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Influence of Microfinance Intervention on Rural Poverty Alleviation in South-west Nigeria:
An Application of Propensity Score Marching Technique

Taofeek Aremu Kasali, PhD

School of Business and Management Studies, Moshood Abiola Polytechnic, Abeokuta, Nigeria
E-mail; taofeekkasali2012@gmail.com

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Abstract: Propensity Score Matching (PSM) measures the impact of treatment of a phenomenon on the treated group that possesses different characteristics. The general objective of the study is to assess the impact of Microfinance loan on Poverty alleviation in South-West Nigeria. The result revealed that microfinance loan has favourable contributions to poverty alleviation in the study area but there is still need for government aid. Government should support the MFIs with funds that would be disbursed at concessionary interest rates. Availability of more infrastructural facilities and more enabling environment would effectively spur the establishment of more MFIs in the rural areas.

Keywords: development finance, poverty reduction, microfinance, Propensity Score Matching,

Introduction

Nigeria is endowed with various human and capital resources. It is established that the country is one of the largest countries in Sub-Saharan Africa and the black world that had recorded consistent rapid economic growth in the past two decades. Despite these attributes, the country is inflicted by the paradox of growth which is "poverty amidst plenty". This is evidenced in the statistics that confirm that over 70 percent of Nigerian population is poor (see Table 1). As a panacea, the Government of Nigeria introduced several development measures, policies and programmes to alleviate poverty; but they are fruitless as the number of poor people continued to increase tremendously. One of these development strategies is microcredit through Microfinance Institutions. However, the empirical findings on the impact of microfinance around the globe are mixed and several reasons were given for this scenario. For instance, supporters of the positive impact of microfinance programmes on poverty alleviation allege that the discovery of the researchers in the other camp devoid the comprehensive methodology to truly assess the impact of microfinance. On the other hand, those who fault the microfinance programmes opine that the proponents of the programmes are too ambitious. One can therefore posit that the available literature on the assessment of microfinance programmes does not provide clear cut results about the effects and achievements of MFIs.

This scenario established the fact that there is need for further studies on the impact of microfinance on the rural poor particularly in the Southern part of Nigeria which does not have comprehensive studies on the subject matter. It is based on this assertion that the current study is set to evaluate the impact of microfinance on the rural poor in South-West Nigeria and identify the problems and prospects of MFIs' programmes.

Table 1: Poverty Incidence in Nigeria from 1980 – 2010

Year	*Poverty Incidence (%)*	*Estimated Population (Million)*	*Population in Poverty (Million)*
1980	27.2	65	17.1
1985	46.3	75	34.7
1992	42.7	91.5	39.2
1996	65.6	102.3	67.1
2004	54.4	126.3	68.7
2010	69	163	112.47

Source: Nigeria Poverty Profile 2010. National Bureau of Statistics (NBS, 2012)

Poverty connotes denial of basic necessities that can make life meaningful. Consequently, a person is deemed poor if he/she has a much lower income below the poverty line and is deprived of any real access to basic services (health, adequate accommodation and education). In essence, there must be policy measures targeted towards the accessibility of social services like health and education in order to have any reasonable economic growth and poverty reduction.The features of the poor include those whose incomes are lowest and who therefore consume least. The concept of poverty can be related to the theory of distributive justice which clarifies that in a" just" society, a person classified as poor is supposed to be assisted with some income support (Azam, 2003). It has been assertedthat people that live below $1 per day are poor. They always live the worst quality of life. Poverty alleviation can rightly be explained as enabling or empowering individuals to get them out of poverty; not only to increase the income and assets of households or individuals but be focused on the increase of the social services and security of the people. Poverty reduction can therefore be construed as development of human capital and the availability of infrastructural facilities that will support the efficiency of the poor (Fay *et al.*, 2005, Aigbokhan 1999, Calderon and Serve, 2010} cited in Sackey (2011).

Statistics have proved that poverty is the World's most demanding development challenge that requires adequate attention (World Bank, 2013). James D. Wolfensohn, former World Bank President, posited that "Poverty amid plenty is the world's greatest challenge". This implies that the poor countries do not necessarily lack adequate resources but they are not efficiently managed and distributed thereby causing poverty and inequalities. Hence, Sub-Saharan Africa remains the poorest region in the World (World Bank,

2013). Poverty and starvation can be regarded as injustice, violation of fundamental human rights and deprivation of freedom. It is therefore an obligation for nation states to map out strategies that would eradicate poverty (Kokaz, 2007; Musarandega, 2009). Ironically, in Sub-Saharan Africa which is considered as the World's poorest region, the concept of poverty is relatively understudied and did not get adequate attention in academic literature (Ssewamala *et al.*, 2010).

Poverty has engulfed ills like civil unrest, human suffering and environmental degradation. This has motivated researchers, particularly in Asian countries and Latin America to embark on comprehensive studies that would proffer more practicable solutions to the menace. It is due to the search for the appropriate panacea to combat poverty that necessitated the establishment of microcredit through microfinance. Although microfinance does not automatically alleviate poverty like a magic, but studies on its impact haverevealed some positive trend in the right direction.

Microfinance can also be regarded as economic development strategy that aims at poverty reduction by providing financial services to the poor, low income earners households and micro-entrepreneurs that are deprived of getting the same services from the formal financial market.

Microfinance has been regarded on several occasions as effective strategy to reduce poverty, in rural areas in particular which are believed to harbour the poorest people in the world. It is an important aid that can improve the economic performance of the poor. The poor people need microfinance to improve their entrepreneurial skill and socio economic needs. But the poor people could not satisfy the requirements of the conventional banks and microfinance is not reachable. They persist in abject poverty and vicious circle.

This study is focused on the rural poor as statistics have indicated that the rural sector harbour more poor and impoverished people (Chukwuemeka, 2009). Table 2 depicts the contribution of Urban and Rural sectors to the poverty incidence. Ironically, less than 2% of rural households have access to financial services (CBN, 2005).

Table 2: Poverty Contribution by Sector

Sector	*Incidence*	*Contribution*
Urban	43.2	35.0
Rural	63.3	65.0

Source: National Bureau of Statistics (NBS, 2006) pp25

In line with the above assertions, it was revealed that about 92% of the Nigerian population survive on less than $2 daily while 71% live with less than $1 daily (UNESCO, 2010). As a result of this, it was deserved of Nigeria and other African countries to take drastic measures to improve the conditions of living in their countries.Government efforts notwithstanding, poverty still

remains endemic and pervasive particularly in the rural communities. Nigeria is yet to record adequate national food security. Most of the communities still lack reliable source of income that can ensure basic health care facilities, good quality education, good standard housing units, cheap and affordable consumer products; and enabling environment for production and trade. What can then be the cause of this malignant monster called poverty? Could it be that the programmes are not well implemented or do they have inadequate monitoring? Do the credit facilities reach the targeted beneficiaries or are there some constraints that make this impossible? What are the basic yardsticks used to measure the severity of poverty?

In this study, an attempt was made to determine the effect and performance of Micro-Finance Institutionson economic growth, income redistribution and poverty eradication particularly in South-West Nigeria having adjudged that Micro-Finance Banks have an important role to play in poverty reduction programmes.

To this end, the factors that support the poverty alleviation of microfinance credit beneficiaries and non-beneficiaries in the study area are examined with a view to assessing the impact of the programme.

Researchers in development economics have demonstrated that Microfinance contributes to poverty alleviation by making concerted effortsin increasing the productivity of the poor and contributing positively to the economic development. This study aims at contributing more insight into literature by evaluating the effect of microfinance loan on poverty alleviation in South-West Nigeria. To this end, the following research questions are therefore important to the study:

- Have Microfinance Institutions contributed to the alleviation of poverty in the communities that they operate?
- Does Microfinance loan contribute to the improvement in the upliftment of health services, increase in per capita expenditure, improvement in standard of living and increase in income of the beneficiaries?

Microfinance Institutions and programs have been recognized as agency of development strategy by serving as important tool for poverty alleviation and support institutions for the growth of micro and small enterprises. It is important to assess the impact of microfinance programmes as literature is full of controversy on the benefits derivable from such programmes. At one end of the argument is that microfinance has some economic and social impacts on its beneficiaries (Kato & Kratzer, 2013; Khandker, 2005); at the other end is the assertion that the benefits are being exaggerated because microfinance has not been able to reach the core poor and should be considered as partial panacea not a total magic to alleviate poverty; the argument continued that microfinance have some negative impacts (Adams & Von Pischke, 1992; Chaudhry, 2009; Weiss, Montgomery & Kurmanalieva, 2003); those who belong to the middle group agree that the programmes have some benefits but they

do not benefit the poorest (Martin, Hulme, & Rutherford, 2002). With the backdrop of aforementioned arguments, it becomes essential therefore for development experts, researchers and policy makers to assess the impact of microfinance programmes (Hulme, 2000).

Several researches have been carried out on the effect of Government policies on poverty alleviation. But due to the paucity of accurate and quality data and the problem of methodology, most of the researchers concentrate on the macro and urban effects. This further widens the gap between the urban and rural inequality which is at the detriment of the rural communities. This study therefore shows the leeway for the policy makers to understand why the percentage of the poor population is rising particularly in the rural areas. It also makes an in-depth inquiry into the rural people's perception and weaknesses. Thereafter, the study makes suggestions to the government on the necessary solutions to the identified problems.

The study is presented in five sections. Next to the introduction are the empirical studies which reviewed the relevant previous studies of the subject matter, then the research methodology follows. Furthermore, the analysis and discussion are used to illustrate the outcome of the study and finally, the summary and policy implications wrap up the study.

Empirical Studies

Efforts on the study of impact evaluation of the microfinance loan on poverty alleviation should consider the issue of selection bias of the beneficiaries and this should be properly controlled for in order to avoid inaccurate results. Supporting this view, Coleman (1999) investigates the impact of group lending in Northeast Thailand by using panel data with Tobit technique. The study compares the borrowers (treatment group) with non-borrowers (control group) before and after the event and considered variables like experience, sex, education, household worker, age, assets and household size. The findings show that the microfinance loans have little impact on the beneficiaries; there was no significant impact on assets holding, there was negative impact of the loan on health status and the borrowers became worse off in debt because they borrow from another source to settle village bank debt. The study concludes that the loans were too small to be productive hence, the negligible impact on the borrowers' welfare.

Using Propensity Score Matching (PSM) method, Arun, *et al.* (2006) used a national-level cross sectional household data set in 2001 to measure the impact of microfinance on the households poverty reduction in India. The result revealed that microfinance was able to play a significant role in reducing urban and rural poverty in India.

Pati and Lyngdoh (2010) assessed the socio-economic impact of microfinance on individual family in Meghalaya, Northeast India. The study used PSM and Difference-in-Differences (DID) method to analyse data collected from 150 clients and 75 non-clients (all women) of microfinance banks.

The results revealed that microfinance loan makes significant increase in income, expenditure, savings, wellbeing, education, health, capacity building and access to social amenities for the clients than non-clients.

Expenditure per head in the household or per capita expenditure is another dimension for the measurement of impact of microfinance on poverty. Ifelunini and Wosowei (2012) examine the role of microfinance on poverty reduction among women entrepreneurs in South-South Nigeria. Data were collected from 400 respondents, comprising 200 beneficiaries and 200 non beneficiaries in eight local governments of the zone. Logit model, Propensity Score Matching and Instrumental variable methods were used to analyse the data. Explanatory variables for the study include age, household size, education, marital status, business time and location of residence. The outcome of the study revealed that access to microfinance has positive impact on per capital expenditure of women entrepreneur; while places of residence and household size have negative impact on per capita expenditure; education has positive effect on the latter.

In Nigeria, empirical studies on impact of microfinance programmes on the welfare of their beneficiaries have yielded mixed results in recent times. For instance, Jegede Kehinde and Akinlabi (2011) evaluate the impact of microfinance loan on poverty alleviation in Nigeria and confirmed that the loan can increase the income and reduce poverty of the beneficiaries. Ofoegbu (2013) conducted study on the impact of microfinance in alleviating poverty in rural Nigeria. Variables like age, household size, education and experience/ skill were identified for analysis. The result revealed that impact of microfinance on poverty was insignificant in view of high interest rates charged, low infrastructure and educational facilities in the rural areas. While Dauda (2015) examines the impact of microfinance on poverty and employment gender gap in Nigeria; and concludes that low income earners derive least benefits from microfinance banks' operation in Nigeria.

The above analyses confirm that microfinance activities have been categorized as an effective development intervention which plays a vital role in poverty reduction. Although researchers have made efforts to study the impact of microfinance, there are still little solid empirical analyses on this subject matter particularly in the study area.

However, it can be observed from the above studies that most of them did not use the appropriate methods that take proper care of covariates/hidden variables to avoid bias and non-robustness of the outcome of the research. This thought is also shared by Snow and Buss (2001) who affirm that little has been done to assess the extent by which microcredit has changed the economic wellbeing of the poor and no solid evaluations of outcomes for many microcredit programmes implemented in sub- Saharan Africa. The view further points to the fact that microcredit will increase the wellbeing if the programme is well designed. And that more research is needed to evaluate the efficiency and economic wellbeing of the beneficiaries which is measured with specific designs.

Propensity Score Matching (PSM) Method

One of the possible methods that can be used to solve the problem of selection bias is the Propensity Score Matching (PSM). This method is used to match the individuals from treatment group with those in the control group who have similar observable characteristics that can be used to discover the impact of programme intervention; like microfinance loan.

The method is useful in measuring observable variables with different dimensions because it provides "a natural weighting scheme that yields unbiased estimates of the treatment impact " (Dehejia & Wahba, 2002). Although PSM relies on observable variables to cushion the effect of selection bias, it is also reliable in reproducing the treatment group among the non-treated by re-establishing the experimental conditions in a non-experimental setting. The method serves as a means for marching different groups in accordance with their mutual relationships. Unlike regression, PSM does not assume linear relationships between the covariates and the result of interest (like the microfinance loan in our case) (Foster, 2003).

The PSM method plays vital role in cause effect treatment estimation. Researchers have recorded some merits for this method. According to Lechner (2002), the matching algorithm can be commended for its simplicity and ability to reduce bias.

In their own contribution, Rosenbaum and Rubin (1983) adduce the following prominent advantages to PSM. First, the method enables the relatively unsophisticated scholar to appreciate the system of matching the treated and control groups with simple analyses that adjust the necessary variables. Second, the mechanism of the method magnifies the process of reducing the variance of the estimated average treatment effect in the matched samples than in the random samples. The decrease in the variance follows the reduction in the x variables of the treatment and the control means. Thirdly, it is also affirmed that adjusted model based on matched samples is more robust to departures from the assumed form of the underlying model than that of random samples because there is less reliance on the extrapolations of the model. Thus, the present study uses PSM to evaluate the selection bias in the estimated model.

The problem of selection bias in treatment/control framework in impact assessment can be hardly eliminated in non-experimental data particularly in microfinance loan. This is based on two factors. One is the self-selection of the households into the programme; and two is the fact that the operators of the bank based their selection on unmeasured factors which are devoid of random placement of the programme. This gives rise to selection bias in impact estimation (Coleman, 1999). This study explores the method of Propensity Score matching to conform to these views.

The empirical review of literature reveals that microfinance programmes are yet to be fully accessed by the rural poor and the results of the studies on

their impacts are mixed. Poverty means deprivation in all ramifications and requires complex policies and programmes. Efforts to alleviate poverty can only succeed where the poor is provided with economic, social and welfare facilities. Although the use of microfinance programmes as development strategy for poverty alleviation have attracted the attention of scholars; but the comprehensive impact studies with the appropriate methodology that would solve the problems of selection bias and fungibility are still inadequate in the developing countries like Nigeria. This is the gap that the current study has attempted to fill in literature.

Sampling Design

The main objective of this study is to assess the impact of Microfinance loan on the poverty alleviation of the poor borrowers in Nigeria through the improvement on poverty alleviation, health status, standard of living, household consumption and income of the household head.

To realise the objectives of the study, primary data were collected between July and September, 2014 from the study area: South-West Nigeria. The study adopted stratified sampling technique to collect cross-sectional data through the structured questionnaire. Three states (Ogun, Oyo and Osun states) were selected out of six states in the Geographical zone. 1,170 Questionnaires were distributed to the respondents out of which 1,136 were collected from the sampled respondents. 1,134 were effectively used for the analyses; comprising 594 loan beneficiaries and 540 non-beneficiaries. Descriptive analyses of the demographic and socio-economics characteristics of the data collected were carried out. In addition, statistical test like t-test was used to test whether the mean values of the characteristics of the two groups of the respondents (beneficiaries and non-beneficiaries) are statistically different. The analysis of the data collected reveals that the gender distribution of the respondents reflects the population of the country with 53 percent male and 47 percent female. The data show that most of the respondents are literate, with about nine year's business experience on average.

A cursory look at the impact of microfinance is described through the cross-tabulations of some of the key variables in the study. It was discovered that microfinance beneficiaries in the study area have higher level of education, more household size, record more sales and income; than their counterparts that did not benefit from the loan. Furthermore, analysis of poverty level reveals that there is reduction of poverty level by more than eight percent in the study area.

Analysis and Discussion

Microfinance Impact Assessment Using Propensity Score Matching (PSM) Method

This section presents the further analysis of the impact of microfinance loan using PSM approach in order to evaluate the potential existence of

selection bias which may affect the estimation of the impact of microfinance loan.

The results of the models analysed through the PSM in this study show that the optimum number of blocks and the balancing properties of the variables are satisfied.

The summary of the PSM result is presented in the Table3:

Table 3: PSM Approach on the Impact of Microfinance loan

Impact of microfinance loan on:	*Observations: Treated/Control*	*ATT*	*Std Error*	*t*
Poverty Alleviation	1176/1070	-0.111	0.020	-5.565
Health Status	582/1068	0.084	0.028	3.003
Standard of Living	585/1079	-0.306	0.069	-4.465
Expenditure per Head	594/1078	-0.140	0.034	-4.071
Income	590/1074	-0.515	0.056	-9.146

Source: Field Survey Data (2014)

The second column in Table 3 shows the number of observations that successfully matched by PSM: 1176 loan beneficiaries (treated group) were matched with 1070 non-beneficiaries (control group). The third column shows the Average Treatment effect on the Treated (ATT). The negative value of ATT (non-beneficiaries versus beneficiaries) indicates that those who benefitted from microfinance loan have higher probability of poverty alleviation by 0.111 unit than their counterpart that did not receive the loan. This result is statistically significant as shown by the t-test (in t column). The ATT for poverty alleviation is consistent and confirms that loan beneficiaries have lower poverty than non-beneficiaries.

The second row shows that 582 microfinance loan beneficiaries are matched with 1068 non-beneficiaries and the outcome indicates that the former are worse off in health status by 0.084 unit than the latter who serve as control. This result is also statistically significant. The ATT result confirms that loan beneficiaries are worse off in health status when compared with their counterparts that did not benefit from the loan programme.

On the impact of Microfinance loan on Standard of living, 585 members of treatment group (loan Beneficiaries) were matched with 1079 members of control group (non-beneficiaries). The result shows that the loan beneficiaries have fewer standards of living by 0.306 unit when compared with the non-beneficiaries. The ATT result confirms that the loan beneficiaries have insignificant level of standards of living when compared with the non-beneficiaries.

On the Expenditure per Head (EPH) impact, 594 members of the treated group were matched with 1078 members of control group. The result indicates that the loan beneficiaries have less EPH of 0.140 unit than their counterpart group. The ATT for EPH supports the estimated impact and confirms that the

loan beneficiaries have insignificant level of expenditure per head in a household when compared with non-beneficiaries.

Also, 590 loan beneficiaries were matched with 1074 non-beneficiaries under the income of household head. It was discovered that the treated members (loan beneficiaries) have more income of 0.515 unit than the control (non-beneficiaries) members. The ATT result on income is consistent and confirms that the microfinance loan beneficiaries have more income when compared with their counterparts that did not receive the loan.

The PSM results are in the same direction with that of preceding analyses on the impact of microfinance. This confirms that the estimated impacts of microfinance loan are not subjected to the selection bias. Thus, the selection bias should be at its minimum level.

Conclusion

The results of the PSM estimators proved that the findings are devoid of the selection bias, by revealing similar outcomes. The overall results have indicated that the poorest are not able to access microfinance loan as expected, as a result of this, it has minimum impacts on the rural poor in the study area. The findings are consistent with results of similar studies of Coleman (1999), Bansal (2010) and Abraham (2015).

The outcome of the study revealed that the impact of microfinance loan on the beneficiaries is positive but needs improvement to enhance adequate welfare for the rural poor in Nigeria. The findings are in line with that of Adams and Von Pischke (1992), and Weiss, *et al.* (2003). However, there is still need for government aid in order to make the poor people benefit more from the microfinance programme. Government should support the MFIs with funds that would be disbursed at concessionary interest rates. Availability of more infrastructural facilities and more enabling environment would encourage the establishment of more MFIs in the rural areas.

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