Nexus Between Microcredit And Poverty Alleviation: Time Series Evidence From Pakistan

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Abstract

Little attention has been paid to the econometric analysis of the relationship between poverty and microcredit advanced to private sector by commercial banks of Pakistan. The main purpose of this study is to empirically examine the impact of microcredit on poverty alleviation using time series data for the period 1990-2007. Engle Granger and Johansen approach was used to examine the correlation between microcredit and poverty alleviation. The econometric results show that the impact of microcredit on poverty alleviation is short run. Diagnostic tests were also applied to check the validity of the results. All diagnostic tests results are in the desirable range. This study recommends that the government should introduce programs like NRSP, SRSP and PPAF which can help to alleviate poverty in Pakistan and furthermore government should encourage NGOs and their services to help poor and vulnerable people. Government should try to develop the financial institutions in those sectors where their services are not available.

Key words: Microcredit, Poverty, Time Series analysis, Engle-Granger, Johansen Approach, Pakistan

1. Introduction

Microcredit has been introduced to rural communities in Bangladesh as a mean of economic and social development. Microfinance is recognized as an effective tool to fight poverty by providing financial services to those who do not have access or those who are neglected by the commercial banks and financial institutions (Shahab, 2002). Microfinance has been gaining popularity for the last few decades, especially after the experience of the Grameen Bank in Bangladesh.

When we talk about poverty then the first question arise in our mind is how poverty generates in our society? Actually poverty results from overpopulation, low economic growth, unequal distribution of wealth and more importantly low per capita income (Shirazi, 2009). Due to low per capita income and poor health of people in third world countries usually get low productivity due to which they are mostly unemployed. Poverty results from unemployment. Poverty specially that one which is generated by low income and low productivity can be reduced by investing in human and physical capital (Khandker & Shahidu, 1998).

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It's a fact that in developing countries most of the population is depending on agriculture sector. So that's why development in agriculture sector is must. And moreover agriculture is providing about more than 70% employment in agriculture sector. As we know the farmers get low income due to their low productivity. They can't afford to fill their requirements by providing capital and cash for their farms. So in this situation, microcredit will play an important role by providing them loans to meet their requirements. Micro loans help poor people to make them self-employed (Khandker & Shahidur, 1998).

There are a lot of arguments about micro loans. Some economists believe that micro loans itself are depending on donors then how can they help in the reduction of poverty? Even other economists believe that micro loans cannot affect long term outcomes. Others think that it can make the poor especially farmers dependent on loans. Some other argues that these programs provide credit access to the poor who in turn increase their consumption and more importantly their productivity due to which their per capita income will definitely increase.

Microcredit program have appeared in the literature as a popular source of financing that provides small loan in rural and remote regions in developing countries. Bangladesh may be considered as the pioneer that started this financial innovation that provide loans to poor especially to woman engaged in self-employment project, allowing them to generate income in many cases, begin to build wealth and eliminate poverty. Several empirical studies support that credit market involvements improve both poor via smoothing consumption and reducing constraints in production. Pitt and Khandakar have found that micro-credit is a significant determinant of money outcome such as household expenditures. Furthermore credit provided to woman more likely to influence these behaviors than credit provide to men (Sayma, 2007).

The emerging microfinance movement demonstrates institutional innovations that appear to greatly reduce the risk and cost of providing financial services to poor households. Innovations include contracts that give borrowers incentives to exclude bad credit risks and monitor other borrower's activities, schedules of loans that increase over time, conditional on successful performance, and weekly or semi-weekly loan repayment requirements. The movement is now global, and leaders at the World Bank, United Nations, and other international organizations have joined in pushing to reach 100 million households around the world by the year 2005 (Morduch, 1997).

Over the last few years micro-finance has been increasingly recognized as an important component in poverty alleviation strategies. Poor households face difficulty in generating regular and substantial income to save for future and are extremely vulnerable to economic, political, and physical downturns. A little drop in income

or increase in expense can have a disastrous effect on their already low standard of living. They have limited access to health care facilities, low literacy rate and poor living conditions. Death, sickness, or accident may force them to dispose their property or some of the productive assets, which in turn further decreases future income and current livelihood. The frequency of losses is also greater for the poor, many are regularly exposed to natural disasters like flood, fire, and theft with limited means of recovery [(Patel, 2004); (Ahmad, 2007); (Obaidullah, 2008)].

In Pakistan there are many non-government organizations (NGOs) which converted into commercial banks and which gives microcredit loans to support those programs. In Pakistan usually microfinance is provided by NGOs, Aga Khan Rural Support Program (ARSP), National Rural Support Program (NRSP), Punjab Rural Support Program. Now most recently the government of Pakistan has introduced Pakistan Poverty Alleviation Fund (PPAF) and Khushhali Bank. The motive for these programs is provision of employment and introduction of infrastructural projects in rural and low income urban areas.

This study tries to look at the impact of micro-credit on the lives of poor peoples. There is a different view on micro-credit as a powerful development tool regarding its success in developing the lives of the poor but sometimes these views are contradictory. However poverty is a global issue, it is a problem that even the wealthiest nations are also facing. Pakistan is facing a great challenge in reducing poverty because poverty becoming cause of many problem like suicides, illiteracy and unemployment. Younas of Bangladesh has given a formula of micro-credit that successfully worked in Bangladesh and is replicated all over the world. In Pakistan the purpose of the study is to observe what role micro-credit plays in poverty alleviation?

2. Research Methodology

2.1 Data and Variables

The core and dominant objective of this study is to examine causality between micro-credit and poverty alleviation in Pakistan. Time series data was used for the period 1990 to 2008. Two variables used in this study are Poverty (POV) and micro-credit (MCP) advanced to private sector by commercial banks. Time series data were taken from World Bank and Federal Bureau of Statistics (FBS). Data were transformed into logarithmic form to remove the problem of heteroscedasticity.

2.2 Unit Root Test

Time series data was used for this research study. Time series data is mostly

non-stationary. First data was tested for unit root on the basis of Augmented Dickey Fuller Test (ADF) and Phillips Perron (PP) test. Data is said to be stationary if its mean and covariance remain constant over time.

The following models were used to check data for stationarity. These include without constant and trend, with constant and with constant and trend.

$$\Delta Y_{t-1} = \gamma_{t-1} + \varepsilon_t \quad (1)$$

$$\Delta y_{t-1} = \alpha + \gamma_{t-1} + \varepsilon_t \quad (2)$$

$$\Delta y_{t-1} = \alpha + \alpha_o t + \gamma_{t-1} + \varepsilon_t \quad (3)$$

There is significant difference between stationary and non-stationary time series. In stationary time series, shocks will be temporary and over time their effects will be eliminated as the series revert to their long-run mean value. On the other hand non-stationary time series will necessarily contain permanent components. The mean and the variance of a non-stationary time series will depend on time which leads to cases where a series (a) has no long-run mean into which the series return and (b) the variance will depend on time and will approach infinity as time goes to infinity. Consider the model:

$$Y_t = \phi Y_{t-1} + \varepsilon_t \quad (4)$$

In general there are three possible cases:

- a. $|\phi| < 1$, the series is stationary.
- b. $|\phi| > 1$, the series is not stationary.
- c. $|\phi| = 1$, the series contains a unit root and is not stationary.

The following version can be obtained by subtracting Y_{t-1} from both sides of the above equation.

$$Y_t - Y_{t-1} = \phi Y_{t-1} - Y_{t-1} + \varepsilon_t \quad (5)$$

$$\Delta Y_{t-1} = (\phi - 1)Y_{t-1} + \varepsilon_t$$

$$\Delta Y_{t-1} = \gamma Y_{t-1} + \varepsilon_t$$

Where;

$\gamma = \phi - 1$. The null hypothesis is $H_0 : \gamma = 0$ and alternative hypothesis is $H_a : \gamma < 0$.

2.3 Augmented Dickey Fuller (ADF) Test

Augmented is the expansion of Dickey-Fuller. It is used to be higher order lag of the dependent variable in order to eliminate the autocorrelation. The lag length is either determined by Akaike Information Criterion (AIC) and Schwartz Bayesian Criterion (SBC). The three possible forms of the ADF test are given by the following equations.

$$\Delta Y_t = \gamma Y_{t-1} + \sum \beta_i \Delta Y_{t-i} + e_t \quad (6)$$

$$\Delta Y_t = \alpha_o + \gamma Y_{t-1} + \sum \beta_i \Delta Y_{t-i} + e_t \quad (7)$$

$$\Delta Y_t = \alpha_o + \gamma Y_{t-1} + \alpha_{2t} + \sum \beta_i \Delta Y_{t-i} + e_t \quad (8)$$

The difference between the three regressions again concerns the presence of the deterministic elements α_o and α_{2t} .

2.4 Phillips-Perron (PP) Test

Like the Augmented Dickey Fuller test, the Phillips-Perron test addresses the issue that the processing generating data for X_t and Y_t might have a higher order of auto-correlation than is admitted in the test equation making X_{t-1} and Y_{t-1} endogenous. Phillips-Perron test makes a non-parametric correction to the t-statistics. The test is robust with respect to unspecified auto-correlation and heteroscedasticity in the disturbance process of test equation.

2.5 Co-integration Test

Co-integration test was applied to find the relationship between variables. Consider two variables X_t and Y_t which are integrated of order one (this is abbreviated I (1), and means that the process contains a unit root). X_t and Y_t are said to be co-integrated if there exists a parameter α such that $\mu_t = Y_t - \alpha X_t$ is a stationary process.

The first thing is to notice to economic series behaves I (1) process, i.e. they seem to “drift all over the place”; but the second thing to notice is that they seem to drift in such a way that they don’t drift away from each other. If researcher formulates this statistically then he or she must come up the co-integration model. The famous paper by Davidson, Hendry, Srba and Yeo (1978) argued heuristically for models that imposed the “long run” condition that the series modeled should not be allowed to drift arbitrarily far from each other. The linear combination of X_t and Y_t can be shown in following regression:

$$Y_t = \alpha X_t + \mu_t \quad (9)$$

And then taking the residuals

$$\mu_t = Y_t + \alpha X_t \quad (10)$$

If μ_t is integrated at level first ($\mu_t \sim 1(1)$) then X_t and Y_t are said to be co-integrated.

2.6 Engle-Granger (EG) Test

Granger (1981) introduced the remarkable link between non-stationary process and the concept of long-run equilibrium. Engle Granger test is used to find the long-run and short-run relationship. Let's consider two variables X_t and Y_t . Relationship can be existed by using the following econometric models:

$$\Delta LY_t = \alpha + \beta \Delta LX_t + \mu_{t-1} \quad (11)$$

$$\Delta LX_t = \alpha + \beta \Delta LY_t + \mu_{t-1} \quad (12)$$

If error term is significance then long-run relationship exists between X_t and Y_t .

2.7 Granger Causality Based on VECM

Vector Error Correction Model (VECM) adds error correction features to a multifactor model such as a vector Auto Regressive Model (VAR). A rough long-run relationship can be determined by the co-integration vectors, and then this relationship can be utilized to develop a refined dynamic model which can have a focus on long-run such as VECM of the usual VAR in Johansen test. Time series data mostly depend upon all past influences that's why data is usually not stationary. Error Correction Model (ECM) is a dynamic model in which the moments of the variables in any period is related to the previous period's gap from long run equilibrium.

$$\Delta LY_t = \alpha + \sum_{j=1}^k \beta \Delta LY_{t-j} + \sum_{j=1}^k \gamma \Delta LX_{t-j} + \mu t_1 \quad (13)$$

$$\Delta LX_t = \theta + \sum_{j=1}^k \beta \Delta LX_{t-j} + \sum_{j=1}^k \gamma \Delta LY_{t-j} + \mu t_2 \quad (14)$$

Where is identically and independently distributed random variable with mean equal to zero. Econometric model (13) says X in period t depends on its own lag as well as the lag values of Y_t and on a random variable. Econometric model (14) says that Y_t depends on its own lag as well as on the lag values of X_t and on random variable. Multivariate Granger causality test based on VECM (Block Exogeneity Wald Test) was used to capture the short run dynamics. Short-run disequilibrium relationship is described by error correction model (ECM).

3. Results And Discussions

3.1 Results of Unit Root Tests

Unit root test was used to examine the data for stationarity. These tests include Augmented Dickey Fuller (ADF) test and Phillips Perron (PP) test.

Figure 1: Graphical Approach to Test Unit Root

Figure 1 shows that both variables LPOV and LMCP are non-stationary at level. Results of Augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests are given in Table 1.

Table 1: Results of Unit Root Test

Variables	ADF Test	Phillips Perron Test	Conclusion
LPOV	-0.032441 (0.6569)	0.296260 (0.7598)	I (1)
Δ LPOV	-2.615764 (0.0125)*	-2.615764 (0.0125)*	
LMCP	0.722101 (0.8613)	0.650074 (0.8467)	I (1)
Δ LMCP	-3.151346 (0.0038)**	-3.199701 (0.0034)**	

Note: Values without parenthesis are t-statistics. Values in parenthesis are p-values. * shows significant at 5 percent and ** significant at 1 percent.

Table 1 shows that both LPOV and LMCP are not stationary at level. These variables are stationary at first difference and integrated at level first I (1). Table 2 gives the optimal lag length based on prediction error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), Hannan-Quin Information Criterion (HQ) and sequential modified LR test statistic (each at 5 percent level). All these criteria confirm that the optimal lag length is one.

Table 2: Results of Lag Length Criteria

Lag	LR	FPE	AIC	SC	HQ
0	NA	0.000163	-3.047270	-2.949245	-3.037526
1	31.01411*	2.87e-05*	-4.791975*	-4.497900*	-4.762744*

Note: * Indicates the optimal lag order selected by the respective criterion.

Figure 2: Box and Whisker Diagram

Box-Whisker diagram represents the range of data. Whisker represents the spread of the data and box the majority of data. This diagram is used to display a set of data. The straight line shows range from smallest value to largest one. This diagram also shows median (the most middle value) and then upper median and lower median. It divides the data into four parts each part represents $\frac{1}{4}$ quarter

Figure shows that in case of poverty, one quarter of the data numbers are less than 3.1. One quarter of the data numbers are between 3.1 and 3.18. One quarter of the data numbers are between 3.18 and 3.3 and one quarter of the data numbers are greater than 3.3.

In case of microcredit, one quarter of the data numbers are less than 3.15. One quarter of the data numbers are between 3.15 and 3.2. One quarter of the data numbers are between 3.2 and 3.25 and one quarter of the data numbers are greater than 3.25.

3.2 Results of Co-integration Tests

Co-integration test was used to examine the long-run and short-run relationship between variables. These are Johansen co-integration test and Engle Granger Test. Results of both tests are given in Table 3.

Table 3: Results of Johansen Test

Null	Alternative	No. of CE(s)	Trace Statistics	5% Critical Value	Max-Eigen Value	5% Critical Value
$r = 0$	$r = 0$	None	12.57842 (0.3984)	20.26184	7.083053 (0.6594)	15.89210
$r \leq 1$	$r = 1$	At most 1	5.495372 (0.2334)	9.164546	5.495372 (0.2334)	9.164546

Note: Values in parenthesis are P-values.

Both Trace statistics and Eigen values are less than critical value at 5 percent significance interval. Therefore; from the above table it is found that the null hypothesis of no co-integration vectors ($r=0$; $r \leq 1$) against the alternative($r=0$; $r=1$) is accepted at the conventional significance level. The absence of any valid co-integration vector is confirmed from both trace statistics and maximum Eigen statistics. Thus, from the results it is concluded that there is no longer relationship between microcredit and poverty

3.3 Results of Engle Granger Test

Results of Engle Granger test are given in Table 4. It shows that the impact of microcredit on poverty is short-run. The value of error correction term (ECT) is negative and insignificant which shows that the model is in equilibrium in the short-run.

Table 4: Results of Engle Granger Test

Variables	$\Delta LPOV$	$\Delta LMCP$	ECT
$\Delta LPOV$	-	-2.679704 (0.0189)**	-0.036844 (0.9155)
$\Delta LMCP$	-2.130602 (0.0528)*	-	-0.171351 (0.5241)

Note: Values without parenthesis are t-statistics. Values in parenthesis are p-values. * shows significant at 10 percent and ** significant at 5 percent.

3.4 Results of Granger Causality Test Based on VECM

There is no co-integration between microcredit and poverty. This study has also used Granger Causality based on Vector Error Correction model (VECM). VECM specifies the short-run dynamics of each variable in the system, and in the frame work that anchors the dynamics to long run equilibrium relation suggested by economic theory. From Johansen test, we have observed that there is no long run relationship

between variables. VAR model was applied. These are as under:

$$\Delta LPOV_t = \alpha + \sum_{j=1}^K \beta \Delta LPOV_{t-j} + \sum_{j=1}^K \lambda \Delta LPCT_{t-j} + \mu t_1$$

$$\Delta LPCT_t = \theta + \sum_{j=1}^K \theta \Delta LPOV_{t-j} + \sum_{j=1}^K \lambda \Delta LPCT_{t-j} + \mu t_2$$

Poverty depends upon its previous year poverty, the previous year credit and on the random variable as well (first model). Credit depends upon the previous year credit and previous year poverty and random variable (error term). Results of Granger Causality based on VECM are given in Table 5.

Table 5: Results of Granger Causality Based on VECM

Dependent Variables	Short-run lagged difference		Lagged ECT
	$\Delta LPOV$	$\Delta LMCP$	
$\Delta LPOV$	-	6.9650 (0.0083)***	[-2.21600] 0.258711
$\Delta LMCP$	0.1958 (0.6581)	-	[-0.86386] 0.071517

Note: Values without parenthesis show χ^2 values, values in parenthesis show P-values. Values in square bracket are t-statistics, *** shows significant at 1 percent.

Table 5 shows that poverty has long-run relationship over the credit. Poverty is depending over the previous year of credit. While credit has no long run relationship over poverty, credit as dependent variable doesn't depend upon the previous year of poverty. By Exogenous Wald test we concluded that poverty has short run relationship over credit as dependent variable while credit as a dependent variable got short run relationship over poverty. Moreover, credit as dependent variable doesn't depend upon the previous years of poverty. In short, run poverty depends on the previous years of credit but credit is not depending over the previous years of poverty. ECT represents the equilibrium relationship for variables. Coefficient of ECT for poverty is 0.2587 means 26percent disequilibrium is correct per year after change in poverty, while ECT coefficient for credit is 0.071517 means credit is correct just 7 percent disequilibrium per year after change in credit.

3.5 Results of Diagnostic Tests

Different diagnostic tests were taken to check validity of results. These include serial correlation, functional form of the model, heteroscedasticity and data normality test. Diagnostic tests results are in desirable range. Results of these tests are given in Table 6.

Table 6: Results of Diagnostic Tests

Variables	Serial Correlation	Ramsey Test	ARCH Lm Test	White Heteroscedasticity	Jarque Bera
Model 4.7	0.080399 (0.960598)	0.364757 (0.545876)	0.399153 (0.527527)	1.948864 (0.377407)	0.066441 (0.967325)
Model 4.8	2.093570 (0.351065)	1.414589 (0.234296)	0.003815 (0.950752)	5.605057 (0.060656)	0.556298 (0.757184)

Note: Values in parenthesis are P values. All are insignificant values.

4. Conclusion And Recommendations

4.1 Conclusion

In the light of the above analysis it can be concluded that there is short run relationship between poverty and credit. Poverty can be affected by credit in Pakistan. We concluded the short run relationship because micro credit is such a short amount of credit that it cannot influence the poverty for long time. Subsequently, it can support poor people for short time.

In above analysis it can also be concluded that the credit situation is not satisfactory in Pakistan. It is barely enough to reduce the poverty for long time. In Pakistan, credit can affect poverty but for short time interval, while poverty can affect credit for long term time interval.

Credit advanced by private sectors can affect the poverty but not creates a significant impact or a massive bent on poverty. This type of credit can just provide the initial push to the poor. Temporary reduction will occur in poverty if the credit is used for non- investment purposes like repayment of existing loan, improving housing and social obligations etc.

In Pakistan, micro credit advanced by the private sectors helping poor is already being neglected by formal sectors. This type of credit usually used for employment purposes. If the credit used for business purposes or employment purposes then it can create a remarkable impact over poverty. But, in Pakistan, more than 60% people use this credit for other purposes like for non-investment activities as marriages, house renovation, payment of loans etc. That's why the results we got in above analysis are not so much satisfactory and overwhelming. Micro credit reduces the risk of poverty in Pakistan by just 47%.

4.2 Recommendations

- The first and important way to control poverty is the fair use of micro credit.

- ii. Government should introduce different funds to reduce poverty in Pakistan.
- iii. Formal and private both sectors should try to make the process smooth, due to which poor people can easily apply for loans.
- iv. People who are in need of money should invest this amount in profitable channels like employment purposes, for education purposes and other beneficial activities to maximize their outcomes.
- v. Government of Pakistan must allow those NGO's who can work for poverty alleviation in different affected areas of Pakistan. And make the existing NGO's efficiently practical and progressive to undertake the critical scenarios lucratively.

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