The Impacts of Self-Help Group Programs:
Experimental and Survey Evidence from South India

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Abstract

This study aims to provide empirical evidence of the economic and social impacts of access to microloans disbursed thorough self-help group (SHG) programs. For this purpose, primary data were collected from households in Kerala, South India, and combined with detailed financial transactions of SHG members and information collected through laboratory experiments. The estimation results show that wealthier group members are significantly more likely to reap economic benefits, probably from productive investments. For poor members, asset accumulation and consumption smoothing are the two main pathways out of poverty through SHG-modeled microfinance initiatives. Finally, I find that reciprocal cooperation and trust among group members are developed by repeated social interactions, which are facilitated by weekly meetings of SHGs.

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1. Introduction

Microfinance is the provision of financial services such as loans, insurance, and fund transfers to the poor, who do not have access to banking services owing to the high transaction costs and asymmetric information problems associated with the provision of these services. It is of particular importance in developing countries as it could help to generate income through self-employment and create social capital.

In India, microfinance became increasingly important after the government launched a massive microfinance program in 1992 with the objective of connecting community-based financial groups, or self-help groups (SHGs), to the existing banking network in order to deliver financial services to the poor. Since the inception of this program, interest in the multifaceted impact of SHGs on households' livelihoods has been considerable, to the point that a large number of programs in developing countries have begun to follow the Indian model. However, rigorous evidence on whether the SHG program provides economic benefits and fosters the creation of social capital at the local level is virtually non-existent[2].

The present study aims to provide empirical evidence on the economic and social impacts of the access to microloans through the SHG program using primary data collected in Kerala, South India, in 2008. Specifically, it describes not only the direct economic effects but also the spillover effects on participants who do not borrow microloans. In addition, it focuses on the extent to which these types of community-based financial services contribute to creating social capital among participants through daily interaction and/or collaborative works.

It is worth noting that this study has two advantages. First, the data set is rich and original because it was collected through three distinct sources: a questionnaire survey on household characteristics, including social network information in a village; personal financial diaries recorded by SHG members, which included details of weekly financial transactions of each SHG; and laboratory experiments targeting program participants in order to measure social capital. The second advantage is related to the estimation strategy used in this study, which overcomes both sample selection bias and replacement bias. I could employ the pipeline approach developed by Coleman (1999) to identify the causal relationship between access to microfinance programs and the well-being of participants, as this was a targeted SHG program with simultaneous recruitment of participants executed in a single village. This methodological framework

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[2] Recently, an experimental approach known as randomized controlled trial was adopted in microfinance programs, although not in the SHG program (Banerjee et al. 2009, Karlan and Zinman 2009). Since there is no consensus with regard to the positive and significant impacts of microfinance, further rigorous studies—including ones adopting nonexperimental approaches—are needed.

enables us to measure the program impacts accurately.

2. Literature Review

Since the 2000s, a number of empirical studies applying the pipeline approach have been published (e.g., Barnes, Gaile, and Kibombo 2001, Dunn and Arbuckle 2001, and Mosley 2001). These studies have generally found positive and significant impacts of microfinance on economic benefits, and subsequently, the welfare levels of program participants[3]. Focusing on the SHG program in India, Swain and Varghese (2009, 2011) also employed the pipeline approach and found positive impacts on asset accumulation, and increases in livestock income and salaries of program participants; surprisingly, they found a negative impact on total income[4].

The difficulty in reaching a consensus on whether microfinance has economic benefits may stem from the existence of heterogeneous impacts among borrowers. Coleman (2006) explicitly considers this difference in creditworthiness among participants and finds that microfinance has little impact because loans are disproportionately obtained by wealthier participants. Furthermore, Pitt and Khandker (1998) describe the possible existence of spillover effects from villages included in the microfinance initiative to control villages. Although this sort of externality was subsequently confirmed by the findings of Khandker (2005), the spillover pathway between participants who have access to loans and those who do not has not been found using microdata.

In terms of the social impact of microfinance, some authors have shed light on its potential to create social capital and facilitate female empowerment through microfinance programs (Garikipati 2008, Rai and Ravi 2011, Swain and Wallentin 2009). Supported by economic theory (e.g., Kreps et al. 1982), an abundance of microfinance approaches—including SHG programs—have clearly stated that community-based financial programs are expected to promote social interactions among group members who live in the same community; this, in turn, brings significant monetary and nonmonetary returns in comparison to regular interaction. To the best of my knowledge, Feigenberg et al. (2010), who provide the first and only rigorous evidence in this regard, employ an experimental approach and show that simply encouraging people to interact more often actually increases economic cooperation among microfinance participants. In addition, the cooperative norm improves informal

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[3] Duvendack et al. (2011) and Kono and Takahashi (2010) provide comprehensive surveys for the methodology of impact evaluation and empirical results of affluent cases of microfinance.

[4] Deininger and Liu (2009) collected original data in Andhra Pradesh. They concluded that there is a positive impact on female empowerment and found increases in consumption and nutritional intake in program areas. Interestingly, their econometric results revealed few impacts on household income.

risk sharing and reduces microloan defaults.

In sum, despite increasing attempts to evaluate microfinance programs, the economic and social impacts of microfinance and poverty reduction mechanisms through microfinance are yet to be clearly established and remain controversial.

3. Survey Design

3.1 Research Setting

Generally speaking, SHG-based microfinance, which falls under the category of village banking, extends the solidarity-type model to 10–20 (primarily female) members. Such a microfinance program follows a group-lending methodology with joint liability clauses inserted into credit transactions and compulsory saving systems. The following paragraphs in this subsection elaborate the financial scheme of the SHG-based microfinance model in the village that I surveyed, which is a part of the ward located in a northern district or Wayanad in Kerala[5]. The survey targets the 220 individuals who participate in the SHG program[6].

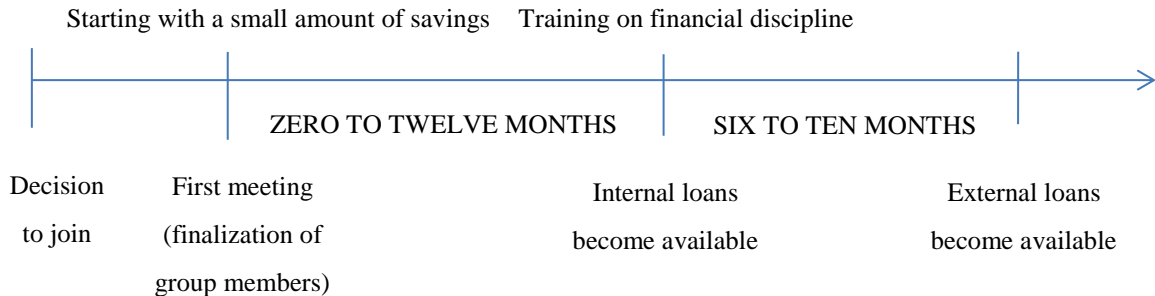Figure 1 Process of the activity and loan availability in an SHG

Figure 1 shows the process of the activity and loan availability of the program in the form of a timeline. Here, the formation process and the conditions of loan availability are the most important institutional features since they relate to the identification strategy and the interpretation of econometric results. Therefore, I will first explain how

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[5] The SHG-based microfinance program that I surveyed is run by the Government of Kerala with the active support of the Government of India and the National Bank for Agriculture and Rural Development (NABARD) to eradicate absolute poverty in Kerala. This program, called Kudumbashree, was started in 1998. The State Poverty Eradication Mission, an autonomous body in the State, implements the program through local self-governments (gram panchayats), formed and empowered in 1992 by the 73rd and 74th constitutional amendments (Kadiyala 2004, p.4).

[6] Note that this survey encompasses all people who live in a part of this ward and participate in the SHG program.

villagers were organized into SHGs. Second, the conditions for accessing microloans are listed.

Initially, microfinance program coordinators, who are hired by the local self-government, visit the targeted village and prepare a list of potential members for each SHG with the support of local NGOs. Note that, in this procedure, they are not supposed to use eligibility criteria adopted in other microfinance programs, such as a threshold of income or land holdings. Alternatively, they identify candidates for each SHG so as to minimize the geographical distance between each other. This is because one of the priorities of the program is to facilitate social interaction through weekly meetings held in one of the members' houses. Thus, the program is open to all villagers, and all they need do is to decide whether to participate in the program with given partners. This recruitment procedure is executed at almost the same time for all those who live in the targeted village. In sum, the program is characterized by simultaneous recruitment in the village, and members are not allowed to select their partners since they are supposed to be organized into each SHG based on geographical proximity[7].

With regard to microloan transactions, SHG members have access to two types of loans: internal and external. The process of obtaining internal and external loans is described below.

It should be emphasized that credit is not instantly extended to SHG members. First, established SHGs must agree on weekly meeting schedules and determine other group rules such as minimum contributions per member at each meeting[8]. Then, the groups must build credit records by first saving small amounts. In addition, all group members are obliged to receive financial training before internal loans are provided from members' savings accounts. Owing to the shortage of program coordinators and poor facilities in the sampled area, these mandatory training sessions were randomly assigned to newly formed SHGs to avoid conflicts among SHGs. Consequently, some SHGs were forced to wait, without prior notification, for access to internal loans. Once savings cross a certain threshold and program-mandated training sessions are completed, groups are qualified to offer internal loans to their members. Thereafter, it takes approximately another six to ten months for SHGs to gain access to external loans disbursed by formal banks. I exploit this time lag and select SHG members who have not yet received their external loans to be part of a control group (Swain and Varghese 2009, 2011).

External loans can be given for up to four times the savings amount. Banks disburse loans under the name of the group rather than the individual member; thus, the group

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[7] In my target area, there are no dropouts from the list prepared by program coordinators.
[8] In the study area, the minimum contribution at each meeting usually ranged from Rs.10 to 50 per member.

decides how to manage and allocate those resources. As savings increase through the group operation, the group can access higher amounts of loans[9].

3.2 Experimental Design

The data used for the empirical analysis in this study were collected by the author in 2008[10]. The household survey was conducted using a questionnaire, and laboratory experiments were used to construct a cross-sectional data set[11].

I conducted three types of laboratory experiments in order to determine each participant's social preference parameters: public goods game, dictator game, and trust game[12]. According to the interpretation of standard experimental games typically used to measure social preferences, contribution to the public goods game reflects reciprocated expected cooperation, sending amounts in the dictator game reflects altruism, and sending amounts in the trust game as the first mover reflects the degree of trust (Camerer and Fehr, 2004; Levitt and List, 2007).

First, I conducted a simple public goods game. In this setting, SHG members were allocated to anonymous groups that comprised four members; members remained in the same group for the entire experiment. At the beginning of the first round, each player was given an envelope containing 10 coins amounting to Rs.100; each player was asked to specify a number of coins, if any, for contribution to the group project and keep the residual amount. The total group contribution was doubled and redistributed evenly among all four members. In the process of this experiment, I carefully controlled the so-called "anonymous" settings. In the first control condition, the games were conducted in a perfectly anonymous setting—members were notified that their partners would be selected from both outside and within their SHGs or the same village. I defined the social preferences extracted from this game as the nature of each participant. In the second control condition, members played the games in a quasi-anonymous

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[9] The SHG program provides, in addition to microloans, two types of subsidy: a matching grant and a revolving fund. The latter is further classified into two types of funds, one for group members and the other for borrowers. The matching grant is provided when the group composition is finalized. Amounting to Rs.5,000, the total grant is supposed to be equally divided among members. The revolving fund, totaling Rs.10,000 for a single SHG, is disbursed to group members as an internal loanable fund after completion of financial training. The revolving fund for borrowers is granted for persons who borrow external loans for the first time and the amount is 10% of loans (with a ceiling of Rs.25,000). Note that all participants are assured access to these grants and funds, although the time of access may differ among them.

[10] Note that information from laboratory experiments was obtained in 2011.

[11] Following the taxonomy suggested by Harrison and List (2004), we could term the laboratory experiments artefactual field experiments.

[12] In addition, we conducted a risk investment game to capture individuals' risk attitude, as in Schechter (2007). Although risk preference would not be included in social capital, we should have grasped this preference to put it in the econometric specification as an independent variable to control the effect of risk aversion that might come up in the trust game, as shown by Schechter (2007).

condition in which partners of an experiment were selected only from among members of the same SHG. Thus, here, the amount of sending money reflected the reciprocal cooperation within groups. I continued this contribution stage for four rounds in both control conditions.

Second, in the dictator game using the strategy method, which is similar to the public goods game, each player was given an envelope containing 10 coins amounting to Rs.100 and was asked to decide how many coins to place into his/her partner's envelope. Employing the strategy method, the respondent's partner could be somebody in the same village and two identified persons in the same SHG. The sending amount decided in the former (latter) partner case is defined as the nature (identified) of altruism.

Finally, I used a two-player trust game using the strategy method—as in the dictator game where individuals played the roles of both investor or sender and trustee or receiver. The structure of the game is similar to that given in Burks et al. (2003) and Bouma et al. (2008); however, the participants of this experiment were SHG members, rather than students and Indian farmers. Again, the strategy method allowed us to define both the nature and the identified trust.

Descriptive statistics for the results of the questionnaire survey and laboratory experiments are shown in Table A1.1 and Table A1.2, respectively, in Appendix 1.

4. Estimation Strategy

Although seemingly straightforward, assessing the impact of SHGs may be affected by the presence of selection bias because of unobserved variables, since the decision to participate in SHGs depends on the same factors that determine impact. At a broader level, bias can arise because policymakers tend to introduce programs into targeted areas, leading to nonrandom program placement. The fact that the selected treatment areas are chosen first means that they are likely to have different characteristics to those of areas chosen subsequently.

A design feature of the SHGs that I targeted provides us with the necessary variables to perform a quasi-experiment on the availability of internal and external loans. Note that I selected treatment and control groups from a single village where simultaneous recruitment was strictly conducted. Fortunately, as mentioned above, newly formed SHGs are randomly forced to wait to receive the necessary financial training before obtaining access to internal loans. Additionally, after beginning the internal loan transaction, there is another waiting period of six to ten months to obtain permission to receive external loans from the bank. Thus, while preceding SHGs have already begun to invest their external loans, lagging SHGs are restricted to receiving internal loans of

relatively small amounts. In other words, even though they simultaneously decided to join the SHG program, the order of turning to financial transactions was exogenously executed by the program coordinator. Bearing in mind the outlined identification strategies, I estimate the following regression:

$$Y_{is} = a + \alpha X_{is} + \beta S_s + \gamma SHGMON_{is} + \delta NETW_{is} \times DEMA_{is} + \varepsilon_{is}, (1)$$

where Y_{is} is the economic outcome for household i in SHG s, X_{is} is a vector of the household characteristics, and S_s is SHG's characteristics. The parameter of interest is γ, which is the causal treatment effect where *SHGMON* is the number of months since the first external loan was disbursed to members. I hypothesize that *SHGMON* is exogenous to the households. Because there may be household-wide spillover effects from microloan borrowers to other members, I explicitly control for these effects by restricting the ranges of their social networks in the above specification as *NETW* multiplied by *DEMA*. *NETW* is defined as the number of partners with whom one has personal experience of availing interest-free informal credit and/or gift exchange in the village, and *DEMA* is the total amount of microloans borrowed by other villagers in the same network. Without including these variables, the spillover effects would create an estimation bias in which the coefficient for *SHGMON* would be underestimated. In other words, this study hypothesizes that the effect of external loans or profits from productive investments can trickle down through informal credit transactions and/or gift exchanges in a social network. I also estimate the following regression:

$$EXPER_{is} = c + \mu X_{is} + \pi S_s + \rho SHGMON_{is} + \sigma DEF_{is} + \varepsilon_{is}, \quad (2)$$

where *EXPER* represents the results of laboratory experiments that indicate social preferences of participants. In addition, I include the variable *DEF*, which represents the number of days borrowers in the same group postponed the stipulated deadline for their loans. I construct this variable on the basis of personal and group financial diaries.

5. Estimation Results

Table 1 provides the regression results for the equations given in section 4 for the various economic outcomes in different specifications. In the first column, I employ a gross income specification. The second column uses the same gross income specification but only includes earnings from agricultural activities. The third and fourth columns use food expenditure as economic outcomes, but the latter only focuses on expenditure during a non-harvesting season in which households tend to be susceptible to a decrease in agricultural income. Finally, the fifth to last columns explore the impact on non-food expenditure and asset accumulation.

Table 1 Estimation results for economic outcomes

	Income	Agricultural income	Food expenditure	Food expenditure (2)	Non-food expenditure	Fixed assets	Savings
SHGMON	0.249 (1.01)	0.134 (0.23)	0.625 (1.92)*	0.789 (2.00)**	0.234 (0.34)	0.523 (1.98)*	1.989 (2.34)**
Social network							
* Other participant's demand	0.125 (0.22)	0.023 (0.12)	0.105 (2.01)**	0.115 (3.89)***	0.055 (0.26)	0.911 (0.76)	0.112 (0.98)
Household characteristics				YES			
Household head characteristics				YES			
SHG member characteristics				YES			
SHG characteristics				YES			

Notes: All regressions include the right-hand variables of Table A.1.1 except for economic outcomes. Analysis based on 220 observations. Absolute t-ratios are given in parentheses. *** 1% significant, ** 5% significant, * 10% significant, respectively

Interestingly, the coefficients are positively significant for the *SHGMON* variable only in the specification for food expenditure, fixed assets, and savings. Contrary to common findings in previous studies, I do not find that the SHG program has a positive impact on household (agricultural) income[13]. With regard to spillover effects, our estimation results imply that if an individual is associated with group members who receive positive amounts of microloans from the program, he or she can also reap positive benefits in food consumption, possibly through gift exchange or interest-free informal credit transactions.

To analyze in detail the reason for the low impact on income, I conduct a quantile regression on income level. Table 2 indicates that although wealthier participants are the main beneficiaries of productive investments using microloans, poorer participants share those benefits through spillover effects in their social networks.

Table 2 Estimation results for economic outcomes using quantile regression

Dep var: Total income	25 percentile	50 percentile	75 percentile
SHGMON	-0.234 (0.91)	0.118 (1.12)	0.211 (2.36)**
Social network			
* Other participant's demand	0.121 (1.92)*	0.424 (0.61)	0.224 (1.28)
Household characteristics		YES	
Household head characteristics		YES	
SHG member characteristics		YES	
SHG characteristics		YES	

Notes: All regressions include the right-hand variables of Table A.1.1 except for economic outcomes. Analysis based on 220 observations. Absolute t-ratios are given in parentheses. *** 1% significant, ** 5% significant, * 10% significant, respectively

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[13]However, this finding is consistent with Swain and Varghese (2009, 2011) and Deininger and Liu (2009).

Table 3 provides evidence of the social impact of the SHG program. The coefficients for trust and reciprocal cooperation among SHG members are positively correlated with the *SHGMON* variable. Combined with the fact that the coefficient for altruism among SHG members is not statistically significant, repeated social interactions in an SHG promote the creation of social capital on the basis of reciprocity and dyadic trust, while sacrificing altruistic preferences. It must be emphasized that altruism among group members is particularly susceptible to the sharking behavior of other group members, such as defaulters. Coefficients in terms of social preferences defined as the nature of participants are not influenced by the activities of or social interaction within SHGs.

Table 3 Estimation results for social outcomes

	Trust (identified)	Trust (nature)	Cooperation (identified)	Cooperation (nature)	Altruism (identified)	Altruism (nature)
SHGMON	1.661 (1.61)*	0.717 (0.21)	0.101 (2.21)**	-0.191 (0.44)	-0.234 (1.54)	0.051 (0.79)
Default experience in a group	-0.473 (1.01)	-0.233 (0.55)	-0.002 (1.88)*	-0.178 (1.02)	-5.43 (2.36)**	-0.123 (0.99)
Household characteristics			YES			
Household head characteristics			YES			
SHG member characteristics			YES			
SHG characteristics			YES			

Notes: All regressions include the right-hand variables of Table A.1.1. In addition, *NETW* and *DEMA* are also included. Analysis based on 220 observations. Absolute t-ratios are given in parentheses.
*** 1% significant, ** 5% significant, * 10% significant, respectively

6. Conclusion

This study evaluated the economic and social impacts of SHG-based microfinance initiatives in Kerala, South India. Comparing these impacts on current and future self-selected borrowers, I found that longer SHG-membership durations since external loans have become available positively influence food expenditure, particularly by buffering its inherent seasonal volatility. Although I found no impact on total current income for poor group members, the estimation results from the quantile regression showed that wealthier members are significantly more likely to reap economic benefits that might stem from productive investments. I also found that there exist spillover effects of microloans on food expenditure from actual borrowers of microloans to other members of SHGs, which can possibly be realized through a risk-sharing network comprising informal credit and gift exchange in a village. Therefore, taken together, for poor participants, asset accumulation and consumption smoothing driven by not only microloans but also the risk-sharing network in a village are the main pathways out of poverty through SHG-based microfinance initiatives. Most previous studies evaluating

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the impact of similar microfinance programs do not highlight this fact[14].

Furthermore, as measured in our laboratory experiments, repeated social interactions have a positive impact on trust and reciprocal cooperation. However, interestingly, altruistic behavior tends to be crowded out from this process of creating social capital. It is worth noting that this estimation result is the first evidence to specify which type of social capital can be created by a microfinance program, which, in turn, implies that social preferences can endogenously change through social interactions.

Appendix 1: Descriptive Statistics

Table A1.1 presents summary data on characteristics of household, household head, SHG member, SHG, and financial transaction, collected by a questionnaire survey. Variables on economic outcomes are used as dependent variables for specification (1). Other variables listed in Table A1.1 are included in specification (1) as independent variables, as well as *SHGMON*. Table A1.2 shows the results of laboratory experiments. Panel A reports the results of the public goods game. Average contributions in perfectly anonymous and quasi-anonymous conditions are used in specification (2) as the innate and the identified cooperation, respectively. Average sending amount to the two identified persons in dictator game and trust game are defined as the identified altruism and trust. Sending amount to somebody in the same village in dictator game and trust game are interpreted as innate social preferences. Finally, invested amounts in risk game measure risk preference and I put it in the right-hand side of specification (2). Again, variables in Table A1.1 including economic outcomes are used as independent variables in specification (2).

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[14] Only Deininger and Liu (2009) and Swain and Varghese (2009, 2011) highlight this fact. In line with their results, my estimation results confirm that this alternative pathway out of poverty is likely to be suitable for Kerala as well.

Table A.1.1 List of variables

Variables	Obs	Mean	Std. Dev	Min	Max
Economic Outcomes					
Total income (Rs.)	220	35,147.50	18,951.48	3,680.00	103,000.00
Agricultural income (Rs.)	220	9,648.50	11,002.19	1,000.00	75,000.00
Food expenditure (Rs.)	220	274.18	281.45	84.74	929.05
Food expenditure (2) (Rs.)	220	141.27	102.12	54.22	341.14
Non-food expenditure (Rs.)	220	311.23	274.81	63.08	1,029.14
Total Fixed assets (Rs.)	220	10,632.24	10,837.71	1,284.00	39,812.31
Total Savings (Rs.)	220	5,699.09	6,389.22	0.00	100,000.00
Characteristics of Household					
Landholdings (100m2)	220	69.27	81.63	0.00	410.00
Government transfer (Rs.)	220	189.64	676.17	0.00	5,500.00
No. of family labor (age 16-59)	220	2.99	1.18	0.00	7.00
No. of family member	220	4.03	1.20	1.00	9.00
Characteristics of Household head					
Educational attainment	220	2.66	1.15	1.00	5.00
Age	220	45.19	10.66	24.00	78.00
Dummy for female household head	220	0.17	0.38	0.00	1.00
Characteristics of a SHG member					
Age	220	40.16	9.91	18.00	70.00
Educational attainment	220	3.62	1.02	1.00	5.00
Residential year	220	32.57	10.85	3.00	58.00
Dummy for experience of emigrant	220	0.04	0.19	0.00	1.00
Private transfer within village (Rs)	220	1,136.36	4,635.53	0.00	30,000.00
Characterisitics of SHG					
Social homogeneity	220	0.54	0.19	0.25	1.00
Total number of participants	220	12.59	2.23	9.00	17.00
Financial transaction					
Dummy for potential demand for loans	220	0.93	0.51	0.00	1.00
Dummy for credit constraint	220	0.80	0.40	0.00	1.00
Friends, relatives (Rs.)	220	342.73	907.95	0.00	7,800.00
Money lender (Rs.)	220	315.91	1,999.19	0.00	19,000.00
SHG (Rs.)	220	10,737.05	15,773.73	0.00	72,500.00
Credit cooperatives (Rs.)	220	3,363.64	15,688.01	0.00	175,000.00
Commercial bank (Rs.)	220	3,643.18	22,516.89	0.00	250,000.00
Government Bank (Rs.)	220	2,900.00	13,461.22	0.00	150,000.00
Total loans (Rs.)	220	22,262.27	37,995.45	0.00	365,000.00
SHGMON (month)	220	44.51	18.59	0.00	72.00
Default experience of SHG loans: *DEF* (days)	220	2.89	6.33	0.00	35.00
Social network: *NETW* (No. of persons)	220	6.21	4.19	0.00	12.00
Total amounts of microloans in *NETW*: *DEMA* (Rs.)	220	10,871.34	12,094.46	0.00	23,781.44

Notes: Food expenditure, food expenditure (2), and non-food expenditure are defined as monthly per capita consumer expenditure (MPCE), MPCE only during a non-harvesting season, and MPCE only for non-food goods. These definitions follow the ones adopted in an all-India sample survey of households consumer expenditure conducted by NSS.

Table A.1.2 Results of laboratory experiments

Variables	Obs	Mean	Std.Dev.	Min	Max
Panel A: Public Goods Game					
Perfectly anonymous condition					
Contribution in 1st round	220	44.54	30.71	0	100
Contribution in 2nd round	220	43.87	32.05	0	100
Contribution in 3rd round	220	41.49	35.31	0	100
Contribution in 4th round	220	39.66	38.38	0	100
Average contribution	220	42.39	28.83	13.42	93.99
Quasi-anonymous condition					
Contribution in 1st round	220	48.46	31.17	0	100
Contribution in 2nd round	220	47.13	32.28	0	100
Contribution in 3rd round	220	50.44	36.34	0	100
Contribution in 4th round	220	51.39	39.08	0	100
Average contribution	220	49.36	30.23	21.59	94.54
Panel B: Dictator Game					
Sending amount to the identified person	440	31.81	19.24	0	100
Sending amount to somebody in the same village	220	29.15	20.77	10	90
Panel C: Trust Game					
Sending amount to the identified person	440	61.19	23.51	10	100
Sending amount to somebody in the same village	220	54.04	24.70	10	80
Panel D: Risk Game					
Invested amount	220	25.11	19.00	0	100

Note: Perfectly anonymous condition in Public Goods Game was played by the half of participants at the first time, while the other half of participants was assigned to quasi-anonymous condition. After four rounds in a certain condition, the former (the latter) was assigned to quasi-anonymous (perfectly anonymous) condition. We did not notify there were two conditions in Public Goods Game beforehand; they could only understand how many times they would play in a certain condition and who the player was at the time before the first contribution.

Appendix 2: Relevance of the Pipeline Approach

As described in section 4, our approach to overcoming selection bias was to hypothesize that current borrowers of external loans and future self-selected SHG members have similar "unobservables" because of their seemingly random assignments. Although it is notoriously difficult to prove this assumption because of the nature of unobservables, one critical check for random assignment might be important to support our assumption. Thus, I employ a logit model to estimate whether there is a substantial difference between current borrowers and future self-selected borrowers [15]. The estimation results in Table A.2 show that a dummy variable for SHGs that have access to external loans is not systematically determined by a participant's or the SHG's observed characteristics. This implies that policymakers do not seem to prefer expanding the qualification criteria for loan transactions for a certain SHG or individual.

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[15] A similar estimation strategy is employed in Swain and Varghese (2011).

Table A.2 Estimation result for the logit model

Dep var: Dummy for a SHG w/ access to external loans =1	Coefficient	z-value
Characteristics of Household		
Landholdings (100m2)	-1.4312	-0.6345
Government transfer (Rs.)	0.1838	0.7227
No. of family labor (age 16-59)	-0.0686	-0.1645
No. of family member	-1.1341	-0.6789
Characteristics of Household head		
Educational attainment	0.339**	2.5134
Age	0.5040	0.5415
Dummy for female household head	-0.5660	-0.3415
Characteristics of a SHG member		
Age	1.0505	0.4201
Educational attainment	1.1530	0.7227
Residential year	0.0290	1.4789
Dummy for experience of emigrant	-0.1510	-0.3414
Private transfer within village (Rs)	0.4600	1.5134
Characterisitics of SHG		
Social homogeneity	0.1580	0.3911
Total number of participants	0.3650	0.2264
Financial transaction		
Dummy for potential demand for loans	0.6450	0.7719
Dummy for credit constraint	0.6970	0.5550
Loan from		
Friends, relatives (Rs.)	-0.1880	-1.4801
Money lender (Rs.)	0.0560	0.4537
Credit cooperatives (Rs.)	0.6892	0.0674
Commercial bank (Rs.)	0.6700	0.2178
Government Bank (Rs.)	0.3658	1.0407
Total loans without SHG loans (Rs.)	0.5629	0.9273
Pseudo R^2	0.251	
Log likelihood	-38.7259	

*** 1% significant, ** 5% significant, * 10% significant, respectively

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