Effectiveness of Microfinance Policy in Nigeria, 2010-2017

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Abstract
This study evaluates the effectiveness of microfinance policy in Nigeria from 2010 to 2017. The Study used AMJU Microfinance Bank as its sample and the objectives of the study are to examine appropriate client targeting mechanisms that enhance good microfinance practice aimed at poverty reduction and how client impact evaluation improves operational efficiency and effectiveness. Propensity Score Matching (PSM) technique of micro econometric framework was used to establish the counterfactual for participants. The fundamental evaluation problem of selection bias was treated in the study and primary data obtained through interviews were analysed. The findings show that microfinance client exist rate was on the increase for established clients being significant; and client loan size dissatisfaction for older clients was on the rise and customers that have benefited from micro-credits were better-off than non-beneficiaries. The study concludes that Microfinance is effective in poverty reduction and recommends amongst others that the delivery methodology should be tailored after their operational strategy and target clients; and also, appropriate feedback mechanism be built into their product and services delivery to encourage impact evaluation of participants' responses, thereby, providing relevant inputs for the formulation of effective National Microfinance Policy in Nigeria.
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1.0 Introduction

1.1 Background to the Study

There has been a growing interest towards recognizing the need to extend financial services freedom to the poor to enable them pursue legitimate economic diversification geared towards survival as well as improving their economic goals. Several schemes were advanced by government to provide the much needed financial succor to this target group, but were characterized by problems such as shallow rooted policy, poor implementation, high default rates, interest rate barriers, corruption and bias allocation (Johnson & Royaly, 1997; and Morduch, 1999).

The attention paid to this subsector by funding institutions and donor agencies as well as research work by various scholars are yet to yield the expected result on the economy as Nigeria is still ranked among the nations with high poverty index. This study is aimed at investigating the effectiveness of the National Microfinance Policy adopted by the Nigeria government and assessing the extent to which the policy has positively affected poverty level in the country. Unlike the past microfinance impact studies on Nigeria (Anyanwu, 2004; Udy, 1993) that focused on service availability and poverty reduction depth, this study used econometric analysis in assessing the effectiveness of Microfinance policies on Nigeria economy using AMJU UNIQUE (MFB) LTD as sample study.

1.2 Objectives of the Study

The primary objective of this study is to evaluate the effectiveness of microfinance policy in Nigeria, studying one of the vibrant performing microfinance institution, AMJU Unique (MFB) Ltd.

The specific objectives are to:

(i) To determine the appropriate client targeting to promote good microfinance practice;
(ii) To ascertain whether impact evaluation of microfinance services helps in improving operational efficiency of microfinance institutions.

1.3 Hypotheses of the Study

For the purpose of this study the following hypotheses were tested.

H_{o1}: Client targeting strategy cannot promote good microfinance practice in Nigeria.

H_{o2}: Impact evaluation is not an effective tool for formulation and implementation of national microfinance policy.

2.0 REVIEW OF RELATED LITERATURE

2.1 Conceptual Issues

Microfinance is a programme that extends small loans (credit) to the poor for self-employment projects that have the capacity to generate income, allowing for sustain ace of the entire family (micro-credit Summit, 1997).

However, micro-credit is a subset of microfinance. Microfinance is the extension of long term financial services to willing low income bracket in the society.

Microfinance offer financial services in the forms of credits micro-insurance, savings, money transfer, micro portfolio advice and other social services that can enhance the welfare of the poor and its family. It's services can target the rural, semi-rural and/or urban poor to enable income generation and improve standard of living (Townsend and Kaboski, 2005). It is a system of decentralized credit delivery marked by the substitution of individual banking by social intermediation, whose financial intermediaries are people's organizations (Nair, 2001).

Microfinance is seen to be characterized by doorstep service delivery. Transaction in small amounts, collateral substitution and focus on poor especially women (Karlan & Goldbery, 2006) top reduce poverty and improve self-worth. This is not a one-off or charity lending and not targeted at the upper class of the society.

2.2 Microfinance Subsector and Financial Development

Cameron et al (1967) opined that despite the direction of the relationship (growth-inducing or growth-induce), imperati9ve is the quality and efficiency of the services offered by the sector, which include: providing incentives to investors, at low cost 10 encourage huge investments, channeling small funds from savings to encourage entrepreneurial drive, promoting technological progress as it enhances access to banking and creating possibilities for a more efficient allocation of the often unproductive stock of initial wealth in the early stages of industrialization. The need to attain higher levels of growth through financial development which can reduce poverty was supported (Beck et al, 2004). Hence, a sound financial environment predicate a link between financial development and poverty reduction.

Pertinent upon the financial sector development, strategies should include bringing on board the informal sector, a vehicle for uplifting the poor. The informal sector predates the formal sector, hence Johnson (2005) opines the financial sector is intrinsically dualistic. As observed by Wai (1992), there is need by researchers to investigate the informal financial arrangements. Aryeetey and Udy (1997) affirm that the informal financial arrangements are those parts of the overall financial system that fall outside the regulated sector. To this, the arrival of the informal sector is a reprisal to financial repression and regulation (Fry, 1995; Patrick, 1996). Though, inestimable the size of the informal sector, available statistics reveal they form the bulk of the credit needs of the poor (Aryeetey, 1995 and Nissanke, 1991). Thus, the contributions of the informal sector to financial development and poverty reduction cannot be ignored. A major component of the informal sector is the microfinance industry (MFI) that has been evolving over time.

The achievement of the Millennium Development Goal (MOG) is the demarginalization of microfinance programmes (Barr, 2004). To achieve these goals various nations designed approaches and implementation of the economic development programmes. These approaches includes the development of the financial sector involving several return programmes with their attendant implications for poverty reduction through financial markets deepening and institutional capacity building.

2.3 Microfinance Policy Development Strategies

Development via the modernization model, especially the direct-credit programmes were frustrated by weak institutions, flourishing corruption, bureaucratic restricts, bloated overhead, transaction costs, poor client targeting and limited products (Morduch, 1999; Adams et al, 1984). Loans were viewed as grants and the institutional framework was viewed with suspicion resulting in loans default. Sometimes halving the entire capital (Hulme and Mosely, 1996 and George, 1990).

The 1970s experienced a new approach to development effort in which there was a mindset viewing economic growth as the main development goal that takes into cognizance, poverty reduction and rural development. Subsequently, in the 1980s, heralded the structural adjustment programme (SAP) in developing economies, coupled with the debt stocks and the acceptance of neo-liberalism by the advanced economies, made way for free market reforms in government intervention in many sectors (Osthoff, 2005; Okojie et al, 2000; Iyoha, 1998; Obadan, 1997; Aryeetey, 1995 and Oyejide, 1993). Thus the government subsidized credit schemes were absorbed by this new development paradigm through the emergence of a more market-based approach. Consequently, the emergence of microfinance however, unusual financial practice, provided financial window to low income brackets. Succinctly put, the failure of past development strategies provoked the emergence and rapid expansion of microfinance (Osthoff, 2005; Moutgomery & Weiss, 2005; Kabeer, 2005; Barr, 2004; Otero, 1999 and Morduch, 1999).

2.4 Poverty Alleviation Programme

Two ways by which the provision of financial services in general and microfinance in particular can have impact on poverty was included in the 2010/2011 world development report, known as the income-generating effect which enhances the poor economies through investment in assets that are affordable. This helps to upgrade the family

from stable below poverty line to stable above poverty line (Osthoff, 2005) and the vulnerability effect in which families are able to reduce the effects of income fluctuations thereby enhancing consumption smoothening and other coping strategies.

The participation dimension of poverty comprises many forms of deprivation such as humiliation and isolation, powerlessness and social inferiority (Hulme & Mosley, 1996). In this dimension of poverty, microfinance takes a broader perspective of poverty reduction to include non-material possessions. A major is the extent of empowerment of women. Empowerment strategy breaks the vicious circle of poverty.

2.5 Microfinance Service Provision

Microfinance institutions are expected to take into account varying needs of the poor in the design of their products. That is, designing and implementing microfinance services, there is need to consider that credit has varying implications for different segment of the poor and as such could create additional risk for them if not properly directed (Hulme & Mosely, 1996). Microfinance encompasses both financial and social intermediation including group formation, and training in financial literacy and management practices (Kalpana, 2004). Expedient upon microfinance institutions to diversify their hitherto relatively homogenous products and services to include environmental considerations.

2.6 Prospective Clients

The issue of who should constitute a majority of microfinance clients, men or women have been a friction. Some literature have opined female dominated clientele, but recent studies have proven otherwise (Brau & Woller, 2004; Amm et al, 2003). The argument in favour of women as clients is the assumption of better usage of credits and focus on family. A view of the sustainable Development Goal (SDG) is that women are critical to achieving these goals, hence the motivation to target them. The access to financial services empower women both financially and socially, hence their large number as clients to microfinance (Tassel, 2004) and World Bank (2007) confirm that most microfinance programmes are targeted towards. Women a contrary view was expressed by (Murduch, 1996) suggesting microfinance did not perform better with women as target. However, gender is not a determinant of poverty or poverty being gender sensitive.

2.7 The Business of Microfinance Banking in Nigeria

Nigeria is endowed with a huge population of abo9ut 200 million people as at 2018, of which 60% is predominantly rural (NBC, 2016) with a physical spread of 923,768km^2. A West African country and strong player in regional economics and politics, bounded in the North by the Nigeria Republic, west by Benin Republic, east by the Chad and Cameroun and Gulf of Guinea in the South. It comprises of 36 Administrative states and a federal capital reserve, Abuja. These broken down into 774 local government areas (LGAs). She got her political independence in October of 1960, an hitherto colony of Britain. For over two decades, it was administered by the military. In May of 1999 a new democratic setting emerged and still running till date. Despite its seemly progress, it still parade indices of poverty characterized by unchecked population growth, slow development, unstable macroeconomic environment buffeted by internal and external crisis and a micro economy, heavily reliant on crude petroleum. The discovery, which have relegated other sectors. The cry for economic diversification had been on, but only serious when oil and gas price shocks are experienced and relapses as soon as the price is stable. The current dispensation is giving an unserious try to this effort but laden with huge debt. As at the time of this study, it owed $6.7 trillion external debt and ₦22.4 trillion internal debt with 15% attracted bytes 36 states of the country.

Specifically, in terms of macroeconomic indicators, Nigeria witnessed a consistent decline in growth rate, Gross Domestic Product (GDP) and rising inflation consecutively between 2014-2017, thereby eroding the saving capability of most households. Nigeria economy is also experiencing an increase in debt to GDP ratio resulting in low foreign investment and inability of the government to meet developmental programmes in the areas of poverty alleviation, infrastructural development and jobs creation. Also, credit extension to the private sector is low, limiting their capabilities of investment activities vis-à-vis poverty reduction.

2.8 Theoretical Issues in Microfinance

There is increasing need among development agencies, donors, government and private concerns to undertake a robust evaluation of any intervention programme. The fundamental question to address about a programme is if objectives have been met within cost. In other words, impact evaluation can provide information on whether a programme measurably benefits participants in comparison with those who did not participate. Although, many stakeholders are eager to undertake formal evaluation of their programmes due to cost implications and the limitation of the outcomes of evaluation (Ogiogio, 2006). A main constraint encountered in most evaluation programmes is getting key players to agree to conducting the evaluation as fear of vested interest may be hindered or due to other ethical objectives. Again, many organisation regard negative findings as hindrance to foster their agenda (Ravillion, 2005; Hulme, 2000 and 1997; and Baker, 1999). Despite these apprehension, the benefits of

conducting impact evaluation are huge (Karlan & Goldberg, 2006).

To have a proper understand of the right methodology to employ in an impact evaluation, there is the need to have a grasp of the basic concept of impact evaluation. The World Bank (2002) defined impact evaluation on a "systematic identification of the effects on individuals, households, institutions and the environment caused by a given development activity such as a programme or project". Evaluation can be analytical assessment of a programme (OECD, 1999). Thus, an evaluation can take the form of beneficiary assessment, indicator monitoring, public expenditure tracking survey, rapid appraisals, concurrent assessment policy-level assessment and tracer studies (Bloomquist, 2003). It is aimed at assessing programmes performance against explicit counterfactual, such as the situation in the absence of the programme (Ravallion, 2005). Impact evaluation therefore, can be both ex-ante and ex-post.

2.9 Empirical Literature on Microfinance

Pitt et al (2003) also evaluated the Bangladesh (BRAC, BRDB, Grameen bank) using the maximum likelihood estimation controlling for endogeity of individual participation and of placement of microfinance programmes. Impact variables being health of men and women (arm measure, body mass under (BMI) and height-for-age). Result shows significantly positive effects of female credit on height-for-age and arm circumference of both men and women. Borrowing by men has either negative or non-significant impact on health of children.

Amin et al (2003) examined Bangladesh (ASD, Grameen Bank, BRAC) using non parametric test of stochastic dominance of average monthly consumption or members and nonmembers and maximum likelihood test of micro credit membership on vulnerability, consumption and household characteristics. Findings indicate members are poorer than non-members. Programmes are more successful at reaching the vulnerable.

Kaboski and Townsend (2002) tested Thailand (production credit groups, rice banks, women groups, buffalo banks) using two stage LS and MLE test of microfinance impact on asset growth, probability of reduction in consumption in bad years, probability of becoming money lender, probability of starting business and probability of changing job. Separate estimation according to types of MFI. Result were that production credit groups and women groups combined with training and savings have positive impact on asset growth, although rice banks and buffalo banks have negative impacts. Emergency services training and savings help to smooth responses to income shock. Women groups help to reduce reliance on money lenders.

3.0 Data and Methodology

3.1 Sources of Data and Description

This study makes use of cross-section data of primary nature. A sample of six hundred and forty (640) clients of AMJU (MFB) Ltd, an MFI licensed by the Central Bank of Nigeria (CBN) under Banks and other financial Institution (BOFIA)I Act No.25 of 1999. It started operation in May, 2000.

This study utilized cross-section data. A sample of six hundred and forty (640) clients of AMJU, an MFI in Nigeria was used.

The poverty scores were calibrated as: Least poor = 0-27 code (12), Less poor = (28-45) code (2), average poor = (46-63), code (3), poor = (64-82) code (4) and poorest = (84-100) code (5). High scores are assigned to low level of the poverty indicators. A client is registered as a member to participate in AMJU programmes if his/her poverty score is at least 46 (i.e. average poor to poorest). Thus, programme placement is determined by a "proxy-means test" (assignment of a score to all potential participants as a function of observable characteristics) as often used for targeting anti-poverty programmes in developing countries (Ravallion, 2005).

3.2 Sample Selection

The sample was drawn from twenty (20) unions spread across ten (10) branches in five locations. The observable characteristics of interest include: age, sex, previous business experience (in years), loan stage, loan type and location. Data were also collected on marital status, education level, primary business and poverty scores at registration for membership and on completion of loan cycle. In line with Heckman, Ichimura and Todd (1997), these variables are those that influence simultaneously the participation decision as well as the outcome variable. Furthermore, the variables are either fixed over time or are measured before participation. Also as noted by Heckman, Lalonde, and Smith (1999), the data for both the treatment and non-treatment groups are from the same population, a basic requirement for matching. All variables were categorical data, hence reflecting only the direction of change and not the exact magnitude.

In addition to the pipeline comparator, this study also employed propensity score matching to correct for selection bias. Analysis of the characteristics of all clients was used to create the control group. To validate these observables, we carried out a qualitative fieldwork of a sample of clients of AMJU. A propensity function was generated linking client characteristics to the likelihood that a client will access loan from the programme on members. The results of a recent study by Frȯlich (2006) on Gender Wage Gap of College Graduates in the UK showed that the propensity score matching is justified under the same assumption than matching on covariates and

that choice-based sampling can be ignored. In other words, PSM can be applied without conditional independence assumption and on non-independently and identically distributed (iid) data. Hence, PSM allows estimation of mean impacts without arbitrary assumptions about functional forms and error distributions. This facilitates testing for the presence of potentially complex interaction effects.

3.3 Model Specification

For an anti-poverty programme, the objective is usually defined in terms of household income or expenditure (on consumption) normalized by a household specific poverty score.

Given that the impact on poverty is known, then set Y = 1 as the outcome with treatment and Y = 0 as the outcome without treatment. Since an individual cannot be in both states, then it is not possible to observe Y = 0 and Y = 1 for the same individual thereby leading to the problem of missing data (Essama-Nssah, 2006; Ravallion, 2005 and Wooldridge, 2002). To guard against the possibility of the case where the treatment of one unit affects another's outcome as may be in general equilibrium effect (Heckman et al., 1998), the sample from the population is assumed to be independently and identically distributed (iid). In many cases the outcomes Y = 0 and Y = 1 are binary.

Let the variable T be a binary treatment indicator, such that T = 1 implies treatment and T = 0 denotes without treatment. Presuming that the data include an observation Y_1 for each unit I in a sample of size n. The value Y_i under treatment is Y_i^T and Y_i^C under the counterfactual of not receiving treatment. The benefit (gain) to unit $_i$ who received treatment is given as:

$G_i = Y_i^T - Y_i^C|T = 1$ ……. 3.17

As noted above, due to the problem of missing data, we assume that we can only observe T_i, Y_i^T for $T_i = 1$;$Y_i^C = 0$ and thus, the fundamental problem of evaluating this individual treatment effect arises because the observed outcome for each individual is given by:

$Y_i = T_iY_i^T + (1 - T_i)Y_i^C$ …….. 3.18

The average gain, which is the mean of all the Gs gives the sample mean gain for all the treated. This is called the average treatment effect on the treated (ATET) given by:

$ATET = E(G|T = 1) = E(Y^T|T = 1) - E(Y^C|T = 1)$ ……. 3.19

Equation (3.19) is the mean impact on poverty among those who actually received the programmes. In other words, ATET is the difference between expected outcome values with and without treatment for those who actually participated in treatment. Similarly, the average treatment effect on the untreated (ATEUT) is given as:

$ATEUT = E(G|T = 0) = E(Y^T|T = 0) - E(Y^C|T=0)$……. 3.20

The overall mean impact of the programme is the sum of equations (3.19) and (3.20) called the average treatment effect given by:

$Ate = E(G) = ATET + ATEUT$ …….. 3.21

Consider X as a vector of covariates (observable characteristics), then interest may be on the following conditional mean impacts.

$ATET (X) = E(G|X, T = 1)$

$ATEUT(X) = E(G|X, T = 0)$

$ATE (X) = E(G|X)$

Frolic (2006), Ravallion (2005) and Wooldridge (2002) agree that the most common method of introducing X assumes that the Y's are linear in the their parameters and the error terms (μ^T and μ^C). hence we have regression equations given as:

$Y_i^T = X_i\beta^T + \mu_i^T$ (i = 1, …, n) …….3.23

$Y_i^C = X_i\beta^C + \mu_i^C$ (i = 1, …, n) …… 3.24

Basically in equations (3.23) and (3.24), X is assumed to be exogenous, hence,

$E(\mu^T|X) = E(\mu^C|X) = 0$

The mean impacts are derived as:

$ATE(X) = X(\beta^T - \beta^C)$ ……3.25

$ATET(X) = ATE(X) + E(\mu^T - \mu^C|X,T = 1)$ ……3.26

$ATEUT(X) = ATE(X) + E(\mu^T - \mu^C|X,T = 0)$ …….3.27

It should be noted that G_i cannot be observed directly for any i since data on Y_i^T for $T_i = 0$ and Y_i^C for $T_i = 1$ are missing. Again, without further assumption, it may not be possible to identify the impacts since $e(Y^C|T = 1)j$ and $E(Y^T = 0)$ are not directly estimable from the data. However, we can form a control group or develop an econometric modeling strategy that provides a consistent estimate. Also, equations (3.23) and (3.24) no longer constitute estimable models in view of the problem of missing data. To obtain a point estimate on mean impact, the starting point is to adopt the approach of the simple-difference (D) in the conditional mean outcome between the treated and the non-treated. This is based on the assumption of ignorability of treatment introduced by Rosenbaum and Rubin (1983) stated as follows:

Assumption 2.1: Conditional on X, then T and (Y^T, Y^C) are independent.

Hence, the single – difference is given as:

$D(X) = E(Y_i^T|X_i,T_i = 1) – E(Y_i^C|X_i,T_i = 0)$ …………………………………………………… 3.28

Equation (3.28) can be estimated by the difference in the corresponding sample means or equivalently by the Ordinary Least Squares (OLS) regression coefficient of Y on T.

For the parametric model with controls, equation (3.23) can be estimated on the sample of treated while equation (3.24) on the rest of the sample, therefore resulting in the following estimable model.

$Y_i^T = X_i\beta^T + \mu^T \text{if} T_i = 1$ ………………………………………………………………….. 3.29

$Y_i^C = X_i\beta^C + \mu_i^C \text{if} T_i = 0$ …………………………………………………………………..3.30

Ravallion (2005) explains that the common practice is to estimate a simple ("switching") regression for the observed outcome measure on the pooled sample, leading to a "random coefficient" specification. Substituting equations (3.29) and (3.30) into the identity $Y_i = T_iY_i^T + (1 – T_i)Y_i^C$ at equation (3.18), then we have:

$Y_i = X_i\beta^C + X_i(\beta^T - \beta^C)T_i + \varepsilon_i; (i = 1, …, n)$ ………………………………………………… 3.31

Where $\varepsilon_i = T_i(\mu_i^T - \mu_i^C) + \mu_i^C$

Adopting the common-impact-model for which $G_i = G$, then equation (3.31) becomes a regression of Y on T and X given by:

$Y_i = (\beta_o^T – \beta_o^C)T_i + X_i\beta^C + \varepsilon_i$ ……………………………………………………………..3.32

Where β_o^T and β_o^C are the intercepts in equations (3.29) and (3.30) and $\varepsilon_i = \mu_i^C$.

To obtain unbiased impact estimates, we first consider the difference in mean outcome between the treated and non-treated at equation (3.28). This can be re-written as:

$D(X) = ATE(X) + BLAS^{ATET}(X)$ ………………………………………………………………3.33

Hence, the bias is:

$BLAS^{ATET}(X) = E(Y^C|X, T = 1) – E(Y^C|X, T = 0)$…………………………………………… 3.34

Also, for the un-treated, the bias is obtained as:

$BIAS^{ATEUT} (X) = E(Y^T|X, T = 1) – E(Y^T|X, T = 0)$ …………………………………………3.35

Then the bias for the average treatment effect is:

$BIAS^{ATE}(X) = BIAS^{ATET}(X), Pr(T = 1) – BIAS^{ATEUT}(X).Pr(T = 0)$ …………………………3.36

If we assume that $BIAS^{ATET} = 0$, then OLS applied to equation (3.32) will produce consistent estimation.

3.3.1 Assessing the Matching Quality

To ensure that the matching procedure is able to balance the distribution of the relevant variables in both the control and treatment group, the quality of matching can be assessed using the Heckman-Hotz (1989) indirect test, standardized Bias, t-test, Joint significance and Pseudo-R^2 and Stratification test.

The Standardized Bias is used the distance in marginal distribution of the X-variables. For each covariate X, this is defined as the difference of sample means in the treated and matched control sub-samples as a percentage of the square root of the average of sample variances in both groups. The standardized bias for before and after matching are given as follows:

$$SB_{before} = 100.\frac{(\bar{X}_1 - \bar{X}_0)}{\sqrt{0.5[V_1(X) + V_0(X)]}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 3.45$$

And

$$SB_{after} = 100.\frac{(\bar{X}_{1M} - \bar{X}_{0M})}{\sqrt{0.5[V_{1M}(X) + V_{0M}(X)]}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 3.46$$

Where $\bar{X}_1$ (V_1) is the mean (variance) in the treatment group before matching and $\bar{X}_0(V_0)$ the analogue for the control group. $\bar{X}_{1M}(V_{1M})$ and $\bar{X}_{oM}(V_{oM})$ are the corresponding values for the matched samples.

The t-test uses a two-sample t-test to check if there are significant differences in covariate mean for the two groups (Rosebaum & Rubin, 1985). The Pseudo-R^2 shows the extent the regressors X explain the probability of participation. The stratification test is used to t4est after dividing the observations into strata, if within each stratum the distribution of X-variables is the same for both groups.

3.3.2 Estimating the Variance of Treatment Effects

The variances of the treatment effects (ATE and ATET) are not usually easy to compute because of the inclusion of the variance due to estimation of the propensity score (Caliendo & Kopeinig, 2005). However, under unconfoundedness assumption, Haln (1998) estimated the asymptotic variances of ATT and ATET as follows:

$$Var_{ATE} = E\left[\frac{\sigma_1^2(X)}{P(X)} + \frac{\sigma_0^2(X)}{1-P(X)} + (E(Y^T|X - E(Y^C|X) - ATE)^2\right] \dots\dots\dots\dots\dots 3.47$$

And

$$Var_{ATET}^{PSunknown} = E\left[\frac{P(X)\sigma_1^2(X)}{P(X)} + \frac{P(X)\sigma_0^2(X)}{E[P(X)]^2(1-P(X))} + \frac{(E(Y^T|X) - E^C|X) - ATE)^2P(X)}{E[P(X)]^2}\right] \dots\dots\dots 3.48$$

Where $\sigma_T^2(X)$ are the conditional outcome variance for the treated (T = 1) and untreated (T = 0) observations.

The estimation of the above variances can be carried out by variance approximation by Lechner (2001) through

nearest-neighbour (NN) matching as follows

$$Var(ATET) = \frac{1}{N_1} vAR\ (Y^T|T = 1) + \frac{(\sum_{j\in\{T=0}(\omega_j)^2}{(N_1)^2} .Var\ (Y^C|T = 0) \ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.49$$

Where N_1 is the number of matched treated individuals and ω_j is the number of timers individual ***j*** from control group has been used taking into account matching with replacement. The approach assumes homescedasticity of the variances of the outcome variables within treatment and control groups.

To distinguish between population and variances, Abadie and Imbens (2006) estimated the sample-average treatment effect on the treated (SATET) as:

$$SATET = \frac{1}{N_1} \sum_{i\in\{T=1\}} [Y^T - Y^C] \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.50$$

Depriving a matching variance estimator that does not require additional non-parametric estimation, the variance or SATET is given by:

$$Var\ (SATET) = \frac{1}{N_1} \sum [T_1 - (1 - T_1).\ \frac{K_M(i)}{M}]^2.\hat{\sigma}_T^2(X_1) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.51$$

Where **M** is the number of matches and $\mathbf{K_M}$(i) is the number of times unit **i** is used as a match.

3.4 Counterfactual Construction

This study adopted the application of quasi-experimental design because of its ability to resolve problems of endogeneity associated with non-random programme placement and self-selection of members of the treatment group. The matching method using pipeline comparison group was adopted where the control group consisted of those clients who were assessed as poor, registered as members of the microfinance programme but were yet to access loans or had accessed loan the first time but were yet to complete their first loan cycle. In this study, the treatment and control group, have similar observable characteristics as portrayed by the poverty score at point of registration in addition to the demographic characteristics, thus, the issue of selection bias has been reduced. This matching ability of the control group was established using equations (3.37) to 3.44).

Galasso and Ravallion (2004) and Chase (2002) affirm that the use of pipeline comparison helps to address the problem of latent heterogeneity. Testing for observable differences between the treatment and non-treatment, Galasso and Ravallion (2004) in their study of Social Protection Programme in Argentina in which the pipeline comparison was adopted, found that the observables including idiosyncratic shocks were well balanced between the two groups. Thus, for this study, the pipeline comparator was employed because there has not been any material change in the criteria for registration as a member of AMJU programmes.

4.0 Presentation and Analysis of Empirical Results

4.1 Characteristics of AMJU Clients

In terms of gender targeting, about 82.8% of the union members of AMJU programmes are female members (Table 4.1). This is consistent with AMJU's mission of empowering poor clients who are locked out of institutional credit due to lack of command over land, stocks and other forms of acceptable collaterals.

Table 4.1: Gender Distribution of Sampled Clients at Registration

Sex	Treatment group		Non-Treatment Group		All Clients	
	No. 523	%	No. 117	%	No. 640	%
Male	90	17.2	12	10.3	102	17.2
Female	433	82.8	105	89.7	538	82.8

Source(s): Author's Computation.

Table 4.2: Age Distribution of Sampled Clients at Registration

Age (years)	Treatment group		Non-Treatment Group		All Clients	
	No. 523	%	No. 117	%	No. 640	%
18-25	18	3.4	6	5.1	24	3.8
26-35	174	33.3	48	41.0	222	34.7
36-45	198	37.9	43	36.8	241	37.7
46-55	103	19.7	12	10.3	115	18.0
56-65	23	4.4	7	6.0	30	4.7
66 and above	7	1.3	1	0.9	8	1.3

Source(s): Author's Computation.

About 94.3% of the sampled clients are between 26 and 55 years of age. This age bracket is the bedrock of the economically active population. It reflects good targeting for a microfinance institution whose mission is to

assist the active poor to build viable and sustainable micro-enterprises.

Table 4.3: Level of Education of Sampled Clients at Registration

Education	Treatment group		Non-Treatment Group		All Clients	
	No. 523	%	No. 117	%	No. 640	%
No Education	20	3.8	5	4.3	25	3.9
Half Primary	38	7.3	4	3.4	42	6.6
Full Primary	165	31.5	29	24.8	194	30.3
Half Secondary	90	17.2	24	20.5	114	17.8
Full Secondary	196	37.5	51	43.6	247	38.6
Tertiary	14	2.7	4	3.4	18	2.8

Source(s): Author's Computation.

Most AMJU clients (about 89%) have a minimum of full primary education. This facilitates better communication between AMJU staff and the clients. Also, it helps clients to quickly understand AMJU's philosophy and enhancing their skills in new business development.

Table 4.4: Marital Status of Sampled Clients at Registration

Marital Status	Treatment Group		Non-Treatment Group		All Clients	
	No. 523	%	No. 117	%	No. 640	%
Married	417	79.7	91	77.8	508	79.4
Living with a companion	30	5.7	11	9.4	41	6.4
Single/never married	26	5.0	6	5.1	32	5.0
Single/Divorced	16	3.1	5	4.3	21	3.3
Single/Widowed	34	6.5	4	4.3	21	3.3

Source(s): Author's Computation.

The majority, about 90.0% of the clients sampled have lived with a partner or have been married. This is a good parameter in group formation as only 5.0% of the clients had not been involved in marital affairs. There is implied sense of responsibilities among clients as the microfinance services are expected to be directed towards the well-being of the families of clients.

Table 4.5: Location of Sampled Clients at Registration

Location	Treatment group		Non-Treatment Group		All Clients	
	No. 523	%	No. 117	%	No. 640	%
Urban/Semi-Urban	312	59.7	70	59.8	382	59.7
Rural	211	40.3	47	40.2	258	40.3

Source(s): Author's Computation.

About sixty percent (60%) of AMJU clients are in the urban/semi-urban areas because of high population density. This facilitates group formation at low cost. However, most rural poor are excluded from benefiting from such services because of risk-return considerations. As noted by ADB (2000), most private MFIs are reluctant to invest in financial technology and innovative programmes oriented to the rural poor because the belief is that the market among the poor is limited and externalities will not allow the MFIs to profit from their investments.

Table 4.6: Previous Business Experience of Sampled Clients at Registration

Years of Previous Business Experience	Treatment group		Non-Treatment Group		All Clients	
	No. 523	%	No. 117	%	No. 640	%
Less than one 1 year	7	1.3	4	3.4	11	1.7
1-3 years	121	23.1	30	25.6	151	23.6
4-6 years	130	24.9	49	41.9	179	28.0
7-9 years	151	28.9	22	18.8	173	27.0
10 years and above	114	21.8	12	10.3	126	19.7

Source(s): Author's Computation.

It appears that prior knowledge of a business is a requirement for eligibility to participate in AMJU programmes. This is probably to guard against fungibility of money and thus ensure that clients use the micro loans for intended purpose (improving their businesses) and thus translate to improvement in the general well-being of clients.

Table 4.7: Loan Stage of Sampled Clients at Registration

Loan Stage	Treatment group		Non-Treatment Group		All Clients	
	No. 523	%	No. 117	%	No. 640	%
0	0	0.0	117	100.0	117	18.3
1	0	0.0	0	0.0	0	0.0
2	238	45.5	0	0.0	238	37.2
3	37	7.1	0	0.0	37	5.8
4	77	14.7	0	0.0	77	12.0
5	51	9.8	0	0.0	51	8.0
6	28	5.4	0	0.0	28	4.4
7	40	7.6	0	0.0	40	36.3
8	33	6.3	0	0.0	33	5.2
9 and above	19	3.6	0	0.0	19	3.0

Source(s): Author's Computation.

From table 4.7, it is evident that members of the treatment group are clients in their second loan stage or more while the control group consists of clients yet to receive any loan. This enhances the construction of appropriate counterfactual.

Table 4.8: Poverty Targeting of Clients at Registration

Poverty Score	Treatment group		Non-Treatment Group		All Clients	
	No. 523	%	No. 117	%	No. 640	%
Least Poor (0-27)	0	0.0	0	0.0	0	0.0
Less Poor (28-45)	10	1.9	2	1.7	12	1.9
Average Poor (46-63)	311	59.5	62	53.0	373	58.3
Poor (64-81)	190	36.3	50	42.7	240	37.5
Poorest (84-100)	12	2.3	3	2.6	15	2.3

Source(s): Author's Computation.

In consonance with AMJU's mission, the targeting tool employed enhanced the recruitment of the poor into its programmes. From the sampled clients (table 4.8), about 98% of AMJU clients are considered at least to be average poor. This recruitment criterion is a major variable in using the propensity score matching methods to establish the adequacy of the non-treatment group.

Table 4.9: Primary Business of Clients at Registration

Primary Business	Treatment Group		Non-Treatment Group		All Clients	
	No. 523	%	No. 117	%	No. 640	%
Crop production	61	11.7	4	3.4	65	10.2
Animal Production	8	1.5	1	0.9	9	1.4
Soap Production	8	1.5	2	1.7	10	1.6
Catering Services	7	1.3	6	5.1	13	2.0
Restaurant Services	19	3.6	8	6.8	27	4.2
Tailoring	24	4.6	3	2.6	27	4.2
Hair Dressing	18	3.4	8	6.8	26	4.1
Selling "Okika" Cloths	28	5.4	3	2.6	31	4.8
Selling New Cloths	14	2.7	14	12.0	28	4.4
Selling Agro Crops	16	3.1	5	4.3	21	3.3
Shop for Foodstuff	53	10.1	21	17.9	74	11.6
Provision/Cosmetic Shop	68	13.0	14	12.0	82	12.8
Selling Livestock	10	1.9	2	1.7	12	1.9
Kiosk for Foodstuff	23	4.4	7	6.0	30	4.7
Kiosk for Provision/Cosmetic	16	3.1	5	4.3	21	3.3
Employed worker	3	0.6	1	0.9	4	0.6
Labourer	2	0.4	1	0.9	3	0.5
Farming	144	27.5	12	10.3	156	24.4
Others	1	0.2	0	0.0	1	0.2

Source(s): Author's Computation.

About sixty percent (60%) of the sampled clients are high turnover businesses of petty trading (e.g. restaurant/catering services, hair dressing, selling of second-hand and new clothes, shop for foodstuff,

provision/cosmetic shops/kiosk) which is usually a pre-condition for regular repayment programmes of microfinance. These types of small enterprises are usually supported through micro-loans. Also, the homogeneity in the type of businesses facilitates the group lending methodology. This may appear to present a threat to the livelihood of the group due to correlated business risks. However, there is an inherent opportunity as it helps to lower monitoring costs of group members because of their technical familiarity with other members' business activities (Pagura, 2003).

Table 4.10: Level of Poverty Reduction Among Treatment Group

Poverty Score	Treatment group	
	No. 523	%
Reduced by 56 points and above	4	0.8
Reduced by 46-55 points	2	0.4
Reduced by 36-45 points	13	2.5
Reduced by 26-35 points	26	5.0
Reduced by 16-25 points	113	21.6
Reduced by 1-15 points	276	52.8
No change (zero points)	64	12.2
Increased by 1-15 points	24	4.6
Increased by 16-25 points	1	0.2

Source(s): Author's Computation.

The level of poverty reduction (table 4.10) among the treatment group shows that 82.0% of the clients noticed a reduction in their poverty score as a result of accessing loans from the AMJU programmes. The reduction in poverty level cuts across the eligibility criteria (irregular household income, poor nutritional status, unhealthy condition of dwelling place; etc) for recruitment of clients into AMJU programmes. The revelation enhances the attainment of AMJU's mission of targeting the poor. Nonetheless, 4.8% claimed that their level of poverty has worsened while about 12.2% did not notice any change in their poverty status after accessing loan from the programme. A major reasons is that the loan amount is too small to meet their business expansion requirements. It is therefore imperative that producer design should take into consideration the peculiar needs of certain clients instead of providing one-size fit-all products to all clients.

4.2 Policy Implications of Findings

The empirical findings of this study have the following policy implications that will help in the implementation of the national microfinance development strategy.

(i) A one-size-fits-all model microfinance delivery mechanism is counter-productive. Instead, MFIs should conduct their operations using a combination of delivery methodology (group or individual) that differentiates among the macroeconomic environment including spatial dispersion of population and other microfinance – driven characteristics (e.g. nature of clients' business and gender concentration).

(ii) Policy makers should encourage the conduct of impact evaluation particularly on certain intermediate indicators. Inter-temporal behavioural responses of participants in a programme are relevant to understanding their impacts (see Ravallion & Chen, 2005).

(iii) A major challenge for policy makers is to design policies that promote microfinance practice. Microfinance policy should take into consideration the congruence between commercial objective and poverty outreach. This will ensure that impact assessment is not relegated to the backstage as a result of too much emphasis on institutional sustainability. Also, it is imperative to get this policy presumptuously right from the outset through consultations with all relevant stakeholders in the microfinance industry and pilot testing.

5.0 Summary of Findings, Conclusion and Recommendation

5.1 Summary of Findings

The main objective of this study is to determine how effective microfinance policies are in the Nigerian context in reducing poverty of target clients. The Nearest Neighbour, Radius and Kernel Matching Techniques based on propensity scores were used to analyse the effect of client registration in AMJU programmes. The following are summary of findings.

(i) As demonstrated by the increase in the exit rate, AMJU may consider innovations in delivery mechanism particularly the area of evolving individual lending for those clients that have attained some level of stability and relative independence in their businesses.

(ii) Also, AMJU needs to review loan sizes since many members expressed dissatisfaction with small loan size. Failure to increase loan size may force some active members to drop out from the

programme. It is important to keep in mind that for any financial service to have a lasting impact on poverty reduction, it should be delivered in flexible way and innovative to adapt to the needs of its clients. This product will enhance high repayment rate, engender business continuity and customer loyalty.

(iii) In all, there were indicators that clients who have accessed loans (treatment group) are somewhat better off than those that are yet to benefit. The study has also helped to clarify the misconception that propensity score matching (PSM) needed to be modified in the presence of choice-based sampling, over – or under-sampling of treatment group as in Heckman, Ichimura, Smith and Todd (1998) and Heckman, Ichimura and Todd (1997).

5.2 Conclusion and Recommendations

One of the areas of interest to these stakeholders is the determination of impact of microfinance. In other words, impact assessment of microfinance intervention became a major issue in the development paradigm. In recent years, researches on impact evaluation produced mixed results due to environmental peculiarities, evaluation method applied by the researchers and operational methodologies by the various microfinance institutions.

Nonetheless, despite the conflicting findings, attempts are still being made to ascertain the efficacy of microfinance in delivering the desired promise of poverty reduction. Unfortunately, most of the previous impact assessment focused on Latin America and Asia with little attention to Africa especially Nigeria. Therefore, this study is part of the ongoing efforts in the application of the growing field of microeconometrics in impact evaluation programmes. The study used a successful microfinance institutions, AMJU as a study sample.

The findings in the study reveal that microfinance delivery mechanism such as proper client targeting, appropriate product design, flexible regulatory stance is central to operational methodology. In particular, the study confirmed the assertion that repeat loan is an important feature of microfinance in achieving its poverty reduction objectives.

The following recommendations were made at the end of our study and includes;

i. Delivery methodology for microfinance should be tailored after their individual operational strategy and client target.
ii. Feedback mechanism should be built into product delivery to enable impact evaluation of target participants' responses.
iii. Microfinance policies should take cognizance of commercial objective and poverty outreach.

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APPENDIX
SUSTAINABILITY AND SUCCESS INDICATORS OF AMJU

Performance indicator	2013	2014	2015	2016	2017
Outreach – Breadth					
No. of Branches	3	5	9	9	13
No. of Clients	17,578	21,766	24,563	32,938	48,735
No. of new clients	5,744	11,019	14,782	22,208	31,167
No. of Women	16,699	20,678	24,072	32,279	46,298
No. of active borrowers	13,859	18,740	23,136	29,812	43,699
Total loans disbursed (₦)	86,584,195.00	194,476,200.00	361,190,050.00	620,517,150.00	1,005,827,500.00
Outreach – Depth					
Average loan (total loan/No. of active borrowers((₦)	6,248	10,378	15,612	20,814	23,017
Clients drop-out rate	8.57%	14.18%	21.00%	22.21%	31.17%
Screening					
Cost of loan administration (N)	n/a	45,629,299.00	779,888,073.00	111,071,728.00	149,029,707.00
Enforcement/Risk					
Outstanding balance of loans exceeding 90 days (₦)	11,298,423.00	11,073,419.00	14,424,323.00	2,641,531.00	4,713,112.00
Outstanding balance/total loan	0.1305	0.0569	0.0399	0.0043	0.0047
Total bad debt (₦)	n/a	5,666,794.00	725,551.00	---	5,927.00
PAR 30 days					
No. of credit officers	54	69	90	114	149
Institutional performance (staff productivity)					
Total clients/loan officer	326	315	273	289	327
Total cost of loan admin/loan officer	n/a	661,294	8,665,423	974,313	1,000,199
No. of staff	28	35	43	56	63
Staff turnover rate	5.36	5.59	14.74	8.78	6.78
Total income from loans (₦)	11,628,355.00	288,249,232.00	53,631,198.00	104,131,897.00	157,406,505.00
Total income from donors (₦)	10,229,070.00	14,552,119.00	748,200.00	---	60,973,392.00
No. of credit officers	54	69	90	114	149

Performance indicator	2013	2014	2015	2016	2017
No. of groups/unions	547	585	1400	1885	2546
No. of fraud cases			4	5	3
Total value of fraud (₦)			253,010.00	203,720.00	192,290.00
Number of union/loan officer	10	8	16	17	17
Administrative Efficiency					
Admin Exp/Total loan		-	-	-	-
Total loans/loan officer (₦)	1,603,411.02	2,818,495.65	4,013,222.78	5,443,132.89	6,750,520.13
Interest Charge					
Interest rate of loans	36%	36%	36%	36%	36%
T-bill rate	0%	0%	0%	0%	0%
Interest premium	36%	36%	36%	36%	36%

Source: AMJU Admin Records at Head Office.