Determinants of Lending-Borrowing in a Credit Rationed Economy

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1. Background

Credit markets worldwide are characterized by the problem of asymmetric information. This asymmetry of information creates a wedge between the intended and the actual amount of lending. The situation is particularly acute in the case of economies that have a low score on economic growth and development. At times, this gets manifested in the form of existence of dualism in credit markets. India being a developing nation faces a similar situation reflecting in the parallel existence of a formal and an informal credit market, none being less in importance than the other.

Although, with a rapid expansion of branch network in rural areas, the magnitude of the formal sector has been growing since independence, a look at the RBI data in Table 1 reveals that in the post-liberalization period, particularly in the decade that just followed it, the share of professional moneylenders increased substantially from 14.2 percent to 26.3 percent within the category of non-institutional lenders. This hints at the possibility of some kind of credit rationing during this period.

Using All India Debt and Investment Survey (AIDIS) data, Choudhary (2022) points out to the existence of credit rationing in rural India in the post- liberalization period. In fact, the study argues that in the decade following liberalization, there has been a rise in credit rationing by the Indian institutional agencies which bears implication for the performance of rural sector in India.

In this paper we take the discussion of Choudhary (2022) further. We enquire about the factors that determine lending-borrowing in the formal sector. This is a pertinent question to ask in light of the evidence received regarding existence of credit rationing in the formal credit market. Consequently using a Heckman Selection Model, we investigate at all-India level, the determinants of size of loan obtained by individual borrowers, conditional on their participation in the formal credit market. We find that among other things, the amount of loan is influenced by environmental conditions and existing endowments in the agricultural sector.

The paper is organized as follows. In Section 2, we give a brief description of the data. Section 3 gives an overview of the variables used. Section 4 outlines our empirical methodology while Section 5 provides the results of the empirical estimation. Section 6 concludes.

2. Data

The data for this study comes from the 59th Round of All India Debt Investment Survey 2003 which is a decennial survey conducted by the National Sample Survey Organization in India. The survey follows a stratified multi-stage sample design. The sample for this study relates to 27647 households covering 16

major states[1]. The loan data for 431 districts covered by the survey pertains to loans taken during the agricultural year July 2002-June 2003. We supplemented the data on district-level variables by data from various other secondary sources like IndiaStat, RBI etc.

3. Overview of Variables

Table 2 provides descriptive statistics of the sample used in this study. As can be seen from the table, 74 percent are cultivator households with a mean plot size of 1.29 hectares. Only 10 percent of the sample has received education level of higher secondary and above. The average household size is 5.6 having an adult male ratio of 33 percent. The average amount of loan received from the formal institutional credit agencies is around INR 26000 (roughly 325 USD) and the average annual interest rate is 13 percent.

We can compare this with the lending-borrowing statistics for the informal sector. A look at Table 3 tells us that the household who typically borrow from the informal sector have less land with average land owned of 0.55 hectare. Also, the size of loan procured from the informal agencies is smaller, approximately 9000 INR (111 USD). The interest rates prevailing in the informal sector are higher with average interest rate being 26 percent per annum. Here, only 60 percent are cultivator household.

4. Empirical Methodology

We employ a Heckman selection model on the formal segment of the credit market for the All-India sample. This is done to study the determinants of the amount borrowed. The idea is that a household must pass a participation hurdle before it is observed with a positive amount of borrowing. The participation equation and the loan amount equation are given as under.

$P_{ij}* = H_{ij}^{p} \gamma + u_{ij}$

$P_{ij} = 1$ if $P_{ij}* > 0$

$\quad = 0$ if $P_{ij} \leq 0$

$L_{ij} = H_{ij}\beta + \varepsilon_{ij}$ if $P_{ij} = 1$

$\quad = 0$, otherwise

where $P_{ij}*$ is a latent variable, P_{ij} and L_{ij} the dependent variables, H_{ij}^{p} and H_{ij} the vectors of characteristics, and β and γ the coefficients to be estimated, and u_{ij} and ij the error terms for participation and credit amount obtained respectively ($u_{ij} \sim$ N(0,1), corr(u_{ij}, ε_{ij}) = $\rho_u \varepsilon$. If the two equations were independent, we could have simply used OLS. This is verified by the Wald test of the null hypothesis: $\rho_u \varepsilon = 0$.

5. Estimation Results

The results of our estimation are presented in Table 3. As demonstrated in the estimation results reported in Choudhary (2022)[2], the Wald test for independence of selection and outcome equation given by the null hypothesis of $\rho_{u\varepsilon} = 0$ suggests that the correction for sample selection is necessary.

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[1] Andhra Pradesh, Assam, Bihar, Haryana, Himachal Pradesh, Madhya Pradesh, Uttar Pradesh, Punjab, Jammu and Kashmir, Rajasthan, Gujarat, Maharashtra, Orissa, Karnataka, Kerala, Tamil Nadu.

[2] Details are provided in Choudhary (2022) for bivariate probit estimation of the credit rationing model.

The estimation results of the Heckman selection model used in this study indicate that participation in the formal credit market is higher for married people with the likelihood of it increasing with age of the household head. Cultivator households owing large parcels of land are likely to borrow more from the formal institutional players. In a district, availability of credit and the quality of infrastructure also have a bearing on borrowing from the formal sector.

Further, the results from the Heckman selection model for all Indian states sample show that the amount of loan obtained from the institutional sources vary positively and significantly with the size of the household, level of education of the household head, land area owned and rainfall. It is negatively and significantly affected by the number of plots cultivated. These findings conform to the findings of Bhende (1986) and Jodha (1981).

6. Conclusion

Once a household decides to borrow from the formal credit market, the amount that it borrows is governed by the size of the household, land area owned and number of plots cultivated. This reflects the increased credit requirement for executing more ambitious projects in the Indian rural sector. Since much of Indian agriculture is still monsoon dependent, rainfall also is a determining factor with previous year good monsoon building positive expectation about the forthcoming year. Our study apart from other things signifies that it is important for the state to pay attention to infrastructure logistics and availability of credit through banks and other formal agencies so that the Indian rural sector is able to make productive use of the opportunities. This is imperative for improving the performance of the rural sector.

Reference:

1. Bhende, M.J., 1986. Credit markets in rural South India. Economic and Political Weekly, pp.A119-A124.

2. Choudhary, I., 2022. Empirical Measurement of Credit Rationing in Indian Rural Sector. International Research Journal of Commerce, Arts & Science, 13(11), 62-75.

3. Heckman. J.J.. 1979, Sample bias as a specification error, Econometrica 47, 153- 161.

4. Jodha, N.S., 1981. Role of credit in farmers' adjustment against risk in arid and semi-arid tropical areas of India. Economic and Political Weekly, pp.1696-1709.

5. RBI Report on Currency and Finance 2008.

Appendix

TABLE 1: PERCENTAGE OF INDEBTED HOUSEHOLDS TO TOTAL HOUSEHOLDS: INSTITUTIONAL VERSUS NON-INSTITUTIONAL SOURCES								
	RURAL					**TOTAL**		
CREDIT AGENCY	**1961**	**1971**	**1981**	**1991**	**2002**	**1981**	**1991**	**2002**
Institutional Agencies	17.3	24	48.8	66.7	50.6	48.2	65.4	50.9
of which:								
(i) Government	8.6	8.3	5.4	7.3	3	6.2	8.3	3.5
(ii) Co-operative societies	15.9	18.5	33.4	29.6	26	30.7	27.9	24.9
(iii) Commercial Banks	0.6	1.1	16	32.1	21.5	15.5	29.1	20.8
All Non-Institutional Agencies	82.7	76	51.2	41.9	58.5	51.8	43.4	57.3
of which:								

(i) Landlords	1.4	11.2	6.2	4.7	1.5	5.1	3.9	1.3
(ii) Agricultural Moneylenders	51	25.4	13.2	9.8	12.5	10.8	8.1	10.2
(iii) Professional Moneylenders	17.7	15.7	10.5	13.2	26	11.8	14.2	26.3
All Agencies	100	100	100	100	100	100	100	100
Source: All India Debt and Investment Survey (AIDIS) various rounds. Published in Report on Currency and Finance , 2008								

TABLE 2: DESCRIPTIVE STATISTICS OF ALL INDIA FORMAL SECTOR LENDING		
Variable	**Mean**	**Std. Dev.**
Gender (Male Head of HH=1)	0.91	0.29
Age	48.2	13.21
Married (Currently married=1)	0.99	0.09
Household Size	5.6	2.74
Adult Male Ratio	0.33	0.17
Higher Education (Educational level of higher secondary or above=1)	0.1	0.3
Educational Level	3.73	2.4
Cultivator (Yes=1)	0.74	0.44
Land (area in hectares)	1.29	2.37
No. of plots cultivated	1.62	2.08
Loan amount	26133.08	66666.07
Credit Agency	2.69	1.37
Interest Rate	13.01	5.87
Nature of Interest rate	2.27	0.55
Purpose of taking loan	3.55	2.27
Type of Security	3.41	2.32

TABLE 3: DESCRIPTIVE STATISTICS OF ALL INDIA INFORMAL SECTOR LENDING		
Variable	**Mean**	**Std. Dev.**
Gender (Male Head of HH = 1)	0.9	0.31
Age	44.23	13.31
Married (Currently married = 1)	0.98	0.13
Household size	5.13	2.49
Adult male ratio	0.3	0.18
Higher education (Educational level higher secondary or above = 1)	0.04	0.19
Educational level	2.77	2.06
Cultivator (Yes =1)	0.6	0.49
Land (area in hectares)	0.55	1.44
No. of plots cultivated	1.14	1.78
Loan amount	8996.95	21952.2
Credit agency	11.58	1.16
Interest rate	26.04	27.13
Nature of interest rate	1.72	0.63
Purpose of taking loan	4.76	1.85
Type of security	1.56	1.72

TABLE 4: FORMAL CREDIT MARKET ALL INDIA SAMPLE				
HECKMAN SELECTION MODEL	**PARTICIPATION**		**LOAN AMOUNT**	
Variables	**Coefficient**	**Standard Errors**	**Coefficient**	**Standard Errors**
Gender	-0.1966973	0.05593	1179.927	3251.91
Age	0.0369512***	0.01371	278.6847	485.92
Age^2	0.0003549***	0.00013	-2.84796	4.79
Married	0.3683436***	0.14936	2388.475	3645.03
Household size	-0.00698	-0.00797	1545.71**	713.4
Adult male ratio	0.08402	0.0905	13739.04	9453.29
Higher education(Secondary & above)	0.117347	0.07174	11755.22***	4882.61
Cultivator household	0.2061029***	0.0164	-384.927	3219.08
Land owned (area in hectares)	0.2512888***	0.0164	4098.788***	1299.68
Landowned^2	0.0081918***	0.00113	-53.7156	70.53
No. of plots cultivated			1344.648***	508.01
Rainfall 2002			4.556461***	1.84
Fertilizer per hectare 2002	0.235049	0.25864		
Bank credit per capita	0.0075015***	0.00229		
Infrastructure Index	0.013608***	0.00102		
Wald Chi2(12)	76.13			
Prob>Chi2(12)	0			
Rho	0.17905	0.02605		
N	27694			
Wald test of independent equations (rho=0)				
chi2(1)=	45.22			
Prob>chi2=	0			
*significant at 10 percent ** significant at 5 percent				
***significant at 1 percent				