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# Determinants of Interlinked Credit Contracts in Informal Agricultural Credit Market

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## ABSTRACT

There are very many reasons for the existence of informal credit market in agriculture such as, credit rationing in the formal credit market, which is argued on both the negative and positive sides, minimal access to formal credit and high cost of borrowing from formal institutions. These act as the push factors compelling the rural borrowers towards informal credit relation (Selvaraj and Sundaravarada Rajan, 1999). The credit rationed borrowers can not get credit at any interest rate and the unmet demand can be satisfied in the informal credit market at high interest rate. There is a large-scale expansion of informal credit with high degree of commercialisation (Feder et al, 1988, Bell, 1990, Reddy, 1992, Swaminathan, 1993, Birtal and Singh, 1993, Bell et al, 1988, Reddy, 1992). The literature on agrarian contracts in the less developed countries highlights the presence of interlinked markets in the informal credit. An interlinked contract is one in which two or more interdependent exchanges are simultaneously agreed upon. While interlinkage may be of various kinds, the most commonly observed ones are those involving the informal (agrarian) credit markets, the labour market, the land market and the market for grains. The nature of linkages depends on the relative bargaining power of the parties involved in the credit transactions, relative urgency of credit and the availability of formal credit. Hence, a linkage may be either beneficial to both the parties involved in credit transactions or disadvantageous to the weaker parties (Reddy, 1992). Since interlinked contracts form an integral part of the rural economy, the subject of interlinkage had received a great deal of empirical attention (Bardhan and Rudra, 1978). This in turn, has led to a spurt of theoretical research (Mitra, 1983, Basu, 1983, Gupta, 1987 and Bell, 1988). Hence the focus of the present study is to examine, the role of informal credit market in agriculture, types of interlinked credit transactions and the determinants of interlinked credit transactions. The specific objectives of the study are: 1. To study the types interlinked credit contracts and extent of interlinked credit contracts; 2. To identify the factors determining interlinked credit contracts. To conclude small farmers were the major beneficiaries of informal credit market. But marginal farmers were not able to get adequate credit in informal credit market. More than 90 percent of the farmers involved in all types of credit contracts, such as cash to cash, cash to labour, seeds to cash and fertilizers to cash contracts. Nearer findings were observed by Basu (1983) and Bardhan (1984). They identified credit labour inter-linkage in the informal agricultural credit market. The value of farm equipments and expenses on seeds were the dominant factors in discriminating the borrowers under all credit contracts in to large and small borrowers. Though the farmers benefited from the informal sources, the farmers were highly exploited in the interlinked credit market through high implicit rates of interests.

## I. INTRODUCTION

Government financial intermediation in rural economics is geared to mobilized savings and investment, via lending. There is a growing body of literature that has focused on the linkages between credit market development and economic growth (Goldsmith, 1969, David and Mayer, 1980, Pischke et al, 1983, Giovannini, 1985, Braverman and Guash, 1986, Iqbal, 1986, Feder et al., 1988, Feder et al., 1990 and Foltz, 2004).

To develop the institutional sources of credit in India, various policy measures such as nationalization of commercial banks (1969), Lead bank scheme (1969), Service Area Approach (1979), introduction of Kisan Credit System (1998) etc. were initiated (Sumathi, 2001). Though the above policy measures increased the flow of institutional credit from 12.30 percent in 1980-1981 to 61 percent in the year 2002, the non institutional credit accounted for 39 percent in the year 2002 (All India Debt and Investment Survey, 2002).

There are very many reasons for the existence of informal credit market in agriculture such as, credit rationing in the formal credit market, which is argued on both the negative and positive sides, minimal access to formal credit and high cost of borrowing from formal institutions. These act as the push factors compelling the rural borrowers towards informal credit relation (Selvaraj and Sundaravarada Rajan, 1999).

credit-rationed borrowers can not get credit at any interest rate and the unmet demand can be satisfied in the informal credit market at high interest rate. There is a large-scale expansion of informal credit with high degree of commercialisation (Feder et al, 1988, Bell, 1990, Reddy, 1992, Swaminathan, 1993, Birtal and Singh, 1993, Bell et al, 1988, Reddy, 1992). The literature on agrarian contracts in the less developed countries highlights the presence of interlinked markets in the informal credit. An interlinked contract is one in which two or more interdependent

exchanges are simultaneously agreed upon. While interlinkage may be of various kinds, the most commonly observed ones are those involving the informal (agrarian) credit markets, the labour market, the land market and the market for grains. The nature of linkages depends on the relative bargaining power of the parties involved in the credit transactions, relative urgency of credit and the availability of formal credit. Hence, a linkage may be either beneficial to both the parties involved in credit transactions or disadvantageous to the weaker parties (Reddy, 1992). Since interlinked contracts form an integral part of the rural economy, the subject of interlinkage had received a great deal of empirical attention (Bardhan and Rudra, 1978). This in turn, has led to a spurt of theoretical research (Mitra, 1983, Basu, 1983, Gupta, 1987 and Bell, 1988).

Hence the focus of the present study is to examine, the role of informal credit market in agriculture, types of interlinked credit transactions and the determinants of interlinked credit transactions.

The specific objectives of the study are :

To study the types interlinked credit contracts and extent of interlinked credit contracts.

To identify the factors determining interlinked credit contracts.

The null hypotheses tested in the study are :

1. The socio-economic characteristics of the farmer borrowers were not related with the total borrowing under all interlinked credit contracts.

## II. METHODOLOGY

Both agriculture and industry played a significant role in Coimbatore District economy. Though commercial and co-operative banks in the district achieved the target amount of agricultural credit, the survey conducted under annual action plan (2005-

2006), Coimbatore district, showed that the marginal and small farmers did not avail adequate amount in institutional credit. They stated that the increased cost of cultivation was not taken in to account in the fixation of scale of finance. The above features make favourability for selecting Coimbatore district for the present study.

The data for the study were collected from primary sources. A two stage random sampling procedure was followed in selecting the sample of borrower farmers (Non-institutional). There are 19 community development blocks in the district such as Anamalai, Annur, Avinashi, Gudimangalam, Karamadai, Kinathukadavu, Madukkarai, Madathukulam, Palladam, P.N.Palayam, Pollachi (North), Pongalur, Sulur, Sultan Pet, Sarkarsanakulam, Thondamuthur, Tiruppur, Udumalpet, and Pollachi (South). Among 19 community development blocks, Karamadai block was found to be low credit intensive block (below district average) in Coimbatore district. In the first stage, among various villages in Karamadai block, T.C.Pudhur and Mangalakari Pudhur were selected randomly through lottery method. The above villages did not get complete access to formal credit. The pilot survey revealed that nearly 50 percent of the farmer respondents in the above villages were not able to get adequate institutional credit.

In the above villages, the moneylenders, commissioner agents and traders were approached to collect the addresses of the borrowers. They also provided the information about other non-institutional sources of credit such as friends, and neighbours. From the 285 addresses of borrowers provided by the above non-institutional sources, 100 farmer-borrowers were selected randomly through lottery method, in the next stage.

Interview schedules were framed to collect information in relation to socio-economic profile of the farmers, the amount borrowed, types of interlinked credit transactions, amount availed under various interlinked credit contracts, the cost of cultivation, production etc. The pilot study was conducted to identify the gaps in the interview schedule. Based on the observations made in the pilot study, the interview schedule was modified and the final survey was conducted with the restructured schedule in the month of December 2005.

The methodology adopted by the earlier studies revealed the extensive application of logit and probit model to estimate the probability of being interlinked credit contracts and not being interlinked credit contracts in terms of selected socio-economic characteristics. In the present study, all farmers had interlinked credit contracts and none of them had non-interlinked credit contracts. The applications of logit and probit analytical models were irrelevant to analyse the determinants of interlinked credit contracts. Hence the present study used discriminant analysis to identify the determinants of interlinked credit contracts apart from simple percentages.

1. Discriminant Analysis to analyse determinants of inter-linked credit contracts

The socio-economic and farm related factors which discriminated the borrowers to borrow higher amount and lower amount under all credit contracts such as cash to cash, cash to labour, seeds to cash and fertilizer to cash contracts were put in to the discriminant analysis. The analysis was carried out by taking into account of seventeen socio-economic characteristics such as caste, size of family, age, education, type of family, consumption expenses, savings, farm income, expenses on seeds, expenses on fertilizers and pesticides, wage expenses, value of farm equipments, value of livestock, size of land, occupation, type of crop cultivated and area under cultivation.

Out of the 100 farmer respondents, 42 farmers were belonged to large borrowers group and 58 were belonged to small borrowers group. It was assumed that certain socio-economic factors were associated with large and small amount of borrowing. Hence to identify the factors responsible and to discriminate the borrowers to borrow higher and lower amount, a linear multiple discriminant function of the following form was used.

$$Z = L1X1 + L2X2 + L3X3 + L4X4 + L5X5 + L6X6 + L7X7 + L8X8 + L9X9 + L10X10 + L11X11 + L12X12 + L13X13 + L14X14 + L15X15 + L16X16 + L17X17$$

Where, Z = Total discriminant score for large and small borrowing group under all interlinked credit contracts.

X1 = Caste

X2 = Size of family

X3 = Age

X4 = Education

X5 = Type of family

X6 = Consumption expenses

X7 = Savings

X8 = Farm income

X9 = Expenses on seeds

X10 = Expenses on fertilizers and pesticides

X11 = Wage expenses

X12 = Value of farm equipments

X13 = Livestock

X14 = Size of land

X15 = Occupation

X16 = Type of crop cultivated

X17 = Area under cultivation

III. RESULTS AND DISCUSSION

1. TYPES AND EXTENT OF INTERLINKED CREDIT CONTRACTS.

In recent years, considerable theoretical work has been done on the issue of interlinked transactions in agrarian credit markets. An interlinked transaction is one that involves the individuals in trade in atleast two markets on the condition that the terms of all trade transactions between them are jointly determined. (Bardhan, 1980, Bell, 1988 and Srinivasan, 1989).

In the study area, the crops such as Banana, Flower Plant and Curry Leaves were cultivated. The farmers involved in inter-linked credit transactions for the purpose of cultivating the above crops. The table - 1 gives details on the types and extent of interlinked credit contracts among different categories of farmers in the study area.

TABLE - 1  
TYPES AND EXTENT OF INTERLINKED CREDIT CONTRACTS

Type of farmer	Cash to cash contract	Cash to labour contract	Seeds to cash contract	Fertilizer to cash contract
Marginal (in number)	4 (100)	4 (100)	4 (100)	3 (75)
Small (in number)	73 (100)	73 (100)	65 (89.04)	68 (93.15)
Semi medium (in number)	23 (100)	22 (100)	22 (95.65)	23 (100)

Source : Field survey

Figures in parentheses denote percentages to total number of

farmers in the corresponding group.

The table - 1 showed that there were four types of interlinked credit transactions such as cash to cash, cash to labour, seeds to cash and fertilizer to cash. All the above four types of interlinked credit transactions are discussed as under.

**CASH TO CASH**

In the cash to cash transaction, the lender offers loan in cash and allows the repayment by the borrowers in terms of cash alone. In the study area, the sample farmers acted as borrowers. They borrowed in terms of cash from commission agents, friends, neighbours and moneylenders. Among all category of farmers, all 100 percent of them were involved in cash to cash contract.

**CASH TO LABOUR**

Under this arrangement, the lender offers cash loans, which, along with interest charges (if any) are to be repaid by the borrowers in terms of labour services only. The sample farmers acted as borrowers. They borrowed in terms of cash, but repaid in terms of labour services. In the sample among marginal and small farmers, all 100 percent of them were involved in cash to labour contracts. But among semi-medium farmers, only 95.65 percent of them were involved in cash to labour contract.

**SEEDS TO CASH**

In this system, loans were advanced not in cash but in terms of seeds although the repayments were made in terms of cash. In the study area, the sample farmers acted as borrowers of seeds. It was found that all hundred percent of the marginal farmers, 89.04 percent of small farmers and 95.65 percent of semi-medium farmers borrowed in terms of seeds and repaid in terms of cash. The survey revealed that in most of these cases, the lenders did not charge any interest explicitly, although those might involve some implicit interest charge on the borrowers.

**FERTILIZER TO CASH**

In this system, the lenders (fertilizer agencies) supplied fertilizers on credit and the borrowers repaid in cash. In this system of credit transaction, implicit and explicit rates of interests were charged. The sample farmers acted as borrowers of fertilizers and repaid in terms of cash. All 100 percent of the semi-medium farmers were involved in this interlinked credit transaction. Among marginal and small farmers, more than 74 percent of them were involved in the above credit transaction.

The farmers category wise comparison revealed that higher number of small farmers was involved in interlinked credit transactions. It therefore, emerged that although the households belonged to the lower farm size groups (small farmers), they displayed a higher tendency to enter into interlinked credit contracts in the study area.

Sankar Kumar, Bhaumik and Abdur Lahim (1999) observed similar findings that 72 per cent of the small farmers practiced input-cash credit linkage in a selected area of West Bengal.

**2. DETERMINANTS OF CREDIT CONTRACTS -DISCRIMINANT ANALYSIS**

The amount borrowed under all credit contracts were clubbed together for all 100 borrowers and then the borrowers were classified as the borrowers borrowed above average level and below average level under all credit contracts. The former group was named as large borrowers group and the latter was named as small borrowers groups. It was assumed that certain socio-economic factors such as caste, size of family, age, education, type of family, consumption expenses, savings, farm income, expenses on seeds and fertilizers and pesticides, wage expenses, value of farm equipments and livestock, size of land holding, occupation, type of crop cultivated and area under cultivation were related with interlinked credit contracts.

The first step in the discriminant analysis was the estimation of the mean and standard deviations of the included variables. The mean and standard deviations of the variables, which were included in the discriminant analysis are shown in table - 2.

**TABLE - 2**  
MEAN AND STANDARD DEVIATIONS OF SELECTED VARIABLES

Variables	Large Borrowers		Small Borrowers	
	Mean	Standard Deviations	Mean	Standard Deviations
Caste	2.62	0.62	2.62	0.52
Size of family	4.52	1.49	4.16	1.48
Age	48.43	9.39	47.47	11.60
Education	2.17	1.17	1.91	0.96
Type of family	1.67	0.48	1.53	0.50
Consumption expenses	59538.1	78	66581.03	66612.78
Savings	4919.05	3979.17	3643.97	4122.91
Farm income	93928.57	71918.02	86137.93	87150.90
Expenses on seeds	5657.29	2668.32	4706.69	2733.22
Expenses on fertilizers and pesticides	6476.19	2680.19	9310.35	15508.51
Wage expenses	6446.43	3126.57	5455.17	3086.06
Value of farm equipments	3126.19	3218.23	2222.41	1353.98
Value of livestock	13135.71	34848.70	10753.45	11276.11
Size of land	253607.1	143751.21	241456.9	126082.76
Occupation	1.12	0.33	1.05	0.22
Type of crop cultivated	1.98	0.84	1.74	0.76
Area under cultivation	0.89	0.33	0.80	0.41

The borrowers who borrowed above average level under all types of credit contracts with greater size of family, high mean age, education, higher number of them belonged to joint family system, higher amount of savings, farm income, higher expenses on seeds, wage expenses and value of farm equipments and livestock, greater size of land holdings, higher number of them had both agriculture and non-agriculture as the occupations, cultivation of high duration crops, and greater area under cultivation were highly distinguished from small borrowers group.

To test the significant of mean differences in the variables between large and small borrowers group, Wilk's Lambda and uni-variate 'F' test were calculated. The values of Wilk's lambda and the 'F' ratio for the selected variables are shown in table - 3.

**TABLE - 3**  
WILK'S LAMBDA (U-STATISTIC) OF THE VARIABLES

Variables	Wilk's Lambda	F
Caste	0.9999	0.00
Size of family	0.9849	1.50
Age	0.9980	0.20
Education	0.9858	1.41
Type of family	0.9824	1.76
Consumption expenses	0.9976	0.24
Savings	0.9761	2.40
Farm income	0.9977	0.22
Expenses on seeds	0.9702	3.01

Expenses on fertilizers and pesticides	0.9862	1.37
Wage expenses	0.9752	2.49
Value of farm equipments	0.9637	3.69*
Value of livestock	0.9975	0.24
Size of land	0.9979	0.20
Occupation	0.9849	1.49
Type of crop cultivated	0.9788	2.12
Area under cultivation	0.9858	1.40

\* - Significant at five percent level

When the value of Wilk's lambda approaches one, there is no significant difference in the means of two groups and vice-versa. The estimated value of Wilk's lambda approached one for all the factors except for the value of farm equipments and machineries held with the farmers, and it was not approximated to one. It showed that the large borrowers and small borrowers differed widely in relation to value of farm equipments.

The other test used in the process of discriminant analysis was correlation between discriminating variables and canonical discriminant function.

TABLE - 4  
CORRELATION BETWEEN DISCRIMINATING VARIABLES AND CANONICAL DISCRIMINANT FUNCTION

Variables	Co-efficients	Rank
Caste	-0.00314	17
Size of family	0.27	7
Age	0.097	16
Education	0.26	9
Type of family	0.29	6
Consumption expenses	-0.11	13
Savings	0.34	4
Farm income	0.10	14
Expenses on seeds	0.38	2
Expenses on fertilizers and pesticides	-0.26	11
Wage expenses	0.35	3
Value of farm equipments	0.42	1
Value of livestock	0.11	12
Size of land	0.09	15
Occupation	0.27	8
Type of crop cultivate	0.32	5
Area under cultivation	0.26	10

The correlation co-efficient was ranked according to their contribution in the discriminant function. It could be seen from the table that value of farm equipments had the highest contribution (0.42) among all other factors.

The percentage number of cases correctly classified was used as another test in the discriminant analysis.

TABLE - 5  
CLASSIFICATION RESULTS

Borrowing group	Number of cases	Predicted group members
Large borrowers group	42	42.00
Percentage *		100

Small borrowers group	58	58.00
Percentage *		100
Total	10	100.00

\* - Percentage of predicted group members to total number of cases.

All hundred percent of the borrowers under all types of inter-linked credit contracts were correctly classified.

The relative discriminating power of the variables was calculated based on the non-standardized coefficients and also the means of the variables.

TABLE - 6  
RELATIVE DISCRIMINATING POWER OF THE VARIABLES

Variables	Unstandardized discriminant Co-efficients	Relative discriminant power
Caste	-0.25	0.03
Size of family	-0.10	3.08
Age	0.0011	0.09
Education	0.16	3.29
Type of family	0.70	7.51
Consumption expenses	1.74041E-07	0.10
Savings	5.81966E-05	6.05
Farm income	-1.81609E-06	1.16
Expenses on seeds	0.00026	19.87
Expenses on fertilizers and pesticides	-3.7234E-05	8.62
Wage expenses	8.34202E-05	6.76
Value of farm equipments	0.00017	12.37
Value of livestock	-8.2083E-06	1.60
Size of land	0.69	7.82
Occupation	0.90	4.93
Type of crop cultivated	0.56	10.76
Area under cultivation	-0.80	5.95

It was found that expenses on seeds (19.87 per cent) had the highest contribution in the discriminant function along with the value of farm equipments (12.37 per cent). It was found that the large borrowers with greater expenses on seeds and with greater value of farm equipments were highly distinguished from small borrowers group in the borrowing under all credit contracts.

To sum up, the value of farm equipments and expenses on seeds were the dominant factors in discriminating the borrowers under all credit contracts in to large and small borrowers.

IV. SUGGESTION

The small, marginal and semi medium farmers borrowed in the formal credit market due to inadequacy of credit in the formal market. It was on account of non-availability of proper securities and documents. Hence proper policy measures taken by the financial institutions to reduce the procedural formalities will reduce the role of informal credit market in agriculture.

If proper measures are undertaken by the government to control the interest rates in the informal credit market, it will be more helpful to control the exploitations of farmers through interest rate.

## V. CONCLUSION

To conclude small farmers were the major beneficiaries of informal credit market. But marginal farmers were not able to get adequate credit in informal credit market. More than 90 percent of the farmers involved in all types of credit contracts, such as cash to cash, cash to labour, seeds to cash and fertilizers to cash contracts. Nearer findings were observed by Basu

2399 (1983). He identified credit labour inter linkage in the informal agricultural credit market. The value of farm equipments and expenses on seeds were the dominant factors in discriminating the borrowers under all credit contracts in to large and small borrowers. Though the farmers benefited from the informal sources, the farmers were highly exploited in the interlinked credit market through high implicit rates of interests.

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