basic day-to-day functioning relies on society's ability to encourage cooperation. Much of the day-to-day exchange of favours range from people offering advice to colleague, a small loan to friend or an emergency help to an acquaintance are often enforceable under informal social relations that rely on network patterns. To be specific if the interaction between two individuals is too infrequent to sustain an exchange of favours, they often do so because of social pressure or the possible loss of other relationships. These informal exchanges underlie much of the literature on social capital.

This particular study provides a game theoretic foundation for the social enforcement of favour exchange using the empirical data from 75 villages in rural Karnataka, India. The model is one of repeated games in networks that optimises between the favour of exchanges that are to be met by the individual and the possible loss of social relations if the favours are not met. The findings from the study shows that any two individuals who have a common friend often have longer and sustained exchange of favours than compared with those that do not. This suggests the common friend, referred to as the "support" is often is critical characteristic of networks that ensure enforcement of informal contracts or behaviour between any two individuals.

Testing Models of Social Learning on Networks: Evidence from Framed Field Experiments

Due to the lack of formal institutions, markets and information aggregating institutions within developing countries individuals often rely on social connections for information, guidance and advice. For this reason social learning on networks can be seen as a building block of several economic processes. The formal studies on social learning often use two models; Bayesian or DeGroot rules of thumb. Both of these models often exhibit distinct behaviour as those who rely on rules of thumb often double-count information and may be more prone to incorrect decisions. The purpose of this particular study is to identify which of the models best fits with the empirical data on social networks available from 22 villages in rural Karnataka, India.

In order to address this question the study relies on a unique lab experiment conducted in the field. The experiment places six people into a network each with full knowledge of its entire structure. The primary objective of the participant is to guess correctly the underlying binary state of the world over multiple rounds. In the first round each individual is provided an independent and identically distributed signal. After which the following rounds each participant is provided the guesses of their neighbours in the previous round, based on which they make guesses for a given round.

The results from the study show that while both models seem to describe the data to some extent, the DeGroot model better fits the data than compared with the Bayesian model. While Bayesian model explains 44% of the actions taken by individuals the DeGroot rules of thumb explain more than 54% of the actions made by individuals. This suggests that individuals are best described by DeGroot rules of thumb where they either go by the simple majority in their neighbourhood or go with popular individuals.

Section 3: Econometrics of Social Networks

Econometrics of Sampled Networks

The purpose of this study is to examine and address the issues that arise when conducting research on network effects using sampled network data. A network represents a set of connections among a collection of agents (nodes). Within applied research it is typical to collect information for a partial sample of nodes rather than the entire set of nodes and then treat the sample as the true network of interest. There is a growing literature that use network based regressions in applied work using sample data. Kremer and Miguel (2007) study the diffusion of de-worming pill take-up, Hochberg et al (2007) study find performance on measures of network importance of venture capital firms and Conely and Udry (2010) who study the diffusion of information among pineapple farmers in Ghana to name a few. Most of the applied work in this area use low sampling rates; 2/3 of the studies using sampling rate below 51%.

This study uses the data from the 43 villages in rural Karnataka to examine if the parameters estimated using sample data are biased when compared with parameters estimated using the entire data set. The primary contribution of this study is that when a sampling rate of 1/3 is used there is a mean absolute bias both within network level regressions and node level regressions of 90% and 63% respectively.

The second contribution of this study includes suggesting two econometric strategies to overcome the above identified bias. The first strategy involves explicitly identifying the bias and thereby making necessary corrections. While this process is often computationally simple and easy to implement it is only possible in network level analysis and is at times dependent on the network statistic of interest. For this reason a second more general strategy is proposed which involves two-step graphical reconstruction. As the first step the researcher can identify models that best fit a given network based on observed data, which could involve fitting different models for different networks. Doing so would allow each network to have its own distribution. The researcher can then use network formation models to take draws of networks with different distributions conditional on the observed data. Using these draws the researcher can then estimate conditional expectations of a regressor. In the second stage these conditional expectations are then used to estimate the parameter of interest. It is demonstrated in the study that implementing such a procedure for the same sample rate of 1/3 of the data reduces the median network level bias and node level bias to 5.7% and 1.4% respectively.

Conclusion

The motivation behind the studies discussed above can be broadly seen as understanding how network structures influence economic behaviour. While some of the studies look to identify the right set of research techniques and econometric tools required to study network effects, others look to understand the impact of networks on financial decisions, contract enforcement and informal institutions. However, these studies should be seen as taking baby steps towards having a comprehensive understanding of social networks. Our ultimate objective would be to predict using our knowledge on network effects how people self-organise, how people make choices and how much are they dependent on the choices of their friends, neighbours, relatives, etc. Being able to explicitly model such behaviour could be immensely useful for development policies within developing countries. In particular it could allow us to understand why people often take to homophily- why people try and associate with other people who are similar to them on several dimensions, how information is transferred from household to household and which form of network structures are conducive for economic growth and development and how they evolve. These, we would like to suggest, are some of the possible areas of research within the field that could be taken up in the future.