Research Objectives
And
Methodology
Research Objectives and Methodology

This chapter states the objectives of the present study. It also describes the methodology used to examine the relationship of microfinance institutions’ outreach with their financial performance and thereby the study of factors affecting the financial performance of microfinance institutions. It also gives a detailed explanation and description of the research design selected for the study. The chapter sheds light on the data collection and data analysis procedures used.

3.1. Research objectives

After an in depth study of the literature the objectives of the study were framed. The study was focused on achievement of following objectives:

- To analyse the Microfinance Institutions’ Outreach and their Financial Performance.
- To examine the trade-off between Outreach and Financial Performance of Microfinance Institutions.
- To identify the determinants of Financial Performance of Microfinance Institutions.
- To suggest policy recommendations to improve the performance of Microfinance Institutions.

3.2. Research design

The purpose of the research was to analyse the trade-off between the outreach and financial performance of microfinance institutions in context of Indian economy and to identify the financial performance determinants of the microfinance institutions. The study employed mixed type of research design. It is of an exploratory nature
because there is not a significant amount of material in the literature regarding the outreach and financial performance of Indian microfinance institutions. The study is also descriptive as it explains various indicators of the outreach and financial performance of MFIs and their relationship with one other.

3.3. **Sample Frame**

The population in this study consisted of all those MFIs of India which are reporting their performance data to Microfinance Information Exchange (MIX) USA, a not-for-profit private organization that aims to promote information exchange in the microfinance industry. It was considered appropriate to take companies from the same platform so as to provide equality in terms of data collected in order to explore the relationship between outreach and financial performance of microfinance institutions. There were nearly 159 MFIs of India reporting their data to the Microfinance Information Exchange (MIX) USA.

3.4. **Sources of data**

Data used for the present study was mainly secondary in nature. Data regarding microfinance institutions were collected from the MIX Market Inc. website. Along with the MIX Market Inc. data, information pertaining to the recent trends in the microfinance industry and their news updates were collected from the sources such as journals, magazines and research publications.

3.5. **Sample Size**

Microfinance industry which includes the different microfinance institutions being classified on the basis of different peer groups i.e., legal status, profit status, regulation and age is the universe of the study. Data for 40 Indian MFIs in the MIX market website to which the researcher had access to data for the period 2005-12
were selected for the purpose of the analysis (Appendix B, C and D). However, for the analysis of third objective, the researcher has made use of the data for the year 2012. The list of the sample companies is appended as Appendix A. The sample size increases with increase in population variability, degree of confidence and the precision level required for the estimation (Malhotra and Indrayan, 2010). The size of the sample does not violate the general rule of thumb that for the generalization, a ratio of number of observations to number of variables should never fall below 5:1. That is five observations are made for each independent variable (Hair et al., 2006). Moreover, Hair et al. (2006) states that although the minimum is 5:1, the desired level is between 15 to 20 observations for each independent variable to be representative. Applying the general rule of thumb as a desired level (that is between 15:1 and 20:1); this required the number of observations to be between 150 and 200. With eight years data from 40 MFI s, we used 320 observations for the analysis of 10 variables. Thus our data size is justified for the present study. In some cases the data was not available. Therefore, to avoid the problem of missing data, the average of the adjacent two year’s data was taken. In case of indicators, which were in absolute figures, logarithm was taken to make them comparable to other indicators which are already in percentage form.

3.6. **Sampling Technique and Procedure**

A combination of convenient and purposive sampling was used for choosing sample MFI s of India. Sample firms were chosen to include MFI s belonging to different categories on the basis of peer groups i.e. age, regulation, legal status and profit status. In order to analyze the age-wise performance of MFI s of India, MIX benchmark methodology has been used which categorized the MFI s on the basis of their age as under.

a) Age less than four years - New MFI.
b) Age between five years to eight years - Young MFI.

c) Age more than eight years - Mature MFIs

Thus, the sample of 40 MFIs was classified into different peer groups as shown in table 3.1. Therefore, the sample of 40 MFIs comprised of 25 regulated and 15 unregulated MFIs on the basis of MFIs’ regulation; 17 NGO and 23 non-NGO MFIs on the basis of MFIs’ legal status; 21 for-profit and 19 not-for-profit MFIs on the basis of MFIs’ profit status and 36 Mature MFIs and 4 Young MFIs based on age of Indian MFIs. The list of the sample companies of different peer groups have been appended to the Appendix-A.1.

Table 3.1. Summary of Different Peer Groups and Number of MFIs

<table>
<thead>
<tr>
<th>On the basis of regulation</th>
<th>On the basis of Legal form</th>
<th>On the basis of Profit status</th>
<th>On the basis of MFI’s age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form of MFI</td>
<td>N</td>
<td>Form of MFI</td>
<td>N</td>
</tr>
<tr>
<td>Regulated</td>
<td>25</td>
<td>NGO</td>
<td>17</td>
</tr>
<tr>
<td>Unregulated</td>
<td>15</td>
<td>Non-NGO</td>
<td>23</td>
</tr>
</tbody>
</table>

3.7. Hypothesis for Testing

On the basis of the literature review, the hypotheses for the study were formed. For the testing of these hypotheses, null hypothesis for each of these hypotheses was formulated. In short, following hypothesis were put to test using SPSS 17 and STATA 10 softwares.

1. \textbf{H01: There is no difference in the financial performance and outreach of regulated and non-regulated MFIs.}
H1: There is a difference in the financial performance and outreach of regulated and non-regulated MFIs.

2. H02: There is no difference in the financial performance and outreach of MFIs on the basis of their age i.e., means of different indicators of financial performance and outreach of young and mature MFIs are same.

H2: There is a difference in the financial performance and outreach of MFIs on the basis of their age i.e., means of different indicators of financial performance and outreach of young and mature MFIs are not the same.

3. H03: There is no difference in the financial performance and outreach of NGO and non-NGO form of MFIs.

H3: There is a difference in the financial performance and outreach of NGO and non-NGO form of MFIs.

4. H04: There is no difference in the financial performance and outreach of MFIs established ‘for profit’ and ‘not for profit’ purpose.

H4: There is a difference in the financial performance and outreach of MFIs established ‘for profit’ and ‘not for profit’ purpose.

5. Here the hypothesis was formulated based on the "good management theory"* given by Waddock and Graves (1997) and Dean (1999), used in D'Arcimoles and Trebucq (2002) model. The hypothesis is:

H5: A greater depth of outreach leads to higher financial performance, ceteris paribus.

* A good management theory holds that social performance comes first. Based on the theory, a company perceived by its stakeholders as having a good reputation in the social and environmental concerns will make it easier for the company through market mechanism to achieve a good financial performance.
6. **H5.1:** A greater depth of outreach leads to higher financial sustainability and profitability, ceteris paribus.

7. **H5.2:** A greater depth of outreach brings increased productivity and efficiency in microfinance institutions, ceteris paribus.

8. **H5.3:** A greater depth of outreach leads to improved portfolio quality, ceteris paribus.

9. The following hypothesis was formulated while referring to "slack resources theory"** given by Waddock and Graves (1997) and Dean (1999). It states the positive impact of good financial performance on the social performance of a company. Thus, the hypothesis is:

   **H6:** Higher financial performance leads to a greater depth of outreach, ceteris paribus.

10. **H6.1:** Higher financial performance leads to a greater increase in the percentage of women borrowers, ceteris paribus.

11. **H6.2:** Higher financial performance leads to an increase in the number of active borrowers, ceteris paribus.

12. **H6.3:** Higher financial performance leads to a decrease in the average loan balance, ceteris paribus.

____________________

**Under the slack resource theory, a company should have a good financial position to contribute to the corporate social performance. Delivering the social performance corporations need some funds resulting from the success of financial performance. According to this theory, financial performance comes first.**
13. \( \text{H07: There is no significant correlation between the financial performance and factors affecting the financial performance.} \)

\( \text{H7: There is a significant correlation between the financial performance and factors affecting the financial performance.} \)

3.8. Outreach and Financial Performance Indicators

3.8.1. Outreach and Financial Performance Indicators for the Analysis of Outreach and Financial Performance

For the analysis of outreach and financial performance of MFIs under 1\textsuperscript{st} objective, different outreach and financial performance indicators (given in 3.8.2 (a) and (b) along with four more indicators like assets, age, capital structure and scale have been taken. A brief explanation of these indicators has been made in the following sections.

3.8.2. Outreach and Financial Performance Indicators for Examining the Trade-Off between Outreach and Financial Performance

Following outreach and financial performance indicators along with control variables have been considered to examine the trade-off between outreach and financial performance.

3.8.2 (a) Outreach Indicators

1. Percentage of Women Borrowers

Percentage of women borrowers, a measure of depth of outreach is linked with gender distribution of the portfolio (Navajas et al. 2000). Polanco (2005) suggests that studies on women and development indicate that women are relatively poorer than men; consequently, any institution engaged in reaching especially women should offer smaller credits. It also shows the commitment of MFIs towards social welfare
and poverty alleviation. The higher is the percentage of women borrowers, the greater is the outreach of an MFI.

II. **Number of Active Borrowers**

The number of loans extended per year and since inception show the ability of an MFI to reach more clients and achieve a degree of scale. However, effectiveness will also depend on portfolio quality. A large number of active borrowers are associated with the greater outreach of an MFI.

III. **Average loan balance**

The loan size is usually taken as a proxy for the depth of outreach (Bhatt and Tang, 2001a; Cull et al., 2007; Lensink et al., 2008; Schreiner, 2002). Smaller the loan size, higher the outreach an MFI can have.

The following table 3.2 shows the outreach indicators used for the present study. These are:

**Table 3.2. Outreach Indicators**

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Variable</th>
<th>Abbreviation Used</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Percentage of Women Borrowers</td>
<td>Percwom</td>
<td>number of active borrowers who are women / number of active borrowers</td>
</tr>
<tr>
<td>2.</td>
<td>Number of Active Borrowers</td>
<td>log (Noactive)</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Average loan Balance</td>
<td>log(ALB)</td>
<td>Total value of loans / Number of credit clients</td>
</tr>
</tbody>
</table>
3.8.2(b) Financial Performance Indicators

i. **Return on Assets**

Return on assets is a measure of the productive use of the company’s assets rather than the productive use of a firm’s equity in the case of return on equity. Return on assets is different from return on equity as return on assets measures profitability irrespective of the institution’s underlying funding structure and doesn’t discriminate against MFIs that are funded with equity. Therefore, return on assets is a good measurement to compare commercial and non-commercial MFIs. A higher return on assets means that the company is generating a higher return from employing its assets. In the case of MFIs, this will generally mean, they are generating a higher return on their loan portfolio. Return on assets includes the return on the loan portfolio of an MFI as well as other revenue generated from investments and other operating activities. A high return on assets will matter to both commercial and non-commercial MFIs because it gives an indication of management’s capability to employ assets productively regardless of the source of funding. Productive assets mean that more is accomplished with the resources the MFI has, something of interest from both a commercial and social impact standpoint.

ii. **Return on Equity**

Return on equity is one of the most commonly used financial indicators for publicly held companies and therefore, for commercial for-profit MFIs, it is the most important profitability indicator. Return on equity measures an MFI’s ability, to reward shareholders’ investment, to build its equity base through retained earnings, and to raise additional equity investment. For a non-profit MFI, return on equity shows its ability to build equity through retained earnings, and increased equity enables an MFI to leverage more financing to grow its portfolio. By excluding
donations and non-operating revenues, return on equity demonstrates an institution’s ability to generate income from its core financial service activity. Return on equity tends to fluctuate more than return on assets, defined above, and thus monthly measurements can be misleading. However, managers should look for a positive trend over several years and a similar or better ratio than competitors’.

iii. Operational Self Sufficiency

The operational self-sufficiency measures how well an MFI can cover its costs through operating revenues. It is the most basic measure of sustainability, indicating whether revenues from operations are sufficient to cover all operating expenses. Operational self-sufficiency focuses on revenues from and expenses of the MFI’s core business and thus, reflects the MFI’s ability to continue its operations if it receives no further subsidies. A positive operational self-sufficiency trend can be achieved through growth and increased efficiency. The drivers behind operational self-sufficiency should be considered when assessing an MFI. Is increase in operational self-sufficiency is due to larger loan sizes, high yields, low financial expenses, or efficient operations? Operational self-sufficiency must be considered within the context of the MFIs’ mission.

iv. Operating Expense Ratio

Operating expense ratio, most commonly used efficiency indicator, highlights personnel and administrative expenses relative to the loan portfolio. It allows managers to compare quickly administrative and personnel expenses to the MFI’s yield on the operational self-sufficiency portfolio. For this reason it is frequently referred to as the efficiency ratio. Lower ratio indicates that the MFI is more efficient in operation. Thus, MFIs should strive to have a downward trend in this ratio even when portfolio growth is flat. While this ratio may fluctuate from month to month, it should decline from year to year.
v. **Borrowers per Loan Officer**

This ratio is defined as the overall productivity of an MFI’s personnel in terms of managing clients, including borrowers, voluntary savers, and other clients. Since MFIs may want to create caseload targets for loan officers, this ratio is an easy and effective way to measure progress against such targets. The ratio will increase until it reaches the optimal range and plateau, but plateaus can be surpassed through structural or technological changes. The ratio should also be evaluated in light of portfolio at risk to ensure that productivity gains are not at the expense of asset quality.

vi. **Cost per Borrower**

It explains the contribution of efficiency in reducing the components of cost per borrower namely, administrative expenses, financial expenses, and staff or personnel related expenses. A low level of cost per borrower is preferable in order to make an MFI sustainable.

vii. **Portfolio at Risk> 30 days**

Portfolio at risk is the most accepted measure of portfolio quality since the primary asset of an MFI is its operational self-sufficiency to loan portfolio. The most common international measure of this ratio is portfolio at risk > 30 days and portfolio at risk > 90 days. Portfolio at risk is important because it indicates the potential for future operational self-sufficiency based on the current performance of the loan portfolio. Portfolio at risk is the most widely accepted measure of loan performance in the microfinance industry. The ratio also includes renegotiated loans which prevents hiding troubled loans through rescheduling or refinancing and indicates a higher level of risk associated with clients that have had repayment problems. When referring to portfolio at risk, the number of days should always be specified. For the purpose of this study portfolio at risk > 30 days, the most
common measure has been used for all MFIs. Portfolio at risk should be low and fairly stable for an MFI.

From the review of literature, it was found that the financial performance was manifested with different variables. These are shown in the table 3.3 given below:

Table 3.3. Financial Performance Indicators

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Core Areas</th>
<th>Variable Description</th>
<th>Abbreviation Used</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sustainability and Profitability</td>
<td>Return on Assets</td>
<td>ROA</td>
<td><em>After tax profit</em>&lt;br&gt;Starting (or period-average) assets</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>Return on Equity</td>
<td>ROE</td>
<td><em>After tax profit</em>&lt;br&gt;Starting (or period-average) equity</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>Operational Self-Sufficiency</td>
<td>OSS</td>
<td><em>Total operating income</em>&lt;br&gt;Total operating expenses (including&lt;br&gt;administrative expenses, interest expenses, and loan loss provision)</td>
</tr>
<tr>
<td>4.</td>
<td>Efficiency and Productivity</td>
<td>Operating Expense Ratio</td>
<td>OE/LP</td>
<td><em>Personnel and administrative expense</em>&lt;br&gt;Period-average gross loan portfolio</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td>Borrowers per Loan Officer</td>
<td>log(BpLO)</td>
<td>number of active borrowers&lt;br&gt;number of loan officers</td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td>Cost per Borrower</td>
<td>log(Cpb)</td>
<td><em>Personnel and administrative expense</em>&lt;br&gt;Period-average number of active borrowers</td>
</tr>
<tr>
<td>7.</td>
<td>Portfolio Quality</td>
<td>Portfolio at Risk &gt; 30 days</td>
<td>PaR&gt;30</td>
<td><em>Outstanding principal balance of all loans</em>&lt;br&gt;past due more than x days&lt;br&gt;Outstanding principal balance of all loans</td>
</tr>
</tbody>
</table>
3.8.2 (c) Control Variables

In strategic management, the relationship between corporate social performance and financial performance is not absolute. Similarly for microfinance institutions, the relationship between social performance and financial performance is influenced by other variables such as age (experience), regulation and size. In the present study, we considered two control variables: 1. MFIAGE (the years since an MFI started microfinance activities) and 2. Assets (the size of MFIs assets).

3.8.3. The Factors Affecting Financial Performance

The financial performance has been measured by the variable “Return on Assets (ROA)”. Studies such as Cull *et al.* (2007) and Olivares-Polanco (2004) among others have used return on assets in measuring sustainability or profitability. Measuring the performance using return on assets has its limitations according to Olivares-Polanco, because it doesn’t take subsidies into account. However, since no detailed subsidy adjusted data is available, the return on assets remains the best alternative available. The various factors affecting the financial performance are:

i. Breadth of Outreach (BOUTCH)

It simply involves the number of poor people served by an MFI (Hishigsurem, 2004). A number of studies have used the number of borrowers as a measure of microfinance breadth of outreach (Ganka, 2010; Hermes et al., 2008; Mersland and Strom, 2009).

ii. Depth of Outreach (DOUTCH)

Hulme and Mosley (1996) assert that without the poor, the supposed MFI is no longer different from a bank. The loan size is usually taken as a proxy for the depth of outreach (Bhatt and Tang, 2001a; Cull *et al.*, 2007; Lensink *et al.*, 2008; Schreiner, 2002). Moreover, the size of the loan reflects the poorness of the clients, because richer people can take higher loans than poorer people can. So if one MFI shows a
higher average loan size compared to another MFI, this indicates that the first MFI is serving richer clients.

iii. Capital Structure
It is the combination of different sources of capital i.e., loans, deposits, savings, and shares (Woller and Schreiner, 2002). It could affect profitability and, therefore, sustainability of microfinance institutions.

iv. Cost per Borrower
Lower ratio indicates that the MFIs are providing services to the poor at low cost. Therefore, the lower ratio would imply higher return on assets.

v. Productivity
In microfinance context, productivity is the most effective way of delivering small loans to the very poor (Woller, 2000). It has an enduring impact on financial sustainability of microfinance institutions. Woller and Schreiner (2002)’s study examined the productivity as a significant determinant of financial sustainability.

vi. Scale of Operation
It is measured by gross loan portfolio. It includes all outstanding principal for all outstanding client loans, including current, delinquent and restructured loans, but not the loans that have been written off and also the employee loans. It does not include interest receivable.

vii. Non-NGO MFIs
NGOs are created and run with donations from private foundations, governments, international aid agencies and even individual donors. Usually, they are registered as non-profit for tax purposes, and do not take deposits. NGOs are typically not regulated by a banking supervisory agency, and face two major problems: a risk of dependency towards external donors, and fragile governance. Originally, these types
of organizations do not seek to make profits, but as with the development of the microfinance sector, many NGOs are in the process of institutionalization, i.e. to turn into profit corporations. In the present study, the variable legal status has been taken as a dummy variable with the value ‘1’ for the non-NGO MFIs.

viii. Regulated MFIs

Whether regulated MFIs serve less poor clients than unregulated MFI’s has not been tested in earlier studies. However, Christen (2000) argued that regulation is a crucial aspect of commercialization. So, the variable ‘regulated’ has been included in the analysis. The variable regulation has been taken as a dummy variable with the value ‘1’ for the regulated MFIs.

ix. For-profit MFIs

Banks, non-bank financial institutions (NBFI), rural banks and the category ‘others’ are considered as for profit institutions while NGOs and credit unions are considered as NFP MFIs. If, the relationship between profit status and firm’s performance is observed to be positive, it would show that NFP MFIs are targeting at poorer clients, while commercial MFIs reach less poor clients. Cull et al. (2007) found that institutional design does play an important role in the tradeoff between sustainability and outreach. The variable profit status has been taken as a dummy variable with the value ‘1’ for the for-profit MFIs.

x. Mature MFIs

Age has been measured as the reporting year minus the year of establishment of the organization. The age of an MFI can affect the performance in two ways. On the one hand, older MFIs are likely to work more efficiently, due to build up (trial and error) experience. Furthermore, the clients of the older MFIs’ may have developed their business and therefore require higher loans. The variable age has been taken as a
dummy variable with the value ‘1’ for the mature MFIs. It has been argued that the greater outreach makes a mature MFI sustainable. However, on the other hand younger MFIs might gain from the existing knowledge by spillover effects and therefore work more efficiently. The sign of the regression coefficient of the variable mature should be positive.

Various factors that can affect the financial performance of microfinance institutions, and their measurement are displayed in the following table no. 3.4:

**Table 3.4. Potential Determinants and Their Measurement**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Abbreviation used</th>
<th>Measurement/proxy used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breadth of Outreach</td>
<td>BOUTCH</td>
<td>Natural log of No. of active borrowers</td>
</tr>
<tr>
<td>Depth of Outreach</td>
<td>DOUTCH</td>
<td>Natural log of average loan balance</td>
</tr>
<tr>
<td>Capital Structure</td>
<td>DE</td>
<td>Debt-equity ratio</td>
</tr>
<tr>
<td>Cost per borrower</td>
<td>Cpb</td>
<td>Natural log of Cost per borrower</td>
</tr>
<tr>
<td>Productivity</td>
<td>Prodvty</td>
<td>Natural log of borrowers per staff member</td>
</tr>
<tr>
<td>Scale of Operation (Gross Loan portfolio)</td>
<td>Scale</td>
<td>Natural log of gross loan portfolio</td>
</tr>
<tr>
<td>Legal status</td>
<td>Non-NGO=1 NGO=0</td>
<td>NGO vs. Non-NGO</td>
</tr>
<tr>
<td>Regulation</td>
<td>Regulated = 1 Unregulated=0</td>
<td>Regulated vs. unregulated</td>
</tr>
<tr>
<td>Profit Status</td>
<td>For-profit=1 Not-for-profit=0</td>
<td>For profit vs. not for profit</td>
</tr>
<tr>
<td>Experience (age)</td>
<td>Mature=1 Young=0</td>
<td>Mature vs. young</td>
</tr>
</tbody>
</table>
3.9. **Analysis Pattern**

To analyze the various data set, different techniques were adopted after considering the suitability of the problem and the objectives to be achieved. More specifically, the analysis pattern adopted in the study has been:

3.9.1 Firstly the descriptive statistics were used where the mean, standard deviation, minimum and maximum values were calculated for the different variables of outreach and financial performance. To present the information for quick understanding, appropriate tables have been used in the study. For making comparison between the various indicators of performance and outreach on the basis of different peer groups (legal status, profit status, age and regulation), two independent samples t test was used. The independent sample t test was run using an alpha level of .05, to determine if there was a significant difference in the microfinance institutions’ outreach and financial performance based on different peer groups. Before testing the hypothesis using parametric test, the normality of data was checked using one sample K-S test run at significance level of five percent (p value>.05). Variables which were found to be normal were analyzed using two independent sample t test. Rest of the variables i.e. not normal variables were analyzed using non parametric two independent sample Mann Whitney U test.

It was found that the performance data on the variables like return on equity, operational self-sufficiency, portfolio at risk and average loan balance were normally distributed as their p values (.202, .123, .060 and .059 respectively) are greater than .05. On these variables, two independent samples T test was applied to see the difference in their mean values regarding the different peer groups. However, the application of t test requires the fulfillment of the assumption of the homogeneity of the variances. For this purpose, Levene’s test was conducted to assess the equality of variances of the items. For those variables where the assumption of homogeneity of
variances was violated, there the value of t test is interpreted in the row of “equal variances not assumed”. In other cases, the value of t statistics is interpreted in the row of “equal variances assumed”.

The rest of the variables like return on assets, operating expenses to loan portfolio, borrowers per loan officer, cost per borrower, percentage of women borrowers and the number of active borrowers were found to be not normally distributed as their p values (.000, .000, .006, .000,.001 and .001 respectively) are less than .05. On these indicators, Mann-whitney U test has been applied. The descriptive statistics of the normality have been shown in Appendix E.1.

3.9.2 To study the trade-off between the outreach and financial performance of microfinance institutions, a panel data regression model stating the relationship between outreach and financial performance was established to confirm whether or not MFIs face a trade-off between their approach to the poor and their financial performance.

The formula for panel data regression:

\[ Y_{i,t} = \mu + \beta (X_{i,t}, Z_{i,t}) + \delta_i + \gamma_t + e_{i,t} \]

where \( Y_{i,t} \) is the measure of financial performance/outreach in institution i at time t

\( X_{i,t} \) is a set of explanatory variables,

\( Z_{i,t} \) is a set of control variables,

\( \delta_i \) captures unobserved individual specific effects,

\( \gamma_t \) denotes unobserved temporal specific effects, and

\( e_{i,t} \) is an error term

i \( 1,2,3,\ldots,,40 \)

\( t \) \( 1,2,3,\ldots,,8 \).
3.9.2(a) To test the model stating the relationship between outreach and financial performance, the use of E-views 5 and STATA 10 softwares has been made. First of all, we checked the data for its stationarity using panel data unit root test i.e., Levin, Lin and Chu t test using the software e-views 5. Here, the null hypothesis is set as “the variables are non-stationary”. The stationarity test (Levin, Lin and Chu t) was run using an alpha level of .05, to determine whether the variables are stationary or not. Variables which were found to be stationary (p value<.05) were included in the analysis. The rest of the variables for whom the value of p is greater than .05 were excluded from the panel data analysis. Stationary variables were then analyzed with the help of STATA 10 software. Levin, Lin and Chu t test of stationarity showed a value of 0.00 for all the variables except the control variables like assets and age for which the value of Levin, Lin and Chu t test are 1 and 0.999 respectively. Thus, the variables assets and age found to be non-stationary were excluded from the panel data analysis. The statistic for panel data stationarity has been shown in Appendix E.2.

3.9.2(b) Panel Data Regression

To run a regression analysis on panel data, the first step is to verify homogeneous or heterogeneous specification of data. For the present study, the first objective has been to verify the existence of either a totally homogeneous model (i.e. identical coefficients and constants) or a model with individual effects. Under the null hypothesis of pooled model, Fisher statistic has been used to test (K + 1) (N - 1) linear restrictions. The results showed that the null hypothesis is not accepted for all the variables with a probability value lower than 5% (p value<.05). It means that there is a lack of totally homogeneous model i.e., each model includes individual effects.

The next step is to identify whether these individual effects are deterministic parameters (fixed effects) or random variables (random effects). The aim is to seek a
BLUE estimator for our models. There are two assumptions: the first is that the specific effects are supposed correlated with the explanatory variables, as for the second they are supposed orthogonal to these variables. Thus, to identify the optimal model for our data, Hausman (1978) test was used. This is a test of null hypothesis (H0): random effect would be efficient, versus alternative hypothesis (H1): random effect would be inefficient. The result of Hausman test uses Chi-square distribution with k degrees of freedom. Using the STATA 10 software and at the 95% confidence level, the null hypothesis of random effect would be efficient has been accepted for all the equation except the equation with Operating expenses/loan portfolio as the dependent variable, so the GLS is the BLUE estimator. Thus, for the rejected hypothesis (H0), the researcher privileged within estimator of fixed effect model.

3.9.2(c) The relationship between outreach and financial performance variables in respect of Indian MFIs for the financial indicators data for the year 2005-12 was carried out with the help of Panel Data Regression analysis.

3.9.2 (c1) Financial Performance versus Outreach

This section describes the impact of outreach on the financial performance of the microfinance institutions. Here, the core areas of the financial performance and the variables included there in are taken as dependent variables and the outreach indicators are used as the independent variables.

I. Sustainability and Profitability versus Outreach

The following model 1 depicts the hypothesized theoretical relationship between the profitability and the different variables of outreach. The “+” sign place emphasis on the positive effect of independent variables on profitability. The “-” sign is used to place emphasis on the negative effect. The model 1 depicting the hypothesized relationship between sustainability and profitability and outreach is:
Chapter 3

Profitability \(_{i,t} = \alpha + \beta_1 \text{percwom}_{i,t} + \beta_2 \text{noactive}_{i,t} - \beta_3 \text{alb}_{i,t} + \delta_i + \gamma_t + e_{i,t}\)

Where:

Profitability = dependent variable \{\text{(Return on Assets (ROA); Return on Equity (ROE) and Operational Self-Sufficiency (OSS))}\} in percentage for firm ‘i’ during time period ‘t’

\(\alpha_i\) = Constant

\(\beta_1\) = Regression coefficient of Percentage of Women Borrowers

\(\beta_2\) = Regression coefficient of Number of Active Borrowers.

\(\beta_3\) = Regression coefficient of Average Loan Balance

II. Efficiency and Productivity versus Outreach

The hypothesized relationship between efficiency and productivity and the outreach variables have been estimated with the help of model 2. The ‘+’ sign is used to place emphasis on the positive impact of variables for outreach on efficiency and productivity. The ‘-’ sign is used to place emphasis on the negative impact. The model 2 depicting the hypothesized relationship between efficiency and productivity and outreach is:

Efficiency and Productivity \(_{i,t} = \alpha - \beta_1 \text{percwom}_{i,t} + \beta_2 \text{noactive}_{i,t} - \beta_3 \text{alb}_{i,t} + \delta_i + \gamma_t + e_{i,t}\)

Where:

Efficiency and Productivity = dependent variable \{\text{(Operating Expense to Loan Portfolio (OE/LP); Borrowers per Loan Officer (BpLO) and Cost per Borrower (cpb))}\} for firm ‘i’ during time period ‘t’

\(\alpha_i\) = Constant

\(\beta_1\) = Regression coefficient of Percentage of Women Borrowers
$\beta_2$ = Regression coefficient of Number of Active Borrowers.
$\beta_3$ = Regression coefficient of Average Loan Balance

### III. Portfolio Quality versus Outreach

The model 3 shows the hypothesized relationship between Portfolio at risk and the three measures of outreach. Risk (PaR>30) is assumed to have positive linkage with all the three variables of outreach. The model 3 depicting the hypothesized relationship between portfolio quality and outreach is:

$$\text{Risk}_{i,t} = \alpha + \beta_1 \text{percwom}_{i,t} + \beta_2 \text{active}_{i,t} + \beta_3 \text{alb}_{i,t} + \delta_i + \gamma_t + \epsilon_{i,t}$$

Where

- Risk = dependent variable (PaR>30 Days) for firm ‘i’ during time period ‘t’
- $\alpha_i$ = Constant
- $\beta_1$ = Regression coefficient of Percentage of Women Borrowers
- $\beta_2$ = Regression coefficient of Number of Active Borrowers.
- $\beta_3$ = Regression coefficient of Average Loan Balance

### 3.9.2(c2) Outreach versus Financial Performance

The relationship between the financial performance and outreach is not complete by the study of the impact of outreach on financial performance. Complete analysis requires the study of the impact of financial performance indicators on the outreach of microfinance institutions. Here, a description regarding the impact of financial performance on outreach of the microfinance institutions have been done. The dependent variables for this analysis were the outreach indicators and financial performance indicators have been taken as independent variables.

After analyzing the effect of different outreach parameters on financial performance, the model 4 shows the hypothesized impact of financial performance on outreach.
Here, we have assumed positive relationship between outreach and the three variables of profitability (ROA, ROE and PaR>30 Days). It is also hypothesized that greater number of borrowers per loan officer would make it possible to approach more and more poor. The rest of variables i.e., OE/LP, log (cpb) and Risk are expected to have negative linkage with outreach. Model 4 showing the hypothesized relationship between outreach and financial performance is:

\[
\text{Outreach}_{i,t} = \alpha + \beta_1 \text{ROA}_{i,t} + \beta_2 \text{ROE}_{i,t} + \beta_3 \text{OSS}_{i,t} - \beta_4 \text{OE/LP} + \beta_5 \log (\text{BpLO}) - \beta_6 \log (\text{cpb}) - \beta_7 \text{PaR} + \delta_i + \gamma_t + e_{i,t}
\]

Where

Outreach = dependent variable \{Percentage of Women Borrowers (Percwom); Number of Active Borrowers (NoActive) and Average Loan Balance (ALB)} for firm ‘i’ during time period ‘t’

\(\alpha_i\) = Constant

\(\beta_1\) = Regression coefficient of Return on Assets

\(\beta_2\) = Regression coefficient of Return on Equity

\(\beta_3\) = Regression coefficient of Operational Self-Sufficiency

\(\beta_4\) = Regression coefficient of Operating Expense to Loan Portfolio

\(\beta_5\) = Regression coefficient of Borrowers per Loan Officer

\(\beta_6\) = Regression coefficient of Cost per Borrower

\(\beta_7\) = Regression coefficient of Portfolio at Risk for more than 30 days

3.9.3. To identify the factors affecting the financial performance of microfinance institutions, the technique of multiple regression has been applied. The formula for multiple linear regression is:

\[
Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots \text{etc.}
\]
Where
\[ Y = \text{Independent variable} \]
\[ \beta = \text{un-standardized regression coefficients} \] and
\[ X \text{ refer to the independent variables} \]

3.9.3 (a) **Multicollinearity**
A very high correlation between independent variables is known as multicollinearity. This implies the two variables are measuring the same variance and will over-inflate R. Therefore only one of the two is needed. The Variance Inflation Factor (VIF) measures the impact of collinearity among the independent variables in a multiple regression model on the precision of estimation. It expresses the degree to which collinearity among the predictors degrades the precision of an estimate. Typically a VIF value greater than 10.0 is of concern. It has been found that the performance data on all the variables have VIF value less than 10.0. The descriptive statistics of the multicollinearity have been shown in Appendix E.3.

3.9.2(b) The relationship between financial performance and the determinants of financial performance in respect of Indian MFIs for the financial indicators data for the year 2011-12 is carried out with the help of multiple linear regression analysis. A multiple regression equation stating the relationship between financial performance and the determinants of financial performance can be expressed by the model 5:

\[
Y = \alpha_i + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} + \beta_8 X_{8it} + \beta_9 X_{9it} + \beta_{10} X_{10it} + \epsilon_i \quad \text{(5)}
\]

Where:
\[ Y = \text{dependent variable} \quad \{(\text{Return on Assets (ROA) in percentage for firm ‘i’ during time period ‘t’})\} \]
\[ \alpha_i = \text{Constant} \]
\(\beta_1\) = Regression coefficient of Breadth of Outreach. It is argued that the increased number of borrowers enhances the sustainability. Therefore, the sign of the coefficient of number of Active Borrowers should be positive.

\(X_{1it}\) = Independent variable Breadth of Outreach for firm ‘i’ during time period ‘t’

\(\beta_2\) = Regression coefficient of Depth of Outreach. It is found that higher the loan size, higher would be the profitability of the MFI. Therefore, the sign of regression coefficient of depth of outreach should be positive.

\(X_{2it}\) = Independent variable Depth of Outreach for firm ‘i’ during time period ‘t’

\(\beta_3\) = Regression coefficient of Capital Structure. It has been found by the studies that capital structure affects the sustainability and have been proven that higher the ratio the higher is sustainability. Therefore, the sign of regression coefficient of Debt/Equity ratio should be positive.

\(X_{3it}\) = Independent variable Capital Structure for firm ‘i’ during time period ‘t’

\(\beta_4\) = Regression coefficient of Cost per Borrower. Cost per borrower is negatively correlated with the financial performance of an MFI. This means that the sign of regression coefficient of the cost per borrower should be negative.

\(X_{4it}\) = Independent variable Cost per Borrower for firm ‘i’ during time period ‘t’

\(\beta_5\) = Regression coefficient of Productivity. Higher productivity is associated with increased profitability and thus the sign of regression coefficient for productivity should be positive.

\(X_{5it}\) = Independent variable Productivity for firm ‘i’ during time period ‘t’

\(\beta_6\) = Regression coefficient of Scale. An MFI can enjoy economies of scale by operating on large scale and thus can improve its financial performance. Hence, the sign of regression coefficient for scale should be positive.

\(X_{6it}\) = Independent variable Scale for firm ‘i’ during time period ‘t’
\( \beta_7 = \) Regression coefficient of Legal Status. Regarding sustainability, Tchakoute-Tchuigoua (2010) found that private microfinance corporations have better financial performance than NGOs. That is the reason of taking non-NGO MFIs into the analysis of financial performance. This means that the sign of the regression coefficient of Inception should be positive.

\( X_{7it} = \) Independent variable Legal Status for firm ‘i’ during time period ‘t’

\( \beta_8 = \) Regression coefficient of Regulation. As regulated institutions are expected to follow a more commercial approach than unregulated institutions, a positive relationship between the variable ‘regulated’ and the financial performance is expected.

\( X_{8it} = \) Independent variable Regulation for firm ‘i’ during time period ‘t’

\( \beta_9 = \) Regression coefficient of Profit Status. Institutions which are labeled ‘For Profit’ are expected to focus on sustainability, at the expense of the poorest clients. Therefore, the variable for-profit is expected to show a positive relationship with the financial performance.

\( X_{9it} = \) Independent variable Profit Status for firm ‘i’ during time period ‘t’

\( \beta_{10} = \) Regression coefficient of Age. It has been argued that the outreach of mature MFIs is better than the young MFIs and therefore more sustainable. Therefore, the sign of regression coefficient should be positive.

\( X_{10it} = \) Independent variable Age for firm ‘i’ during time period ‘t’

\( \varepsilon_i = \) Error term

For such analysis, researcher has made use of SPSS 17 software. To check the statistical significance of the overall regression analysis, F statistics has been applied to test whether the regression model is a good fit for the data.
3.10. Summary

The chapter explains the research methodology adopted for the purpose of the analysis. It describes the course of actions that had been used while conducting the study. Research objectives, research design, sample selection, data collection, financial performance and outreach indicators and control variables have been explained here. Hypotheses set for testing have also been mentioned. This is inclusive of description of various data analysis techniques like average, independent t test, panel data regression analysis and stationarity test.