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Welfare Impact of Microcredit: A Case Study of Silchar Town

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Abstract

The paper examines the welfare impact of microcredit on the borrowers in terms of per capita income and asset acquisition. The study has been conducted in the Silchar town of Cachar, Assam. The objective of the study is to examine whether there has been any significant increase in per capita income and asset acquisition in the borrowers' households after joining the microcredit programme. To measure the impact of the programme the study has collected 540 samples from among those micro credit holders of Silchar town, who have taken the loans for at least five times.

Keywords: Composite Index, Joint Liability Group, Microcredit, Microfinance Institution, Welfare.
JEL Classification: G21, I 31

1. Introduction: In developing countries, providing credit to the poor people by formal financial institutions has not been fully successful so far to meet the credit requirements of the poor people. The main reason behind this is the absence of collateral with them. The high risk and the high transaction costs of banks associated with small loans and savings deposits are some other factors which are responsible for making the poor non-bankable. Thus, the failure of formal credit institutions to deal with the credit requirements of poor people successfully, has led to the emergence of microcredit as an alternative finance system for the poor.

Microcredit is one of the many financial services offered by Microfinance Institutions (MFI). It is a provision of credit services to low income people without any collateral. The different credit products offered by MFIs are working capital loans, consumption loans, risk management loans, asset building and productive investment loans, housing loans, education loans, etc.

There are a number of delivery models of microcredit, viz., Grameen Bank Model, Joint Liability Group (JLG) Model, Individual Banking Model, Village Banking Model, Self Help Group- Bank Linkage Programme (SHG-BLP) Model, etc. The present study concentrates on the JLG Model of credit delivery. In this model generally 5 to 10 individuals are organized in a group known as Joint liability Group. The group members can avail loans from the MFI against mutual guarantee and there is no condition of their own saving fund. All members sign a joint liability contract, making each one jointly liable for repayment of all loans taken by all individuals in the group.

There are quite a few number of MFIs offering microcredit in Silchar town. The total number of borrowers in these MFIs in Silchar town in the year 2012 was approx. 30,000. The study investigates the welfare impact of microcredit in terms of per capita income and asset accumulation by randomly selecting a sample of borrowers.

2. Area of the Study: The area of the study is Silchar town, the second largest town in the state of Assam, in terms of population and municipal area. As of Census 2011, Silchar has a population of 1,72,709. The area of the town is 15.75 sq.km. Silchar town is governed by Municipal Board. The town is divided into 28 municipal wards.

3. The Objectives of the Study:
The study attempts to analyze the following objectives:

1. To examine whether there has been any significant change in per capita income after availing microcredit.
2. To examine whether there has been any significant increase in household assets after availing microcredit.

4. Hypotheses of the Study:

Based on the objectives mentioned above, the following hypotheses have been framed:

$H_0$1: There is no significant change in per capita income after availing microcredit.

$H_0$2: There is no significant increase in household assets after availing microcredit.

5. Methodology of the Study:

Data collection: The study is based on both primary and secondary data. The reference period is January 2008- December 2012. In this particular study benefits of microcredit have been analysed based on the borrowers who have joined microcredit programme in 2008 and continued taking at least five loans.

Sampling design: For selecting the sample, a combination of multi-stage random and purposive sampling method has been applied. The total number of selected borrowers is 540. The sample has been drawn from those borrowers who have joined microcredit programme in 2008 under JLG method and continued taking at least five loans.

Methods & Tools: The study makes estimation of the economic impact of microcredit on households by comparing the per capita income and asset acquisition score of households before taking microcredit and after five cycles of taking microcredit.

In this study we have taken per capita income and asset acquisition as measures of household welfare in order to capture welfare effect of microcredit in Silchar town. The reason behind taking per capita income and asset acquisition as measures of household welfare is they are directly related to welfare. Both categories are valid indicators for tracking changes in household welfare. In order to measure the welfare impact of microcredit, we have applied multiple regressions in statistical packages like SPSS 15 and STATA 8.2.

Total annual income of the sample households have been collected for two periods- just before the year 2008, i.e., just before taking microcredit and after five cycles of taking microcredit, i.e., just after the year 2012. Then the per capita income for the two periods has been calculated. After that the Present Value of per capita income of the year 2012 for 2008, has been calculated taking average inflation rate (Wholesale Price Index) for five years as 7.2% (Source: www.rbi.com).

For testing the first hypothesis, the two per capita incomes of the two periods- actual per capita income just before 2008 and PV of per capita income of 2012 for 2008, have been compared by using paired samples t-test.

Besides, per capita income, we have taken asset acquisition as outcome variable in measuring the effect of microcredit on household welfare. Asset acquisition is defined as addition of assets like mobile phone, fan, television, bicycle, kerosene stove, gas oven, rickshaw, theta, cattle, sewing machine, land and house. The scores assigned to different assets are as shown in the following table:

Table 1: Scores assigned to the different assets

Assets	Scores
Mobile phone	1
Kerosene stove	1
Fan	1
Television	2
Bicycle	2
Gas oven	2
Rickshaw	3
Thela	3
Sewing machine	4
Cattle	4
Land	5
House	5

Each households score in asset acquisition has been estimated based on the information on household assets acquired before taking microcredit and after five cycles of taking microcredit, i.e., just before the year 2008 and just after the year 2012. The scores of each household's assets are then added and the total scores of the two periods have been compared using paired samples t-test.

In order to measure the influence of various factors including microcredit on household welfare in terms of per capita income and asset acquisition, we have formulated linear regression models. The change in per capita income and asset acquisition of households before and after microcredit has been measured by using difference method.

Regression Models:

Model 1

$Y_{1i} = \alpha_i + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 D_i + \varepsilon_i$.....(1)

i= 1, 2, 3, ..., 540

where Y_1 is the change in per capita income of the sample households, X_1 is the change in proportion of earners, X_2 is the change in empowerment index of the borrower, X_3 is the change in highest education level in the family, X_4 is the change in family size, X_5 is the average monthly amount of loan taken, D is the dummy variable for use of loan (each household has been awarded 1 for productive use of the loan and 0 otherwise) and ε_i is the random error term. α, β_1, β_2, β_3, β_4, β_5 are regression coefficients & β_6 is differential intercept coefficient.

We have collected information relating to proportion of earners in the family, household size, highest level of education in the family, empowerment index of the borrower before and after microcredit, of the sample households. We have also collected information related to amount of loan and use of loan.

For use of loan, those households which have used 2 or more loans for productive purposes has been awarded 1 and 0 otherwise.

Education level of each household has been evaluated in terms of values assigned to number of years of schooling, e.g., 0 for no education, 1 for education up to class I, 2 for education up to class II and so on.

Empowerment index of the borrowers has been calculated by using dimension index, the formula for which is as follows:

$$\text{Dimension Index}=\frac{Actual\,value\,of\,j^{th}\,indicator\,for\,i^{th}\,borrower-Minimum\,value\,of\,j^{th}\,indicator}{Maximum\,value\,of\,j^{th}\,indicator-Minimum\,value\,of\,j^{th}\,indicator}\text{.....(2)}$$

There are ten indicators of empowerment for each borrower. The scores assigned to the different responses for different indicators of empowerment are shown in the following table:

Table 2: Scores assigned to the different responses for different indicators of empowerment

Indicators/Scores	1	2	3	4	Maximum
1.Opinion in day to day matters	Not at all	Very little	Much more	To a great extent	4
2.Opinion in matters of large expenditure	-do-	-do-	-do-	-do-	4
3.Opinion in matters of savings	-do-	-do-	-do-	-do-	4
4.Utilization of personal income	-do-	-do-	-do-	-do-	4
5.Political participation	-do-	-do-	-do-	-do-	4
6.Opinion in matters of asset acquisition	-do-	-do-	-do-	-do-	4
7.Domestic violence	Much more	Somewhat	Very little	Not at all	4
8.Mobility	Restricted	Occasional	More often	Free and always	4
9.Respect from other family members	Not at all	Very little	Much more	To a great extent	4
10.Confidence of interacting with official people	-do-	-do-	-do-	-do-	4

Unobserved Component Model is used to determine the weights that are associated with the above mentioned indicators. Using this method, the weight of each indicator has been calculated by using the following formula:

$$Wj_1=\frac{varj_1^{-1}}{1+varj_1^{-1}+varj_2^{-1}+varj_3^{-1}+varj_4^{-1}+varj_5^{-1}+varj_6^{-1}+varj_7^{-1}+varj_8^{-1}+varj_9^{-1}+varj_{10}^{-1}}\ldots\ldots(3)$$

$$Wj_2=\frac{varj_2^{-1}}{1+varj_1^{-1}+varj_2^{-1}+varj_3^{-1}+varj_4^{-1}+varj_5^{-1}+varj_6^{-1}+varj_7^{-1}+varj_8^{-1}+varj_9^{-1}+varj_{10}^{-1}}\ldots\ldots(4)$$

$$Wj_3=\frac{varj_3^{-1}}{1+varj_1^{-1}+varj_2^{-1}+varj_3^{-1}+varj_4^{-1}+varj_5^{-1}+varj_6^{-1}+varj_7^{-1}+varj_8^{-1}+varj_9^{-1}+varj_{10}^{-1}}\ldots\ldots(5)$$

Likewise the weights of all other indicators have been calculated. The score for the responses of each individual for each indicator has been multiplied by the respective weights of the indicators. And then composite of all the scores of each individual has been taken to finally get the empowerment index of each borrower before taking microcredit and after five cycles of taking microcredit.

We also ran regressions taking change in household asset score as dependent variable in measuring the impact of microcredit in terms of asset acquisition.

Model 2:

$$Y_{2i}= \alpha_i + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 D_i + \varepsilon_i \ldots\ldots(6)$$

$$i=1, 2, 3,\ldots\ldots, 540$$

Where Y_2 is the change in asset acquisition score of the sample households and other notations indicate the same meaning as mentioned in equation (1).

Apart from the regression models as specified above, we have used composite index for measuring the extent of the effect of microcredit on household welfare. Here again we have used Unobserved Component Model to determine the weights that are associated with the two welfare indicators viz. per capita income and asset acquisition. Using this method, the weight (w_i) corresponding to per capita income (i=1) and asset acquisition (i=2) is given by

$$w_1=\frac{varpci^{-1}}{1+varpci^{-1}+varaa^{-1}}\ldots\ldots (7) \quad \text{and}$$

$$w_2=\frac{varaa^{-1}}{1+varpci^{-1}+varaa^{-1}}\ldots\ldots (8)$$

The weight is a decreasing function of the variance of the indicators. Thus, higher the variance, lower will be the weight assigned to that particular indicator. The formula for composite index is given by

$$CI_i= w_1M_{1i}+w_2N_{1i} \ldots\ldots (9)$$

$$i=1, 2, 3,\ldots\ldots, 540$$

$$CI_j= w_1M_{2i}+w_2N_{2i} \ldots\ldots (10)$$

$$i=1, 2, 3,\ldots\ldots, 540$$

Where, CI is the composite index; M is the per capita income and N is the asset acquisition score.

Finally, in order to examine the influence of different socio-economic factors on household welfare, we have run regression taking change in composite index as the dependent variable and change in proportion of earners, change in empowerment index of the borrower, change in highest education level, change in family size, average monthly amount of loan and use of loan as the independent variables. The model estimated is as follows:

Model 3:

$$CI_i=\alpha_i+\beta_1X_{1i}+\beta_2X_{2i}+\beta_3X_{3i}+\beta_4X_{4i}+\beta_5X_{5i}+\beta_6D_i+\varepsilon_i\ldots\ldots(11)$$

$$i=1, 2,3,\ldots\ldots,540$$

Where CI is the change in composite index of households and other notations indicate the same meaning as mentioned above in equation (1).

6. Results and Findings:

6.1 Per capita income:

Objective 1: To examine whether there has been any significant change in per capita income after availing microcredit.

H_0 1: There is no significant change in per capita income after availing microcredit.

For this the per capita income of the two periods –actual per capita income just before 2008 and PV of per capita income of 2012 for 2008, has been compared by using paired samples t-test. The result of the paired samples t-test is shown below:

Table 3: Per Capita Income before and after Microcredit Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Per capita income after five cycles of taking microcredit	825.3494	540	55.97784	2.40890
Per capita income before taking microcredit	760.4786	540	56.85608	2.44670

Source: Field survey

From the above table of paired sample statistics if we compare the mean values of the per capita incomes before and after microcredit, we can see that the mean value of per capita income is higher after taking microcredit.

Table 4: Difference in Per Capita Income before and after Microcredit Paired Samples Test

	Mean	Std. Deviation	Std. Error mean	t	Df	Sig. (2-tailed)
Per capita income after five cycles of taking microcredit – Per capita income before taking microcredit	64.87080	16.61809	0.71513	90.712	539	.000

Source: Field survey

From the results of the paired samples t-test as shown in the above table we can see that the mean value of the difference between per capita incomes of the two periods, i.e., before taking microcredit and after five cycles of taking microcredit, is 64.87080. The standard deviation is 16.61809. The number of observation is 540 and the degrees of freedom are 539. The t value is found to be 90.712 relative to the standard error of 0.71513, which is much greater than the critical value, i.e., 2.576 at 1% level of significance. From this we can conclude that the per capita income after five cycles of taking microcredit is significantly more than the per capita income before taking microcredit. So our first objective is satisfied and the first null hypothesis that there is no significant change in per capita income after availing microcredit, is rejected.

In order to measure the influence of various factors, including microcredit, on household welfare in terms of per capita income, we have formulated linear regression model as elaborated in the methodology section. After running the regression we have got the following result:

Table 5: Result of the regression test of the influence of different socio-economic factors, including microcredit, on the change in per capita income.

Dependent variable: Change in per capita income

Variables	Coefficients	Standard Error	*t* values	*p* values	R^2	Adjusted R^2	F value	Number of observations
Constant	39.972	3.247	12.311	.000	.623	.619	146.887* (.000)	540
X_1	21.403*	2.763	7.745	.000				
X_2	0.513	1.598	.321	.748				
X_3	3.223*	0.341	9.459	.000				
X_4	-2.855*	0.850	-3.360	.001				
X_5	0.006	0.004	1.444	.149				
D	21.671*	1.030	21.048	0.000				

*significant at 1% (p<0.01), ** significant at 5% (p<0.05) *** significant at 10% (p<0.1)

Based on the above results we have fitted the following regression equation:

$\hat{Y}_{1i} = 39.972 + 21.403\ X_{1i} + 0.513\ X_{2i} + 3.223\ X_{3i} - 2.855\ X_{4i} + 0.006X_{5i} + 21.671D_i$ …….. (12)

As the estimated regression line (12) shows, the unstandardised coefficient ($\hat{\beta}_1$) of change in proportion of earners (X_{1i}) is positive and significant implying that each unit increase in proportion of earners, per capita income will also increase. It is further observed that unstandardised coefficient of change in empowerment index of the borrower ($\hat{\beta}_2$) is also positive implying that empowerment of the borrower has a positive impact on per capita income. Further it can be observed from the table that the value of $\hat{\beta}_3$ is also positive and significant implying that education has a positive relation with increase in per capita income. It could be seen that the value of $\hat{\beta}_4$ is negative and significant. The sign of the coefficient is correct from the theoretical point of view as family size has an inverse relation with per capita income. The value of $\hat{\beta}_5$ is positive but insignificant implying that amount of microcredit taken has a direct relation with the per capita income, i.e., the bigger the amount of credit taken, the higher the increase in per capita income if that credit amount is properly utilized. If bigger amount of loan is taken and invested properly there is the probability that the return will also be higher. The value of $\hat{\beta}_6$ is positive and significant suggesting that productive use of loan will lead to increase in per capita income.

It is further observed from the table 7.3 that the value of $\boldsymbol{R^2}$ is 0.623 implying that 62.3% of the dependent variable is explained by the explanatory variables. The value of $\boldsymbol{F}$ is found to be 147.887 and statistically significant with p value <0.01. The high values of $\boldsymbol{R^2}$ and $\boldsymbol{F}$ are indicating good fit for the variables in the model.

6.2 Asset acquisition :

Objective 2: To examine whether there has been any significant increase in household assets after availing microcredit.

H_0 2: There is no significant increase in household assets after availing microcredit.

For this the scores of each households assets for the two periods, i.e., before and after five cycles of taking microcredit, have been compared by using paired samples t-test. The results of the paired samples t-test is shown in the following table:

Table 6: Asset Acquisition before and after Microcredit Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Household assets after five cycles of taking microcredit	11.6370	540	1.77117	0.07622
Household assets before taking microcredit	4.2648	540	1.80760	0.07779

Source: Field survey

From the above table of paired sample statistics, a comparison of the mean values of the household assets before and after microcredit shows that the mean value of household assets is higher after taking microcredit.

Table 7: Difference in Household Assets before and after Microcredit Paired Samples Test

	Mean	Std. Deviation	Std. Error mean	t	df	Sig. (2-tailed)
Household assets after five cycles of taking microcredit – Household assets before taking microcredit	7.37222	0.78504	0.03378	218.223	539	.000

Source: Field survey

From the results of the paired samples t-test as shown in the above table we can see that the mean value of the difference between household assets of the two periods, i.e., before taking microcredit and after five cycles of taking microcredit, is 7.37222. The standard deviation is 0.78504. The t value is found to be 218.223 relative to the standard error of 0.03378, whereas the critical value is 2.576 at 1% level of significance. From this we can conclude that the household assets after five cycles of taking microcredit is significantly more than the household assets before taking microcredit. So our

second objective has been satisfied and the second null hypothesis that there is no significant increase in household assets after availing microcredit is rejected.

In order to measure the influence of various factors including microcredit on household welfare in terms of asset acquisition, we have also formulated linear regression model as described in the methodology section. The result of the regression is shown below:

Table 8: Result of the regression test of the influence of different socio-economic factors, including microcredit, on the change in household assets.

Dependent variable: Change in household assets

Variables	Coefficients	Standard Error	*t* values	*p* values	R^2	Adjusted R^2	F value	Number of observations
Constant	5.158	0.157	32.947	.000	.607	.603	137.385* (.000)	540
X_1	2.040 *	0.133	15.309	.000				
X_2	0.177 **	0.077	2.291	.022				
X_3	0.319 *	0.016	19.388	.000				
X_4	-0.257 *	0.041	-6.267	.000				
X_5	0.002 *	0.000	10.318	.000				
D	0.244	0.050	4.924	.000				

*significant at 1% (p<0.01), ** significant at 5% (p<0.05) *** significant at 10% (p<0.1)

Based on the above results we have fitted the following regression equation:

$\hat{Y}_{2i} = 5.158 + 2.040\ X_{1i} + 0.177\ X_{2i} + 0.319\ X_{3i} - 0.257\ X_{4i} + 0.002\ X_{5i} + 0.244\ D_i$ …….. (13)

As the estimated regression line (13) shows, the unstandardised coefficient ($\hat{\beta}_1$) of change in proportion of earners (X_{1i}) is positive and significant implying that if proportion of earners increases by 1 unit, household assets will also increase. It is further observed that unstandardised coefficient of change in empowerment index of the borrower ($\hat{\beta}_2$) is also positive and significant implying that empowerment of the borrower has a significant positive impact on household asset acquisition. It also implies that microcredit has helped the female borrowers in empowering themselves. Further it can be observed that the value of $\hat{\beta}_3$ is also positive and significant implying that education has a positive relation with increase in household assets. It could be seen from the table that the value of $\hat{\beta}_4$ is negative and significant which suggests that family size has an inverse relation with household asset acquisition. The value of $\hat{\beta}_5$ is positive and significant implying that amount of microcredit taken has a direct relation with household asset acquisition, i.e., the bigger the amount of credit taken, the higher the increase in household assets, may be because bigger amount of loan will lead to higher income and more assets. It also suggests that the credit money is used for buying assets along with other uses which is also supported by the responses from the sample households, as a good percentage of respondents have said that they used the loan money for buying household assets. The value of $\hat{\beta}_6$ is positive and insignificant suggesting that productive use of loan leads to increase in assets.

It is further observed from the table 7.6 that the value of $\boldsymbol{R^2}$ is 0.607 implying that 60.7% of the dependent variable is explained by the explanatory variables. The value of ***F*** is found to be 137.385 and statistically significant with *p* value <0.01. The high values of $\boldsymbol{R^2}$ and ***F*** are indicating good fit for the variables in the model.

Besides applying regressions of change in per capita income and asset acquisition, we derived composite index of per capita income and household asset acquisition as mentioned in methodology section. Then we regressed change in composite index for per capita income and household asset acquisition on change in proportion of earners, change in empowerment index of the borrower, change in highest education level in the family, change in family size, average monthly amount of loan taken and use of loan for the sample households under study as mentioned in the methodology section in order to make more accurate measurement of different socio-economic factors linking microcredit and household welfare. The result of the regression is as follows:

Table 9: Result of the regression test of the influence of different socio-economic factors, including microcredit, on the change in composite index.

Dependent variable: Change in composite index

Variables	Coefficients	Standard Error	*t* values	*p* values	R^2	Adjusted R^2	F value	Number of observations
Constant	1.273	0.036	35.018	.000	.635	.631	154.806* (.000)	540
X_1	0.494*	0.031	15.947	.000				
X_2	0.041**	0.018	2.264	.024				
X_3	0.077*	0.004	20.141	.000				
X_4	-0.066*	0.010	-6.959	.000				
X_5	0.001*	0.000	11.586	.000				
D	0.065*	0.012	5.614	.000				

*significant at 1% (p<0.01), ** significant at 5% (p<0.05) *** significant at 10% (p<0.1)

Therefore the estimated regression line derived from the above table is as follows:

$$\hat{CI}_i = 1.273 + 0.494\, X_{1i} + 0.041\, X_{2i} + 0.077\, X_{3i} - 0.066\, X_{4i} + 0.001\, X_{5i} + 0.065 D_i \quad \ldots\ldots\ldots (14)$$

As the estimated regression line (14) shows, the unstandardised coefficient ($\hat{\beta}_1$) of change in proportion of earners (X_{1i}) is positive and significant implying that if proportion of earners increases by 1 unit, composite index for per capita income and household assets will also increase. It is further observed that unstandardised coefficient of change in empowerment index of the borrower ($\hat{\beta}_2$) is also positive and significant implying that empowerment of the borrower has a significant positive impact on the change in composite index. Further it can be observed that the value of $\hat{\beta}_3$ is also positive and significant implying that education has a positive relation with household welfare in terms of per capita income and asset acquisition. It could be seen that from the table that the value of $\hat{\beta}_4$ is negative and significant which suggests that family size has an inverse relation with composite index of per capita income and asset acquisition which again is theoretically true. The value of $\hat{\beta}_5$ is positive and significant implying that amount of microcredit taken has a direct relation with household welfare, i.e., the bigger the amount of credit taken, the higher the increment in household welfare in terms of per capita income and asset. The value of $\hat{\beta}_6$ is positive and insignificant suggesting that productive use of loan has a direct relation with composite index of household welfare.

It is further observed from the table 7.7 that the value of $\boldsymbol{R^2}$ is 0.635 implying that 63.5% of the dependent variable is explained by the explanatory variables. The value of $\boldsymbol{F}$ is found to be 154.806 and statistically significant with *p* value <0.01. The high values of $\boldsymbol{R^2}$ and $\boldsymbol{F}$ are indicating good fit for the variables in the model.

7. Conclusion: Microcredit is considered as a vital tool to break the vicious circle of poverty which is characterized by low income, low savings and low investment. The empirical data in this study has shown that microcredit is positively correlated with household welfare. Microcredit has helped in increasing the number of earners in the borrower's households as well as the existing earner's income, by giving them working capital loans, which in turn helps in increasing the per capita income of the household. The study also revealed that borrowers' households had acquired durable assets after joining microcredit programme. It could be seen that microcredit has contributed to the improved welfare by enabling the households to own durable assets like land, machines and tools, cattle, which in turn help in increasing the household's income. The results of the study show regular flow of income from microcredit activities.

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