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**Repayment of Short Term
Loans in the Formal Credit
Market: The Role of
Accessibility to Credit from
Informal Sources**

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REPAYMENT OF SHORT TERM LOANS IN THE FORMAL CREDIT MARKET: THE ROLE OF ACCESSIBILITY TO CREDIT FROM INFORMAL SOURCES

Manojit Bhattacharjee and Meenakshi Rajeev*

Abstract

This paper is an attempt to link the problem of non-repayment in the formal credit market with the accessibility to credit from informal sources. In many developing countries a well established network of informal lenders continues to prevail in spite of various formal lending programmes implemented by the government. Scholars often dealt with how the poorer households become the victim of usurious rates of interest charged by informal lenders and lose their valuable properties. We however show that more unfavourable the terms of loan from a moneylender compared to that of a formal lending agency, better is the chance of a borrower making timely repayment and get the benefit of formal loan on a recurring basis, which is not available in case of default. After establishing the conditions theoretically, the paper using National Sample Survey Organisation (NSSO, India) database, empirically tries to examine such an impact in the case of short term formal loans. The empirical analysis reveals the positive and significant impact of informal interest rates on repayment of formal loans.

Key Words: Repayment, Formal Lending Agency, Informal Lending Agency

JEL Classification O1, G0, G2

Introduction

One of the main constraints faced by households of developing countries is inadequate access to financial resources. Majority of households being either self-employed in agriculture or small business need credit to sustain their livelihood. The formal banking sector extends financial support to the poor but most of these credit institutions are also faced with serious problems of monitoring and non-repayment. Default in repayment in any credit market is the result of a genuine inability to repay due to crop failures or other such setbacks or a wilful move by the borrower if penalty is not severe. In the formal market, owing to interventions from the local political bodies, penalty in the form of transfer of property rights is almost absent (see Besley, 1994). Penalty in the form of discontinuation of future credit services exist but a well established network in the informal sector provides an alternative source of credit in the event of default.

The informal lenders, due to their proximity to the borrower and power in the local market, accept collateral from a borrower (such as future labour service) that is not accepted in the formal credit market (Bhaduri, 1977, 2006; Basu, 1997). One can also observe higher repayment rates in the informal sector even with unfavourable terms and conditions (see Basu, 1997). The question then naturally arises, can the availability of loans from informal sources, such as village moneylenders or

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traders, influence a borrower to wilfully default in the repayment of formal credit? This is an important question to explore both empirically and theoretically because the terms of informal lending are unfavourable when compared with the formal sector. Amongst the usually discussed vices of the informal credit market, this aspect has never been highlighted by the authors.

As far as previous studies are concerned, the problem of non-performing assets or non-repayment of loans in the formal credit market has received attention across the globe (Rajaraman *et al*, 1999; Rajaraman and Vasishtha, 2002, Hoff and Stiglitz, 1990; Besley, 1994). Studies focusing on the link between the formal and informal credit markets have largely tried to explore the impact of cheap credit from formal agencies on the terms and conditions of a loan in the informal credit market (Hoff and Stiglitz, 1997; Bose, 1998). The existence of an opposite link between informal to formal credit has not received due attention. On the repayment front studies have mainly investigated the impact of group lending programmes on repayment of loans (Besley and Coate, 1995; Sharma and Zeller, 1997; Bhat and Tang, 2002).

Our analysis brings out certain interesting results. With regard to the impact of informal lending, scholars have always been critical of the usurious rates of interest levied by the moneylenders. We, however, show that more unfavourable the terms of loan from a moneylender, better is the chance of a borrower making timely repayment and getting the benefits of formal loan on a recurring basis. Thus lowering the interest rate in the formal sector (which makes informal sector interest rate comparatively more unfavourable) influences a borrower to repay a loan. Apart from looking into the impact of accessibility to credit from informal sources on the repayment of formal loans, this paper also identifies and compares the factors that determine repayment of loans in the formal and informal credit markets of India.

To test the hypothesis empirically, we have used 59th Round 'All India Debt and Investment Survey' of the National Sample Survey Organisation (NSSO). The paper considers only short-term loans (loans that are advanced for a period up to one year). Medium term (1-3 years) and long term loans (more than 3 years) have not been considered because the repayment of medium and long term loans is slow and therefore not captured adequately in the data provided by the NSSO. Moreover, medium and long-term loans are not availed frequently in a household's lifetime[†]. Since credit market features, especially in the informal sector, differ across regions, three types of states (provinces) were considered based on the level of development. The classification was based on the percentage of people living below the poverty line and the per capita income of the states[‡].

The rest of the paper unfolds through the following sections. The next section provides an overview of nature of repayment of loans across different credit agencies. This is followed by the

[†]In this context one should note that the studies discussed in this section are mostly free of the type of loan. However, our analysis will confine only to short term loans. Thus the results obtained from the current study are contingent upon short-term loans, apart from the states selected for the analysis.

[‡] More precisely, the following states were selected: Punjab and Haryana, considered as developed states; West Bengal and Karnataka, considered as middle performing states and Chattisgarh, Madhya Pradesh and Bihar considered as less developed states.

theoretical model. The fourth section provides an empirical analysis and is followed by the concluding section.

Nature of Repayment of loans across different agencies

In this section we have mainly tried to understand the overall repayment pattern across different types of lending agencies. We first have computed certain indicators of repayment. We start with the ratio of incidence of repayment and incidence of borrowing. The incidence of repayment in a given year is defined by the percentage of households that have partly or fully repaid loans, while incidence of borrowing is defined as the percentage of households that have availed loans in the year. A higher value of the ratio implies better repayment. However, one should note that the repayment figures may sometime exceed hundred as incidence of repayment may consist of repayment of loans availed earlier (the year considered while computing IOB) plus repayment of fresh loan. One should also note that a low value of the ratio does not necessarily imply default since households may also be late in making repayments.

Table 1 in this context provides the ratio mentioned above for 2002-2003. Certain interesting results are obtained from Table 1. The repayment figures for professional moneylenders and formal lending agencies are better than that of non-professional moneylenders, relatives and friends. For non-professional moneylenders, relatives and friends, repayment figures may be low due to better relations with the borrower and also interlinking of markets where the lender can wait for late payments.

In addition to this, repayment is better in the developed and middle performing regions compared to less developed regions. The table also reveals better repayment in urban areas vis-à-vis rural areas (Table 2).

Table 1: Ratio of Incidence of Repayment to Incidence of Borrowing during 2002-03 for Short Loans (in percentage)

	Formal	Professional	Non Professional	Relatives
Rural				
Developed	54.1	38.4	35.5	23.2
Middle performing	54.7	83	41.7	27.3
Less Developed	37.2	35.3	33.2	31.4
Urban				
Developed	88.9	55.4	56.6	39.6
Middle performing	102.1	92.5	44.7	44.4
Less Developed	137.5	61	53.2	48

Note: Repayment figures may sometimes exceed hundred because incidence of repayment may consist of repayment of loans availed before (the year considered while computing IOB)

Computed using the 59th round All India Debt and Investment Survey unit level data (NSSO, 2002-03)

However, Table 1 does not provide information on the repayment pattern that different moneylenders face. For instance, from figures given in Table 1, one cannot determine what percentage of households have fully repaid loans or have only made interest payment without repaying principal.

In this regard, Table 2 provides information on the different kinds of repayment patterns that lenders face. From the table it seems that in most cases those who borrow from professional moneylenders repay only the interest on the loan while principal remains intact. Total repayment of loan takes much longer time and the loan burden becomes much heavier. For instance, in the rural areas of the less developed regions, 26.6 per cent of the households that had availed loans from the formal sector had paid only the interest (without repaying any part of the principal) and for professional moneylenders it was 44.5 per cent. The figure for non-professional moneylenders is between professional and formal lenders. Thus, borrowers are more likely to remain indebted for a longer time and pay a larger amount as interest if they borrow from informal moneylenders.

Table 2: Pattern of Repayment of Loans across different agencies and type of region (percentages)

	Rural				Urban			
	Formal							
	1	2	3	Total	1	2	3	Total
Developed	2.2	47.5	50.3	100	1	67.2	31.8	100
Middle	0.2	48.9	50.9	100	1.1	83.6	15.3	100
Less developed	0.4	73	26.6	100	2.4	83.3	14.3	100
	Professional							
Developed	0.2	42.7	57.1	100	0.2	37.5	62.3	100
Middle	0.1	22.8	77.1	100	0	45.6	54.4	100
Less developed	0	55.5	44.5	100	5.6	59.8	34.6	100
	Non Professional							
Developed	1.3	58.5	40.2	100	0	77.5	22.5	100
Middle	0.7	45.9	53.4	100	0	61.7	38.3	100
Less developed	3.6	50.1	46.3	100	0.4	58.1	41.5	100

Note: 1 = full repayment of principal, 2 = partly repayment of principal, 3 = only interest payment
Computed using 59th round 'All India debt and Investment Survey unit level data (NSSO, 2002-03)

One possible reason behind such a phenomenon can be attributed to the high rate of interest charged by professional moneylenders. Table 3 shows that in all the three regions professional moneylenders charge higher interest rate compared to non-professional moneylenders who charge higher rate *vis-à-vis* the formal lending agencies.

Table 3: Annual Average rate of interest charged by lenders of different kinds

Lenders	Rural			Urban		
	Developed	Middle	Less Developed	Developed	Middle	Less Developed
Professional	27.96	47.94	43.18	29.17	54.32	41.15
Non Professional	24.6	27.73	37.54	21.53	17.64	25.21
Formal	12.83	12.4	13.23	11.75	11.16	11.14

Computed using 59th round All India debt and Investment Survey unit level data (NSSO, 2002-03)

Thus, those who borrow from professional moneylenders tend to remain indebted for a longer time. Consequently, an important question that arises is what factors determine non-repayment and perpetual indebtedness? We next identify the factors that influence repayment of loans of different agencies. We address the issue both theoretically and empirically. The theoretical model addresses the repayment issue only for the formal sector, which faces information asymmetry. Informal credit is not segregated as professional or non professional. It is assumed that in informal market perfect information exists.

Theoretical Model

We first constructed a theoretical model to examine the problem of repayment in the formal sector, which is then empirically tested. A particular case is considered where a representative household requires loan to generate income[§]. Keeping the Indian scenario in mind, especially the agricultural sector, the model assumed the presence of a well-developed informal credit market and the possible announcement of a loan waiver by the government^{**}. The main assumptions of the model are as follows:

1. Assumptions

Suppose that the earning cycle of a household consists of two periods. In the first period, the household puts effort (which is temporally constant) and other inputs financed by a fixed loan of size L , it produces an output y in period 2. It is assumed that due to natural reasons, such as a good monsoon or drought, the borrower realizes a high value output $y_h \nu L$ with probability p and a low value $y_l \nu L$ with probability $(1-p)$, where $dy_j/dL > 0$ and $d^2y_j/dL^2 < 0$, $j = l, h$. For tractability we assume this particular form of $y_j = y_j \nu L$. The loan can be availed from the formal or informal sector and has to be repaid in the second period. In addition to this, in both the periods, the household has a fixed income w , generated from animal husbandry or other non-farm sources. Thus, the income of the borrower is composed of two components, a certain component, w , which is same in all periods and a random component, y , which provides utility to the household denoted by the utility function 'u'. For simplicity we assumed the utility function to be additive in its arguments. The income of the household is assumed to be independently

[§] The result would not vary a great deal if one incorporates consumption loans.

^{**} In this regard, one should note that the Government of India had announced loan waiver schemes in 1991 and 2007 to give relief to farmers.

The second possible choice in front of the household is to borrow from formal sources and then wilfully default. In such circumstances the household has to avail loan from informal sources in subsequent periods, except under loan waiver. If there is a loan waiver, which occurs with probability a , the household gets back the formal loan along with an expected lifetime utility of VFD. The expected lifetime utility in the presence of wilful default, to be denoted by VFD, can be written as

$$\begin{aligned}
 & \frac{1}{1+r} [w + \beta (1-a) VFD + a (w + \beta VFD)] \\
 & = \frac{1}{1+r} [w + \beta (1-a) VFD + a (w + \beta VFD)] \dots\dots\dots (2)
 \end{aligned}$$

Equation 2 shows that in the first period, akin to the no wilful default case, the household derives utility from its fixed income, w . In the second period, the household does not repay and therefore enjoys the full value of output (high or low output). In the subsequent periods, with probability a , the household gets a lifetime utility of VFD and with probability $(1-a)$ it borrows from informal sources.

Apart from these two choices, a third choice for a household is to borrow from informal sources in all periods. The household cannot default wilfully. In case of genuine default (due to realisation of lower output), it has to transfer a collateral of value C to the moneylender. For simplicity we have assumed $C = L(1+r)$. Since the moneylender does not face any loss, the borrower can borrow from informal sources in all the subsequent periods. The expected lifetime utility of borrowing from informal sources, denoted by V_I is

$$\begin{aligned}
 & \frac{1}{1+r} [w + \beta (1-a) V_I + a (w + \beta V_I)] \\
 & = \frac{1}{1+r} [w + \beta (1-a) V_I + a (w + \beta V_I)] \dots\dots\dots (3)
 \end{aligned}$$

2. Condition for Wilful Default in the Formal Sector

It is clear that a household would find it optimal to default in the formal sector if expected lifetime utility by defaulting is greater than expected lifetime utility by repaying loan. Stated otherwise, a household would wilfully default if

$$\begin{aligned}
 & VFD > VFR \\
 & \text{or, } \frac{1}{1+r} [w + \beta (1-a) VFD + a (w + \beta VFD)] > \frac{1}{1+r} [w + \beta (1-a) V_I + a (w + \beta V_I)] \dots\dots\dots (4)
 \end{aligned}$$

Inserting the value of VI, from 3, one obtains

$$r^* = \frac{1}{1+i} \left[\frac{1}{1+r} \left(\frac{1}{1+i} \right)^{-1} \right] \dots (5)$$

Equation 5 indicates that for every rate of interest in the informal sector there is an interest rate in the formal sector that prevents the borrower from defaulting. This leads us to the following proposition

Proposition 1: If i and r are the interest rate in the formal and informal credit markets respectively, \exists an r^* such that if $r > r^*$, it is optimal for a borrower to repay in the formal market

The next important question that arises is how does the critical rate of interest r^* in the informal sector relate to i — more specifically how does it respond to a decrease in the interest rate in the formal credit market.

Observation 1:

The critical interest rate in the informal sector satisfies (see 5)

$$r^* = \frac{1}{1+i} \left[\frac{1}{1+r} \left(\frac{1}{1+i} \right)^{-1} \right] \dots (6)$$

Given the fixed scale of finance norms in the formal sector it is reasonable to assume that $dL/di = 0$. Now differentiating both sides of (6) we get

$$\frac{dr^*}{di} = \frac{1}{(1+i)^2} \left[\frac{1}{1+r} \right] \dots (7)$$

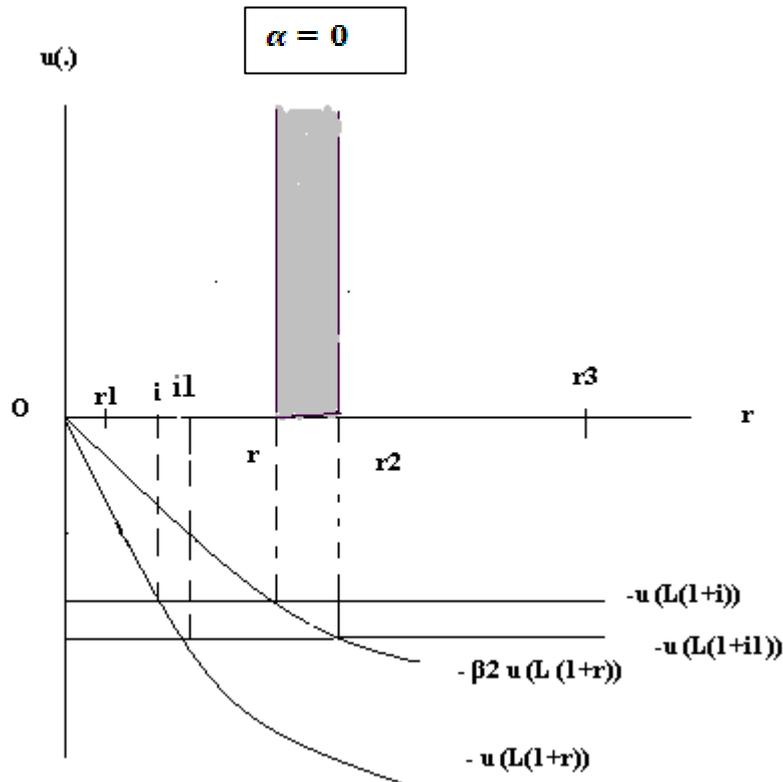
Or, $\frac{dr^*}{di} = \frac{1}{(1+i)^2} \left[\frac{1}{1+r} \right]$

Since by assumption $u'(\cdot) > 0$ and $(0 < a, b, p < 1)$, we get, $\frac{dr^*}{di} > 0 \forall i$ and r^* (8)

Suppose now formal sector interest rate falls from i to i_1 . The corresponding values of r satisfying (7) are say r and r_1^* . From 8, it is clear that $r_1^* < r^*$. Thus as i falls to i_1 , all borrowers who are facing (either potentially or actually) informal sector rate of interest r , $r_1^* < r < r^*$ would also find it optimal to repay loan in the formal credit market. Thus there is an increase in the number of borrowers in the formal credit market who do not default.

This observation is of critical importance given the policy of the Indian Government — for prompt repayment the borrower gets a benefit of 2 per cent interest rate subvention. The situation can be diagrammatically represented as follows.

Figure 1: Condition for wilful repayment



In Figure 1, utility is measured in the vertical axis, while rate of interest is measured in the horizontal axis with O as the origin. The relation between utility sacrificed for repaying loan and interest rate is given by the curve $-u(L(1+r))$. Since $\beta < 1$, the discounted utility curve $-\beta^2 u(L(1+r))$ is above $-u(L(1+r))$. Suppose the formal sector rate of interest is i . At i , the sacrifice that a borrower makes by repaying is represented by the straight line $-u(L(1+i))$. At rate of interest r in the informal sector, $-\beta^2 u(L(1+r)) = -u(L(1+i))$. Thus, at any interest rate above r in the informal credit market, the cost of borrowing from informal market is higher vis-à-vis the cost of borrowing in the formal market. Therefore, a household would not find it optimal to default in the formal market. Suppose now that i (formal sector interest rate) rise to i_1 . This would shift the curve $-u(L(1+i))$ to $-u(L(1+i_1))$, thereby shifting the critical value of informal interest rate obtained from the intersection between the curves $\beta^2 u(L(1+r))$ and $-u(L(1+i_1))$ to r_2 . In this new situation households availing loan between r and r_2 would also find it optimal to default, thereby increasing the default rate.

Alternatively, one can also show that an increase in r or cost of borrowing from informal sources reduces the proportion of households defaulting.

We now consider the impact of loan waiver on repayment, which has not been introduced so far.

Rearranging Equation 5 and using the additive property of utility function, we get the following condition

$$P = \frac{a\beta^2 u(L(r-i))}{r-i} \dots \dots \dots (9)$$

The second component on the left hand side of Equation 9 (i.e. $a\beta^2 u(L(r-i))$), henceforth denoted by P) measures the net impact of probability of loan getting waived on cost of borrowing from informal sources while the right hand side is the cost of borrowing from formal sources. It is to be noted that P is negatively related to cost of borrowing from informal sources. In other words an increase in P reduces the cost of borrowing. This leads to the following two corollaries^{††}

Corollary 1: If $r > i$, presence of loan waiver has a negative impact on repayment of loans

Corollary 2: Higher the differences between the informal and formal sector rate of interest, higher is the negative impact of loan waiver on repayment.

One can get this by differentiating Equation 9 with respect to a and (r-i). Since $dP/da > 0$ and $dP/d(r-i) > 0$, it implies that an increase in a or (r-i), reduces cost of borrowing from informal sector corresponding to each formal sector rate of interest. This in turn shifts the critical rate of interest of the informal sector (required for repayment in formal market) upwards, thereby increasing the number of borrowers willing to default. We next proceed to test these propositions empirically.

Empirical Analysis

We have established theoretically that usurious rates of interest in the informal market may force a borrower to make prompt repayment in the formal sector and take advantage of the favourable terms and conditions of the formal credit market. While this result is interesting it is also necessary to empirically test it. To do so we used the data from the 59th round of the NSSO on debt and investment in India, which provides substantial information regarding household debt and investment for about 1, 43,285 households in India, covering both rural and urban areas^{§§}. Apart from testing the theoretical proposition, the empirical part also identified and compared the factors that determine repayment of loans in the formal and informal credit markets of India. Thus two separate regressions, one for formal and the other for informal lending agency were carried out.

^{††} The case of $i > r$, regardless of the value of a, it is always economically beneficial for the household to default.

^{§§} This data was collected through a two stages of the stratified random sampling procedure, where rural villages and urban units form the first stage units and households are the second stage units. The survey period of this data was from January to December 2003. The data was collected from the same sample households during two visits. The information collected in the second visit was considerably less compared to the first. The survey period of the first visit was eight months and that of the second was four months. In this paper we concentrated only on the select states, viz., Punjab, Haryana, Chattisgarh, Madhya Pradesh, Karnataka, West Bengal and Bihar. We have information on 3,975 households in Punjab, 2,630 in Haryana, 2,637 in Chattisgarh, 6,586 in Madhya Pradesh, 6260 in Karnataka, 11,120 in West Bengal and 8185 in Bihar.

1. Variable Selected For the Analysis

The dependent variable which captures repayment is formed by dividing repayment (completed till date of survey) of each loan by the corresponding loan amount^{***}. The dependent variable is considered as a ratio since it would reduce the heteroscedasticity problem, which is prevalent in the data.

The amount of loan is computed by adding the amount of loan repaid before the survey date and amount due on the date of the survey. Fully repaid loans were assigned the value 1. As mentioned above, only short-term loans availed during July 2002 to June 2003 were considered. Data before July 2002 was not considered because information was only available for loans outstanding on 30.06.2002.

Explanatory variables

A household may default, if one of the following possibilities occurs. First, if the maximum utility achievable by defaulting is greater than the maximum utility attainable by repaying (Srinivasan, 1989). This is generally viewed in literature (Stiglitz, 1987) as a problem of incentives^{††}. Secondly, default may occur if a household does not have enough money at the time of repayment. This can be termed as the insolvency factor. Apart from the insolvency and incentive factors, institutions^{†††} may play a major role in repayment by influencing the above two factors (see Udry, 1990).

Generally, the need for loans in future, the presence of alternative sources of credit and loss of collateral in the event of default influence the incentives to repay loans. On the contrary, the returns from loan, cost of availing it, size of the loan along with income and assets of the household determine insolvency. Institutional factors are expected to change with region and lending agencies.

In the regression analysis the impact of each factor is captured by appropriately choosing variables.

Factors Influencing Incentives to Repay

Households that require loans on a regular basis are expected to have higher incentives to repay loans (see Coate, 1993; Haugen, 2005; Rajeev *et al.*, 2006; Shivappa, 2005; Hatai *et al.*, 2005) because a default generally stops future credit. Thus, one can expect self-employed households that require loans on a regular basis for running business to have a better repayment record than wage labourers or regular salaried households. The regression analysis captures this aspect by a dummy variable.

The economic condition of the household may well influence repayment. For instance, a household having higher income is expected to have lesser incentive to repay a loan because in the

^{***} Amount of loan is considered since it considers both amount borrowed and interest paid. Thus, households perpetually indebted by paying only rate of interest would get captured in the analysis as having lower repayment rates.

^{†††} In this context, one should note that economic aspects might not necessarily influence the welfare function of the borrower. Indeed, the welfare function of the borrower may also consist of non-economic social components such as relationship with the lender.

^{†††} 'Institutions are social rules, conventions, and other elements of the structural framework of social interaction' (Bardhan, 1989).

event of default by one lender it can avail loan from some other sources by providing collateral. On the contrary, poorer households with fewer sources of credit would have higher incentives to repay the loan (see Dev and Rajeev, 2007). In our analysis, the monthly per capita consumption expenditure (MPCE) of the household is considered as a proxy of the economic status of the household. Since there are three kinds of regions (which differ in terms of features), we have considered three interactive variables with MPCE and type of region instead of a single MPCE variable.

Apart from the economic status of the household, the interest rate in the informal sector may affect the incentive to repay the loan in the formal sector. This is evident from the propositions obtained in the previous section. However, the potential interest rate faced by each household in the informal market is not available. Information on interest rate in the informal market is only available for households that have availed informal loans. To address this issue we have formed an explanatory variable at the district level. Using information on the rate of interest for households that have availed informal loans we have calculated the percentage of households (belonging to the same MPCE group)^{§§§} in the district availing loan at rates higher than the highest rate of interest in the formal sector. If a larger percentage of households in the district avails loan at a rate of interest higher than that of the formal sector, one can expect repayment to increase.

The presence of security may also act as an incentive for repaying loans. In case of a default, it may lead to loss of assets (see Barro, 1976; Bester, 1987).

Factors Influencing Insolvency of Loan

In addition to incentives, a household may default if it does not have enough money at the time of repayment. Generally three factors determine insolvency — the size of the loan, the cost of availing the loan and income or assets of the household. The following variables were conceived to capture these factors. Firstly, we used the ratio of loan size and asset of a household as a variable. If this ratio is very high, a household may face difficulty in repaying the loan. Secondly, to capture the income status, we used two variables, namely, MPCE of the household and utilisation of loan. Households with higher MPCE are expected to have a higher income. A second variable that can influence insolvency is utilisation of loan. If the loan is utilised for income generating purposes, where returns are relatively certain, a household would find it easier to repay the loan. Thus, one may find repayment of loan to be more for working capital needs than for consumption or capital expenditure purpose.

The cost of availing a loan mainly depends on the rate of interest. If the rate of interest is very high, a borrower may find it difficult to repay the loan, leading to default and loss of collateral (see Bhaduri, 1977)^{****}.

§§§ The MPCE group is formed based on the division followed by Bhattacharjee and Rajeev (2009) using the same data set.

**** In the formal credit market, interest rate tends to differ across schemes across lending agencies (such as between cooperatives and commercial banks).

Institutional factors

In the analysis to follow, to capture the institutional differences existing between locations (such as rural and urban), a location-specific dummy variable was incorporated. We also introduced a variable to capture the level of economic development of a district. Generally, economic development depends on per capita income and level of infrastructure development. Since information on per capita income for each district was absent, we considered the average MPCE of households in a district to capture development.

In addition to the above variables, a variable representing time of repayment was included to control the differences in repayment owing to differences in time when availing the loan. This variable was constructed in the following way. For loans that remained unpaid on the date of the survey, the variable was computed by taking the difference between the time of the survey and the time when the loan was borrowed. For fully repaid loans, the time variable was formed by taking the difference between dates when the loan was repaid fully and when it was availed. In this context, one should note that NSSO collects data through two visits and provides information on the repayment status of loans on a quarterly basis.

Table 4 explains the variables used in the regression, while, Table 5 provides the mean value and standard deviation of the variables.

Table 4: List of variables with notation used

Explanatory Variables	Notations
Time (measured on a quarterly basis)	Time
Developed region dummy (Developed Region =1, others = 0)	Developed
Less developed region dummy (Less Developed Region =1, others = 0)	Less Developed
Middle Performing Region dummy (Middle= 1, others = 0)	Middle
Loans availed for working capital (Working capital =1, others =0)	Working Capital
Rate of interest	Interest Rate
Presence of security (security = 1, others = 0)	Security
Professional money lender (Professional =1, others =0)	Non Professional
Self-employed household (Self Employed =1, others =0)	Self Employed
Monthly per capita consumption expenditure	MPCE
Rural area	Rural
Loan by asset ratio of household	Loan by Asset
Average MPCE of a district	Average MPCE
Education of the Household (Below Secondary level =1, others =0)	Education
Percentage of households availed loan in a district above formal sector rate of interest	Percent above formal
Interactive dummies	
Developed region * MPCE	Dev MPCE
Less developed region * MPCE	Less Dev MPCE
Middle Performing * MPCE	Middle MPCE

Computed by Authors

Table 5 Mean and Standard Deviation of the Variables Used in the Regression Analysis

Variables	Formal		Informal	
	MEAN	S.D	MEAN	S.D
Repayment (Dependent Variable)	0.15	0.25	0.12	.003
Dev MPCE	313.99	522.09	150.78	349.63
Less Dev MPCE	194.62	322.83	178.66	243.25
Middle MPCE	212.95	393.68	217.24	362.72
Security	0.54	0.49	0.14	0.34
Working Capital	0.53	0.49	0.21	0.40
Interest Rate	12.69	6.78	33.83	28.25
Time	8.75	5.16	8.23	5.95
Loan by Asset	0.095	0.42	0.13	0.82
Education	0.68	0.46	0.86	0.35
Self Employed	0.68	0.46	0.53	0.50
Rural	0.77	0.42	0.74	0.43
Professional	-	-	0.44	0.50
Percent Above Formal	47.99	0.8	-	-
Average MPCE	678.25	4.35	653.69	3.08

Computed by authors

The table given above (table 5) shows certain interesting results. Firstly it is observed that on an average, mean value of repayment is marginally higher in formal credit market (though with higher variance) compared to that of the informal credit market. One generally expects a higher repayment figure for informal market. This is because informal lenders normally possess better information about their borrowers. This assumption further gets strengthened when one looks at the mean value of the dummy variable 'security' in table 5. In fact the variable shows that proportion of loan provided against security is more in formal market than in informal market, indicating that in the informal market loans are mainly provided to known borrowers. Thus a lower repayment rate, in the informal market portrays about the nature of repayment that takes place in informal market, where informal lenders generally encourage interest payments rather than principal part of the loan. However, it is also important to note that the mean values considered in table 5 have been computed without controlling the time of availing loan.

Table 5 shows some other features which have essential implications. One observes that formal borrowers are comparatively richer than borrowers in the informal credit market in all the three regions (see the interactive variables Less Dev MPCE, Dev MPCE and Middle MPCE). It is also observed that compared to that of informal market, formal borrowers mainly avail working capital loans as against consumption or loans for other purposes.

2. Econometric Specification

The dependent variable is a ratio, assuming two censored points, namely 0 and 1^{†††}. In a censored data, running ordinary least square (OLS) models leads to biased estimates. Therefore, we considered a two-limit Tobit model that uses a maximum likelihood procedure to correct bias.

The Tobit model assumes that the actual dependent variable (Y_i^*) possesses a linear relation with the explanatory variables.

$$Y_i^* = \beta x_i + u_i \quad \dots (1)$$

However, it is latent for a large number of observations. For instance, in the present context, the latent variable is observable when Y_i^* lies between zero and 1. Zero value is observed when ($Y_i^* \leq 0$) or $\beta x_i + u_i \leq 0$. The value of 1 is observed when, ($Y_i^* = 1$) or $\beta x_i + u_i = 1$.

Thus we have three sets of observations: $Y_i^* \leq 0$, $1 > Y_i^* > 0$ and $Y_i^* = 1$. The probability of Y_i^* assuming a zero value can be written as $F(-\beta x_i/s)$. On the other hand, the probability of Y_i^* assuming the value 1, can be written as $F(1-\beta x_i/s)$. For observations lying between zero and one, we can write down the normal density function.

The maximum likelihood maximises the joint probability density functions of all the observations. Since we have three sets of observations the likelihood function is given as follows:

$$L = \prod_{y_i=0} F(-\beta'x_i/\sigma) \prod_{1 > y_i > 0} \frac{1}{\sigma} f(y_i - \beta'x_i/\sigma) \prod_{y_i=1} F(1 - \beta'x_i/\sigma)$$

Maximising the likelihood function with respect to β and s yields the estimates.

Results

Tables 6 and 7 provide the regression results for the formal and informal sectors respectively. Two separate regressions were carried out for formal and informal lending agencies on the assumption that they face a different nature of repayment.

††† In the present analysis, the observations are naturally censored at the point zero because the zero value may not be actually zero. It may be possible that the repayment process has not started, for some households. However, there is no natural censoring at point 1. For methodological purpose, we have assumed it (see also Clark and Stanley, 1999; 2003).

Table 6: Regression Results (Tobit) for the Formal Lending SectorNumber of observations = 1717, F (13, 1704) = 22.50, P > F = 0.0000 Pseudo R² = 0.0883

Explanatory Variables	Coefficient	t values
Dev MPCE	0.00009**	1.91
Less MPCE	0.00011	1.43
Mid MPCE	0.00009*	1.61
Percent above formal	0.00081*	1.76
Security	0.01856	0.57
Working Capital	-0.12619***	-3.47
Interest Rate	-0.00578**	-1.94
Average MPCE	0.00041***	3.58
Time	0.02097***	7.28
Loan asset	0.05067**	1.86
Education dummy	-0.07590**	-2.15
Self-employed	0.00043	0.01
Rural	-0.23305***	-5.18
Constant	-0.37294***	-3.22
Sigma	0.53996**	

Notes: *, ** and *** implies significance at the 10 %, 5 % and 1 % levels, respectively**Table 7: Regression Results (Tobit) for the Informal Lending Sector**Number of observations = 2978, F (13, 1704) = 23.36, P > F = 0.0000, Pseudo R² = 0.

Explanatory Variables	Coefficient	t values
Less MPCE	-0.0002***	-2.76
Dev MPCE	-0.0002***	-2.89
Mid MPCE	0.0001*	1.68
Average MPCE	0.0003***	3.84
Education dummy	-0.0253	-0.7
Loan asset	0.0203	1.37
Time	0.0191***	7.41
Security	-0.0496	-1.36
Working Capital	0.0499*	1.57
Interest Rate	0.0024***	5.42
Professional	0.0330	1.26
Self-employed	0.0529***	1.94
Rural	-0.1910**	-6.24
Constant	-0.5771***	-6.34
Sigma	0.5545	

Notes: *, ** and *** implies significance at the 10 %, 5 % and 1 % levels, respectively

Let us first consider the variable (see the variable 'percentage above formal' in Table 6) that helped us in testing the propositions obtained from the theoretical model. It is observed that districts where a larger percentage of households availed loans at interest rates higher than the formal sector rate of interest have higher repayment. Thus the empirical analysis also provides support for the theoretical result obtained in Section 3. In other words, higher interest rate in the informal sector leads to higher repayment in the formal sector.

Some common features were observed between formal and informal lending agencies. It is observed that both formal and informal lenders face a lower repayment in rural areas compared to urban areas. It is further observed that repayment rate is higher in comparatively developed regions (see variable *Average MPCE* in Tables 6 and 7) and improves with time.

The following differences were observed between the formal and informal credit markets. While in the formal credit market, monthly per capita consumption expenditure (representing economic status) positively influenced repayment of loans, in the informal credit market, for developed and less developed states, MPCE possessed a negative relation with the dependent variable. Poorer borrowers are expected to face higher insolvency and therefore expected to have lower repayment. However, an opposite sign in informal market of developed and less developed states suggested that incentives to repay loan outweighed the insolvency problem. This may happen if poorer borrowers in the informal market possessed limited accessibility to credit, such that default would stop future credit. However, this effect might not hold true for formal borrowers in general and informal borrowers of middle performing regions, in particular, because of the following reasons. First, it was empirically observed that borrowers in the formal market were economically better off than the borrowers in the informal market. For instance, the data set used in our regression analysis revealed that the average MPCE of formal and informal borrowers was Rs 722 and Rs 540 respectively (See also Table 5). Secondly, in the middle performing regions poorer households possessed better accessibility to credit. For example, the lender borrower ratio is higher in middle performing regions compared to that of developed and less developed regions (See Table 8).

Table 8 Percentage of lender household, borrower household and their ratio during 2002-03

Regions	Lender Households (%)	Borrower Households (%)	Ratio (Lender/borrower) (%)
Developed	2.4	21.4	11.2
Middle	2.54	18.47	13.8
Less Developed	1.51	14.77	10.2

Computed by authors using 59th Round (AIDIS), NSSO

Apart from this, our analysis shows that education is having a positive relationship with repayment of formal loans (Table 6). The coefficient of the variable is insignificant for repayment in the informal sector (Table 7). It appears that educated borrowers avoid availing loan from informal lending agencies. To avail formal loans on a continuous basis in future they make timely repayment of formal loans. Table 9 below shows the education level of borrowers availing formal and informal loans. The

table shows that households that had members with higher level of education generally availed fewer loans from informal lenders.

Another difference between formal and informal lending institution is regarding loans availed for working capital needs. In general, working capital loans are expected to have better repayments. However, in the regression analysis carried out for formal lending agencies, repayment is observed to be less for loans availed for working capital needs. It seemed that due to loan waiver schemes of government and the expectations of future waiver households defaulted in the formal sector.

It also observed that in formal agencies repayment is higher if interest rate is lower. On the other hand, for informal lenders, repayment increased with increase in interest rate. The unanticipated result for informal lenders primarily occurs due to undervaluation of collateral, which transfers the risk from the lender to the borrower. According to previous studies (see Bhaduri, 1977, 2006) higher interest in the informal market positively correlated with extent of undervaluation of collateral. This is because in the event of default a lender earns more income by taking possession of the collateral. This undervaluation at the same time leads to greater loss for the borrower and it provides the incentive for the borrower to repay the loan.

Table 9: Distribution of loans in formal and informal credit markets classified by highest education within the household

Highest Education of the Household	Formal	Informal
Not Literate	4.5	14.8
Literate without formal schooling	0.8	0.9
Below Primary	6.0	13.3
Middle	17.1	23.1
Secondary	19.2	20.2
Higher secondary	20.1	13.6
Diploma/certificate course	16.4	7.7
Graduate	2.3	0.5
Post-graduate	10.0	4.5
Above Post Graduate	3.7	1.3
Total	100	100

Computed using unit level data of the 59th round of the All India Debt and Investment Survey (NSSO, 2002-03)

Note: In the table only short loans of July 2002-2003 was considered

Conclusions

In this paper we establish theoretically and empirically that more unfavourable the terms of credit from a moneylender compared to a formal lending agency, better are the chances of a borrower making timely repayment. Thus lowering the interest rate in the formal sector (which makes informal sector interest rate comparatively more unfavourable) influences a borrower to repay loans. This observation is of critical importance given the policy of the Indian government, that prompt repayment is rewarded with the benefit of 2 per cent interest rate subvention from government.

Apart from testing the proposition obtained from the theoretical model, the empirical part of this paper portrays some of the differences in repayment of loans across formal and informal credit markets. It is observed that while in the formal sector, higher interest rate reduces repayment; in the informal sector it improves repayment. To provide an explanation for this we have considered the justification given by previous studies. Existing theoretical studies (see Bhaduri, 2006) explain such results for informal lenders in terms of the undervaluation of collateral in the informal market, which transfers the risk from lender to the borrower. According to previous studies (see Bhaduri, 1977, 2006) higher interest in informal market is positively correlated with extent of undervaluation of collateral. This is because in the event of default a lender earns bigger income by taking possession of the collateral. Since this undervaluation at the same time leads to greater loss for the borrower, it provides incentive to the borrower to repay. Another difference between formal and informal lending institutions is regarding repayment of loans availed for working capital needs. In general working capital loans are expected to have better repayments. But in the regression analysis carried out for formal lending agencies, repayment was less for loans availed for working capital needs possibly due to the moral hazard problem arising out of the loan waiver schemes of the government that mainly exempts working capital loans. The paper also shows the positive relation between education and repayment of formal loans.

From the results of our analysis, it has been inferred that the education level of the borrowers and regulation of interest rate are the two most important variables that lead to better repayment in the formal credit market.

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