CONTRACT DESIGN STRATEGIES FOR GROUP LOANS LIMITING LATE REPAYMENT IN MICROFINANCE INSTITUTIONS (MFIS)

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ABSTRACT

The objective of this paper is to show how the components of a debt contract optimize the loan repayment terms of borrowers (BEPs) at MFIs. The results of the bivariate probit model censored from a database of 321 group loan contracts granted over a period from 2007 to 2014 in the different second-tier MFIs show a pre-default of borrowers characterized by late repayment behaviour and/or penalty payments. Our model successfully predicts being a pre-default borrower by 70.75%, while being a non-pre-default borrower will be successfully predicted by 69.54%. The results also show that the model correctly classifies 70.09% of the sample observations. Our results show that the sector of activity, the nature of the project and the presence of other MFIs in the area have a significant effect on reducing the risk of pre-default. Similarly, we note that the interest rates applied to group loans and loan rationing significantly increase the potential for group default.

Keywords: Group loan; Contract; Late repayment; MFI

Jel classification: D84; D86; G41; G51

Statements and Declarations

This document was written by myself without the participation of any person.

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1.0 INTRODUCTION

Since the success of the Grameen Bank, particularly in terms of repayment rates, lending groups (such as savings and loan associations) have become widespread in sub-Saharan Africa. This has prompted economic policy-makers to draw on economic theory to find a way to leverage the 'social' assets of households, even when physical assets are scarce. It is generally accepted that the success of microcredit is due to financial innovations. However the role of lending groups has been exaggerated as this is not the only innovation that differentiates microfinance contracts from standard loan contracts from banks. In addition to loan pools, there

are other innovations such as dynamic incentives, regular repayment schemes, and collateral substitutes, to which one can add verification and project implementation procedures to achieve high repayment rates. One of the difficulties that microfinance institutions (MFIs), particularly in Cameroon, face today is the implementation of incentive contracts and the problems related to the repayment of these loans due to information asymmetry, including moral hazard, adverse selection and other risks related to the lack of real physical collateral, the increase in the interest rate. In addition, risks to the economic, political, cultural and social environment are factors that limit low-income people's access to credit. The lack of institutional and human capacity is the main obstacle. Transparency of financial activities and information services is a key factor for the growth of the sector. There appears to be a lack of technical assistance to build human and institutional capacity in the sector. Other incentive or efficiency parameters that MFIs can apply are coaching and training of credit clients by empowering them and mobilizing them on specific objectives, building their confidence in their own capacities and encouraging them to use existing public or private services. This is a good example of challenging traditional loan contracting strategies. And it justifies the adoption of probit models for the analysis of pre-default repayment.

2.0 THEORETICAL FOUNDATIONS OF THE RELATIONSHIP BETWEEN LOAN CONTRACTS AND BORROWER BEHAVIOUR IN MICROFINANCE

The concern to find a better articulation of contracts that protects against credit defaults has always been at the centre of the financial activity of banks. It can certainly find its original logical justification in I Fischer's (1939) proposal to separate financing decisions from investment decisions. And even if microfinance could be part of the paradigm of financial intermediation, and the neutrality of financial intermediaries presupposes perfect information (Modigliani and Miller in 1963), this concern quickly moved to the field of the economic analysis of contracts, the basis of which is undoubtedly the agency relationship of Jensen and Meckling (1976).

2.1 Informational imperfections and opportunistic behaviour of borrowers

In this framework, the problem of loan defaults seems to have as its main cause the scourge of informational asymmetry at the heart of loan contracts. Indeed, it is the agency theory described by Jensen and Meckling (1976) which, by studying how informational asymmetries and the difficulty of observing the principal can be overcome by setting up contractual cues that encourage the agent to act in the principal's interest, inspires a large part of the optimal credit contract models. Thus, Diamond (1984) proposes a non-contingent contract where repayments are made on a lump sum basis and coordination principles are reduced to the extreme in order to minimise the costs of control. In this same perspective, Holmstrom (1979) and Mookherjee (1984) develop the idea according to which the correlation between the projects carried out by different agents makes it possible to improve the information on these agents. But already, following the logic of incentive and signal models, Stiglitz and Weiss (1981) reveal that in order to decrease the risk associated with bad payers, the bank must decrease the size of the loan without increasing the interest rate, thus paving the way for a series of works considering that bad borrowers will improve their efforts to obtain a high premium and benefit from a renewal of the contract (Stewart ,1984), using separating contracts (Karlan, D.,2007), relating to implicit contracts (Sharp, 1990) or developing adverse selection models that show that joint

and several guarantees can lower interest rates (Armendariz, Aghion and Gollier, 1997). In this context, it is shown that hedging is the best way to improve the accuracy of information, and it is also applied to the regulation of the banking system (Holmstrom and Tirole, 2000).

2.1.1 Challenging traditional loan contracting strategies in microfinance

Microcredit itself, group lending or solidarity microcredit, tested by the Grameen Bank and Bancosol and generalised in most developing countries, is one of the innovative mechanisms that enable MFIs to minimise the risks of anti-selection and moral hazard in the credit relationship. Several theoretical (Stiglitz, 1990; Ledgerwood J., al,. 2006) and empirical (Laffont J. al., 2000; Le Saout, E., et al. 2016. Lelart., 2007) works examine the effectiveness of solidarity credit as a response to informational problems (anti-selection and moral hazard). This theoretical work places particular emphasis on studying the determinants of the repayment performance of borrower groups, namely group size, composition and organisation. They therefore study the effectiveness of solidarity microcredit from the perspective of the borrower group. Only a few works explain informational efficiency in MFIs by the choice of the type of credit contract (Godquin. M., 2004; Guerin I., 2000; Tedeschi A. G., 2006). They focus mainly on MFIs that choose between individual and group loans. They also do not consider organisations that opt for mixed (diversified) contracts, i.e. MFIs that build their credit offer on both individual and group contracts. The effectiveness of this methodology has given rise to a wealth of theoretical interpretation, including the role of group lending with joint and several guarantees and peer review in overcoming informational problems. The lending techniques, particularly group lending, achieve repayment rates of over 90% (Sengupta and Aubuchon, 2008). According to Van Maanen (2005), these loans are successful with low-income populations because they are a form of forced savings. Indeed, low-income populations need to save, but find it difficult to do so on their own because of the insecurity of household savings and their vulnerability to the temptation to spend. Most theoretical and empirical studies have focused only on the factors that explain repayment rates while considering two broad options, either full repayment or default. They exclude from their scope of study the possibility of repayment with delay and/or penalty payment. In particular, they ignore the fact that the micro-enterprises that the MFIs are interested in may suffer from childhood illnesses that require special and possibly local paediatric care.

1.2.2 The limits of a contractual analysis of intermediation and the financial relationship

The menu of contracts offered combines a level of interest rate with a level of guarantee in such a way that the mere choice of a particular contract by the borrower automatically reveals the state of risk of the project for which he or she is applying for credit (this is referred to as a separator contract). This is why, in order to alleviate these difficulties, the MFI introduces a level of repayment effort to all clients (Chicot et al, 2021). Those who manage to reach a considerable level of effort are entitled to a bonus, following the observation of a high repayment rate. This form of incentive to better manage credit can mitigate the problem of moral hazard and anti-selection. One of the main causes of the failure of microfinance programmes in the past has been the mismatch between the services offered and the real needs of the target populations (Mayoukou, 2000). Microcredit has often been simply imported into certain areas as a tool to promote private entrepreneurship, without regard to the real needs of the population. Hence the risk that these credits are diverted from their purpose by the local

populations. Over time, it became clear that savings were as important, if not more important, than credit for populations isolated from the banking system. This debate was heated among scientists, with those on one side believing that the poor were unable to save because of their subsistence lifestyle. On the other side were the advocates of the idea that the poor could save if only given the opportunity; while the poor can rarely make productive use of credit, saving is always useful. Informal savings and credit systems, such as tontines or ROSCAs (Rotating Saving and Credit Associations) in West Africa and Latin America, are not sufficient to deal with the myriad of small contingencies that require large expenditures of their resources. According to Armendáriz and Morduch (2005), the idea of the preference of savings over credit undermines the very precepts of the first microfinance movements exclusively oriented towards microcredit. It has led to a diversification in the activities of microfinance institutions, with an increasing emphasis on savings collection. Some institutions judiciously combine the two activities of credit and deposit collection, by obliging their clients/members to save before granting credit. For example, in an association such as ASSEFA (Association of Sarva Sev aFarms) in India, groups save a certain amount per week for at least six months, with the granting of credit thereafter being conditional on the good management of these collective savings. These dynamic incentives, according to Morduch (1999) and Navajas, S. (2000), motivate members to choose their peers well at the time of group formation, to monitor more actively, and also to apply social pressure against defaulting members. The repetitive nature of loan cycles (and the real threat of rejection of defaulting clients) can thus be well exploited to improve the rigour of contracts. The burden on low- and irregular-income people is to have to repay their debts in one go (Yunus, 1997). The advantages of this speed are numerous (Servet J-M, 2006). It is a means of monitoring by the bank, which can thus follow the behaviour of clients in order to select only the best in the next credit phase. It is also a way of avoiding the diversion of cash for other purposes (repayment of other loans, consumer spending, etc.). However, this method assumes that the borrower has an additional source of income. Indeed, repayment is probably triggered before the initial investment with the borrowed capital is productive. Microfinance practitioners are thus revolutionising financial activity through new practices. Despite their singularity, they are participating in a global movement of expansion of finance by conveying its principles to societies that have so far remained on the fringes of this movement.

3.0 THE LIMITS OF NON-COOPERATIVE GAME THEORY

This theory shows that joint responsibility can occur even if people do not know each other. It does this by focusing on the repayment of the loan. This will allow them to show the importance of regular repayments and the need for an optimal level of effort.

3.1 Model on the realization of joint responsibility

It is an individual debt incurred by a borrower to his bank. The bank is supposed to have all the bargaining power. This means that now the bank will receive less than the borrower's income because limited liability does not oblige the borrower to pay back more than his investment. With the social sanction, the bank cannot charge too high an interest rate for fear of having too high a probability of default. Here we find the bank's promise in implicit contracts such as those in the Sharpe model. This is a dynamic incentive made by the MFI. This type of incentive is

also found in individual lending in microfinance. Nevertheless, in this model, these incentives are the key to microfinance lending.

3.1.1 Incentives for optimal effort

It grows with the social sanction, the project performance and the discount factor. The authors show that this dynamic incentive is the key to microfinance. This allows them to show that a regular repayment programme is necessary in microfinance as it helps to form a discipline for borrowers to repay. The authors suggest that group lending can help beyond the fact of joint liability for several reasons: Given the inability of agents to provide secure collateral, these programmes can use the social context of borrowers to induce timely repayment; By organizing meetings of agents in a borrowers' group, it can lower some transaction costs for the bank; The group is a useful informational resource for the bank that can be used directly to create the necessary incentives; This lending allows for an increase in welfare. It can facilitate education and training for clients with limited business experience and/or low literacy. Education improves the financial performance of individuals and can be measured by improvements in health and knowledge; It provides an incentive for those who have never been in contact with a bank to do so with their neighbours. This outcome is particularly valuable in the most vulnerable areas. This essentially attracts female clients who improve the bank's performance because of their better repayment rate compared to men.

This model has the particularity of giving a lot of intuition about the mechanisms at work during group lending. Here again, we find a reference to Sharpe in the incentives provided by the bank. Indeed, the bank implicitly provides a promise to borrowers. However, this promise has the particularity of being double. It includes both the promise to be refinanced afterwards (possibly with a larger amount) and the threat of the bank to never lend again to a borrower who would default. In addition, this model suggests that the borrower's social background alone may suffice as collateral for the MFI. These last two models on the repayment decision in group lending provide a new contribution compared to those on group formation, namely the role of social sanction. This sanction helps to increase the repayment of these loans. Moreover, here again in these models, reputation plays a role. Here, it is seen as a means of pressure from the group and the MFI for the agents to repay. If the borrower does not repay, he or she will lose reputation and it will be harder for him or her to get a loan and to group with others.

3.1.2 The model for delegating supervision

In this model, reputation between agents and between the bank and its customers is seen as the pillar of the financial relationship between them. However, the acquisition of reputation by an agent can lead him to individual lending. Today, there is a pronounced trend towards individual lending. Reputation is the foundation of the group relationship as well as with the MFI, but it is also the major limitation to the scope of this financial technology.

Indeed, an agent who has acquired a large reputation over time may no longer want the group mechanism to borrow. As shown in the model of Ghatack (2000) and Stiglitz (1990), agents will be willing to group together but with agents of identical risk. This homogenisation of the group's risk may no longer be possible in the long term in the case where agents have acquired a "reputation surplus". The latter will not want to take any additional risk and will opt for

individualistic behaviour. As a result, more and more individual lending programmes are emerging in microfinance today.

3.2 Rationale for the Categorical Variables Econometrics approach

One of the main shortcomings of most microcredit models is that they are used to assess the creditworthiness of all applicants. Yet they are formulated and constructed only on the basis of applicants previously judged good enough to be granted credit. The effectiveness of such models depends on good applicants differing from bad applicants in terms of their attributes, such as age or income, which are deployed by such models to predict repayment behaviour. Such efficiency also depends on good claimants who do not differ from each other. In this case, their repayment behaviour is predicted by the structure and parameters of the model. Otherwise, the disproportionate omission of bad borrowers among the rejected applicants will result in biased predictions of repayment behaviour. Rejection inference techniques (treatment of rejects) attempt to obviate such possible bias resulting from calibration models in the absence of rejected applicants, and to incorporate the characteristics of rejected applicants. Unfortunately, the main missing characteristic of such applicants is the repayment behaviour that would have emerged if they had been accepted. Thus, any corrective influence of inference techniques on rejections will be, at best, partial.

To better clarify the rejection inference, it will be treated as a two-step process. In the first step, we seek to determine whether the borrower has been accepted or rejected by the microfinance institution (selection mechanism). The second stage of the process describes the follow-up of successful applicants (repayment or default). Each loan application is considered to be characterised by a vector of k characteristics $x = (x_2, x_2, x_3,....., x_k)$. These features are completely observable for each applicant. However, the borrower's outcome noted y is only observed for successful applicants (it is unknown for unsuccessful applicants). Without loss of generality, it is assumed that $y = \{0, 1\}$, with the convention that bad loans are assigned 1, and good loans are assigned 0. In addition, an auxiliary variable a is defined with $a=1$ if the loan is granted and $a=0$ otherwise. We note at this stage that y is only observed if $a=1$. The microcredit model (usually called credit scoring) assigns to each potential borrower a score S (points) which is based on the individual characteristics $x_{ij} = (x_{i1}, x_{i2}, x_{i3},......., x_{ik})$. The calculated score should thus be correlated with the probability of repayment. It is expected that low values of S_i will be strongly correlated with low repayment probabilities and vice versa. The lender has to set the threshold c at which the loan is granted. The credit review process consists of a two-step process illustrated by the following two questions: Has the applicant obtained credit? Has the loan been repaid? The decision to grant a depends, as already mentioned, on c

$$a = \begin{cases} if\ S_i < c\ \text{Credit refused} \\ if\ S_i \geq c\ \text{Credit granted} \end{cases}$$

After a well-defined period of time, we will obtain two possible sequences for the group of accepted borrowers ($a=1$):

$$y = \begin{cases} 1\ \text{Fault} \\ 0\ Reimbursement \end{cases}$$

The simplest approach to dealing with sample selection is to give credit to all applicants for a short period (see, for example, Rosenberg and Gleit, 1994). However, this approach is not feasible in reality because of its high risks.

The re-weighting method, in various implementations, is well known and widely applied. Crook and Banasik (2004) described a method that consists of first constructing an acceptance score on the set of acceptances and rejections. Subsequently, the accepted applicants and their default information are used in the determination of the new model by weighting each accepted applicant with an inverse probability weight $p(S_i)$, hence $1/p(S_i)$. This method gives cases near the cut-off high weights, with the idea that these cases are closer to the credit situation of a rejected applicant. Augmented data-set reclassification consists of building a default score model on accepted applicants and then applying it to rejected applicants. It assigns the status y=l to the x% with the lowest scores, with the assumption that this group will certainly be insolvent. A new score is then constructed on the overall population (successful applicants and unsuccessful borrowers not included). However, this method can lead to considerable bias because the x% with the lowest scores are not necessarily insolvent (see, for example, Ash and Meester, 2002). Various types of extrapolation are used. For example, the method described by Ash and Meester (2002), as well as that by Crook and Banasik (2004) are based on the posterior probabilities of default, which have been extrapolated for rejected credit applicants. By introducing a threshold, the population (a=0) will be divided into good and bad risks. The information from this division together with the observed y-values of the (a=l) group determine the new model, but lead only to small improvements (see Crook and Banasik (2004)). Another method suggested by Ashet Meester (2002) is the approach of Heckman (1978). The latter considers the sample selection problem as an omitted variable problem. Although this method is designed for continuous and non-dichotomous variables (which undermines the claims made), the idea can be used for model building by adding a variable representing the choice mechanism. In addition, Boyes et al (1989) use a censored bivariate probit model to determine default probabilities. Their method is based on the work of Poirier (1980) who considers the sample choice problem as a case of partial unobservability. As with Heckman's approach, the fundamental choice mechanism will be incorporated, but in a bivariate probit estimation of the scoring parameters. As mentioned earlier, there are several techniques for dealing with refusals (Ash and Meester, 2002; Crook and Banasik, 2004,). However, the majority of published work seems to indicate mixed results. Thus, the effectiveness of the method is strongly related to the nature of the data. It is therefore considered that the best methodology for dealing with refusals is to apply all methods, compare the results provided and select the most appropriate for the data available.

4.0 METHODOLOGY

Our sample consists of 321 group loan contracts granted by various second tier MFIs in Cameroon for the period 2007-2014.

4.1 Explanations and coding of socio-economic variables of group loan borrowers

The collective contract here represents the file of a loan granted to a collective and/or group of individuals generally grouped together within an association or a company (SARL or SA) for a well-defined period. The variables identified on the various loan files and loan officers'

follow-up sheets are grouped into two categories: the socio-economic variables of the group or collective and the variables related to the loan and the borrower's repayment behaviour.

4.1.1 Socio-economic variables of group loan borrowers

The analysis of the files selected for our study shows the following variables: The age of the group refers to the time that has passed since the creation of the collective or the enterprise until the moment of the loan application. We observed that for each group loan applicant, the age is exclusively quantitative and in all the files analysed the ages range from less than one year to less than ten years. The applicant must provide information on his location plan, which must then be verified by the loan officer and/or the loan officer. Thus, during the analysis of the files, we observed two phenomena in particular: clients who did not specify their location plan (number 0 for code) and those who filed it (number 1 for code). The sector of activity specifies the activities carried out by the credit applicant. The activities listed in the various files have been grouped into two poles, namely the trade pole (services; sales, etc.) for which the number 0 is used as the code and the production pole (livestock, agriculture, etc.) for which the number 1 is used as the code. Wealth here refers to the assets held by the applicants. Generally, for reasons of reliability, group loan applicants mention their assets and their values. The observation of the files shows that the applicants who have mentioned their assets are coded as 0 and those who have not mentioned their assets or have no assets are coded as 1. Income here means the assets or income of the applicants (employed or not). The source of income characterises the permanence or otherwise of the loan applicants' income. Two types of applicants are identified: those with permanent income (coded as 0) and those with non-permanent or transitory income (coded as 1). The new project designates the nature of the activity for which the loan is requested. Here, we seek to ascertain whether or not the activity that requires financing is already being carried out by the applicants. Two cases are identified: those whose project is new (new activity) with the number 1 as the code; those whose activity is not new with the number 0 as the code. The variable presence of MFIs characterises the competitive environment of microfinance activities. Thus, this variable explains the nature of the client's environment, which may or may not allow him to have several lenders. The number 0 is retained for the code of applicants whose presence of other microfinance institutions is noted; and that of 1 for the code of other applicants. Guarantee refers to the joint and several guarantee offered by the loan applicant to the lender in case of non-repayment. Two cases have been identified, namely: applicants who do not offer any joint guarantee (code number 1) and applicants who have a joint guarantee (code number 0).

4.1.2 Group lending variables.

The follow-up sheet of the managers and/or loan officers provides us with information such as: the amount of the loan granted; the study time; the duration of the loan; the interest rate; the credit rationing; the number of loans already granted to the applicant. It should be noted that only accepted applications are made available to us. The study time represents the number of days taken by the credit committee for the acceptance or not of the loan application formulated by a client. On the follow-up sheets, we note that the time taken for the acceptance of credit applications varies from 01 to 28 days. This time has been grouped into 3 classes: the first class is made up of the values 01 to less than 15 days with the number 1 as the code; the number 2 represents the code of the second class with the interval from 15 to less than 24 days; the

interval from 24 to less than 30 days represents the third class with the number 3 as the code. Credit rationing occurs when the amount of the loan received is different from the amount requested by the borrower. In terms of coding, the number 1 is for cases where rationing is observed and the number 0 for the opposite case. Loan duration means the number of loan repayment schedules granted to the borrower. Thus, the monitoring sheets count the number of repayment schedules ranging from 02 to 08 months for all the files analysed. Observations show that a repayment schedule is defined as either daily or monthly, depending on the case. The number of schedules were grouped into two classes: schedules ranging from 02 to less than 6 months with the number 1 as the code and the interval from 06 to less than 10 months represented by the number 2 in the coding. Interest rate represents the cost of the loan granted. Here it is determined by negotiation between the lender and the borrower on a principle based on the risk level of the lender. This essentially monthly rate follows an order from 12% to 28%. For the sake of completeness, the rates have been grouped into two groups in chronological order. Thus, the first group (code number 1) is composed of rates ranging from 12% to less than 24%, the second group ranging from 24% to less than 30% with code number 2. The number of loans granted to the borrower characterises the number of loan contract renewals. Here, the aim is to present the history of the relationship between the applicant client and the borrower. This number varies from 01 to 05 for all the files analysed in our study. The amount granted represents the monetary value received by the client as a loan. In all the files retained for our study, these values range from 100,000 to 1,600,000FCFA. The value of the amounts was grouped into 3 classes: the first class made up of values from 100,000 to less than 500,000FCFA with the number 1 as the code; the number 2 represents the code for the second class with the interval from 500,000 to less than 1,000,000FCFA; the interval from 1,000,000 to less than 1,700,000FCFA represents the third class with the number 3 as the code.

Results and interpretations

4.2.1 Overall significance of the model and interpretation of the coefficients

This study has developed a method of measuring default risk without revealing bank secrecy; the notion of pre-default. Any deadline not met on the day in question is a pre-default, revealing that information problems have not been properly resolved without imputing the incident to one of the parties. At the same time, this tool helps to prevent the actual failure. The following main results present the characteristics of the regression model used and an analytical description of them.

4.2.1.1 Characteristics of the regression model

Since Probit regression is only applicable to large sample sizes, checking for the absence of a multi-colinearity problem is of paramount importance. The Pearson correlation matrix shows that all correlation coefficients are significantly smaller than 0.8, which is the limit drawn by Kennedy (1985), at which one usually starts to have serious multi-colinearity problems.

$\Pr(Y=1) = \emptyset(\beta 0 + \beta 1 \text{ acti} + \beta 2 \text{ npce} + \beta 3 \text{ration} + \beta 4 \text{time} + \beta 5 \text{rising} + \beta 6 \text{duration} + \beta 7 \text{ wealth} + \beta 8 \text{ collat} + \beta 9 \text{income} + \beta 10 \text{ age group} + \beta 11 \text{new project} + \beta 12 \text{contact} + \beta 13 \text{ local} + \beta 14 \text{presence} + \beta 15 \text{Interest}) + \varepsilon$

Number of obs = 321 Wald chi2 (15) = 78.6 Prob > chi2 = 0.0000

Log pseudolikelihood = -180.82904 Pseudo R2 = 0.1870

We can see that the R2 is 0.187. It represents the variance explained by the model (explanatory power). In other words, in this case, the model expresses 18.8% of the variance of the dependent variable. This rate may seem low, but it can be explained by the relatively exploratory nature of the present study. Similarly, it can be attributed to the diversity of the variables which are related to the borrower, his activity and the institution. The Chi-square test tests the null hypothesis that all explanatory variables are not significant in aggregate. The table shows a Chi-square of 78.63 for 15 degrees of freedom. This value is significant at the 1% level. This finding allows us to state that our model is significant as a whole.

4.2.1.2 Regression results: estimated model coefficients

Before moving on to the interpretation of the estimated coefficients of the model, the overall quality or significance of the model is questioned. In terms of checking the strength of association of the model, the results are as follows: Among the 15 explanatory variables included in the model, only 06 variables are statistically significant. The following table illustrates these results.

Table: Variables in the group lending equation

	dy/dx	Odds	P>|z|
Sector_ of activity	-.3809829	.2062825	0.000*
Npce	-.020941	.9403938	0.628
Rationing_credits	.4451118	9.173488	0.000*
Time	-.0117354	.946952	0.345
Amount	5.38^e -08	1	0.572
Duration	.0520138	1.216818	0.133
Interest rate	.0186287	1.08333	0.034**
Guarantee	.405486	5.590876	0.000*
Contact	.01330223	1.80844	0.261
Wealth	-.0294996	.891409	0.673
Source_of_income	.1479667	1.953977	0.149
Age of the group	.0033587	1.013015	0.856
Location	.2075775	2.316239	0.004**
New _project	-.245789	.3419977	0.000*
Presence_ imf	-.0372027	.8442209	0.596
Constant	-.0372027	.7898405	0.596

*significant at 1% level, ** significant at 5% level

Source: Our results

This table allows us, on the one hand, to observe the variables that have been included in the equation and, on the other hand, to examine their significance (box P>|z|.). When the variables are significant, we proceed to the interpretation of the odds ratios (Exp(B), or "Odds Ratios").

These odds ratios correspond to the number of times the group membership is increased when the value of the independent variable increases by 1 (i.e. in the case of binary variables when moving from one state to another). A odds ratio greater than 1 indicates an increase in the likelihood of being in the pre-default group, while a ratio less than 1 indicates a decrease in the likelihood of being in this group.

4.2.2 Interpretation of results

The results from the model indicate that the amount (size) of credit extended to a borrower is associated with a significant and positive coefficient. This is because the amount of credit granted to the borrower is determined by the loan officer based on the borrower's estimated probability of default. As a result, the borrower will tend to modify his or her project; this generally causes a disruption in the realisation of the project. These results are in line with those of Sharma and Zeller (1997) and Godquin (2004): the difficulty of repaying a loan increases logically with its amount. The commercial and service activities carried out by the borrowers generate sufficient income to maintain a good credit relationship with the microfinance institution. This finding allows us to conclude that the sector of activity and more specifically the commercial and service activities carried out by the borrowers reduce the chance of being a pre-default borrower by 38.09%. This result can also be attributed to the variability of production income such as agriculture and livestock which makes this industry risky. Being rationed is positively related to the probability of default. There are several reasons for this. Firstly, when the amount requested is different from the amount granted, the borrower will tend to modify his project, which generally leads to a disruption in its realisation. Secondly, the willingness of the microfinance institution to test borrowers with small loans increases the probability of default to the extent that the amount received does not cover all the costs of the borrower's project. Finally, it is often the opposite that is presented insofar as the borrower is concerned about the relationship with the credit agency, credit rationing will motivate the latter to increase these efforts and consequently reduce the probability of default. The significant coefficient associated with the credit rationing variable indicates that it is likely to increase the chance of pre-default by 44.51%. It is clear from the results of our study that the presence of a joint and several guarantee is positively correlated with the risk of default. It increases the chance of joining the group of pre-default borrowers by 40.54%. This result stems from the divergence of individual and collective interests on the one hand and the difficulty of managing the group on the other. These results are contrary to the results of Sengupta and Aubuchon (2008), who found that joint and several guarantees favoured a repayment rate of almost 90%. This is still debatable as late payment is not synonymous with default. The location of the group's places of activity by the institution is likely to increase the chance of being a pre-defaulter and qualified as a bad borrower by 20.75%. This location does not favour a methodical monitoring of the group by the lender, which will push the borrower to behave less well, as they are not always the managers of the project and/or the company. Generally, the lender's visits to the business are sometimes unsuccessful, as the managers of the company refuse to give information about the poor financial health of the entity. But they present better situations to lenders. The fact of having the contact of the representative of the collective or group by the institution increases by 13.30% the chance of having a delay in the payment of loans. This is justified when the representative does not have good information about the group and/or collective. The presence of other microfinance institutions in the same geographical area that offer the same service as the institution in question is likely to decrease the chance of

the group being classified as pre-default by 3.72%. The probability of borrowers falling into arrears decreases with the presence of alternative sources of finance. This is justified by the fact that the borrower is more concerned about financing since his chances of financing are improved. Thus, even if there is a delay with the first microfinance institution, the borrower risks being rejected by the second microfinance institution in his or her region because of the diffusion of information through the proximity link. This is especially important as microfinance institutions through the proximity link share information on borrowers. The risk of insolvency increases when the borrower (the group) has a permanent income (salary, pension). This stable income should be an alternative to be exploited in case of repayment problems, but the opposite is observed. That it can be justified by the fact that generally the group made up of wage-earners relying on their wages or pensions is no longer concerned with the repayment of credit knowing that it will have the members' wages. For a group whose members are wage earners, we observe a 14.19% higher chance of being a pre-default borrower. New projects are more at risk than old ones. This result hardly justifies the negative correlation with late payment risk. According to the results of our study, this variable decreases by 2.45% the chance of repaying late and joining the group of pre-default borrowers. This degree of risk associated with new projects can be attributed to the search for a good reputation of new entrepreneurs as well as to the limited likelihood of risk taking. The risk of pre-default decreases if the borrower has wealth. This wealth, which is generally stable, is used as an alternative to exploit in case of repayment problems. This can be justified by the fact that generally the borrower with assets is more concerned about repaying the loan. For a group with assets, we observe a 29.49% lower chance of being a pre-default borrower. Our investigation shows that the age of the collective increases by 3.35% the chance of obtaining loans that will be in arrears. The interest rate set by the microfinance institution is positively correlated with the risk of late payment. This is unexpected since, as the interest rate is usually integrated in the overall amount of the debt, the borrower seeks to repay on time because otherwise he will be obliged to pay the penalties based on the said amount. And as sometimes this rate seems to be high, if there is a delay, the borrower will pay a high amount of penalty. The time it takes to apply for a loan is negatively correlated with the risk of late repayment. This is because when the application time is spread over a long period of time, lenders tend to take a good look at all the parameters on the stability of the group. It decreases the probability of late repayment by 11.73%. The results from the model indicate that the number of loans granted to the group measuring the long-term relationship is negatively related to the probability of pre-default. There are several possible reasons for this finding. These results support the view that the long-term relationship measured by the number of loans granted to a borrower reduces the risk of pre-default. New projects are more at risk than old ones. This result justifies the positive correlation with default risk. According to the results of our study, this variable increases by 1.891 the chance of repaying late and joining the group of bad borrowers. This degree of risk associated with new ventures can be attributed to the lack of experience of new entrepreneurs as well as the limited likelihood of risk taking. The results of our study show that the risk of late repayment increases with the duration of the group loan. This result can be justified by the fact that the spreading of a loan over a long period of time causes a race to individual interests in the group, which will then dominate those of the collective. This is a source of the group's fragility, as we observe a 5.20% chance that long-term loans are in arrears.

5.0 CONCLUSION

The observed delay in repayment is evidence that information problems were not well resolved at the time of contract design. These problems include project uncertainty, information asymmetry, and moral hazard. The combination of possible causes ensures that no one party is discredited. The criterion therefore preserves the good name of the institution and its client. Delayed repayment as a pre-default is a premise for final default. This concept allows for early detection of the difficulties of the micro-enterprise and to prevent actual default. It is therefore a risk management tool. No institution without a legal obligation would allow the publication of data from its technical base that would compromise it. Pre-failure means that the actual failure is not revealed. Consequently, the study does not risk violating banking secrecy.

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