Can Microfinance Programmeand NREGS Jointly Improve the Economic Condition of the Participating Rural Households? A Social Experiment

Amit Kundu (Associate Professor in Economics, Jadavpur University, Kolkata, West Bengal, India,Pin-700032)

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Author

Amit Kundu
Associate Professor in Economics
Jadavpur University, Kolkata, West Bengal, India,Pin-700032
E-mail:akundu1970@rediffmail.com, akundu29@gmail.com

Abstract

This paper tries to investigate the effectiveness of two poverty alleviation policies adopted by Indian government;(i) microfinance programme under SwarnaJayanti Gram SwarojgarYojona Scheme (SGSY) and (ii) National Rural Employment Guarantee Scheme (NREGS) to improve the economic wellbeing of the rural households. For this investigation we have to depend on Social Experiment where the drawn samples are non-random in nature. In this experiment the considered time gap between the 'base line' period and 'end line' period is two and half years. It is proved that there is total absence of any type of sample selection bias mainly during the time of drawing samples belong to control group. So the impact study could be done on the basis of 'First differenced method' rather than to take the help of 'Treatment effect procedure' calculated on the basis of two step method. It is proved from our experiment that both the government polices are jointly effective to reduce the acuteness of poverty of the rural households of India.

Key Words: Micro Finance, NREGS, Poverty
JEL Classifications: G21, G28, I38

Introduction

Major portion of the world population living in low and lower middle income economies do not have access to formal sector financial services. Microfinance system can be a solution of this problem. Actually it has become an important component of development, poverty reduction and economic regulation strategies around the world. It is used as an instrument of the transformation of economic and social structure through micro enterprise loans and group formation when the target group is generally the poor rural women. The development of the microfinance system is based on the assumption that the poor posses the capacity to implement income generating activity but are limited by lack of access to formal credit market and inadequate provision of savings and credit facilities. It is believed that average productivity of these households could be increased substantially with access to appropriate institutional savings and credit facilities delivered locally. This microfinance system has emerged as an alternative to the well documented failure of government rural credit schemes to reach mainly the small or marginal farmers or other types of rural poor households. Using microfinance system, they can now avail credit from the formal system indirectly.

Most of the microfinance system use group based lending approach and thus reduces the administrative costs of getting information and enforcement of credit transactions including loan recovery. The Self Help Groupprogramme in India, a distinctive microfinance programme under joint liability credit contract has become more popular.SHG is a voluntary association of 10-15 members, predominantly from same socio-economic background.This programme in India is a special type of microfinance system which is based on the existing banking network in delivering financial services to the poor. Generally microfinance institutions are different from government sponsored schemes. In this paper we consider the microfinance programme under SwarnaJayanti Gram SwarojgarYojana (SGSY) scheme. SGSY scheme is the government supported micro

finance programme in India which is operating among village women through encouraging them to form Self-Help Group (SHG) which was not always formed through self-selection mechanism. Rather the local panchayet sometimes plays an important role during the time of group formation.

These groups are encouraged to save small amount regularly and in installment and take credit from the accumulated savings of the group just like ROSCA after taking full consent of other co-members of her group. At least after six months of the formation of the group each SHG has to appear in a gradation test. This gradation test is conducted in order to minimize the adverse selection problem, which may arise when the borrowers have characteristics that are unobservable to the lenders and that may affect the probability of the ability of loan repayment. After qualifying the test the group becomes eligible to get revolving fund.

If they qualify, then this group also becomes eligible for loan from commercial bank which totally depends on accumulated group corpus which itself depends on savings and credit operations of the group members.Consequently the group has to go through II-gradation test, and ultimately they become eligible to get back ended subsidy from the government sanctioned through local District Rural Development Agency. As the groups pass different gradation test, they become eligible to get higher amount of credit which is known as 'progressive lending'. The 'back ended' subsidy also increase the corpus of the group which ultimately help the group members to get larger size of credit if they take proper initiative to sustain their group. Actually the basic objective of the scheme is to bring the self-employed persons above the poverty line by providing them income generating asset through bank credit and government subsidy.

Government of India has also initiated National Rural Employment Guarantee Scheme (NREGS) in the rural areas to arrange at least 100 man days of employment annually for each rural household for unskilled manual work where the wage rate was initially Rs.81 and now that has become Rs.136. The basic objective of the policy is to arrange little income security for the poor rural households who fail to get sufficient number of days of employment annually both in the farm and in the non-farm sector and to protect the rural households from poverty.This policy also helps the locality to improve its infrastructure like road, irrigation facilities, checking of floods etc. So proper implementation of NREGS in a locality can help the poor households of that locality to enjoy few positive externalities.

The target group of both the above mentioned two public poverty eradication policies of the government of India is rural poor households. Kundu (2008) had already proved total absence of 'positive assortative matching' during the time of group formation under SGSY scheme. Almost absence of self-selection mechanism during the time of group formation is the major cause behind that. Besides that there is little possibility of spillover effect of those two programmes among the beneficiaries. So we can try to investigate the combined effectiveness of those two poverty alleviation programme to improve the economic condition of the rural mainly poor households.

Overview of Literature

The SGSY scheme has been designed on three features: joint liability, progressive lending and back ended subsidy. The existing economic research on group lending can be divided into two broad areas: (i) the theoretical analysis of the distinctive features of 'credit contracts'(like joint liability and dynamic incentives) with an emphasis on their implications for solving the adverse selection and moral hazard problems (See, for example, Stiglitz (1990), Besley and Coate (1995), Ghatak (2000), Jain and Mansuri (2003), Laffont and Rey (2003), and Rai and Sjostron (2004)), and (ii) the empirical analysis that focuses on the evolution of the effects of such programmes on the welfare of the borrowers, especially the women (See, for example, Pitt and Khandker (1998), Morduch, (1998), Smith (2002)).

Though the programme is in vogue for last ten years, there are meager studies to provide comprehensive picture as well as the impact generated by the programme. Nirmala Banerjee and JayantiSen (2003) in their study conducted on the working of the SGSY scheme in West Bengal found that the funding pattern is opaque and there is lack of coordination among different stake holders. Tekkekara.T. F(2008) found in Amaravati District, Maharastra that the swarajgaris being formed into Self help Groups solely with the objective of availing subsidy under the programme and bank loans were arranged even while they had not acquired the threshold level of entrepreneurial capacity and confidence to take-up self employment project. She made a strong plea that the programme must be delinked from BPL list and the subsidy must be withdrawn. According to her the whole process of selection of beneficiary proceeds from a premise of suspicion rather of trust. With the help of field data collected in Maharastra she further found that the assumption on investment levels necessary for poverty alleviation under SGSY are unrealistic.

The Controller and Auditor General (CAG Report on SGSY, 2003) have observed that all over the country the programme couldn't be implemented in the desired manner. It felt that the implementing agencies didn't carry out the required planning and didn't prepare the swarajgaris for taking up self employment. In fact although the programme was conceived on process oriented one, the activities-such as proper identification of swarajgaris, selection of key activities, market survey, networking the swarajgaris were not carried out properly in many districts. The report even went to the extent of saying that SGSY has not emerged as an improvement over the earlier IRDP.

National Institute of Rural Development, Hyderabad conducted a national Study on SGSY during 2006. The study was taken up with the principal objective of providing detailed insight into the planning process and identifying constraints in the implementation process. The study found a positive relationship between incremental employment and incremental income suggesting marginal productivity of labour in trades like vegetable and fruit vending, spices manufacturing and handicrafts. The average post project income of the SGSY group swarojgaris was RS. 1356/-, at least 46% less than the level of income desired in the project objectives.

No proper impact study has yet done to investigate the effectiveness of NREGS to improve the livelihood of rural participants. Shankar, Gaiha and Jha (2011) on the basis of their survey in Rajasthan, Andhra Pradesh and Maharastrahad shown that at the initial level of implementation of NREGS, mainly the non-poor are participating in this scheme because they have more access about getting information about implementation of the programme. The authors gave stress that social networking as well as the access to information about different aspects of this programmecan only increase the likelihood of participation by the non affluent and poor in this scheme. So according to them Government should spend more in campaigns about its programme.Jha,Gaiha and Pandey (2011) calculated transfer benefit from NREGS or NREGS earnings net of opportunity cost of time. It was proved that mainly the landless of marginal farmer households rely more on NREGS because they have little alternative sources of income. But according to them net transfer under NREGS are not so high and as a result its poverty alleviating potential is limited.

We here hypothesize that participation in government initiated microfinance programme under SGSY scheme and getting job in their own or nearby locality through NREGS are jointly effective to improve the economic condition of the participating rural households. We here try to investigate it through quasi-experimental study in two randomly selected blocks of South 24 Parganas district of West Bengal, India.

Sample Selection and Methodology

Banerjee *et. al* (2010) had recently done an impact study of the micro finance programme among the rural households on the basis of randomized evaluation. Here the researchers themselves had totally controlled the micro finance programme. Initially the authors had chosen 104 slums of Hyderabad in the base line

period of their experiment (in 2005) and after that half of those 104 slums were selected randomly for opening a branch of Spandon (a micro finance institution) while in remaining were not. Micro credit was disbursed by Spandon to the individuals of the treatment slums. They again surveyed both the villages in the end line period i.e. between April-2007 to March 2008, at least 12 months after disbursement of loan by Spandon to study the impact of the programme. But in our experiment we had no control to initiate the microfinance programme under SGSY because the program is operated through local panchayet. Same is applicable also for NREGS. So the researchers can only choose the base line as well as 'end line' period of their experiment for impact evaluation of public policies but cannot depend on randomized evaluation process. Hence we have to depend on Social Experiment to do the combined impact study.Social Experiment is an econometric approach that uses micro data, statistical methods and behavioral models to compare the outcome of the participants in a social programme with those of the non-participants.Greenberg and Shroder (2004) had defined a 'Social Experiment' as having at least the following three features (i) policy intervention, (ii) follow up data collection and (iii) evaluation.

Following Maddala, in this type of experiment we have to identify the individuals who are willing to participate in the experiment in a particular locality chosen randomly. After that, the researcher has to select the individuals among the willing individuals according to their research objective. The researchers then divide the individuals in to treatment group and control group to do the impact evaluation of a program. According to Heckman, two possible types of selection bias may emerge in this type of sampling. One is self-selection bias. Following Kundu (2008), this type of possibility is remote in our experiment particularly in the base line period when the samples are chosen for experiment. The second one is the selection bias made by researchers which problem can be tackled through social experiment (Heckman and Smith, 1995).

Initially we have to enlist a group of willing participants some of whom are assigned to a treatment group[1] and rest to the control group. The experiment is required to comparethe incremental change of the outcome variables of the group affected by the change which is known as 'treatment group', with those of another group having similar characteristics but untouched by the change which is known as 'control group'. Here individuals are surveyed before the experiment begins as well as during the time of experiment which in many cases after several years.This type of experiment actually requires before versus after comparison of a population that receives a specific treatment and an identical (or as near as possible) population that did not receive the treatment. To identify the treatment effect on selected individual's, one need for each participant an analogous non-participant particularly in the base period.

Here sample selection refers to a sample that is not randomly selected. It is different from classical statistical method which assumes a randomized experiment. As the samples are being inferred and not generated randomlythere is a possibility of selection bias. The bias may occur due to differences in both unobservable and observable characteristics of the sample respondents between the treatment group and the control group. In any microfinance policy the unobservable features of the sample respondents belong to treatment group are like entrepreneurial capacity or motivation of borrowers or non-borrowers which brings about systematic relationship between programme participants and outcomes. So to do the experiment in a better way we are required to compare 'like' with 'like' in terms of control variables related to socio-economic characteristics. Hence careful selection of the samples belongs to non-treatment group is required such that they will have the same distribution of observed characteristics which only canminimize thepossibility of sample selection bias.

[1]Here the treatment group belongs to the individuals who had joined SHG under SGSY scheme in the base line period.

We initially have chosen two out of 16 blocks of South 24 Parganas district of West Bengal randomly and those two blocks were Mandir Bazar and PatharPratima. Now three gram panchayetsGabberia, Ghateswar and Krishnapur of Mandirbazar block and two gram panchayetsDakhin Raipur and Digambarpur of PatharPratima block of South 24 Parganas district of West Bengal, a state of India were chosen randomly. All are remote villages and not so agriculturally developed.But in all the sample villages we observe simultaneous existence of both the above mentioned poverty alleviation programmes. The agricultural wage in both the blocks during the experimental time period was Rs.100 per day and all the wages are paid in cash. Due to pre dominance of marginal farming in all those two sample blocks, the agricultural labourers fail to get even 60 full man-days of employment. The female members of the households fail to get sufficient number of days of employment in the farm sector. There is little job opportunity in those sample areas even in non-farm sector. A large number of agricultural workers are working as rickshaw van-puller in the agricultural slack season and earns around Rs.40 per day

Initially we have to identify the Self-Help Groups under SGSY scheme in those two sample blocks which have formed between Aprils to July 2007 because that time period is considered as base line period of our Experiment. Here we have taken the help of two stage sampling. The information about the time of formation of SHGs during that particular time period was collected from local panchayet offices. We have altogether found 33 such groups (19 of PatharPratima block and 14 of Mandir Bazar block). From each group we have chosen 7 members (from one group we have chosen 8 members) who are willing to participate in our experiment. So total sample size of treatment group members had become 232.

We know that in any Social Experiment the choice of Control Group plays a crucial role in determining the reliability of the results. So during the time of drawing sample belongs to control group we should be very careful about the respondents who have not yet joined in any SHGat the baseline period and remains non-member even at the end line period of our experiment i.e. at September-December 2009. We also have to investigate whether that respondent belongs to the householdshave almost identical economic condition that of treatment group in the 'base line' period. If that is 'yes' and the individual is willing to answer my questionnaire then only we can choose that sample respondents as representative of 'control group'.

Actuallyone needs analogous non-participant particularly in the base periodfor robustness' of our Social Experiment[2]. In our social experiment the end line survey was designed to cover the same respondents both members and non-members who had been considered in the base line period. If it is observed that a member at the base line period had left her group and became a non-member or a non-member in the base line period became member between the experimental time periods then these types of respondents were dropped in our experiment. Hence the data for our analysis are based on longitudinal individual and household surveys conducted just prior to the intervention and followed up two and half years after intervention. So the problem of non-randomization arises. Following Heckman we can say that in such Experimental study we have to depend on two-step procedure or switching regression.

The 'treatment effect model' calculated on the basis of two step procedurehas two aspects: (i) a dummy variable indicating the treatment condition is directly entered into regression equation where the binary explanatory variable is endogenous rather than exogenousand (ii) the outcome variable(s) of the regression equation is (are) observed for both the treatment group and the control group. The 'treatment effect model' has many applications in programme evaluation. In particular it is useful when the

[2]In our experiment the households who enjoy the benefit of both microfinance programme and getting job through NREGS belong to 'treatment group' and non participants of microfinance programme are considered as control group because the benefit of NREGS has percolated down to both types of rural households though not uniformly.

investigators have data that were generated by a nonrandomized experiment. The modern literature of 'treatment effect' begins with contra-factual when each individual has an outcome with or without treatment. But because an individual cannot be observed in both the states at a given time, we cannot observe the value of the explanatory variable in both states in a particular time period. So in fact we face a problem of missing data.To tackle this problem, we have to depend on 'First Differenced method' in our experiment which is mainly required to minimize the problem of unobserved heterogeneity between the households belong to treatment group and control group.

The basic objective of microfinance programme under SGSY scheme and NREGS is to improve the livelihood of the rural households mainly those households who are really poor. The economic condition of a household can be improved if and only if the monthly income of the household as well as monthly per-capita consumption expenditure (MPCE) are enhanced within the experimental time period. If it can be proved that the incremental value of monthly income as well as MPCE of the member households is more than the non-member householdsbetween the 'base line period' and 'end line' period then only we can claim that the microfinance programme under SGSY scheme jointly with NREGS play a significant role to improve the economic condition of the participating rural household. In the baseline period we have to collect data of two types of rural households:(i) who are joining Self-Help Group and (ii) who are not joining the government supported microfinance programme under SGSY scheme. We have again collected the same information of both types of sample households in our 'end line' period[3]. Then we have calculated the change of the outcome variables as well as other necessary explanatory variables which can possibly play an important role due to the change of outcome variables between the concerned time periods. We can write the model with a single observed explanatory variable as

$$Y_{it} = \alpha_0 + \beta_0 d2t + \beta_1 X_{it} + a_i + u_{it} \text{ when } t = 0 \& 1 \ldots\ldots\ldots \text{Eq. (1)}$$

In the above linear model 'd2t' is the dummy variable which equals to zero when t= 0 and 1 when t= 1. Therefore the intercept term at t = 0 is α_0 and at t = 1 is $\alpha_0+\beta_0$. The explanatory variable a_i is generally called unobserved effect. In this application, the main reason for collecting longitudinal data (two period panel data) is to allow for the unobserved effect to be corrected with the explanatory variables. To remove the unobserved effect, we can difference the data across the two years. If we subtract the first equation i.e. the situation when t= 0 from the second equation when t =1 we have the following equation:

$$(Y_{i1} - Y_{i0}) = \beta_0 + \beta_1(X_{i1} - X_{i0}) + (u_{i1} - ui0 \text{or} \Delta Yi = \beta 0 + \beta 1 \Delta Xi + \Delta ui \ldots\ldots \text{Eq.(2)}$$

'Δ' denotes the change from t=0 to t= 1. Eq. (2) is called the First differenced equation. It is just a single cross-section equation. The most important is that Δu_i which is uncorrelated with ΔX_i. To do the impact study, we modify the above First differenced equation in the following form:

$$\Delta Y_i = \beta_0 + \beta_1 \Delta X_i + \beta_2 DT + \Delta u_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{Eq.(3)}$$

Here DT = 1 if the respondent household has joined SHG in the base line period and = 0 for the non-participants. Actually in this estimation procedure we have to assume that each explanatory variable changes over time and no perfect linear relationship exists among the explanatory variable. To check the possibility of sample selection bias problem particularly

[3]Here we were very careful because we have to check whether any respondent who was not a member of SGSY in the base line period has become a member of SHG under SGSY scheme, or any member of SHG under SGSY scheme has left the group within the experimental time period. If we found 'yes' for any respondent then the response of that respondent was not considered in our experiment. Fortunately this incident did not happen in our experiment, due to which the sample size of the respondents both belongs to treatment group and control group remains undisturbed both in the 'base line' and in the 'end line' period.

during the time of drawing sample of the households belongs to control group in spite of our cautiousness we have to depend on 'Treatment Effect Model' estimated in a two step method. If it can be proved that there is no problem of sample selection then we can easily do the impact study on the basis of 'First differencedmethod' mentioned in Eq.(3) through applying OLS, otherwise we have to depend on Treatment Effect Model to estimate the parameters mentioned in Eq.(3) .

The basic idea behind the Treatment effect model in a two step procedure is to estimate two regressions simultaneously. The first one is a Probit regression predicting the probability of 'treatment' and the second is a linear regression for the outcome of interest as a function of treatment variable controlling for observable confounders. In order to estimate the two regressions simultaneously we have to assume that the error terms are jointly normally distributed. To make the 'outcome' more robust we have some explanatory variables in the treatment regression that do not belong in outcome regression. Especially the 'treatment effect model' is expressed in two equations:

(i) Regression equations: $y_i = \beta X_i + \delta w_i + \varepsilon_i \dots\dots\dots\dots\dots\dots$ Eq. (4)

(ii) Selection equation: $w_i = \gamma Z_i + \square_i \dots\dots\dots\dots\dots\dots\dots\dots$ Eq. (5)

Actually in the above model w_i is an endogenous dummy variable and to do the evaluation task it is required to estimate β. Here ε_i and μ_i both are bivariate normal distribution with mean zero and the covariance matrix is expressed as $\begin{bmatrix}\sigma & \rho\\ \rho & 1\end{bmatrix}$.

STATA-10 will give an estimate of 'ρ' which basically indicates the correlation between the error terms of the two equations mentioned as Eq.(4) and Eq.(5). 'σ' is the standard error of the outcome regression mention as Eq. (4) if that is linear in nature and $\lambda=\rho\sigma$. If 'ρ' is positive, the estimated effect of treatment from single equation estimation will generally be biased and away from zero. STATA will give us whether $\rho = 0$ or equivalently whether $\lambda = 0$ since $\sigma>0$ or not. If $\rho = 0$ there is no selection bias and we can present single equation estimate. If $\rho \neq 0$, there is sample selection bias and we should follow the estimates on the basis of the treatment selection model calculated on the basis of two steps method.

In our experiment we can write Eq. (4) and Eq. (5) in the following form:

$$\Delta MPCE_i = \alpha_0 + \alpha_1 SGSYMEM_i + \alpha_2 \Delta DRATIO_i + \alpha_3 \Delta NREGS_i + \varepsilon_i \dots\dots\dots\dots\dots\dots \text{Eq. (6A)}$$

or

$$\Delta MINCOME_i = \alpha_0 + \alpha_1 SGSYMEM_i + \alpha_2 \Delta DRATIO_i + \alpha_3 \Delta NREGS_i + \varepsilon_i \dots\dots\dots\dots\dots\dots \text{Eq. (6B)}$$

$$SGSYMEM_i = \beta_0 + \beta_1 AGE_i + \beta_2 EDU_i + \beta_3 ERNOT_i + \beta_4 EMPIDX_i + \beta_5 VASSET_i + \beta_6 DRATIO_i + \square_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{Eq. (7)}$$

Here the two outcome variables are ΔMPCE and ΔMINCOME i.e. increment of Monthly Adult equivalent[4]Per- Capita consumption expenditure[5]and change of Monthly Income of the sample respondents both belong to treatment group as well as control group between the base period and end line period[6].

[4]Following Townsend (1994) to get adult equivalent family members we have considered 1 for any adult member (both male and female), 0.25 for any member of that household up to six years of age and 0.5 for any member of the household between six and fourteen years of age and 0.75 between fourteen and eighteen years of age.

[5]In order to calculate the MPCE of the sample households in both the periods we initially have calculated the annual income of the sample households from different occupations. Then we have to convert that in to average monthly income. Now we have to take information about average monthly savings of the sample households both in the group and outside. Besides that we also have taken information of any amount required to repay any loan. Subtracting that sum total from average monthly income we have got average total monthly consumption expenditure of the sample households. Dividing that by adult equivalent number we can get MPCE of the sample household both belongs to treatment group as well as control group in both the periods.To get accurate result we have also calculated that from expenditure side on the basis of mixed reference periodas taken by NSSO recently. If the difference is not more that Rs.50 then we considers the latter figure otherwise we consider former figure.

[6]All the outcome variables in our experiment are quantitative in nature. The possible qualitative outcome variables are change of empowerment or

So outcome variables are observed both for treatment group as well as control group.Hence in this 'impact evaluation' study we have adopted the 'First Differenced Method' together with treatment effect method estimated on the basis of two step procedure. If we look at ΔMINCOME and ΔMPCE we have to mention that both the outcome variables are measured at constant price on the basis of Consumer's Price Index of the Agricultural Labourers of West Bengal (published regularly by Reserve Bank of India) considering the 'base line period' as base year.

It has been calculated that the values of both the explained variables are positive for most of the sample households belong to treatment group (225 of ΔMINCOME and 213 of ΔMPCE). But for the sample households belong to control groupthe figures are 165 of ΔMINCOME and153 of ΔMPCE respectively. The values of ΔMPCE are comparatively less or sometimes very near to zero or negative mainly for the treatment group when it is observed that the household is a larger amount of microcredit borrower and still repaying her credit at the 'end line' period which means a good portion of their monthly income is still spent for loan repayment and very few amount is left for consumption.

The explanatory variables are as follows:

(i) SGSYMEM =1 if the respondent has become a member of Self-Help Group under SGSY scheme in the 'base line' period and remains member up to 'end line' period and = 0 for the non-members. Here to check the existence of selectivity bias we have to consider SGSYMEM as endogenous dummy variable during the time of estimation of 'Treatment Effect Model' through two step procedure. This is considered as 'endogenous' dummy because we suspect there are few factors which may influence a rural household to join microfinance programme under SGSY scheme.[7]

(ii) $\Delta DRatio_i$ =>Change of dependency ratio[8]of the i^{th}household (both belongs to treatment group as well as control group) between the experimental time periods. Dependency ratio of a rural household can be reduced if a non-earning member starts an income generating activity after taking credit from the SHG and has become an earning member.

(iii) $\Delta NREGS_i$ =>Change of average number of monthly man-days (between the base line period and end line period) the i^{th} sample household gets employment through NREGS. Actually due lack of proper implementation of NREG Scheme the total number of man-days each respondent got employment in those sample gram-panchayets were almost zero in the t^{th} period. But the scheme was properly initiated in those sample blocks as well as villages from 2008. It came out from field survey that a male job card holder on an average has got 30-35 man-days of employment and a female job card holder has got around 30 man-days of employment in the last reference year[9].

Eq.(6A) and Eq.(6B) individually represent 'First Differenced Model' where there is a possibility that the dummy variable

happiness of the sample respondents belong to treatment group if we compare them with control group. Kundu (2011) had proved the combined effectiveness of both the government policies to enhance the 'happiness index' of the sample respondents belong to treatment group if we compare that with control group.

[7] It is required to mention that except SGSY scheme no other type of microfinance system under joint liability is present in the sample villages.

[8] $DRatio_i = \left[\frac{\text{TotalAdultEquivalentFamilyMember of the } i^{th} \text{ household}}{\text{TotalAdultEquivalentEarningMember of the } i^{th} \text{ household}}\right]$

[9] In this paper the last reference year implies between June-August 2008 to May-July 2009. The information was collected on the basis of the answer of the respondents which we think is more authentic.

SGSYMEM is endogenous in nature. So we have to consider Eq.(7) where the explanatory variables are (i) Age of the respondents (AGE), (ii) Education level of the Respondents (EDU), (iii) Whether the respondent herself is an earning member or not during the time of group formation (ERNOT), (iv) The value of the Empowerment Index of the respondent (for the treatment group respondents) or the value of the Empowerment Index of the wife of the respondent (few control group respondentswhen he is married) (EMPIDX)[10], (v) The value of Asset of the respondent household during the time of group formation (VASSET), and (vi) Dependency Ratio of the respondent household (DRATIO).The taken values of the explanatory variables are of base line period in our experiment.

Results

Before moving towards the regression result we should initially look at the following Table-1 to get a glimpse of summary statistics of both the explained and explanatory variables observed in our main econometric model both in the 'base line' period and in the 'end line' period.

Discussions

If we have a look at the results mentioned in of the Table-2Aand Table-2B where we observe the factors which can influence two outcome variables of our experiment i.e. ΔMPCE and ΔMINCOME we can draw the following inferences.

1. Participants of microfinance programme under SGSY scheme help the participating households to make a positive impact in terms of change of Monthly Income as well as 'Monthly Adult Equivalent Per capita Consumption Expenditure' between the concerned time periods if we compare them with the households belong to control group. It is also observed that employment through NREGA also plays a supportive role to help the rural household to improve thevalues of the outcome variables within the experimental time period and the change of the values of the outcome variables are more among the households who have participated in microfinance programme and also getting more jobs in terms of man-days through NREGA than the households belong to control group.

Conclusions

1. In our social experiment we have considered two quantitative indicators of 'living conditions' of a rural householdand those are Average Monthly Income and Monthly Adult Equivalent Per-Capita Consumption Expenditure. Though the time gap between the 'base line' period and 'end line' period of our experiment is only two and half years still it is observed that increment of the values of those two outcome variables are more for the sample respondents belong to treatment group if we compare them with that of control group. So this experiment proves that active participation of microfinance programme through SGSY Scheme and availability of job through National Rural Employment Guarantee Programme can jointly effective enough to enhance the living condition of the participating households and both those government policies have potential to play an important role to reduce the intensity of poverty among rural people of India.

[10]The method of calculating the Empowerment Index is mentioned in the Appendix.

Table-1: Summary Statistics of the Explained and Explanatory Variables both for the Treatment Group as well as for the Control Group.

Name of the Variables	Treatment Group Member Households		Control Group Member Households	
	Base line pd.	End line pd.	Base line pd.	End line pd.
MINCOME(Rs.)	1717.6	2338.99	1935.27	2187.05
MPCE (Rs.)	468.15	571.70	465.73	528.09
DRatio	2.50	2.48	2.33	2.41
NREGS (Average No of Man Days) per month	1.01	3.30	1.50	2.73

Source: calculated by the author on the basis of primary data.

The above table shows that at the base line period the average monthly income of the sample households belongs to control group is slightly better than that of treatment group but at the end line period average monthly income of the sample households belong to treatment group measured at constant price (after considering base line period as base year[11]) is more than that of control group. The increase of average income as well of MPCE is more for the sample households belong to treatment group if we compare that with sample households belong to control group. It is also observed that average number of man-days a sample household get job in a month through NREGS is more than the sample households belong to control group at the end line period[12]. Now we have to check whether 'treatment effect model' calculated on the basis of two step procedures is here appropriate to do the Social Experiment. If it is observed that there is no possibility of selection bias then automatically we can take the help of linear regression (which is basically the application of 'First Differenced Method')mentioned in Eq. (6A) and Eq.(6B) to investigate whether microfinance programme under SGSY scheme jointly with NREGS are able to uplift the economic condition of the households belong to treatment group. The results of the regression are presented in Table-2A, 2B and 2C respectively.

From the above tables it is observed that the Value of 'Wald χ^2 are 12.70 and 12.36 respectively and both are statistically significant at 1% level. This establishes the fact that the covariates used in the regression model is appropriate and at least one of the covariate has an effect that is not equal to zero. In both the 'Two Stage Treatment Effect Model' the estimated value of 'ρ' are positive and$\hat{\lambda}$ (where $\hat{\lambda} = \widehat{\sigma_\varepsilon}\hat{\rho}$) in both the situations are statistically insignificant within 5% level which basically establishes the fact that $\hat{\rho} = 0$ i.e. the value of correlation between ε_i and $\square_i$ is zero. It is also observed that the parameter estimate of 'SGSYMEM' (which is here treated as treatment variable) is statistically insignificant in both the models when we have applied two steps treatment effect model. Considering both the results we can say that 'treatment effect model' with two step procedure is not essential in this 'Social Experiment' and we can ignorethepossibility of any type of sample selection bias, during the time of drawing sample both belongs to treatment group as well as control group in our experiment in the 'base line' period and we cando the impact study solely on the basis of 'First differenced method'. Our inference will be much more robust if we look at Table-2C.

It is also observed from Table-2C that there is no economic factor which influences a rural household to join in a microfinance programme under SGSY scheme i.e. SGSY participation was not endogenous in nature. Only age and intra-household decision making power of married women at the base line period influences the representative household to form SHG under SGSY scheme. So we can easily

[11]Adjustment was done on the basis of Consumer's Price Index of the Agricultural Labourers of West Bengal.

[12]May be generation of 'social capital' among the SGSY participants help the sample households to get job comparatively more numbers in terms of man-days through NREGS than the non-participants.

conclude total absence of sample selection bias in our social experiment when our objective is to find out whether those two above mentioned government policies are effective enough to improve the economic condition of the households belong to treatment group?

The following Table shows the distribution of the sample households both belongs to treatment group as well as control group in terms of Adult Equivalent Monthly Per capita Consumption Expenditure both in the base line period as well as in the end line period.

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Table-2A: The Regression Results of our Econometric Exercises Eq. (6A)

Outcome Variables	ΔMPCE (Applying Two-Steps Treatment Effect Model)		ΔMPCE (Applying First Differenced Equation only)	
Explanatory Variables	Coefficients	P > |Z|	Coefficients	P > |Z|
Constant	181.80	0.000	156.44*	0.000
SGSYMEM	26.62	0.544	73.38	0.001
ΔDRATIO	5.484	0.694	4.89	0.728
ΔNREGS	.02904	0.001	.028	0.001
$\hat{\lambda}$	32.41	0.25		
P	.233			
Wald χ^2	12.70	0.005		
$\overline{R^2}$			0.36	

Table- 2B: The Regression Results of our Econometric Exercise Eq. (6B)

Outcome Variables	ΔMINCOME (Applying Two-Steps Treatment Effect Model)		ΔMINCOME (Applying First Differenced Equation only)	
Explanatory Variables	Coefficients	P > |Z|	Coefficients	P > |Z|
Constant	937.79	0.000	701.07	.000
SGSYMEM	84.54	0.87	463.94	.000
ΔDRATIO	216.19	0.085	221.24	.07
ΔNREGS	.147	0.001	.2350	.001
$\hat{\lambda}$	343.25	0.07		
P	.280			
Wald χ^2	12.36	0.006		
$\overline{R^2}$			0.32	

Table- 2C: Regression Results of Our Econometric Exercise Eq. (7)

Outcome Variables	SGSYMEM	
Explanatory Variables	Coefficients	P > |Z|
Constant	1.55	0.000
AGE	-0.0367	0.000
EDULEVEL	-0.0361	0.125
EARORNOT	0.055	0.779
$EMPIDX_{it1}$	0.1052	0.000
$VASSET_{it1}$	0.0008	0.090
$DRATIO_{it1}$	.122	0.142

Table-3: Distribution of the Sample Households in terms of Adult Equivalent Monthly Per-Capita Consumption Expenditure

MPCE (Rs.)	Treatment Group Members	Control Group Members

	Base line period	End line Period	Base line Period	End line Period
0 – 250	67	47	48	41
251 - 400	78	54	47	52
401 - 511	49	62	49	52
511 - 600	30	64	37	36
600 & above	08	05	12	12
Total	232	232	193	193

Source: Calculated by author

The above picture shows that just before joining Self-help Group under the SGSY scheme 194 of 232 households belong to treatment group and 144 out of 193 households belong to control group were lying below the adjusted rural poverty line of West Bengal. But in the end line period 163 out of 232 sample households belong to treatment group and 145 out of 193 sample households belong to control group were still lying below the adjusted rural poverty line of West Bengal[13]. So 31 rural households belong to treatment group were able to cross the poverty line between the concerned time period after joining microfinance programme under SGSY scheme and getting employment through NREGS. But only 2 households belong to control group were able to cross the poverty line between the concerned time periods. Besides that acuteness of poverty[14]has also declined among the treatment group member households. Actually, taking microcredit mainly for income generating activitiesand getting employment through NREGS help the member rural households to improve their economic conditions. Table-4 shows the purposes for which credit was taken by microfinance participants from their respective groups.

It is observed that credit was taken mainly for income generating activities especially for agricultural or for business purposes.It is observed from field survey that a good number of member households who are basically marginal or small farmers have started to cultivate horticultural products after taking loan from their respective groups. Few have started business like small grocery shops or food stalls after taking microcredit. So most of the micro credits are taken to utilize it as working capital for income generating activities which play an important role to improve the values of the outcome variables. The sample households also took loan for non-income generating activities
mainly for repairing house or for medical purposes. This basically helps the microcredit borrowers to protect themselves from the crunches of the professional money lenders and help them to get credit at a comparatively cheaper rate. Availability of credit for medical purposes helps the borrowers to get themselves or any other family member well quickly without facing any financial hindrance because they do not have any health insurance and most of the medical expenses have to bear from their own pocket. Here we should mention total absence of default among the microcredit borrowers with in the experimental time period.

2. The result shows change of total earnings received through Natural Rural Employment Guarantee Scheme' between the experimental time periods also plays a vital role to improve average monthly income as well as MPCE of the rural households. Here we have to mention that out of the two sample blocks, the success of NREGS in PatharPratima block is comparatively better than Mandir Bazar block. Average number of man-days of getting job under NREGS in PatharPratim block is around 30 where that is around 20 in Mandir Bazar block. Now to explain the possible reasons of effectiveness of NREGS to improve the livelihood of the

[13]The Expert group of Planning Commission had calculated rural poverty line of West Bengal on the basis of mixed reference period and that was Rs.445 in 2004-05. To calculate the rural poverty line of West Bengal in the baseline period i.e. April-July 2007 of our investigation we have to calculate the adjusted rural poverty line on the basis of Consumer's Price Index of Agricultural Laborers of West Bengal and that became Rs.511 MPCE

[14] Acuteness of poverty is observed among those households whose MPCE is less than Rs.250.00

rural poor households we can mention the following causes:

(i) The daily wage as well as number of man-days getting job under NGEGS has improved in the end line period if we compare that with base line period in both the sample blocks. It was enhanced from Rs.81 per man-day to Rs.100 per man-day

(ii) The wage rate both in the farm sector as well as non-farm sector have improved to keep the parity of the wage rate under NREGS.

Actually due to implementation of NREGS the households of the sample villages are enjoying few positive externalities. The expansion of NREGS has helped the rural households both directly as well as indirectly. Directly the member households most of whom are in regular touch with the local panchayet were able to get job on an average 30 to 35 man days between September-December 2008 to September to December 2009 which automatically help them to improve their earnings. Besides that lots of river dams were constructed under NREGS in the sample villages which protected the villages from flood. Flood wasan almost regular phenomenonin the sample villages in 2006 which had affected the agricultural land regularly and it became difficult for the marginal farmers to cultivate that land in the winter or in boro season. Now the agricultural lands are much more protected and marginal farmers have started to cultivate land in the winter or boro season after taking microcredit from their respective group which also helps them to earn more from their agricultural land even after repaying credit. Few brick roads were also constructed through NREG scheme which is now helping the small and marginal farmers to sale their crop outside the village which also helps them to get better price of crop. So influence of microcredit programme under SGSY scheme supported by NREGS help the rural households mainly the member households to reduce their poverty.

3. Change of dependency ratio of the sample households does not make any impact on any of the two outcome variables. This is because little fall of dependency ratio is observed among the sample households mainly belongs to treatment group between the concerned time period.

Table-4: Different purposes of taking microcredit by the sample respondents belong to treatment group

Credit taken for Income generating activities	SGSY	Non Member
Agriculture	75	0
Business	44	0
Fishery	7	0
Agriculture And Business	15	0
Buying Van	5	0
Animal Husbandry	2	0
Bidi Business	1	0
Buying shop	1	0
Buying tractor	1	0
Sub total	151	0
Credit taken for Non Income generating purpose		
House building	18	0
Advance for repairing house	4	4
Medical treatment	25	10

Bribe	0	0
Education of son	18	0
Household purpose	0	2
Sub Total	65	16
Credit for both Income as well as Non Income generating purposes		
House building and business	2	0
Agriculture and medical treatment	4	0
Education of son and agriculture	1	0
Sub Total	7	0

Source: Information collected from field data.

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Appendix-1

Calculation of Women's Empowerment Index: (Asked either the member or wife of the member or the non-member respondent)[15].

Name of the Variable	Points
1. Decision about utilization of Micro-credit	Female:-2, Both:-1, Male:-0
2. Decision on purchase of daily food items	Female:-2, Both:-1, Male:-0
3. Decision on purchase of live stock	Female:-2, Both:-1, Male:-0
4. Decision on purchase of utensils and other household items	Female:-2, Both:-1, Male:-0
5. Decision on child education, child vaccination and other health related matters	Female:-2, Both:-1, Male:-0
6. Does she earn regularly and contribute in her family?	Yes:- 2, No:-0
7. Can she participate in different gram sabhas according to her will?	Yes: -1, No:-0
8. Can she spend for consumable goods (cosmetics) according to her will?	Yes: -1, No:-0
9. Can she go outside without taking permission from her husband or elder son?	Yes: -1, No:-0
10. Can she cast her vote according to her will?	Yes: -2, No:-0
11. Can she protect herself against domestic violence?	Yes: -1, No:-0
12. Decision on Family Planning	Female:-2, Both:-1, Male:-0

Maximum point is 20 and more point indicates more Empowerment of Woman or more intra-household decision making power of the main woman of the sample household

[15]All respondent households belong to control group are married.