# **International Journal of Allied Research in Economics**

Volume.14, Number 6; November-December-2023; ISSN: 2836-7995| Impact Factor: 5.93 <u>https://zapjournals.com/Journals/index.php/ijare</u> Published By: Zendo Academic Publishing

# CRITICAL EVALUATION OF MICROFINANCE AS A POVERTY REDUCTION TOOL IN NEPAL: A FOCUS ON HOUSEHOLD CONSUMPTION

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#### **Article Info**

Keywords: Microcredit, Poverty Reduction, Household Consumption, Assets, Endogeneity, Instrumental Variable Technique, Nepal Living Standards Survey, Conditional Mixed Process Estimator, Multivariate Analysis, Livestock Ownership, Transportation, Appliances, Sustainable Development.

DOI

10.5281/zenodo.10148929

#### Abstract

This research critically evaluates the impact of microcredit as a poverty reduction tool in Nepal, with a specific focus on its influence on household consumption and assets. Employing multivariate techniques, the study utilizes data from the Nepal Living Standards Survey 2011, encompassing 5,988 households. Recognizing the endogeneity inherent in household microcredit participation, the research employs the instrumental variable technique (IV method). After addressing endogeneity concerns, instruments such as the distance of the bank, distance of the cooperative from the household, and the size of the household's landholding are utilized. The eligible households in the intervention group were reduced to 475 out of the total 779, while in the control group, 2,953 households were selected from the initial 5,209. The Conditional Mixed Process (CMP) estimator is employed to provide flexibility in combining continuous and binary variables in the same model. The multivariate analysis reveals a positive and significant relationship between microcredit participation and household consumption, as well as assets in the intervention group compared to the control group. Household consumption is disaggregated into food consumption, non-food consumption, and total consumption. Similarly, household assets include ownership of livestock (buffaloes, cows, sheep, etc.), transportation (cycle or motorcycle), and appliances (refrigerator, television, CD player). The results and findings, coupled with a review of relevant literature, present a comprehensive body of evidence supporting the notion that microcredit programs have the potential to increase incomes and elevate families out of poverty. This paper concludes that microcredit emerges as a viable and potentially sustainable tool for poverty reduction in Nepal.

#### 1. Introduction

The notion of providing loans to the impoverished was once considered absurd. However, millions of economically vulnerable households, including both the non-poor and the unbanked, express a substantial demand for financial services. These services encompass a diverse array, ranging from loans and savings to insurance and

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facilities for remittance transactions. Households seek financial services to bolster their incomes, hedge against risks, and safeguard themselves from vulnerabilities exacerbated by economic downturns, health crises, and natural disasters. The utilization of financial services extends beyond mere survival; households leverage them to invest in micro and small businesses, acquire assets, enhance their homes, and access vital health and education services (Pokhrel, 2017).

Critics often argue that the financial sector in low-income countries has failed in catering to the needs of the poor. Formal financial institutions, including banks, typically demand substantial collateral, favor high-income clients, and subject applicants to protracted and bureaucratic procedures. On the other hand, the informal sector, represented by money-lenders, tends to impose exorbitant interest rates, undervalue collateral, and, unfortunately, allows prejudiced attitudes to influence lending decisions. This failure of both formal and informal financial sectors to provide affordable credit to the poor is frequently identified as a key factor reinforcing the vicious cycle of economic, social, and demographic structures, ultimately leading to illiteracy and poverty (Pokhrel, 2017).

As a partial response to this systemic failure, the past three and a half decades have witnessed substantial growth in what is commonly referred to as "microcredit." Microcredit involves the disbursement of small, collateral-free loans to joint groups with the aim of fostering income generation and reducing poverty by enhancing self-employment opportunities (Pokhrel, 2017). One of the most renowned microcredit institutions is the groundbreaking Grameen Bikas Bank in Nepal, modeled after the Grameen Bank of Bangladesh. The Grameen model has been replicated in numerous countries, including high-income nations such as the United States, and it is estimated that over 10 million households worldwide benefit from microcredit services (Morduch, 1997).

Periodically, international donor agencies like the World Bank and USAID convene summits on microcredit, where representatives set ambitious targets for poverty alleviation through microfinance. However, the efficacy of microcredit in achieving these lofty goals is a subject of debate. Some studies suggest that access to this form of credit has a positive, substantial, and enduring effect on living standards, while others contend that it may lead to increased poverty through the additional burden of debt (Chowdhury, 2005).

Against this backdrop, it becomes imperative to critically evaluate the impact of microfinance, specifically microcredit, as a poverty reduction tool in Nepal. Does microcredit genuinely contribute to eradicating poverty and improving poverty-related indicators as claimed by international microcredit summits and microfinance institutions in Nepal? This study seeks to address these questions empirically by examining the impact of microcredit on household consumption and assets in Nepal, with a particular focus on assessing its effectiveness as a poverty reduction tool.

To conduct this assessment, cross-sectional data from the Nepal Living Standards Survey III (2011) is employed, covering a sample of 5,988 households, with 5,209 in the control group and 779 in the intervention group. Recognizing the potential bias associated with impact assessment studies based on one-period cross-sectional data, this research acknowledges the challenges of self-selection and endogeneity. In response, the study adopts the instrumental variable technique (IV method) to assess the impact of microcredit on household consumption and assets, thereby contributing to a critical evaluation of microfinance's role in poverty reduction in Nepal.

# 2. Hypotheses of Research

The main hypothesis of this study is that microcredit is a sustainable tool to reduce poverty of borrowing households. The poor households in rural areas fail to acquire the minimum amount of capital that is required to improve the employment status of the members of the households due to lack of collateral. Microfinance institutions provide poor households with this minimum capital to improve their employment status. Through improving employment status poor households increase their income and thus, improve the fulfillment of basic

needs. Gradually these households graduate to increase in household consumption is on food consumption, nonfood consumption and total consumption. And able to make their life by increasing their household assets. So, microcredit will be a sustainable tool to reduce poverty. Within this main hypothesis, two sub hypotheses can be defined:

- The membership in the microcredit institutions improves the employment opportunity and increases income of the poor households;
- The membership in the microcredit institution improves the fulfillment of basic needs of the poor households, i.e. membership of the microcredit institutions increases the access to financial services which ultimately increase self-employment and lead to increase the household consumption and assets (household consumption is on food consumption, non-food consumption and total consumption. similarly, household assets is on ownership of livestock such as buffaloes, cows, sheep, goats, hens, horses, and donkeys, ownership of transportation such as Cycle or Motor cycle or Tractor or Trolley or Cart, Ownership of appliances, such as Refrigerator or Television or CD player or Washing Machine or Sewing Machine or Cell-Phone or Others).

# 3. Literature Review

In spite of the existence of microcredit for over thirty-three years, it is surprising that there is a shortage of literature, which provides clear evidence of alleviation of poverty indicators capacity of microcredit. Only a few impact assessment studies have been conducted with carefully chosen treatment and control groups and these studies provides a mixed picture of the impact (Morduch, 1999).

The results of the empirical evidence on impact of microcredit on poverty's indicators such as employment, income, assets, formal education health access, sanitation etc. have found very mixed results (Hossain, 1984), (Proshika, 1995), Mustafa, et.al (1996), Sebstad and Chen (1996), Khandker and Chowdhury (1996), Pitt and Khandker (1996), Bruntrup et.al (1997), Edgecomb and Barton (1998), (Morduch, 1999), Schrieder and Sharma (1999).

Glewwe and Jacoby (1995) tested the effect of child health and nutrition outcomes in Ghana, including the age of enrollment and years of completed schooling. They used the crosssectional data to identify effects. One of the approaches in that study was to seek instruments that affect child health characteristic (such as height for age anthropometric outcome) but were not correlated with unobserved family characteristic affecting child education. They proposed as instruments for child health (a) Distance to the closest medical facility and (b) Maternal height. Both justifiably correlate with child health, but they also pointed out the mother's height could affect her labor productivity and hence household income and the resulting time she has to spend on her children's education. Distance to nearby medical facilities could also correlate with other community characteristic, such as presence of school. Both of the caveats weaken the assumption that cov(Z, e) = 0. From the IV estimate, as well as alternative estimate specifying fixed effect for families. They found strong negative effects of child health on delayed enrollment but no statistically significant effect on completed years of schooling.

Ghalib (2009) explained the social impact on lives of the poor by means of a standard model. This is sort of an experimental design which consists of a control group and a treatment group. Treatment group is exposed to microfinance intervention whereas control group is not, assuming that both the groups are living in the identical economic and social conditions. The difference in the quality of lives, in terms of social indicators is considered the impact of microfinance. Since social impact is a complex process and a number of other factors will contribute to the model.

Some impact evaluation studies have found that access to credit by the poor has a positive, large and permanent effect on poverty's indicators such as employment, income, assets, formal education health access, and sanitation. However, other studies have found that poverty is not reduced through micro-credit, poor households simply become poorer through the additional burden of further debt. Since more money for micro-credit essentially means less money for other programs with similar aims. Bruntrup et.al (1997), have only used descriptive statistics for impact analysis. They have not used any multivariate technique to determine the impact of microcredit on poverty related aspects of borrowing households. Mustafa et.al;(1996) and Hossain (1984) completed their study without solving endogeneity problems. It means they were biased in selecting the sample households. Among the studies reviewed, Khandker and Chowdhury (1996), and Pitt and Khandker (1996) were found sound in methodological perspective. Hossain (1998), Khandker and Chowdhury (1996), have conducted the study using cross sectional data and only one impact assessment study, Khandker (2005), has conducted using a panel data set. Instrumental variable technique (IV) method (Stock & Watson, 1998) allows for endogeneity in the individual participation, program placement, or both and it also can allow for time-varying selection bias. Measurement error that results in attenuation bias can also be resolved through this procedure. This approach involves finding a variable (or instrument) that is highly correlated with program or participation but that is not correlated with unobserved characteristics that affecting outcomes.

(Megumi & Abhay, 2021) explained about the microcredit group-lending program and estimates how and the extent to which post-determined group-related factors reflecting the group atmosphere and rivalry among the group members affect the economic achievements of the loan users. Based on data from Maharashtra State, India, the study found that social homogeneity and monitoring among members worked as building blocks to increase the household income of a loan user, while fairness and frequent meetings with other members work as stumbling. (Samer ali, Abdullah, & Nurulizwa, 2021) Investigated Al-Amal Bank's microcredit impacts on women empowerment in Yemen, one of the poorest Middle Eastern nations. A panel dataset and primary and secondary data were gathered through household surveys and propensity score matching to restrict intangible variables 'possible effects and the empirical results revealed that microcredit had a significant positive effect on monthly household incomes and accumulated asset values. Although microcredit facilitated female entrepreneurship and income generation for improved household incomes and expenditure, no influence was found on female household decisions and mobility following the patriarchal system practiced in many Arabian nations, including Yemen. They found that theoretically and practically contributed to the body of knowledge in three ways. First, a novel proof of how microcredit interactions affected several Yemeni women empowerment elements was identified. Second, provides new insight into the empowerment theory by explaining how access to microcredit influences numerous features of women's economic and social empowerment. Lastly, social and family traditions significantly influenced female attributes and lifestyles by reflecting how communal and family rituals affected microcredit impacts on women empowerment and vice versa.

(Mohammad Monzur, Khanam, & Nghiem, 2019), investigated the impact of microcredit programs on child schooling in rural Bangladesh using cross-sectional data from 439 households across 20 villages of four districts of the country. A child's school outcomes were measured by school enrolment, school attendance and grade attainment (measured by the right grade for age). The results of that study revealed that the participation in microcredit programs had a significant positive effect on school attendance but no effect on either school enrolment or grade attainment. They suggested that care should be taken in assessing the effectiveness of microcredit programs.

(Pham Tien, Katsuhiro, & and Pham, 2019) evaluated the macro and micro, impact of microcredit on rural household economy, particularly on output value and net income of rural households, using Matched Differencein-Difference method; on economic growth, especially the aggregate effect of production increase and income growth, using Input–Output analysis. The results at micro level found that microcredit benefits self-employment rather than other economic activities of households. The salient results from the macro-economic analysis revealed that, not as expected, the effect of microcredit on output increase is not so large. They suggested to Vietnamese government that microcredit is an effective development strategy at both micro and macro levels and recommended to enact the relevant policies to enhance the effectiveness and outreach of microcredit.

(Nigusu & Asfaw, 2019) the impact assessment of microfinance conducted both at household and institutional outreach and sustainability based on average income, access to education, access to medical facilities, nutritional status, savings, employment generation and empowerment and found that if outreach of above variables expanded a positive impact. Major socioeconomic variables that affect credit repayment include education, age of household head, family size, gender of household head, farm size, loan size, livestock ownership, annual farm revenue, loan diversion, frequency of contact with development agent, group effect and location of borrowers from lending institution.

# 4. Methodology

# 4.1. Source of Data

The data used in this research are taken from Nepal Living Standard Survey (NLSS). The original survey was carried out by the Central Bureau of Statistics (CBS), National Planning Commission, and Government of Nepal. The NLSS has been carrying out since 1995/96. The second time the NLSS was carried out in 2003/04. And the NLSS 2010/11 was the third round of the survey conducted by the CBS. NLSS followed the globally adopted framework and methodology developed by the World Bank. All the three surveys followed the Living Standard Measurement Survey Methodology, which was developed by the World Bank. While the panel data could be desirable to inter temporal changes and specially studying on impact. This study used the cross-section data of NLSS III in view of unavailability of panel data. This cross-section survey NLSS III enumerated 7,020 households, of which 5,988 households have been for the cross-section sample and remaining 1,032 were for the panel sample. (CBS, 2012).

Data for expenditure has been generated from the different chapter of the NLSS (III). The data of the consumable goods and occasions are taken from the five and six chapter. Data for household assets has been generated from the six and thirteen chapter of the NLSS (III). Livestock data have been taken (Buffaloes, Cows, Sheep, Goats, Hens, Horses, and Donkeys) from 13.66. Similarly, Transportation (Cycle, Motor cycle, Tractor, Trolley, Cart) and Appliances (Refrigerator, Television, CD player, Washing Machine, Sewing Machine, CellPhone, Others) are taken from chapter 6.05 of the NLSS (III).

#### 4.2. Research Framework

On the basis of discussion made so far and theoretical underpinnings explained in the review of literature, the model has been developed like as shown in the Figure 1 which is a unified framework that sheds light on the impact of microcredit on education at household level. In addition to this demographic and other independent variable has been added in the model.



# *Figure 1.* Research Framework *Source: Developed by the researcher.*

# 4.3. Dependent and Independent Variables

Treatment (independent) variables and the outcome (dependent) variables have been considered in the study. Several outcome variables taken into consideration, namely: children education (number of schools going children, highest educational level and school expenditure). There are three possible treatment variables that can be used to assess the impact of microfinance. These are: (1) number of years the clients spent as an access of the microfinance, (2) amount/value of loans availed, (3) number of loan cycles. Treatment variable 1 and 2 are deemed better in representing program availability (Coleman, 1999). Present study has taken (2) as the treatment variable to assess the impact of microfinance. Outstanding loan without collator from agricultural development bank or from commercial bank or from rural development bank or from other financial institution or from NGO or from relief agency or from co-operative has been considered the proxy of microcredit.

# 4.4. Other Control Variables

Other control variables have been included in the control function such as sex, age, education, household size, type of area (rural, urban), ecological belts (mountain, hills, terai), development region (eastern, central, western and mid and far western), population, number of banks and total number of schools.

# 4.5. Theoretical Statement of IV Model and Assumptions

Sometimes, problems occur in the regression model. This is often due to omitted variables, or due to errors in variables or due to simultaneous causality which make the error term correlated with the regressor. Omitted variable can be addressed directly by including the variable in a multiple regression, but there is feasible if data is available on the omitted variable. And sometimes, when causality runs both from X to Y and from Y to X, there is simultaneous causality bias, multiple regression cannot eliminate the bias. If a direct solution to these problems is either infeasible or unavailable, then a new method is required. In such situation Instrumental Variables (IV) regression is a general way to obtain a consistent estimator of the unknown coefficients of the population

regression function when the regressor, X is correlated with the error term u. The variation in X as having two parts: one part that, for whatever reason, is correlated with u, and the other part that is uncorrelated with u. if we had the information that allowed us to isolate the part second, then we could focus on those variation in X that are uncorrelated with u and disregard the variation in X that bias the OLS estimates. The information about the movements in X that are uncorrelated with u is gleaned from one or more additional variables, is an instrumental variables or instrument.

# 4.6. General Instrumental Variables Regression Model

Yi = B0+ B1 X1i + ... + BkXki+ Bk+1 W1i + ... Bk+rWri+ ui (1) i =1, ... n where,

Y<sub>i</sub> is the dependent variable,

 $B_0, B_1, ..., B_{k+r}$  are the unknown regression coefficients,

 $X_{1i_1}$ ...,  $X_k$  are k endogenous regressors, which are potentially correlated with  $u_i$ 

W1i, ..., Wri are r included exogenous regressors, which are uncorrelated with ui or are control variables,

 $u_i$  is the error term which represents measurement of error and /or omitted factors, and  $Z_{1i}$ , ...,  $Z_{mi}$  are the m instrumental variables.

# 4.7. Two Stage Least Squares

The TSLS estimator in the general IV regression model in Equation (1) with multiple instrumental variables is computed in two stages:

First-stage regression(s): Regress X<sub>1i</sub> on the instrumental variables (Z<sub>1i</sub>, ..., Z<sub>mi</sub>) and the induced exogenous variables (W<sub>1i</sub>, ..., W<sub>ri</sub>) using OLS. Compute the predicted values from this regression; call these X<sub>1i hat</sub>. Repeat this for all the endogenous regressors X<sub>2i</sub>,

...,  $X_{ki}$  thereby computing the predicated values  $X_{2i hat, ..., }X_{ki hat}$ 

(2) Second-stage regression: Regress Y<sub>i</sub> on predicted values of the endogenous variables (X<sub>1i hat</sub>, ..., X<sub>ki hat</sub>) and the included exogenous variables (W<sub>1i</sub>, ..., W<sub>ri</sub>) using OLS. The TSLS estimators, B<sub>0hat</sub><sup>TSLS</sup>, ..., B<sub>k+r hat</sub><sup>TSLS</sup> are the estimators of the second –stage regression.

In this study two stages are done automatically within TSLS estimation commands in STATA software.

# 4.8. Two Conditions for Valid Instrument

A set of m instruments  $Z_{1i}$ , ...,  $Z_{mi}$  must satisfy the following two conditions to be valid:

# (1) Instrument Relevance

- In general, let X<sub>1i hat</sub> is the predicted value of X<sub>1i</sub> from the population regression of X<sub>1i</sub> the instruments (z's) and the included exogenous regressor (W's) and let "1" denote a regressor that takes on the value "1" for all observations (its coefficient is the intercept), then (X<sub>1i hat</sub>, ..., X<sub>ki hat</sub>, W<sub>1i</sub>, ..., W<sub>ri, 1</sub>) are not perfect by multicollinear.
- If there is only one X, then at least one Z must enter the population regression of X on Z's and the W's.

# (2) Instrument Exogeneity

The instruments are uncorrelated with the error term, that is  $Corr(Z_{1i}, u_i)=0, ..., (Z_{mi},u_i)=0.$ 

# 4.9. The Instrument Variable Assumptions

The variables and error in the IV regression model satisfy.

- (1)  $E(u_i/W_{1i},...,W_{ri})=0$
- (2)  $(X_{2i}, ..., X_{ki}, W_{1i}, ..., W_{ri}, Z_{1i}, ..., Z_{mi}, Y_i)$  are i.i.d. draws from their joint distribution.
- (3) The X's, W's, Z's and u all have nonzero, finite fourth moments
- (4) The W's are not perfectly multicollinear and

(3)

# (5) The two conditions for the valid instrument hold.

# 4.10. A Rule of Thumb for Checking for Weak Instruments for Relevancy

The first stage F-statistics is the F-statistics testing the hypothesis that the coefficients on the instruments,  $Z_{1i}$ , ..., $Z_{mi}$  equal to zero in the first stage of the two stage least squares. When there is single endogenous regressor, first-stage F less than 10 indicates that the instruments are weak. In which case, the TSLS estimator is biased (even large sample), and TSLS tstatistics and confidence interval are unreliable (Stock and Watson, 1998).

#### 4.11. Empirical Instrumental Variables Regression Model

## 4.11.1. First Stage

 $\begin{array}{l} Micro = \alpha + \beta_{1}sex + \beta_{2}age + \beta_{3}education + \beta_{4}size \ of \ households + \beta_{5} \ area + \beta_{6} \ belts + \beta_{7} \ development \ regions + \\ \beta_{8} \ population + \beta_{9} \ no \ of \ banks + \beta_{10} \ total \ number \ of \ school + \beta_{11} distance \ of \ bank + \beta_{12} \ distance \ of \ cooperative + \\ \beta_{13} \ holding \ of \ land + u_{i} \ (2) \end{array}$ 

# 4.11.2. Second Stage

 $Y = \alpha + \Box_1 sex + \Box_2 age + \Box_3 education + \Box_4 size of households + \Box_5 area + \Box_6 belts + \Box_7 development regions + \Box_8 population + \Box_9 no of banks + \Box_{10} total number of school +$ 

 $\Box_{11}$ micro<sup>hat</sup> + vi

Y is the dependent or outcome (Household Consumption and Assets)

Micro is the endogenous regressor, which is potentially correlated with  $u_i$  whose characteristic is the participation of microfinance which is measuring the household status (a binary variable having a value 1 if there is participating in the credit and 0 otherwise)

Sex, age, education, household size, type of area (rural, urban) belts (mountain, hills, terai) development region (eastern, central, western and mid and far western), population, no of Banks and total number of school are included exogenous regressor, which are uncorrelated with ui or Control variables. Ui is the error term which represents measurement of error and /or omitted factors. Distance of bank, distance of cooperative and holding of land size are the instrumental variables which are is highly correlated with program or participation but that is not correlated with unobserved characteristics that affecting outcomes.  $\beta_1$ , ...,  $\beta_{13}$  are the unknown regression coefficients.

#### 4.12. Mandatory Diagnostic Tests of Models for IV

Two important tests, testing for endogenneity and testing of over identifying restrictions have been carrying out for searching the plausible instruments for a potentially endogenous explanatory variable. As a diagnostic test conducted on all given 3 equations for the test of the strength of instruments and over identification restrictions. Cragg-Donald Wald F statistic, Sargan statistic (over-identification test of all instruments), and under identification test (Anderson canon. corr. LM statistic), have been tested and results of all six models are verified (Table1)

When the distance of the cooperative is used as IV for outcome variables in all 3 equations, the criteria of testing the over identifying restriction. Distance of cooperative from the household, over identification test is satisfied. When distance of bank and land holding (eligibility restriction criteria to the participant of households for microcredit) are added to the IVs list,  $nR^2$  is higher than the 10 percent level which is statistically verified. Therefore, it is valid to add these two variables as instruments to the IV list.

Testing for endogeneity, OLS and 2SLS estimator have been estimated in the study. As it is seen, there is statistically significant difference between OLS and 2SLS. As Hausman (1978) suggested directly comparing the OLS and 2SLS estimates and determining whether the difference is statistically significant or not for all 3 equations, both OLS and 2SLS are found consistent because all variables are exogenous. If OLS and 2SLS

statistically significant, it concludes that dependent (outcome) variable must be endogenous. For details, (Number of observations, Result of F-test, Probability > F, R-Squared and Adjusted R-squared) see in Appendix. Table 1.

Diagnostic test Results

| Dependent<br>Variable<br>(outcome<br>variable ) | Exogenous<br>variables | Endogenous<br>variables | Instruments  | Weak<br>identification<br>test<br>(CraggDonald<br>Wald<br>F statistic) | Sargan<br>statistic<br>(over<br>identification<br>test of all<br>instruments) | Under<br>identification<br>test<br>(Anderson<br>canon. corr.<br>LM<br>statistic): |
|---|------------------------|-------------------------|--------------|--|---|---|
|   | age, sex,              | Micro                   | Distance of  | 13.92 13.92  | 1.93  | 41.55 41.55   |
| nonfood_7                                       | edu(education)         | )                       | Bank,        | 13.92 13.92  | 63.23   | 41.55 41.55   |
| totcons_7                                       | (size of               |                         | Distance of  | 13.92  | 111.93  | 41.55   |
| livestock                                       | household),            |                         | cooperative  | 13.92  | 19.44   | 41.55   |
| (cown bufn                                      | type of area           |                         | and size of  | •  | 89.67   |   |
| goatn sheepr                                    | rural and              |                         | land holding |  | 40.86   |   |
| horn henn                                       | ) urban),              |                         |              |  |   |   |
| transportation                                  | Region                 |                         |              |  |   |   |
| (cycle  | (eastern,              |                         |              |  |   |   |
| Motercycle                                      | central,               |                         |              |  |   |   |
| car)  | western                |                         |              |  |   |   |
| Appliances                                      | Midwestern             |                         |              |  |   |   |
| (radio ref                                      | and far                |                         |              |  |   |   |
| wash televi                                     | western ),             |                         |              |  |   |   |
| phone sew                                       | population,            |                         |              |  |   |   |
| com)  | numbers of             |                         |              |  |   |   |
|   | schools,               |                         |              |  |   |   |
|   | numbers of             |                         |              |  |   |   |
|   | bank and               |                         |              |  |   |   |
|   | financial              |                         |              |  |   |   |
|   | institutions           |                         |              |  |   |   |

Table 1 shows the all individual results of tests on all dependent variables. Weak identification test (Cragg-Donald Wald F statistic): > 10 Sargan statistic (over identification test of all instruments):  $\leq$  10% of level

Chi-sq(2) P-val  $\leq 10\%$  of level

For the results of OLS and IV estimator of all six models (Appendix)

#### 5. Emperical Results and Discussion

To assess the impact of microcredit on consumption and assets of participants, controlling for selected demographic and other variables. An instrumental variable technique with CMP command was run to determine the effect of microcredit on consumption and assets. The key coefficients of all the variables estimated household consumption i.e.,food consumption (exp\_food), non-food consumption (nonfood) and total

consumption(totalcons) and household assets i.e. ownership of livestock, ownership of transportation and ownership of home appliances. The coefficients of all the estimated model of IV estimator are summarized in Table 2 and in Table 3.

# 5.1. Impact of Microcredit on Consumption

Based on the iv estimator's results in Table 2 show that expenditure on food (exp\_food) variable is positive and highly significant with participation of microcredit. It shows that the participant household are more likely to spend on their food consumption with respect to nonparticipant households. So, there is no evidence of rejection of the hypothesis Participation in the microcredit leads to increase total household expenditure in food items (food consumption).

Table 2.

|              | ,          |               |               |
|--------------|------------|---------------|---------------|
| Variable     | exp_food   | nonfood_7     | totcons_7     |
| Age          | 22.93***   | 1149.08***    | 1581.64***    |
| Sex          | 17.44      | -28615.86***  | -30882.11***  |
| Edu          | 78.45***   | 8321.97***    | 10815.93***   |
| Hhsize       | 400.89***  | 13361.82***   | 25130.05***   |
| Urban        | 499.28***  | 59696.53***   | 73332.67***   |
| Hill         | 374.78**   | 7875.62       | 7698.00       |
| Terai        | 149.81     | 32172.03**    | 37667.32**    |
| Edr          | 620.06***  | 15592.80*     | 39211.98***   |
| Cdr          | 890.42***  | 42682.67***   | 70709.27***   |
| Wdr          | 790.93***  | 22416.80***   | 44980.38***   |
| Mwdr         | 68.98      | 15875.65*     | 27365.12**    |
| Population   | 0.00       | 09***         | 12***         |
| Noofbank     | 13.54***   | 700.68***     | 904.16***     |
| totalnoofs~l | -1.31***   | 22.91         | 24.96         |
| micro        | 3014.97*** | -107240.48*** | -111059.45*** |
| _cons        | -599.00**  | -84879.99***  | -96140.69***  |

*IV results indicators of household consumption (exp food, nonfood, and totcons)* 

legend: \* p<0.05; \*\* p<0.01; \*\*\* p<0.001

Source: Author's calculation based on instrumental variable technique estimator.

The variable non-food (nonfood\_7) has a negative and highly significant with participant of the microfinance. This reflected that household those who is not participated in the microcredit is more likely to spend on nonfood with negative sign. So, there is no evidence of acceptance of the hypothesis participation in the microcredit leads to decrease the nonfood items (nonfood consumption). The total consumption (totcons\_7) is negative and highly significant with participation of microcredit. It shows that the participant household are more unlikely to spend on their total consumption with respect to non-participant households. The amount of non-food expenses is in the total expenses influence the total household expenditure of household which made the negative result of total consumption. So, there is no evidence of acceptance of the hypothesis Participation in the microfinance leads to increase household expenditure (consumption).

These results are supported by some previous studies like, Effa and Herring 2005; Alexander and Karlan, 2006 and Noreen U, 2010. However, Morduch (1998), argued that eligible households that participated in the microfinance have strikingly less consumption level than eligible household living in the same are without participation in the microfinance. Same result has been observed in this study for H4ab.

# 5.2. Impact of Microcredit on Assets

Household assets consist of one-dimension ownership, which is comprised of three categories is ownership of livestock, transportation and appliances. The hypotheses were developed to measure the impact of microcredit on assets were that participation in the microcredit leads to increase the ownership of livestock (Buffaloes, Cows, Sheep, Goats, Hens, Horses, and Donkeys) as a household asset, led to increase the ownership of transportation (Cycle or Motor cycle or Tractor or Trolley or Cart) and leads to increase the ownership of appliances (Refrigerator or Television or CD player or Washing Machine or Sewing Machine or CellPhone or Others) as a household asset.

To assess the impact of microfinance on ownership of household assets of participants, controlling for selected demographic and other variables, and an instrumental variable regression estimator with cmp estimator was run to determine the effect of microfinance ownership of household assets. The key coefficients of the estimated model of IV estimator are summarized in Table 3.

Based on the results in Table 3 show that ownership of livestock (Buffaloes, Cows, Sheep, Goats, Hens, Horses, and Donkeys) as a household asset is positively associated with the participation of microcredit. It led to more ownership of livestock as compared to nonparticipant of microcredit. So, there is no evidence of rejection of the hypothesis participation in the program leads to increase the ownership of livestock as a household asset. Table 3.

| <u> </u>     |               |              |               |  |
|--------------|---------------|--------------|---------------|--|
| Variable     | livestock     | transporta~n | appliances    |  |
| Age          | .00907914***  | .00154881    | .0044959**    |  |
| Sex          | .03867899     | .11145297*   | 37322299***   |  |
| Edu          | 03444658***   | .06414221*** | .10649359***  |  |
| Hhsize       | .13151061***  | .12498885*** | .09225813***  |  |
| Urban        | -1.1410635*** | .38532948*** | .797144***    |  |
| Hill         | .00421917     | .87146747*** | .0653098      |  |
| Terai        | 17676137      | 2.9784928*** | .6980666***   |  |
| Edr          | .04159695     | .31570271*** | .47270023***  |  |
| Cdr          | 55330549***   | .48803745*** | .64742554***  |  |
| Wdr          | 52654603***   | .49215935*** | .78235418***  |  |
| Mwdr         | 19019319      | 10624876     | .03761554     |  |
| Population   | -2.734e-07    | -8.606e-07** | -1.141e-06*** |  |
| Noofbank     | 01456811***   | .00643633*** | .00764987***  |  |
| totalnoofs~l | .00090826***  | .00013058    | .0005218**    |  |
| micro        | .0676377      | .51671024*** | .38002344*    |  |
| _cons        | .41087284*    | -3.453432*** | -1.2882093*** |  |

*IV* results indicators of Household assets <u>(livestock, transporta~n</u> and appliances)

legend: \* p<0.05; \*\* p<0.01; \*\*\* p<0.001

Based on the results, the ownership of transportation (Cycle, Motor cycle, Tractor, Trolley Cart) as a household asset is positively associated with the participation of microcredit and which is highly significant. So, there is more likely to have ownership of transportation as compared to non-participant of microfinance. Theoretically, it can be said that participant household might start a new kind of business and they may need to buy Cycle or Motor cycle or Tractor or Trolley or Cart after taking microcredit. This theoretical concept is supported with this result. The ownership of appliances (Refrigerator or Television or CD player or Washing Machine or Sewing Machine or Cell-Phone or Others) as a household asset is positively associated with the participation of microcredit and which is highly significant. So, there is more likely to have ownership of appliances as compared to non-participant of microcredit. Based on the interpretation of all results, there is no evidence of rejection of the hypothesis participation in the microcredit leads to increase the ownership of appliances (Refrigerator or Television or CD player or Washing Machine or Sewing Machine or Sewing Machine or CellPhone or Others) as a household asset. These results are supported by some previous studies with Kondo (2007); Sebstad, J. and Chen, G. (1996) Sengsourivong (2006) and Setboonsarng and Parpiev 2008. However, Kondo et al (2008) and Noreen (2010), are found contradict with this result.

# 6. Conclusion

Does microcredit work? This study and review of the literature in this paper provided a wide range of evidence that microcredit programs can increase incomes and lift families out of poverty.

In conclusion to this study, it is argued that there is a role for microcredit as a poverty reduction policy tool. However, it is emphasized that if microcredit is chosen as an intervention policy to enhance the illiteracy reduction there is need to set clear objectives for the indicators of economic empowerment for the people. More importantly the ability of households to begin informal sole micro entrepreneurships should not be assumed to be adequate for the improvement of household income. There is need to create a policy framework to spur growth in the enterprises as well as the rural economy as a whole through the creation of employment opportunities and an increment in the agricultural output to achieve such illiteracy reduction objective policy intervention may be required. In essence this calls for both private (microcredit) and public partnerships to create the environment where such a quality education objective could be realized. Further impact study should be done on expenditure, housing quality and food security in the same model presented here to perceive the impact of other indicators of poverty.

#### References

Alexander, T, G., and Karlan, D. (2006). "Microfinance Impact: Bias from Dropouts." working paper.

- Bruntrup, M., Huda, A., Alauddin, S.M., and Mizanur, R. (1997). *Impact Assessment of ASA*; Dhaka: Association for Social Advancement (ASA).
- Chowdhury, A. (2009). *Microfinance as a Poverty Reduction Tool-A Critical Assessment*. DESA Working Paper, UN-DESA.
- Coleman, B.E. (1999). The impact of group lending in northeast Thailand. *Journal of Development Economics*, 60, 105-42. <u>https://doi.org/10.1016/S0304-3878(99)00038-3</u>
- CBS, *Nepal Living Standards Survey (2012)*. National Planning Commission Government of Nepal, Central Bureau of Statistics.

- CBS, *Nepal Living Standards Survey. (2004)*. National Planning Commission Government of Nepal: Central Bureau of Statistics.
- Edgecomb, E. and Barton, L. (1998). *Social Intermediation and Microfinance Programs; A Literature Review.* Bethesda, MD: Development Alternatives Inc.
- Effa, A. D., & Herring, R. D. (2005). Micro Finance Support to Rural Women Farmers in Ghana: A Case Study of the Ga District of the Greater Accra Region, Ghana, Proceedings of the 21st Annual Conference, San Antonio, TX.
- Ghalib, A. (2009). Measuring the Impact of Microfinance Intervention: A Conceptual Framework of Social Impact Assessment. UK: *Journal of Development Economics*, 71 (1), 146-159.
- Glewwe, P., and G.Jacoby, H. (1995). An Economic Analysis of Delayed Primary School Enrollment in a low Income Country:The Role of Early Childhood Nutrition. *The Riview of Economics and statistics*, 77 (1), 156-169. <u>https://doi.org/10.2307/2110001</u>
- Hausman, J. A. (1978). Specification Test in Econometrics. Econometrica, 46(6): 1251-1271. https://doi.org/10.2307/1913827
- Hossain, M. (1984). Credit for the poor; *Research Monograph* No.4; Bangladesh Institute of Development Studies; Dhaka.
- Joshi, M. N. (2021). Competitive loan-groups and economic achievements of microcredit loan. https://doi.org/10.2139/ssrn.3760976
- Khandker, S.R. (2005). Micro-finance and poverty: Evidence using panel data from Bangladesh. *The World Bank Economic Review*, 19(2), 263–286.
- Khandker, S. R. and Chowdhury, O. H. (1996). Targeted Credit Programmes and Rural Poverty in Bangladesh in Bangladesh; World Bank Discussion Paper No.336; Washington D.C.: The World Bank. <u>https://doi.org/10.1596/0-8213-3706-8</u>
- Kondo, T., Aniceto, O, Jr., Dingcong C., and Infantado, C. (2008). Impact of Microfinance on Rural Households in the Philippines, Discussion paper # 2008-05, *Philippine Institute for Development Studies*.
- Morduch, J. (1999). "The Micro finance Promise." Journal of Economic Literature, Vol. 37(4) 1569-1614. https://doi.org/10.1257/jel.37.4.1569
- Morduch, J. (1999). The Role of Subsidies in Microfinance: Evidence from the Grameen bank. *Journal of Development Economics*, 60, 229-248. <u>https://doi.org/10.1016/S03043878(99)00042-5</u>
- Mustafa, S., Ishrat, A., Dilruba, B., Altaf, H., Azmal, K., Mohammad, M., Abu, Y., & Sarwar, J. (1996). Beacon of Hope: An Impact Assessment and study of BRAC's Rural Development Programme; Research Division, Bangladesh Rural Advancement Committee (BRAC), Dhaka.

- Megumi, N., & Abhay, J. (2021). Competitive loan- groups and economic achievements of microcredit loan suers in a group-lending program: Evidence from India. *Social Science & Humanities Open*, 1-10.
- Mohammad Monzur, M. B., Khanam, R., & Nghiem, M. M. (2019). Microcredit participation and child schooling in rural Bangladesh : Evidence from a cross-sectional survey. *Economic Analysis and policy*, 293-301. <u>https://doi.org/10.1016/j.eap.2019.09.005</u>
- Nigusu, A., & Asfaw, M. (2019). Impact of Microfinance on Rural Household Poverty in Ethiopia. . Journal of Economics and Sustainable Development, www.iiste.org, 72.
- Noreen, U. (2010). "Impact of Microfinance on Poverty", A Ph.D. dissertation submitted to the Faculty of Management Sciences Foundation, University of Islamabad, Pakistan.
- Pham Tien, T., Katsuhiro, S., & and Pham, B. D. (2019). Impact of microcredit on rural household welfare and economic growth in Vietnam. *Journal of Policy Modeling*, 120139. <u>https://doi.org/10.1016/j.jpolmod.2019.02.007</u>
- Pit, M.M. and Khandker S.R. (1996). Household and Intra household Impact of Grameen Bank and Similar Targeted Credit Programme in Bangladesh, World Bank Discussion Papers. 306. Washington D.C. The World Bank. <u>https://doi.org/10.1596/0-8213-3594-4</u>
- Pokhrel, S.R. (2017). *Impact of Microfinance on Poverty in Nepal*. A PhD. dissertation submitted to the Faculty of Humanities and Social Sciences of Tribhuvan University in Kirtipur, Kathmandu, Nepal.
- Proshika (1995). Impact Assessment Survey Report; Proshika: A Centre for Human Development; Dhaka.
- Schrieder, G. and Sharma, M. (1999). "Impact of Finance on Poverty Reduction and Social Capital Formation: A review and Synthesis of Empirical Evidence." *Savings and Development*, 23, (1) pp. 67-93
- Sebstad, J. and Chen, G. (1996). Overview of Studies of the Impact of Micro Enterprise Credit. Washington: Management Systems International.
- Sengsourivong, K. (2006). *The Impact of Microfinance on Household Welfare: case study of a savings group in Lao*, PDR, Master Thesis, Department of Regional Cooperation Policy Studies, Graduate School of International Cooperation Studies, Kobe University, Japan
- Setboonsarng, S., and Parpiev, Z. (2008). Microfinance and the millennium development goals in Pakistan: Impact assessment using propensity score matching. *ADB Institute Discussion Paper* No. 104. Retrieved April 18, 2008, from worldwide web: http://www.adbi.org/discussion paper/2008/04/1 8/2526
- Stock, J. H., and Watson, M. W. (1998). *Introduction to Econometrics* (Second ed.). United State of America: Pearson Education, Inc.
- Samer ali, A.-s., Abdullah, A. M., & Nurulizwa, R. & Mohammed, A.-s. (2021). Impact on Socio -Economic Development and Women Empowerment in Low-Income Countries: Evidence from Yemen. Sustanability, An Open Access Journal MDPI, 13. <u>https://doi.org/10.3390/su13169326</u>

#### (Appendix) OUTPUT OF IV ESTIMATORS Impact on Household Consumtion

1 cmp (exp\_food = age sex edu hhsize urban hill terai edr cdr wdr mwdr population noofbank totalnoofschool micro) (micro =dist\_ban k dist\_coop land\_hec\_tot age sex edu hhsize urban hill terai edr cdr wdr mwdr population noofbank totalnoofschool), indicators (\$cmp\_cont \$cmp\_probit)

#### **Mixed-process regression**

Number of obs = 5988 LR chi2(32) = 2481.12 Log likelihood = -55660.148

```
Prob > chi2 = 0.0000
```

| exp_food   | Coef      | Std. Err | Z      | <b>P&gt;</b>  z | [95% Conf.] | [nterval]  |
|------------|-----------|----------|--------|-----------------|-------------|------------|
| age        | 22.9382   | 2.284168 | 10.04  | 0               | 18.46131    | 27.41508   |
| sex        | 17.44877  | 75.69067 | 0.23   | 0.818           | -130.9022   | 165.7998   |
| edu        | 78.45252  | 6.898559 | 11.37  | 0               | 64.93159    | 91.97345   |
| hhsize     | 400.8886  | 13.81828 | 29.01  | 0               | 373.8052    | 427.9719   |
| urban      | 499.2819  | 74.85101 | 6.67   | 0               | 352.5766    | 645.9871   |
| hill       | 374.7829  | 131.6408 | 2.85   | 0.004           | 116.7716    | 632.7942   |
| terai      | 149.8199  | 208.6356 | 0.72   | 0.473           | -259.0985   | 558.7382   |
| edr        | 620.0646  | 123.859  | 5.01   | 0               | 377.3054    | 862.8239   |
| cdr        | 890.42    | 120.2189 | 7.41   | 0               | 654.7953    | 1126.045   |
| wdr        | 790.9395  | 127.9263 | 6.18   | 0               | 540.2086    | 1041.67    |
| mwdr       | 68.97702  | 133.8186 | 0.52   | 0.606           | -193.3027   | 331.2567   |
| population | .000042   | .0004257 | 0.10   | 0.921           | 0007924     | .0008763   |
| noofbank   | 13.5392   | 2.579874 | 5.25   | 0               | 8.482742    | 18.59566   |
| totalnoof  | -1.31022  | .2450347 | -5.35  | 0               | -1.790479   | 829961     |
| micro      | 3014.967  | 69.63966 | 43.29  | 0               | 2878.475    | 3151.458   |
| _cons      | - 599.001 | 222.8822 | - 2.69 | .007<br>- 1035  | .842        | - 162.1598 |

| micro        | Coef     | Std. Err | Z     | <b>P&gt;</b>  z | [95% Conf. | Interval] |
|--------------|----------|----------|-------|-----------------|------------|-----------|
| dist_bank    | 0056545  | .0013035 | -4.34 | 0               | 0082092    | 0030997   |
| dist_coop    | 0038318  | .0016443 | -2.33 | 0.020           | 0070546    | 0006091   |
| land_hec_tot | .0386874 | .0195498 | 1.98  | 0.048           | .0003706   | .0770043  |
| age          | 0076177  | .0014686 | -5.19 | .000            | 010496     | 0047394   |
| sex          | .0416116 | .047867  | 0.87  | 0.385           | 0522059    | .1354291  |
| edu          | 0061135  | .0045129 | -1.35 | 0.176           | 0149587    | .0027316  |
| hhsize       | 0346299  | .0084513 | -4.10 | 0.000           | 0511941    | 0180656   |
| urban        | 1481861  | .0484372 | -3.06 | 0.002           | 2431212    | 0532509   |
| hill         | 2205241  | .0785491 | -2.81 | 0.005           | 3744775    | 0665707   |
| terai        | 0992911  | .1241673 | -0.80 | 0.424           | 3426546    | .1440724  |

| edr         | .0119308  | .0736327 | 0.16   | 0.871 | 1323866   | .1562482  |
|-------------|-----------|----------|--------|-------|-----------|-----------|
| cdr         | 1471166   | .0727222 | -2.02  | 0.043 | 2896495   | 0045836   |
| wdr         | 2242232   | .0773823 | -2.90  | 0.004 | 3758897   | 0725568   |
| mwdr        | .2002511  | .0776613 | 2.58   | 0.010 | .0480376  | .3524645  |
| population  | -2.95e-07 | 2.56e-07 | -1.15  | 0.248 | -7.97e-07 | 2.06e-07  |
| noofbank    | 005349    | .0015628 | -3.42  | 0.001 | 0084121   | 0022859   |
| totalnoofs  | .0007158  | .0001509 | 4.74   | 0     | .0004201  | .0010114  |
| _cons       | 3415095   | .1426128 | -2.39  | 0.017 | 6210254   | 0619936   |
| lnsig_1     | 7.753078  | .0101213 | 766.02 | 0     | 7.733241  | 7.772916  |
| atanhrho_12 | -1.548326 | .0339761 | -45.57 | 0     | -1.614918 | -1.481734 |
| sig_1       | 2328.73   | 23.56975 |        |       | 2282.989  | 2375.387  |
| rho_12      | 9135088   | .0056231 |        |       | 9238834   | 9017923   |

2 cmp (nonfood\_7 = age sex edu hhsize urban hill terai edr cdr wdr mwdr population noofbank totalnoofschool micro) (micro =dist\_bank dist\_coop land\_hec\_tot age sex edu hhsize urban hill terai edr cdr wdr mwdr population noofbank totalnoofschool), indicators (\$cmp\_cont \$cmp\_probit)

#### **Mixed-process regression**

Number of obs = 5988 LR chi2(32) = 1984.14 Log likelihood = -4375.4423

Prob > chi2 = 0.0000

|            | <u>Coef</u> |                 |        |                 |             |            |
|------------|-------------|-----------------|--------|-----------------|-------------|------------|
| _nonfood_7 | _           | <u>Std. Err</u> | Z      | <b>P&gt;</b>  z | [95% Conf.] | Interval]  |
| age        | 1149.082    | 120.2837        | 9.55   | 0               | 913.3301    | 1384.834   |
| sex        | -28615.86   | 3976.585        | -7.20  | 0               | -36409.82   | -20821.9   |
| edu        | 8321.977    | 362.5074        | 22.96  | 0               | 7611.476    | 9032.479   |
| hhsize     | 13361.83    | 726.253         | 18.40  | 0               | 11938.4     | 14785.26   |
| urban      | 59696.54    | 3932.331        | 15.18  | 0               | 51989.31    | 67403.77   |
| hill       | 7875.627    | 6921.525        | 1.14   | 0.255           | -5690.313   | 21441.57   |
| terai      | 32172.03    | 10962.13        | 2.93   | 0.003           | 10686.65    | 53657.41   |
| edr        | 15592.8     | 6510.917        | 2.39   | 0.017           | 2831.64     | 28353.97   |
| cdr        | 42682.67    | 6317.675        | 6.76   | 0               | 30300.25    | 55065.08   |
| wdr        | 22416.8     | 6722.183        | 3.33   | 0.001           | 9241.566    | 35592.04   |
| mwdr       | 15875.65    | 7047.704        | 2.25   | 0.024           | 2062.408    | 29688.9    |
| population | 092257      | .0223842        | -4.12  | 0               | 1361293     | 0483848    |
| noofbank   | 700.6792    | 135.7046        | 5.16   | 0               | 434.703     | 966.6554   |
| totalnoof  | 22.90565    | 12.94441        | 1.77   | 0.077           | -2.464934   | 48.27622   |
| micro      | -107240.5   | 6599.414        | -16.25 | 0               | -120175.1   | -94305.86  |
| _cons      | - 84879.99  | 11717.82        | - 7.24 | 0               | - 107846.5  | - 61913.47 |

|              | ~ •       | ~        |         |              |              |          |
|--------------|-----------|----------|---------|--------------|--------------|----------|
| micro        | Coef      | Std. Err | Z       | <b>P</b> > z | [95% Conf. I | nterval  |
| dist_bank    | 0028713   | .0018008 | -1.59   | 0.111        | 0064008      | .0006583 |
| dist_coop    | 0069737   | .0026031 | -2.68   | 0.007        | 0120757      | 0018718  |
| land_hec_tot | 154682    | .0363064 | -4.26   | 0            | 2258412      | 0835228  |
| age          | 0021486   | .0018259 | 1.18    | 0.239        | 0057274      | .0014302 |
| sex          | 0584967   | .0562427 | -1.04   | 0.298        | 1687304      | .0517369 |
| edu          | .0159808  | .0054939 | 2.91    | 0.004        | .005213      | .0267485 |
| hhsize       | .0451169  | .0107393 | 4.20    | 0.000        | .0240682     | .0661655 |
| urban        | 0255418   | .0598641 | -0.43   | 0.670        | 1428734      | .0917897 |
| hill         | 3150727   | .0917039 | -3.44   | 0.001        | 4948091      | 1353364  |
| terai        | 0935278   | .1465342 | -0.64   | 0.523        | 3807296      | .193674  |
| edr          | .1291718  | .0859742 | 1.50    | 0.133        | 0393345      | .2976782 |
| cdr          | .0243266  | .08593   | 0.28    | 0.777        | 144093       | .1927462 |
| wdr          | 1159787   | .0917699 | -1.26   | 0.206        | 2958444      | .063887  |
| mwdr         | .3454345  | .0890241 | 3.88    | 0            | .1709506     | .5199185 |
| population   | -5.04e-07 | 3.00e-07 | -1.68   | 0.093        | -1.09e-06    | 8.44e-08 |
| noofbank     | 0078611   | .0019149 | -4.11   | 0            | 0116141      | 004108   |
| totalnoofs   | .0009923  | .000177  | 5.61    | 0            | .0006454     | .0013393 |
| _cons        | -1.236611 | .1679619 | -7.36   | 0            | -1.56581     | 907412   |
| lnsig_1      | 11.71457  | .0104587 | 1120.07 | 0            | 11.69407     | 11.73506 |
| atanhrho_12  | .6850145  | .0386042 | 17.74   | 0            | .6093517     | .7606772 |
| sig_1        | 122340.8  | 1279.532 |         |              | 119858.5     | 124874.6 |
| rho_12       | .5947696  | .0249479 |         |              | .5436706     | .6414757 |

**Impact on Household Assets** 

3 cmp (livestock = age sex edu hhsize urban hill terai edr cdr wdr mwdr population noofbank totalnoofschool micro) (micro =dist\_ban k dist\_coop land\_hec\_tot age sex edu hhsize urban hill terai edr cdr wdr mwdr population noofbank totalnoofschool), indicators (\$cmp\_probit \$cmp\_probit)

**Mixed-process regression** 

Number of obs = 5988 LR chi2(32) = 3335.61 Log likelihood = -3839.9681

| Prob > chi2 | = | 0.0000 |
|-------------|---|--------|
|-------------|---|--------|

| livestock | Coef     | Std. Err | Z     | <b>P&gt;</b>  z | [95% Conf.] | Interval] |
|-----------|----------|----------|-------|-----------------|-------------|-----------|
| age       | .0090791 | .0016631 | 5.46  | 0.000           | .0058196    | .0123387  |
| sex       | .038679  | .0531961 | 0.73  | 0.467           | 0655835     | .1429414  |
| edu       | 0344466  | .0047716 | -7.22 | 0               | 0437987     | 0250945   |
| hhsize    | .1315106 | .0108397 | 12.13 | 0               | .1102652    | .152756   |

| urban   | -1.141064  | .046447  | -24.57  | 0   | -1.232098  | -1.050029   |
|---|--|--|---|---|--|---|
| hill  | .0042192   | .0998469   | 0.04  | 0.966   | 1914771  | .1999154  |
| terai   | 1767614  | .1448509   | -1.22   | 0.222   | 4606638  | .1071411  |
| edr   | .041597  | .0945762   | 0.44  | 0.660   | 143769   | .2269629  |
| cdr   | 5533055  | .0888851   | -6.22   | 0   | 7275171  | 3790938   |
| wdr   | 526546   | .0940486   | -5.60   | 0   | 7108778  | 3422143   |
| mwdr  | 1901932  | .10233   | -1.86   | 0.063   | 3907562  | .0103699  |
| population  | -2.73e-07  | 2.81e-07   | -0.97   | 0.330   | -8.23e-07  | 2.77e-07  |
| noofbank  | 0145681  | .0017461   | -8.34   | 0   | 0179904  | 0111459   |
| totalnoof   | .0009083   | .0001696   | 5.35  | 0   | .0005758   | .0012407  |
| micro   | 0676377  | .1371506   | -0.49   | 0.622   | 336448   | .2011726  |
| _cons   | .4108728   | .163829  | 2.51  | 0.012   | .0897739   | .7319718  |
|   |  |  |   |   |  |   |
| micro   | Coef   | Std. Err   | Z   | <b>P&gt;</b>  z   | [95% Conf.   | . Interval]   |
| dist_bank   | 0076801  | .0021336   | -3.86   | 0   | 0124979  | 004084  |
| dist_coop   | 0122934  | .0030762   | -4.00   | 0   | 018174   | 0062121   |
| land_hec_tot  | 1590347  | .0425484   | -3.05   | 0   | 2048468  | 0444862   |
| age   | 0057695  | .0019745   | -3.21   | 0.003   | 0101256  | 0024437   |
|   |  |  |   |   |  |   |
| sex   | .0038861   | .0607904   | 0.09  | 0.949   | 1131239  | .1244178  |
| sex<br>edu  | .0038861<br>.0115227   | .0607904<br>.0059396   | 0.09<br>1.77  | 0.949<br>0.052  | 1131239<br>0011482   | .1244178<br>.0221404  |
| sex<br>edu<br>hhsize  | .0038861<br>.0115227<br>.0230945   | .0607904<br>.0059396<br>.0113472   | 0.09<br>1.77<br>1.85  | 0.949<br>0.052<br>0.042   | 1131239<br>0011482<br>001228   | .1244178<br>.0221404<br>.0428586  |
| sex<br>edu<br>hhsize<br>urban   | .0038861<br>.0115227<br>.0230945<br>1578929  | .0607904<br>.0059396<br>.0113472<br>.0650329   | 0.09<br>1.77<br>1.85<br>-2.49   | 0.949<br>0.052<br>0.042<br>0.015  | 1131239<br>0011482<br>001228<br>2880701  | .1244178<br>.0221404<br>.0428586<br>0342437   |
| sex<br>edu<br>hhsize<br>urban<br>hill   | .0038861<br>.0115227<br>.0230945<br>1578929<br>3507404   | .0607904<br>.0059396<br>.0113472<br>.0650329<br>.0986003   | 0.09<br>1.77<br>1.85<br>-2.49<br>-3.72  | 0.949<br>0.052<br>0.042<br>0.015<br><b>0</b>  | 1131239<br>0011482<br>001228<br>2880701<br>5609091   | .1244178<br>.0221404<br>.0428586<br>0342437<br>1738022  |
| sex<br>edu<br>hhsize<br>urban<br>hill<br>terai  | .0038861<br>.0115227<br>.0230945<br>1578929<br>3507404<br>1559665  | .0607904<br>.0059396<br>.0113472<br>.0650329<br>.0986003<br>.1559126   | 0.09<br>1.77<br>1.85<br>-2.49<br>-3.72<br>-1.09   | 0.949<br>0.052<br>0.042<br>0.015<br><b>0</b><br>0.317   | 1131239<br>0011482<br>001228<br>2880701<br>5609091<br>4776273  | .1244178<br>.0221404<br>.0428586<br>0342437<br>1738022<br>.1355024  |
| sex<br>edu<br>hhsize<br>urban<br>hill<br>terai<br>edr   | .0038861<br>.0115227<br>.0230945<br>1578929<br>3507404<br>1559665<br>.0836817  | .0607904<br>.0059396<br>.0113472<br>.0650329<br>.0986003<br>.1559126<br>.0911766   | 0.09<br>1.77<br>1.85<br>-2.49<br>-3.72<br>-1.09<br>0.84   | 0.949<br>0.052<br>0.042<br>0.015<br><b>0</b><br>0.317<br>0.359  | 1131239<br>0011482<br>001228<br>2880701<br>5609091<br>4776273<br>1020774   | .1244178<br>.0221404<br>.0428586<br>0342437<br>1738022<br>.1355024<br>.255847   |
| sex<br>edu<br>hhsize<br>urban<br>hill<br>terai<br>edr<br>cdr  | .0038861<br>.0115227<br>.0230945<br>1578929<br>3507404<br>1559665<br>.0836817<br>0225327   | .0607904<br>.0059396<br>.0113472<br>.0650329<br>.0986003<br>.1559126<br>.0911766<br>.0912549   | 0.09<br>1.77<br>1.85<br>-2.49<br>-3.72<br>-1.09<br>0.84<br>-0.36  | 0.949<br>0.052<br>0.042<br>0.015<br><b>0</b><br>0.317<br>0.359<br>0.805   | 1131239<br>0011482<br>001228<br>2880701<br>5609091<br>4776273<br>1020774<br>2119959  | .1244178<br>.0221404<br>.0428586<br>0342437<br>1738022<br>.1355024<br>.255847<br>.1466896   |
| sex<br>edu<br>hhsize<br>urban<br>hill<br>terai<br>edr<br>cdr<br>wdr   | .0038861<br>.0115227<br>.0230945<br>1578929<br>3507404<br>1559665<br>.0836817<br>0225327<br>2214588  | .0607904<br>.0059396<br>.0113472<br>.0650329<br>.0986003<br>.1559126<br>.0911766<br>.0912549<br>.0972705   | 0.09<br>1.77<br>1.85<br>-2.49<br>-3.72<br>-1.09<br>0.84<br>-0.36<br>-2.41   | 0.949<br>0.052<br>0.042<br>0.015<br><b>0</b><br>0.317<br>0.359<br>0.805<br>0.023  | 1131239<br>0011482<br>001228<br>2880701<br>5609091<br>4776273<br>1020774<br>2119959<br>4263226   | .1244178<br>.0221404<br>.0428586<br>0342437<br>1738022<br>.1355024<br>.255847<br>.1466896<br>0439204  |
| sex<br>edu<br>hhsize<br>urban<br>hill<br>terai<br>edr<br>cdr<br>wdr<br>mwdr   | .0038861<br>.0115227<br>.0230945<br>1578929<br>3507404<br>1559665<br>.0836817<br>0225327<br>2214588<br>.3869945  | .0607904<br>.0059396<br>.0113472<br>.0650329<br>.0986003<br>.1559126<br>.0911766<br>.0912549<br>.0972705<br>.0939041   | 0.09<br>1.77<br>1.85<br>-2.49<br>-3.72<br>-1.09<br>0.84<br>-0.36<br>-2.41<br>4.13   | 0.949<br>0.052<br>0.042<br>0.015<br><b>0</b><br>0.317<br>0.359<br>0.805<br>0.023<br>0.000   | 1131239<br>0011482<br>001228<br>2880701<br>5609091<br>4776273<br>1020774<br>2119959<br>4263226<br>.2036937   | .1244178<br>.0221404<br>.0428586<br>0342437<br>1738022<br>.1355024<br>.255847<br>.1466896<br>0439204<br>.5720431  |
| sex<br>edu<br>hhsize<br>urban<br>hill<br>terai<br>edr<br>cdr<br>cdr<br>wdr<br>mwdr<br>population  | .0038861<br>.0115227<br>.0230945<br>1578929<br>3507404<br>1559665<br>.0836817<br>0225327<br>2214588<br>.3869945<br>-4.91e-07   | .0607904<br>.0059396<br>.0113472<br>.0650329<br>.0986003<br>.1559126<br>.0911766<br>.0912549<br>.0972705<br>.0939041<br>3.19e-07   | 0.09<br>1.77<br>1.85<br>-2.49<br>-3.72<br>-1.09<br>0.84<br>-0.36<br>-2.41<br>4.13<br>-1.51  | 0.949<br>0.052<br>0.042<br>0.015<br><b>0</b><br>0.317<br>0.359<br>0.805<br>0.023<br>0.000<br>0.124                                    | 1131239<br>0011482<br>001228<br>2880701<br>5609091<br>4776273<br>1020774<br>2119959<br>4263226<br>.2036937<br>-1.11e-06  | .1244178<br>.0221404<br>.0428586<br>0342437<br>1738022<br>.1355024<br>.255847<br>.1466896<br>0439204<br>.5720431<br>1.43e-07  |
| sex<br>edu<br>hhsize<br>urban<br>hill<br>terai<br>edr<br>cdr<br>wdr<br>mwdr<br>population<br>noofbank                                       | .0038861<br>.0115227<br>.0230945<br>1578929<br>3507404<br>1559665<br>.0836817<br>0225327<br>2214588<br>.3869945<br>-4.91e-07<br>0058222                                    | .0607904<br>.0059396<br>.0113472<br>.0650329<br>.0986003<br>.1559126<br>.0911766<br>.0912549<br>.0972705<br>.0939041<br>3.19e-07<br>.0020007   | 0.09<br>1.77<br>1.85<br>-2.49<br>-3.72<br>-1.09<br>0.84<br>-0.36<br>-2.41<br>4.13<br>-1.51<br>-2.92   | 0.949<br>0.052<br>0.042<br>0.015<br><b>0</b><br>0.317<br>0.359<br>0.805<br>0.023<br>0.000<br>0.124<br>0.004                           | 1131239<br>0011482<br>001228<br>2880701<br>5609091<br>4776273<br>1020774<br>2119959<br>4263226<br>.2036937<br>-1.11e-06<br>0097536                                     | .1244178<br>.0221404<br>.0428586<br>0342437<br>1738022<br>.1355024<br>.255847<br>.1466896<br>0439204<br>.5720431<br>1.43e-07<br>0019165                                   |
| sex<br>edu<br>hhsize<br>urban<br>hill<br>terai<br>edr<br>cdr<br>wdr<br>mwdr<br>population<br>noofbank<br>totalnoofs                         | .0038861<br>.0115227<br>.0230945<br>1578929<br>3507404<br>1559665<br>.0836817<br>0225327<br>2214588<br>.3869945<br>-4.91e-07<br>0058222<br>.0009448                        | .0607904<br>.0059396<br>.0113472<br>.0650329<br>.0986003<br>.1559126<br>.0911766<br>.0912549<br>.0972705<br>.0939041<br>3.19e-07<br>.0020007<br>.0001894                                     | 0.09<br>1.77<br>1.85<br>-2.49<br>-3.72<br>-1.09<br>0.84<br>-0.36<br>-2.41<br>4.13<br>-1.51<br>-2.92<br>5.13                                   | 0.949<br>0.052<br>0.042<br>0.015<br><b>0</b><br>0.317<br>0.359<br>0.805<br>0.023<br>0.000<br>0.124<br>0.004<br><b>0</b>               | 1131239<br>0011482<br>001228<br>2880701<br>5609091<br>4776273<br>1020774<br>2119959<br>4263226<br>.2036937<br>-1.11e-06<br>0097536<br>.0005961                         | .1244178<br>.0221404<br>.0428586<br>0342437<br>1738022<br>.1355024<br>.255847<br>.1466896<br>0439204<br>.5720431<br>1.43e-07<br>0019165<br>.0013341                       |
| sex<br>edu<br>hhsize<br>urban<br>hill<br>terai<br>edr<br>cdr<br>wdr<br>mwdr<br>population<br>noofbank<br>totalnoofs<br>_cons                | .0038861<br>.0115227<br>.0230945<br>1578929<br>3507404<br>1559665<br>.0836817<br>0225327<br>2214588<br>.3869945<br>-4.91e-07<br>0058222<br>.0009448<br>9181536             | .0607904<br>.0059396<br>.0113472<br>.0650329<br>.0986003<br>.1559126<br>.0911766<br>.0912549<br>.0972705<br>.0939041<br>3.19e-07<br>.0020007<br>.0020007<br>.0001894<br>.1823267             | 0.09<br>1.77<br>1.85<br>-2.49<br>-3.72<br>-1.09<br>0.84<br>-0.36<br>-2.41<br>4.13<br>-1.51<br>-2.92<br>5.13<br>-4.86                          | 0.949<br>0.052<br>0.042<br>0.015<br><b>0</b><br>0.317<br>0.359<br>0.805<br>0.023<br>0.000<br>0.124<br>0.004<br><b>0</b>               | 1131239<br>0011482<br>001228<br>2880701<br>5609091<br>4776273<br>1020774<br>2119959<br>4263226<br>.2036937<br>-1.11e-06<br>0097536<br>.0005961<br>-1.240863            | .1244178<br>.0221404<br>.0428586<br>0342437<br>1738022<br>.1355024<br>.255847<br>.1466896<br>0439204<br>.5720431<br>1.43e-07<br>0019165<br>.0013341<br>5273744            |
| sex<br>edu<br>hhsize<br>urban<br>hill<br>terai<br>edr<br>cdr<br>wdr<br>mwdr<br>population<br>noofbank<br>totalnoofs<br>_cons<br>atanhrho_12 | .0038861<br>.0115227<br>.0230945<br>1578929<br>3507404<br>1559665<br>.0836817<br>0225327<br>2214588<br>.3869945<br>-4.91e-07<br>0058222<br>.0009448<br>9181536<br>.1781355 | .0607904<br>.0059396<br>.0113472<br>.0650329<br>.0986003<br>.1559126<br>.0911766<br>.0912549<br>.0972705<br>.0939041<br>3.19e-07<br>.0020007<br>.0020007<br>.0001894<br>.1823267<br>.0875814 | $\begin{array}{c} 0.09\\ 1.77\\ 1.85\\ -2.49\\ -3.72\\ -1.09\\ 0.84\\ -0.36\\ -2.41\\ 4.13\\ -1.51\\ -2.92\\ 5.13\\ -4.86\\ -2.96\end{array}$ | 0.949<br>0.052<br>0.042<br>0.015<br><b>0</b><br>0.317<br>0.359<br>0.805<br>0.023<br>0.000<br>0.124<br>0.004<br><b>0</b><br>0<br>0.042 | 1131239<br>0011482<br>001228<br>2880701<br>5609091<br>4776273<br>1020774<br>2119959<br>4263226<br>.2036937<br>-1.11e-06<br>0097536<br>.0005961<br>-1.240863<br>4266672 | .1244178<br>.0221404<br>.0428586<br>0342437<br>1738022<br>.1355024<br>.255847<br>.1466896<br>0439204<br>.5720431<br>1.43e-07<br>0019165<br>.0013341<br>5273744<br>0868303 |