



# IMPLEMENTATION OF REGRESSION ANALYSIS IN MICROFINANCE FOR WOMEN'S SOCIAL EMPOWERMENT

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**Abstract:** The evolution and blooming of any economy depend on the economic and social empowerment of its occupiers. Now day Microfinance plays a very wide role to empower the poor. Also, microfinance is a tool to boost women's empowerment. This paper reviews the literature based on women's empowerment. It can see the productive or rejective proof and dares link to the uplift the living and existence of the poverty. For this study, almost 330 microfinance customers were approached for filling up the questioner for the study. Out of these 330 respondents, 300 responded well and completed the questionnaire with the required attention. The data collected has few outliers, as we can see in the boxplot given below. To overcome the effect of outliers the natural log of the per capita income before and after has been calculated and used in further analysis to create models.

**Index terms:** *Microfinance, regression analysis*

## I. INTRODUCTION

### Multiple Regression Model:

Multiple linear regression also known as multiple regression is a statistical technique that uses several explanatory variables to predict the outcome of a response variable. The goal of multiple linear regression is to model the linear relationship between the explanatory (independent variable) and the response variable (dependent variable). Multiple regression is the extension of ordinary least square (OLS) regression because it involves more than one explanatory variable.

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_p x_{ip} + \epsilon$$

Where  $i = n^{\text{th}}$  observation

$y_i$  = dependent variable

$x_i$  = explanatory variable

$\beta_0$  = y-intercept

$\beta_p$  = slope of coefficient for each explanatory variable

$\epsilon$  = the model's error term also known as residual

### Review of Literature

D. S. A. Wokoma and F. N. Nwobi, W. M. Eke & A. E. Ukwubuiwe (2017) developed a statistical comparison of the M. Estimator model by using multiple regression analysis of the data of loans and advances issued by the microfinance banks in Nigeria. The study identified a robust estimator, an estimator in the class of m-estimator that reduce the RMSE of Nigerian Microfinance loans and advances

**Avika Saraf (Spring 2015)** – Study of the microfinance penetration Imbalance in India. She started with the linear model to the correlation between literacy and existence of MFI in a particular area and she found the positive correlation also find statistically significant at 1% level. Also Adding in linear model with multiple variables. She tests to see the correlation be per centation of literate female in a district and the state level. She found in multi variable model, the percentage of literate females in a district is positively correlated and it is significant at level 1%. In study of linear model difference in south versus other area she found different result, she created dummy variable for the south with is = 1 and for other states was 0, so created dummy variable for region that were not from south.

**She constructed 1<sup>st</sup> Model (Shakya 2016)** conducted the study of International Business on “Microfinance and Women Empowerment” concluded the finding. The study establishes the concept about poor villager as less risk taker to continue credit as they are highly depending on agriculture sector. This study related to linear regression urban women are completely on commercial business, they tend to be determined to continue loan rather dropping out cause by natural disaster for instance floods.

**S. M. Reazul Alam, Fauzia Hamid, and Apurba Roy’ (2015)** developed a multiple linear regression model. In the study titled the ‘Depth of Impact of Microfinance with special reference to Uttarakhand’ conducted by Singhal & Arora, investigated the participation of the poor in microfinance and the factors influencing their participation in microfinance. The authors utilized regression analysis and fitted the regression model and found that women are better at repaying the loan as compared to men

In the study of Depth of Impact of Microfinance with special reference to Uttarakhand, Anchal Singhal and Bindu **Arora (2018)** they are used the participation in the of poor in the microfinance and found the influencing factor of participation. They use Regression analysis and fitted the regression model and found the more amount of women membership for more than three years and they also found female are better in repaying the loan as compared to men. In this study variable find significant among various determinants of the level of participation.

**S. M. Reazul Alam, Fauzia Hamid<sup>2</sup>, Apurba Roy’ (2015)** A multiple linear regression model has been used in their study. Economic Empowerment of moment through Microcredit in south-west Region of Bangladesh to estimate the effect of independent variable on dependent variable. And they found economic empowerment of women depends on aforesaid variable. The model finds in regression analysis in highly significant.at 1% level. It can be concluded that microcredit taking has a positive effect on empowerment of women.

**(2018) Mr Abebow Yenesew and Dr Bhupendra Kumar** in their study of microfinance institutions and their financial performance in a special reference to Ethiopia used regression. The aim of study of assessing determinant of financial performance the quantitative research approach by using panel research design to realize stated objectives. Multiple regression models were used to assess the significant determinant of financial performance of MFIs in Ethiopia. To measure the financial performance, were applied as the dependent variables

## Research Design & Methodology

This research study is conducted by applying both quantitative and qualitative research designs. This comprehensive empirical research study was conducted to address the central research question about women's empowerment. The primary data was gathered on the identified parameters with the help of a well-designed questionnaire which includes discrete, continuous and categorical choices. Quantitate research relies on empirical analysis via statistical and mathematical techniques to investigate the phenomena and their relationship Mohajan. In this study, regression models are constructed to observe the relationship between the various parameters of microfinance and women’s empowerment. Qualitative research covers a wide range of behaviours which include interaction, thoughts, reasoning, composition and norms in the social context

The specific objectives of the study are presented below:

1. To study the functioning of microfinance in the Amravati district of Maharashtra, India with the help of a suitable statistical tool.
2. To investigate the parameters of microfinance and analyse them statistically.
3. To examine the statistical association of microfinance with income and the standard of living of the beneficiaries.
4. To study the penetration of microfinance services regarding rural women

## Research Hypotheses

The following hypotheses are formulated for this research study:

### Social Empowerment

The following null and alternate hypotheses are formulated:

**Null Hypothesis (H<sub>0</sub>):** Microfinance does not affect the social empowerment of women.

**Alternate Hypothesis (H<sub>1</sub>):** Microfinance has a significant effect on the social empowerment of women.

### Target Population and Sample Design

A group of individuals with common features defined by a researcher under the study is called a population (Gupta & Kapoor, 2020).

*Study area:* The study was conducted in Amravati district, Maharashtra, India.

*Target population:* Women beneficiaries of microfinance from the Amravati district constitute the target population of this study. These women belong to the economically weaker section of the rural area of Amravati districts of Maharashtra.

*Sampling method:* The samples were selected by using a purposive sampling technique. Purposive sampling allows a selection of the sample units with a certain purpose in view (Gupta & Kapoor, 2020). Purposive sampling is a non-probability sampling technique.

The sample size was calculated with the help of the following formula.

$$\text{Sample size} = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p(1-p)}{e^2 N}\right)}$$

Where,

p = the estimated proportion of the study variable based on previous studies or pilot studies. p=0.3 was considered.

z = the Z-score or a standard normal deviation corresponding to (100%,  $\alpha/2\%$ ),

where  $\alpha$  refers to the significance level or the probability of making a type I error. The z score for different significance levels is 1.96 for 5%, 1.28 for 10% and 2.58 for 1%. A 95% confidence level was considered.

Therefore, z = 1.96.

e = margin of error.

N = the population size.

### Scope of the Study

Presently, the microfinance sector has got operationalized in thirty states in India and has about a million clients. Out of the total number of microfinance beneficiaries, 98% are women belonging to low-income households. Microfinance works with underserved social segments. The clients graduated to higher standards of living. The clients could receive the product and services they need with ease so that they should not be a victim of aggressive miss-selling by financial companies. Microfinance must conduct proper diligence as per their internal credit policy to assess the need and repayment capacity of the client before making a loan and must make loans commensurate with the customer's ability to repay the loan amount.

Traditionally, microfinance institutions have offered short-duration term loans along with life insurance cover for the borrower and her spouse. Indian microfinance is not allowed to collect saving; hence their main offering is credit. The loans are disbursed to individuals where the group stands as co-grantors for repayment and repayment collected at a fixed frequency. As per RBI guidelines, MPIS can offer weekly/fortnightly/monthly frequency. Fixed repayment terms are considered important to develop credit discipline among the borrowers, the small borrowers, i.e., especially when the loan is unsecured.

### Limitations of the Study

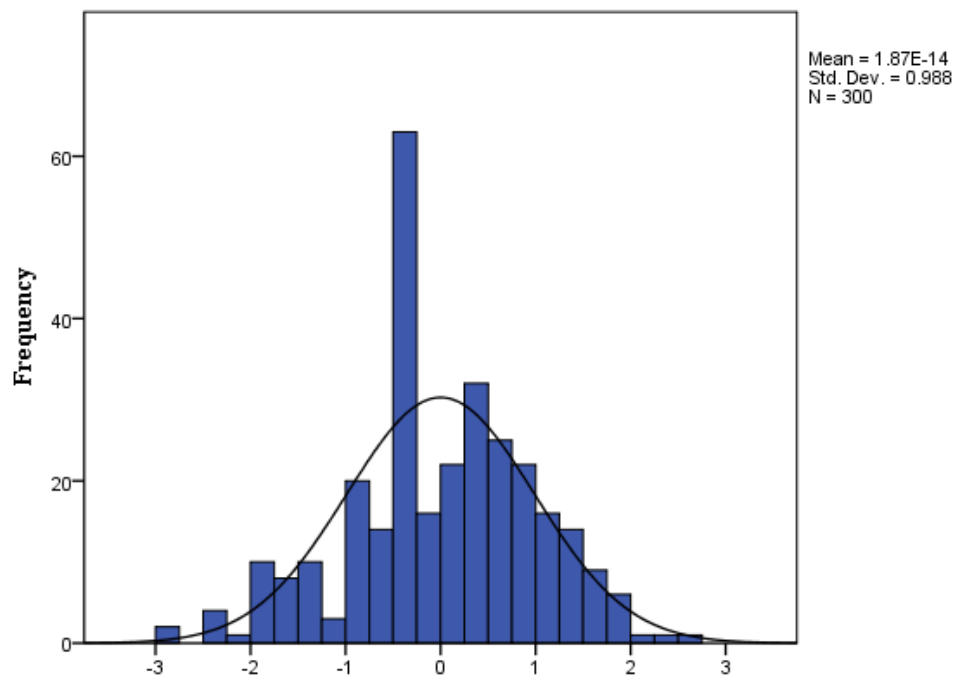
This empirical study comprehensively covers the issues related to women's empowerment through microfinance yet it has a few limitations. Firstly, the result of this study is related to a few different microfinance companies. Secondly, a sample survey was conducted for the present study from the employees working at currently in different microcredit companies like Grameen Vikas Bank, Bhagwati Mahila Vikas Bank, Dakshinkali Mahila Vikas Kendra, Gadhimai Mahila Vikas Kendra, Grameen Vikas Bank Kendra, Grameen Vikas Bank Kendra. The different working sector women entrepreneurs were chosen randomly. Thirdly, the study examines how women play their role in microfinance companies. It does not examine the other factors of how the people in remote areas could get access to the facilities. Fourthly, a few women participants denied to provide their information due to their busy work schedules. Therefore, the collection of primary data was very difficult. Consequently, the results of the study are based on the data provided by the respondents. The study is limited to highly-educated women participants. The study excluded poor people because the researcher perceived that they possibly don't possess sufficient information regarding microfinance loans. The research employed quantitative and qualitative research design.

### Expenditure on Children's Education

Linear regression assumes that the relationship between two variables  $x$  and  $y$  can be modelled by a straight line.

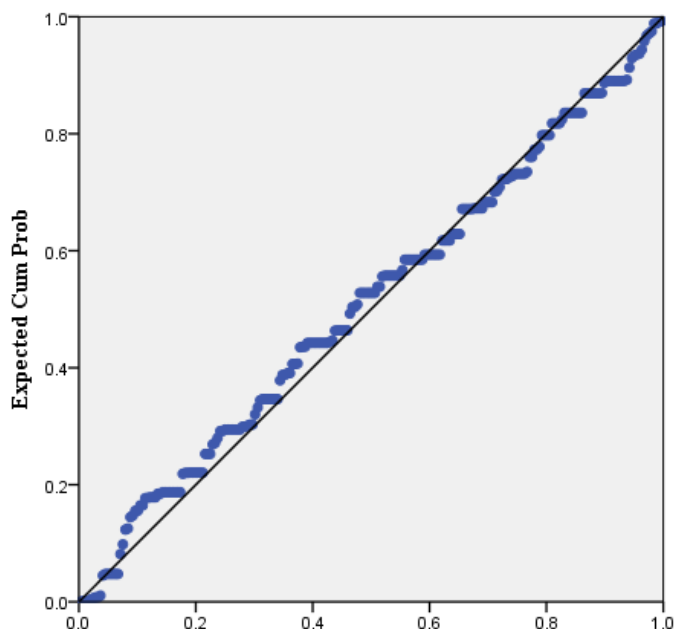
$$Y = \beta_0 + \beta_1 x$$

Where  $\beta_0$  and  $\beta_1$  represent two model parameters. These parameters are estimated using data and are represented as point estimates which are symbolised as  $b_0$  and  $b_1$ . When we use  $x$  to predict  $y$ ,  $x$  is the explanatory or predictor variable and  $y$  is considered as a response or dependent variable. The normality of data is verified by preparing a histogram (and a P-P plot



histogram  
dependent variable: log (expenditure on children education)  
regression standardised residual

Histogram showing normality in the data



normal p-p plot of regression standardized residual  
 dependent variable: log (expenditure on children education)  
 observed cum prob

P-P Plot showing the normality of data

The model summary table (Table 2.8) is showing that 26% of the variation in per capita income is explained by the expenditure in children’s education ( $y_2$ ) as R square = 0.26.

model summary

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate
1	0.51	0.26	0.26		0.13

As reported in the ANOVA table (Table 2.8.1), the regression and residual sum of the square are significantly different ( $p < 0.05$ ) and indicate that the regression model predicts the dependent variable significantly and there is a good fit.

ANOVA

Model		Sum Squares	of <i>df</i>	Mean Square	F	Sig.
1	Regression	1.389	1	1.389	80.754	<b>.000</b>
	Residual	3.989	232	.017		
	Total	5.378	233			

coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.666	.148		11.243	.000
	Log (change in per capita income)	.380	.042	.508	8.986	.000

Based on the regression coefficients reported in above, the below regression model is developed:

$$y_2 = 1.67 + 0.38 \log(y_1) \text{ ----- (3)}$$

The regression equation explains that one unit change in per capita income will increase the expenditure on children's education by 0.38 times.

### Conclusion

Effect of Microfinance on Social Empowerment of Women: The effect of microfinance on social empowerment is evaluated the impact of per capita income on children's education is found to be significant

Impact of per capita income on children's education: The results are found to be significant ( $F=80.754$ ,  $p<.05$ ). Hence, it is concluded that per capita income has a significant effect on children's education with  $R^2 = .26$ , suggesting that 26% of the variation in children's education is predicted by change in per capita income.

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