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Microfinance and its role in household poverty reduction: findings from Pakistan

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Abstract

This study examines whether household access to microfinance reduces poverty, and if so, to what extent and across which dimensions of wellbeing. The study draws on first-hand observations and empirical data gathered from interviews of 1,132 households across 11 districts in the rural areas of the province of Punjab in Pakistan. It employs a quasi-experimental research design and makes use of data collected by interviewing both borrower (treatment) and non-borrower (control) households. Sample selection biases are controlled by matching propensity scores. Findings reveal that although borrowers seem to fare better than non-borrowers across around 70 percent of the indicators, a majority of these are not statistically significant. This suggests that despite producing some degree of positive impact, microfinance institutions still have to make sustained efforts to bring about real difference to the livelihoods of the poor.

Keywords: microfinance, poverty, impact assessment, propensity score matching, Pakistan

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1. Introduction

Poor households in urban and, in particular, rural areas in many developing countries do not have easy access to basic financial services. Their 'systematic exclusion' from formal financial services has led to the evolution of an alternative mode of finance called microfinance, where financial services are provided not through traditional routes, such as local money lenders, cooperatives or banks, but through NGOs or microfinance institutions (MFIs). Microfinance has evolved and expanded from Bangladesh to other developing countries over the last three decades, based on the conviction that the livelihoods of such financially-excluded poor households, without any physical collateral or credit history, can be improved if they have access to small-scale loans or other financial services, such as savings or insurance, offered either to a group or to individuals.

The concept and practice of microfinance, however, has changed dramatically over the last decade as the microfinance sector increasingly adopts a financial systems approach, either by operating on commercial lines or by systematically reducing reliance on interest rate subsidies and/or aid agency financial support (Hulme and Arun 2009). As opposed to the 'welfarist' or poverty approach, the 'self-sustainability' or 'financial systems' approach advocated by the institutionists now covers mainly non-poor or relatively less-poor clients on the fringes of the formal financial system, and it does not target the poorest because of the need for the financial sustainability of the MFIs themselves. As MFIs are required by this approach to lessen their reliance on donor funds and subsidies and adopt good banking practices, they are expected to innovate to ensure provision of more efficient and better financial services with lower costs. Profits are viewed as being not only acceptable, but essential, because they are expected to attract private investment to the sector (Conning 1999). Whilst many MFIs have begun to place more emphasis on the financial systems approach during the recent global recession, some of the major MFIs have designed specialised and targeted products for the very poor. For example, Grameen Bank and BRAC in Bangladesh offer financial products specifically tailored and targeted at the needs of the poorest. BRACs Income Generation for Vulnerable Groups Development (IGVGD) programme, 'provides food subsidies and intensive skills training to vulnerable women, as well as a standard package of microcredit, healthcare and social services' (Maes and Foose 2006, p.11).

While a few empirical studies at the micro level have shown that participants in microfinance programmes have progressively become capable of accessing financial services and escaping from poverty (Matin et al. 2008, Hossain and Zahra 2008), the wider literature on impact evaluations of large-scale programmes has revealed mixed and conflicting findings, with some disagreements amongst academics and practitioners about the effectiveness of microfinance as a poverty reduction measure. At one end of the spectrum lie the studies that have concluded that microfinance is a positive and effective measure of poverty reduction (e.g. Hossain 1988; Barnes 2001; Dunn 2002; Snodgrass and Sebstad 2002; Goldberg 2005; Khandker 2005; Rabbani et al. 2006; Haseen 2006; Mahjabeen 2008; Banerjee, Duflo et al. 2009; Imai et al. 2010). At the opposite end are studies which have argued that employing this strategy has in fact driven people into greater poverty and has weakened the position of women even further, rather than empowering them (e.g. Goetz and Gupta 1996;

Neff 1996; George 2006; Chanana 2007; Bateman 2008). In between, there are studies that have cautioned against considering microfinance as a 'cure-all', yet have endorsed it as assisting people to a certain extent, and have urged that it should be used with 'cautious optimism' (e.g. Bello 2006; Banerjee et al. 2009; Karlan and Zinman 2009). Regardless of the different and apparently contradictory conclusions that have been derived from these empirical studies, which might reflect the diverse settings of the studies (focusing on different geographical areas or drawing on different methodologies), impact assessment nevertheless remains one of the most powerful tools by which programme effectiveness can be measured.

In Pakistan, the microfinance sector has been operational in various forms and sizes for over four decades. Nevertheless, there is a dearth of reliable studies attempting to measure impact using rigorous methods. Claims about the impact of microfinance are not well documented or supported by verifiable evidence (Hussein and Hussein 2003), one of the main reasons for this being the limited availability of primary and secondary data in Pakistan (OPM, 2006).

There are, however, a few empirical studies that have generally confirmed that microfinance intervention has had some positive impacts on the welfare of households in Pakistan. For example, Hussain (2003) shows that there are significant differences between participants and non-participants in microfinance programmes in terms of monthly per capita expenditure, living conditions, literacy rates and, more importantly, increase in income of participants. Montgomery (2005) contends that microcredit programmes have a positive impact on both economic and social indicators of welfare, as well as income-generating activities, especially for the very poorest participants in the programme. Finally, Shirazi and Khan (2009) show that microfinance programmes have a positive impact on poverty reduction in Pakistan and argue that borrowers tend to shift to higher income groups during the given period. In contrast to Montgomery's findings, however, they show that the poverty status of extremely poor borrowers increases only marginally, as they believe that the chronically poor borrow essentially for protection, as opposed to investing in entrepreneurial activities. There is no conclusive evidence of the impact of microfinance in Pakistan and the present study is one of the few to evaluate microfinance programmes where sample selection bias is controlled for.

Multi-dimensional aspects of poverty are particularly relevant to Pakistan. The poor in Pakistan not only have low levels of income, they also lack access to basic services, such as clean drinking water, adequate sanitation, proper education, financial services, employment opportunities, efficient markets, and sufficient and timely health facilities (World Bank, 2007). Despite considerable efforts through various poverty alleviation programmes, widespread social and economic poverty remains a core problem in Pakistan, as its economy is based predominantly on agriculture. Almost 65 percent of the population reside in rural areas and are directly or indirectly linked to agriculture (CIA 2010, World Bank 2002). The FAO (2009) estimates that around 66 percent of the population of Pakistan relies on agriculture for its livelihood. Consequently, the poor are overwhelmingly concentrated in rural areas, where the poverty headcount is 27 percent, more than double the size of that in urban areas. Furthermore, 80 percent of the total poor live in rural areas (IMF 2010). According to the

2007-08 estimates, 22.3 percent of the country's population lives below the poverty line, with another 20.5 percent living in vulnerable conditions (Haq 2008).

As there are no officially-published poverty figures for Pakistan for 2009, researchers have estimated these at various levels. Ahmed and Donoghue (2010), for instance, estimate poverty to have climbed to as much as 40 percent, an increase of almost 80 percent from the 22 percent recorded in 2006. Given the poor performance that the country showed in terms of GDP growth rate (only 1.2 percent in 2009), coupled with the high inflation experienced during 2008-09 (22 percent) and the country's involvement in internal and external conflicts, estimates such as these cannot be regarded as excessive. The recent flooding in the country will place an additional burden on the already fragile economy and, as analysts say, will drag the country back by many years. Given these signs, poverty levels are set to rise in the coming years, and the targets and growth forecasts seem over-ambitious.

The limited access to financial services in the developing world is one of the main obstacles to both income generation and social protection. Nenova et al. (2009: ix) report that out of the 40 percent of the Pakistani population which does not engage in either the formal or informal financial system, an estimated 19 percent have voluntarily excluded themselves through lack of understanding, awareness, need, or for religious reasons. Despite considerable efforts, microfinance has been slow to scale up, and outreach to women has been especially limited. It is estimated that only about eight percent of poor households receive credit from formal sources (World Bank 2007). The size of Pakistan's population and the number of the poor imply that there is a large potential market for microfinance in Pakistan, which, according to PMN estimates, is close to 27 million individuals (Haq 2008), thus bringing the current penetration rate to just 6.97 percent.

The rest of this paper is organised as follows. The next section summarises the survey design and descriptive statistics. Section 3 describes the econometric methodology and model used to control for sample selection biases. Section 4 discusses the results obtained and the main findings of the study. The concluding remarks are presented in Section 5.

2. Survey design and data

This study aims to assess the nature, extent and direction of the socio-economic impact of microfinance programmes on borrowers, based on detailed cross-sectional primary household surveys conducted over 11 districts across the rural parts of Punjab, in Eastern Pakistan. The study is based on a quasi-experimental design survey,¹ whereby comparison is made between two groups of respondents: the control group (represented by non-borrowers) and the treatment group (comprising borrowers). The total sample of 1,132 respondents comprises 463 borrowers and 669 non-borrowers. The hypothesis that we test in our study is: *participation in microfinance programmes improves the socio-economic conditions of member households.*

¹ The field survey was carried out by one of the authors between 2008 and 2009. The questionnaire and further details of the survey will be furnished on request.

In order to select households, a four-stage random stratified sampling technique was applied. In the first stage, 11 out of the 36 districts were selected from the entire province. Districts were selected systematically, as opposed to being selected randomly, in order to control for social and economic disparities that occur across the province between various districts, and to ensure that the selected districts represent maximum and diverse population across the entire province. Starting from the north of the province, districts were selected towards the east, west and south. In the second stage, at least one *tehsil*² was randomly selected from each identified district. In the third stage, at least two villages were subsequently selected randomly from amongst the selected tehsils, and in the fourth and final stage participating and non-participating households were selected at random for conducting surveys.

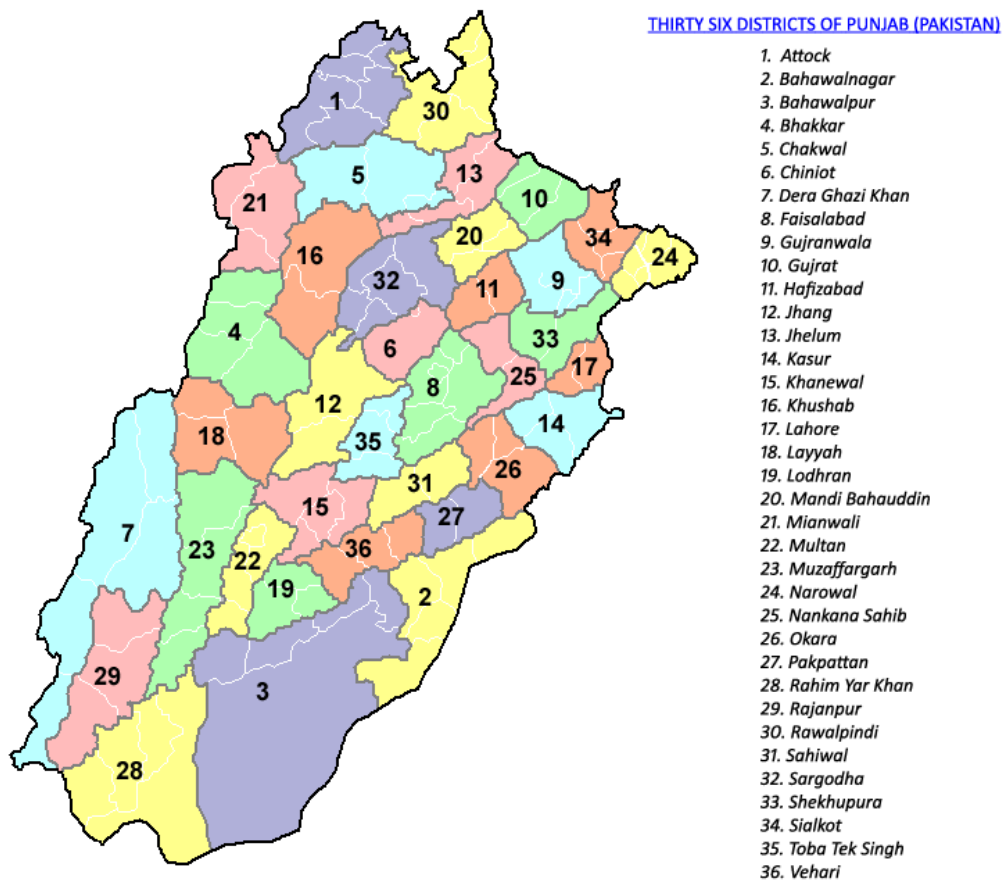


Figure 1: Map of Punjab showing the 36 districts of the province

² For administrative purposes, Pakistan is divided into four provinces and a Federal Capital. Each province comprises several districts, further divided into *tehsils* as administrative divisions. As entities of the local government, tehsils exercise certain fiscal and administrative powers over the villages and municipalities within their jurisdiction.

2.1 Selection and choice of indicators applied

Due to the multidimensional nature of poverty (Armendariz and Morduch 2005; Daley-Harris 2006), it is necessary to have a representative nature of dimensions and accompanying indicators that would reflect the actual poverty of a typical household within the sample frame. After careful screening and extensive pilot testing, the final field instrument comprised questions designed to capture information across the following four dimensions: human resources; dwelling; food security and vulnerability; and ownership of household assets. Table 1 lists the dimensions and related indicators used in the survey.

Table 1: Final list of dimensions and related indicators used in survey

Human resources	Dwelling-related indicators	Food security and vulnerability	Ownership of household assets
Age and sex of adults in household	House ownership	Number of days when staple foods were served	Livestock (cattle and buffalo, sheep and goats, poultry, horses and donkeys, etc.)
Adult literacy	Type of floor	Number of days when vegetables were served	Transportation-related assets (motorcycle, bicycle, carts)
Number of children	Material used for constructing exterior walls and roof	Number of days when meat was served	Appliances and electronics (television, VCR, refrigerator, washing machine, radio/tape/stereo, mobile phone, sewing machine, etc.)
Occupations of adults in household	Number of rooms in the house		
Number of children below the age of 15 in household	Source of water supply		
Annual expenditure on clothing and footwear for all members in household	Type of toilet.		
	Method of bathroom waste disposal		
	Energy for lighting in the house		
	Type of fuel used for cooking		
	Structural condition of house		

The questionnaire was field-tested and a number of indicators were consequently altered to control for local specificities, and to ensure that they fully captured and reflected the relative poverty levels of both groups of households. Indicators such as those relating to highly contextual and subjective responses were subsequently dropped from the final field instrument.

2.2 Descriptive statistics and explanation of variables

The survey respondents represented eight MFIs in the province. As shown in Appendix 1, given the strong nationwide presence of the National Rural Support Programme (NRSP), its borrowers represented almost 32 percent of the total sample. Kashf Foundation's strong presence and extensive outreach in the districts surrounding the provincial capital gave it a share of 28 percent, and the Punjab Rural Support Programme (PRSP) was represented by 14 percent of those interviewed. Appendix 2 reflects the number of loan cycles that respondents had completed at the time of interview. Almost 60 percent were found to be within their first two years of borrowing, while 16 percent were in their third cycle. By principal occupation, although the largest group of respondents were involved in casual labour, at over 32 percent, there is a significant disparity when data is disaggregated across borrowers and non-borrowers. That is, 22 percent of borrowing households reported their occupation as casual labour, as opposed to almost 40 percent of non-borrowing households.

For social and cultural reasons, extended families are common in Pakistan, particularly in the rural areas. The most commonly occurring size of households (mode) was five members. The mean size calculated from the data was 5.98 members per household and the median value 6.00. Household sizes of five to seven members constituted almost 50 percent of the entire sample, while those consisting of eight or more members amounted to around one quarter, and single to four-member households accounted for the remaining 25 percent of the sample. The national average household size is 6.58 members, according to the Household Integrated Economic Survey (GoP 2009a), while the average for Punjab was reported as 6.33 members for 2007-08, close to the mean (5.98) and median (6.00) values reported in the survey results. Household sizes are illustrated in Appendix 3.

In terms of loan size, as shown in Appendices 4 and 5, 22 percent of respondents had availed themselves of loans ranging from Rs.5,000 to Rs.10,000, and 30 percent had credit facilities ranging from Rs. 11,000 to Rs. 15,000. Taken together, these loans (up to Rs.15,000) constituted more than half of the sample. Instalment amounts also corresponded proportionately to the size of loans; it was noted that over 60 percent of the instalment amounts varied from Rs. 1,000 to Rs.2,000, followed by smaller amounts of up to Rs.1,000, and larger amounts that ranged from Rs.2,000 to Rs.2,500, accounting for almost a quarter of the total sample. The sample mean is Rs.17,473, and the median value Rs.15,000.

Literacy rate, according to the Pakistan Social and Living Standards Measurement Survey (PSLM) for 2007-08 (for both males and females, aged 10 and above) was 56 percent at the national level and 53 percent for rural Punjab (GoP 2009b, p. 43). Data from this survey found the adult literacy rate (household members aged 15 and above) to be 39.92 percent, whereas it was 40.02 percent according to PSLM (2007-08). UNESCO's Asia-Pacific Literacy Data Base (2009) estimates Pakistan's adult literacy rate at 54.9 percent (2007 figures estimated in 2008). Both groups of respondents exhibited a fairly uniform pattern, with the borrowing households being slightly better off in having more literate adults, as illustrated in Appendix 6.

PSLM (GoP 2009b) captures data across a series of indicators divided into rural and urban categories across all four provinces, but comparison will only be made with rural Punjab, the province of this study. According to the PSLM survey, 18 percent of the total households in rural parts of Punjab have access to piped water, 44 percent use hand pumps and 35 percent have motorised pumps in their homes. These figures were close to those obtained by the survey carried out for this study, in which 53 percent reported using hand pumps and 30 percent had motorised pumps. Data published by PSLM for access to toilet facilities revealed that 51 percent had access to flushed toilet systems and 49 percent did not have any facility at all. The survey for this study found 57 percent and 42 percent for the two classes, respectively. Data for drainage systems were captured across three categories: covered, open and no facility, which was reported by the survey at six percent, 67 percent and 27 percent, respectively (Appendix 7).

In addition to water and sanitation facilities, the survey for this study captured vital data relating to households' general dwelling conditions. Data collected for home ownership showed that around 94 percent of respondents owned the houses they were living in. Roofing structures were dominated by metal beams and bricks at 52 percent, followed by wooden beams and bricks at 42 percent. Only six percent of the houses had concrete roofs. For construction of exterior walls, bricks were used in 75 percent of the cases, and mud for the remaining 25 percent. Mud was more commonly used as flooring material (68 percent) as opposed to the brick or cement floors found in the remaining 32 percent of houses. Electricity for lighting was reported at over 95 percent. In terms of type of energy used for cooking, the most common form was firewood (65 percent), followed by 27 percent that used animal-dung cakes (the cheapest alternative); only eight percent used methane gas cylinders. Appendix 8 illustrates the various dwelling-related indicators that survey respondents exhibited.

Finally, the field instrument contained questions that were designed to capture elements of borrowers' behaviour, views and attitudes towards credit. As shown in the table in Appendix 9, in terms of purpose of obtaining credit, 43 percent stated that it was for establishing a new business, while 57 percent reported its use for expanding businesses. When asked about the usefulness of the loan, around 81 percent expressed satisfaction, but 19 percent reported not finding it beneficial. This figure of unsatisfied borrowers matches the proportion of those who had no plans for borrowing in future (17 percent); around 75 percent were willing to borrow in the next cycle and around eight percent were still undecided at the time of interview. As expected, delinquency was almost absent and the repayment rate was very high (approximately 99 percent), an indication that borrowers continue to repay regularly, despite the difficulties that they face or their decision not to borrow in future. What is noteworthy, however, is that 'missed' payments were usually paid in the following month, and hence cannot be considered 'defaults' per se.

3. Modelling methodology

We measure the impact of treatment on the outcome, which is the impact of borrowing within MFI programmes on the livelihood of the households, by estimating the difference between individuals who received the treatment and those who did not receive the treatment. We apply the standard approach of matching widely used in the literature, formalised by Rubin (1973). This is defined as:

$$\Delta_i = Y_i^1 - Y_i^0 \quad (1)$$

where Δ_i is the treatment effect of individual i , in which $i=1,2,\dots,N$. Y_i^1 and Y_i^0 are the potential outcomes for treated and non-treated individuals, respectively. Even though we use cross-sectional data (as opposed to panel data) the equation (1) is supposed to approximate the difference between the potential outcomes before and after receiving the treatment for each individual under certain assumptions. It is noted that, for each individual i in (1), there is only one observed outcome and the other is counterfactual and is not observed from the data. This makes it impossible to directly calculate, using cross-sectional data, the difference between the outcomes before and after treatment for each individual or household.

Therefore, equation (1) is modified to estimate the average treatment effects on the treated, Δ_{TT} , which can be expressed formally as:

$$\Delta_{TT} = E(\Delta | D = 1) = E(Y^1 | D = 1) - E(Y^0 | D = 1) \quad (2)$$

Δ_{TT} measures the difference between the expected outcome with and without treatment for the actual participants. The term $E(Y^1 | D = 1)$ represents expected outcomes for programme participants, while $E(Y^0 | D = 1)$ is the hypothetical outcome that would have resulted if the programme participants had *not* participated. In short, equation (2) allows extraction of the effect of the treatment programme on the treated from the total effects estimated. Finally, equation (2) is used in the present study as an estimator to answer this counterfactual question: 'What would be the state of those individuals who participated in microfinance programmes if they had not actually borrowed?'

3.1 Selection bias issue

The equation (2) may be subject to selection biases, as $E(Y^0 | D = 1)$ is an unobserved counterfactual outcome of treated individuals. If the approximation $E(Y^0 | D = 1) = E(Y^0 | D = 0)$ holds true, then non-participants can be conveniently used as the comparison group. However, with non-experimental data, this condition does not generally hold, since the components which determine the participation decision also determine the outcome variable of interest. Thus, the outcomes of the participants would differ even in the absence of programme participation, leading to selection bias.

When the bias is due to observables, we face a scenario known as *self-selection bias*. This refers to the case that the outcomes are not observed for all individuals, since they cannot

participate in the treatment programmes at the same time. One way to handle this bias is by implementing matching procedures, such as covariate matching (as in Rubin 1973) and propensity scores, as suggested by Rosenbaum and Rubin (1985) (RB, hereafter), which use non-participants' available information to estimate the impact. In this paper, we use Propensity Score Matching (PSM) to handle the bias, since it solves the problem of multi-dimensionality which arises from the application of covariate matching with a large number of covariates.

Observables are not, however, the only source of bias, as bias associated with unobservables is possible. In order to control for this, the instrumental variables (IV) approach can be used, as in Heckman et al. (1997) and Moffitt (1996). One of the methodological advantages in using statistical matching rather than the IV estimation approach is that the former does not assume linearity and is valid even though distributions of explanatory variables of treatment and control groups overlap relatively little; and it does not require a valid set of instruments.³ However, the matching approach (e.g. PSM) does help to eliminate much of any bias associated with unobservables. Indeed, replication studies comparing non-experimental evaluations, such as PSM, with experiments for the same programs do not appear to have found such an example in practice. For example, Heckman et al. (1997) in an evaluation of job training programmes have shown that the matching method applied to the control groups in the same labour markets using the same questionnaire would eliminate much of the selection bias associated with unobservables, although the remaining bias is still non-negligible. Furthermore, Chemin (2008) applied PSM to the cross-sectional household data set on Bangladesh in 1991/92 and evaluated the impact of participation in microfinance programmes on a number of outcome indicators. The study found that microfinance had a positive impact on participants' expenditure, supply of labour and male/female school enrolment. The results are consistent with an earlier study by Pitt and Khandker (1998), who applied the IV technique to the same data. In our data, the members of the control group were selected to be geographically close to the members of the treatment group, and the same questionnaire was used for both groups, so it is conjectured that selection bias on unobservables has been minimised.

Thus, in the context of this study, the bias is defined as the difference between the outcomes of programme participation and non-participation. Formally:

$$bias = E(Y^1 | D = 1) - E(Y^0 | D = 0) \quad (3)$$

As the effect of interest of those treated participants is captured by (3), we also need to remove the effect of non-treated participants, which is defined as:

$$E(Y^0 | D = 0) - E(Y^0 | D = 1) \quad (4)$$

Equation (5) defines the sub-set of all individuals who are non-participants and have not been treated. Therefore the bias is the difference between the effect on the treated

³ Methodological issues and programs for propensity score matching estimation are discussed in detail in a number of studies, such as Becker and Ichino (2002), Dehejia (2005), Dehejia and Wahba (2002) and Smith and Todd (2005).

participants and the difference between effects on non-treated participants and non-participants. Formally:

$$\Delta_{TT} - [E(Y^0 | D = 0) - E(Y^0 | D = 1)] = E(Y^1 | D = 1) - E(Y^0 | D = 1) - E(Y^0 | D = 0) + E(Y^0 | D = 1) \quad (5)$$

$$\Delta_{TT} - [E(Y^0 | D = 0) - E(Y^0 | D = 1)] = E(Y^1 | D = 1) - E(Y^0 | D = 0) \quad (6)$$

In the ideal case, the bias is zero, which implies:

$$E(Y^1 | D = 1) - E(Y^0 | D = 0) = 0 \Leftrightarrow E(Y^1 | D = 1) = E(Y^0 | D = 0) \quad (7)$$

Therefore, Δ_{TT} is identified only when equation (7) holds, thus solving the issue of self-selection.

3.2 PSM Estimator and estimation methodology

Equation (2) is estimated from the PSM estimator. Rubin introduced what is known as a balancing score to avoid the problem of high dimensionality. The balancing score suggested by Rubin is defined as a propensity score, which is a function that estimates the probability of participating in the programme given the observed covariates (e.g. observed characteristics for each individual). Formally, the propensity score is defined as:

$$P(D = 1 | X) = P(X) \quad (8)$$

This latter is estimated using one of the models available in the literature, such as the logit or probit model. These models predict the likelihood that individuals would join the microfinance programmes conditional on their personal characteristics. Following much of the literature, equation (8) is specified as a probit model and expressed as follows:

$$P(D = 1 | X) = P(y^* > 0 | X) = P(u > -X\beta | X) = 1 - G(-X\beta) = G(X\beta) \quad (9)$$

where $0 < G(X\beta) < 1$, for all values of covariates X , $X\beta = \sum_{j=1}^k \beta_j X_j$ and G is a standard normal cumulative function. The model in (9) is non-linear and therefore the estimator implemented is a maximum likelihood estimator.

Equation (9) satisfies the unconfoundedness assumption, which implies in this case that potential outcomes are independent of treatment, given the set of covariates X such that: $Y^0, Y^1 \perp D | P(X)$, as well as the overlap condition. This latter ensures all individuals with the same characteristics in the sample have a positive probability of being participants and non-participants (i.e. $0 < P(D = 1 | X) < 1$). Therefore, the PSM estimator of Δ_{TT} is selection-bias free. Formally, the PSM estimator defined is as:

$$\Delta_{TT}^{PSM} = E_{P(X)|D=1} [E(Y^1 | D = 1, P(X)) - E(Y^0 | D = 1, P(0))] \quad (10)$$

A number of matching algorithms have been suggested in the literature to contrast the outcome of treated individuals with the outcome of individuals in the comparison group (i.e. borrowers and non-borrowers). We report the results of two matching algorithms, namely, *stratification* and *kernel* matching,⁴ which are widely used in the literature. Using these matching algorithms avoids any shortcomings that may result from relying on a single method, and it also helps to check the robustness of the estimated impact.

3.3 PSM estimates: general discussion

Appendix 10 reports the estimation output of the propensity score using the probit model reported in the first panel, along with its estimated marginal effects reported in the second panel. The dependent variable is whether the household participated in the microfinance programme. We assume that household composition and characteristics, conditions of housing, infrastructure, and participation in the labour market would affect the decision to participate, and we use the reduced form of equation for the programme participation equation. The explanatory variables include age of household adults, occupation of household head and adults, child dependency ratio, access to electricity, home ownership status (owned or rented), consumption of luxury food, such as beef, percentage of literate adults, and availability and type of toilet.

Among the explanatory variables, type of occupation of household head, home ownership, consumption of luxury food (beef), and consumption of staple food had a negative and statistically significant effect on the likelihood of borrowing money, or of joining the programme. This implies that better living conditions as well as higher consumption of beef and staple food lowered the probability of individuals joining the programme. On the other hand, indicators such as child dependency ratio, instances of child labour and availability and type of toilet have a positive and statistically significant effect on the probability of borrowing or joining the programme; these indicators reflect the fact that household members are in deprivation, encouraging one of the members to borrow to set up small family-run businesses.

Distribution of the estimated propensity score of all the households resulted in some 11 observations being dropped from the matching procedure, since they lay outside the overlap region. This is shown in Appendix 11 where the propensity score distributions for both groups are displayed. Six blocks are estimated to be within the common support region in which the balancing property is confirmed for each block and all individuals within the range [0.138, 0.982] are kept in the model. Thus, 462 borrowers are to be matched to 659 non-borrowers. The intervals identified are of [0.131, 0.2], [0.2, 0.3], [0.3, 0.4], [0.4, 0.6], [0.6, 0.8], and [0.8, 0.982] with 42, 195, 303, 512, 61 and eight overlaps in each block,

⁴ Stratification matching is based on splitting the predicted propensity score within the common support region into intervals in a way that in each interval there are treated and controls, while Kernel matching is a non-parametric algorithm that uses weighted averages of almost all the individuals in the control group to construct the counterfactual outcome. See Becker and Ichino (2002) or Caliendo and Kopeinig (2008) for more details.

respectively. This gives the fourth block the largest overlap, while the last interval has the least number of individuals with common characteristics. In all blocks, the balancing property is tested and there is no significant difference between the means of the treated group and control group as reported. With the balancing property satisfied and six blocks estimated, the PSM estimator satisfies the unconfoundedness and overlap conditions, and is thus bias-free.

The matching of covariates is well balanced, using the propensity score estimated within the common support region. A test of the equality (t statistic) of the two samples before and after matching is run for each covariate, in which the null hypothesis states that the means of a covariate in the comparison and treated groups are equal. If we accept the null hypothesis then the two groups are well balanced. It has been confirmed that all covariates are well balanced after matching⁵ and thus matching quality for each covariate individually is not an issue.

4. Survey findings: economic and social impact of microfinance

The sections above discussed the methods and various procedures adopted to control the sample of any selection biases. Once tests showed that both groups (control and treatment) were at par, the average treatment-on-treated effect (ATT) and the t -statistics for each indicator across the four dimensions of wellbeing were calculated, as shown in Table 2. As discussed in detail below, across each dimension, statistically significant values provide strong evidence that disparities in both groups did not occur merely by chance, but are attributable to programme participation.

⁵ Details will be furnished on request.

Table 2: Average Treatment-on-Treated effect (ATT) and *t*-statistics across various dimensions and associated indicators

Variables	KERNEL		STRATIFICATION		Variables	KERNEL		STRATIFICATION	
	ATT	<i>t-stat</i>	ATT	<i>t-stat</i>		ATT	<i>t-stat</i>	ATT	<i>t-stat</i>
LIVESTOCK					HUMAN DEVELOPMENT INDICATORS (continued)				
Poultry 168.89		1.5	171.42	1.46	Clothing expenditure: percentage of income	-0.15	-0.66	-0.16	-0.64
Cows 4,292.73		0.89	4,096.13	0.88	Clothing expenditure: percentage of expenditure	0.48	1.64*	0.4	1.27
Total livestock value	5,241.99	1.06	4,958.42	1.07	Monthly expenditure on healthcare	148.1	3.29***	148.28	3.84***
TRANSPORT-RELATED ASSETS					Poverty ranks	0.1	2.09**	0.09	1.80*
Motorcycle -591.33		-0.66	-896.35	-0.99	Poverty score	0.07	1.1	0.06	1.01
Bicycle 142.55		1.62	136.44	1.51	Children currently at school	0.03	0.35	0.02	0.16
Carts -231.3		-0.19	-110.98	-0.09	Monthly children's schooling expenditure	53.33	0.39	17.46	0.11
Total transport assets value	-680.08	-0.46	-870.89	-0.7	Total children in household	0.07	0.58	0.08	0.69
SAVINGS					Total family size	-0.02	-0.15	-0.02	-0.14
ROSCA (participation in schemes)	0.08	3.99***	0.08	4.17***	Monthly household expenditure	229.84	0.89	211.01	0.89
Total ROSCA encashment amount	1,722.99	1.2	1,544.77	0.94	Monthly household income	1,301.16	2.76***	1,221.75	2.60***
APPLIANCES AND ELECTRONICS					FOOD CONSUMPTION AND PURCHASE-RELATED INDICATORS				
Mobile phones	-104.63	-0.84	-116.35	-0.93	Consumption of luxury food: chicken	0.06	1.93*	0.05	1.62
Radio -87.57		-1.62	-83.79	-1.70*	Consumption of luxury food: mutton	-0.02	-0.6	-0.02	-0.77
Sewing machine	33.01	0.32	14.66	0.15	Purchase of staple food: wheat	0.34	1.86*	0.29	1.54
TV 364.03		1.97**	344.52	1.62	DWELLING-RELATED INDICATORS				
VCR -15.29		-0.2	-14.96	-0.21	Type of cooking fuel used	-0.07	-0.98	-0.07	-0.97
Washing machine	-65.38	-0.48	-84.09	-0.55	Material used for constructing floors	0.06	1.3	0.06	1.04
Total appliances and electronics	124.76	0.18	80.7	0.11	Overall condition of house	0.05	1.3	0.05	1.23
Value of assets per person	601.43	0.64	558.92	0.56	Material used for constructing roof	0.18	2.71***	0.17	2.53**
Total value of household assets	4,686.67	0.85	4,168.23	0.76	Material used for constructing walls	0.15	2.84***	0.15	3.06***
HUMAN DEVELOPMENT INDICATORS					Source of water supply in house	0.26	3.26***	0.23	2.64***
Per capita expenditure on clothing and footwear	112.37	2.43**	103.35	2.08**	Method used for waste water disposal	-0.02	-0.67	-0.03	-0.99
Clothing and footwear expenses per annum	632.08	2.35**	569.86	1.90*					

Source: Survey data. 1% *t* critical value is 2.576 (***significant at 1%). 5% *t* critical value is 1.96 (** significant at 5%). 10% *t* critical value is 1.645 (*significant at 10%).

4.1 Asset accumulation and household wellbeing

Out of the four dimensions across which various indicators were captured by the survey, assets tend to be more stable over time and hence are a better indicator of economic wellbeing than income or expenditure. Moreover, assets are normally calculated to represent an annual estimate and represent the enduring results of income flows and expenditures. Another important role that household assets play during 'lean' periods is helping to cope with adverse conditions and in periods of low and unstable income; as their disposal can 'smooth' consumption and expenditure during crises. Household assets in the survey were captured across two dimensions: physical assets (tangible) and human capital (intangible). Tangible household assets were further classified into livestock, transport-related assets, savings (financial capital), and appliances and electronics.

Livestock constitute an important category of assets for the rural poor, as they can be classified as 'income-generating' and provide a means of livelihood. A substantial portion of borrowing was done to purchase cows and goats, and some households relied exclusively on livestock as a source of income, although they were found to provide supplementary income in most cases. Survey findings show that borrowers seem to fare better in terms of livestock-related assets, albeit not to a significant level. Differences in poultry, being of small monetary value, show borrowers to be marginally at an advantage (on the average between both methods) by around Rs.170; they were statistically non-significant with *t* statistics 1.50. ATT for cows was positive and large, but not statistically significant and does not lead to any firm conclusion.

In the case of transport-related assets, non-borrowers seemed to fare better, although the differences were not statistically significant. Bicycles were the only asset where borrowers seemed to be better off, by small amounts, as compared to non-borrowers, by values ranging from Rs.136 to Rs.142 across the two methods used for comparison, with *t* statistics ranging from 1.51 to 1.62.

Savings constitute an important component of financial capital. Robinson (2001:21) argues that:

deposit services are more valuable than credit for poorer households. With savings, not only can households build up assets to use as collateral, but they can also better smooth seasonal consumption needs, finance major expenditures such as school fees, self-insure against major shocks, and self-finance investments.

Owing to the variation in policies and the erratic and inconsistent saving behaviour of client households, the most suitable and relevant proxy for establishing saving behaviour of respondents was considering participation in ROSCA (Rotating Savings and Credit Association) schemes, which are a form of informal saving model found in many parts of the world, known by different names. Survey findings show that there is a marked difference in saving behaviour across both groups. As shown in Table 2, borrowers show a much higher probability and incidence of participation in ROSCA schemes than did non-borrowers. Moreover, there was an average difference (ranging from Rs. 1,723 to Rs. 1,545, across kernel and stratification methods) in the encashment amount of the scheme, with borrowers

saving greater amounts and, as would be expected, contributing more (around Rs. 105 monthly) towards instalments. A possible explanation is that once rural households start to participate in microcredit programmes, they develop a sense of financial access and realise the importance of participating in saving schemes. In the absence of formal options, they resort to semi-formal models (such as ROSCA, in this case) and commit a certain amount to be contributed.

As opposed to livestock, the impact of borrowing on appliances and electronics was not so pronounced. There was a very small, almost negligible difference across household electronics such as fridges, VCRs and sewing machines, whereas non-borrowers seemed to fare slightly better in terms of owning radios. Borrowers, however, seemed to be better off in owning televisions (with average difference in values ranging from Rs.344 to Rs.364 across both methods) as compared to non-borrowers. Borrowers were also found to be better off if comparisons were made of the overall value of appliances and electronics, although the difference was not statistically significant. The overall value of total or per capita household tangible assets owned by borrowers was found to be greater than that of non-borrowers, but it is not statistically significant.

4.2 Human resources

Our survey questionnaire also captures various demographic characteristics of household members, household income and amounts spent on clothing and footwear, children's schooling, and healthcare. Clothing and footwear expenditure shows that borrower households spend more than non-borrowers, and the difference ranges from Rs. 569 to Rs.632 which is statistically significant at the five percent level. Calculations also reveal that borrowing households' spending on healthcare was on average Rs. 148 more than non-borrowers' and the difference is statistically significant at the one percent level. In terms of indicators on literacy, borrowing households were found to be slightly better in terms of adult literacy, while school attendance was found to be almost the same for both groups. There was, however, a small and non-significant difference in the amount of average monthly schooling expenditure with borrower households spending more. There are minor, almost negligible, differences when households are compared for total adults, children and total family size.

4.3 Household income and expenditure

Table 2 portrays the differences between both groups of respondents in terms of monthly household income and expenditure. While the difference in expenditure is inconsequential (varying from Rs.211 to Rs.230 across matching methods), the difference in income is both substantial (given that the sample's median income is Rs. 7,500), as well as statistically significant at the one percent level. Depending on the matching method used, monthly income of borrowers is greater by Rs.1,221 (stratification) and Rs. 1,301 (kernel method). This disparity can be attributed to a number of factors. One possible explanation is that borrowers supplement their income by obtaining microcredit and investing the amount in livestock or other small income-generating assets, such as a sewing machine, bicycle or cart. On the other hand, if they have access to savings, borrowers can combine credit from

the MFI and invest in a larger asset, which acts as the primary source of income. Examples from the survey include setting up a roadside hotel, a barber's shop, a bicycle repair shop, buying a donkey-cart, purchasing a cow or selling an existing one and 'upgrading' to a better breed.

4.4 Food security and consumption behaviour

The present study focuses on dietary diversity, food quality, frequency of purchase and stock of storable staple foods as proxy indicators for food security. As shown in the calculations, borrowers were seen to fare better in terms of consuming 'luxury food' (chicken) more often than non-borrowers. The indicator was captured by enquiring how many days the household consumes chicken or mutton (both identified as luxury foods within the local context). For ease of recall and to ensure accuracy, the period was kept to one week. The frequency of chicken consumption was found to be significant (at the 10 percent level), while mutton favoured non-borrowers by a negligibly small amount. Since borrowing households consume more luxury foods, consumption of staple food (wheat, in the case of this survey) was found to occur in greater frequency amongst non-borrowing households, as would be expected.

Other indicators in this dimension were the frequency of purchase and the stocks of storable staple food held on the premises. These indicators are very sensitive and capture relative household wellbeing by estimating the number of weeks of wheat that the household has in store, the proxy for which was the frequency of its purchase. Poorer households were observed to purchase more frequently, possibly due to liquidity constraints, with the poorest having to purchase on a daily basis. The frequency was captured across an ordered variable, ranging from a daily basis to weekly, fortnightly, monthly, biannually and annually. Table 2 shows that borrowers seem to be better off in terms of holding stocks of wheat, as the *purchase of wheat* indicator was found to be statistically significant (at the 10 percent level).

4.5 Dwelling-related indicators

The dimension that measured housing conditions was captured across various indicators, such as the type of cooking fuel used, energy used for lighting, material used for constructing floors, roofs, walls, source of water supply, and the method used for waste water disposal. Finally, the overall condition of the house was ranked during interviews by observing its condition. The results show that borrowers seem to live in better conditions than non-borrowers across all indicators, except for the type of cooking fuel used and the method of disposing of waste water, where non-borrowers show very slight, negligible instances of being at an advantage. The most pronounced and statistically significant differences were found in 'the type and material used for constructing roofs, internal and external walls' and 'the source of water supply in the house'. All of these reflect better dwelling conditions enjoyed by borrowers.

5. Concluding remarks

Drawing up on a primary provincial-level cross-sectional household survey conducted in Pakistan, the present study analyses the extent and direction of programme impact on borrowers, assessed through a range of dimensions that captured and reflected relative well-being of a typical rural household in Pakistan. Household characteristics were captured across four dimensions, further segregated into various indicators, the data on which was gathered by administering a semi-structured questionnaire in the field. The research was based on the quasi-experimental design that compared differences between borrowers and non-borrowers. In order to control for any selection bias that may have arisen during sampling of households, the propensity score matching model was applied, through which the average treatment-on-treated effect was finally computed.

As discussed in the previous sections, borrowers were seen to fare better in most of the indicators across various dimensions of relative household wellbeing. The extent of the difference across both groups was substantial as well as statistically significant in some indicators, while it was found to be weak and negligible in others. For example, borrowers performed better in terms of livestock, participation in savings schemes, and overall value of household assets. Borrowers' household income and expenditure was also seen to be better and in terms of food consumption they had a slight edge over non-borrowers, as they were found to consume more 'luxury' foods and also had larger stocks of storable staple foods. In the case of dwelling-related indicators, borrowers had a better quality of floors, roofs, walls, and water supply in their houses, although non-borrowers seemed to use better quality cooking fuel and had improved waste water disposal systems. The most prominent and statistically significant differences across both groups favoured borrowers, and were observed in savings, televisions, expenditure on healthcare, monthly household income, expenditure on clothing and footwear, and certain dwelling characteristics, such as water supply and quality of roofing and walls. Overall, borrowers were seen to be better in around 70 percent of the indicators across which comparisons were made in the final model. Borrowing households, in comparison with non-borrowers, were therefore able to increase household income by investing more in productive assets, such as livestock or sewing machines; this income was either saved for future investment or was consumed in the form of 'luxury' foods or for stocking staple food items, or was incurred on healthcare. Given the persistence of poverty and vulnerability in rural Pakistan, the results show that microfinance can be used as an effective measure in alleviating poverty in the country.

As the nature of poverty is multi-dimensional, people's needs are unique and hence have to be addressed by offering them distinctive, customized solutions. MFIs in Pakistan lack innovation and have a limited number of programmes to offer. The 'one size fits all' approach was observed across almost all lenders who formed part of the survey, as most of them offered basic credit and saving facilities, with rigid rules regarding interest rates, loan sizes, or borrower selection criteria. Most of the successful MFIs in the world have been observed to have an assortment of products and services that are tailor-made to suit specific groups of vulnerable clients. BRAC's programmes committed to targeting the ultra poor (TUP and IGVGD) and Graameen Bank's beggar loans are such examples. These programmes combine livelihood protection (food aid, employment) with livelihood promotion (financial

services with skills training) and are geared towards assisting the poorest to gradually move out of poverty. Pakistan would need to implement programmes such as these to address the multi-dimensional poverty and bring about real change to livelihoods.^{6 7}

Despite the limitations in the methodology of PSM applied to cross-sectional data, such as the possible bias arising from unobservable factors, the study has confirmed that microfinance programmes had a positive impact on the welfare of participating households; that is, the poverty-reducing effects were observed and statistically significant on a number of indicators, including expenditure on health care or clothing, monthly household income, and certain dwelling characteristics, such as water supply and quality of roofing and walls. Much more sustained efforts, however, such as tailoring the microfinance programmes to meet borrowers' demands, would make the positive impact more pronounced, given the limited access to financial services in Pakistan.

⁶ During focus groups and individual interviews, many borrowers complained of the size of the loan, which was too small to start any business and required very frequent repayments. If lenders are sensitive to such basic borrower demands, the impact will be more pronounced without affecting institutional sustainability.

⁷ Limited access to financial services in the developing world is one of the main obstacles to both income generation and social protection. Demirgüç-Kunt et al. (2008) use a composite measure of estimating financial inclusion and reveal that only 12 percent of people in Pakistan have access to an account with a financial intermediary. This is seen to be especially low if compared to 48 percent in India, 59 percent in Sri Lanka, and 32 percent in Bangladesh (Haq 2008).

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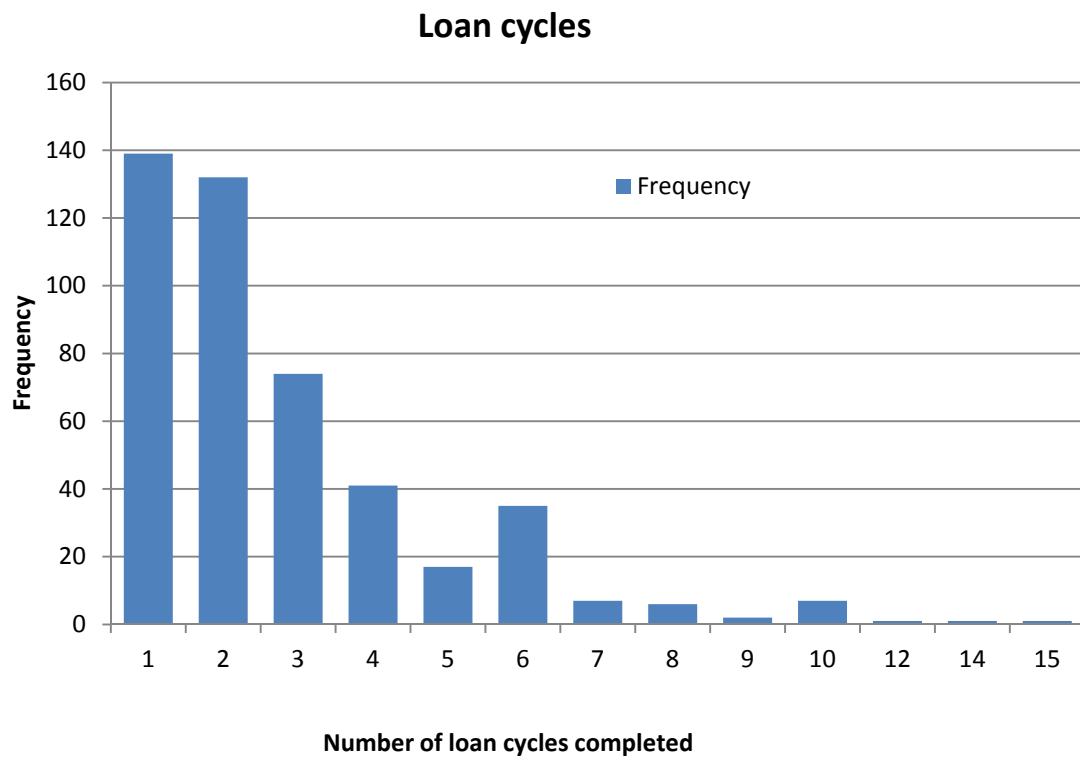
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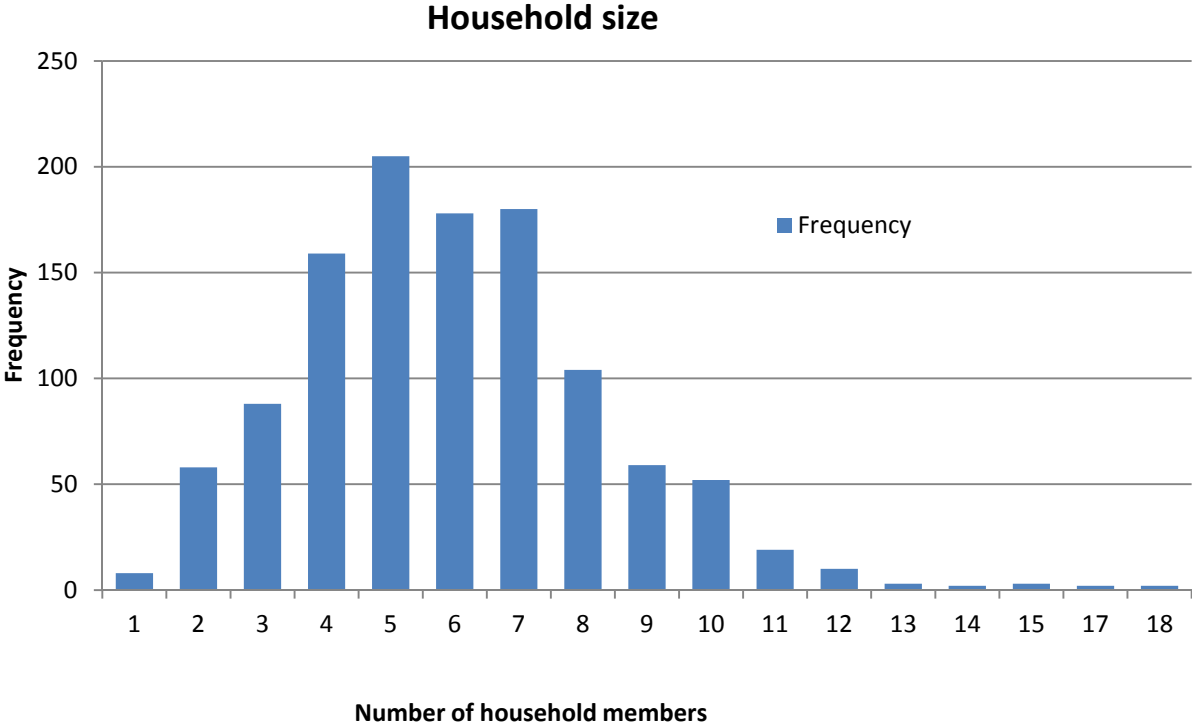
Appendix 1: Distribution of institutional participation among survey participants

Microfinance institution	1	2	3	%	Grand total
National Rural Support Programme (NRSP)	153	4	1	31.66	158
Kashf Foundation	138	2	0	28.06	140
Punjab Rural Support Programme (PRSP)	67	2	2	14.23	71
Khushhali Bank	39	0	0	7.82	39
Pak Oman Bank	25	0	0	5.01	25
CSC	22	8	3	6.61	33
1 st Microfinance Bank	13	2	1	3.21	16
Asasah	6	8	3	3.41	17
Total	463	26	10	100	499

Appendix 2: Distribution of survey respondents showing loan cycles completed



Appendix 3: Distribution of household size among survey participants

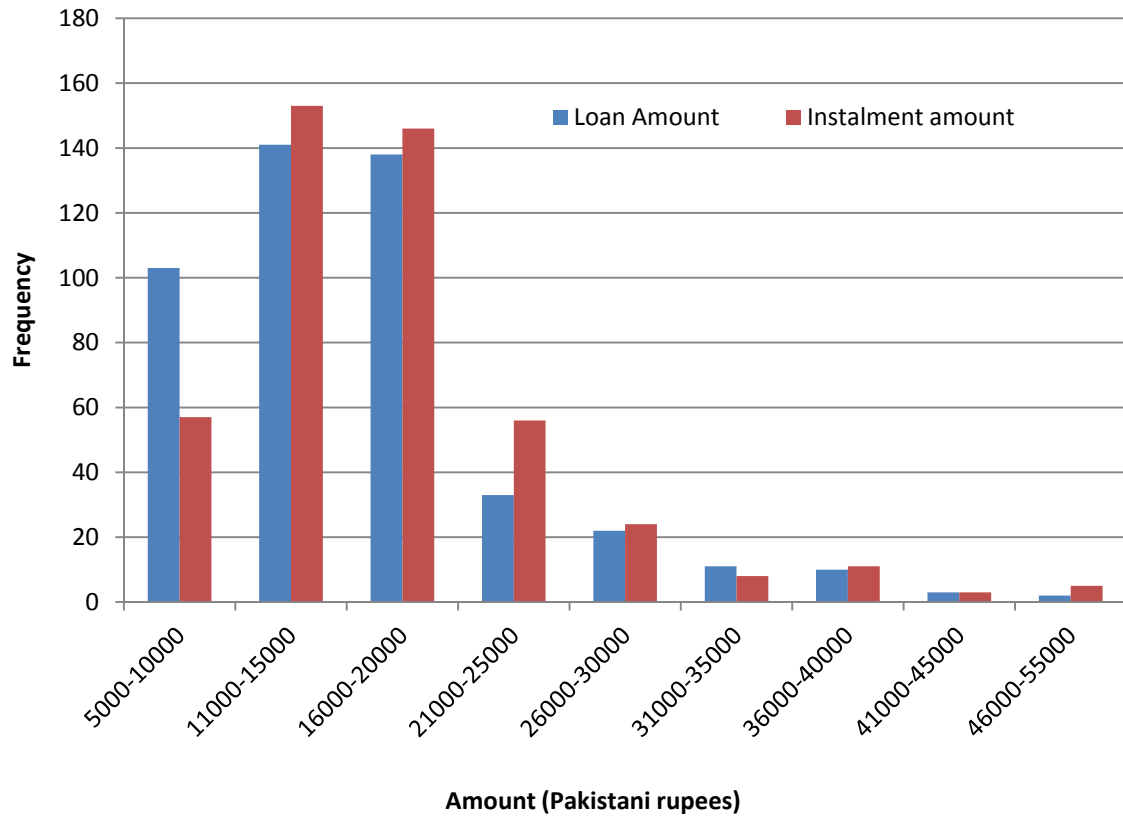


Appendix 4: Loan sizes and instalment amounts of borrowers interviewed

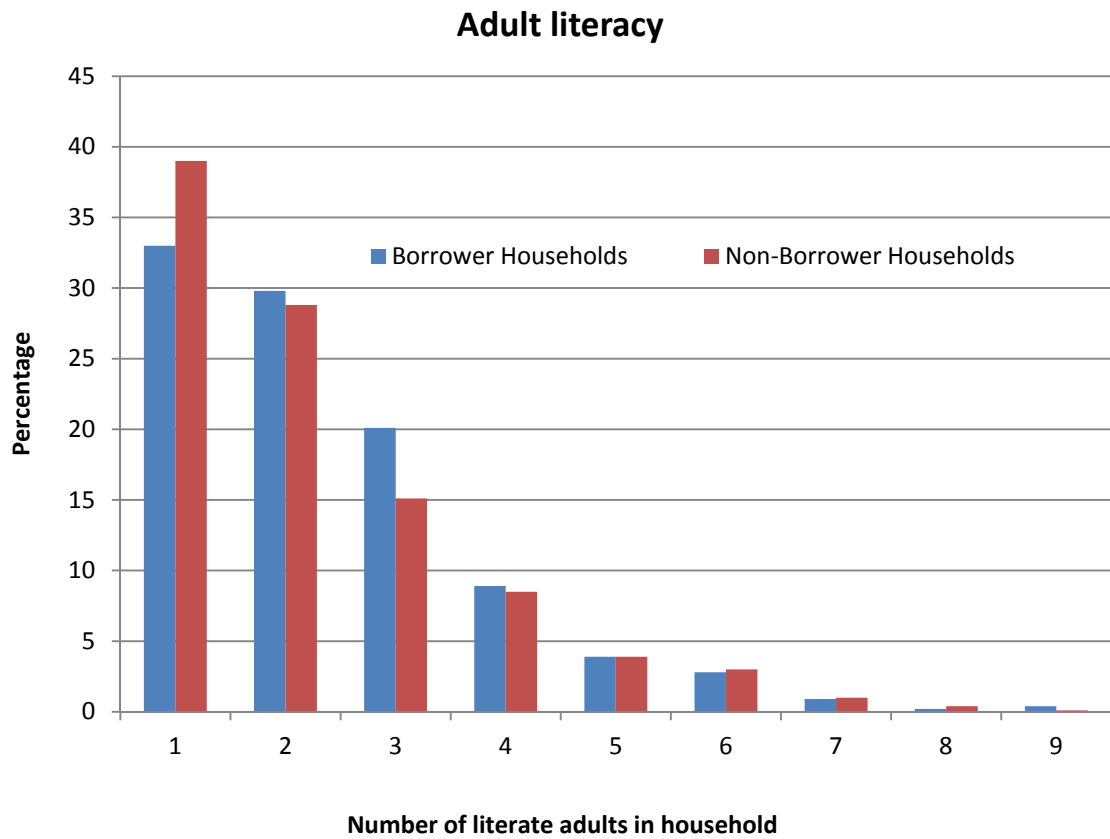
Loan Amount (Pakistani Rupees)	Frequency	Percentage	Instalment amount (Pakistani Rupees)	Frequency	Percentage
5000-10000	103	22.25	0-1000	57	12.31
11000-15000	141	30.45	1001-1500	153	33.05
16000-20000	138	29.81	1501-2000	146	31.53
21000-25000	33	7.13	2001-2500	56	12.10
26000-30000	22	4.75	2501-3000	24	5.18
31000-35000	11	2.38	3001-3500	8	1.73
36000-40000	10	2.16	3501-4000	11	2.38
41000-45000	3	0.65	4001-4500	3	0.65
46000-55000	2	0.43	4501-5500	5	1.08
Total	463	100	Total	463	100

Appendix 5: Loan sizes plotted against instalment amounts

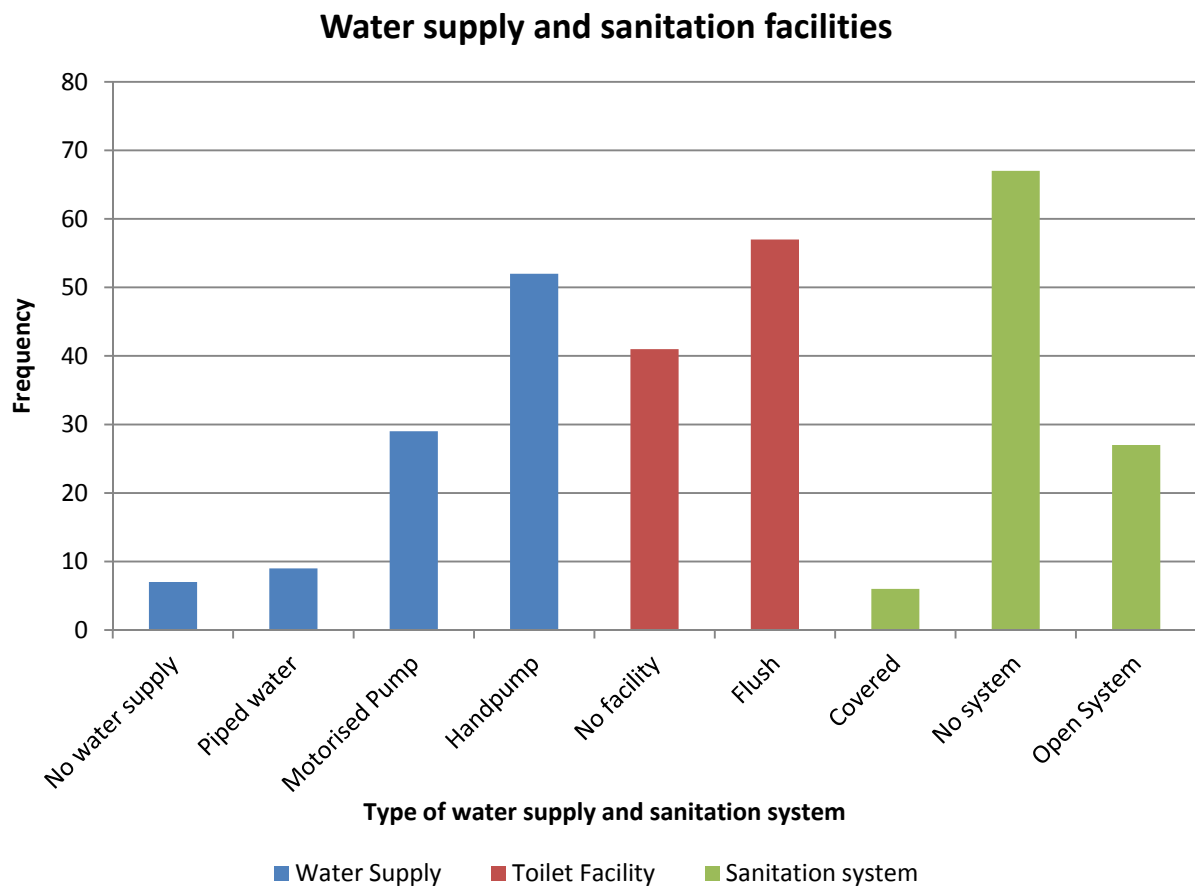
Loan and instalment amounts



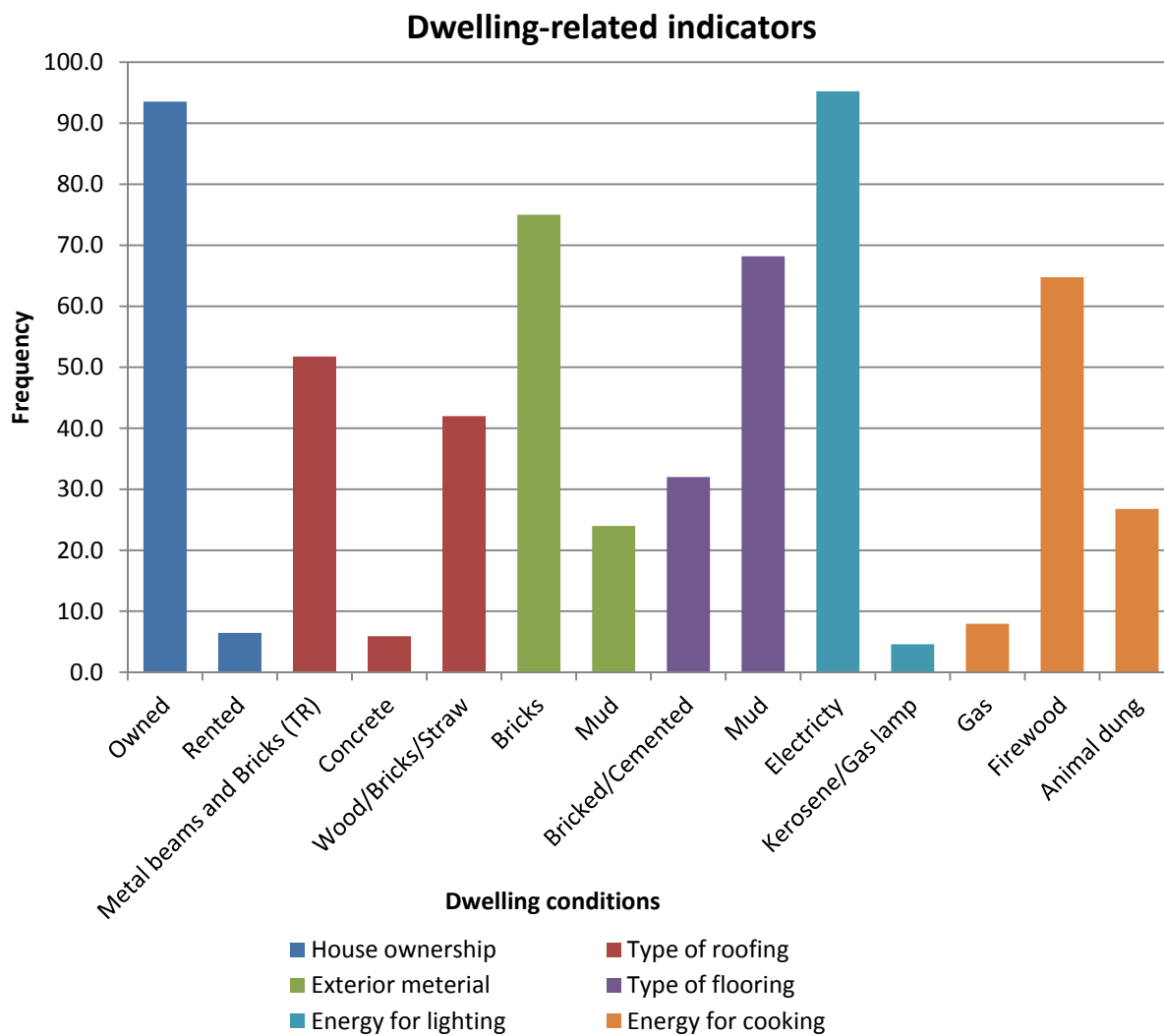
Appendix 6: Comparison of borrower and non-borrower households for adult literacy



Appendix 7: Types of water supply and sanitation facilities available to survey respondents



Appendix 8: General dwelling conditions of surveyed respondents



Appendix 9: Basic indicators showing loan use and satisfaction among survey participants

Indicators	Frequency	Percentage
Purpose of obtaining credit		
New business	202	43.63
Expansion	261	56.37
Was the loan beneficial?		
Yes	375	80.99
No	88	19.01
Plans for future borrowing		
Yes	346	74.73
No	80	17.28
Not sure/will think about it	37	7.99
Missed payments		
No	458	98.92
Yes	5	1.08

Appendix 10: LPM and Probit estimated score (Dependent variable: whether a household participated in the microfinance programme)

Variables	Probit Estimates		Probit Marginal Effects	
	β	<i>p</i> – value	β	<i>p</i> – value
Intercept	1.662	0.011	-	-
Value of agricultural land	0.008	0.936 0.003	0.936	
Average age of household adults	0.006	0.252 0.002	0.252	
Type of occupation of household head	-0.088	0.017 -0.034	0.017	
Child dependency ratio	0.098	0.030 0.038	0.030	
Child labour	0.206	0.021 0.080	0.021	
Elect electricity supply in house	-0.227	0.216 -0.088	0.216	
Value of goats/sheep	0.000	0.009 0.000	0.009	
Home ownership status (owned or rented)	-0.465	0.008 -0.180	0.008	
Consumption of luxury food: beef	-0.233	0.031 -0.090	0.031	
Occupation of adults	-0.050	0.129 -0.019	0.129	
Percentage of literate adults	0.002	0.093 0.001	0.093	
Number of rooms in house	-0.030	0.400 -0.012	0.400	
Consumption of staple food	-0.196	0.010 -0.076	0.010	
Availability and type of toilet	0.174	0.028 0.068	0.028	
Stock of wheat held	-0.003	0.155 -0.001	0.155	
N	1127		1127	

β : refers to estimated coefficients.

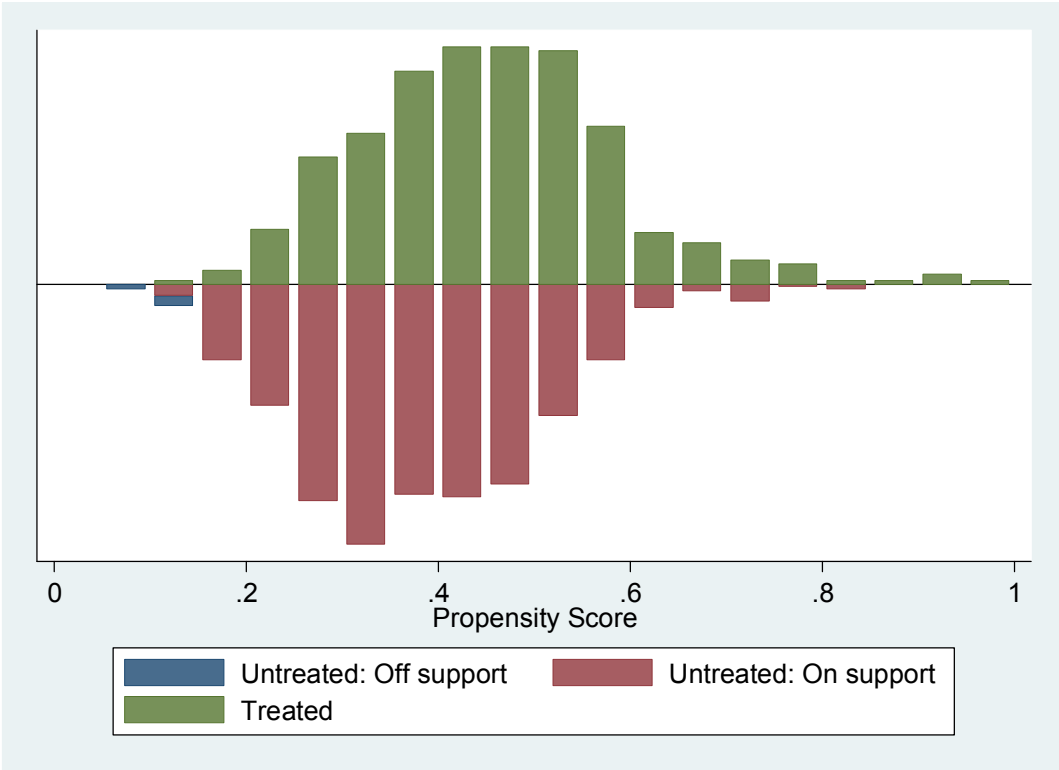
: The test statistics for the estimated probit model is based on the standard normal distribution, unlike the linear probability model that is based on the t distribution.

N : is the number of observations.

LR is the log likelihood ratio estimated for the probit model. Both statistics are to test the null hypothesis that states the model is jointly is not significant. If the hypothesis is accepted then the model is overall not significant, which implies the set of covariates need to be changed. Values between parentheses are *p* values.

p . R^2 : pseudo R^2 is the goodness of fit measure estimated for the probit model.

Appendix 11: Propensity score for borrowers and non borrowers



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The Brooks World Poverty Institute (BWPI) creates and shares knowledge to help end global poverty.

BWPI is multidisciplinary, researching poverty in both the rich and poor worlds.

Our aim is to better understand why people are poor, what keeps them trapped in poverty and how they can be helped - drawing upon the very best international practice in research and policy making.

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