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Research Note

ALLOCATIVE EFFICIENCY EFFECTS OF FARM CREDIT : A STUDY OF SMALL HOLDER RUBBER LOANS IN KERALA*

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Introduction

The extension of liberal credit through State intervention in rural credit markets has generally been justified on the grounds of improving small farmers' access to formal credit. Yet, not much is known about the impact of credit on farm productivity, via its influence on input allocation, technology adoption, etc. The objective of this paper is to model and estimate the allocative efficiency effects of small farm credit. It is based upon data pertaining to two groups of rubber growers in Kerala - one which cultivated with financial assistance from government agencies and the other which operated without financial assistance.

Materials and methods

The study was located in Meenachil taluk, Kottayam district, Kerala. The taluk was selected since it had the maximum proportionate area under rubber cultivation in the state.

The sample for the study included both beneficiaries of the loan facility under RPDS, Phase-I+, as well as non-beneficiaries. There were 209 beneficiaries during the year 1983**. Out of this, 20 per cent, ie., 42 farmers

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\+ RPDS, Phase I refers to Rubber Plantations Development Scheme, Phase I (1980-84), one of the Rubber promotion schemes implemented by the Government of India, through the Rubber Board, with financial assistance from NABARD.

** The year 1983 was selected so that all the selected farmers will have started tapping their trees at the time of enquiry, viz, 1991.

were selected at random. One sample was omitted due to irreconcilable data problems. There were 254 newly registered holdings which operated without financial assistance from NABARD, during 1983. Twenty per cent of this, ie., 50 farmers were selected randomly to represent non-beneficiaries. Together, the sample size came to 91.

All the required primary data were collected from the farmers by personal interview with the help of a comprehensive schedule. Secondary data were collected from the publications of the Rubber Board, India. Field survey for data collection was conducted during April to July, 1991. The collected data were subjected to statistical analysis to generate results and arrive at conclusions.

Tools of analysis

In addition to simple averages and percentages, an endogenous switching regression model developed by Carter (1989) is also used in this study with appropriate modifications. The technique is discussed briefly below.

Since by the terms and conditions of the rubber loans scheme, loans are available to any small farmer with secure title to his land, it is likely that a farmer's use of credit is positively correlated to unobservable and unmeasurable factors. A single equation econometric approach to the analysis of credit's effect could hence be misleading. Therefore, in this study, two estimations as detailed below were done in order to disentangle the multiple influences of factors related to farm and farmers' attributes from that of credit per se.

(1) A naive estimation of credit effect which ignores the issue of selectivity bias. This was specified with the value of intermediate inputs per hectare as a log-linear function of normalized prices of intermediate inputs (fertilizer and plant protection) and labour (in rupees), land cultivated in hectares, education dummy, and years of experience in rubber growing.

(2) An estimation which accounts for the non-random allocation of credit, using univariate probit estimates to construct correction factors.

The estimating equation for endogenous credit status is formulated as

$$E(Yi) = \beta' Zi + \delta \ni (c_i) + (\sigma_c - \sigma_n) f(c),$$

where Yi is the log of latex production in kg, Zi are the observable or market conditions and ə (ci) and f(ci) the standard normal cumulative distribution function and probability distribution function, respectively.

Estimation and Results

Table 1 presents descriptive statistics (mean values with standard errors in parentheses) on the 91 rubber growers included in the study. The data show that the beneficiaries incurred higher expenditure on inputs like manures and fertilizers, plant protection and labour. These higher input intensities translate into an average per annum output of 1617.42 kg/ha which is 10.10 per cent higher than the output realized on a non-loanee farm. These data might suggest that credit recipients are more productive and contribute more to rubber production than the non-recipients. It might also be inferred that absence of formal credit is a major hindrance to input use and increased productivity on non-loanee farms.

Since credit is open to all and it is individual farmer initiative that decides whether he receives credit, it is posible that the observed differences in productivity and related parameters is in fact due to their inherent personal characteristics.

As a first step towards the estimation of the endogenous switching regression model, a univariate probit equation was estimated. It determined credit status as a function of land stock, education, age of the farmers, experience in rubber growing and cooperative membership dummy variable. The results are given in Table 2. Level of education, experience in rubber growing and membership in cooperatives were found to be positively related to the probability of using credit.

Influence of credit on Input allocation

The effect of credit on input allocation was obtained by estimating an input allocation equation which specified the log value of intermediate inputs (fertilizer and plant protection) as a function of landstock, normalized with respect to output price), education dummy, experience in rubber growing and cooperative membership dummy. The results of both estimations - naive OLS as well as endogenous credit equation - are given in Table3.

Table 1 : Descriptive Statistics - Rubber Production (1990-91)

Sl. No.	Variables	Beneficiary n = 41	Non-beneficiary N = 50
1.	Total landstock (ha)	1.25	1.05
		(75.11)	(73.15)
2.	Land under rubber (ha)	0.98	0.92
		(31.38)	(39.03)
3.	Value of manures and	603.50	476.22
	fertilizers (Rs./ha)	(286.52)	(252.32)
4.	Plant protection costs	2426.91	2043.86
	(Rs./ha)	(511.61)	(402.23)
5.	Tapping charges (Rs./ha)	6535.92	5903.20
		(1393.62)	(1567.00)
6.	Hired labour charges*	853.15	503.75
	(Rs./ha)	(415.22)	(157.57)
7.	Output per annum	1617.42	1468.31
	(kg/ha)	(420.14)	(358.88)
8.	Net Revenue (Rs./ha)	16119.36	14290.07
		(6352.87)	(9787.29)

* Excluding wages for tapping and spraying.
Figures in parentheses are standard errors.

Table 2 : Probit Estimates of Parameters of Credit Equation.

Variable	Coefficient	Standard error
Constant	1.625	0.5935
Land stock	-0.011	0.0057*
Level of education	0.367	0.3312
Age	-0.014	0.0190
Experience in rubber cultivation	0.039	0.0203*
Membership in Cooperatives	2.083	0.4891*
2* Log likelihood Ratio		85.916

* Significant at 5 per cent level.

The gap in intermediate input level between two farmers who are observationally identical, but differ in credit status is estimated to be –0.0119. In the naive estimation which ignores selectivity bias, formal credit is estimated to lower intermediate input levels by approximately one percent. Taking selectivity correction factors into account, the endogenous credit equation estimates that if credit was distributed randomly among

Table 3 : Input allocation equation estimates of credit effect.

		Coefficient
A.	Naive OLS	
1.	Average input intensity gap, $\hat{\delta}$	-0.0119*
B.	Endogenous credit equation.	(0.0698)
2.	Average input intensity effect, δ	-0.0176 NS
	$H_1 : \delta = 0$	(0.1287)
	Significance level of hypothesis	0.862
3.	Input intesity differentiation effect	0.4667*
	$H_2 : (\sigma_c - \sigma_n) = 0$ $\sigma_c - \sigma_n$	(0.2759)
	Significance level of hypothesis	0.097
4.	Conditional input intensity effect	0.2928
	$\delta + (\sigma_c - \sigma_n) \lambda c$	(0.2075)

Figures in parentheses are standard errors.

* Significant at 10 per cent level.

NS - Not significant.

farmers irrespective of their latent characteristics, intermediate input allocation will decrease on an average by a factor of 1.76. Since the coefficient was not statistically significant it can be argued that credit does not influence input allocation, when distributed randomly among farmers. The differentiation effect is estimated to be 0.4667 and the hypothesis that there is no selectivity bias cannot be rejected as shown by the level of significance of the hypothesis H_2.

The conditional credit effect on input allocation is 0.2928, ie. a credit recipient is estimated to apply 25 per cent more inputs when he operates with credit as compared to when he operates without it. The results imply that the latent characteristics of credit users do influence input allocation while credit per se does not.

Conclusions

Results of the econometric exercises controlling the self-selection process suggest that while evaluating any programme where participation is non-random, the selection process has to be suitably structured and included in the analysis to get unbiased estimates.

Reference

Carter, M.R., 1989. The impact of credit on peasant productivity and differentiation in Nicaragua. *Journal of Development Economics*, **32** : 13-35