



AN EMPIRICAL ANALYSIS OF CAUSAL RELATIONSHIP BETWEEN MICRO-LOANS AND VARIOUS ECONOMIC INDICATORS OF INDIA

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ABSTRACT

Microfinance is the provision of a broad range of financial services such as deposits, loans, payment services, money transfers and insurance to poor & low-income households and micro enterprises. Microfinance sector in India has grown manifold from its inception. This evolutionary growth process has given a great opportunity to the rural poor to attain reasonable economic, social and cultural empowerment, leading to better living standard and quality of life for participating households. Microfinance has been a panacea for poverty reduction in India and thus it is profoundly promoted by our financial system throughout the economy. Moreover the phenomenon, as an important part of our innovative financial tool, must be sharing certain relationship with various economic indicators. Such a financing tool helps in increasing the economic activities in a country and thus adds value to the economic growth as a whole. And if economy grows it improves the financial system and thus such financial tools. Apart from this direct relation, micro loans would be, in a way, linked to other economic indicators as well and thus it provides us with a great area to focus on. For the same purpose, various variables, i.e. GDP, WPI, IIP, IAP, SENSEX and Micro loans to Self Help Groups (SHG), have been taken for the study. Their annual data from the financial year 1992-93 to 2011-12 (20 years) have been taken for the analysis. The study investigates the dynamic relationship between these variables selected. The objectives of the study are examined by employing ADF test to check the stationarity and Granger Causality test to know the cause and effect relationship between the variables.

KEYWORDS: Microfinance, Self Help Groups (SHG), Micro Loans, GDP, Economic Indicators, ADF Test, Granger Causality Test.

INTRODUCTION

The microfinance concept introduced by Bangladeshi Professor in Economics, Muhammad Yunus, in 1970 has grown into worldwide movement & is gathering momentum to become a major force in India. Before this, the world's poorest people were almost underserved by financial institutions as they were unable to offer the necessary collateral to secure loans. Along with it most banks did not consider small loans to be appropriate as high transaction costs were prohibitive. Here in India, many poor people lacks formal banking services. In the absence of formal access to financial services, the poor have no choice but to go to local money lenders at the time of need, which exploits and charges interest rates ranging from 30 to 120%. Microfinance, as a boom, came to rescue such poor. Microfinance, through granting very small loans, enables poor people to run small businesses and earn livelihood. Microfinance is an economic development approach that involves providing financial services through institutions to low income clients. Microfinance is the practice of providing small scale financial services to the world's poor, mainly loans and savings and increasingly other products like insurance and money transfer. Also referred to as "banking for the poor", microfinance has emerged as a simple and viable way to provide financial assistance to the under privileged. It also helps in pulling them out of rut of poverty and thus

acclaimed recognition across the globe as a silver bullet to reduce poverty & bring in social empowerment. The study will look into the basic concept of Microfinance. There after the study will focus on depicting the relationship between the various economic indicators and the innovative financial tool called microloans. Six variables namely, GDP, WPI, IIP, IAP, SENSEX and Micro loans to Self Help Groups (SHG) symbolizing the state of microfinance, has been used for the analysis. The tools like ADF Test has been used to check the stationarity and Granger causality test have been used for empirically testing the relationship that which variable has a cause and effect relationship with other. The study would also be helpful to all academicians, researchers and practitioners in this field.

OBJECTIVE OF THE STUDY

In this study the major objective is to find out the causal relationship, if any, between the Micro loans to SHG and real economic variables. It will shed light on the degree of integration of the macroeconomic variables and Microloans and how they affect each other. The specific sets of objectives of the study are as follows:

- To understand the relationship between Microloans in the economy with other economic indicators and between various indicators as well.

- To examine the cause and effect relation between various macro-economic variables and microloans to SHG.

HYPOTHESIS

H0- There is no stationarity in the data series related to particular variable under study.

H0- There is no cause and effect relation between various macro economic variables & Micro loans to SHG.

LITERATURE SURVEY

Barr (2005) evaluated the relationship between the microfinance and financial development. He argued that millennium developmental goals would only be achieved if the new financial reforms will focus more on microfinance to curb the poverty and thus achieving financial development. He emphasized on making the microfinance an integral part of the overall financial development strategy of any developing economy.

Husain (2006) has examined the causal relationship between stock price and real sector variables of Pakistan economy, using annual data from 1959-60 to 2004-05. It had divided the data into two halves- pre and post liberalization and had studied the causal relationship between them using various econometric techniques like ECM, Engle-Granger co integrating regressions and Augmented Dickey Fuller (ADF) Unit Root tests. By using this data set and methodology, this analysis indicated the presence of a long run relationship between the stock prices and real sector variables.

Kandir (2008) investigated the role of macroeconomic factors in explaining Turkish stock returns. Macroeconomic variables used in this study were, growth rate of industrial production index, change in consumer price index, growth rate of narrowly defined money supply, change in exchange rate, interest rate, growth rate of international crude oil price and return on the MSCI World Equity Index. Empirical findings revealed that exchange rate, interest rate and world market return seem to affect all of the portfolio returns, while inflation rate was significant for only three of the twelve portfolios. On the other hand, industrial production, money supply and oil prices did not appear to have any significant affect on stock returns.

Sengupta and Aubuchon (2008) have focused on achievement made by Prof. Muhammad Yunus and the Grameen Bank for their efforts to create economic and social development from below. Their article was intended as a non-technical overview on the growth and development of microcredit and microfinance. The Grameen bank and its achievement were reviewed. Paper also emphasized on the group lending mode of granting microfinance and how it is beneficial. Paper also reviewed the microfinance in different economies and its future.

Vanroose & D'Espallier (2009), in their paper analyzed the relationship between performance of microfinance institutions (MFIs) and the development of the formal financial sector of the country in which the MFI is active. They found indications of interdependencies between MFI-performance and formal financial sector development and also found that the MFIs reach more clients and are

more profitable where access to the formal financial system is low.

Kumar , Bohra and Johari (2010) in their descriptive paper had analyzed the present microfinance sector of India focusing on economic problems like population, under employment, low rate of education, low per capita income etc. that has actually resulted in poverty. Another major factor, as per the authors, resulting in poverty is the low asset base. The paper also centers its attention on microfinance in rural sector of our economy and how marketing of microfinance takes place in such areas. The paper concluded that the rural people have very low access to institutionalized credit especially from commercial banks which needs to be improved.

Awojobi and Bein (2011) in their paper has established a causal relationship between the variables selected and evaluated it with the 't-test' statistic. The relevance of the independent variables in explaining the subject has been justified based on the F-statistic test and R2 coefficient of multi-determination. They also used a lin-log regression model, where economic growth has been regressed on poverty level in Nigeria. Results showed that about 93 percent variation in GDP is explained by changes in micro loans and savings. And 79 percent change in poverty was due to growth and unemployment. It was also observed that poverty is multifaceted and it is because of the lack of productive resources in the country. It was revealed that the standard of living of the Nigerian people can be improved by providing them finance (Capital). Because of which there can be extensive participation in economic activities which could improve their lives.

Devaraja (2011) has described the evolution of the Microfinance revolution in India. The study stated that the outreach of such activities has been low along with the question mark on the profitability and sustainability of MFIs. This paper defined the three distinct aspects where government needs to play a significant role. The first was to protect the rights of the micro-borrower. The second was that of prudential oversight of risk-taking by firms operating in microfinance. The third was a developmental role, emphasizing scale-up of the microfinance industry where the key issues are diversification of access to funds, innovations in distribution and product structure, and the use of new technologies such as credit bureaus and the UID. He also suggested having proper regulation mechanism for the microfinance industry.

Krishnan (2011) emphasized on the well functioning of financial system for the long-run economic growth of a country. The paper looked at how the financial development of an economy can be measured. It then traced the financial development of India through the 1990s to the present, assessing the development of each segment of financial markets. In doing so, it highlighted the dualistic development of the financial sector. Finally, the paper made an attempt to offer an explanation of this dualistic development and proposed a road map for the future development of financial markets in India.

RESEARCH METHODOLOGY

The study begins with the collection of the data pertaining to the macro economic variables. (GDP, Micro loans to SHG, WPI, IIP, IAP, and SENSEX)

Data and its source

The present study uses 20 year annual data for the period 1992-93 to 2011-2012 for India on the following macroeconomic variables, namely, GDP, Micro loans disbursed to SHG, Index of industrial production (IIP), wholesale price index (WPI), Index number for Agricultural Production (IAP) and SENSEX. The major source of data of all the above macro economic variables is Handbook of Statistics on Indian Economy maintained by Reserve Bank of India (RBI). For SENSEX, it is the official website of Bombay Stock Exchange (www.bseindia.com). The Data on microloans have been collected from the reports published by NABARD.

Variables in the study

The major economic variables used in this study are briefly explained below:

Gross domestic product (GDP): GDP is the market value of all officially recognized final goods and services produced within a country in a given period of time. GDP per capita is often considered an indicator of a country's standard of living. GDP per capita is not a measure of personal income. Under economic theory, GDP per capita exactly equals the gross domestic income (GDI) per capita. GDP is related to national accounts, a subject in macroeconomics.

Micro Loans to SHG: Microcredit is the extension of very small loans (microloans) to impoverished borrowers who typically lack collateral, steady employment and a verifiable credit history. It is designed not only to support entrepreneurship and alleviate poverty, but also in many cases to empower women and uplift entire communities by extension. Modern microcredit is generally considered to have originated with the Grameen Bank founded in Bangladesh in 1983. As of 2012, microcredit is widely used in developing countries and is presented as having enormous potential as a tool for poverty alleviation.

Wholesale price index (WPI): For any country's economy to grow, low rate inflation serves as an inducing tonic. Slow rise in prices are supposed to induce the producers to increase the production which in turn ensure more and more employment opportunities in the country. But uncontrolled inflation or even deflation has serious repercussions for the economy. To measure this inflation Government of India (GoI) has various indices, amongst which WPI is the one which is believed to be a very comprehensible and lucid measure. It is the only general index capturing price movements in a comprehensive way. It is an indicator of movement in prices of commodities in all trade and transactions. The new series of WPI has about 435 items in its commodity basket. In its new series 'Primary Articles' contribute 98 items, 'Fuel, Power, Light and Lubricants' 19 items and 'Manufactured Products' provide 318 items.

Index of Industrial production (IIP): IIP, in simplest terms, is an index which details out the growth of various sectors in an economy. E.g. Indian IIP will focus on sectors like mining, electricity, Manufacturing & General. Also base year needs to be decided on the basis of which all the index figures would be arrived at. In case of India the base year has been fixed at 1993-94 hence the same would be equivalent to 100 Points but now it changed its based year to 2004-2005. Index of Industrial Production

(IIP) is an abstract number, the magnitude of which represents the status of production in the industrial sector for a given period of time as compared to a reference period of time.

S&P BSE SENSEX: It was first compiled in 1986 and calculated on a "Market Capitalization-Weighted" methodology of 30 component stocks representing large, well-established and financially sound companies across key sectors. S&P BSE SENSEX today is widely reported in both domestic and international markets through print as well as electronic media. Since September 1, 2003, S&P BSE SENSEX is being calculated on a free-float market capitalization methodology. The "free-float market capitalization-weighted" methodology is a widely followed index construction methodology on which majority of global equity indices are based; all major index providers like MSCI, FTSE, STOXX, and Dow Jones use the free-float methodology.

Index Number for Agricultural Production (IAP): In India, Index number on Agricultural Production is being compiled at all India and state levels. Construction of IAP started only after independence. The Directorate of Economics and Statistics (DES) had adopted Triennium Ending (T.E.) 1981-82 as base year for the purpose of Index Numbers of Area, Production and Yield in Agriculture until 1999-2000. In 2000-2001, it decided to adopt T.E. 1993-94 as a way of updating the base to a recent year and keep it in harmony with the other series of indices such as Index of Industrial Production, Whole Sale Price Index and the series of National Accounts Statistics.

STATISTICAL TOOLS AND TECHNIQUES

To check the hypothesis, following tests were used to examine the causality between various economic indicators and micro loans:

- ADF-Augmented Dickey Fuller test to check the stationarity of the data series.
- Granger Causality test to check the causality

Augmented Dicky Fuller test

Augmented Dickey Fuller test has been applied to test the stationary status of the data using E-views software. In the ADF test that has been conducted on all the variables to check their stationary in order to fulfill the precondition of Granger causality. In any model, it is necessary to analyze whether the prices are stationary or not. If the mean and variance of a series remain constant no matter at what point we measure, then the series is stationary, i.e. they are time invariant. A series of prices that grow without bound in time is not stationary, and, in this case, the mean is not constant. Even if a price series has a constant mean, if fluctuations around that mean become increasingly larger with time, the series is again not stationary. If a time series is not stationary it is called as non-stationary time series. Stationary time series is important because if it is non-stationary, its behaviour can be studied only for the time period under consideration. Each set of time series data will therefore be for a particular episode. As a consequence it is not possible to generalize it to other time periods. Therefore, for the purpose of forecasting, such non stationary time series may be of little practical value.

To test the stationarity of the data, we used ADF (Augmented Dickey Fuller) test. The ADF test is applied to the model:

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \delta \Delta y_{t-1} + \dots + \delta_{p-1} \Delta y_{t-p+1} + \varepsilon_t$$

Where α is a constant, β the coefficient on a time trend and p the lag order of the autoregressive process.

Granger Causality Test

A statistical approach proposed by Clive W Granger (1969) to assess whether there is any potential predictability power of one indicator for the other (Foresti, 2007). A time series is said to Granger cause other if the past values of the former improve the forecast of the latter (Enders, 2008). A Granger causality test is testing for the causal relationship between two stationary series X_t and Y_t in the following two equations:

$$Y_t = \alpha_0 + \sum_{k=1}^m \beta_k Y_{t-k} + \sum_{k=1}^m \phi_k X_{t-k} + u_t$$

$$X_t = \delta_0 + \sum_{k=1}^m \gamma_k X_{t-k} + \sum_{k=1}^m \phi_k Y_{t-k} + v_t$$

Where $\alpha, \beta, \gamma, \phi$'s are constants and m is the optimal lag length and u_t and v_t are assumed to be white noise i.e., disturbance terms with zero mean and finite variance. Granger causality test seeks to answer whether changes in Y_t causes changes in X_t ? If Y_t causes X_t , lags of the former should be significant in the equation for the latter i.e., $\phi_k \neq 0$. If this is the case and not vice-versa (i.e., $\phi_k = 0$) it would be said that Y_t Granger causes X_t or that there exists unidirectional causality from Y_t to X_t . On the other hand, if X_t causes Y_t , lags of X_t should be significant in the equation for Y_t . If both sets of lags were significant, it would be said that there exists 'bi-directional causality' or 'bi-directional feedback'. Also, if there exists unidirectional Granger causality from Y_t to X_t , then Y_t is said to strongly exogenous in the equation of X_t . If neither set of lags are statistically significant in the equation for the other variable, then it is said to be independent of each other.

DATA ANALYSIS AND INTERPRETATION

ADF Test

While testing for the stationarity of series using ADF test, the hypothesis is:

- H₀**: presence of unit root i.e., non-stationary series.
- H₁**: no unit roots i.e., stationary series.

It can be seen from the table 1 to table 6 that all the variable series, i.e. series for GDP, IAP, IIP, LoanSHG, SENSEX and WPI, are not stationary in its level form. But there is evidence of stationarity in the first difference form. The p value at first difference level is less than .05 in every variable case and thus the null hypothesis is rejected. The series is made stationary at first level of difference.

TABLE 1: Results of Stationarity at first difference for GDP

Null Hypothesis: D(GDP,2) has a unit root		
Exogenous: Constant		
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.945400	0.0002
Test critical values: 1% level	-3.886751	
5% level	-3.052169	
10% level	-2.666593	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 17

TABLE 2: Results of Stationarity at first difference for IAP

Null Hypothesis: D(IAP,2) has a unit root		
Exogenous: Constant		
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.003830	0.0000
Test critical values: 1% level	-3.886751	
5% level	-3.052169	
10% level	-2.666593	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 17

TABLE 3: Results of Stationarity at first difference for IIP

Null Hypothesis: D(IIP,2) has a unit root		
Exogenous: Constant		
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.859910	0.0017
Test critical values: 1% level	-3.920350	
5% level	-3.065585	
10% level	-2.673459	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 16

TABLE 4: Results of Stationarity at first difference for LoanSHG

Null Hypothesis: D(LOANSHG,2) has a unit root		
Exogenous: Constant		
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.619415	0.0004
Test critical values: 1% level	-3.920350	
5% level	-3.065585	
10% level	-2.673459	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 16

TABLE 5: Results of Stationarity at first difference for SENSEX

Null Hypothesis: D(SENSEX,2) has a unit root		
Exogenous: Constant		
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.065778	0.0002
Test critical values: 1% level	-3.920350	
5% level	-3.065585	
10% level	-2.673459	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 16

TABLE 6: Results of Stationarity at first difference for WPI

Null Hypothesis: D(WPI,2) has a unit root		
Exogenous: Constant		
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.651966	0.0000
Test critical values: 1% level	-3.886751	
5% level	-3.052169	
10% level	-2.666593	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 17

The optimal lag values were chosen on the basis of VAR Lag Order Selection Criteria. As can be seen from table 7, the optimal lag length, 'p' for the model is 2.

TABLE 7: Results for optimal lag length

VAR Lag Order Selection Criteria						
Endogenous variables: GDP IIP LOANSHG SENSEX WPI						
Exogenous variables: C						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-632.2063	NA	3.86e+24	70.80070	71.04802	70.83480
1	-527.6215	139.4464	6.36e+20	61.95795	63.44190	62.16256
2	-466.2069	47.76694*	2.64e+19*	57.91188*	60.63246*	58.28701*

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

After this, pair-wise Granger causality test have been used to estimate the cause and effect relationship between all the variables selected for the study. The results show that there is bi-directional causality relationship between IAP and GDP. GDP Granger Cause IAP and IAP Granger Cause GDP as the null hypothesis is rejected because p value is less than 0.05. Null hypothesis that GDP does not Granger Cause LOANSHG is also rejected. It can be very well interpreted that when the GDP grows it makes the micro loans grow and caused it significantly. No significant causal relationship has been found between GDP and IIP. Similar is the case with GDP and WPI.

Also, unidirectional relationship has been observed where GDP is granger causing Sensex. Another major interpretation can be made regarding the relationship of Micro loans and IAP. There is a bi-directional causal relationship. The Index for Agricultural productions cause microloans and vice versa. This is the outcome because microloans are majorly taken in the rural sector by the farmers. Null hypothesis of SENSEX does not Granger cause IAP is also rejected at p value of 0.018. Another bi-directional relationship between SENSEX and Micro loans is there.

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
IAP does not Granger Cause GDP	18	4.05460	0.0428
GDP does not Granger Cause IAP		5.08207	0.0234
IIP does not Granger Cause GDP	18	0.54389	0.5931
GDP does not Granger Cause IIP		1.31296	0.3024
LOANSHG does not Granger Cause GDP	18	2.74748	0.1011
GDP does not Granger Cause LOANSHG		4.94789	0.0252
WPI does not Granger Cause GDP	18	0.32514	0.7281

GDP does not Granger Cause WPI		0.32774	0.7263
SENSEX does not Granger Cause GDP	18	0.53790	0.5964
GDP does not Granger Cause SENSEX		4.97573	0.0249
IIP does not Granger Cause IAP	18	0.29052	0.7526
IAP does not Granger Cause IIP		0.26681	0.7699
LOANSHG does not Granger Cause IAP	18	5.01249	0.0243
IAP does not Granger Cause LOANSHG		3.72585	0.0526
WPI does not Granger Cause IAP	18	0.93024	0.4192
IAP does not Granger Cause WPI		0.00811	0.9919
SENSEX does not Granger Cause IAP	18	5.55616	0.0180
IAP does not Granger Cause SENSEX		0.49451	0.6209
LOANSHG does not Granger Cause IIP	18	0.18727	0.8314
IIP does not Granger Cause LOANSHG		0.00435	0.9957
WPI does not Granger Cause IIP	18	2.79948	0.0975
IIP does not Granger Cause WPI		0.16189	0.8522
SENSEX does not Granger Cause IIP	18	0.02905	0.9714
IIP does not Granger Cause SENSEX		0.20262	0.8191
WPI does not Granger Cause LOANSHG	18	0.07572	0.9275
LOANSHG does not Granger Cause WPI		0.65343	0.5365
SENSEX does not Granger Cause LOANSHG	18	5.72375	0.0165
LOANSHG does not Granger Cause SENSEX		10.0499	0.0023
SENSEX does not Granger Cause WPI	18	0.05572	0.9460
WPI does not Granger Cause SENSEX		0.56756	0.5803

CONCLUSION

The microfinance sector in India is on a growth. It cannot be denied that it shares a causal relationship with other economic indicators. The empirical analysis proves that it is on the nascent stage and when the economy grows, it causes useful growth in micro loans. Also, unidirectional relationship was observed where GDP is granger causing Sensex. Another major interpretation that was made regarding the relationship of Micro loans and IAP is that there is a bi-directional causal relationship between IAP and microloans. A causal relationship between these two variables is quite obvious as microloans are majorly being taken in rural areas. The Index for Agricultural productions cause microloans and vice versa. Another bi-directional relationship between SENSEX and Micro loans was there. No doubt, micro finance has come a long way but still it has to climb the ladder more. The days are not that far where Microloans would be significantly causing the GDP of India. The industry have made impressive gains in coverage of rural population with financial services but mainstreaming of impact assessment and incorporation of local factors in service delivery to maximize its impact on achievement of goals of poverty alleviation has to be considered. In spite all weakness and constraints microfinance remains a powerful tool for development of economy. It may be a drop in the ocean,

but it has made people self-sufficient and let economies grow.

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