# Does Institutional Credit Drive Agricultural Growth: Evidence from Odisha

**ALOK RANJAN BEHERA**
Assistant Professor
Department of A & A Economics, Utkal University, Bhubaneswar (Odisha) India

## ABSTRACT

To examine the link between agricultural credit and growth in agriculture is the aim of the study and tried to investigate the direction of causality between institutional agricultural credit and agricultural GSDP of Odisha. The study is based on only secondary data for the period of 1996-2016. To find out growth rate of financial and agricultural indicators, Compound Annual Growth rate (CAGR) is used in study. To examine the direction of causality between agricultural credit and agricultural GSDP of the state granger causality test has been employed in the study. The study postulates that the growth rate of agricultural credit is more than that of the agricultural GSDP and there is an unidirectional relationship from agricultural GSDP to agricultural credit.

**Key Words :** Agricultural credit, Agricultural GSDP, Granger causality, Unidirectional relationship
**JEL Classification :** C22, E44, O11, O47, Q14

## INTRODUCTION

In a developing economy like India, agriculture plays a crucial role as majority of people engaged in agricultural activities. According to 2011 population census of India, 68.84 percentages of people lives in rural areas, who depends directly or indirectly on agriculture for their livelihood. Thus it could be expected that growth of agricultural sector will reduce poverty and will approach towards achieving equality and equity in the economy. Growth of agricultural sector will solve the problem of hunger and increase employment opportunity, which ultimately will bring economic development in the economy (Jatuporn *et al.*, 2011). But lower level of productivity and higher dependency is obstructing the path of development of agricultural sector. It is many times argued that growth of financial system is a key factor for agricultural development (Puatwoe and Piabu, 2017). Economists often argued that economic growth and development of financial system are interlinked.

The relationship between financial development and economic growth has been one of the most studied subject matter in economics literature. Well known theory of development of Schumpeter (Shumpeter, 1911) in which he argued that economic development is result of innovative enterprises which is obtained by proper credit mechanism. Thus financial institution plays an important role in economic development by facilitating technological innovation in production which was termed as "supply leading hypothesis" in the later period by Patrick (Patrick, 1966).

Credit facilitates resources to be mobilized in a productive and effective manner in production process. Entrepreneurs get the incentive to use optimal level of input with availability of funds in his hand. So many literatures in economics investigated this particular concept and supported "supply leading hypothesis" in economic development like (Goldsmith, 1969; Gupta, 1984 and Acaravci *et al.*, 2007). The growth of economy becomes faster with better financial system. Because according to (Hicks, 1969) "Development of financial system is crucially important in stimulating economic

growth of an economy". This is because not a well-developed financial system decelerates economic growth.

Economic growth requires development of financial sector was another view of thought in existing previous literatures. In this regard (Robinson, 1952) stated that there exists a unidirectional causal relationship from economic growth to financial development. Latter this statement was termed as "demand following hypothesis" by Patrick (1966). Economic growth of an economy demands development of financial system to facilitate it by which growth will be more progressive. As growth of an economy continues it gives rise to more demand for credit facilities and in result lead to development of financial system (Jung, 1986 and Kar and Pentecost, 2000). But the statement is not always true. As economic growth demands development of financial system similarly credit may also facilitates economic growth. Both the scenario can be occurred simultaneously which is known as bidirectional relationship as supported by (Luintel and Khan, 1999; Ünalmi , 2002 and Arac and Ozcan, 2014). In this situation credit leads growth as well as growth demands credit.

In the literature, besides support of supply leading studies and demand following studies, there are some studies which support that there is no causal relationship between credit and growth. The neo classical economist regarded that existence of relationship between above two is not universal. Sometimes economists are over emphasizing the role of credit in economic growth (Lucas, 1988). He stated his argument as "irrelevance of finance hypothesis". So there does not exist any causal relationship between economic growth and financial development (Bakhouche, 2007 and Lucas, 1988). In this context it could be inferred that there is no direct relationship between development of financial sector and economic growth (Bakhouche, 2007). But the situation is not necessarily same in the context of agricultural development due to the peculiar characteristics of agriculture.

Agricultural growth is associated with more number of factors. There are some controlled variables and also some uncontrolled variables determining growth of agricultural sector. It is desirable to identify those factors by which better growth of this sector can be achieved should be emphasized from the view point of researcher and policy maker. Better input uses in agriculture have positive impact on production which is positively associated with agricultural credit (Narayanan, 2015). The

mobilization of resources in agriculture becomes effective with better credit mechanism as a result it have impact on production.

In many literatures it is stated that agricultural credit has significant positive impact on agricultural production (Sial *et al.*, 2011 and Iqbal *et al.*, 2004). The resources in use in agriculture become economical due to availability of required finance in the hand of farmer as a result production per unit of factor also increases. Therefore (Misra *et al.*, 2016) stated that agricultural credit have positive impact on agricultural productivity. Higher productivity and production in agriculture occurs as a result of increased use of input in production which is associated with higher credit use (Das *et al.*, 2009). Thus marginal productivity of factors employed in the agricultural production process is increasing due to credit system. As a result agricultural credit has effect in raising agricultural income and employment through enhancement of production ( im ir, 2012 and Byerlee *et al.*, 2009).

The relationship between agricultural credit and agricultural GDP as an indicator for agricultural growth is indicating a positive relationship (Hartarska *et al.*, 2015). This is because the responsiveness of agricultural GDP is high to the change in agricultural credit (Khan *et al.*, 2017). Agricultural production is increasing over the time and also agricultural credit. In long run there could be existence of a relationship between agricultural credit and agricultural growth (Ayeomoni and Aladejana, 2016 and Chandio *et al.*, 2016). But many times economists argued unidirectional relationship of above two variables (Sial *et al.*, 2011) and many times it argued that it is bidirectional (Chandio *et al.,* 2016). Thus the existence of relationship of these two indicators differs in different economic conditions.

The peculiarity is that rarely real farmers get the actual benefit of credit system in developing economies. The operating farming system in these countries exploits the real farmers in availing benefits of credit. So in this aspect there is no causal relationship between agricultural credit and agricultural output (Chakrabarty and Chaudhuri, 2001). The financially poor characteristic of farmer enforces to under utilize availed credit. Thus effect of institutional agricultural credit on output is either non-existent or negligible (Binswanger and Khandker, 1992).

With aforementioned literatures one point of issue arises that the relationship between agricultural credit and agricultural GDP is not uniform. So the present study

aims to investigate growth pattern of institutional agricultural credit and agricultural Gross State Domestic Product (GSDP) in Odisha and also to examine the existence and direction of causal relationship between agricultural credit and agricultural GSDP of Odisha.

# METHODOLOGY

The study is based purely on secondary data. Time series data of institutional agricultural credit[1] advanced and agricultural GSDP of Odisha has been collected from Odisha economic survey, State Level Banker's Co-operation (SLBC) report etc. The study covers a time period from 1995-96 to 2015-16. The collected data is interpreted with suitable analytical tool. To examine the growth of agricultural credit and agricultural GSDP, compound annual growth rate (CAGR) technique has been employed. The functional form of CAGR method as follows.

$$\text{CAGR } (t_0, t_n) = \left( \left[ \frac{V(tn)}{V(t0)} \right]^{\frac{1}{tn-t0}} \right) - 1$$

where,

$V(t_0)$ - starting value, $V(t_n)$ - ending value, $t_n$-$t_0$ - number of years

To investigate the long run relationship between agricultural credit and agricultural growth in a time series data, need to be stationary. To check the stationary of data series Augmented Dickey-Fuller test is used.

$$Y_t = \ + \ _t + \ Y_{t-1} + \sum_{i=1}^{m} \ _i \ Y_{t-1} + \ _t$$

where,

$\varepsilon_t$ is a white noise error term.

H0: $\gamma=0$ (Non-stationary series)

H1: $\gamma \neq 0$ (stationary)

The study aims to investigate causal relationship between agricultural credit and agricultural GSDP, for which Granger causality is tested. Existence of Granger causality is tested by the coefficient of following functions.

$$\text{Credit}_t = \sum_{i=1}^{n} \ _i \text{AGSDP}_{t-i} + \sum_{j=1}^{n} \ _j \text{Credit}_{t-j} + u_{1t}$$

$$\text{AGSDP}_t = \sum_{i=1}^{n} \ _i \text{AGSDP}_{t-i} + \sum_{j=1}^{n} \ _j \text{Credit}_{t-j} + u_{2t}$$

where, AGSDP is agricultural GSDP of Odisha and Credit is the amount of institutional agricultural credit disburse to agricultural sector over the years. It is assumed that $u_{1t}$ and $u_{2t}$ is is white noise error components and n is the maximum number of lagged observation included in the model. Here we want to test the statistically significance of $\alpha_i$ and $\delta_j$ value. If value of $\alpha_i$ coefficient is significantly different from zero, agricultural GSDP granger causes agricultural credit. And also like that if value of $\delta_j$ is significantly different from zero, agricultural credit granger causes agricultural GSDP.

**Growth of Agriculture and Institutional credit :**

The growth of institutional agricultural credit in Odisha is depicting the improvement in the condition of financial sector towards agricultural sector. Development of financial sector is essential for innovative production and growth of production.

# RESULTS AND DISCUSSION

It is observed that growth of institutional agricultural credit and agricultural GSDP is quite uneven and fluctuating. But the changes in same direction in maximum time indicate an association between the two variables. The growth rate of both the variables in maximum time is positive in nature. After 2000 growth rate of both the variables became higher. The lower base of institutional financial position and production in case of agricultural sector in Odisha, depicting a higher growth rate of both indicators. Over the years in compound annual growth rate, agricultural credit has increased at 21.73 percentages and agricultural GSDP has increased at 7.92 percentages.

Importance of stationary is a concern of time series analysis. In this study variables are agricultural credit and agricultural GSDP which provides a trend in general phenomena. So to examine the existence of stationary of these two variables, Iplot log value of it in graphical method. The Fig. 2 depicts that both the variables are showing a little trend or pattern over the years. Thus here question of existence of unit root in these variables arises.

To check the stationary of both variables, ADF unit root test has been used in the study. If the time series have a trend over time period and also if the sample is finite one, it is better to include both intercept and trend

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1.  Institutional agricultural credit here refers to agricultural credit advanced by commercial banks, RRBs and co-operative banks. Formal credit used in the study also refers to institutional credit.

Sources: Economic survey of Odisha
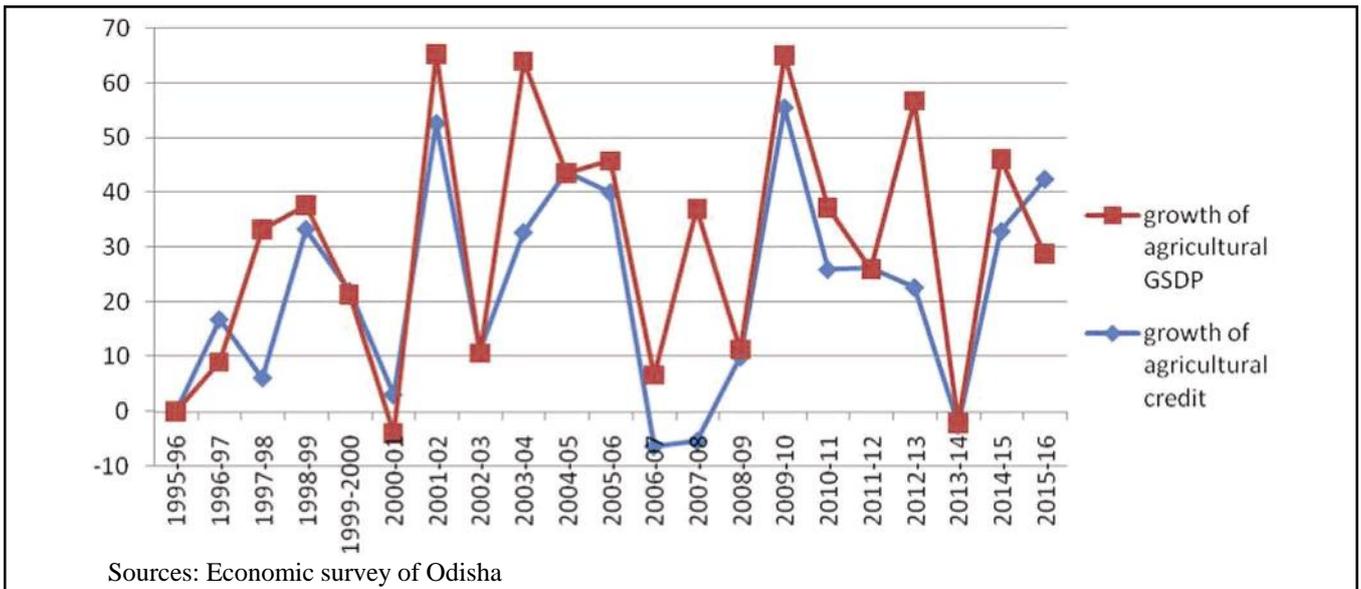
**Fig. 1 : Growth of agricultural credit and GSDP**



Sources: Economic survey of Odisha
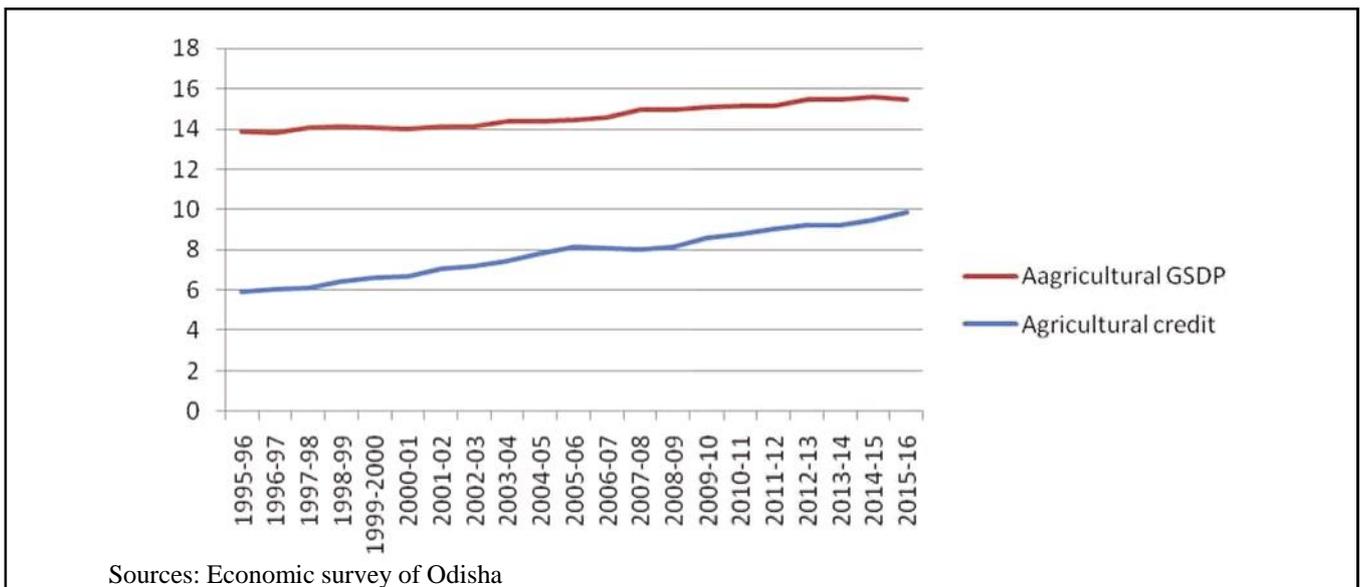
**Fig. 2 : Log plot of agricultural credit and agricultural GSDP of Odisha**

in the stationary test of ADF model. The variables of my study are showing a trend. Thus it includes both intercept and trend in our ADF test.

The Table 1 shows result of ADF test indicates that both agricultural GSDP and agricultural credit are non-stationary in level form. Furthermore agricultural GSDP found to be stationary after taking first difference of it. But non-stationary still prevail in agricultural credit after taking first difference of it. Thus we proceed for checking stationary of agricultural credit at second difference. And

it is found that agricultural credit is stationary at second difference. The Durbin-Watson statistic for agricultural credit is 2.16 which are closer to 2 and for agricultural GSDP. It is 1.49 which is little far from 2 but not much. Thus serial correlation is not a serious problem in current study.

However to test the long run relationship co-integration could be applied. But a disadvantage of co-integration approach is that the time series of all variables included in the model must be integration of same order.

**Table 1 : ADF test of unit root including (trend and intercept)**

| Variables | At level | | 1st difference | | 2nd difference | | Durbin-Watson statistics for auto-correlation |
|---|---|---|---|---|---|---|---|
| Null hypothesis: unit root exists | t-statistics | Prob | t-statistics | Prob | t-statistics | Prob | |
| Agricultural GSDP | -2.2855 | 0.422 | -3.7144 | 0.049 | -9.5941 | 0.000 | 1.49 |
| Agricultural Credit | 3.8863 | 1.000 | -2.4487 | 0.345 | -3.5383 | 0.074 | 2.16 |

Source: Authors own calculation

**Table 2 : Pair wise Granger causality test**

| Null hypothesis | F –statistics | Prob. | Decision |
|---|---|---|---|
| Agricultural GSDP does not granger cause agricultural credit | 5.472 | 0.0151 | Reject |
| Agricultural credit does not granger cause agricultural GSDP | 1.802 | 0.2048 | Accept |

Source: Authors own calculation

However, with relatively short time series data (21 in our study), it is difficult to establish order of integration with some certainty. In this scenario granger causality test is suitable, which does not assume and certainty about the order of integration. In this study both variables are stationary with different order. So it is preferable to apply granger causality approach in our study.

Above table postulates that agricultural GSDP granger cause agricultural credit but the reverse is not true. The study found unidirectional relationship between agricultural credit and agricultural GSDP. Here our study supporting the "demand following hypothesis" stated by (Patrick, 1966). The growth of agricultural sector is requiring better credit mechanism to allocate resources in an effecting manner as a result demanding for development of financial sector in that aspect. So the development of financial sector in agriculture is demand driven by growth of agriculture. Here we accept that agricultural credit does not granger causes agricultural GSDP. The justification of this statement is quite peculiar in developing economies. The benefits of financial system are not enjoyed by the real farmers in developing economies (Adeyeye *et al.*, 2015). In developing economies and particularly in our study of Odisha state, share cropping is widely practiced. In this particular case share cropper does not avail the financial facility for farming activity. Rather maximum benefits agricultural credit is obtained by the land owner. Thus credit is not utilized in the farming activity. This is one important reason for which agricultural credit does not granger cause agricultural GSDP.

**Conclusion :**

In this study we have empirically investigated the causes and direction of Odisha's agricultural credit and agricultural GSDP over the period of 1996-2016. The study gives us the idea that growth of agricultural credit is more than growth of agricultural credit at compound annual growth rate. This is no surprising due to lower base of agricultural credit in initial time period. Our study postulates unidirectional causal relationship from agricultural GSDP to agricultural credit. Agricultural GSDP granger cause agricultural credit due to higher requirement of credit demands development of credit system.

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