Role of agriculture credit in enhancing livelihood of farmers: Evidence from Northern Tamil Nadu

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ABSTRACT

Agricultural credit plays a vital role in improving productivity and efficiency in the farming sector. The pattern and extent of loan utilization and crop loan diversification was analyzed with sample farmers from K.V. Kuppam and Gudiyatham blocks of Vellore district where 45 farmers (borrowers and non-borrowers) from each block were selected respectively by multistage random sampling method. The majority of the sample respondents are educated where 56.36 per cent of borrowers and 45.71 per cent of non-borrowers have secondary education. The major crops grown by the sample farmers were papaya, mango, and coconut. Major sources of credit for farmers were found to be co-operative banks (52.10 %) followed by relatives and friends (26.99 %), commercial banks (12.26 %) and money lenders (8.65%). An 83.40% of loan amount was utilized for the crop production, 11.41% was used for other farm enterprises and 5% was used for household consumption. About 86.07 per cent of borrowers used the loan amount for crop production while 8.93 per cent of loan amount is used for other farm production purpose and 7.23 per cent is used household purpose. Technical efficiency scores were higher for borrowers (0.79) when compared with non-borrowers (0.63). The results of Tobit regression show that crop loan availed by the farmers, gross cropped area and net irrigated area has a significant effect on the technical efficiency of farm business. Availing loans has helped farmers to adopt new technologies and increased the technical efficiency of farming.

Keywords: agriculture credit, technical efficiency, Tobit regression.

Background

Agriculture is the main stay of Indian economy contributing 8.29% to the annual GDP in 2020-2021. Indian agriculture has wide scope for technological development and mechanization. Agricultural credit is not only an input but plays a vital role in improving productivity and efficiency in the farming sector by increasing private investment. Resource-poor farmers like small and marginal farmers are unable to cope with the improvements in farming as their savings are inadequate and credit is the only source. Hence agriculture credit is an important tool to uplift the socio-economic status of the

farmer. Farmers depend on different sources of credit like public and private institutions, money lenders, relatives, and friends. Institutional credit in agriculture was started with the objective of eliminating informal sources of credit. The studies conducted by RBI in 1936 and 1937 found that the entire finance required by farmers were provided by money lenders which led to building a cooperative credit structure by RBI between 1945 and 1950. But only 3.30 percent of cultivators had access to credit from co-operatives and 0.90 percent from commercial banks as of 1951.

All India Rural Credit Review committee was set up in July 1966 to review the supply of rural credit which recommended commercial banks to play a complementary role along with co-operatives. The Green revolution in 1960s necessitated adequate credit availability for purchase of inputs like seeds and fertilizers. The foundation of RRB and NABARD accelerated the growth of rural credit structure. At present, scheduled commercial banks must meet 40 percent of net credit to priority sector in which 18 percent goes to agriculture. The share of institutional credit to agriculture has grown from 7 percent in 1951 to 98 percent in 2018 reflecting the decrease in share of non-institutional credit from 93 percent to 2 percent between 1951 and 2018. But the indebtedness of rural agricultural households, which was 46.1 percent in 1971 has decreased meagerly to 40.3 percent in 2019. The Government of India enacted the policy of doubling agricultural credit wherein the annual growth rate of agriculture credit was 35 percent between 2004 and 2007. The compound growth rate of agriculture credit from 1999-2000 to 2019-2020 was 19.81 percent (Kumar, 2021).

As of 2021, 75.52 percent of total institutional credit to agriculture is from commercial banks while it is 12.74 percent and 11.73 percent from co-operative banks and Regional Rural Banks respectively (GOI, 2021). In Tamil Nadu, 82.15 percent of total institutional credit to agriculture is from commercial banks while it is 7.26 percent and 10.59 percent from co-operative banks and Regional Rural Banks respectively (GOI, 2021). The present study aims to analyze the crop loan utilization pattern and technical efficiency of farms among farmers of Vellore district in Tamil Nadu. It is hypothesized that the crop loan availed has a significant and positive effect on improving the technical efficiency of farms.

Literature Review
Overview of agricultural credit programs

Availing credit by farmers didn't have large effect on output but increased the usage of fertilizers and increased investment on machinery and livestock implying that additional capital input has helped in substituting agricultural labor (Binswanger and Khandekar, 1995). The effect of co-operative credit on fertilizer use is ten times as large as the impact

on total crop output while the elasticity of co-operative credit on agricultural employment (2.51) and investment on pumps (3.59) is higher than the commercial credit which is 2.07 and 3.63 respectively. (Binswanger and Khandekar, 1995)

A study on efficiency of agricultural credit in Pakistani Punjab stated that the farmers who obtained average sized loans produced 48 per cent more output than the non-borrowers (Sial and Carter, 1996). Untimely release of credit by institutions, difficulty in repayment during crop failure and difficulty in meeting consumption requirements were stated as the constrains associated with credit in high-suicide risk states like Tamil Nadu, Karnataka and Chattisgarh (Mishra, 2008)

Direct agriculture credit amount has positive effect on increasing productivity in agriculture (Das et al., 2009). Bhalla and Singh (2010) analyzed the elasticity of demand for inputs with respect to credit and concluded that an 10% increase in supply of institutional credit led to an 8-9% increased fertilizer use, tractors and tube wells. An 1 percent increase in credit has led to 0.0245 percent increase in productivity of wheat in Lahore, Punjab, Pakistan (Bashir et. al., 2010). A study by Gandhimathi and Vanitha (2010) found that the factors like cost of production (64.69%) and landholding size (13.46%) has greater influence on borrowing behavior of farmers from commercial and cooperative banks while utilization of credit has the least effect (0.36%) among farmers in Coimbatore district of Tamil Nadu.

Ayaz and Hussain (2011) used Stochastic Frontier Analysis to study the technical efficiency of farmers using credit in Punjab. The study concluded that 78.91 per cent of the borrowers are in higher efficiency class of 0.80 to 1.00 while 62 per cent of non-borrowers were found in the same class. The factors like education, farming experience, herd size and cultural practices had a significant influence on increasing farm effciency while the agricultural credit had the highest impact. Farmers of Karnataka borrowed 69 percent of total loan from financial institutions where in the effect of credit on crop productivity is insignificant as the cost of credit accounted for only 1.9 percent of total cost of cultivation and 0.9 percent of total value of output (Kanan. E, 2011)

A study by Narayanan.S (2016) found that credit flow has increased the use of inputs in agriculture by 5.1% in pesticides, 10.8% in purchase of tractors and reduced labour intensity by 2% but the credit flow has no direct effect on growth of GDP. The institutional credit is an enabling input but its effects are weakened by low technical efficiency and productivity. The diversion of institutional credit to non-farm use was higher for large farmers (3.03%) than small farmers (23.22%) for redgram production in Karnataka. In case of cotton production higher diversion was observed among marginal

farmers (25%) followed by small farmers (21%) and large farmers (4%). This is due to the small loan amount which is inadequate for farm utilization (Chavan et.al., 2016).

Analysis on technical inefficiency of bank borrowers and non bank borrowers in West Bengal found that the land owners who borrowed from banks are less technically inefficient than the farmers who borrowed from their landlords. Thus farmers having access to institutional credit has higher efficiency by using improved technology in agricultural production (Laha. A ,2013). Farmers who availed credit has adopted new technology and had higher technical efficiency when compared with farmers who have not availed credit (Padma Rani, 2020). The study by Baba.S.H., et.al., (2015) in Jammu and Kashmir found that financial institutions advanced only 7.61 per cent of the total credit requirements in the state in which only 65 percent of total credit was utilized for productive purpose by the farmers. The credit indirectly increased the farm returns through higher capital formation and adoption of new technology.

Chandio A.A. et. al., (2019) used Stochastic Frontier Analysis to study the impact of farm size and agricultural credit on rice productivity in Sindh, Pakistan and concluded that the increase in farm size would lead to more than 80 per cent increase in rice productivity while availing credit increases productivity by 26.95 per cent. Entire agricultural crop loan from co-operatives was utilized by the farmers of Thiruvananthapuram, Kerala and 94.23 percent of crop loan from commercial bank was utilized as the consumption needs of the farmers were higher (Kshama and Shantha, 2019).

Method

The Vellore district in North Eastern Zone of Tamil Nadu was selected for the study as this region remains untouched in several aspects of agricultural studies. The major crops of the district are Paddy, Red Gram, Mango, Papaya, Brinjal and Tomato. The lead bank of the district is Indian Bank and it is served by 6 cooperative banks, 9 public sector banks and 4 commercial banks. Two blocks were selected at random – K.V. Kuppam and Gudiyatham and 45 farmers from each block were selected by multi stage random sampling procedure.

Primary data was collected form sample farmers through pre tested interview schedule. Information on basic details of the farmers, land use pattern, crops cultivated, cost of inputs for livestock and crops and income pattern were collected. Information on credit availed, repayments, overdue and problem faced by farmers were also collected. The pattern and extent of loan utilization and crop loan diversification was analyzed by tabular representation. Statistical analyses like t-test and z test were used to know the

significance. The efficiency of sample farmers – borrowers and non borrowers was studied using Stochastic Frontier Analysis of Cobb-douglas production function. The present study aimed at analyzing the technical efficiency of borrowers and non borrowers household. The empirical model was taken as

$$\ln Y = \alpha_0 + \alpha_1 \ln X_1 + \alpha_2 \ln X_2 + \alpha_3 \ln X_3 + \alpha_4 \ln X_4 + \alpha_5 \ln X_5 + V_i - U_i \quad (1)$$

Y = Total output in Kg/acre
X_1 = FYM in Kg/acre
X_2 = Seed rate Kg/acre
X_3 = Human labour in man days per acre
X_4 = Value of fertilizers in Rs./acre
X_5 = Other costs (Plant protection chemicals and post harvest practices) in Rs./acre
V_i = Random variable
U_i = Farm technical efficiency factor

The determinants of technical efficiency was analysed using Tobit regression using STATA 15.1. The structural equation of Tobit model was given as

$$y_i^* = Z\beta + e_i \qquad i = 1,2,3,\dots\dots n \qquad\qquad (2)$$

The dependent variable value ranges between 0 and 1 hence it is not normally distributed. The empirical model for the Tobit model in this study is

$$y_i^* = \beta_0 + \Sigma_{n-1}^8 + \beta_n + Z_i + e_i \qquad\qquad (3)$$

Where Z_1 is the farming experience in years, Z_2 is education of farmers in years, Z_3 is a dichotomous variable for credit where borrowers are assigned a value of 1 and 0 for non-borrowers, Z_4 is family size, Z_5 is dichotomous variable where farmers with a secondary occupation as given a value of 1 and farmers with agriculture as sole income source are given a value of 0, Z_6 is the gross cropped area in acres, Z_7 is the net irrigated area in acres and Z_8 is the number of chemical sprayings done.

Results and Discussion

1) **General Profile of The Sample Respondents**

Table 1. Age profile of the sample respondents

Sl No	Age (Years)	Borrowers	Non Borrowers
1	31-40	14 (25.45)	8 (22.86)
2	41-50	27* (49.09)	11 (31.43)
3	51-60	13 (23.63)	13 (37.14)
4	More than 60	1 (1.81)	3 (8.57)
5	Total	55** (100.00)	35 (100.00)
5	Average age of farmer in years	46	51

Source : Farm household survey during February 2021-April 2021

Note : Figures in parenthesis indicates percentage to total

*** , ** and * indicates values are significantly different 1%, 5%, and 10% levels from the corresponding values of non-borrowers

There was a significant difference in the age of borrowers and non-borrowers. Majority of borrowers are in the age group 41-50 years while for non-borrowers it is 51-60 years. Older farmers are reluctant to go for institutional finance because of cumbersome procedure and time taken for sanction.

Table 2. Educational status of sample famers

Sl No	Education	Borrowers (No)	Non Borrowers
1	Illiterate	2 (3.63)	4 (11.43)
2	Primary	3 (5.45)	2 (5.71)
3	Secondary	31 (56.36)	16 (45.71)
4	Higher secondary	18 (32.72)	10 (28.57)
5	Graduate	1 (1.82)	3 (8.57)
6	Total	55 (100.00)	35 (100.00)

| 5 | Average years of education | 10.33 | 9.21 |

Note: Figures in parenthesis indicates percentage to total

The majority of the sample respondents are educated where 56.36 per cent of barrowers and 45.71 per cent of non-borrowers have secondary education. There was no significant difference in the education level of respondents indicating that age does not have an influence on borrowing character of farmer.

Table 3. Land holding pattern of respondents.

Sl No	Size of land holding	Borrowers (No)	Non Borrowers
1	Marginal (< 1ha)	24 (43.63)	5 (14.29)
2	Small (1 to 2 Ha)	16 (29.09)	12 (34.29)
3	Medium (2 to 4 ha)	14 (25.45)	8 (22.86)
4	Large (more than 4 ha)	1 (1.82)	10 (28.57)
6	Total	55** (100.00)	35 (100.00)
5	Average size of land holding (Hectares)	1.68	3.77

Source : Farm household survey during February 2021-April 2021

Note : Figures in parenthesis indicates percentage to total

*** , ** and * indicates values are significantly different 1%, 5%, and 10% levels from the corresponding values of non-borrowers

With respect to size of land holding, majority of the borrowers (44%) were marginal farmers while majority of non-borrowers (34%) were small farmers. A 29 per cent of non-borrowers were large farmers while only 2% of borrowers were large farmers. There was significant difference in the land holding character of borrower and non-borrowers indicating that the borrowers were short of own resources for investment and had to resort to credit.

Cropping pattern of the sample respondents

The major crops grown by the sample farmers were papaya, mango and coconut. About 85.45 per cent of borrowers cultivate papaya with total area of 73.32 ha and 14.55 per cent cultivate mango with an area of 14.92 ha. For non-borrowers, the major crop cultivated is mango with 137 ha. There is significant difference in the choice of crops between

borrowers and non-borrowers. The borrowers shifted to papaya cultivation after availing credit as the fruit fetches higher price in the local markets of Vellore and Ranipet.

2. Crop Loan Utilization Pattern

Average loan availed by farmer respondents.

The average amount of loan availed is the highest for marginal farmers with Rs.1,88,637 / ha followed by large farmers with Rs.1,66,600. There is a significant difference in the total loan amount availed for crop production between marginal and medium farmers.

Table 4. Loan availed by sample respondents

Size of holding	Number of farmers	Average farm size	Amount borrowed (Rs/farm)	Amount borrowed (Rs/ha)
Marginal	24	0.65	2,60,095	188637
Small	16	1.66	3,32,637	113388
Medium	14	3.33	3,03,465**	121000**
Large	1	4.8	2,52,000	166600
Total	55	1.68	125125	74446

Source : Farm household survey during February 2021-April 2021

Note : Figures in parenthesis indicates percentage to total

*** , ** and * indicates values are significantly different 1%, 5%, and 10% levels from the corresponding values of marginal farmers

Sources of loan availed by farmers

Major source of credit for farmers was found to be co-operative banks (52.10 %) followed by relatives and friends (26.99 %), commercial banks (12.26 %) and money renders (8.65%). Marginal farmers get the highest amount (68.75 per cent) of total loan from co-operatives followed by money lenders (11.23 per cent). Small farmers get 43.84 per cent of loan from relatives and friends followed by marginal farmers (19.91 per cent).

Co-operatives are the major source of credit as the interest rate is less and 10 per cent of loan is given as fertilizers and 2 per cent as crop insurance. This is helpful in preventing diversification of loan for non-farm operations. Higher interest rate is the major problem cited in acquiring credit from commercial bank. As the procedure is tedious and waiting time is long in institutional credit, farmers resort to non-institutional credit during uncertain situations.

Table 5. Average amount of loan availed from different sources

S.No	Type of farmer	Average crop loan availed (Rs./year)				Total (Rs./year)
		Co-operatives	Commercial Bank	Relatives and friends	Money lenders	
1	Marginal farmer	168330 (68.75)	0 (0.00)	68750 (19.91)	23015 (11.23)	2,60,095 (100.00)
2	Small farmer	1,58,937 (47.78)	0 (0.00)	1,45,833 (43.84)	27,867 (8.38)	3,32,637 (100.00)
3	Medium farmer	1,05,319 (34.71)	0 (0.00)	50,000 (16.48)	29,260 (9.64)	3,03,469 (100.00)
4	Large farmer	1,58,000 (62.70)	34,752 (13.79)	41,368 (16.42)	17,880 (7.10)	2,52,000 (100.00)
5	Total (Rs./year)	1,47,647 (52.10)	34,752 (12.26)	76,488 (26.99)	24,506 (8.65)	2,83,393 (100.00)

Utilization pattern of crop loan by farmers

About 86.07 per cent of borrowers used the loan amount for crop production while 8.93 per cent of loan amount is used for other farm production purpose and 7.23 per cent was used for household consumption. Diversification of crop loan for non-farm use is less and this results in higher farm productivity.

Table 6. Utilization pattern of credit

(Rupees/hectare)

S.No	Type of farmer	Average crop loan availed	Loan amount used for crop production	Loan amount used for other crops	Loan amount used for household purpose
1	Marginal farmer	188637 (100.00)	1,63,623 (86.74)	7,296 (3.87)	17,718 (9.39)
2	Small farmer	113388 (100.00)	1,11,716 (98.53)	0 (0.00)	1,672 (1.47)
3	Medium farmer	1,21,000 (100.00)	95,750 (79.13)	9,000 (7.44)	16,250 (13.43)
4	Large farmer	166600 (100.00)	1,36,400 (81.87)	23,200 (13.93)	7,000 (4.20)

| 5 | Total | 1,47,406 | 1,26,872 | 13,165 | 10,660 |
| | | (100.00) | (86.07) | (8.93) | (7.23) |

Source : Farm household survey during February 2021-April 2021

Note : Figures in parenthesis indicates percentage to total

Stochastic Frontier Analysis

Stochastic Frontier Analysis (SFA) was used to estimate the technical efficiency of borrowers and non borrowers. The technical efficiency is taken as the fraction of estimated production of the production unit being analysed (Y_i) and the maximum output (Y). The estimated efficiency scores lie between 0 and 1 where production units having efficiency value equal to 1 is technically efficient and production units having efficiency value equal to 0 is technically inefficient. This clearly explains how much output can be maximized with the given level of input.

Table 7. Technical efficiency of borrower and non-borrower farmers

Technical efficiency	Non borrower		Borrower	
	Frequency	Percentage	Frequency	Percentage
Less than 0.30	1	2.78	5	9.09
0.31 to 0.60	7	20.00	4	7.27
0.61 to 0.80	26	72.22	18	32.73
0.81 to 0.90	1	2.78	17	30.90
0.90 to 1.00	0	0	11	20.00
Mean	0.63		0.79	
Maximum	0.90		0.99	
Minimum	0.11		0.15	

None of the non-borrowers have technical efficiency of more than 0.9 while 20 percent of borrowers have technical efficiency of more than 0.9 indicating that farmers who availed credit have adopted new technologies and utilized the available limited resources to maximize production. The efficiency distribution indicates that 22.78 percent of non borrowers were below efficiency level of 60 percentage while it is 16.36 percent for borrowers.

Tobit regression model

The technical efficiency scores indicate that the average efficiency score was 0.63 for non borrowers and 0.79 for borrowers. Tobit model was used to analyse the factors affecting technical efficiency of borrowers. The dependent variable was technical efficiency scores while the independent variables are education of farmers in years, credit availed by the

farmers, family size, secondary occupation other than agriculture, gross cropped area in acres, net irrigated area in acres and the number of chemical sprayings done.

Table 8. Tobit regression model

S. No	Independent variables	Coefficient	t values
1	Education of farmers in years	-0.0008	-0.08
2	Experience of farmers in years	-0.0043	-1.21
3	Credit availed by the farmers (1=Borrowers 0= non borrowers)	0.2324***	3.99
4	Family size	0.0159	1.22
5	Secondary occupation	-0.1871	-1.53
6	Gross cropped area in acres	-0.0172**	-2.01
7	Net irrigated area in acres	0.0807**	2.23
8	Number of chemical sprayings	0.0881	1.53
9	Constant	0.2796	1.57
10	Pseudo R^2	0.9372	
11	LR chi 2(8)	31.04	

*** , ** and * indicates values are significant at 1%, 5%, and 10% levels

Availing credit has positive and significant influence on the technical efficiency of farmers as it enables them to carry out private investments in their farm increasing the productivity of the resources. Net irrigated area has a positive and significant effect while gross cropped area has a negative but significant effect. Increased area under irrigation improves the yield of the crops and aids in adopting improved technologies like micro irrigation and high yielding varieties. Experience and education of the farmers have negative influence as elder farmers are reluctant to avail institutional loans and to adopt latest technology. Farmers with secondary occupation in addition to agriculture as primary occupation have negative influence on technical efficiency on the farm. Family size and number of chemical sprays have positive influence but not significant.

Conclusion

It could be inferred from this study that Co-operatives are the major source of credit as the interest rate is less and 10 per cent of loan is given as fertilizers and 2 per cent as crop insurance. This is helpful in preventing diversification of loan for non-farm operations. There was significant difference in the productivity of crops for borrowers and non-borrowers of crop loan indicating the increased efficiency of input usage by borrowers. Credit enabled small and marginal farmers to cope up with the farming improvements as their savings are inadequate. Thus institutional credit increased the livelihood of farmers. Technical efficiency scores were higher for borrowers (0.79) when compared with non-borrowers (0.63). Availing loan has helped farmers to adopt new technologies and increased the technical efficiency of farming. The results of Tobit regression shows that crop loan availed by the farmers, gross cropped area and net irrigated area has a significant effect on the technical efficiency of farm business. The loan waiver system has positive view among farmers as it helped them prevent loss during price fluctuation and motivated farmers to continue farming. Hence policy initiatives to increase crop loan sanctions will help in increasing the farm investment which will lead to higher productivity.

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