Research Article

Indian Journal of Extension Education
Vol. 58, No. 2 (April–June), 2022, (167-172)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Determinant of Access to Credit and Availing Subsidies for Protected Cultivation in Maharashtra

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ARTICLE INFO

Keywords: Credit, Heckman selection model, Multiple linear regression model, Protected cultivation, Subsidy, Repayment pattern

http://doi.org/10.48165/IJEE.2022.58240

ABSTRACT

Protected cultivation requires high initial investment and intensive use of inputs for crop production but offers better yield which in turn increases the profitability of the farm. The study attempts to explore the economics of protected cultivation with different interest rates regime and subsidy in Pune and Nasik districts of Maharashtra conducted during 2018-19. About 95 to 97 per cent of the farmers availed subsidy from the government and the rest of the farmers constructed their polyhouse and shade net house without subsidy. About 47 to 50 per cent of the total cost was given as subsidy. Heckman selection model showed that the factors such as years of education, farm size, farm income, membership and occupation were the major determinants of access to credit. The study also indicated that household age, farm size, farm income, distance from the market and access to subsidies were important drivers of technology adoption. Among all, the access to subsidy reflected the availability of external capital support as one of the determining factors for adoption of technology. The factors responsible for non-repayment of loans were increase in farm income, family size and years of schooling.

INTRODUCTION

Government of India has taken several steps to enhance the flow of credit for the development of agriculture sector. The steps taken are creation of priority sector lending, formation of self-help groups, kisan credit card scheme and institutional innovations for better management of existing financial institutions. Despite all these effort about 36 per cent of the people in India do not have access to credit from formal financial institutions (Kumar et al., 2017). One of the main reasons is the lack of viable businesses for which financial institutions should lend. Horticulture sector has very strong backward and forward linkages and provides numerous viable enterprise combinations which are worthy of lending by financial institutions. Poor repayment is one of the major hindrances in financing agriculture sector. This has an implication on the viability of financial institutions. The repayment capacity of the farmers could be strengthened by enabling them to adopt profitable horticulture enterprises like protected cultivation through suitable farm finance. Protected cultivation involves high initial investment (Nordey et al., 2017; Harisha et al., 2019) and intensive use of inputs for crop production, but offers higher yield and returns as compared to open cultivation (Gruda & Tanny, 2014; Gruda & Tanny, 2015). To attract farmers towards protected cultivation, the Government has initiated a number of programmes and schemes namely Mission for Integrated Development of Horticulture (MIDH) by subsuming various schemes viz, National Horticulture Mission (NHM), National Horticulture Board (NHB), Horticulture Mission for North East Himalayan States (HMNEH) etc. The NABARD has launched

Received 05-03-2022; Accepted 16-03-2022

pilot projects to fund the protected cultivation in Maharashtra, Haryana and West Bengal. Besides, financial institutions are providing long term loan for establishing protected cultivation structures and short term loan through Kisan credit card for meeting the working capital. Thus, the availability of credit would be deciding factor about the adoption of the protected cultivation technology. Also, subsidy scheme needs to be continued to encourage maximum farmers to adopt protected cultivation and farmers need to be encouraged to form farmers producers organizations (FPOs), which would help them in seeking better quality of inputs and enhancing negotiating power in the market to realize maximum returns for their farm produce (Kumar et al., 2021). It is also imminent that it is a capital intensive crop is driven by a subsidy offered by the government. It is therefore important to assess the impact of credit on the adoption of technology. The overdue behaviour of the farmers also needs to be measured to understand the underlying factors turning them to be a defaulter. In this backdrop, this study was conducted in Pune and Nasik districts of Maharashtra with the objective to study the factors affecting access to credit and how it influences the extent of adoption of technology. The repayment position of the loans borrowed by protected cultivation farmers and the factors responsible for non-repayment of loans was also studied.

METHODOLOGY

The study was based on primary data collected from farmers practicing protected cultivation in Pune and Nasik districts of Maharashtra having large area under protected cultivation during 2018-19. The random sampling procedure was used to select the 116 farmers and data were collected through personal interview method with the help of schedule. In sampled farm household, 96 farmers adopted polyhouse and 20 farmers adopted shade net house. The selected farmers were interviewed to gather the information on polyhouse establishment cost, shade net house establishment cost, amount of subsidy, source of credit, amount borrowed, rate of interest, factors determining access to credit and its effects on the extent of adoption of technology, repayment pattern and the reasons for non-repayments of loan.

The Heckman model has been used to correct bias from samples not randomly selected (Abbeam et al., 2019; Aditya et al., 2018; Subash & Ali, 2018; Olawuyi, 2019). First, the probit regression model was used to identify the factors determining access to credit. Second, the estimated inverse mills ratio (IMR) from a probit model was used to account for the selection bias and was included as explanatory variables in estimating OLS to see how it influences adoption of technology.

The selection equation is

$$M = \gamma z_j + \mu_{1j} > 0 \quad \ldots (1)$$

Where, M denotes access to credit (M=1 if accessed and M=0 otherwise), z is the vector of explanatory variables, ã is a vector of unknown parameters.

The outcome equation is

$$y_j = \alpha + \beta X_j + \beta_\lambda \lambda_j + \mu_{2j} \quad \ldots (2)$$

Where y_j is the composite technology adoption index; X_j is the vector of independent variables; λ_j is the IMR; α and β are parameters to be estimated.

$\mu_1 \sim N(0, 1)$

$\mu_2 \sim N(0, \sigma)$

Corr $(\mu_1, \mu_2) = \rho$

When $\rho \neq 0$, the standard regression methods applied to the second equation produce biased results. Heckman provides consistent and asymptotically efficient estimates for all the parameters in these models.

The factors responsible for non-repayment of loans were estimated through multiple linear regression using OLS method and the equation is specified as.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 \quad \ldots (3)$$

Where, Y = Loan amount overdue (Rs.), X_1 = Age of the farmer (years), X_2 = Farm income (Rs.), X_3 = family size (numbers), X_4 = Education (years), X_5 = Access to kisan credit card loan ('1' if yes, else '0'), X_6 = Access to non-institutional credit ('1' if yes, else '0'), X_7 = Duration of loan (years), X_8 = Agriculture is the main occupation ('1' if yes, else '0').

RESULTS AND DISCUSSION

The interest rate charged by banks to the Kisan Credit Card (KCC) beneficiaries for a loan up to Rs. 3.0 lakh was governed by government policy of interest subvention and incentives for prompt repayment. The Indian government provided an interest subsidy of 2 per cent to banks to enable them to lend at 7 per cent. In addition to government interest subvention, the Government of Maharashtra also provided interest subvention to banks at 1 per cent to enable them to lend at 6 per cent. Further, interest rebate of 3 per cent was given to farmers for prompt repayment of the crop loan under the Government of India interest subvention scheme. The state government also provided interest subvention of 3 per cent up to Rs. 1 lakh. Thus, farmers in the state of Maharashtra got crop loan up to Rs. 1 lakh at 0 per cent and above Rs. one lakh to Rs. 3 lakh at 1 per cent. Further, it was observed that there was not much difference in the interest rate charged by financial institutions on the KCC loan (above Rs. 3.0 lakh) and agriculture term loan.

Table 1 describes the volume of investment, subsidy and credit availed by the farmers for the construction of different sizes of the polyhouse. Out of the total respondents (n=96), 97 per cent received subsidy that was provided by the government and 3 per cent of the farmers constructed their polyhouse without subsidy. About 47 per cent of the total cost was given as subsidy to construct a polyhouse of different sizes. Among the total respondents, 29 per cent had taken loans from financial institutions. About 79 per cent of the total amount was obtained from financial institutions and the remaining 21 per cent was contributed by farmers.

Table 2 depicts the investment, subsidy and credit availed for various sizes of shade net house farmers. Out of total farmers (n=20), 95 per cent were beneficiaries of subsidy provided by the government and 5 per cent of the farmers constructed shade net house without availing subsidy. About 50 per cent of the total cost was given as subsidy to construct different sizes of shade net houses. Among the total farmers, 30 per cent had taken the loan from financial institutions. About 80 per cent of the total amount

Table 1. Investment, subsidy and credit availed for various size of poly house

Size (ha)	Total No. of farmers	Total Cost# (Rs.)	No. of farmers availed subsidy	Subsidy amount (Rs.)	No. of farmers availed loan	Beneficiary contribution (Rs.)	Bank loan (Rs.)
0.1	50	963507	48	467500	10	216789	746718
	(52.08)	(100.00)	(96.00)	(48.52)	(20.00)	(22.50)	(77.50)
0.2	32	1887643	31	890000	10	437403	1423888
	(33.33)	(100)	(96.87)	(47.15)	(31.25)	(23.17)	(75.43)
0.3	1	2704546	1	1266000	1	540909	2163637
	(1.04)	(100.00)	(100.00)	(46.81)	(100.00)	(20.00)	(80.00)
0.4	13	3599221	13	1688000	7	745553	2853668
	(13.54)	(100.00)	(100)	(46.90)	(53.84)	(20.71)	(79.29)
Over all	96	2288729	93	1077875	28	485163	1796977
	(100)	(100.00)	(96.87)	(47.09)	(29.16)	(21.19)	(78.51)

Note: Figures in the parenthesis indicate respective percentage. # indicates the cost incurred for establishing polyhouse structure.

Table 2. Investment, subsidy and credit availed for various size of shade net house

Size (ha)	Total No. of farmers	Total Cost# (Rs.)	No. of farmers availed subsidy	Subsidy amount (Rs.)	No. of farmers availed loan	Beneficiary contribution (Rs.)	Bank loan (Rs.)
0.1	14	548611	13	274500	3	109722	472222
	(70.00)	(100.00)	(92.85)	(50.03)	(21.42)	(20.00)	(80.00)
0.2	2	796139	2	398000	2	159228	636912
	(10.00)	(100.00)	(100.00)	(49.99)	(100.00)	(20.00)	(80.00)
0.4	4	1421978	4	710989	1	284396	1137582
	(20.00)	(100.00)	(100.00)	(50.00)	(25.00)	(20.00)	(80.00)
Overall	20	922243	19	461163	6	184449	748905
	(100.00)	(100.00)	(95.00)	(50.00)	(30.00)	(20.00)	(80.00)

Note: Figures in the parenthesis indicate respective percentage. # indicates the cost incurred for setting up shade net house structures.

Table 3. Source of borrowing

Size of polyhouse	Institutional sources		Non-institutional sources		Total loan borrowed	
	Polyhouse (Rs.)	Shade net house (Rs.)	Polyhouse (Rs.)	Shade net house (Rs.)	Polyhouse (Rs.)	Shade net house (Rs.)
0.1 ha	279218	197722	89000	50000	368218	247722
	(75.80)	(79.81)	(24.17)	(20.18)	(100.00)	(100.00)
0.2 ha	533888	238912	175000	59000	708888	297912
	(75.30)	(80.19)	(24.68)	(19.80)	(100)	(100.00)
0.3 ha	897637	-	-	-	897637	-
	(100.00)				(100.00)	
0.4 ha	1165668	426593	73000	-	1238668	426593
	(94.10)	(100.00)	(5.89)		(100.00)	(100.00)
Overall	719103	287742	84250	54500	803353	243057
	(89.50)	(88.78)	(10.48)	(11.21)	(100.00)	(100.00)

Note: Figures in the parenthesis indicate percentage to the total loan borrowed

was obtained from financial institutions and the remaining 20 per cent of the total amount was contributed by farmers.

Table 3 depicts the proportion of respondents availing credit from institutional and non-institutional sources. Overall, about 90 per cent and 89 per cent of the total amount for polyhouse and shade net house was obtained from the institutional sources and remaining nearly 11 per cent of the total loan was borrowed from non-institutional sources. The small size polyhouse and shade net house farmers (0.1 and 0.2 ha) borrowed 75 to 80 per cent of the total amount of the loan from institutional sources and the remaining 20 to 25 per cent of the amount was obtained from non-institutional sources. The large size polyhouse farmers borrowed 94 per cent of the total amount from institutional sources and the remaining 6 per cent from non-institutional sources. Thus, it is revealed that the share of the amount borrowed from institutional sources increased with the increase in the size of polyhouse/shade net house. Kumari (2005) & Kumar et al., (2015) reported that the non-institutional share in the total amount decreased with increasing farm size.

The variables viz., years of education, farm size, farm income, membership and main occupation positively and significantly influenced access to credit (Table 4). However, the estimated inverse mills ratio was found to be insignificant which indicates no selection bias. This findings are also consistent with that of Ngwira et al., (2014); Abeam et al., (2019). The coefficients of age, land size, farm income, distance from market and access to subsidy were significant and hence influenced the extent of adoption of protected cultivation technology. With one year increase in farmer's age, the extent of adoption of technology will increase by 0.002 per cent. Similarly, increasing farm size and farm income by one unit will increase the extent of adoption of technology by 0.006 and 0.033 per cent

Table 4. Determinants of access to credit and their effects on technology adoption

Particulars	Access to credit (selection equation)		Extent of adoption of technology (outcome equation)	
	Coefficient	P>|z|	Coefficient	P>|z|
Age	0.006	0.751	0.002**	0.036
Education	0.258***	0.000	0.004	0.309
Household size	-0.048	0.629	0.003	0.600
Land	0.312*	0.074	0.016*	0.086
Experience	-0.024	0.490	-0.002	0.222
Income	0.411*	0.097	0.033**	0.031
Distance	0.001	0.918	-0.001*	0.088
Members	0.281*	0.061	0.007	0.402
Extension contact	-	-	0.058	0.132
Subsidy	-0.206	0.674	0.050*	0.086
Occupation	1.166*	0.073	-0.020	0.821
Credit	-	-	0.001	0.953
Inverse mills	-	-	-0.013	0.598
Constant	-10.289***	0.005	-0.021	0.924

Notes: In case of selection equation, the log likelihood = -65.589522, Number of observation = 116, Pseudo R^2 = 0.1779 and LR chi^2 (10) = 28.39; while in case of outcome equation, Number of observation = 116, R-squared = 0.2206 and Probability > F = 0.0080; ***p<0.01, **p<0.05, *p<0.1

respectively. Harisha et al., (2019) and Kumari et al., (2022) also confirmed that farmers age, education and landholding size were positively related to the adoption of technologies. Further, one km decrease in distance from the market the extent of adoption of technology will increase by 0.001 per cent. In all, access to subsidy was found to be an important determinant in the adoption of technology as it indicated with the provision of subsidy, the extent of adoption of technology will increase by 0.05 per cent. Yadav et al., (2019) found that subsidy, motivation, demonstration and training were the main prioritized strategies for adoption of technology.

Most of the respondents (60%) receiving short term credit were found to be regularly repaying the loan amounts, and about 24 per cent of the farmers paid their loan amount partly. Whereas, 16 per cent of the farmers failed to repay the loan due to various reasons. Similar results was observed in Northern Telangana Zone in Andhra Pradesh by Kumari (2005). The repayment position of medium-term credit by protected cultivation farmers showed that at the overall level, the average per farm amount borrowed was Rs. 2.93 lakh. Out of this amount Rs. 2.04 lakh (69.63%) amount was repaid, leaving 30.37 per cent of the amount as an outstanding. The proportion of repayment was the highest for the size of 0.2 ha (70.63% of the amount borrowed) followed by 0.1 ha. The average amount of outstanding per family was the highest (31.63%) for the size of 0.1 ha followed by 0.2 ha (29.37%). The average per family amount of outstanding loan with the interest was Rs. 9859 and Rs. 12277 for the size of 0.1 ha and 0.2 ha respectively. Out of the total outstanding loan amount the proportion of overdues was the tune of 32.85 per cent. The average per family amount of overdues was Rs. 20768 and Rs. 46642 for the size of 0.1 and 0.2 ha. The percentage of overdues to total outstanding loans was 22.52 and 43.19 for size of 0.1 and 0.2 ha.

The repayment position of long term credit by protected cultivation farmers revealed at the overall level, the average per farm amount borrowed was Rs. 8.45 lakh. Out of this amount Rs. 5.33 lakh (63.19%) amount was repaid, leaving 36.81 per cent of the amount as an outstanding. The proportion of repayment was the highest for the size of 0.3 ha (71.78% of the amount borrowed) followed by 0.2 ha (62.30%) and 0.3 ha (51.47%) respectively. The average amount of outstanding per family was the highest (48.53%) for the size of 0.4 ha followed by 0.2 ha (37.70%) and 0.3 ha (22.22%). The average amount of outstanding per family was increased with an increase in the size of structure. The average per family amount of outstanding loan with the interest was Rs. 39549, Rs. 29921 and Rs. 193892 for the size of 0.2, 0.3 and 0.4 ha respectively. Out of the total outstanding loan amount the proportion of overdue was 32.23 per cent. The average per family amount of overdues was increased with the increase in the size of structure, similar to that of outstanding amount. The average per family amount of overdues was Rs. 92592 (36.71% of the total outstanding amount), Rs. 91758 (40% of the outstanding amount) and Rs. 142894 (19.99% of the outstanding amount) for the size of 0.2, 0.3 and 0.4 ha respectively.

Multiple linear regression model were employed to identify the factors determining the loan defaulters (Table 5). The coefficient of multiple determinations (R^2) was 0.64 indicating that 64 per cent of the total variation in the loan overdue was explained by the regression analysis. The regression coefficients of farm income, household size and years of schooling were positive and significantly influenced the loan overdue. Whereas, the regression coefficients of the duration of the loan was found to be negative and significantly influenced the loan overdue. The regression results revealed that the effect of income on loan overdue was found to be positive and significant which indicated that as household income increases by one rupee, the loan overdue amount increase by 0.031 rupees. Similarly, the effect of education on loan overdue was positive and significant showed that one year increase in education, there was Rs. 12489 increase in loan overdue amount. This may be attributed to the high level of awareness about government loan waiver policy which induces them to delay the loan repayment. Gandhimathi & Ambigadevi (2013) & Singh et al., (2014) reported that an increase in farm income and education, then higher will be

Table 5. Regression estimates of factors determining loan overdue

Particulars	Coefficient	Std. error	P>|t|
Age of the farmer (years)	-76.801	1673.05	0.964
Farm income (rupees)	0.031*	0.0179	0.093
Household size (numbers)	52175.86***	18755.28	0.010
Education (years of schooling)	12489.77**	6025.97	0.049
Access to kisan credit card loan (yes=1, 0=otherwise)	-12664.1	36202.05	0.729
Access to non-institutional credit (yes=1, 0=otherwise)	-14836.9	43596.72	0.736
Duration of loan (years)	-18133.35***	4825.99	0.001
Occupation (yes=1, 0=otherwise)	109139	84510.01	0.208
Constant	-409834.5**	180703.4	0.032
R^2	0.6405		
F value	5.57		
Number of observation	34		

Note: ***p<0.01, **p<0.05, *p<0.1

wilful defaulting. A significant and positive coefficient of household size suggested that with the increase of one member in the family tend to increase the loan overdue amount by Rs. 52175. Finally, a significant and negative coefficient of the duration of loan suggested that with one year decrease in the loan period, farmers would tend to repay their loans it was Rs. 18133 decrease the loan overdue amount.

CONCLUSION

Protected cultivation is a capital and inputs intensive crop production, and rammed by a subsidy provided by the government. It was observed that the rate of interest prevailing in different institutions for short term loans is the cheapest among all kinds of loans. It is suggested that the banks need to be sensitized to offer loans to the farmers through KCC scheme for investment in protected cultivation.

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