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The Impact of Microfinance and its Role in Easing Poverty of Rural Households: Estimations from Pakistan

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Abstract

This study examines if household access to microfinance reduces poverty in Pakistan, and if so, to what extent and across which dimensions of well-being by taking account of the multi-dimensional aspect of poverty. The study draws on first-hand observations and empirical data gathered through the interviews of 1,132 households across eleven districts in the rural areas of the province of Punjab in Pakistan. We employ a quasi-experimental research design and make use of the data collected by interviewing both borrower (treatment) and non-borrower (control) households and control for sample selection biases by using propensity score matching. It has been 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 healthcare or clothing, monthly household income, and certain dwelling characteristics, such as water supply and quality of roofing and walls.

Keywords: Microfinance; poverty; impact assessment; propensity score matching; Pakistan

JEL Classification: C21, I32, O15, Q12

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1. Introduction

Poor households in both urban and rural areas in many developing countries – particularly those living in rural areas - do not have easy access to basic financial services. Their ‘systematic exclusion’ from formal financial services has led to the evolution of 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 in the world over the last three decades based on the conviction that 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, that is offered either to a group or individuals.

The concept and practice of microfinance, however, have 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 & Arun 2009). As opposed to the ‘welfarist’ or poverty approach, the ‘self-sustainability’ or ‘financial systems’ approach which has been advocated by the institutionists has eventually covered mainly non-poor or relatively less-poor clients on the fringes of the formal financial system and it has not targeted the poorest for the sake of financial sustainability of MFIs. As MFIs are supposed to lessen their reliance on donor funds and subsidies and adopt good banking practices in this approach, they are expected to innovate to ensure providing more efficient and better financial services with lower costs. Profits are viewed as being not only acceptable, but also essential because they are expected to attract private investment to the sector (Conning 1999). Whilst many MFIs have began to place more emphasis on the financial systems approach under 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 that specifically tailor and target 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 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 at large scale 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 side 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 side 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 some 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, Duflo 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 have reflected diverse settings of these studies (focusing on different geographical areas or drawing on different methodologies), impact assessment nevertheless remains one of the major and 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 that have attempted 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 primary reasons for which is the very limited availability of primary or secondary data in Pakistan (OPM, 2006).

There are, however, a few empirical studies that have generally confirmed that microfinance intervention has brought some positive impacts on the welfare of households in Pakistan. For example, Hussain (2003) show that there are significant differences between participants and non-participants in microfinance programs 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 positive impacts 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 positive impact on poverty reduction and argue that borrowers tend to shift to higher income groups during the given period in Pakistan. In contrast with Montgomery's findings, they show that the poverty status of the extremely poor borrowers increases only marginally, which according to Shirazi and Khan represents itself as evidence that the chronic poor borrow essentially for protectional purposes, 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 which 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, access to financial services, employment opportunities, efficient market access, 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). FAO (2009) estimates that around 66 percent of the population in 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 urban areas. Furthermore, 80 percent of the total poor population lives 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 set forth 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) report that nearly 50 percent of Pakistan's population does not engage in either formal or informal financial systems and an estimated 30 percent are involuntarily excluded through lack of understanding and awareness. Despite considerable efforts, microfinance has been slow to scale up, and outreach to women has been especially limited. It is estimated that only about 8 percent of poor households receive credit from formal sources (World Bank 2007). The size of Pakistan's population and 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 main findings of the study. The concluding remarks are presented in the last section.

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 eleven districts across the rural parts of Punjab, in Eastern Pakistan. The study is based on quasi-experimental design survey[1] whereby

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

comparison is made between two groups of respondents: the control group (represented by non-borrowers) and the treatment group (comprising borrowers). The total surveyed 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*.

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 of the province. 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.

(a) 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 actual poverty situations 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.

[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.

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

Table 1: List of dimensions and related indicators used in survey

The questionnaire was initially field-tested and a number of indicators were consequently altered to control for local specificities, and to ensure that they fully capture and reflect 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.

(b) *Descriptive statistics and explanation of variables*

The survey represented eight MFIs in the province. Given the strong nationwide presence of 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 Punjab Rural Support Programme (PRSP) was represented by 14 percent of those interviewed. In terms of 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 is 5.98 members per household and the median value is 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 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.

In terms of loan sizes, 22 percent of respondents had availed loans ranging from Rs. 5,000 to Rs. 10,000 whereas 30 percent had credit facilities ranging from Rs. 11,000 to Rs. 15,000. Taken together, these loans (up to Rs.15,000) constitute more than half of the sample. Instalment amounts also correspond proportionately to the size of loans, whereby it was noted that over 60 percent of the instalment amounts vary from Rs.1,000 to Rs.2,000 followed by smaller amounts of up to Rs.1,000 and larger amounts that range from Rs.2,000 to Rs.2,500, account for almost a quarter of the total sample. The sample mean is Rs.17,473, while the median value Rs.15,000.

Literacy rate, according to the Pakistan Social & 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 exhibit a fairly uniform pattern with the borrowing households being slightly better-off in having more literate adults.

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 6 percent, 67 percent and 27 percent respectively.

Apart from water and sanitation facilities, the survey for this study also 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 6 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 bricked or cemented floors found in only 32 percent of houses. Electricity use 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 8 percent used methane gas cylinders.

Finally, the field instrument contained questions that were designed to capture elements of borrowers' behaviours, views and attitudes towards credit. 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 inquired about the usefulness of the loan, around 81 percent expressed satisfaction, while 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 8 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 non-payments were only ‘missed’ which 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, or namely, the impact of borrowing within MFI programmes on the livelihood of the households via 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 literature which was formalised by Rubin (1973). This is defined as:

$$\Delta_i = Y_i^1 - Y_i^0 \tag{1}$$

where Δ_i is the treatment effect of individual *i*, in which $i=1,2,\ldots,N$. 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 at one point of time (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 by 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:

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

Δ_{TT} measures the difference between the expected outcome with and without treatment for the actual participants. The term $E(Y^1 \mid D=1)$ represents expected outcomes for programme participants, while $E(Y^0 \mid D=1)$ 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 actually participated in microfinance programmes if they had not borrowed?'

3.1 Selection bias issue:

The equation (2) may be subject to selection biases, as $E(Y^0 \mid D=1)$ is an unobserved counterfactual outcome of treated individuals. If the approximation $E(Y^0 \mid D=1) = E(Y^0 \mid D=0)$ 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 type refers to the case that the outcomes are not observed for all individuals since they cannot participate on the treatment programmes at the same time. One way to handle this type is implementing matching procedures, such as covariates 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, hereafter) to handle the bias since it solves the problem of multi-dimensionality, which arises from the application of covariate matching procedure due to large number of covariates.[3]

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

$$bias = E(Y^1 \mid D=1) - E(Y^0 \mid D=0) \qquad (3)$$

[3] The bias may also be due to unobservables. See the discussion in the next sub-section.

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

$$E\left(Y^{0} \mid D=0\right)-E\left(Y^{0} \mid D=1\right) \tag{4}$$

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

$$\begin{aligned}&\Delta_{TT}-\left[E\left(Y^{0} \mid D=0\right)-E\left(Y^{0} \mid D=1\right)\right]= \\ &E\left(Y^{1} \mid D=1\right)-E\left(Y^{0} \mid D=1\right)-E\left(Y^{0} \mid D=0\right)+E\left(Y^{0} \mid D=1\right)\end{aligned} \tag{5}$$

$$\Delta_{TT}-\left[E\left(Y^{0} \mid D=0\right)-E\left(Y^{0} \mid D=1\right)\right]=E\left(Y^{1} \mid D=1\right)-E\left(Y^{0} \mid D=0\right) \tag{6}$$

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

$$E\left(Y^{1} \mid D=1\right)-E\left(Y^{0} \mid D=0\right)=0 \Leftrightarrow E\left(Y^{1} \mid D=1\right)=E\left(Y^{0} \mid D=0\right) \tag{7}$$

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 using PSM estimator. RB introduce what is known balancing score to avoid the problem of high dimensionality. The balancing score suggested by RB 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:

$$P(D=1 \mid X)=P(X) \tag{8}$$

This latter is estimated using one of the models available in literature such as logit or probit model. These models provide predictions on 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:

$$P(D=1\mid X)=P(y^{*}>0\mid X)=P(u>-X\beta\mid X)=1-G(-X\beta)=G(X\beta) \tag{9}$$

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 maximum likelihood estimator.

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

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

One of the methodological advantages in using statistical matching over the instrumental variable estimation approach is that the former does not assume linearity and it is valid even though distributions of explanatory variables of treatment and control groups overlap relatively little, and it does not require a valid instrument. Methodological issues and programs for propensity score matching estimation are discussed in details, for example, by Becker and Ichino (2002), Dehejia (2005), Dehejia and Wahba (2002), Smith and Todd (2005), Todd (2008) and Ravallion (2008).

Despite these advantages in using PSM to estimate the impact of the policy, the derived impact depends on the variables used for matching and the quantity and quality of available data and the procedure to eliminate any sample selection bias is based on observables (Ravallion 2008). If there are important unobservable variables in the model, the bias is still likely to remain in the estimates. For example, if the selection bias based on unobservables counteracts that based on observables, then eliminating only the latter bias may increase aggregate bias, while the replication studies comparing non-experimental evaluations, such as PSM, with experiments for the same programmes do not appear to have found such an example in practice (ibid. 2008). However, Heckman et al. (1997) in the context of evaluation the job training programmes, has 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, though the remaining bias is still non-negligible. Because in our case, the control groups are selected so that they are geographically close to the treatment groups and the same questionnaire are used for both, it is conjectured that selection bias on unobservables has been minimised in our study. However, because the present study is based on cross-sectional data, the results are subject to some limitations discussed above and will have to be interpreted with caution.

A number of matching algorithms have been suggested in literature to contrast the outcome of treated individuals with outcomes 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 two matching algorithms avoids any shortcoming that may result by relying on just one method, and it also helps to check the robustness of the estimated impact.

3.3 PSM Estimates: general discussion

Appendix 1 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, condition of housing, infrastructure, and participation in the labour market would affect the decision to participate and 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, availability and type of toilet among others.

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

[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.

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. Households with a greater child dependency ratio and more instances of child labour or without a toilet reflect the fact that household members are in deprivation, inciting one of the members to borrow to set up small family-run businesses.

Distribution of the estimated propensity score of all the households implies that around 11 observations are dropped from the matching procedure since they lie outside the overlap region. This is shown in Appendix 2 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 8 overlaps in each block 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 treated group and control group as reported. With the balancing property satisfied and six blocks estimated, the PSM estimator satisfies the unconfondness and overlap conditions, and thus bias free.

The matching of covariates is well balanced using the propensity score estimated within the common support region. 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 matching[5] and thus matching quality for each covariate individually is not an issue.

[5] Details will be furnished on request.

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 well-being were calculated as shown in Appendix 3. 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.

4.1 Asset accumulation and household well-being

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 well-being than income or expenditure. Moreover, assets are normally constructed 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 that they help to cope with adverse conditions and assist in periods of low and unstable income, as their disposal can ‘smooth’ consumption and expenditure activities 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 constitutes an important category of assets for the rural poor, as they can be classified as ‘income-generating’ assets and provide a means of livelihood. A substantial portion of borrowing was done to purchase cows and goats, and some households relied exclusively on them 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. It is statistically non-significant with t statistics 1.50. ATT for cows is positive and large, but it is not statistically significant and do not lead to any firm conclusion.

In case of transport-related assets, non-borrowers seem to fare better, though 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, p.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 3, borrowers show a much higher probability and incidence of participation in ROSCA schemes, as opposed to 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 is a very small, almost negligible difference across household electronics such as fridges, VCRs and sewing machines, whereas non-borrowers seem to fare slightly better in terms of owning radios. Borrowers, however, seem 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 as compared to those who had not borrowed, but it is not statistically significant.

4.2 Human resources

Our survey questionnaire also captures various demographic characteristics of household members, household income and amount spent on clothing and footwear, children’s schooling, and healthcare. Clothing and footwear expenses shows that borrower households spend more than non-borrowers and the difference ranges from Rs.569 to Rs.632 which is statistically significant at 5% level. Calculations also reveal that borrowing households spending on healthcare on average Rs.148 more than non-borrowers and the difference is statistically significant at 1% 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 on a monthly basis. 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 3 portrays the differences that both groups of respondents have in terms of monthly household income and expenditure. While the difference in expenditure is inconsequential (which varies between Rs.211 and 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 1% level. Depending on the matching method used, monthly income of borrowers exceeds 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, and 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 the '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 10 % 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 well-being 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 3 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 % 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 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 upon 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 well-being. 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 the house, 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 better in around 70 percent of the indicators across which comparisons were made in the final model.

As the nature of poverty is multi-dimensional, people's needs are unique and hence have to be addressed by offering them unique, customised 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 interests 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. BRACs programmes committed to targeting the ultra poor (TUP and IGVGD) and Grameen 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 healthcare or clothing, monthly household income, and certain dwelling characteristics, such as water supply and quality of roofing and walls. This is promising from the policy-maker's perspective.

[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 of too much frequency of repayment. 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. Demirguc-Kunt et al. (2005) 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).

Much more efforts, however, for example, by making the microfinance programmes tailored to borrowers' demand would make the positive impact substantial given the highly limited access to financial services in Pakistan. Future research will have to employ the improved survey design and methodologies through, for example, the panel data survey data to be collected in Pakistan to overcome some of the limitations of the current study.

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Appendix 1: LPM and Probit estimated score (Dependent variable: whether a household participated in the microfinance programme)

Variables	Probit Estimates		Probit Marginal Effects	
	$\boldsymbol{\beta}$	$\boldsymbol{p-value}$	$\boldsymbol{\beta}$	$\boldsymbol{p-value}$
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 $\dagger$	**1127**		**1127**	

β: refers to estimated coefficients.

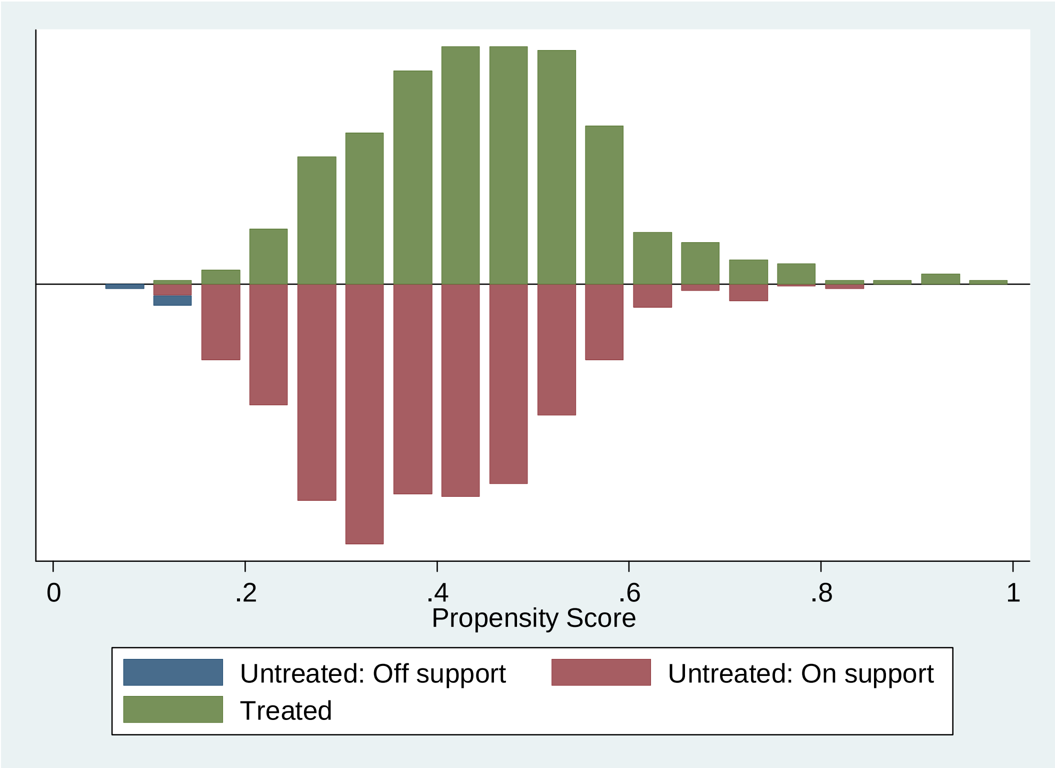
: The test statistics for the estimated probit model is based on the standard normal distribution, unlike the linear probability model that is based on the t distribution.

$\dagger$: *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 2: Propensity score for Borrowers and non borrowers



Appendix 3: Average Treatment-on-Treated effect (ATT) and t-statistics across various dimensions and associated indicators

Variables	KERNEL		STRATIFICATION	
	ATT	*t-stat*	*ATT*	*ATT*
LIVESTOCK				
Poultry	168.89	*1.5*	171.42	*1.46*
Cows	4,292.73	*0.89*	4,096.13	*0.88*
Total livestock value	**5,241.99**	***1.06***	**4,958.42**	***1.07***
TRANSPORT-RELATED ASSETS				
Motorcycle	-591.33	*-0.66*	-896.35	*-0.99*
Bicycle	142.55	*1.62*	136.44	*1.51*
Carts	-231.3	*-0.19*	-110.98	*-0.09*
Total transport assets value	**-680.08**	***-0.46***	**-870.89**	***-0.7***
SAVINGS				
ROSCA (participation in schemes)	0.08	*3.99****	0.08	*4.17****
Total ROSCA Encashment Amount	1,722.99	*1.2*	1,544.77	*0.94*
APPLIANCES AND ELECTRONICS				
Mobile phones	-104.63	*-0.84*	-116.35	*-0.93*
Radio	-87.57	*-1.62*	-83.79	*-1.70**
Sewing Machine	33.01	*0.32*	14.66	*0.15*
TV	364.03	*1.97***	344.52	*1.62*
VCR	-15.29	*-0.2*	-14.96	*-0.21*
Washing Machine	-65.38	*-0.48*	-84.09	*-0.55*
Total appliances and electronics	124.76	*0.18*	80.7	*0.11*
Value of assets per person	**601.43**	***0.64***	**558.92**	***0.56***
Total value of household assets	**4,686.67**	***0.85***	**4,168.23**	***0.76***
HUMAN DEVELOPMENT INDICATORS				
Per capita expenditure on clothing and footwear	112.37	2.43**	103.35	2.08**
Clothing and footwear expenses per annum	632.08	*2.35***	569.86	*1.90**

Variables	KERNEL		STRATIFICATION	
	ATT	***t-stat***	***ATT***	***ATT***
HUMAN DEVELOPMENT INDICATORS (continued)				
Clothing expenditure: percentage of income	-0.15	*-0.66*	-0.16	*-0.64*
Clothing expenditure: percentage of expenditure	0.48	*1.64**	0.4	*1.27*
Monthly expenditure on healthcare	148.1	*3.29****	148.28	*3.84****
Children currently at school	0.03	*0.35*	0.02	*0.16*
Monthly children's schooling expenditure	53.33	*0.39*	17.46	*0.11*
Total children in household	0.07	*0.58*	0.08	*0.69*
Total family size	-0.02	*-0.15*	-0.02	*-0.14*
Monthly household expenditure	229.84	0.89	211.01	0.89
Monthly household income	1,301.16	2.76***	1,221.75	2.60***
FOOD CONSUMPTION AND PURCHASE-RELATED INDICATORS				
Consumption of luxury food: Chicken	0.06	*1.93**	0.05	*1.62*
Consumption of luxury food: Mutton	-0.02	*-0.6*	-0.02	*-0.77*
Purchase of staple food: Wheat	0.34	*1.86**	0.29	*1.54*
DWELLING-RELATED INDICATORS				
Type of cooking fuel used	-0.07	*-0.98*	-0.07	*-0.97*
Material used for constructing floors	0.06	*1.3*	0.06	*1.04*
Overall condition of house	0.05	*1.3*	0.05	*1.23*
Material used for constructing roof	0.18	*2.71****	0.17	*2.53***
Material used for constructing walls	0.15	*2.84****	0.15	*3.06****
Source of water supply in house	0.26	*3.26****	0.23	*2.64****
Method used for waste water disposal	-0.02	*-0.67*	-0.03	*-0.99*

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%)