

# Empowering Women with Micro Finance: Evidence from Bangladesh

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## **I. Introduction**

In recent years, governmental and nongovernmental organizations in many low income countries have introduced credit programs targeted to the poor. Many of these programs specifically target women, based on the view that they are more likely than men to be credit constrained, have restricted access to the wage labor market, and have an inequitable share of power in household decision making. The Grameen Bank of Bangladesh is perhaps the best-known example of these small-scale production credit programs for the poor, and over 90% of its clients are women. Earlier work (Pitt and Khandker 1998; Pitt et al. 1999; Pitt 2000; Pitt et al. 2003) has found that the effects of program participation differ importantly by the gender of program participant. For example, Pitt and Khandker (1998) find that the flow of consumption expenditure increases 18 taka for every 100 taka borrowed by women, but only 11 taka for every 100 taka borrowed by men. Pitt et al. (2003), using a totally different approach to parameter identification, find that credit provided women importantly improves measures of health and nutrition for both boys and girls, while credit provided men has no significant effect.

What underlies these gender differences? There are essentially two different mechanisms that can result in different effects of credit program participation by gender: (i) “empowerment” effects and (ii) standard income and substitution effects. Collective models of household decision making provide one avenue

This article benefited from the comments of seminar participants at the University of the Witwatersrand and from the comments of referees and the editor.

of understanding empowerment. In a simple version of collective decision making, the household's social welfare is some function of the individual utility functions. Browning and Chiappori (1998) have shown that if behavior in the household is Pareto efficient, the household's objective function takes the form of a weighted sum of individual utilities, with weights  $\tau$ . The weight  $\tau$  can be thought of as representing the bargaining power of the female household member relative to the male household member in determining the intra-household allocation of resources. When  $\tau$  is zero, female preferences are given no weight and the household's social welfare function is identically that of the male. In much of the literature,  $\tau$  is presumed to be increasing in the relative value of female time and her money income. In addition,  $\tau$  may be altered through social pressure. The parameter  $\tau$ , which directly reflects women's power in household decision making, is one index of "women's empowerment."

The differing credit effects by gender of participant reported by Pitt, Khandker, and associates are not sufficient to establish that credit program participation has an empowerment effect. The results cited above can, in principle, be simply the result of standard income and substitution effects. In an economy in which women do not work in the wage labor market, participation in a group-based credit program increases the shadow value of female time by providing a complementary input for the production of goods for the market by the self-employed. In contrast, if men still provide time to the wage labor market, the shadow value of their time is unaffected by program participation. Consequently, the self-employment activities of women fostered by micro credit may generate different demand effects than the self-employment activities of men fostered by micro credit. If the preference weight  $\tau$  is unaffected by male participation, such participation does not alter the shadow price of women's time either. The only source of change in demand when men are the credit program participants arises from the income effect associated with the rental value of the capital endowment provided by the credit program. Note that although male participation identifies the income effect conditional on  $\tau$ , this information does not help disentangle the substitution effect from the bargaining (empowerment) effect induced by women's participation. Thus a finding that the effect of women's program participation on child health differs from the effect of men's program participation (as in Pitt et al. 2003) cannot be taken to necessarily imply that women have gained power in the household, even if women are assumed to prefer child quality more than their husbands.

A modeling strategy that seeks to separate out the income and substitution effects from the empowerment effect (on  $\tau$ ) resulting from micro credit program participation would make difficult demands on the data and require strong

restrictions on the form of preferences. An alternative approach is to collect data on attitudes by and toward women and on women's decision-making autonomy. These data are necessarily self-reported and subjective, but econometric techniques, notably instrumental variables estimation, are available to correct for the possible confounding effects of systematic variation in subjective response. Note that self-reported measures of decision-making power, even if experimentally elicited, do not necessarily imply that women actually have more power (as measured by  $\tau$ ), but they do add one more piece to the accumulated evidence pointing in that direction. Frankenberg and Thomas (2001) make the case that it is useful to include explicit questions about decision making within the household in household surveys, arguing that patterns of decision making may be the outcome of relative power within the household. Using a special module included as part of the second Indonesia Family Life Survey (IFLS2), they demonstrate that combining qualitative and quantitative approaches enriches our understanding of intrahousehold decision making.

A few studies in the recent past have attempted to establish the relationship between credit program participation and some notion of women's empowerment. But all of these studies suffer from possible bias due to endogeneity of decisions involved in program participation and the unobserved household, individual, and area characteristics. The unobserved heterogeneity likely to bias the estimates includes the unobserved attitudes and characteristics of husbands, wives, and other family members, including preexisting women's empowerment and autonomy. It seems quite possible, for example, that more empowered women are more likely to be able to join a micro credit program. For example, Hashemi, Schuler, and Riley (1996) find that membership in Grameen Bank and BRAC has a significant positive effect on empowerment by contrasting program villages with nonprogram villages.<sup>1</sup> Doing so neglects the potential for village-level unobservable characteristics to bias the results.

Our study estimates the impact of participation in micro credit programs on an index of empowerment and its proxy indicators using a large set of qualitative responses to questions that characterize women's autonomy and gender relations within the household with due attention to heterogeneity bias. The data come from an extensive household survey collected in rural Bangladesh in 1998–99. We test the assertion that participating in micro credit programs is an empowering experience for women whose life choices

<sup>1</sup> Hashemi et al. (1996) create an "index" of empowerment through a linear weighted combination of individual empowerment indicators. They establish an arbitrary cutoff point such that women who score above this cutoff are labeled empowered and those who score below it are labeled unempowered.

are otherwise restricted through poverty, patriarchy, and societal or religious norms. In addition, we examine the effect of men's credit program participation on these same measures of female empowerment. Unlike Hashemi et al. (1996) and others, we measure women's empowerment as a latent variable encompassing a number of indicators that proxy for a woman's autonomy, decision-making power, and participation in household and societal decision making.

The article is organized as follows. Section II discusses the data and their salient features useful for the measurement of empowerment. Section III formalizes the concept of empowerment as an unobserved latent variable reflecting common components of qualitative responses to a set of questions pertaining to women's autonomy and decision-making power. Section IV presents reduced form determinants of various latent empowerment measures; important among the determinants is the effect of village-level exposure to micro credit by gender. Section V estimates the effect of micro credit programs on the empowerment of participating households using two-stage least squares. Section VI summarizes the findings.

## II. Data

The data used in this article come from a large household survey conducted in 1998–99, which is a follow-up survey of an earlier survey conducted in 1991–92. Both household surveys were conducted by the Bangladesh Institute for Development Studies (BIDS) in collaboration with the World Bank. Only the follow-up survey (conducted in 1998–99) included a special module on women's empowerment.

The base household survey interviewed 1,798 households randomly drawn from 87 villages of 29 *thanas* in rural Bangladesh. Of these 29 *thanas*, 24 were program *thanas* (8 from each of the three programs: Grameen Bank, BRAC, and BRDB RD-12 project), and 5 were nonprogram *thanas*. Three villages in each program *thana* were randomly selected from a list of program villages in which a program had been in operation for at least 3 years. Three villages in each nonprogram *thana* were also randomly selected from the village census of the government of Bangladesh. From the village census list of households, 20 households from each village were drawn using stratified random sampling. Out of these households, 17 were target (owned land of one-half acre or less and, hence, qualified for program participation) and 3 nontarget (owned land of more than one-half acre and, hence, did not qualify for program participation). To ensure that a sufficient number of program participating households were included in the target households in program villages, par-

**TABLE 1**  
**NUMBER OF HOUSEHOLDS BORROWING FROM CREDIT PROGRAMS, BY GENDER OF BORROWER**

	BRAC	BRDB	GB	ASA	PROSHIKA	GSS	Youth Development	Other NGO
Male	16	54	121	4	9	2	0	35
Female	273	72	545	105	29	3	1	183

ticipant households were overdrawn.<sup>2</sup> All regression estimates are appropriately weighted to account for this sampling design. Of the 1,798 households selected, 1,538 were target and 260 were nontarget households. Among the target households, 905 (59%) participated in a credit program.

The program villages surveyed had either male and female credit groups or both: 40 villages had credit groups for both men and women; 22 had female-only groups, so that males in landless households are denied the choice of joining a credit program; and 10 had male-only groups, so that landless females are denied program choice. All program groups are single-sex, and not all villages have both a male and a female group. The existence of villages with only female or only male groups is a key feature of the parameter identification method described below. In addition, these programs require that no more than one member of a household may join.<sup>3</sup> A more detailed description of this survey can be found in Khandker (1998).

These households were revisited in 1998–99. The resurvey tried to include all households from the 1991–92 survey, including splits, plus some new households were added.<sup>4</sup> A sample of 2,074 households with married couples was administered the women’s empowerment questionnaire. Table 1 shows the distribution of households across the eight categories of program credit, broken down by gender. Appendix table A1 lists all of the empowerment questions, to whom each question was asked, and the mean responses. Approximately 80% of the questions were asked only of wives.

We have grouped the survey questions into the following thematic groups: (1) purchasing: ability to spend money independently and to make household

<sup>2</sup> An additional 58 households were selected from 15 villages of five program *thanas* (covering all three programs), because a nutrition survey was additionally conducted in those villages and a larger number of target households was required.

<sup>3</sup> In a few households, both men and women borrowed, and some women borrowed from more than one program.

<sup>4</sup> After the 1991–92 survey, one or more micro credit programs moved to some control villages of the 1991–92 survey, making them program villages. So three new *thanas* (with three villages in each *thana*) were added. In addition, two more villages were added to previous nonprogram *thanas*. In the program *thanas*, six new villages were added. Altogether 104 villages from 32 *thanas* were included.

purchases; (2) resource: general economic power and access to funds; (3) finance: power regarding household borrowing and ability to borrow from informal sources; (4) transaction management: balance of power relating to decision, implementation, and spending for household; (5) mobility and networks: freedom of movement, development of networks, relationships with blood kin and in-laws; (6) activism: awareness of law and politics, autonomous action on public and private matters; (7) household attitudes: attitudes on women's empowerment, dowry, and status within household; (8) husband's behavior: husband's actions and opinions pertaining to women's status; (9) fertility and parenting: decisions and action for family planning and child rearing; and (10) all variables: general women's empowerment encompassing all nine of the above thematic groups.

Economic decision making consists of questions on whether women themselves were involved in decisions on expenditures for house repair and construction, livestock sale and purchase, borrowing money, and transactions involving household equipment. For all four issues, it was very rare for women to report either that they alone decided and implemented their decision or that they decided alone and implemented jointly with the husband. For each issue, less than 3% of respondents answered that they decided on these issues alone. Similarly, for all four issues, almost all the respondents (more than 98%) said that they themselves do not spend money in such matters; rather, it is the husband who actually handled the money in the transaction.

Purchasing capacity involves questions in seven categories of common household purchases (food, toiletries, candies for the children, cooking utensils, furniture, children's clothing, and own clothing) to find out if women (rather than someone else in the household) were able to make the purchase and, if so, whether or not they make the purchase without their husbands' permission. The percentage of women who answered that they make purchases themselves varies widely by category, from less than 5% (for furniture) to more than 60% (for candies and household utensils). When husbands were asked about their wives' freedom to make purchases, 87% responded that their wives are not able to buy assets on their own without the husband's permission. On control over loans, a growing literature in the field of micro credit addresses the degree to which credit is fungible within the household.<sup>5</sup> Of central importance is whether or not women retain control over their loans and management power of the activities for which the loans are used. In cases where wives had taken small loans, from any source, 78% of husbands reported that they use their

<sup>5</sup> See, e.g., Goetz and Sengupta (1996), Montgomery, Bhattacharya, and Hulme (1996), and Pitt and Khandker (1998).

wives' loan money to spend on their own income-generating projects. Among women who had taken loans for income-generating activities, only 5% reported having total autonomous control over the money. Fifty-six percent reported that they share control over the loan money with their husbands, and 38% reported that their husbands have sole control over the proceeds of the loan.

Control over income and savings reflect if women have control on these important economic outcomes. More than 60% of men reported that their wives have no independent source of income. Over 75% of women reported that they do not operate any income-generating activity of their own, and 78% of women reported not having independent income that they could use at their own discretion (without consulting their husband). A sizable number (42%) of women reported that they do have their own independent savings, and if they did, husbands were aware of these savings 91% of the time. Wives expressed having a low level of control over these savings, with 85% saying that they were not able to decide autonomously how to utilize them.

Only around 15% of women reported having received money from their parents, siblings, or other blood relatives in the past 12 months. Of these, 95% said that their husbands knew that they had received this money. Only 17% reported that they had full control over deciding the use of that money: 62% reported partial control and 21% reported having no control at all.

More than three-quarters of women (78%) reported that they had at some point been forced to cede money to their husbands, and 56% of women replied that their husbands had forced them not to work outside the home. Eighty-one percent reported that they would not be able to give their own money away at will.

When asked if they would be able to get 500 taka in the case of an emergency, two-thirds of women predicted that they would be able to. The primary sources from which women predicted they would borrow such emergency money were from own relatives (32%), husbands (29%), and husband's relatives (28%). Less than 3% of women in the sample replied that they would borrow from moneylenders.

Mobility is very much restricted in rural Bangladesh. Traditions and family-imposed restrictions may forbid women from leaving the family compound or may regulate when, where, and with whom they travel. Additionally, issues of safety often prevent women from traveling alone for even short distances. Eighty-three percent of husbands reported that their wives never went alone to places such as the market, bank, health clinic, and so on. Of these, over half (55%) explained that they or their sons always accompanied the wives when going outside the home, and another 18% explained that their wives were accompanied by neighbors or relatives. Wives responded similarly. Fifty-

three percent said that when they traveled outside the village they went with their husbands and/or sons, and 22% traveled in the company of other women. Almost 9% of women reported that they never left the village at all. Eighty-two percent of women said that they had never visited their parents without their husband's permission.

Political awareness and activism involved a few questions that were asked to women in the sample relating to their involvement or awareness of local politics. Only 35% of women respondents knew the name of their member of parliament. While an impressive majority (86%) of women reported having voted in the last election, 74% also reported that their husbands had influenced or compelled them to vote for a certain candidate. Less than a quarter of women reported having ever publicly protested against an incidence of wife beating.

The questions about networking and friendships involved asking women about the extent of networking and friendships that they could maintain beyond their immediate family. Marriage in Bangladesh is characterized by patrilocal residence and village exogamy—when a woman marries, she leaves her home, family, and village and moves into the household of her new husband, in a new village. As a result, wives—and new wives in particular—may not have many close relationships outside the household. In this sample, however, women generally tended to say that they did have close friendships and relationships (possibly with their blood relatives) outside the household. Eighty-five percent of women stated that there were people within their *bari* with whom they were close enough to share their feelings, and 73% had such friends outside the *bari*.

Family planning involves questions to assess whether women exert their power in family planning practices. Women were more likely than men to be users of birth control. Among couples of reproductive age, over 93% of men reported that they did not use any male birth control method. Among these men, 65% explained that the reason was that their wives used a female birth control method, and 16% responded that they simply did not like to use birth control. Women's responses were similar: over 91% of women reported that they had never been able to make their husbands use a male birth control method. Of these women, 68% explained that the responsibility of birth control was usually given to them.

On assessing attitudes, the survey included several questions for both husbands and wives regarding their opinions and attitudes on gender in society. More than two-thirds of men (68%) replied that they believe their wives to be less intelligent than themselves. Seventy-nine percent replied that they do not consider their wives capable of making decisions pertaining to purchase

or sale of major household assets. An overwhelming majority of women (94%) stated that they believe that their husbands are superior to them “in qualities and education.” When asked why, 59% of these women explained that the husband is the earning member of the household and that this makes him superior, and 34% stated that a woman’s lot in life is to be inferior to her husband. When asked what kind of impact women’s empowerment would have (or was having) on society, men were fairly evenly split between positive and negative reactions. Roughly half (47%) responded positively by claiming that the primary impact of women’s empowerment would either be the creation of a better society or that it would be economic improvement for the family. The other 53% responded negatively, saying that women’s empowerment would cause chaos in society, problems bringing up children, or a disruption of peace within the household.

When asked to describe what they perceived to be the greatest obstacles to achieving women’s empowerment in Bangladeshi society, 46% of men cited lack of education as the primary obstacle, 23% cited lack of safety, and 17% cited religious restrictions. As secondary obstacles, men also cited religious restrictions (30%), lack of income-generating activities (22%), lack of safety (21%), and the social structure (18%). The main obstacles cited by women were lack of education (47%), lack of safety (21%), and religious restrictions (16%).

Spousal arguments and abuse have been identified as a common concern when women get an economic influence within a household. Women were thus asked to describe the nature of arguments that tended to arise within the household. The most commonly cited topics of arguments were children, money, and household chores. More than a third of women reported that when such arguments occurred they were abused in some way: 20% reported verbal abuse, and 16% reported physical abuse. Of those who reported physical abuse, 17% said that their injuries from the abuse had been severe enough to require medical attention.

### **III. Empowerment as an Unobserved Latent Variable**

Unlike many other measures of human behavior studied by economists, women’s empowerment does not readily lend itself to direct measurement. The large number of empowerment indicators collected in the survey suggests not only that women’s empowerment is multifaceted but also that drawing conclusions from a large number of regressions may be problematic. Some of the empirical research on credit and women’s empowerment has used some variant of an index approach to address this problem. In this approach, answers to different questions are weighted and summed to form one universal “score”

that represents empowerment. For example, a “yes” answer to each of 10 questions may be coded as one and a “no” as zero; then these ones and zeros are added to produce an index with a minimum of zero and a maximum of 10. This approach is quite arbitrary because the researcher must choose the weights without reference to theory or data. Some studies have used only one scale, while others construct multiple scales for various thematic groupings of questions.

This article treats empowerment variables as measured through a set of observed variables or indicators. The idea is that unobserved latent variables account for the dependencies among the indicators. The number of empowerment latent variables is smaller than the set of empowerment indicators, the idea being that the number of true “underlying dimensions” that describe a condition (such as empowerment) is smaller than the number of observed indicators. The latent variable model estimated has two parts. The first part links the unobserved latent variables to a set of observed indicators and is called the measurement model. The well-known factor analysis model is a special case of a latent variable measurement model with indicators measured on a continuous scale. After fitting a factor analysis model, latent scores (factor scores) are easily computed and are commonly used as dependent variables in the second part of the analysis. The standard factor analysis measurement model is inappropriate when the indicator variables are discrete, as they are in our empowerment survey. Instead, we use the item response theory (IRT) approach, in which the element of analysis is the whole response pattern of a set of binary indicators. As demonstrated below, this approach essentially estimates a random effects binary response model such as a random effects probit or logit. The latent factor is an estimate of the random effect (factor) conditional on the fitted parameters and the data.

At one extreme, we could postulate that all the variables in the study are causally determined by only one factor, which we could call “empowerment.” Beegle, Frankenberg, and Thomas (2001), in exploring the relationship between various indicators of power and reproductive behaviors, conclude that women’s bargaining power is not adequately summarized by a single indicator but spans multiple aspects of a couple’s life. We follow that view and think it sensible to expect, for example, that those questions that pertain to political activism measure a different type of underlying condition than do those questions that ask about reproductive control. Consequently, we estimate separate empowerment factors for the nine thematic groups described previously. In the one-parameter item response model, the conditional densities of the re-

sponses of person  $j$  to question  $i$ , given the latent empowerment variable of person  $j$ ,  $\lambda_j$ , depends on the linear index given by

$$\eta_{ij} = \beta_i + \lambda_j, \quad (1)$$

where  $\eta_{ij}$  is the (linear) index, and  $\beta_i$  represents a question-specific threshold for a positive response. The  $\lambda_j$  is the latent empowerment (“factor”) in the linear index. This model has been used to estimate latent ability using data from binary (true/false) test questions and is known as the Rasch model if the factors  $\lambda_j$  are estimated as parameters rather than random effects, as in this application. Appending a nonsystematic error  $\varepsilon_{ij}$  to equation (1) such that the random effects  $\lambda_j$  are the only source of stochastic covariation between the responses of any person, and assuming normally distributed errors, this is essentially a random effects probit model. Estimation of this model is accomplished by maximum likelihood using Gauss-Hermite quadrature for numerical integration. After estimating the parameters, an empirical Bayes method is used to estimate the latent variable  $\lambda_j$  (the random effect) for each household observation. This estimation was carried out with the `gllamm6` package of Rabe-Hesketh, Skrondal, and Pickles (2004). The same estimation was also carried out using standard factor analysis methods for models with continuous indicators. In every case, the simple correlation coefficient between the factor estimated from the item response model (probit random effects model) and the factor estimated from standard continuous variable factor analysis was above 0.95. The results reported below are based on the item response model with the exception of the “all” factor, which is estimated from continuous factor analysis over the nine (continuous) different types of latent empowerment factors itemized above.

The selection of variables in the 10 categories of empowerment was based on our prior belief about which variables contain similar types of information. Out of the 101 eligible variables, only 75 were actually used in the item response analysis (most were used only once, but some were used to create several different factors). The other variables were not used since it was felt that they were not directly relevant to any of the factor themes.

#### IV. Reduced Form Determinants of Women’s Latent Empowerment

Having reduced the set variables of 75 individual variables to 10 empowerment factors, including an aggregate “all” factor, we can more simply examine the partial correlations among different dimensions of empowerment, and between them and exogenous covariates. Table 2 presents the correlation matrix among our 10 empowerment factors. That all the elements of this matrix are positive

**TABLE 2**  
CORRELATION MATRIX OF LATENT VARIABLES

	Purchasing	Resources	Transaction Management	Husband's Behavior	Mobility and Networks	Activism	Finance	Fertility and Parenting	Household Attitudes	All Factors
Purchasing	1.000									
Resources	.362	1.000								
Transaction management	.330	.172	1.000							
Husband's behavior	.281	.201	.104	1.000						
Mobility and networks	.306	.432	.229	.010	1.000					
Activism	.197	.193	.114	.135	.148	1.000				
Finance	.293	.291	.729	.035	.382	.163	1.000			
Fertility and parenting	.414	.236	.256	.096	.243	.182	.215	1.000		
Household attitudes	.334	.147	.282	.740	.133	.152	.214	.150	1.000	
All factors	.658	.533	.705	.510	.514	.316	.724	.468	.649	1.000

is reassuring. Only two elements are not significantly different from zero at the 0.01 level using the Bonferroni adjustment to significance levels—the correlation between husband’s behavior and mobility, and the correlation between husband’s behavior and finance. The highest correlations are between transaction management and finance (0.729) and husband’s behavior and household attitudes (0.740).

In estimating the reduced form (exogenous) determinants of these measures of empowerment, we condition on whether the household has exogenous choice to join a credit program. The linear-in-the-variables reduced form demand equation for empowerment that is estimated is of the form

$$y_{ij} = d_{ij}^f \alpha_f + d_{ij}^m \alpha_m + X_{ij} \beta_y + Z_j \gamma_y + \mu_j^y + \varepsilon_{ij}^y, \quad (2)$$

where  $y_{ij}$  is the measured empowerment factor of woman  $i$  in village  $j$ ,  $X_{ij}$  is a vector of household characteristics (e.g., age and education of household head),  $Z_j$  is a vector of village characteristics,  $d_{ij}^f$  and  $d_{ij}^m$  are 0-1 binary indicators of the ability of women and men to choose to join a credit program (program choice),  $\beta_y$ ,  $\gamma_y$ ,  $\alpha_f$ , and  $\alpha_m$  are parameters to be estimated,  $\mu_j^y$  is an unmeasured determinant of  $y_{ij}$  that is fixed within a village, and  $\varepsilon_{ij}^y$  is a nonsystematic error reflecting, in part, unmeasured determinants of  $y_{ij}$  that vary over households.

A woman (man) has the choice of joining a credit program ( $d_{ij} = 1$ ) if (1) a women’s (men’s) credit program operates in village  $j$  and (2) the household owns no more than one-half acre of average quality cultivable land and is thus exogenously eligible to participate in the program.<sup>6</sup> The coefficient  $\alpha_f$  ( $\alpha_m$ ) represents the average effect of having a micro credit program for their sex in their village on the empowerment measure  $y_{ij}$  for eligible women (men).

<sup>6</sup> The validity of the assumption that landownership is exogenous is defended at length in Pitt and Khandker (1998). There are a number of households in our sample that were program participants and yet had more than 0.5 acres of land at the time of program entry, raising the possibility of mistargeting and potential bias in econometric results relying on this targeting rule. It appears that some of this excess land is either uncultivable or marginally so. Pitt (1999) demonstrates that the value per acre of land owned by program-participating households who also own more than 0.5 acres of cultivable land at the time of joining is a small proportion of the value per acre of the cultivable land of program participants owning less than 0.5 acres of cultivable land at the time of joining. This suggests that program officers are using some notion of “effective” units of cultivable land in determining eligibility rather than of the type of mistargeting that would result in econometric bias. Pitt (1999) discusses this issue at length and demonstrates that treating the exogenous targeting rule to be greater than 0.5 acres provides a consistent estimator for certain types of mistargeting. He finds that application of targeting rules greater than 0.5 acres (up to 2.0 acres) actually slightly strengthens the qualitative results on the effect of credit by gender on household consumption. This insensitivity of results to the choice of targeting rule used in estimation is further demonstrated in Pitt (2000).

Our sample of households includes households in villages that do not have access to a group-based credit program. If credit program placement across the villages of Bangladesh is attentive to the village effects  $\mu_j$ , estimating the impact of program availability on eligible individuals by comparing individuals in nonprogram villages with individuals in program villages without controlling for the selectivity of program placement will generally result in biased estimates of this impact. Using a village fixed effects estimation technique removes the source of this bias, the village fixed effect  $\mu_j^y$ , but prevents the estimation of the parameters  $\gamma_y$ .

The combination of the item response model for empowerment (eq. [1]) and the determinants of women's response model (eq. [2]) together constitute a structural equation model (SEM) for categorical variables. SEMs consist of (i) a measurement model that relates a set of observed indicators to unobserved latent variables and (ii) a "structural model" that relates the latent variables to each other and to observed variables. Skrondal and Rabe-Hesketh (2004) review latent variable modeling and the estimation of SEMs for a variety of response types, including categorical variables. Our model is a MIMIC (Multiple Indicator Multiple Cause) model, a special case of a SEM. MIMIC models are SEMs in which the relationships among the latent variables are not modeled, so that the structural equation consists only of regressions of the latent variables on a set of observed covariates. Although joint estimation of the measurement equations and the structural equations by maximum likelihood is possible, estimation in this study consists of three stages: (1) estimate the item response measurement model by maximum likelihood, (2) obtain empirical Bayes predictions of the latent variables from this model, and (3) estimate various structural models by OLS, fixed effects, and, in the causal models described in a subsequent section of this article, by two-stage least squares with fixed effects. Joint maximum likelihood estimation of the MIMIC model is made daunting in our case by the features of the data, binary indicators and nonrandom sampling, and the features of the model, the need for fixed effects and instrumental variables in the structural equation.<sup>7</sup> Consequently, we use the multistep procedure for estimation.

<sup>7</sup> Note that commercial software such as LISREL (Jöreskog and Sörbom 1999), EQS (Bentler 1992), and Mplus (Muthén and Muthén 2000) use the underlying variable approach (UVA) rather than item response theory (IRT), the method used in this study, in modeling the measurement equations. Very briefly, in IRT the element of analysis is the whole response pattern of an observation, whereas UVA uses only the univariate and bivariate margins. Moustaki, Jöreskog, and Mavridis (2004) compare these two approaches on the basis of two examples. LISREL is used to estimate the UVA model, but the authors develop their own software for the IRT model, as it is not part of LISREL. They find that the parameter estimates of the UVA and IRT models are often close but that the

TABLE 3  
SUMMARY STATISTICS

Variable	Mean	SD
Age of household member (years)	34.95	10.59
Education of the member (years)	1.85	3.07
If parents of household head own land	.161	.367
If brothers of household head own land	.349	.477
If sisters of household head own land	.287	.453
If parents of household head's spouse own land	.331	.471
If brothers of household head's spouse own land	.338	.473
If sisters of household head's spouse own land	.284	.451
Household land asset (decimals)	86.75	167.23
Age of household head (years)	43.69	12.14
Education of household head (years)	2.82	3.79
Highest male education in household (years)	2.83	3.77
Highest female education in household (years)	4.20	4.49
Household has male choice (yes = 1)	.615	.487
Household has female choice (yes = 1)	.685	.465
Factor: purchasing	.0088	1.035
Factor: resources	.00006	.500
Factor: finance	-.00008	.175
Factor: transaction management	-.0015	1.409
Factor: mobility networks	.0002	.178
Factor: activism	.00005	.192
Factor: household attitudes	-.00075	.542
Factor: husband's behavior	-.00097	.188
Factor: fertility and parenting	.000077	.686
Factor: all	$-3.26 \times 10^{-11}$	.910
Log(female program loans + 1)	4.127	4.707
Log(male program loans + 1)	.948	2.845
Female participation (yes = 1)	.443	.497
Male participation (yes = 1)	.106	.307
Number of observations	2,064	

Table 3 presents summary statistics for the 10 factors and the 13 household-level exogenous variables used in the analysis, as well as 0-1 indicators of female and male credit choice and program participation, and the (log) of cumulative actual borrowing. Table 4 presents the estimated effects of having a micro credit program by gender on the estimated latent empowerment factors for the (functionally landless) eligible. The column labeled "OLS" presents the effects of female and male credit programs under the assumption of exogenous program placement and with *t*-ratios adjusted for clustering in villages. The adjacent column presents village fixed effects estimates. All regressions are appropriately weighted to account for the sampling design. The OLS regressions also included a set of 11 village-level variables and a set of 13 household-level exogenous variables. The village fixed effects regressions include the same

IRT method fits the data better, often much better, as a consequence of its use of the whole response pattern.

**TABLE 4**  
**REDUCED FORM ESTIMATES OF THE DETERMINANTS OF WOMEN'S EMPOWERMENT**

Factor and Female/Male Choice	OLS (Clustered)	Village Fixed Effects
Factor 1: purchasing:		
Female choice	.199 (2.16)	.224 (3.10)
Male choice	.035 (.34)	-.018 (-.28)
Factor 2: resources:		
Female choice	.438 (4.86)	.509 (6.84)
Male choice	-.601 (-1.66)	-.148 (-2.08)
Factor 3: finance:		
Female choice	.411 (4.69)	.366 (4.67)
Male choice	-.160 (-1.88)	-.171 (-2.35)
Factor 4: transaction management:		
Female choice	.471 (4.85)	.302 (3.89)
Male choice	-.121 (-1.36)	-.089 (-1.25)
Factor 5: mobility and networks:		
Female choice	.376 (3.80)	.433 (5.12)
Male choice	-.230 (-2.58)	-.275 (-3.54)
Factor 6: activism:		
Female choice	.109 (1.12)	.188 (2.20)
Male choice	.052 (.62)	-.068 (-.90)
Factor 7: household attitudes:		
Female choice	.181 (2.01)	.114 (1.40)
Male choice	-.013 (-.15)	.030 (.36)
Factor 8: husband's behavior:		
Female choice	.144 (1.53)	.122 (1.47)
Male choice	-.080 (-.94)	-.043 (-.53)
Factor 9: fertility and parenting:		
Female choice	.310 (3.49)	.341 (4.28)
Male choice	-.057 (-.73)	-.185 (-2.52)
Factor 10: all variables:		
Female choice	.512 (6.08)	.473 (6.40)
Male choice	-.134 (-1.57)	-.167 (-2.39)

**Note.** Numbers in parentheses are t-statistics.

set of 13 household-level exogenous variables. All regressions are appropriately weighted to account for the sampling design. The OLS and village fixed effects estimates are not qualitatively or quantitatively different.<sup>8</sup> Consequently, we will focus our discussion on the village fixed effects estimates. The presence of a female micro credit group in a village has a positive and highly significant ( $t = 6.40$ ) effect on the factor encompassing all the questions in the questionnaire (thus a representation of the “general level of empowerment”), and it has a significantly ( $t > 2.0$ ) positive effect on eight out of the 10 factors (latent variables); the exceptions are factors 7 (attitudes on women’s empowerment, dowry, and status within household) and 8 (husband’s actions and opinions pertaining to women’s status).<sup>9</sup> Male credit choice significantly reduces the overall empowerment factor ( $t = -2.39$ ), has a statistically significant and negative effect on four of the other empowerment factors, and does not have a statistically positive effect on any of them. The estimated empowerment factors have been scaled to have unit variance to aid in the interpretation of the regression coefficients. The presence of a female group-based micro credit program in a village increases the overall empowerment measure of eligible women by an average of 0.473 standard deviations. The distribution of this “all variables” factor is close to normal—a skewness and kurtosis test cannot reject normality at the 0.05 level ( $\chi^2(2) = 5.02$ ,  $p = .081$ ). This implies that, for the median woman in the sample, the presence of a female micro credit program increases her place in the distribution of empowerment from the 50th percentile to the 68th percentile, and the presence of a male micro credit program reduces her place to the 43rd percentile. Among the nine thematic empowerment latent variables, the largest percentile gains in

<sup>8</sup> The village-specific error accounts for approximately 30% of the variance of the total regression error in the determinants of the composite measure of empowerment (factor 10).

<sup>9</sup> The dependent variable in this analysis is the predicted factor derived from the estimated parameters of the item response models for empowerment. This prediction generates measurement error of the dependent variable. Classical measurement error of the dependent variable is generally ignorable in regression analysis, as it is absorbed into the error residual. That is, no estimation issue results if the true empowerment factor equals the estimated factor plus a woman-specific independently and identically distributed random error independent of the independent variables. It may not be ignorable if there is measurement error on the individual empowerment variables that enter into the predicted empowerment factors because the transformation into the empowerment factor is nonlinear in the measurement error (Abrevaya and Hausman 2004). There is no straightforward way to correct for any bias due to the nonlinear transformation of measurement error. However, any bias due to the nonlinearity of measurement error is likely to be slight, as our model is very nearly linear. In standard factor analysis, the estimated factor is a linear combination of the indicator variables. Linear regressions of the estimated factor predicted by our item response model and the indicator variables all have  $R^2 > 0.95$  and half are at least 0.99. Thus, as in factor analysis with continuous variables, the estimated factors from the item response model are almost linear in the indicator variables.

the distributions of empowerment relative to the median arising from the availability of a female credit program in one's village are in resources (general economic power and access to funds) and mobility and networks (freedom of movement, development of networks, relationships with blood kin and in-laws), with large increases in fertility and finance factors as well. In the case of the resource empowerment latent variable, the presence of a women's credit group increases the median female percentile ranking by 19 percentage points to the 69th percentile. The largest declines arising from male credit programs are in the mobility, fertility and parenting, finance, and resource factors. In the case of mobility, the presence of a male micro credit program reduces the median women's place in the distribution of mobility empowerment to the 39th percentile.

Appendix table A2 reports the remaining regression coefficients of the reduced form determinants of women's empowerment using village fixed effects. These coefficients are for the 13 individual and household characteristics in these regressions included as controls in addition to the credit choice variables. Only the education variables seem to have any power (conditional on village fixed effects) in explaining variation in the various measures of empowerment. In the "All factors" regression, woman's own education is the only statistically significant determinant of their empowerment. Household land ownership has a marginally negative effect ( $t = -1.54$ ), and the highest female education in the household has a marginally positive effect ( $t = 1.56$ ). The latter variable overlaps with "own" education in that the subject woman may also be the woman with the highest education in the household. In this case, the effect of increasing education on empowerment is the sum of the two coefficients. Own education also has a positive coefficient in all nine empowerment thematic groups, and has  $t$ -ratios greater than 2.0 for six of these. Household land ownership decreases transaction management and mobility/networks but seems to increase activism. Empowerment related to husband's behavior is increasing in the highest male education in the household, while empowerment in the areas of activism and fertility are increasing in the education of the household head.

## V. Estimating the Treatment Effect of Program Participation on Empowerment

Although the reduced form estimates suggest that the presence of micro credit programs for women increase the empowerment of landless women and that micro credit programs for men have the opposite effect, the analysis can be extended to the estimation of the causal effect of individual-level participation in a micro credit program on measures of empowerment. Specifically, we

estimate conditional demands for a set of empowerment indicators, conditioned on the household's intensity of program participation as measured by the cumulative (price-adjusted) quantity of credit borrowed since joining the program.<sup>10</sup> The econometric methods used in this analysis are essentially the same as those presented in Pitt and Khandker (1998) and, hence, only an abbreviated version is presented. Consider the reduced form equation (3) for the level of participation in one of the credit programs ( $C_{ij}$ ), where level of participation will be taken to be the value of program credit that household  $i$  in village  $j$  borrows,

$$\begin{aligned} C_{ij} &= X_{ij}\beta_c + \mu_j^c + \varepsilon_{ij}^c \quad \text{for } d_{ij} = 1 \\ C_{ij} &= 0 \quad \text{for } d_{ij} = 0, \end{aligned} \quad (3)$$

where  $X_{ij}$  is a vector of household characteristics (e.g., age and education of household head),  $\beta_c$  are unknown parameters,  $\mu_j^c$  is an unmeasured determinant of  $C_{ij}$  that is fixed within a village,  $\varepsilon_{ij}^c$  is a nonsystematic error that reflects unmeasured determinants that vary over households, and  $d_{ij} = 1$  indicates that the household is both eligible to participate in the credit program and resides in a village with a program, that is, that they have the choice to borrow.

The conditional demand for women's empowerment outcome  $y_{ij}$ , conditional on the level of program participation  $C_{ij}$ , is

$$y_{ij} = X_{ij}\beta_y + C_{ij}\delta + \mu_j^y + \varepsilon_{ij}^y, \quad (4)$$

where  $\beta_y$  and  $\delta$  are unknown parameters,  $\mu_j^y$  is an unmeasured determinant of  $y_{ij}$  that is fixed within a village, and  $\varepsilon_{ij}^y$  is a nonsystematic error reflecting, in part, unmeasured determinants of  $y_{ij}$  that vary over households. The estimation issue arises as a result of the possible correlation of  $\mu_j^c$  with  $\mu_j^y$  and of  $\varepsilon_{ij}^c$  with  $\varepsilon_{ij}^y$ . Econometric estimation that does not take these correlations into account may yield biased estimates of the parameters of equation (4) due to the endogeneity of credit program participation  $C_{ij}$ . In the model set out above, the vector of household characteristics,  $X_{ij}$ , is presumed to be the same in both equations (3) and (4).

Using a village fixed effects estimation technique removes the correlation

<sup>10</sup> The cumulative quantity of credit ever borrowed from these micro credit groups is thus our measure of program exposure up until the date at which empowerment is measured. Credit is just one facet of the multidimensional "treatment" associated with participation in any one of the group-based lending programs. These programs are more than just lending institutions. Nevertheless, the quantity of credit is the most obvious and well measured of the services provided. Duration of program participation is an alternative measure of exposure to treatment, but it is highly correlated with cumulative borrowing, and its use makes little qualitative difference in estimation.

between  $\mu_j^c$  with  $\mu_j^y$  as a source of estimation bias.<sup>11</sup> The parameter of interest,  $\delta$ , the effect of participation in a credit program on the outcome  $y_{ij}$ , can be identified if the sample also includes households in villages with treatment choice (program villages) that are excluded from making a treatment choice by exogenous rule. That exogenous rule is the restriction that households owning more than 0.5 acres of cultivable land are precluded from joining any of the three credit programs.

To illustrate the identification strategy, consider a sample drawn from two villages—village 1 does not have the program and village 2 does; and, two types of households, landed ( $x_{ij} = 1$ ) and landless ( $x_{ij} = 0$ ). Innocuously, we assume that landed status is the only observed household-specific determinant of some behavior  $y_{ij}$  in addition to any treatment effect from the program. The conditional demand equation is

$$y_{ij} = C_{ij}\delta + x_{ij}\beta_y + \mu_j^y + \varepsilon_{ij}^y. \quad (5)$$

The exogeneity of land ownership is the assumption that  $E(x_{ij}, \varepsilon_{ij}^y) = 0$ , that is, that land ownership is uncorrelated with the unobserved household-specific effect. The estimator of the program effect  $\delta$  is a variant of the difference-in-the-difference estimator widely applied in the general program evaluation literature. To see this, note that an estimate of  $\delta$  is obtained from the following difference-in-the-difference:<sup>12</sup>

$$\begin{aligned} & \{E(y_{ij}|j = 2, x_{ij} = 0) - E(y_{ij}|j = 2, x_{ij} = 1)\}\beta_y \\ & + \{E(y_{ij}|j = 1, x_{ij} = 0) - E(y_{ij}|j = 1, x_{ij} = 1)\} \\ & = (\rho\delta + \mu_2^y) - (\beta_y + \mu_2^y) + (\mu_1^y) - (\beta_y + \mu_1^y) = \rho\delta, \end{aligned} \quad (6)$$

where  $\rho$  is the proportion of landless households in village 2 that choose to participate in the program. If landed status is a continuous measure of landholding, then the credit effect  $\delta$  is identified from variation in landholding within the program villages ( $j = 2$ ), and a sample of nonprogram villages is not required.

Two-stage instrumental variable estimation of a model of this type can be accomplished by treating as identifying instruments a dummy variable for program choice interacted with all the exogenous variables. As noted earlier,

<sup>11</sup> In addition, the effect of any observed village characteristics that are thought to influence  $y_{ij}$ , such as prices and community infrastructure, are not identifiable.

<sup>12</sup> However, as Pitt (1999) points out, since this is a quasi-experiment, not an actual experiment, the direct application of (6) would most likely result in a downward biased estimate of  $\delta$ . The regression approach applied here is necessary to control for differences in other observed and unobserved variables across the four groups for whom expectations are formulated in eq. (6).

a woman has program choice if her household owns less than one-half acre of average quality cultivable land and she lives in a program village. The idea is that all of the exogenous variables have an effect on self-selection into the program only for the eligible—as only they have a choice of whether to participate—but influence empowerment outcomes for both the eligible and ineligible. Parameter identification requires that landownership (the eligibility criterion) not discontinuously affect the treated outcomes (contraception, health) conditional on program participation, although it may affect outcomes in a continuous fashion. It is important to note that the variable “landownership” is not an exclusion restriction in this approach. It remains one of the independent variables in the vector  $X_{ij}$  of equation (4).

The first-stage equation of the two-stage least squares estimation is simply the estimation of equation (3) over the subset of women who have program choice. For women without program choice, either because they live in a nonprogram village or live in a household with more than one-half acre of land, program participation ( $C_{ij}$ ) is deterministically zero. That is, the “regression equation” for those without program choice is simply  $C_{ij} = 0$  without any error term. To see where the identifying instrumental variables arise, one can combine the “choice” and “nonchoice” subsamples of equation (3) and write it equivalently as

$$C_{ij} = X_{ij}\beta_c + (d_{ij} - 1)X_{ij}\beta_c + \mu_j^c + (d_{ij} - 1)\mu_j^c + \varepsilon_{ij}^c + (d_{ij} - 1)\varepsilon_{ij}^c. \quad (3')$$

The identifying instruments available to identify  $C_{ij}$  in the second-stage equation (4) are thus the elements of the vector  $(d_{ij} - 1)X_{ij}$ , the interactions of “choice,” and the exogenous variables  $X_{ij}$ , plus the variables  $(d_{ij} - 1)\mu_j^c$ , the interactions of the village fixed and the choice variable.<sup>13</sup> Standard two-stage least squares estimation provides consistent estimates of this model.

Identification of gender-specific credit is achieved by making use of the rule that program groups are single sex and the fact that not all villages have both a male and a female group. As noted previously, the sample includes some households from villages with only female credit groups, so that males in landless households are denied the choice of joining a credit program, and

<sup>13</sup> Note that eq. (2), the reduced form estimated in Sec. II, is obtained by substituting eq. (3') into eq. (4) and then dropping all of the interaction terms such as  $(d_{ij} - 1)X_{ij}$  except for the interaction of  $d_{ij}$  and the intercept. In eq. (2), the linear-in-the-variables reduced form, the coefficients on the sex-specific choice variables  $d_{ij}$ ,  $\alpha_f$ , and  $\alpha_m$  represent the average effect of providing a woman or a man with the choice of joining a micro credit program on the empowerment measure  $y_{ij}$ . Also, note that in the village random effects model, the  $(d_{ij} - 1)\mu_j^c$  interactions are not sources of identification in the estimation of eq. (4).

some households from villages with only male credit groups, so that landless females are denied program choice. For that reason, the reduced form credit equation is disaggregated by gender, and the instruments are the interactions of  $X_{ij}$  and gender-specific indicators of the ability of women and men to choose to join a credit program,  $d_{ij}^f = 1$  and  $d_{ij}^m = 1$ , respectively.

Table 5 presents the regression parameters for credit by gender estimated by OLS (with clustered standard errors), village fixed effect regression, and two-stage least squares with fixed effects. Appendix table A3 presents the estimates for the noncredit independent variables. All regressions are appropriately weighted to account for the sampling design. Surprisingly, the estimated effects of credit program participation do not vary importantly by estimation method. If microfinance organizations are more likely to site women's groups where eligible women are more empowered, the ordinary least squares estimates of the women's credit effect should be larger than the village fixed effects estimates. Conforming to that prediction, in only two of 10 cases are the fixed effects estimates smaller than the OLS estimates. However, the differences are inconsequentially small in every case. Furthermore, if there is causation running from empowerment to joining a credit group, the village fixed effects estimates would be expected to overestimate the women's credit program treatment effect as compared to the fixed effects-instrumental variables estimates. This is true in six of 10 instances, but once again the differences are quite small except for factor 7 (attitudes on women's empowerment, dowry, and status within household). In this case, the fixed effects coefficient is two-thirds larger than the fixed effects-instrumental variables coefficient. Male credit effects are generally not statistically different from zero no matter what the estimation method is. Only in the case of factor 5 (freedom of movement, development of networks, relationships with blood kin and in-laws) are men's credit effects different from zero at the .05 level for both the fixed effects and fixed effects-instrumental variables methods.

Female credit choice has a positive and highly significant ( $t = 7.78$ ) effect on the factor encompassing all the questions in the questionnaire (thus a representation of the "general level of empowerment"), and it has a significantly ( $t > 2.0$ ) positive effect on nine out of the 10 factors, with factor 8 (husband's actions and opinions pertaining to women's status) being the sole unaffected empowerment latent variable. As noted above, male participation in a micro credit program is not found to have a statistically positive effect on our measure of latent overall empowerment. As before, the latent empowerment factors are scaled to have unit variance so that the coefficients on (log) credit are the effect of a 1% increase in credit on empowerment in units of standard deviations. The regression results predict that a woman who has median overall

**TABLE 5**  
**EFFECT OF CREDIT PROGRAM PARTICIPATION ON THE EMPOWERMENT OF WOMEN**  
**IN PARTICIPATING HOUSEHOLDS**

Factor and Female/Male Credit	OLS (Clustered)	Village Fixed Effects	FE-IV
Factor 1: purchasing:			
Female credit	.032 (5.77)	.034 (7.15)	.031 (4.10)
Male credit	.001 (.10)	-.009 (-1.04)	-.004 (-.25)
Factor 2: resources:			
Female credit	.066 (12.10)	.070 (14.63)	.062 (8.00)
Male credit	.010 (.82)	.000 (.02)	-.022 (-1.35)
Factor 3: finance:			
Female credit	.046 (7.84)	.046 (8.49)	.051 (5.73)
Male credit	-.006 (-.46)	.001 (.05)	-.002 (-.13)
Factor 4: transaction management:			
Female credit	.045 (7.77)	.038 (7.56)	.043 (4.75)
Male credit	-.0004 (-.04)	.008 (.82)	.011 (.61)
Factor 5: mobility and networks:			
Female credit	.045 (6.84)	.045 (7.51)	.051 (4.86)
Male credit	-.011 (-.84)	-.022 (-2.43)	-.034 (-2.07)
Factor 6: activism:			
Female credit	.021 (3.35)	.026 (4.74)	.021 (2.56)
Male credit	.005 (.60)	-.001 (-.16)	-.010 (-.76)
Factor 7: household attitudes:			
Female credit	.031 (5.67)	.030 (5.65)	.018 (2.07)
Male credit	.006 (.49)	.009 (1.02)	.018 (1.21)
Factor 8: husband's behavior:			
Female credit	.016 (2.86)	.021 (3.66)	.016 (1.77)
Male credit	.005 (.70)	.011 (1.01)	.011 (.83)
Factor 9: fertility and parenting:			
Female credit	.032 (5.87)	.036 (6.79)	.038 (4.28)
Male credit	-.003 (-.31)	-.016 (-1.66)	-.020 (-1.27)

**Note.** Numbers in parentheses are t-statistics.

empowerment and has never participated in a micro credit program would be in the 72nd empowerment percentile (a 22 percentile increase) if she had borrowed at the mean (log) level of woman participants.

It is useful to compare this calculation to the reduced form result that the median woman would be in the 68th empowerment percentile if her village had a women's micro credit group and she was eligible to participate. It should be expected that participants receive greater benefits on average from participating than eligible nonparticipants, but this 4 percentile gap may seem small. As Pitt and Khandker (1998) point out, it is possible that credit programs can alter the attitudes of those who do not participate in the credit programs as well as those who do, perhaps through demonstration or spillover effects. These externalities may be larger for the eligible (landless) nonparticipants than for the ineligible, as the former are of the same economic and social class as participants. If these village externalities exist, they are not captured by the estimated program effects. It is important to consider that the reduced form equations estimate the average effect of having a village in the program on the empowerment of eligible women compared to ineligible women. In contrast, the conditional demand equations estimate the average effect of program participation on the empowerment of participating women compared to nonparticipating women irrespective of their eligibility status. If program participants gain more from micro credit programs than eligible nonparticipants, who in turn gain more than the ineligible, the estimated average effect of the program on the eligible will be larger than the average effect on participants as village spillovers/externalities are unaccounted for.

As there may be interest in the effect of female and male credit program participation, regression analysis was performed not only on the 10 factors but also on all of the observed variables, including some that were not included in any factor grouping. Estimation of the determinants of the binary responses to individual empowerment questions is complicated for some variables for which there is little or no variation within some villages. The village fixed effect will then perfectly predict the outcomes for the village. Instead, estimated village fixed effects from the model with the corresponding factor are included as independent variables to correct for any heterogeneity bias resulting from nonrandom program placement across villages. Since the results of table 5 demonstrate that the fixed effects estimates are very close to the fixed effects-instrumental variables estimate, only the former are discussed in the context of briefly summarizing the results for each thematic empowerment latent variable. The results for individual observed variables are presented in appendix table A4.

*Purchasing.* Female credit choice positively and significantly ( $t = 4.86$ )

affects the latent empowerment factor describing women's autonomy with purchasing. In addition, female credit significantly augments women's ability to purchase all seven questionnaire items in this category as well as five of six spending decision-making questions. Among those, female credit increases the likelihood that a husband states both that his wife could buy assets on her own and that she could buy them without his permission.

*Resources.* Female credit significantly ( $t = 8.00$ ) increases the latent factor representing a woman's access to and control over economic resources. It also significantly affects several individual indicators, including the likelihood that a man says his wife has her own income, the likelihood that a wife reported having her own income, and the likelihood of her reporting having her own savings (it did not, incidentally, affect the likelihood that a woman had savings that she herself could control). In addition, female credit increases the likelihood that a woman responds that she would be able to raise emergency funds from any source and that she would be able to raise them specifically from (1) selling off assets, (2) getting money from her husband, and (3) borrowing from other people. Female credit decreases the chances that a household reports that it fights about money.

*Finance.* Women's credit significantly increases ( $t = 5.73$ ) the latent empowerment factor associated with finance. Women's micro credit participation significantly increases their role in deciding and implementing household borrowing and in deciding how those borrowed funds are expended. Husband's micro credit participation increases the probability that spouses will fight over household loans.

*Transaction management.* Female credit significantly ( $t = 4.75$ ) increases the factor representing a woman's power to oversee and conduct major household economic transactions. The individual variables describe decision making and implementation arrangements (ranging from full power in the wife's hands to full power in the husband's) and the likelihood that a wife spends money, for four major categories: housing repair, livestock purchase, household loans, and land/equipment transactions. In all four categories, female credit affects women's autonomy regarding decision making and project implementation. The same is true for the likelihood that a woman spends money in every category except land/equipment transactions. Male credit had a negative effect on wives implementing housing repair projects, livestock purchase projects, and land/equipment purchase or sale projects.

*Mobility and networks.* Female credit significantly ( $t = 4.86$ ) affects the factor representing mobility/networking and also affects several individual measures of mobility, including the odds that a husband will report that his wife travels alone outside the house, that a woman reports traveling outside

the house at all, and that she reports traveling outside alone. It also has an effect in reducing the odds that a household will argue about the wife traveling outside. Male credit reduces the mobility and network latent factor ( $t = -2.07$ ), the level of a wife's physical mobility, and the likelihood that she ever travels outside the house (even if accompanied).

*Activism.* Female credit positively affects the factor relating to women's awareness and activism ( $t = 2.56$ ). Female credit positively affects the odds that a woman will be informed of (meaning able to list) the ways in which *kabinnama* (a premarital bridal contract) can be used to help a woman in the event of divorce. Female credit also affects the probability that a woman knows the name of the member of parliament in her area, the probability that she voted in the last election, and the probability that she claims to have voted independently (rather than under advice/pressure from her husband). Male credit reduces the probability that his wife claims to have voted independently.

*Attitudes and husband's behavior.* Female credit significantly ( $t = 2.07$ ) increases the factor relating to household attitudes but not the factor relating to husbands' opinions and actions ( $t = 1.77$ ). This lack of effect on husband's opinions and actions mirrors the reduced form results that found this to be the only factor not significantly affected by female eligibility to participate in villages with a female micro credit group. Female credit affects the likelihood that a man will describe his wife as intelligent and the probability that a woman will say that she does not view her husband as superior to herself. In the questionnaire, men were given the chance to cite positive and/or negative impacts of women's empowerment. Female credit increases the odds that a man listed a positive impact of women's empowerment and decreases the odds that he listed a negative impact. Specifically, female credit affects the odds that a man would cite the creation of a "better society" and "economic improvements for the family" as results from women's empowerment. Male credit has a negative effect on the odds that a husband would say that his wife is as smart as he is.

*Family planning and parenting issues.* Female credit significantly ( $t = 4.28$ ) increases the fertility and parenting latent factor. Women were asked whether they initiated discussion on a range of family planning and parenting issues and whether their husbands initiated discussion (wife initiation and husband initiation were not mutually exclusive: answers could be one, the other, both, or neither). Female credit increases the likelihood that a woman initiates discussions with her husband about birth control use, birth control methods, and birth numbers. In addition, female credit increases the likelihood both that husbands will initiate discussion and that wives will initiate the same discussion for issues of birth control use and children's education (im-

plying a positive effect on the total likelihood of spousal communication on these two issues). Male credit has a negative effect on both the odds that a wife initiated discussion regarding birth control use with her husband and on the odds that she initiated discussion about birth control methods.

## VI. Summary and Conclusion

This article examines the effects of men's and women's participation in group-based micro credit programs on various indicators of women's empowerment using data from a special survey carried out in rural Bangladesh in 1998–99. Credit programs are well suited to studying how gender-specific resources alter intrahousehold allocations because they induce differential participation by gender through the requirement that only one adult member per household can participate in any micro credit program. The results are consistent with the view that women's participation in micro credit programs helps to increase women's empowerment. Credit programs lead to women taking a greater role in household decision making, having greater access to financial and economic resources, having greater social networks, having greater bargaining power vis-à-vis their husbands, and having greater freedom of mobility. They also tend to increase spousal communication in general about family planning and parenting concerns. The effects of male credit on women's empowerment were generally negative. The presence of male micro credit programs had a negative effect on an overall measure of empowerment for eligible households and specifically on women's control of resources, finance, freedom of movement and development of networks, and on fertility and parenting decisions.

What is the evidence that credit programs affect household welfare and that women's empowerment is an important causal pathway for any welfare gains? Pitt and Khandker (1998) provide separate estimates of the influence of borrowing by both men and women on household expenditure, nonland assets held by women, male and female labor supply, and boys' and girls' schooling. They find that credit provided to women was more likely to influence these behaviors than credit provided to men. Credit provided women was found to significantly affect all six of the behaviors studied. Credit provided men did so in only one of six cases. Pitt et al. (2003) find that women's credit has a large and statistically significant impact on two of three measures of the health of both boy and girl children. Credit provided men has no statistically significant impact, and the null hypothesis of equal credit effects by gender of participant is rejected. These results are consistent with an empirical literature that suggests that a mother's relative control over resources importantly alters the human capital of her children, specifically, that children seem to be better off when their mothers control relatively more of their family's resources.

In contrast, the results of Pitt et al. (1999) find that women's participation in micro credit programs has a positive (although not always significant) effect on fertility. However, this finding is not necessarily at odds with the finding in this study that micro credit increases the fertility empowerment latent variable. Income and substitution effect and empowerment effects are not mutually exclusive. The theoretical model in Pitt et al. (1999) suggests that the increase in the shadow price of a child arising from increased labor market opportunities may be quite small in the case of self-employment where there is jointness in the production of child good and the self-employment activity. This small substitution effect may be swamped by an income effect arising from the increased value of the women's time endowment.

In summary, the finding that the effect of women's program participation on outcomes such as child health differs from the effect of men's program participation cannot be taken to necessarily imply that women have gained power in the household. This result can, in principle, reflect standard income and substitution effects. However, our analysis of the relationship of subjectively measured empowerment to micro credit adds another piece of evidence suggesting that program-induced changes in women's empowerment may be a powerful mechanism underlying the differential welfare impacts by gender of participant.

## Appendix

**TABLE A1**  
**LEGEND FOR FULL TEXT AND CODING OF INDIVIDUAL EMPOWERMENT VARIABLES**

Name of Variable	Full Text from Questionnaire	Coding*	Asked Of:	Proportion	Thematic Group†
Food purchase	Do you buy the family's daily consumable food items?	Yes = 1, No = 0	Wife	0 = .839 1 = .161	1
Cosmetics purchase	Do you buy toiletries and cosmetics for your own use?	Yes = 1, No = 0	Wife	0 = .709 1 = .291	1
Candy purchase	Do you buy ice creams, candies, or cookies for your children?	Yes = 1, No = 0	Wife	0 = .386 1 = .614	1, 9
Utensils purchase	Do you buy utensils, pots, and pans for the household?	Yes = 1, No = 0	Wife	0 = .362 1 = .638	1
Furniture purchase	Do you buy household furniture?	Yes = 1, No = 0	Wife	0 = .960 1 = .040	1
Children's clothing purchase	Do you buy clothing for your children?	Yes = 1, No = 0	Wife	0 = .837 1 = .163	1, 9
Own clothing purchase	Do you buy clothing for yourself?	Yes = 1, No = 0	Wife	0 = .806 1 = .194	1
Wife initiates discussion (birth control methods)	Do you initiate discussion of birth control methods?	Yes = 1, No = 0	Wife	0 = .287 1 = .713	9
Wife initiates discussion (birth control use)	Do you initiate discussion of birth control use?	Yes = 1, No = 0	Wife	0 = .270 1 = .730	9
Wife initiates discussion (children's education)	Do you initiate discussion of children's education?	Yes = 1, No = 0	Wife	0 = .172 1 = .828	9
Wife initiates discussion (birth timing)	Do you initiate discussion of birth timing?	Yes = 1, No = 0	Wife	0 = .300 1 = .700	9
Husband initiates discussion (birth timing)	Does your husband initiate discussion of birth timing?	Yes = 1, No = 0	Wife	0 = .368 1 = .632	9
Wife initiates discussion (birth numbers)	Do you initiate discussion of birth numbers?	Yes = 1, No = 0	Wife	0 = .272 1 = .728	9
House repair decision	Who decides issues of repair/construction of the house?	Husband alone = 0, Husband and wife together = 1, Wife alone = 2	Wife	0 = .231 1 = .753 2 = .016	4
House repair implementation	Who implements issues of repair/construction of the house?	Husband alone = 0, Husband and wife together = 1, Wife alone = 2	Wife	0 = .227 1 = .769 2 = .004	4
House repair spending	Do you spend on repair/construction of the house?	Yes = 1, No = 0	Wife	0 = .990 1 = .010	1, 4
Livestock purchase decision	Who decides issues of sale/purchase of livestock?	Husband alone = 0, Husband and wife together = 1, Wife alone = 2	Wife	0 = .240 1 = .747 2 = .013	4

TABLE A1 (Continued)

Name of Variable	Full Text from Questionnaire	Coding*	Asked Of:	Proportion	Thematic Group <sup>†</sup>
Livestock purchase implementation	Who implements issues of sale/purchase of livestock?	Husband alone = 0, Husband and wife together = 1, Wife alone = 2	Wife	0 = .383 1 = .611 2 = .006	4
Livestock spending	Do you spend on sale/purchase of livestock?	Yes = 1, No = 0	Wife	0 = .985 1 = .015	1, 4
Household loans decision	Who decides issues of borrowing money?	Husband alone = 0, Husband and wife together = 1, Wife alone = 2	Wife	0 = .278 1 = .702 2 = .020	3, 4
Household loans implementation	Who implements issues of borrowing money?	Husband alone = 0, Husband and wife together = 1, Wife alone = 2	Wife	0 = .376 1 = .613 2 = .011	3, 4
Household loans spending	Do you spend on issues of borrowing money?	Yes = 1, No = 0	Wife	0 = .973 1 = .027	1, 3, 4
Land/equipment decision	Who decides issues of sale/purchase/mortgage of land/transport or household equipment/irrigation equipment?	Husband alone = 0, Husband and wife together = 1, Wife alone = 2	Wife	0 = .308 1 = .678 2 = .014	4
Land/equipment implementation	Who implements issues of sale/purchase/mortgage of land/transport or household equipment/irrigation equipment?	Husband alone = 0, Husband and wife together = 1, Wife alone = 2	Wife	0 = .466 1 = .529 2 = .005	4
Land/equipment spending	Do you spend on issues of sale/purchase/mortgage of land/transport or household equipment/irrigation equipment?	Yes = 1, No = 0	Wife	0 = .989 1 = .011	1, 4
Husband says wife is intelligent	Do you think that your wife is as intelligent as you are?	Less = 0, Same = 1, More = 2	Husband	0 = .688 1 = .241 2 = .071	7, 8
Wife can buy an asset	Do you think your wife can take decisions in selling/buying of major household assets?	Yes = 1, No = 0	Husband	0 = .807 1 = .193	1, 7
Wife can buy an asset (without husband's permission)	Can your wife buy any asset on her own without your permission?	Yes = 1, No = 0	Husband	0 = .880 1 = .120	1
Wife has own income	Does your wife have her own income?	Yes = 1, No = 0	Husband	0 = .641 1 = .359	2
Husband says wife travels alone	Does your wife go to market/bank/doctor's chambers, and so on alone? If not ...	Yes = 1, No = 0	Husband	0 = .842 1 = .158	5
Reason: women not allowed outside	... Why? Because women are not allowed to go outside?	Yes = 0, No = 1	Husband	0 = .867 1 = .133	5
Reason: lack of safety	... Why? Because of lack of safety?	Yes = 1, No = 0	Husband	0 = .884 1 = .116	5
Reason: wife goes with husband/son	... Why? Because she goes with husband or son?	Yes = 1, No = 0	Husband	0 = .430 1 = .571	5

Reason: wife goes with neighbor	... Why? Because she goes with a neighbor or relative?	Yes = 1, No = 0	Husband	0 = .845 1 = .155	5
Wife has independent income	Do you have your own income, which you can spend without your husband's permission?	Yes = 1, No = 0	Wife	0 = .787 1 = .213	2
Wife has independent savings	Do you have your own savings?	Yes = 1, No = 0	Wife	0 = .645 1 = .355	2
Wife has independent savings which she herself controls	Do you have your own savings which you can decide how to utilize?	Yes = 1, No = 0	Wife	0 = .822 1 = .178	2
Emergency funds access	If you needed 500 taka in an emergency, could you get it (from any source)?	Yes = 1, No = 0	Wife	0 = .342 1 = .658	2
Emergency funds access (asset sale)	If you needed 500 taka in an emergency, could you get it by selling own assets?	Yes = 1, No = 0	Wife	0 = .977 1 = .023	2
Emergency funds access (from husband)	If you needed 500 taka in an emergency, could you get it from your husband?	Yes = 1, No = 0	Wife	0 = .798 1 = .202	8
Emergency funds access (husband's relatives)	If you needed 500 taka in an emergency, could you get it by borrowing from your husband's relatives?	Yes = 1, No = 0	Wife	0 = .830 1 = .171	3, 5
Emergency funds access (own relatives)	If you needed 500 taka in an emergency, could you get it by borrowing from your own relatives?	Yes = 1, No = 0	Wife	0 = .788 1 = .212	3, 5
Emergency funds access (moneylenders)	If you needed 500 taka in an emergency, could you get it by borrowing from moneylenders?	Yes = 1, No = 0	Wife	0 = .984 1 = .016	3
Emergency funds access (other people)	If you needed 500 taka in an emergency, could you get it by borrowing from other people?	Yes = 1, No = 0	Wife	0 = .966 1 = .034	3, 5
Remittance	Have you received money from parents/brothers/sisters or other relatives outside the household in the last 12 months?	Yes = 1, No = 0	Wife	0 = .841 1 = .159	2, 5
Wife can decide how to use remittance	Can you decide yourself how to use that remittance?	No = 0, Partially = 1, Yes = 2	Wife	0 = .182 1 = .634 2 = .184	2
Money seizure by husband	Has your husband ever compelled you to give him money/asset if you don't want to?	Yes = 0, No = 1	Wife	0 = .777 1 = .223	2, 8
Freedom to remit	Can you give away your money/asset at will to somebody?	Yes = 1, No = 0	Wife	0 = .805 1 = .195	2
Husband forbids work outside home	Has your husband ever forced you not to work outside home even if you wanted to?	Yes = 0, No = 1	Wife	0 = .539 1 = .461	8
Visits relatives (without husband's permission)	Have you ever visited your parents or other relatives without your husband's permission?	Yes = 1, No = 0	Wife	0 = .819 1 = .181	5
Marriage has <i>kabinnama</i>	Does your marriage have any <i>kabinnama</i> (prenuptial bride price agreement)?	Yes = 1, No = 0	Wife	0 = .294 1 = .706	6
Awareness of <i>kabinnama</i>	Can <i>kabinnama</i> help a woman in the event of a divorce?	Yes = 1, No = 0	Wife	0 = .056 1 = .944	6
Awareness of inheritance laws	Can a widow establish her legal claim over her dead husband's property?	Yes = 1, No = 0	Wife	0 = .071 1 = .929	6
Has prevented husband remarrying	Have you ever been successful in stopping your husband from remarrying?	Yes = 1, No = 0	Wife	0 = .965 1 = .035	6
Voted (at all)	Did you vote in the last election?	Yes = 1, No = 0	Wife	0 = .153 1 = .845	6

TABLE A1 (Continued)

Name of Variable	Full Text from Questionnaire	Coding*	Asked Of:	Proportion	Thematic Group†
Voted independently	Did you vote in the last election without your husband telling you who to vote for?	Yes = 1, No = 0	Wife	0 = .785 1 = .215	6
Protested against domestic abuse	Did you ever protest against any incidents of wife beating?	Yes = 1, No = 0	Wife	0 = .761 1 = .239	6
Thinks dowry is good	Do you think dowry is good?	Yes = 0, No = 1	Wife	0 = .193 1 = .807	6, 7
Protested against corruption	Did you ever protest against any favoritism by a chairman or a member who distributes government relief?	Yes = 1, No = 0	Wife	0 = .972 1 = .028	6
Confidant within <i>bari</i>	With anybody outside your immediate family/household, but within your <i>bari</i> , are you close enough to share your feelings?	Yes = 1, No = 0	Wife	0 = .151 1 = .849	5
Confidant outside <i>bari</i>	With anybody outside your <i>bari</i> , are you close enough to share your feelings?	Yes = 1, No = 0	Wife	0 = .293 1 = .708	5
Severity of spousal arguments	When you and your husband argue, how bad does the argument get?	Physical abuse = 0, Verbal abuse = 1, Loud arguments = 2, Mild arguments = 3	Wife	0 = .144 1 = .197 2 = .268 3 = .391	8
Own relatives in same village	Do your parents or any sibling live in the same village as you do with your husband?	Yes = 1, No = 0	Wife	0 = .825 1 = .175	5
Wife thinks husband is superior	Is your husband superior to you in qualities and education?	Yes = 0, No = 1	Wife	0 = .946 1 = .054	7
Husband uses male birth control	Do you yourself use any male birth control method?	Yes = 1, No = 0	Husband	0 = .933 1 = .067	9
Husband says women's empowerment leads to better society	Does women's empowerment lead to a better society?	Yes = 1, No = 0	Husband	0 = .571 1 = .429	7
Husband says women's empowerment leads to chaos in society	Does women's empowerment lead to chaos in society?	Yes = 0, No = 1	Husband	0 = .456 1 = .544	7
Husband says women's empowerment leads to problems with kids	Does women's empowerment lead to problems bringing up the children?	Yes = 0, No = 1	Husband	0 = .208 1 = .792	7
Husband says women's empowerment leads to loss of peace	Does women's empowerment lead to loss of family peace?	Yes = 0, No = 1	Husband	0 = .275 1 = .725	7
Husband says women's empowerment leads to the family being better off economically	Does women's empowerment lead to the family being better off economically?	Yes = 1, No = 0	Husband	0 = .678 1 = .323	7
Husband cites positive impact of women's empowerment	Does women's empowerment have a good impact?	Yes = 1, No = 0	Husband	0 = .507 1 = .493	8
Husband cites negative impact of women's empowerment	Does women's empowerment have a bad impact?	Yes = 0, No = 1	Husband	0 = .586 1 = .413	8
Wife has made husband use birth control	Have you ever succeeded in making your husband adopt a male birth control method?	Yes = 1, No = 0	Wife	0 = .903 1 = .097	9

Wife has income-generating activity	Do you have any income-generating activity?	Yes = 1, No = 0	Wife	0 = .696 1 = .304	2
Degree of mobility	How do you go to banks, markets, health centers, or places outside the village (except for your parents' place)?	Doesn't go at all = 0, Goes with husband or son = 1, Goes with women = 2, Goes alone = 3	Wife	0 = .111 1 = .549 2 = .217 3 = .123	5
Prevent remarriage (local government)	How can a wife prevent her husband from remarrying ... by pressing charges in the local administration?	Yes = 1, No = 0	Wife	0 = .692 1 = .308	6
Prevent remarriage ( <i>parishad</i> )	How can a wife prevent her husband from remarrying ... by pressing charges in the <i>Union Parishad</i> ?	Yes = 1, No = 0	Wife	0 = .791 1 = .209	6
Wife views social structure as obstacle	Is the social structure an obstacle to women's empowerment?	Yes = 1, No = 0	Wife	0 = .639 1 = .361	6
Wife views laws as obstacle	Is inheritance law an obstacle to women's empowerment?	Yes = 1, No = 0	Wife	0 = .919 1 = .081	6
Wife views religion as obstacle	Is religion an obstacle to women's empowerment?	Yes = 1, No = 0	Wife	0 = .508 1 = .492	6

\* Most variables are coded with Yes = 1, No = 0. Variables coded differently are shaded.

† Thematic group is coded as follows: 1 = purchasing, 2 = resources, 3 = finance, 4 = transaction management, 5 = mobility and networks, 6 = activism, 7 = household attitudes, 8 = husband's behavior, 9 = fertility and parenting. All variables enter the "general empowerment" group 10 (see text).

**TABLE A2**  
**REDUCED FORM ESTIMATES OF THE DETERMINANT OF WOMEN'S EMPOWERMENT: NONCREDIT INDEPENDENT VARIABLES**

Regressors	Purchasing	Resources	Finance	Transaction Management	Mobility and Networks
Age of household member (years)	.007 (1.26)	-.004 (-.57)	.006 (.63)	.001 (.10)	.006 (.45)
Education of the member (years)	.029 (2.36)	.018 (1.34)	.040 (2.51)	.036 (2.75)	.045 (2.85)
If parents of household head own land	-.014 (-.25)	.036 (.52)	.006 (.06)	.071 (1.07)	-.028 (-.38)
If brothers of household head own land	.032 (.62)	.096 (1.78)	-.011 (-.16)	-.048 (-.86)	.073 (1.13)
If sisters of household head own land	.022 (.40)	.018 (.32)	.069 (1.13)	.021 (.34)	-.011 (-.12)
If parents of household head's spouse own land	.013 (.28)	.048 (.92)	.046 (.86)	-.022 (-.43)	.118 (1.99)
If brothers of household head's spouse own land	.014 (.28)	.068 (1.31)	-.017 (-.25)	-.003 (-.06)	-.079 (-1.30)
If sisters of household head's spouse own land	.097 (1.63)	.080 (1.32)	-.109 (-1.61)	-.077 (-1.25)	.017 (.23)
Household land asset (decimals)	-.022 (-1.39)	-.004 (-.29)	-.017 (-.94)	-.062 (-3.49)	-.039 (-2.15)
Age of household head (years)	-.003 (-.63)	.004 (.75)	-.006 (-.97)	.001 (.13)	-.006 (-.73)
Education of household head (years)	.020 (2.03)	-.006 (-.57)	-.006 (-.31)	.001 (.12)	-.022 (-1.71)
Highest male education in household (years)	.004 (.38)	.004 (.39)	-.017 (-1.67)	-.008 (-.78)	-.011 (-.67)
Highest female education in household (years)	-.011 (-1.26)	.024 (2.60)	.011 (1.08)	.009 (1.00)	.011 (.84)
R <sup>2</sup>	.438	.47	.373	.456	.313
Number of observations	2,064	2,064	2,064	2,061	2,064

	Activism	Household Attitudes	Husband's Behavior	Fertility and Parenting	All Factors
Age of household member (years)	.016 (2.69)	-.004 (-.56)	-.001 (-.09)	-.009 (-1.40)	.001 (.17)
Education of the member (years)	.042 (2.82)	.020 (1.41)	.005 (.50)	.042 (3.18)	.048 (3.84)
If parents of household head own land	-.042 (-.62)	-.004 (-.04)	-.027 (-.36)	.098 (1.48)	.019 (.30)
If brothers of household head own land	.031 (.58)	-.024 (-.41)	.005 (.06)	.001 (.03)	.014 (.26)
If sisters of household head own land	.036 (.58)	.044 (.71)	.027 (.41)	-.004 (-.07)	.051 (.84)
If parents of household head's spouse own land	.047 (.92)	-.076 (-1.31)	-.048 (-.87)	-.003 (-.06)	.009 (.17)
If brothers of household head's spouse own land	.021 (.32)	.011 (.18)	.074 (1.26)	-.042 (-.77)	.009 (.16)
If sisters of household head's spouse own land	-.002 (-.02)	-.096 (-1.61)	-.138 (-2.29)	.087 (1.50)	-.054 (-.90)
Household land asset (decimals)	.031 (1.74)	.004 (.16)	.032 (1.87)	-.023 (-1.37)	-.024 (-1.54)
Age of household head (years)	-.010 (-2.12)	.002 (.28)	-.003 (-.55)	-.013 (-2.65)	-.004 (-.80)
Education of household head (years)	.031 (2.58)	.018 (1.71)	.011 (1.16)	.026 (2.28)	.011 (1.07)
Highest male education in household (years)	.005 (.60)	.004 (.36)	.021 (2.12)	-.004 (-.38)	-.002 (-.23)
Highest female education in household (years)	-.005 (-.71)	.011 (1.31)	.011 (.99)	.010 (1.09)	.013 (1.56)
R <sup>2</sup>	.445	.354	.363	.367	.429
Number of observations	2,064	2,064	2,064	2,064	2,061

**Note.** Numbers in parentheses are t-statistics.

TABLE A3

EFFECT OF CREDIT PROGRAM PARTICIPATION ON THE EMPOWERMENT OF WOMEN IN PARTICIPATING HOUSEHOLDS: NONCREDIT INDEPENDENT VARIABLES

Regressors	Purchasing	Resources	Finance	Transaction Management	Mobility and Networks
Age of household member (years)	.007 (1.27)	-.002 (-.42)	.006 (.59)	.000 (.05)	.006 (.43)
Education of the member (years)	.030 (2.37)	.018 (1.25)	.034 (2.51)	.037 (2.76)	.045 (2.83)
If parents of household head own land	-.016 (-.30)	.038 (.54)	.006 (.11)	.073 (1.10)	-.022 (-.31)
If brothers of household head own land	.031 (.61)	.094 (1.74)	-.006 (-.14)	-.047 (-.84)	.079 (1.16)
If sisters of household head own land	.022 (.40)	.018 (.30)	.069 (1.13)	.021 (.35)	-.006 (-.12)
If parents of household head's spouse own land	.014 (.31)	.050 (.96)	.046 (.81)	-.024 (-.48)	.112 (1.94)
If brothers of household head's spouse own land	.012 (.24)	.076 (1.43)	-.011 (-.22)	-.004 (-.06)	-.079 (-1.23)
If sisters of household head's spouse own land	.096 (1.61)	.076 (1.24)	-.109 (-1.57)	-.075 (-1.20)	.017 (.25)
Household land asset (decimals)	-.022 (-1.45)	-.006 (-.35)	-.017 (-.86)	-.062 (-3.47)	-.039 (-2.07)
Age of household head (years)	-.003 (-.61)	.002 (.60)	-.006 (-.98)	.001 (.16)	-.006 (-.75)
Education of household head (years)	.020 (2.00)	-.006 (-.51)	-.006 (-.28)	.001 (.13)	-.022 (-1.67)
Highest male education in household (years)	.004 (.37)	.004 (.30)	-.017 (-1.62)	-.008 (-.74)	-.006 (-.65)
Highest female education in household (years)	-.011 (-1.28)	.024 (2.52)	.011 (1.12)	.009 (1.04)	.011 (.87)
R <sup>2</sup>	.438	.467	.372	.456	.313
Number of observations	2,064	2,064	2,064	2,061	2,064

	Activism	Household Attitudes	Husband's Behavior	Fertility and Parenting	All Factors
Age of household member (years)	.016 (2.71)	-.002 (-.47)	-.001 (-.07)	-.009 (-1.40)	.001 (.19)
Education of the member (years)	.042 (2.79)	.020 (1.44)	.005 (.51)	.042 (3.17)	.048 (3.82)
If parents of household head own land	-.042 (-.60)	-.013 (-.17)	-.027 (-.39)	.101 (1.51)	.019 (.30)
If brothers of household head own land	.031 (.58)	-.028 (-.46)	.003 (.04)	.003 (.04)	.013 (.25)
If sisters of household head own land	.036 (.57)	.044 (.70)	.027 (.41)	-.004 (-.06)	.051 (.84)
If parents of household head's spouse own land	.047 (.92)	-.070 (-1.21)	-.048 (-.84)	-.004 (-.09)	.010 (.18)
If brothers of household head's spouse own land	.021 (.37)	.006 (.09)	.069 (1.22)	-.041 (-.74)	.009 (.18)
If sisters of household head's spouse own land	-.002 (-.04)	-.098 (-1.67)	-.138 (-2.31)	.089 (1.51)	-.055 (-.91)
Household land asset (decimals)	.031 (-1.74)	.0004 (-.02)	.032 (1.80)	-.023 (-1.33)	-.025 (-1.56)
Age of household head (years)	-.010 (-2.17)	.001 (.29)	-.003 (-.55)	-.013 (-2.66)	-.004 (-.81)
Education of household head (years)	.031 (2.60)	.018 (1.64)	.011 (1.14)	.026 (2.31)	.011 (1.07)
Highest male education in household (years)	.005 (.58)	.004 (.29)	.021 (2.08)	-.004 (-.36)	-.002 (-.25)
Highest female education in household (years)	-.005 (-.71)	.011 (1.21)	.011 (.97)	.010 (1.11)	.013 (1.55)
R <sup>2</sup>	.445	.351	.363	.367	.429
Number of observations	2,064	2,064	2,064	2,064	2,061

**Note.** Numbers in parentheses are t-statistics.

**TABLE A4**  
**CREDIT EFFECTS ON INDIVIDUAL EMPOWERMENT QUESTIONS (VILLAGE FIXED EFFECTS ESTIMATES)**

Name of Variable	Female Credit Coefficient (t-Statistic)	Male Credit Coefficient (t-Statistic)
Food purchase	.04776041 (2.2032317)	.00141589 (.11540183)
Cosmetics purchase	.05860924 (3.0890573)	-.00085887 (-.07842965)
Candy purchase	.06361531 (3.3796502)	.00238608 (.21357556)
Utensils purchase	.06462877 (3.3973055)	-.01015248 (-.91474276)
Furniture purchase	.11399304 (3.3408784)	-.04055258 (-1.7362839)
Children's clothing purchase	.06593455 (3.0208841)	-.01710887 (-1.3094382)
Own clothing purchase	.06782688 (3.2403093)	-.0324938 (-2.541223)
Wife initiates discussion (birth control methods)	.0912055 (4.3732557)	-.03085828 (-2.4979816)
Husband initiates discussion (birth control methods)	.02865999 (1.5042031)	.01073733 (.92167669)
Wife initiates discussion (birth control use)	.12275242 (5.6980881)	-.04567825 (-3.6508717)
Husband initiates discussion (birth control use)	.06501086 (3.3148577)	.00328392 (.27138652)
Wife initiates discussion (children's marriage)	.0733686 (3.0038177)	-.01647947 (-1.1171852)
Husband initiates discussion (children's marriage)	.05491004 (2.2773254)	-.01561035 (-1.0662414)
Wife initiates discussion (children's education)	.12380831 (5.2159512)	-.00700765 (-.47441271)
Husband initiates discussion (children's education)	.14298343 (6.100405)	-.01911873 (-1.3296468)
Wife initiates discussion (birth timing)	.01643459 (.83961744)	.00820515 (.68634246)
Husband initiates discussion (birth timing)	.03155623 (1.6648596)	.02181647 (1.8607394)
Wife initiates discussion (birth numbers)	.08293512 (4.0749984)	-.0060319 (-.49479264)
Husband initiates discussion (birth numbers)	.08366957 (4.298626)	.01287064 (1.0768375)
House repair decision	.08907876 (4.2620781)	-.00975032 (-.78694676)
House repair implementation	.07207265 (3.3856953)	-.05098127 (-4.2001659)
House repair spending	.13213097 (2.2869854)	-.02265464 (-1.044386)
Livestock purchase decision	.12567333 (5.7735449)	-.01387871 (-1.087525)
Livestock purchase implementation	.06872113 (3.5365616)	-.03405356 (-2.9825091)
Livestock spending	.11883032 (2.4274332)	-.00371256 (-.20287309)
Household loans decision	.16210609 (7.6887465)	-.04490973 (-3.8469249)
Household loans implementation	.14057259 (7.1552867)	-.06104301 (-5.4802638)
Household loans spending	.12991344 (3.3276476)	-.08472108 (-2.2018748)
Land/equipment decision	.12638888 (6.2372212)	-.02497008 (-2.1609634)
Land/equipment implementation	.09766105 (5.1815832)	-.03660103 (-3.3099373)
Land/equipment spending	.08693242 (1.5483862)	-.03123732 (-.76965112)
Husband says wife is intelligent	.09782371 (5.1313304)	-.0359709 (-3.1449831)
Wife can buy an asset	.07018261 (3.3838999)	-.0128851 (-1.0876201)
Wife can buy an asset (without husband's permission)	.06747569 (2.8552021)	-.00803558 (-.60671635)
Wife has own income	.12659167 (6.4359697)	-.01102797 (-.99794156)
Husband spends wife's loan money	-.35438 (-9.711638)	-.01802366 (-.68702186)
Husband says wife travels alone	.12570957 (5.7274842)	-.01651619 (-1.3198174)
Wife has independent income	.08544579 (4.1829839)	-.00230439 (-.20117939)
Wife has independent savings	.4468341 (21.264715)	-.1220153 (-10.70441)
Wife has independent savings which she herself controls	.04887458 (1.6630768)	.00488506 (.29625473)
Emergency funds access	.17599848 (8.8439957)	-.04927985 (-4.3592823)
Emergency funds access (asset sale)	.15163642 (3.7263403)	-.05101663 (-2.0145894)
Emergency funds access (from husband)	.05816154 (2.7675279)	.00836456 (.69821613)
Emergency funds access (husband's relatives)	.11225464 (5.3892888)	-.02625655 (-2.1466454)
Emergency funds access (own relatives)	-.0035531 (-.17016661)	-.02508447 (-2.0300173)
Emergency funds access (moneylenders)	-.03163719 (-.65054464)	.01068736 (.36908294)
Emergency funds access (other people)	.08425008 (2.4472459)	-.00779705 (-.37519001)
Wife's control over loans	-.01703254 (-.60133783)	-.0205718 (-1.1283077)
Remittance	-.05035626 (-2.1274473)	.00549734 (.41368397)
Wife can decide how to use remittance	-.02334331 (-.36612289)	.01616041 (.43267576)
Money seizure by husband	-.01399654 (-.68291502)	.01176347 (1.0159757)
Freedom to remit	.07680612 (3.554106)	-.01941725 (-1.596456)
Husband forbids work outside home	-.08583542 (-4.4739977)	.03820209 (3.3884507)
Visits relatives (without husband's permission)	.01911277 (.91810268)	-.04657823 (-3.3794914)
Marriage has <i>kabinnama</i>	.02275705 (1.1305345)	-.00044701 (-.03591271)
Awareness of <i>kabinnama</i>	.05771666 (1.8559487)	.0066104 (.33847749)
Awareness of inheritance laws	.02878196 (.91363229)	-.01984606 (-1.0841944)
Has prevented husband remarrying	.00728302 (.19819264)	.00616823 (.29205465)
Knows MP's name	.08391138 (4.3870888)	-.00768854 (-.68322894)
Voted (at all)	.13131678 (5.1633827)	-.00194159 (-.12746871)
Voted independently	.0414437 (2.0471695)	-.02997352 (-2.3834331)
Protested against domestic abuse	.03678351 (1.8633071)	.01145688 (1.027746)
Thinks dowry is good	.01067717 (.51269369)	.00030867 (.02543997)
Protested against corruption	.04417861 (1.2452415)	-.00056154 (-.02879464)
Confidant within <i>bari</i>	-.03205397 (-1.4444465)	.00007672 (.00579186)

TABLE A4 (Continued)

Name of Variable	Female Credit Coefficient (t-Statistic)	Male Credit Coefficient (t-Statistic)
Interval of contact within <i>bari</i>	-.03091528 (-1.3888953)	-.00121859 (-.09191732)
Confidant outside <i>bari</i>	.06783766 (3.4223935)	.01653874 (1.314044)
Interval of contact outside <i>bari</i>	.07150086 (3.6184072)	.01697922 (1.3522985)
Severity of spousal arguments	-.0394947 (-1.6873243)	.01730603 (1.2730856)
Occurrence of physical spousal abuse	-.03443847 (-1.5268851)	.00547143 (.42907311)
Own relatives in same village	.08333928 (4.0508622)	-.06561099 (-4.6359715)
Wife thinks husband is superior	.1450791 (4.872342)	-.01446311 (-.87795812)
Husband uses male birth control	.02956166 (.93340601)	-.00821234 (-.44513926)
Reason = women not allowed outside	.14900052 (5.0660569)	-.02041713 (-1.1715493)
Reason = lack of safety	-.06532019 (-2.328394)	-.00085579 (-.05026752)
Reason = wife goes with husband/son	.00564198 (.27281459)	.03149786 (2.5582753)
Reason = wife goes with neighbor	.14400445 (6.1232355)	-.06842666 (-4.468412)
Husband says women's empowerment = better society	.05421608 (2.7797372)	-.01704432 (-1.5155241)
Husband says women's empowerment = chaos in society	.03310243 (1.7129112)	-.00927146 (-.82634147)
Husband says women's empowerment = problems with kids	.02226409 (1.073948)	-.01075105 (-.88421994)
Husband says women's empowerment = loss of peace	.0175682 (.88853243)	-.00413204 (-.36055211)
Husband says women's empowerment = better economically	.04666237 (2.3018161)	-.00193728 (-.16867565)
Husband cites positive impact of women's empowerment	.04462788 (2.3051181)	-.02053908 (-1.8382332)
Husband cites negative impact of women's empowerment	.05758083 (2.9349831)	-.00996125 (-.88881097)
Husband's assessment of women's empowerment	.04144622 (2.1361352)	-.01981529 (-1.7648085)
Husband views lack of education as obstacle	.00169411 (.09063681)	.00593213 (.54870205)
Husband views lack of safety as obstacle	-.01163518 (-.6298988)	-.01664214 (-1.5188646)
Husband views lack of income-generating activity as obstacle	.06036897 (2.8999283)	.02357819 (2.0845775)
Husband views social structure as obstacle	-.04693505 (-2.2465429)	.00915417 (.76310031)
Husband views law as obstacle	-.03500877 (-1.0524301)	-.05751117 (-2.1869163)
Wife has made husband use birth control	-.00065728 (-.0240695)	-.03375585 (-1.7794337)
Wife has income-generating activity	.15477253 (8.1828396)	-.04342009 (-3.9260772)
Wife has income-generating activity that she herself operates	.09505125 (4.7972341)	-.01599552 (-1.3898103)
Degree of mobility	.31089568 (7.9629522)	-.07537371 (-4.2162371)
Wife ever travels	.31089568 (7.9629522)	-.07537371 (-4.2162371)
Wife ever travels alone	.11742115 (5.0836324)	-.02500812 (-1.8386287)
Prevent remarriage (threaten divorce)	-.06295729 (-2.779748)	-.00846561 (-.5652342)
Prevent remarriage (family pressure)	.01169626 (.58635634)	-.0105242 (-.85967706)
Prevent remarriage (local government)	.04096012 (2.0876515)	.01848534 (1.5525177)
Prevent remarriage ( <i>parishad</i> )	.02593949 (1.2173839)	.01867645 (1.4848455)
Prevent remarriage (deny permission)	-.01546954 (-.81803909)	.007914 (.68036286)
Household fights about children	.01404173 (.77187727)	-.01900658 (-1.7803394)
Household fights about money	.04539589 (2.4881701)	.02509254 (2.3033101)
Household fights about in-laws	-.04694592 (-1.3519341)	-.00885686 (-.47053079)
Household fights about going outside	.1881154 (3.5742584)	-.02962608 (-1.0165987)
Household fights about loans	-.02284063 (-.85639037)	.04246613 (2.1445597)
Household fights about chores	-.02625961 (-1.4146924)	-.025423 (-2.2501207)
Wife views lack of education as obstacle	-.00427501 (-.2370279)	.01070229 (1.0109335)
Wife views lack of safety as obstacle	-.04081731 (-2.2378315)	-.01799485 (-1.6545223)
Wife views lack of jobs as obstacle	.03693626 (1.9910125)	-.00553119 (-.51098451)
Wife views social structure as obstacle	-.03275009 (-1.7516397)	.02392744 (2.2276055)
Wife views laws as obstacle	.00952706 (.36527339)	-.00408264 (-.2639975)
Wife views religion as obstacle	.02434441 (1.3408948)	-.04375407 (-4.0588575)

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