Where NGOs go and do not go?

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Abstract

In this paper, we investigate the role of output market imperfections in constraining the microfinance program to mitigate credit market imperfections. We develop a model in which output market imperfections increase operating costs for NGOs and create barriers for producers to market their goods. Therefore, NGOs engage in locations having good physical infrastructure and better productive and marketing opportunities to minimize operating cost and maximize loan repayment. Using data from northern Bangladesh, we find strong support for the model predictions. NGO coverage in a village, measured both by percentage of NGO member households and number of NGOs working, decreases with distance of the village from marketplace and increases with adoption of modern irrigation method and soil quality. NGOs do not consider poverty incidence in the village. The results have important implications for development economics in general and impact assessment of microfinance program in particular.

Keywords: Microfinance, location choice, NGO, market imperfections, poverty
JEL Classification Codes: D23, G21, O12, O17

Where NGOs Go and Do not Go?

1. Introduction

One of the stated objectives of the microfinance program is poverty alleviation. It is therefore expected that an NGO[1] will take microfinance to the poor and also to the places where profit driven financial institutions do not engage due to high operating costs.[2] On the other hand, sustainability of the microfinance program without donor support depends on the cost-effectiveness as well as on the loan repayments. To achieve the latter objective, an NGO will minimize operating costs by placing its program in the adjacent areas or in the areas having good physical infrastructure. It will also place the program in the areas where there are ample opportunities for investment in productive activities so that the NGO clients can generate income to repay the loan. Therefore, an NGO faces a trade-off in the selection of program location,[3] and the ultimate choice depends on the implied objective that may differ from the stated objective. Nevertheless, even accepting this trade-off, the actual motivation of an NGO in selecting a program location is unknown.[4]

The understanding of program location choice by NGOs is important for a number of reasons. First, several interlinked markets are simultaneously imperfect in developing countries. For example, credit and output markets are directly linked and both are highly imperfect. One of the reasons for output market imperfections is lack of good physical infrastructure and marketing facilities that causes the producers to incur high transaction costs to search for the buyers. The microfinance program was devised as a response to credit market imperfections in developing countries. If program location

[1] We do not make any distinction between an NGO and a microfinance institution.

[2] Operating costs consist mainly of personnel and administrative costs, which also depend on physical infrastructure; see discussion in Section 3.4 and also Gonzalez (2007).

[3] By program location we refer to a village or a community where an NGO engages in microfinance activities (in other words, where its clients or borrowers are located). This is different from the place where the NGO itself is located.

[4] Fruttero and Gauri (2005) find that NGOs in Bangladesh establish new programs where they had no program previously without considering the community need or the presence of other NGOs.

choice by NGOs is influenced by quality of physical infrastructure and availability of marketing facilities of the goods produced by their clients, then microfinance cannot mitigate credit market imperfections in the presence of output market imperfections. This understanding is crucial not only for the microfinance program but also for development economics in general. Second, poverty alleviation performance of the microfinance program cannot be understood without studying the selection of program locations because distribution of poverty incidences differs across geographic locations even within a small region. Finally, if NGOs actually choose program locations purposefully as opposed to randomly, then research on the impact of the microfinance program that does not account for the selection bias of program locations will also be biased.

Our investigation of program location choice by NGOs relies on the role of output market imperfections in constraining NGOs' endeavor to microfinance program expansion. We develop a model that we use to guide our empirical work. In the model, an NGO is assumed to locate at point 0 on a unit interval [0, 1]. The NGO travels to the producers to lend who are uniformly distributed on that unit interval.[5] In doing so, the NGO incurs operating costs that increase with distance. Each producer borrows one unit of capital from the NGO to produce one unit of good. The NGO does not purchase goods from the producers. We introduce output market imperfections by assuming that the only marketplace on the unit interval is located at point 0 (both assumptions of the NGO and the marketplace locating at point 0 are justified in Section 2). Poor physical infrastructure and absence of marketing facilities in distant locations make search for buyers costly for the produces. They travel to point 0 to meet buyers but, in doing so, they incur transaction (transportation and time) costs which are increasing with distance. Therefore, producers located beyond a cut-off distance (a cut-off point on the unit line) are not able to sell their goods because of high transaction costs. We show that this cut-off distance is negatively related to unit transaction cost (cost of transportation and time for travelling one unit of distance) and producers' unit production cost.

The NGO has a humanitarian objective of poverty alleviation that is attained by lending to the poor but it also aims to be financially self-sufficient by minimizing operating costs and loan defaults. The humanitarian objective is achieved by lending as

[5] Financial transactions in the microfinance program usually take place at borrowers' locations.

far as possible on the unit line but this objective is constrained by increasing operating costs. We show that the borrowers' cut-off distance eventually compromises the humanitarian objective of poverty alleviation of the NGO because a producer located beyond the cut-off distance cannot sell her good and consequently cannot repay the NGO loan. The NGO takes into account this cut-off distance in selecting the producers for lending because program sustainability also depends on loan repayment from the producers. Therefore, there is another cut-off distance for the NGO which also depends on the same factors that determine the producers' cut-off distance such as unit transaction cost and unit production cost. We show that the humanitarian objective motivates the NGO to lend beyond the producers' cut-off distance by cross-subsidizing from the profits generated by lending to the producers inside the cut-off distance.

Using data for 156 villages in three districts in Northern Bangladesh, we test the model predictions that NGOs will not lend in distant locations (and with poor physical infrastructure) and prefer locations where production costs are low. Our unit of analysis is village. The dependent variable is NGO coverage for which the proxies are percentage of NGO member households and number of NGOs working in a village. Production costs are captured by adoption of modern irrigation method and soil quality of agricultural land in a village. The empirical results strongly support the model predictions. We find that NGO coverage decreases with the distance from the main marketplace in rural areas and poor physical infrastructure (such as distance from all-weather road). NGO coverage is higher in the villages having localized marketing opportunities. Given distance and marketing opportunities, NGO coverage increases with adoption of modern irrigation method (and better soil quality). We also find that NGOs do not consider poverty incidence in selecting program locations. These results strongly support our prediction that microfinance program is constrained by imperfections in the output market.

There is a growing body of empirical works investigating the "mission drift" (trade-off between serving the poor and cost-effectiveness) of the microfinance institutions at national or cross-country level (Copestake 2007; Gutiérrez-Nieto, Serrano-Cinca and Molinero, 2007; Mersland and Strøm, 2010). This paper can also be considered as an effort to study the reasons for the "mission drift" using village level survey data. The results have important policy implications. Our model and the empirical

results show that credit market imperfections cannot be mitigated independently without mitigating output market imperfections. In this sense, our paper has resemblance with Emran, Morshed and Stiglitz (2007) who have discussed labor market imperfections in understanding some important puzzles and debates in the microfinance program, such as unwillingness or inability of the producers (borrowers) to scale up their economic activity. NGOs do not invest in infrastructure development but their mission of poverty alleviation relies, to a great extent, on the existing infrastructure.[6] This justifies the need for government intervention.

The rest of the paper proceeds as follows. Section 2 discusses some background information about NGOs in Bangladesh and output market imperfections in rural areas that are important for understanding the model environment. Section 3 develops the model. Section 4 tests the model predictions and discusses the results. This section also provides an alternative interpretation of the model and empirical results. Finally, Section 5 discusses policy implications and concludes.

2. Background

In the following, we provide some background information about NGOs and output market imperfections in Bangladesh that will be useful for understanding the model and empirical results.

Before launching microfinance program in a particular rural region, an NGO first builds, purchases or rents a (large) house at or nearby the Thana[7] headquarters to set up a branch office (big NGOs such as ASA, BRAC or Grameen Bank usually build a house on purchased land, while small NGOs usually rent).[8] The NGO staffs then collect information about possible program locations (villages or communities) in the region

[6] One exception can be the mobile phone and internet services provided by Grameen Bank in Bangladesh. However, no NGO invests in developing physical infrastructure such as roads.

[7] Thana is the lowest administrative unit in Bangladesh and is also known as *upazila* (sub-district). A district consists of several Thanas, a Thana consists of several *Union Parishads* (councils), and a *Union Parishad* (lowest local government unit) consists of many villages.

[8] The NGO head office is located at the capital or large city and is not involved in transactions with the clients/borrowers. These transactions are conducted from the branch offices located at the Thana headquarters, and the head office monitors the performance of the branch offices.

where it can engage in lending activities, and based on the information (that NGOs do not disclose), they finally select the program locations. Our model and empirics are about the selection of program locations by NGOs. However, in the following, we also discuss the reasons for choosing the Thana headquarters to set up the NGO branch office and also the strategic interactions among NGOs in a given region.[9] This discussion will be important for understanding the assumptions of our model.

The Thana headquarters is the place of main commercial and financial activities in rural Bangladesh. Rural branches of all commercial banks are located at the Thana headquarters because of its commercial importance and also because of security concerns since the local police station (and all government administrative offices) is located in the Thana headquarters. By locating nearby the Thana headquarters, NGOs minimize the costs of regular financial transactions with commercial banks (in the morning NGOs withdraw money from accounts in commercial banks for loan disbursement and in the afternoon deposit in banks the money collected from borrowers) and also ensure security.[10]

A typical NGO initially chooses one or two particular Thanas in a district to start microfinance program and gradually expands to remaining Thanas before expanding to other districts. In each Thana, the NGO chooses several villages or communities for lending to the poor therein. This is the standard practice of all NGOs in Bangladesh. NGOs do not disclose information about how they choose a Thana or the villages in a Thana. A general observation is that two NGOs do not start operations in the same village simultaneously, rather they move sequentially. There is no cooperation among NGOs, explicit or implicit, on the selection of villages or communities. It is now common that several NGOs lend in the same village although they did not enter simultaneously. However, there is an unofficial agreement on information sharing that an NGO will not lend to someone who has already been a client of another NGO, but in practice no NGO follows this implicit rule.

[9] NGOs do not disclose information on location choice and strategic interactions. The discussion in this section is based on anecdotal evidence and the authors' discussions with NGO staffs.

[10] In the model presented in next section, the Thana headquarters is point 0 on the unit interval where both the NGO and the market are located.

The microfinance program emerged in Bangladesh (and also in other developing countries) as a response to credit market imperfections. However, output market is also highly imperfect, especially in rural areas, due to lack of physical infrastructure and marketing opportunities. Physical infrastructure (such as all-weather road) is usually well developed only in and around the Thana headquarters. But such infrastructure is of poor quality or even absent altogether at locations away from the Thana headquarters. Marketing opportunities are also very limited or absent in remote areas. The rural producers usually travel to the Thana headquarters to sell their goods. In many instances, transporting goods to the Thana headquarters is prohibitively costly for small individual producers. Sometimes *beparees* (large middlemen who are also located at the Thana headquarters or at the town) travel to villages to buy goods from producers and then sell at the Thana headquarters or at the nearest town. Small producers in remote areas receive lower price (adjusting for transportation costs) from *beparees* than that they would receive if they could transport to the Thana headquarters.[11] There are some *haats* (small village market or bazaar that takes place for few hours once or twice a week) where small producers bring their goods. The *beparees* sometimes visit *haats* and bulk purchase goods from small producers thus depriving the local buyers who then need to travel to the Thana headquarters for purchase. It is important to mention that NGOs in Bangladesh do not engage in marketing the goods produced by their clients.

3. The model

This section develops a simple model of how an NGO chooses a program location to lend to the potential producers.

3.1 Model environment

The model consists of a set of producers, buyers, and an NGO. The NGO is located at point 0 on a unit interval [0, 1]. It takes microfinance to the producers who are uniformly distributed on that unit interval. An individual producer *j* is located at distance

[11] Aminuzzaman, Baldersheim and Jamil (2003) document that mobile phone expansion in rural Bangladesh has lowered the price gap between rural and urban areas because the rural producers are now better informed about the market price, so that middlemen pay higher price than before.

d_j from point 0. The NGO incurs operating costs to reach the producers that increase with distance. Each producer borrows one unit of capital from the NGO to produce one unit of good. We assume that there exists a single marketplace on the unit interval and it is also located at point 0 (the Thana headquarters). The reason for this assumption is that marketing opportunities in remote areas are very limited or even non-existent because of underdeveloped physical infrastructure. The NGO does not purchase goods from the producers, nor do the producers consume their goods. An individual producer needs to travel to point 0 to sell her goods and incurs transaction (transportation and time) costs, which is increasing with distance. Therefore, transaction costs for searching buyers is very high for the producer as one moves way from point 0. This leads to output market imperfection.

3.2 Buyer

An individual buyer *i* has the willingness to pay v_i.[12] We assume that v_i is uniformly distributed over [0, 1] interval. Let *p* be the price paid by the buyers, where $p \leq 1$. The total demand for the good (Q^d) will be those buyers whose willingness to pay is higher than or equal to *p*:

$$Q^d = \Pr\{v : v_i \geq p\} = 1 - \int_0^p dF(v) = 1 - p \,. \qquad (1)$$

3.3 Producer

Each producer combines her labor with one unit of capital borrowed at zero interest rate from the NGO[13] to produce one unit of a homogenous good. The unit cost of production, $c \in (0,\ 1]$, is assumed to be the same for all producers. The producers travel to point 0 to search for the buyers. We assume that a producer located at distance *d* has the

[12] The willingness to pay can be expressed as $v_i = \theta - \tau d_i$, where θ is the utility from consuming one unit of the good which is the same for all consumers and τ is the unit transaction cost. v_i decreases with distance of the consumer from the market because of transaction costs. However, our simplification does not change the demand curve in equation (1).

[13] A typical NGO in Bangladesh charges the same interest rate to all borrowers, so interest rate can be normalized to zero.

unit transaction cost $\tau(d)$ (cost of transportation and time for travelling one unit of distance) that is an increasing function of *d*, i.e., $\tau'(d) > 0$. The reason is that as one moves away from point 0, quality of infrastructure gets worse, which increases unit transaction cost. A producer located at point *d* can sell her good at point 0 only if the sum of her unit production cost and total transaction cost is less than or equal to the market price,

$$c + \tau(d)d \leq p \,. \qquad (2)$$

For simplicity, we assume that $\tau(d) = \tau d$ where $\tau \in [0, 1]$, i.e., unit transaction cost increases proportionately with distance. Note that $\tau'(d) = \tau > 0$ can also be interpreted as the quality of physical infrastructure (such as existence and quality of paved or all-weather road), which deteriorates as one moves along the unit line. Therefore, higher τ implies poor physical infrastructure that induces higher transaction costs. Using equation (1), equation (2) can be rewritten as

$$c + \tau d^2 \leq 1 - d \,. \qquad (3)$$

Solution of equation (3) gives the following expression for *d* that determines a cut-off distance beyond which producers will not be able to travel to point 0 to sell their goods (or the remotest producer who can travel to point 0):

$$d_f^* = \left(\sqrt{1 + 4\tau(1-c)} - 1\right) / 2\tau \,. \qquad (4)$$

For feasibility, we need $0 \leq d_f^* \leq 1$, which requires $c \leq 1$. It can be shown from equation (4) that the producers' cut-off distance is decreasing with both unit transaction cost (quality of infrastructure), τ, and unit production cost, *c*. If $\tau \to 0$, $d_f^* \to 1$ for a value of $c = 0$. [14] The equilibrium price will be

$$p_f^* = 1 - \left(\sqrt{1 + 4\tau(1-c)} - 1\right) / 2\tau \,. \qquad (5)$$

3.4 Program location choice by NGO

[14] If we instead assume that $\tau(d) = \tau$, that is constant unit transaction cost at all points on the unit interval, the cut-off distance becomes $d_f^* = (1-c)/(1+\tau)$. The result that d_f^* is decreasing with both *c* and τ, does not change. The same limit also holds.

An NGO faces a trade-off in the maximization of its objective function. It aims to alleviate poverty and therefore would like to lend to all producers on the unit interval. On the other hand, covering distant areas constrains its program sustainability (cost-effectiveness) by increasing operating costs.[15] There are two types of operating costs for an NGO. The first is transportation costs to reach the borrowers that depend on distance and physical infrastructure such as all-weather road. The second is staff salary and office maintenance costs.[16] An NGO is also concerned about loan repayment for its program sustainability; hence it prefers to lend in locations where producers can generate income to repay the loan. The role of the producers' cut-off distance comes into play here. Producers locating beyond d_f^* will be unable to sell their goods and, as a consequence, they will be unable to repay the loan. Keeping this in mind, the NGO's objective function is written as follows:

$$\max_d L(d) = \phi(d) - \beta(d) - \varphi(d_f^*, d) \qquad (6)$$

where $\phi(d)$ is the coverage (number of producers) that increases with distance *d*, $\beta(d)$ is the operating costs that also increase with *d*, and $\varphi(d_f^*, d)$ is the distance relative to the producers' cut-off distance. For simplicity, we assume, i) $\phi(d) = d$, ii) operating costs are convex, i.e., $\beta(d) = \frac{1}{2}d^2$, and iii) $\varphi(d_f^*, d) = I_{d>d_f^*}\left[d_f^* - d\right]^2$, where $I_{d>d_f^*}$ is an indicator function that takes a value of 1 if $d > d_f^*$, and 0 otherwise. The last expression captures the loss from loan default. An NGO can attain its humanitarian objective by lending beyond d_f^*, but the producers located beyond d_f^* will not be able repay loan as they cannot sell their goods. With the above assumptions, the NGO's objective function is rewritten as:

$$\max_d L(d) = d - \frac{1}{2}d^2 - I_{d>d_f^*}\left[d_f^* - d\right]^2. \qquad (7)$$

[15] Gonzalez (2007) defines operating costs in terms of personnel and administrative costs. He documents that operating costs of microfinance institutions increase with poor physical infrastructure such as absence of paved or all-weather roads.

[16] Higher number of staff will be required (or more time will be spent by each staff) to work in remote areas. If information asymmetry is introduced in the model, this corresponds to higher cost of information collection about the producers in remote areas.

The first-order condition yields the following cut-off distance of the NGO:

$$d_N^* = (1 + 2d_f^*)/3. \qquad (8)$$

Equation (8) yields the following proposition:

Proposition 1: *An NGO will expand its microfinance program up to a critical (cut-off) distance (d_N^*), which is positively related to the producers' cut-off distance (d_f^*).*

Proof: The proof follows from directly equation (8).

Equation (8) sets out the important role of the producers' cut-off distance in forcing the NGO to behave strategically in choosing its coverage distance. It implies that the NGO's cut-off distance decreases if both unit transaction cost and unit production cost increase.

Poor infrastructure and associated transaction costs cause imperfections in the output market. When imperfections disappear, i.e., $d_f^* \to 1$, $d_N^* \to 1$implying that all producers are now served by the NGO.[17]

It can also be shown that $d_N^* > d_f^*$except at the point where $d = 1$, which suggests that the NGO will lend beyond the producers' cut-off distance. Although for any $d > d_f^*$, the NGO incurs loss because of loan default, it will cross-subsidize from the profit generated at $d_N^* \le d_f^*$. This is because of its humanitarian objectives.[18] Aubert et al. (2009) discuss the case of higher expected repayment rate with less-poor borrowers to cross-subsidize loans to poor borrowers. McIntosh and Wydick (2005) model the

[17] If the NGO has only the humanitarian motive, the objective function becomes $\max_d W = d - \frac{1}{2}d^2$, and the cut-off distance is $d_s^* = 1$. The NGO will cover the entire distance.

[18] Cross-subsidization can also be due to information asymmetry in the credit market, which is absent in our model. Costs of obtaining information about the producers increase with distance, therefore some bad producers (borrowers) will also borrow from the NGO and default. It is important to mention that although loan repayment is very high for most NGOs, it is always less than 100%. Microfinance program can still be profitable for an NGO even after certain percentage of loan delinquency, which can be shown by substituting the value of d_N^* in the objective function of the NGO in equation (7) that gives $1/6 + (1/3)d_f^*(2 - d_f^*) > 0$.

behavior of non-profit lenders, and show that their non-standard, client-maximizing objectives cause them to cross-subsidize within their pool of borrowers. We have a similar result if we interpret the producers' distribution in terms of poverty incidence instead of distance (discussed in Section 4.6).

3.5 Multiple NGOs

In this section, we allow the presence of more than one NGO. We assume that NGOs enter the space sequentially (based on discussion in Section 2) and do not have capacity constraint. We also assume that a producer cannot borrow from more than one NGO (given that producers are poor NGO borrowers, they cannot utilize larger amounts of capital),[19] thus ruling out membership overlapping. Therefore, only one NGO can serve at each point on the unit interval. Finally, NGOs do not engage in a strategic game. An NGO, when it decides to launch a microfinance program, chooses from the remaining distance uncovered by previous NGOs to maximize its objective function subject to its own operating costs and the producers' cut-off distance. For example, the second entrant takes the distance d_N^* covered by the first NGO as given and maximizes its objective function by choosing its optimal distance from the $(1-d_N^*)$ space. The incumbent, the first NGO, was not concerned about potential entrants when it chose its optimal distance d_N^* in the first instance. The objective function of the second NGO is therefore given by:

$$\max_{d_2} L^2(d) = [1-d_1^*]d_2 - \frac{1}{2}d_2^2 - I_{d_2>d_f^*}\left[d_f^* - d_2\right]^2, \qquad (9)$$

where $d_1^* = d_N^*$ in equation (8). The first-order condition combined with equation (8) yields the cut-off distance of the second NGO:

$$d_2^* = (2/3)d_N^*. \qquad (10)$$

Equation (10) shows that the second NGO always covers a shorter distance than its predecessor. The third potential entrant chooses its optimal distance by maximizing $[1-d_1^*-d_2^*]d_3 - \frac{1}{2}d_3^2 - I_{d_3>d_f^*}\left[d_f^* - d_3\right]^2$, which is given by $d_3^* = (2/3)^2 d_N^*$. Solving recursively, the cut-off distance of the *n*-th NGO is derived as $d_n^* = (2/3)^{n-1} d_N^*$. The total

[19] Emran, Morshed and Stiglitz (2007) also discuss that borrowers (producers) are not willing to borrow larger amounts because of labor market imperfections.

distance covered by all *n* NGOs is the sum of the distances covered by each NGO: $d^* = 3d_N^*\left[1-(2/3)^n\right]$. Note that d^* is proportional to the cut-off distance in the case of a single NGO (d_N^*) implying that d^* is also negatively related to *c* and τ.

Using the value of $d_N^* = (1+2d_f^*)/3$ and that $d^* \leq 1$, the optimal number of NGOs is derived as:

$$n \geq \ln[2d_f^*/(1+2d_f^*)]/\ln(2/3) = n^*. \qquad (11)$$

Proposition 2: $\forall\ d_f^* \in [0,1]$, n^* is decreasing with d_f^*.

Proof: The proof follows from equation (11).

Proposition 2 is intuitive. The distance covered by an NGO increases with d_f^* because more producers can sell their goods at point 0 and thus repay loans. The incumbent NGO will therefore cover a longer distance leaving less space for potential new entrants. It is clear from equation (11) that *n* = 1 when $d_f^* = 1$. It implies that as imperfections in the output market disappear ($d_f^* \to 1$), the role of NGOs in mitigating credit market imperfections becomes less important.

Figure 1 displays the relationship between d_f^* (for a range of values between 0.01 and 1) and the optimal number of NGOs. The number of NGOs decreases monotonically with d_f^*. For the smallest and largest values of d_f^* in our parameterization, the maximum and minimum number of NGOs is nine and one, respectively.

Insert Figure 1 here

4. Taking the model to data

Our testable predictions are summarized in Proposition 1, which implies that NGO coverage decreases if both unit transaction cost (inversely related to distance and

infrastructure quality) and producers' (borrowers')[20] unit production cost increase. Our unit of analysis is village, so we investigate the determinants of NGO coverage in a village.

Our first prediction is that NGO coverage in a village is negatively associated with distance from NGO (and also infrastructure quality in and around the village). Given that NGOs are invariably located at or nearby the Thana headquarters, where commercial banks are also located (discussed in Section 2), our proxies for distance of a village from NGO are distances from the Thana headquarters and from the nearest commercial bank, respectively. Our second prediction is that NGO coverage is positively (negatively) associated with lower (higher) unit production cost. Unit production cost will be low in a village with better opportunities for productive activities, such as modern irrigation facilities or better soil quality of agricultural land. We investigate whether percentage of agricultural land irrigated using electricity and percentage of agricultural land growing multiple crops a year increase NGO coverage in a village. It is important to mention that good infrastructure also lowers production cost because of better access to production inputs.

We measure NGO coverage by percentage of households in a village who are NGO members. There is a significant positive association between percentage of NGO member households and number of NGOs working in a village.[21] We thus consider number of NGOs as an alternative measure of NGO coverage. Then the testable predictions are that the number of NGOs working in a village decreases with distance from the Thana headquarters and increases with better opportunities for productive activities. Note that this does not contradict the model results in the case of multiple NGOs. The model predicts that as d_f^* increases, there will be fewer NGOs in the [0, 1] space. The model is not about the number of NGOs at a particular point on the space, which is assumed to be only one.

[20] In our model producers borrow from NGO to produce goods. Therefore, in the empirical section we also refer to producers as borrowers to be consistent with the data.

[21] In our data, the regression of the percentage of NGO member households on the number of NGOs produces a coefficient of 0.04 with a robust standard error of 0.009.

4.1 Data

Village level information was collected in 2002 from 156 villages in 15 Thanas in three districts (Kurigram, Rangpur and Nilphamari) in northern Bangladesh as part of a baseline household survey. Both Participatory Rural Appraisal (PRA) and Focus Group Discussion (FGD) were conducted in the villages randomly selected. The information collected includes, among others, physical infrastructure, economic opportunities, marketing facilities, educational and health infrastructure, microfinance and other development activities, and poverty incidence. A structured questionnaire was used because of the type of information sought and also because of reliability and possibility of replication. The PRA sessions were attended by people of all walks of life, while the people most knowledgeable about the village attended the FGDs. The group of attendants in the FGDs generally included school teachers, elected *Union Parishad* members, health workers, students, and clients of different NGOs.[22]

4.2 Descriptive statistics

Descriptive statistics of the villages are presented in Table 1. On average 3.9 NGOs operate in a village with the minimum and maximum number being one and nine, respectively . Although there are a total of 48 NGOs and 10 government organizations working in all sample villages (a list is provided in Appendix A.1), microfinance activities are largely dominated by few big (brand) NGOs. This is evident from the fact that the average number of big NGOs in a village is 3.4 with the minimum and maximum number being one and seven, respectively. All seven big NGOs are engaged in microfinance activities. The presence of several big NGOs in a village supports the findings of Fruttero and Gauri (2005) that an NGO does not consider presence of other NGOs in choosing program location. On the other hand, average number of small (non-brand) NGOs working in a village is only 0.4. There are on average 549 households in a

[22] At the beginning of the session, the objective of the FGD and the type of information to be sought were clearly specified. It was also made clear at the outset that the FGD will continue for about two hours. However, in several occasions, all issues were not possible to cover in two hours so that discussions had to discontinue. Groups were not kept beyond schedule because it was perceived that impatience of the participants may lead to inaccurate answers. Therefore, all information could not be collected from many villages.

village, and 33% of them borrow from any NGO. Only about 11% of the households in a village have access to electricity, and 27% of the agricultural land in a village is irrigated using electricity. About 81% of agricultural land grows two to three crops a year, while 13% of land grows a single crop a year.

Insert Table 1 here

Average distance of the center of a village from the Thana headquarters is about 7.5 kilometers. Average distance from the nearest commercial bank is about 6.5 kilometers. Therefore, it can also be inferred that average radius of operational area of an NGO ranges between 6.5 to 7.5 kilometers.[23] The correlation between the two distances is high at around 0.76.

4.3 Distance as a measure of poverty incidence

We also want to test the poverty alleviation motive of NGOs. However, NGO intervention changes the poverty dynamics in a village, thus inclusion of direct measure of poverty incidence or proxies, such as wage rate or landlessness, in the regression will lead to simultaneity bias. We need a measure for poverty incidence that is immune to this bias. In the following, we show that distance can be treated as such a measure because poverty incidence increases with distance; in other words, poverty incidence is higher in the remote villages. We show that two proxies for poverty incidence—daily wage rate and percentage of landless households in a village—are strongly related to distance. Both lower wage rate and higher landlessness are indications of higher poverty incidence.

Wage rate fluctuates depending on the availability of employment opportunities in different seasons. To account for seasonal fluctuations, we take average of daily wage rate for each month over twelve months. Data indicate that there is a strong negative and statistically significant correlation between average daily female wage rate and distance

[23] This cut-off radius can also be generalized for the rest of Bangladesh. In 2010, BRAC has launched a new lending program for the share-croppers (*Borga Chashi* program) funded by the Bangladesh Bank (the central bank in Bangladesh). The program initially covers 40 districts across the country. The implicit cut-off radius set by BRAC is eight kilometers from the BRAC branch offices (which are located nearby the Thana headquarters). However, BRAC does not officially make available the information about this cut-off radius.

from the Thana headquarters. Figure 2a superimposes a lowess fit line representing the best nonparametric fit of the relationship between female wage and distance from the Thana headquarters. The fitted line indicates that female wage decreases sharply with distance up to four kilometers after which it remains stable up to nearly 10 kilometers and then decreases again. The estimated linear regression coefficient is -0.306 with a robust standard error of 0.153, which is shown in Figure 2b by the downward sloping fitted line. Figures 3a and 3b show the lowess and linear regression fits, respectively, for average daily male wage rate, which is very similar to female wage rate.

Insert Figures 2a-4b here

In Figure 4a, we display the lowess fit for the correlation between percentage of households in a village who are landless (or own only homestead) and distance from the Thana headquarters.[24] Percentage of landless households increases sharply with distance up to five kilometers, remains stable and then increases steadily after 10 kilometers. Figure 4b plots the linear regression fit which is upward sloping—the regression coefficient of distance from the Thana headquarter on percentage of landless households is 0.183 with a robust standard error of 0.095. These results indicate that the distribution of borrowers in terms of distance can also be interpreted as their distribution in terms of poverty incidence, and therefore, distance can be treated as an exogenous measure of poverty incidence.

4.4 Estimation strategy

We estimate OLS regressions when NGO coverage is measured by percentage of households in a village with current NGO membership. We estimate Poisson regressions when number of NGOs working in a village is considered as NGO coverage. For robustness checks, we also estimate Poisson regressions for number of big and small

[24] There are some villages where landlessness suddenly and sharply increased because of river bank erosion. River erosion causes land permanently disappearing under the river and the victim families lose their home and agricultural land forever. This is a regular phenomenon in Bangladesh. We have excluded those villages to draw the fits.

NGOs working in a village, respectively. Finally, NGO density, calculated as number of NGOs per household, is also employed as the dependent variable.

If NGOs are motivated by cost-effectiveness and higher loan repayment rather than poverty alleviation, it is expected that NGO coverage will decrease with distance of the village from NGO for which our proxies are the distances from the Thana headquarters and the nearest commercial bank. It is also expected that an NGO will not cover a village because of high operating costs if physical infrastructure in and around the village is not developed. Distances of the village from all-weather road and bus stop are included to account for the quality of physical infrastructure. Conversely, if NGOs are motivated by poverty alleviation, NGO coverage will increase with (or unrelated to) distance from the Thana headquarters (and commercial bank) and in the villages with poor infrastructure. Therefore, the sign and significance of the distance variables will determine the actual motivation of NGOs. A negative and statistically significant coefficient will support the cost-effectiveness motive, while a positive and significant coefficient (or insignificant coefficient) will support the poverty alleviation motive.

As mentioned earlier, unit cost of production is captured by opportunities for productive activities, such as percentage of agricultural land irrigated using electricity,[25] and percentage of agricultural land that grows one, two and three crops a year (four crops is the base category). The higher the productive opportunity in a village, the higher is the likelihood of success in investment projects. More NGOs will place programs therein and also cover more borrowers to take advantage of higher loan repayment. Number of shops per household in the village[26] and distance from the local *haat* (bazaar) are included to

[25] In northern Bangladesh, irrigation is usually done by extracting underground water by deep tube-well that runs using electricity. Installation of such deep tube-well is very costly that only large landowners can afford. Small and marginal farmers purchase water from large landowners. Purchase of water by small and marginal farmers is not usually made from NGO loans. NGOs do not provide fund for seasonal or working capital so that borrowers resort to alternative informal sources including the moneylenders for such additional fund (Jain and Mansuri, 2003; Mallick, 2009). In Bangladesh, electricity connection is provided by the government. NGOs are not involved in any stage. Therefore, percentage land irrigated using electricity is an exogenous variable.

[26] NGOs in Bangladesh do not usually lend for starting up a shop but lend the shop owners for expanding their existing business. Therefore, number of shops in a village is exogenous.

control for localized marketing opportunities in the village. Percentage of households with electricity connection also captures infrastructure.

We check the robustness of the results by including a vibrancy score constructed by the principal component analysis from distances of the village from Thana, bank, all-weather road, *haat*, and bus stop. We also control for the general education level in the village by distance from the nearest high school. It is important to mention that the village level infrastructure accounts for the village level unobservables. These are slowly changing village characteristics, and therefore, can also be considered as the village level fixed effects.[27] District dummies (two dummies for the three sample Districts) are also included to capture the regional heterogeneity. Number of households is included in the regression to account for village size when the dependent variable is number of NGOs working a village.

In a nutshell, the dependent variable is related to credit market and the independent variables are related to output market. This specification helps us investigate the effect of output market imperfections on credit market imperfections.

4.5 Results

In this section, we discuss the regression results. Table 2 reports the results when the dependent variable is percentage of NGO member households in a village. In column 1, distance of the village from the Thana headquarters is the proxy for distance from NGO, and in column 2, distance from the nearest commercial bank is the proxy. Although none of them is significant, in both columns, distances from all-weather road and from local *haat* are negative and significant. The former result suggests lower NGO coverage in the village with poor infrastructure, while the latter suggests higher NGO coverage in the village having localized marketing opportunities. In column 3, all distance variables are replaced by a vibrancy score constructed by the principal component analysis. High score implies poor physical infrastructure. The coefficient is negative but not significant. The only other variable that is robustly significant (and is positive) across specifications is percentage of agricultural land irrigated using electricity.

[27] Distance of the village from mobile phone mast (tower) may be another fixed effect. However, we use the data for 2002 and mobile phone masts were limited only in the Thana headquarters in 2002.

Insert Tables 2-6 here

The results are similar (and also improve) for the alternative dependent variable—number of NGOs working in the village (Table 3). The main changes in the results are that instead of distances from all-weather road and *haat*, distances from the Thana headquarters and the nearest commercial bank are negative and significant (at 1% level) in columns 1 and 2, respectively, and their magnitudes are the same at around 0.04. The coefficient of vibrancy is now negative and significant at 1% level. Number of NGOs also increases with number of shops per household in the village again suggesting higher NGO coverage in the village with localized marketing opportunities.

When the number of big NGOs is employed as the dependent variable, the results, presented in Table 4, are similar to that when the dependent variable is total number of NGOs. The results do not also change qualitatively when the number of small NGOs is the dependent variable (Table 5). Percentage of agricultural land irrigated using electricity now becomes insignificant. Instead, percentage of agricultural land growing single crop a year, which is another proxy for productive opportunities, is negative and robustly significant at 1% level, suggesting that NGO coverage decreases in the villages with less fertile agricultural land. Percentage of agricultural land that grows three crops a year is also negative and weakly significant but its magnitude is five times smaller than that of percentage of land that grows single crop a year (note that the base category is percentage of agricultural land that grows four crops a year). Number of shops per household is insignificant.

For another robustness check, we consider NGO density in the village, measured by per capita number of NGOs ((number of NGOs/number of households)*100), as the dependent variable. The results, presented in Table 6, are similar to those previously reported. The change in the results is that percentage of land irrigated using electricity is not significant. In addition to distances from the Thana headquarters and commercial bank, distance from all-weather road now becomes (negative and) significant.

The above results confirm the model predictions that NGO coverage decreases with distance and poor physical infrastructure, and increases with the opportunity for

productive activities.[28] Placing program in the remote and inaccessible villages increases the operating costs of an NGO, thus jeopardizing its cost-effectiveness. Rather, to ensure loan recovery, an NGO places program in the village where loans can be better utilized in productive activities. Incidence of poverty is not a consideration for an NGO to choose program locations.[29]

4.6 An alternative interpretation of the results

It has now been established that NGOs, at least in Bangladesh, have deliberately excluded the extreme poor because they are considered as risky clients, and operating costs of serving the extreme poor are also high because they usually borrow a smaller amount. Some extreme poor also self-select themselves not to borrow because they perceive that they will not be able generate a flow of income necessary to repay the loan (Amin, Rai and Topa, 2003; Hashemi, 2001; Matin, 2005). In Section 4.3 and Figures 2-4, we have provided evidence that distance from the Thana headquarters is associated with higher incidence of poverty. Therefore, the borrowers' (producers') distribution in terms of distance can alternatively be interpreted in terms of poverty incidence; borrowers become poorer as one moves along the unit line. An NGO incurs higher operating costs for serving poorer borrowers away from point 0 on the unit line as they borrow a smaller amount (hence, they produce smaller quantity). Only the borrowers up to the cut-off level of poverty d_f^* will be able to produce sufficient goods to sell in the market after incurring transaction costs. Therefore, only these borrowers will borrow from the NGO because they can repay the loan. However, motivated by its humanitarian objective (or due to imperfect information), the NGO also wants to lend to the poorer in the $[d_f^*,\ d_N^*]$ interval. But these producers will be unwilling to borrow since they cannot

[28] There are similar findings at the macroeconomic level. Ahlin et al. (2010) find some strong relationship between macroeconomic conditions and microfinance program performance. For example, NGOs become more cost-effective when macroeconomic growth is higher.

[29] The results do not meaningfully change if standard errors are clustered at the Thana level. The minor changes are the following. In Table 2 (dependent variable is percentage of NGO member households), the coefficient of percentage of agricultural land irrigated using electricity is not robustly significant across specifications. On the other hand, in Table 6 (dependent variable is NGO density), the negative coefficient of percentage of land growing one-crop a year becomes robustly significant across specifications.

sell their goods and consequently default on the loan. The borrowers locating in the $[1-d_N^*,\ 1]$ poverty interval will always be excluded by the NGO. This is an alternative explanation of why NGOs deliberately exclude some extreme poor and why some extreme poor also self-select themselves out of the microfinance program.

5. Concluding remarks

This paper develops a simple model of program location choice by an NGO. An NGO, even with its humanitarian objective of poverty alleviation, will limit the microfinance program to locations where operating costs are low and productive opportunities are ample, so that it can attain cost-effectiveness. Empirical results using data from three northern districts in Bangladesh strongly support the model predictions. NGO coverage, measured both by percentage of NGO member households and number of NGOs operating in a village, decreases with distance from the main marketplace in the region and poor physical infrastructure. On the other hand, NGO coverage is higher in the villages where higher percentage of agricultural land is irrigated using electricity. The model and empirical results also explain why NGOs deliberately exclude some extreme poor and why some extreme poor self-select not to participate in the microfinance program.

The results have important implications for policy analysis as well as for research on impact evaluation of the microfinance program. The microfinance program was devised to mitigate credit market imperfections. However, rural output market is also highly imperfect due to poor physical infrastructure and lack of marketing facilities, which impedes proper functioning of the microfinance program. This illustrates the fact that imperfections in credit market cannot be mitigated in the presence of imperfections in output market.

NGOs do not invest in infrastructure development but their mission of poverty alleviation depends, to a great extent, on the existing infrastructure. This justifies government intervention in infrastructure development. Since NGOs choose locations purposefully rather than randomly, research investigating the impact of the microfinance program must take into account village level selection bias in addition to selection bias at the participant level.

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Tables

Table 1: Descriptive statistics

	(1)	(2)	(3)
Variables	**Notation**	**Mean**	**Standard deviation**
Number of NGOs working in a village		3.890 [min = 1, max = 9]	1.412
Number of big NGOs working in a village		3.445 [min = 1, max = 7]	1.244
Number of small NGOs working in a village		0.445 [min = 0, max = 3]	0.685
% of NGO member households in the village		0.332	
Number of households in a village	HHNV	549.32	418.73
% of land irrigated using electricity	IRRIG	0.268	
% of land growing 1 crop a year	CROP_1	0.126	
% of land growing 2 crops a year	CROP_2	0.492	
% of land growing 3 crops a year	CROP_3	0.317	
% of land growing 4 crops a year	CROP_4	0.036	
% of households owning less than 10 decimal of land	LNDLES	0.063	
Number of shops per household	SHOP	0.053	0.087
% of households with electricity	ELECT	0.111	
Distance from Thana (in km)	DTHAN	7.541	4.057
Distance from nearest bank (in km)	DBANK	6.503	4.134
Distance from nearest *haat* (bazaar) (in km)	DBAZR	1.993	1.689
Distance from nearest bus stop (in km)	DBUST	5.550	4.543
Distance from nearest all-weather road (in km)	DROAD	1.803	1.691
Distance from nearest high school (in km)	DHSCH	2.187	1.619
Average male wage rate (in Taka)	MWAGE	43.916	8.362
Average female wage rate (in Taka)	FWAGE	29.695	7.022

Table 2: OLS regression—Dependent variable: Percentage of NGO member households in a village

Explanatory variables	(1)	(2)	(3)
IRRIG	0.148** (2.34)	0.151** (2.43)	0.114* (1.81)
CROP_1	0.138 (0.77)	0.153 (0.83)	0.037 (0.20)
CROP_2	-0.126 (-1.07)	-0.112 (-0.91)	-0.156 (-1.37)
CROP_3	-0.195 (-1.57)	-0.168 (-1.31)	-0.223* (-1.81)
SHOP	-0.119 (-0.91)	-0.121 (-0.92)	-0.022 (-0.17)
ELECT	-0.116 (-0.60)	-0.133 (-0.69)	0.035 (0.19)
DTHAN	-0.005 (-0.97)		
DBANK		-0.002 (-0.35)	
DBAZR	-0.023* (-1.68)	-0.026* (-1.89)	
DBUST	0.009 (1.42)	0.008 (1.12)	
DROAD	-0.036*** (-3.37)	-0.035*** (-3.26)	
VIBR [ψ]			-0.026 (-1.44)
DHSCH	0.027 (1.61)	0.028* (1.68)	0.002 (0.15)
R-square	0.254	0.247	0.143
Sample size	111	111	110

Figures in parentheses are White (1980) corrected robust *t*-statistics. All regressions include a constant and two district dummies but not reported. ***, **, and * are significant at 1%, 5%, and 10% level, respectively.

[ψ] Vibrancy score is constructed using principal component analysis from distances from nearest all-weather road, bus stand, bank, bazaar, and Thana headquarters. Higher score implies poor infrastructure.

Table 3: Poisson regression—Dependent variable: Number of NGOs in a village

Explanatory variables	**(1)**	**(2)**	**(3)**
IRRIG	0.143* (1.95)	0.217*** (3.01)	0.193*** (2.66)
CROP_1	-0.291 (-0.98)	-0.211 (-0.71)	-0.221 (-0.72)
CROP_2	-0.091 (-0.33)	-0.132 (-0.47)	-0.115 (-0.40)
CROP_3	0.039 (-0.13)	-0.077 (-0.25)	-0.026 (-0.08)
SHOP	0.966*** (4.05)	0.676** (2.24)	0.700*** (2.72)
ELECT	0.006 (0.05)	-0.016 (-0.11)	-0.061 (-0.45)
DTHAN	-0.038*** (-5.16)		
DBANK		-0.035*** (-4.42)	
DBAZR	0.018 (0.96)	0.010 (0.52)	
DBUST	0.005 (0.92)	0.006 (1.13)	
DROAD	-0.024 (-1.34)	-0.017 (-0.95)	
VIBR [Ψ]			-0.094*** (-4.44)
DHSCH	-0.021 (-0.89)	-0.010 (-0.41)	-0.004 (-0.20)
HHNV	-0.000 (-0.43)	0.000 (0.14)	-0.000 (-0.19)
Log pseudo-likelihood	-237.144	-235.966	-236.291
Sample size	134	133	133

Figures in parentheses are White (1980) corrected robust *t*-statistics. All regressions include a constant and two district dummies but not reported. ***, **, and * are significant at 1%, 5%, and 10% level, respectively.

[Ψ] Vibrancy score is constructed using principal component analysis from distances from nearest all-weather road, bus stand, bank, bazaar, and Thana headquarters. Higher score implies poor infrastructure.

Table 4: Poisson regression—Dependent variable: Number of big NGOs in a village

Explanatory variables	**(1)**	**(2)**	**(3)**
IRRIG	0.220*** (2.74)	0.281*** (3.53)	0.262*** (3.30)
CROP_1	0.201 (0.95)	0.273 (1.26)	0.272 (1.23)
CROP_2	0.008 (0.05)	-0.032 (-0.18)	0.015 (0.08)
CROP_3	0.119 (0.61)	0.088 (0.42)	0.131 (0.62)
SHOP	0.997*** (5.16)	0.785*** (4.01)	0.753*** (4.42)
ELECT	-0.049 (-0.36)	-0.070 (-0.51)	-0.112 (-0.80)
DTHAN	-0.027*** (-3.86)		
DBANK		-0.022*** (-2.82)	
DBAZR	0.030* (1.59)	0.025 (1.39)	
DBUST	-0.001 (-0.15)	-0.001 (-0.16)	
DROAD	-0.016 (-0.96)	-0.013 (-0.79)	
VIBR [ψ]			-0.069*** (-3.53)
DHSCH	-0.031 (-1.29)	-0.023 (-0.97)	-0.007 (-0.35)
HHNV	0.000 (0.30)	0.000 (0.73)	0.000 (0.58)
Log pseudo-likelihood	-225.839	-224.673	-224.866
Sample size	134	133	133

Figures in parentheses are White (1980) corrected robust *t*-statistics. All regressions include a constant and two district dummies but not reported. ***, **, and * are significant at 1%, 5%, and 10% level, respectively.

[ψ] Vibrancy score is constructed using principal component analysis from distances from nearest all-weather road, bus stand, bank, bazaar, and Thana headquarters. Higher score implies poor infrastructure.

Table 5: Poisson regression--Dependent variable: Number of small NGOs in a village

Explanatory variables	**(1)**	**(2)**	**(3)**
IRRIG	-0.093 (-0.26)	0.033 (0.09)	-0.174 (-0.49)
CROP_1	-5.451*** (-3.66)	-5.217*** (-3.49)	-5.578*** (-3.60)
CROP_2	-0.878 (-1.28)	-0.918 (-1.30)	-0.982 (-1.33)
CROP_3	-1.202* (-1.65)	-1.266* (-1.65)	-1.107 (-1.47)
SHOP	0.236 (0.14)	-0.193 (-0.10)	0.553 (0.35)
ELECT	0.261 (0.33)	0.299 (0.35)	0.239 (0.31)
DTHAN	-0.113*** (-2.86)		
DBANK		-0.129*** (-3.24)	
DBAZR	-0.118 (-1.14)	-0.149 (-1.42)	
DBUST	0.039 (1.25)	0.040 (1.34)	
DROAD	-0.074 (-0.78)	-0.031 (-0.32)	
VIBR [Ψ]			-0.315*** (-3.11)
DHSCH	0.084 (0.88)	0.120 (1.32)	0.050 (0.58)
HHNV	-0.001 (-1.41)	-0.000 (-1.09)	-0.001 (-1.57)
Log pseudo-likelihood	-99.239	-97.984	-100.274
Sample size	134	133	133

Figures in parentheses are White (1980) corrected robust *t*-statistics. All regressions include a constant and two district dummies but not reported. ***, **, and * are significant at 1%, 5%, and 10% level, respectively.

[Ψ] Vibrancy score is constructed using principal component analysis from distances from nearest all-weather road, bus stand, bank, bazaar, and Thana headquarters. Higher score implies poor infrastructure.

Table 6: OLS regression—Dependent variable: Per capita number of NGOs in a village

Explanatory variables	(1)	(2)	(3)
IRRIG	0.256 (0.96)	0.350 (1.30)	0.319 (1.25)
CROP_1	-0.695 (-1.48)	-0.547 (-1.28)	-0.551 (-1.23)
CROP_2	-0.112 (-0.30)	-0.135 (-0.37)	-0.136 (-0.41)
CROP_3	0.123 (0.27)	0.120 (0.25)	0.258 (0.56)
SHOP	1.391 (1.47)	0.966 (1.14)	0.930 (1.05)
ELECT	0.210 (0.38)	0.161 (0.29)	0.126 (0.26)
DTHAN	-0.063** (-2.35)		
DBANK		-0.056** (-2.50)	
DBAZR	0.050 (1.09)	0.034 (0.75)	
DBUST	0.036 (1.63)	0.034 (1.56)	
DROAD	-0.094** (-2.16)	-0.080* (-1.80)	
VIBR [Ψ]			-0.122* (-1.74)
DHSCH	0.063 (1.08)	0.076 (1.28)	0.069 (1.33)
R-square	0.191	0.179	0.148
Sample size	134	133	133

Figures in parentheses are White (1980) corrected robust *t*-statistics. All regressions include a constant and two district dummies but not reported. ***, **, and * are significant at 1%, 5%, and 10% level, respectively.

[Ψ] Vibrancy score is constructed using principal component analysis from distances from nearest all-weather road, bus stand, bank, bazaar, and Thana headquarters. Higher score implies poor infrastructure.

Figures

Figure 1: Optimal number of NGOs and the producers' cut-off distance

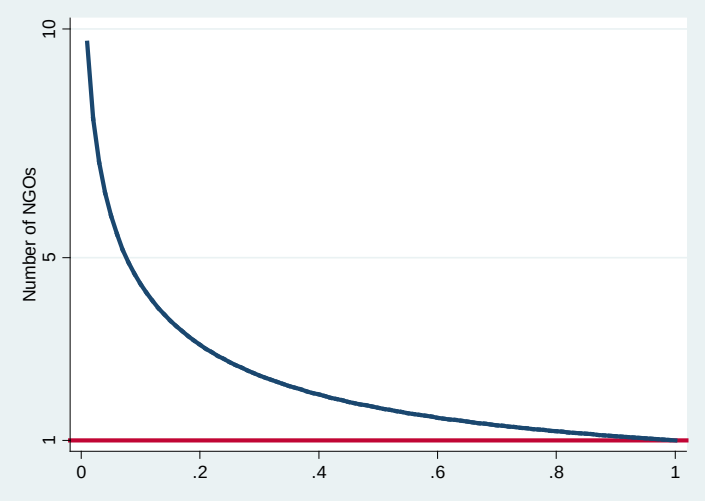


Figure 2: Correlation between average daily female wage rate and distance from the Thana headquarters

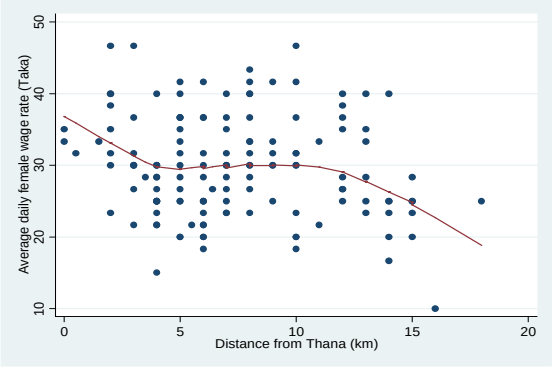
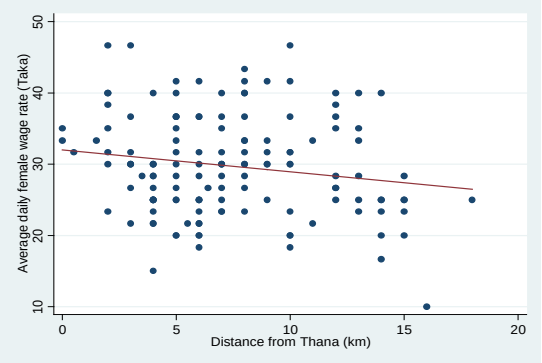
Figure 2a	Figure 2b
	
Note: Nonparametric regressions, lowess smoother (bandwidth is 0.8).	Note: Linear regression, coefficient is -0.306 with a robust standard error of 0.153.

Figure 3: Correlation between average daily male wage rate and distance from the Thana headquarters

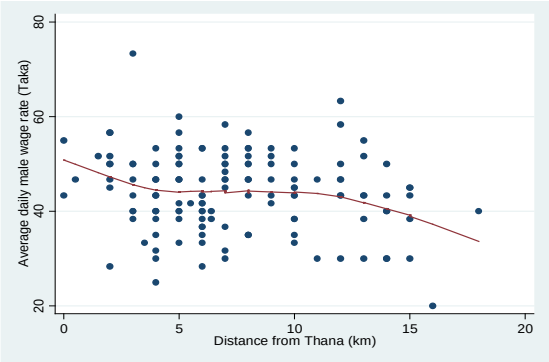
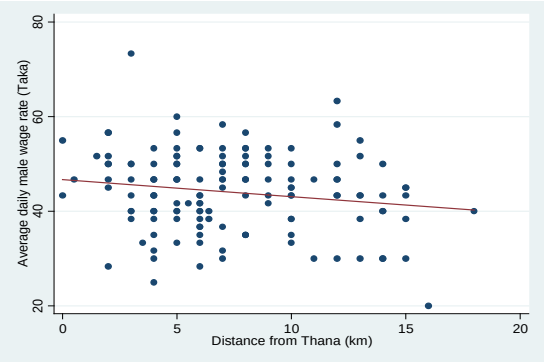
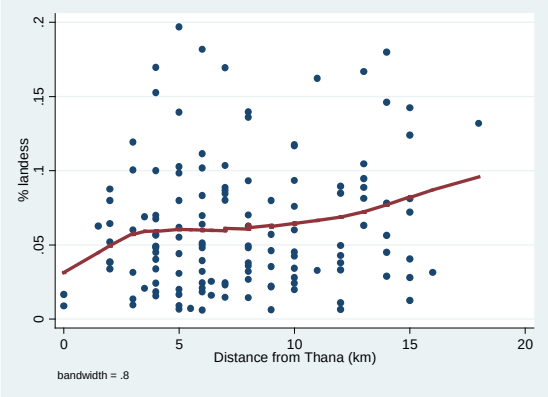
Figure 3a	Figure 3b
	
Note: Nonparametric regressions, lowess smoother (bandwidth is 0.8).	Note: Linear regression, coefficient is -0.358 with a robust standard error of 0.190.

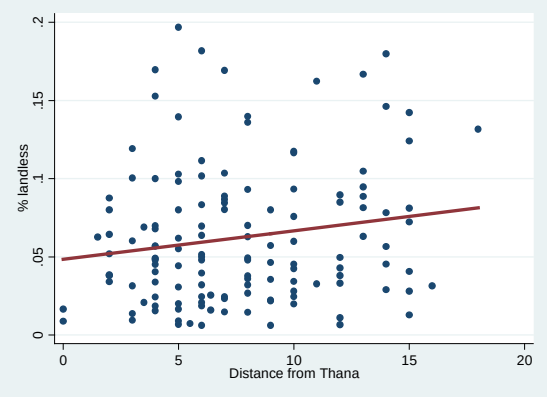
Figure 4: Correlation between percentage landless households and distance from the Thana headquarters

Figure 4a



Note: Nonparametric regressions, lowess smoother (bandwidth is 0.8).

Figure 4b



Note: Linear regression, coefficient is 0.183 with a robust standard error of 0.095.

Appendix

A.1: List of NGOs

The NGOs are CARE, Grameen Bank, Proshika, ASA, BRAC, Nijera Kori, RDRS, Alor Pothe, PIP, Chhinnomul, Gram Unnayan Kendra, Palli Unnayan Kendra, Swanirvar Bangladesh, Grameen Krishi Foundation, Krishi Foundation, Academy, Apon Udjog, Heed Bangladesh, Thengamara, RDI, Shishu Kalyan, Samaj Unnoyon Sangho, Samokal, Karitas, CCDB, ECDP, BAHED, IDS, Plan, CDC, Udoyan, RESA, Padatik, RDS, Solidarity, RISED, Mishuk, Gram Bikash, BISIC, ASOD, Bandhan, Setu, Rescue, Come-to-work, PPS, NBRDS, Islami Relief, Pusti, BRDB, ANSAR-VDP, Jubo Unnoyan, Palli Daridro Bimochon Karmashuchi, LGD, Bangladesh Agricultural Bank, Government Fisheries, IRDB, Social Welfare, and RD9.

Most of the NGOs listed above are involved in microfinance activities. Some government organizations are also involved in microfinance and other development activities (such as BRDB, Bangladesh Agricultural Bank, ANSAR-VDP). We treat all of them as NGO.

The big NGOs are Grameen Bank, BRAC, ASA, Proshika, BRDB, RDRS, and Thengamara. The last two are big regional NGOs working only in the northern Bangladesh. Only BRDB is government organization. Grameen Bank is a commercial bank lending only to the poor. Microfinance is the only/main activity of all these big NGOs.