

Determinants of Successful Group Loan Repayment: An Application to Tunisia

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Abstract:

This study shed light on the main factors vulnerable to affect the repayment performance of group lending. We analyzed through a Logit model the internal and external delinquency of a self-designed survey of 286 groups of credit. The Results of the estimation shows that the repayment is influenced positively by the internal rule of conduct, the same business, the knowledge of the other members of the group before his formation, the peer pressure, the self-selection, the sex, the education, and the non financial services. However, the homogeneity, and the marital status are among the main factors acting negatively on the repayment. This survey has permitted also to conclude that the tie with the loan officer is able to improve positively the repayment performance of credit groups.

JEL classification: G21

Keywords: Microfinance; Group lending; Internal Delinquency; External Delinquency; Repayment performance.

Introduction

The difficulty to reach the financial sources is one of the main obstacles to an increased involvement of the poor borrowers to the economic development. This layer of the population is ineligible to the classic banking sector because of lack of collateral permitting the covering of the value of the loan in case of repayment problems. Moreover, it is expensive to punish a borrower because these sanctions breed more important costs than the real value of the loan. The microfinance emerged as an economic development approach oriented toward households of weak income. Instead of bestowing some individual microcredits, MFI in developing countries prefer to lend to groups of people that are jointly responsible for the repayment of the received loan. Each member receives an individually loan at the condition to accept the responsibility of repayment of the credits granted to the other members if they give up or are revealed incapable to repay their instalments.

The methodology of group lending triggered the interest of practitioners and researchers in finance and development because of its discerned potential of credit concession to poor borrowers and its role in stamping out the poverty in developing countries. The success of group lending in concession of credits to poor borrowers has been assigned to its faculty to attenuate the asymmetry of information and enforcement problems that faces the MFI in the individual microlending. The ability of group lending institutions to conquer the informational asymmetry and enforcement problems has been considered as the driving force behind their supports to the poor, their sustainability, and their repayment performance. While there is a host of theoretical models confirming that joint liability and the group solidarity lead to higher repayment performance thanks to a more and more efficient procedure of peer monitoring, of self selection, and of peer pressure, only some empirical studies tried to document these dynamics in a rigorous manner.

The main purpose of this paper is not to test if the use of group lending is preferable to other arrangements in the production of higher repayment rate; rather our worries are factors that make some groups more effective than other within a Tunisian NGO¹. We designate a model of group lending that incorporates at the same time the traditional determinants of repayment performance in the individual microcredits, and those relative to the dynamics of the group in order to demonstrate their importance. We use data from a self designed survey of 286 borrowing groups to test the effect of the peer monitoring, of social ties, of peer pressure, of self selection, of homogeneity, of personal features, of control variables, and finally of a new variable that has not been treated by the previous theoretical and empirical studies which is *the tie with the loan officer* on the repayment performance. We led two empirical studies through a Logit model but with two different dependent variables. The first study aims the determination of factors that influence the internal delinquency of groups while the second survey concentrates on the other dimension of delinquency: the external delinquency in order to explore factors capable to affect it.

The remainder of this paper will be structured as follows: The second section analyzes the methodology of group lending. The third section describes problems of repayment in group lending. Section four provides a brief review of empirical literature. The fifth section retraces the Tunisian group-based lending program, while section six summarizes the main characteristics of the sample we use in the empirical analysis, the empirical models, and the methodology. Section 7 discusses the empirical results and finally, section 8 provides conclusions and recommendations.

¹ Non Governmental Organization

The methodology of group lending

The principles of the methodology of group lending

The group lending is based on the following elements that constitute its key factors of success. One mentions first of all the self-selection of the group members, which means that the choice of members is done in a free way, personally, and without the intervention of the loan officer. Thus, the group is responsible for the choice of his members. The self-selection between borrowers is considered as a vital specificity of the group lending because of the joint liability on repayment of the loan at the due date. These auto-formed groups must be of small size gathering 2 to 5 members and count only one member of the same family that participates in a same group (Berenbach & Guzman, 1994).

The self-selection is considered as the first step toward the curb of non repayment problems. The mutual knowledge between borrowers as well as their desire to repay makes them more attentive of the members choice (Hauge, 1999). Alexander (2000), consider that the self-selection and the monitoring exercised by the group members between each other are among the main elements that contribute to the success of programs that looks like the Grameen Bank. In the same way, the self-selected groups can provide the microfinance institution with information on borrowers that cannot reach them with its own means.

Abbink, Irlenbusch, and Renner (2002), argue that to guarantee the loan for non repayment constitutes the basis problem of the group lending. Thus microfinance institutions resort in their methodologies to processes that help members to repay their instalments. The self-selection constitutes one of these principals' processes since the strong social ties strengthen the methodology of group lending.

The self-selection of the group members indicates that members are not risky, confidants, and are responsible for the repayment of the loan. Hence a group without

self-selection of its members cannot be considered as a group operating according to the methodology of the loan (Schreiner, 2000).

The monitoring of projects of group members constitutes the second characteristic. Thus, group members must be attentive in the affectation of the loan in the most profitable uses and that guarantee his repayment (Hauge, 1999). The mission of assessment of the loan is done by borrowers themselves and not by the microfinance institution. As soon as borrowers decide to be in a group with other members, they are certain that they are skilled to get the loan, and that they are capable to repay instalments regularly. This phenomenon named by peer screening effect, enables to reduce the loan costs. It drifts from a mutual knowledge between members of the same society better than the knowledge of the microfinance institution. It incites group members to exercise the appropriate effort and to allocate funds in the more productive ways in order to increase the probability of success of the project (Anderson and Nina, 2000).

The borrowers interest granted to the repayment of all the group members of their loans as well as not to profit the opportunity to miss their engagements, while guaranteeing a sufficient income, exhibit the importance of the social sanction evoked here by the pressure exercised by members of group on the defaulting one, considered stronger than sanctions exercised by the lender (Hauge, 1999).

The group lending is characterized by the obligation of members to pay instalments nevertheless, the solvent borrowers have limited choices to oblige borrowers in delay to repay their instalments, one mentions for example sanctions exercised by borrowers each other as the prohibition of a group member from the access to future loan, in addition to the social guarantees that contribute to improve the repayment rate. Thus, the good choice of group members from the beginning is very important for the success of the group. The more the importance granted in the choice is raised, the less the need of members to monitor or to exercise pressure in case of non repayment will be (Bastelaer, 2000).

Microfinance institutions use often the Joint Liability which means the transfer of a part of the lender's risk to borrowers (Alexander, 2000). Schreiner, 2000 define the Joint Liability by the fact that all borrowers are responsible on their loans as well as on loans of the other group members.

The Joint Liability is one of the main factors that help the group to repay. It is one of guarantees that allow members to acquire basis incitements of the social guarantee and to benefit from it in order to manage the risk of non repayment (Hauge, 1999).

Group members are responsible for the failure of one or several member in repaying their instalments. Hence, the Joint Liability is considered like an insurance against the individual risks of group members. In case of failure of the project of a member and by the way his failure in the repaying his instalments, the group will be responsible for the repayment of his arrears. The Joint Liability is considered as a surrogate of traditional guarantee (Abbink and al., 2002).

The Joint Liability incites group members to select themselves in a free and efficient manner that offer the IMF the possibility to use the social guarantee and the Joint Liability as a means to supervise borrowers (Gangopadhyay and Lensink, 2001).

Anderson and Nina 2000, argue that losses of the MFI relative to projects that fail decrease following the success of another number of project in the same group covering a fraction of these losses. Thus, the group guarantee is evoked when group members hasn't individual guarantee. The importance of the Joint Liability as well as the social guarantee between group members lie in the lowering of losses allowing the MFI to lower its interest rate, attracting subsequently borrowers possessing some less risky projects. The increase of numbers of borrowers at the MFI decreases the average risk and permits in the future to lower the interest rate.

Bastelaer 2000, consider that the self-selection of group members, as well as its small size, and the coincidence between members in regions with high density of dwelling drives to the possibility of Joint Liability and by the way the engagement of repayment.

MFI use Dynamics Incentives mechanisms in order to encourage borrowers to repay their instalments. The progressive lending is considered among the main incentives mechanisms offered to encourage borrowers to stay with the same institution. The non refinancing threat in the future if only one group member fail is exercised by the MFI to incite borrowers who are interested by this relation to repay.

The Dynamics Incentives Mechanisms are a succession of concession of credit in a regular way (Abbink and al., 2002). Microfinance institutions use different kinds of incentives mechanisms as well as sanctions to facilitate the repayment in time. The delay of repayment of a group means the delay of other group members in the repayment of their instalments and subsequently, they will be forbidden from the access to future loans (Berenbach & Guzman 1994). The non refinancing threat in the future even if only one group member fail in repaying his instalments is considered the effective and less expensive means to affirm the Joint Liability between group members.

In this domain, Cohen 2001 confirms that poor households don't need always loans as the MFI supposes. Customers of MFI need to go out of the program of credit for several reasons; among them the rest, and the research of another less expensive financing source. This researcher concluded that MFI must create new programs or examine again the old programs and modernize them to face the hard competition from various institutions of credit, and also to satisfy its customers.

Similarly, several borrowers prefer to continue with loans of small size instead of acquiring loans of large size because of needs of their business that don't require a lot of capital in only one cycle (Revan and MKNelly, 2002).

The point of view of Alexander 2000, conditioning the access to future loans to the repayment of the current loan, is not sufficient to prevent the strategy of non repayment when borrowers face adverse shocks. The strategy of definitive non-refinancing is unjust. Thus, when the borrower fails in the repayment of his loan, he will be definitely ineligible. However, one notes in America and in other countries developed in the financial sectors that the non repayment doesn't mean the interdiction for life to reach another loan. He will be forbidden from the access for a definite period. After the breathing out of this period he gets a second opportunity to construct his career.

Bastelaer 2000, confirm while taking as a basis a certain number of research which he has pass in review in his survey that to deprive all the groups to reach the future loans, in case of failing of one member is an expensive decision for the lender as well as for the borrower. Bastelaer notes that delaying the concession of credit for a long period or modifying the loan size can give some considerable results. The refusal to bestow some future loans for the whole group because of only one member harms to group members having a good history of credit. In the same way, the non-obtaining of group members of a loan (essentially when the group is of large size) leads to the loss of a large number of safe borrowers (Revan and MKNelly 2002).

Manalo 2003, stipulate that one can encourage borrowers to repay while refinancing them by the progressive lending, or by the reduction of interest rate and this while referring to their registers of repayment, also, one can resort to the negative incitements represented by sanctions, moreover, the MFI invented the obligatory saving system, and the Joint Liability to create a pressure between borrowers to repay in time.

The characteristics of group lending

While reviewing the methodology of group lending one noted several features that are considered the basis of this program, as well as differences in these features according to

countries or the region. Among these features one notes a concentration on women who often use the microfinance (Vonderlack and Schreiner, 2001). Berenbach and Guzman 1994, note that the majority of customers of microcredits are women and their projects concentrate on the small professions, the services, the trade, and on other non formal projects. Thus, women are more intentioned by joining microfinance institutions, and by the way obtaining loans guaranteed by the group. For this fact, Abbink and al., 2002 consider that this intention is encouraging microfinance institutions to be interested in the concession of credits to women. In this context, Hauge 1999, note that these institutions improve the woman's statute that is generally marginalized. These microcredits are often of progressive small size (BAYDAS Mayada M, GRAHAM Douglas H & VALENZUELA liz, 1997). Every group gathers 3 to 10 members that are together in order to get a loan (Berenbach and Guzman 1994). Group members support themselves to repay instalments of the loan and subsequently, to reach future loans while taking their degrees of success in the repayment of the current loan as a basis (Berenbach and Guzman 1994). Granted loans concurrent with the needs of borrowers as regard to objective, size, and professions. Group members decide the amount which they needs, thereafter; the microfinance institution judges the degree of coincidence between the asked amounts and the project to undertake. Once all formalities are accomplished, she grants the loan individually while insisting on the guarantee of the group in the repayment. Noting at this stage that these granted loans are of small sizes and limited duration and this to allow borrowers to develop their business (Berenbach and Guzman 1994). In loans guaranteed by groups, employees of the microfinance institution don't concentrate on the financial analysis of projects presented to get loans, but they transfer this task to the group members in order to guarantee the repayment (Larson, 2002). Costs of obtaining a loan gather the interest rate, charges, and costs of the obligatory saving. However, these costs are raised compared to their commercial counterparts. With the appearance of the saving system, which means an

additional amount poured to the institution in addition to the instalments, the saved amounts serve like a guarantee to repay instalments of the loan, also, it is used by institutions in case of urgent need of borrowers (Berenbach and Guzman 1994).

Repayment problems in group lending

The financial sustainability is considered among the principals purpose that microfinance institutions attempt to reach. It is the tentative of institutions and lending programs to cover their operations and their financial costs by the setting up in dispersed regions, the proposition of high-quality loans, and the formation of an effective portfolio (Manalo, 2003). According to Brandsma and hart 2001 fruitful microfinance institutions that adopted the institutional approach are however, the only capable to offer financial services in a lasting way. In the same way, they are the only able to cover their operations and their financial costs. Costs of their financial operations gather the depression of their funds, losses on their loans, and the administrative costs relative to the very small loans size that they grant. These costs are very raised even for the most effective microfinance institutions. When to the financial costs, they contain the commercial charges of financial resource as the saving, Banks loans, and the emission of fixed income securities. These costs are able to be supported only by sustainable microfinance institutions that can attract some financial resources to develop and to offer financial services for several poor borrowers. However, microfinance institutions must not count a lot on subsidies because they are poured in most cases for political considerations.

Hauge 1999, assimilate the financial sustainability of microfinance institutions to a three-legged table; weak delinquency, administrative efficiency of the institution, and weak transaction costs for every borrower. In case of destruction of one of its feet the table falls as well as the characteristic of microcredit for borrowers.

Following the description of Hauge for the financial sustainability, one notes that the main determinant that contributes to her realization is the regular repayment of instalments and the weak percentage of default. Thus, regular loans help microfinance institutions to develop and to achieve its objectives.

Revan & Mk Nelly (2002) note that delays of repayment lead to two ominous effects for the MFI. First of all, the non refinancing of a large number of safe borrowers and the collection of late instalments by the loan officer driving to an increase of its loads without compensations in resources. Secondly, because of the delay of a member, other members will be incited then to delay their repayment and even to negotiate with the institution the possibility to abandon the last part of the loan.

Repayment Problems are among the main topics treated by researchers in microfinance since they weaken the financial health of the microfinance institutions. They handicap their missions while putting in danger their capitals. Besides, the weak repayment rates affect negatively their relations with depositor and let them disinterested by the conduct of other financial transactions.

Group lending and repayment performance: a literature review

Because of lack of collateral securing loans, poor borrowers cannot reach the formal credit market. Moreover, the informational asymmetry as the adverse selection that describes the situation of a Bank that cannot distinguish the safe borrowers from risky, and the moral hazard describing the inability of Banks to supervise borrower's behaviors, became more pronounced in the case of poor borrowers. It becomes very expensive for Banks to screen and to monitor several small borrowers than to work with some big borrowers. Considering these problems commercial Banks considered this layer of the population little profitable.

Microfinance institutions provide microcredits to borrowers who didn't reach commercial Banks and without requiring collateral. Group lending is an innovation that makes it possible, where the poor borrowers act as guaranties each other by the Joint Liability. While exploiting the local knowledge that has members on each other, group lending solved several problems of asymmetry of information between borrowers and creditors.

The first literature providing the theory behind the microfinance and the group lending is drawn by the works of Stiglitz (1990) and Varian (1990), that analyze how the Joint Liability can incite borrowers in a group to screen their capacities and to monitor their efforts mutually, in order to alleviate the moral hazard issues involved in lending to those with no collateral, and to induce a borrower to encourage a partner to choose a safer project.

The additional literature accentuated the capacity of group lending to attract safe borrowers in the credit market while lowering the monitoring and enforcement costs and by the way the interest rate. Besides, several papers found that the group lending can also increase the repayment rate because of social sanctions.

The findings of empirical studies concerning the determinants of repayment rates in group lending are controversial. Khandker, Khalily & Khan, (1994) use the registers of the Grameen Bank to extract the determinants of repayment performance. Their survey shows that the rate of non repayment increased with the period of activity of the branch. Authors suggest that the formation of members that can be associated to non financial services had a positive influence on repayment. Khandker et al, (1994) prove through an empirical test on late repayment of Grameen Bank loan that shortcomings of repayment are influenced in a systematic way by the local features that can affect local conditions of production or the branch efficiency. Finally, authors perceive that the farming electrification, the roads size, the infrastructures of primary education, and the commercial Bank density as well as the wage of the manager of the branch is positively correlated with a weak rate of non repayment. Wenner

(1995) examines the determinant of repayment performance of 25 groups of credit of Costa Rica. His survey shows that the internal delinquency is negatively correlated with the formal screen (written internal rules), and positively with the number of visit. In external delinquency case Wenner finds the formal screen negatively correlated and meaningful, and the informal screen and the infrastructure index meaningful and positively correlated. The analysis of Wenner also suggests that the mobilization of the saving, that acts as kind of insurance facilitates credit repayment. In the case of Bangladesh, Sharma and Zeller (1997) found a negative relationship between the presence of relatives in the group, the square of the credit rationing, the loan size and the repayment rates. The fact to exercise agriculture as main profession, the variance of land proves to give high repayment rates. They also stated that the groups which followed the self-selection measure perform better. The findings of Zeller (1998) in Madagascar shows that the degree of monetization, the density of inputs retails, the saving service, the group size, the social ties, and the internal rule improves in a meaningful way the repayment performance. In the same way, he shows that the group has a role of insurance that increase the repayment performance of his members. Finally, the survey of Zeller examines the effects of homogeneity of assets or projects of group members on the repayment performance. It concludes that the diversification of the risk perform well. Matin (1998) uses data of 246 borrowers of the Bank Grameen in Bangladesh. Matin notes that the education reduces meaningfully the probability of default (The impact of the education is not meaningful in the survey of Karlan (2003)). On the other hand, Matin finds a positive and meaningful impact of other credit source on the repayment performance (whereas this variable doesn't have a meaningful impact in the survey of Wydick (1999)). Matin notes that the housing loan increases meaningfully the repayment problems. In the same way, results indicate that members that were customers of the program during several years could be disinterested toward repayment. Wydick (1999) in his study in Guatemala recorded that social

cohesion and the strong social ties have rather negative than positive impact on repayment rates. He finds that the average distance between activities of group members, as well as the knowledge of the weekly sales of the other group members is the only meaningful variables. Paxton, Graham, and Thraen (2000), use data of 140 groups of PPPCR. They use a two-stage econometric model: the first stress the existence of repayment problems, and the second on the repayment of the loan. In the first period results indicate that socioeconomic homogeneity of the group in term of ethnicity, profession, income, etc, and the negative domino effect² increases meaningfully the problems of repayment. However, the fact to live in an urban zone is positively correlated with high repayment performances. In the second stage Paxton et al (2000) note that the quality of the group leader, living in urban zones, the access to other credits sources, and the group pressure is meaningful and positive, and the local domino effect and the loan size are negatively meaningful. Karlan (2003) uses data of the investigation driven by himself in 2000 on 1801 loans of the FINCA association that covers 36 periods of loan and 118 customers. Karlan notes that the geographical concentration and the Cultural similarity increase meaningfully the percentage of loans repaid at the deadline. Recently, M Godquin (2004) studied the explanatory power of social ties, the group homogeneity, the social intermediation, the dynamic incentives mechanisms, and features of the loan (size and duration) on the group repayment performance. Godquin used 1629 observations of borrowers of the Grameen Bank, Bangladesh Rural Advancement Committee, and Bangladesh Rural Development Broad from Bangladesh. M Godquin noted a negative effect of the social ties between group members on the repayment. The group homogeneity doesn't affect the repayment performance. The credit rationing a measure of the dynamic incentive has the waited positive influence but its coefficient is not meaningful. The group size doesn't intervene in the determination of the repayment performance. The access to non financial services

² The domino effect describes the situation where at least one group members don't repay solely because other members of his group don't repay their loan.

displays a positive impact on the repayment. Lending to women doesn't contribute meaningfully to a better repayment performance. However, their weak probability of default is generally owed to the small loans sizes that they receive. Finally, the loan size is considered among privileges granted by the MFI to its borrowers, one notes that an increase of the loan size gives a positive effect that justifies the success that achieves projects over the time. However, the loan size can have an ominous effect resulting from the growth of the risk that faces the project following its size.

ENDA group lending program

The Tunisian group lending program is essentially articulated around the ONG ENDARABE that implanted a solidarity group scheme earlier in 1999 despite the scepticism of Tunisian sociologists and some of loan officers. Generally speaking, the group is composed from 3 to 5 members where women are the majority. All relationship of first degree is strictly forbidden. The loan officer doesn't intervene in the selection of members but check another primordial task because he must perpetually control the veracity of information transmitted by customers, to inquire in the district for the reputation and notoriety of customers and to test solidarity between group members. He often makes financial analysis of micro-enterprises, solves procedures of repayment and the internal rule of conduct, and finally prepares the bill and the contract. Amounts of loans granted space out themselves from 150 to 1000 TND. The ENDA portfolio is constituted by loans of 6, 8, and 12 months repaid by monthly instalments. ENDA accepts the anticipated repayment but she doesn't grant grace delays for the first payment that follows freeing. Procedures of penalty in case of delay are very strict, if a group has delays; he will remain at the same level of loan and must repay the registration fees. All the groups are penalized even if only one member is responsible for the delay. This procedure as discussed above creates a lot of discontent at the sure borrowers who leave in most cases the

program. The success of 3 cycles of group lending without delays and without problems constitutes an ineluctable condition to reach the individual loans of ENDA.

Data, empirical models, and methodology

In an essay to study factors behind a high repayment performance in group lending we conduct a survey among 286 borrowing groups dispersed on the Tunisian territory and that got a loan from one of the antennas of the ONG ENDA. We looked for information on the socioeconomic features of group members, as well as on the repayment performance. Moreover, we integrated questions on the process of the group formation, the existence of social ties, and on the process of selection, monitoring, and pressure within the group.

In this work we chose to collect data of nearly all group members including the leader and to make thereafter an approximation by the arithmetic average. The argument behind this choice is that group leader used in most empirical studies relative to this topic is not always revealing of all information concerning his group and can be subjective in information that he reveals. A verification of the veracity of some information relative to the repayment has been done in every concerned antenna.

In our empirical survey one is going to take into consideration the dynamics of the repayment mechanism in the time that prevails within the group. Indeed, borrowers can choose between two strategies of repayment (Wenner, 1995, Kritikos et al.2003). Group members can choose the same strategy: either to repay or not their loans. The group will be considered like defaulter or not. However, if the group members choose different moves, they have to go through the second stage of their repayment decision. Borrowers, who decided to the first stage to repay their deposits, need to compare the discounted benefits of having access to further loans with the cost of repaying the outstanding loan(s). They have to decide whether to force

the delinquent partner(s) to repay, or alternatively, to make up for the difference and to exclude the defaulters.

To illustrate the aspects of the decision making we introduced two equations. The first equation named «Internal Delinquency» reflects the dynamics of the first stage of the repayment decision and shows the major factors that affect the internal delinquency between the group members. The dependent variable is a Dummy with a value of 1 if there were no cases of internal delinquency in the group and 0 otherwise. The second equation called "External Delinquency", replicated the second stage of the repayment decision when the repayment was due. We aim to find features distinguishing between groups with external repayment problems from groups with perfect repayment history or groups which experienced internal repayment problems solved without raping the contract terms or the repayment schedule. Our second dependent variable is a dichotomous with a value of 1 if the group succeeds in respecting his contract towards the lender and 0 if there are external delinquency problems.

We use a Logit model that permits to analyze a binary qualitative variable. This method defines a variable taking the value 0 or 1 to identify two distinct events of which one wants to determine the respective probability. Explanatory variable weighting are estimated in order to maximize the probability to foresee the explained variable. The model can be written as follow:

$$\begin{cases} \text{Pr } ob (Y = 1) = F (\beta X) \\ \text{Pr } ob (Y = 0) = 1 - F (\beta X) \end{cases}$$

Where Y represent the explained binary variable, X the vector of explanatory variable, F the cumulative distribution function of the logistical law and β the vector of valued parameter. In this type of method the value of coefficients gotten in the equation imports little. It is the sign that imports since he gives the sense of the relation between the concerned variable and the probability to know delinquency problems. In our survey, a positive coefficient indicates that the variable influences positively this probability. One can study the explanatory variable impact on the aforementioned while having recourse to the marginal effect. These represent the variation in percentage of the probability to know delinquency problems when the value of a variable increases by 1%.

The set of the explanatory variables used to test the internal and external delinquency can be categorized in eight groups. The first group gathers variables of peer monitoring in which one finds the distance between members of the group, the presence of internal rule and laws to reach the group, the execution of the same business, and finally if group members visits each other. The second set of dependent variables described the social ties in which one finds the knowledge of the other group members before the formation of this one, the length in number of years passed in the place of the investigation, and finally the period (in month) during which the borrower was member of his group lending to the deadline of the loan. The third sets of variables are relative to the peer pressure in which one finds the will to make pressure to incite to the repayment. In fourth stage one finds the peer selection. In fifth level one finds the homogeneity that takes account of the age homogeneity, the sex homogeneity, and the education homogeneity. In a sixth rank one finds the personal features in which one finds the age, the sex, the level of education, and the borrower's marital status. To the seventh level one finds control variables that contain the existence of other sources of money for the borrower, the number of members in the group, the access to non financial services, and the credit rationing. Finally, the meets and the discussion with an employee of the ONG ENDA inspired

me the idea that the honest relation between the loan officer and the group members can be an important factor for the improvement of the group repayment performance. Hence, we introduced a variable relative to our analysis that takes account of this tie to test its impact on delinquency.

Group Internal/External Delinquency (1, 0) = f (Peer Monitoring, Social Ties, Peer Pressure, Selection, Homogeneity, Personal Features, Control Variable, Tie with the Loan Officer)

The variables ***DIST*** and ***VISIT*** are joined to the peer monitoring. They indicate in what measure group members arrange information on themselves that can help them to monitor each other. For ***DIST***, the more the distance between the borrower and the other group members are long the more the surveillance will be difficult, therefore problems of delinquency will enlarge too. For ***VISIT*** one expects that they influence negatively the delinquency. The probability of repayment problems decreases since the more the group members exchange visits between them, the more the opportunity to control their behaviors will be raised. ***SAMEBUS*** informs on the homogeneity of the group professions. The more the group members are homogeneous in their business, the simpler the mission of the monitoring will be, and the least the problems of delinquency will be too. Nevertheless, the use of this variable can reduce in certain circumstances the repayment rate by the increase of risk covariant (Sharma and Zeller, 1998; Matin, 1998). From this fact one cannot decide on an exact sign of the ***SAMEBUS***. One waits for groups that have an internal written code to show a weak probability of delinquency. This internal regulation helps in an initial stage to select the group members and facilitate their controls thereafter.

Beside the aforementioned variables one has three other variables estimating the existence of social ties. The knowledge of other group members before the formation of the group, the period passed in the place of the investigation, and the group age. These variables

show in what measure group members lived together in the same setting and know themselves mutually before the formation of the group and use social sanctions towards the defaulting members that can help to alleviate repayment problems. *KNOWMEMBERS* indicates that the knowledge of the other group members increase the existence of social ties and reduces the occurrence of delinquency problems. Similarly for *PERIOD*, the bigger the length passed by a member in the same region, the bigger the extent of social ties will be and the weaker will be the delinquency problems either. For the age of the group *AGEGP* (Length (in month) during which the borrower was member of his group to the deadline of the loan), one estimates that members had the sufficient time to know mutually themselves and the social ties develop. Subsequently, one waits from members that the peer monitoring and the peer pressure increase with the age of the group. The variable *AGEGP* is waited to have a negative impact on delinquency.

The will to exercise pressure on defaulters group members, permits to reduce the moral hazard. One foresees that the peer pressure is going to lead to a weak probability of delinquency. In the same setting a safe borrower wants always to maintain with borrowers presenting the same features to form a solvent group. Hence, one waits for the selection to affect negatively the delinquency.

The empirical studies carrying on the impact of the homogeneity on the repayment performance have brought mitigated results. Paxton et al., (2000) note that the socioeconomic homogeneity of the group increases considerably the repayment problems. The survey of Sharma and Zeller (1997) find a non waited negative impact of the pre-existing social ties as well as of the group members homogeneity in term of assets and type of enterprise. Karlan (2003), showed that to share the same cultures that the founding members of the group and to live to their proximities increases meaningfully loans repaid to the deadline. Finally, Godquin (2004) didn't find in her survey a meaningful impact of the education homogeneity and the age

homogeneity on the repayment performance. One foresees from variables of homogeneity (*SAMEAGE*, *SAMESEX*, and *SAMEEDUC*) to affect negatively the delinquency. They are based on shared features between group members and also with their leader. The more the group is homogeneous, the more the control that improves the repayment performance will be comfortable. However, the very individualist type of the Tunisian society can put in question this waited effect, and give some perfectly contrary results.

Regarding the impact of personal feature on delinquency we introduced four variables that are *AGE*, *SEX*, *EDUCATION*, and *MARITAL STATUS*. For the *AGE* and the *MARITAL STATUS* we don't foresee any explicit sign. Women are presumed to have a weak probability of delinquency than men because they are financially disciplined and are interested by maintaining a good relation of credit with the Microfinance institution. The more educated Borrowers are supposed to have the necessary faculties to select the profitable projects and to manage them appropriately thereafter. These faculties are hoped to reduce borrowers delinquency.

Finally, one introduced control variables. The possession of other sources of financing that constitutes an asset to exploit in case of repayment problems. One estimates that this variable is going to improve the repayment rate of the debtor while affecting negatively the delinquency. Groups of small size are estimated to show a weak probability of delinquency because they can easily control themselves. Even so, borrowers belonging to groups of large size can benefit from intragroup insurance possibilities. The larger groups can also have a negative impact on delinquency. Thus, one can't pronounce an exact sign of the group size. The access to non financial services is waited to have a negative impact on delinquency. These services can improve the borrowers capacities and thus to improve their probabilities of success in their projects, and by the way to have a positive impact on the repayment capacity of the borrower. The dynamics incentives mechanisms approximated here by the credit

rationing are supposed to have a negative impact on delinquency. Indeed, a rationed debtor has a lot of chance to be more fascinated by the access to future loans, especially if they are of more important size.

In addition to the aforementioned factors tested by the aforesaid empirical studies our survey is going to test a new variable that is the nature of the relation between the loan officer, and the group members. Until now there is no empirical survey that took in account this factor yet one foresees to him a negative effect on delinquency insofar as a strong relation will incite group members to search solutions in order to keep a good fame on the one hand, and of the other hand to don't cause problems to this agent. Table 1 provides a complete list of the set of the variable proxies of the peer monitoring, the social ties, the peer pressure, the peer selection, the homogeneity, the personal features, control variables, and finally of the tie with the loan officer, used in the analysis as well as pertaining information.

Table 1: Description of Explanatory variables used in the analysis

Variables	Description	Theoretical effect on the Delinquency	Average	Standard Deviation
<i>Peer Monitoring</i>				
DIST	The average distance (in meter) between the member and the other group members	+	52,8076923	31,3428367
INTRULE	Dummy=1 if the group has regulations and internal laws to reach there	-	0,43356643	0,49643558
SAMEBUS	Dummy =1 if all group members have the same business	-	0,52097902	0,50043534
VISIT	Dummy =1 if e group members visit each other	-	0,66433566	0,47304992
<i>Social Ties</i>				
KNOWMEMBERS	Dummy =1 if the member knows the other group members before the formation of the group	-	0,72727273	0,44614242
PERIOD	= The length in number of year passes in the place of the investigation	-	36,534965	16,2053868
GROUPAGE	= Length (in month) during which the borrower was member of his group to the deadline of the loan	-	20,2167832	9,79770103
<i>Peer Pressure</i>				
PRESSURE	Dummy =1: will to make pressure to incite repayment	-	0,51748252	0,50057016
<i>Selection</i>				
SELECTION	Dummy =1 if the group rejects a borrower who wants to join it	-	0,43006993	0,49595345
<i>Homogeneity</i>				
SAMEAGE	Indicative=1 if the borrower and the leader of his group have the same age (+/-2 years)	-	0,41258741	0,49316267
SAMESEX	Dummy=1 if all the group have the same sex	-	0,62937063	0,48381991
SAMEEDUC	Indicative=1 if the borrower and the leader of his group have the same level of education	-	0,54545455	0,49880239
<i>Personnel Features</i>				
AGE	=Age of the group member (year)		41,2027972	11,0425394
SEX	Dummy =1 if the group member is female	-	0,73076923	0,44433759
EDUCATION	Indicative=1 if the borrower has at least 6 years of education	-	0,64335664	0,47984785
MARITAL STATUS	Dummy =1 if the group member is married		0,25524476	0,43676294
<i>Control Variables</i>				
OTHER SOURCES	Dummy=1 if the group member has other sources of money	-	0,58041958	0,494355329
GROUP SIZE	=the number of members in the group		4,12237762	0,78296957
NON FINANCIAL SERVICES	Indicative=1 if the MFI puts at the disposal of borrowers non financial services	-	0,734265734	0,442497679
CRERAT	Indicative=1 if the borrower would have liked to borrow more than the assigned amount	-	0,42307692	0,4949134
TIES WITH LOAN OFFICER	Indicative=1 if the relation is very intimate, 0 elsewhere	-	0,496503497	0,500864178

Empirical results

Results of two model evaluations of which we used the same explanatory variables that permit us to seize the dynamics of repayment within the group are carried in table 2.

Table 2: Results of Logit regression

Independent Variables	Dependent Variables	
	Internal Delinquency	External Delinquency
DIST	-0.00511 (-0.09)	.0051399 (0.69)
INTRULE	-0.7162282** (-2.24)	-1.313387*** (-3.22)
SAMEBUS	-0.7722194* (-1.79)	-0.3490263 (-0.68)
VISITT	-0.2897949 (-0.92)	-0.2395253 (-0.58)
KNOWMEMBERS	-0.7619469** (-2.18)	-0.7888049* (-1.94)
PERIOD	-0.0030566 (-0.31)	.0044292 (0.36)
GROUPAGE	.0114589 (0.63)	.0534671** (2.38)
PRESSURE	-0.3858053 (-0.99)	-0.8119211* (-1.72)
SELECTION	-1.139161*** (-3.39)	-1.463468*** (-3.68)
SAMEAGE	.9387484** (2.49)	1.923647*** (3.84)
SAMESEX	.6540742 * (1.79)	.719484* (1.87)
SAMEEDUC	-0.5297377 (-1.63)	-0.5797644 (-1.46)
AGE	.0158168 (1.08)	.0173103 (1.05)
SEX	.434469 (1.15)	-0.932586* (-1.93)
EDUCATION	-1.591844*** (-4.57)	-2.362266*** (-4.63)
MARITAL STATU	.3062415 (0.90)	1.556605*** (3.31)
OTHER SOURCES	.0267664 (0.08)	.1320207 (0.34)
GROUP SIZE	.0734979 (0.38)	.0622842 (0.26)
NON FINANCIAL SERVICES	-0.658984** (-2.01)	-0.7834824* (-1.70)
CRERAT	.3696574 (1.24)	.2187479 (0.60)
TIES WITH THE LOAN OFFICER	-0.5945136* (-1.83)	-1.425877*** (-3.00)
CTE	1.648759 (1.13)	3.076112 (1.62)
Number of observations	286	286
Wald Statistic	48.07	74.79
Log pseudo-likelihood	-158.97805	-118.34712
Pseudo R2	0.1962	0.3628

* Significant at 10% level, ** Significant at 5% level, *** Significant at 1% level
z values in brackets

The marginal effects waited of each variable are described in table 3

Table 3: Marginal Effect

Independent Variables	Marginal Effect	
	Internal Delinquency	External Delinquency
DIST	-.0001267 (-0.09)	.0009923 (0.69)
INTRULE	-.1749986 (-2.27)	-.2599739 (-3.16)
SAMEBUS	-.1894913 (-1.84)	-.0670922 (-0.67)
VISITT	-.0720165 (-0.92)	-.0453522 (-0.60)
KNOWMEMBERS	-.1882146 (-2.23)	-.1387335 (-2.12)
PERIOD	-.0007581 (-0.31)	.0008551 (0.37)
GROUPAGE	.0028421 (0.63)	.010322 (2.41)
PRESSURE	-.0954567 (-1.00)	-.1550248 (-1.75)
SELECTION	-.2731192 (-3.53)	-.2903216 (-3.61)
SAMEAGE	.2299679 (2.57)	.3364201 (4.75)
SAMESEX	.1593816 (1.84)	.1443057 (1.79)
SAMEEDUC	-.1309004 (-1.64)	-.1102871 (-1.50)
AGE	.003923 (1.08)	.0033418 (1.03)
SEX	.1061457 (1.18)	-.1608193 (-2.20)
EDUCATION	-.3780003 (-5.07)	-.3792108 (-6.24)
MARITAL STATU	.0762091 (0.90)	.2449771 (4.23)
OTHER SOURCES	.0066374 (0.08)	.0256129 (0.34)
GROUP SIZE	.0182294 (0.38)	.0120242 (0.26)
NON FINANCIAL SERVICES	-.163249 (-2.04)	-.1374892 (-1.92)
CRERAT	.0916418 (1.25)	.0418775 (0.60)
TIES WITH THE LOAN OFFICER	-.1463772 (-1.84)	-.2719951 (-3.34)

The observation of results of the Logit model for the internal and external delinquency allows us to count seven variable that influential at the same time and according to their sign (positively or negatively) the internal and external delinquency of groups, and other variables that act separately on every specification. The possession of an internal regulation that serves as a means to select group members from the beginning and thereafter of sanction in case of default appears among the main factors that affect negatively the delinquency under its two measurements. While increasing the transparency and by the way the reduction of internal conflict between group members as well as the coordination costs, the internal regulation reduces in a meaningful manner the delinquency and improves the repayment performance. In

his works Wenner (1995), shows that the use of internal written code reduces meaningfully the repayment problems.

The coefficient of *SAMEBUS* that informs on the homogeneity of the group members professions affect solely and negatively the internal delinquency. It indicates that groups whose members share the same profession have a weak probability of internal delinquency. While sharing ideas and advices and while working in group, projects develop and groups improve their repayment performances. In the same way, the more the group members are homogeneous in their business, the simpler will be the mission of monitoring, and the least will be the repayment problems. Wydick (1999), consider that the correlation of activities facilitate the monitoring within groups and improve therefore the repayment rates.

The coefficient associated to the knowledge of other group members before the formation of this one that is a social tie proxy is meaningful and negative. The mutual knowledge between group members increases the existence of social ties and reduced consequently the delinquency. The probability to show the group solidarity will be more raised driving therefore to support a member with repayment problems (Devreux and Fische, 1993). The positive correlation between the group age that is also a social tie proxy and the external delinquency indicate that the more the length passed by the borrower within the group is long, the more the problems of external delinquency tend to occur. One estimates that this incitement can be due to the distinct evolutions in time of member needs encouraging tensions within groups, to costs of insurance more elevated supported by small borrowers of the group, and to the relations more and more long therefore more and more private that have tendency to drop the social control inside the group. Sharma and Zeller (1997) find also a negative impact of social tie on the repayment performance.

The sign of **PRESSURE** is negative and meaningful indicating the importance of the peer pressure in the reduction of external delinquency problems and in the attenuation of moral hazard behaviors of borrowers. The will to exercise a pressure after the deadline of the contract affects negatively the probability to make default. Indeed, in case of appearance of repayment problems, the non passivity of group members who are interested about future credit, facing the potential sanctions linked to the application of the peer pressure permits the group to reduce his repayment problems in order to respect his contract with the MFI. Similar results have been found by Ahlin and Townsend (2005) and Wydick (1999). The pressure exercised by group members on the defaulting member reduces considerably the repayment problems.

The variable **SELECTION** displays a negative coefficient and statistically meaningful confirming its positive impact in the reduction of the internal and external delinquency and in the improvement of the group repayment performance so that he repays on the agreed time. The good choice of borrowers appears as the key of success of the repayment. The solvent borrowers tend always to maintain relations with borrowers who share the same principles and the same intentions. The future of the relation with the MFI intervenes also in the selection because a borrower wanting to keep a good fame is going to present a good discipline of repayment and this while filtering appropriately from the beginning borrowers with which he is going to form a group. The survey of Zeller (1998) confirms also the positive role of the selection on the repayment performance.

The coefficient associated to the variable **SAMEAGE** (proxy of the homogeneity) is meaningful and positive indicating that the more the group members are homogeneous, the more the internal and external delinquency problems and by the way the repayment problems tend to occur. This result can be assigned to the fact that the productivity of group members of same age begins to decrease from a certain age, and then these members are more arranged to repayment problems. Groups of **SAMESEX** also make proof of a strong internal and external

delinquency. This result can be assigned in our context to the fact that groups of *SAMESEX* can have limited capacities of investment and of risk management. They are impoverished of the necessary experience to manage projects of high profitability. The homogeneity limits possibilities of fertile exchange of conceptions between the two sexes. Finally, a member of a homogeneous group discerning that the other members faces problems, will make also a proof of repayment problems in order to avoid the repayment of parts of these members in difficulty. Results of Paxton et al., (2000) indicate that the socioeconomic³ homogeneity increases meaningfully the repayment problems.

In our sample debtors of feminine sex display in a meaningful manner a weak external delinquency. Women are revealed the more disciplined facing the waiting of MFI. They are good manager and they have the will to work and to improve their life conditions. They are more responsible, more honest and more indebted than men. They are more appreciable to the social pressure because it is very badly seen when a woman doesn't repay, less mobile and more active in jointly liable groups (Montalieu, 2002). The targeting of women can have otherwise for purpose the increase of their decisional and economic autonomies (Empowerment) because it encourages their controls on resources.

The negative and meaningful sign of the *EDUCATION* coefficient clarifies that borrowers with raised levels of education possess a weak probability of delinquency. This human capital can help borrowers to better manage their business and to take advantage of the offered opportunities of gain reducing subsequently their delinquencies. Ahlin and Townsend (2005) found that the most productive groups in terms of education have a better repayment performance. Therefore, the more instructed the borrower is, the more he tends to respect his

³ A first indicatory of homogeneity used by authors worth one when five members of the group have: the same ethnic, the same gender, the same age, similar levels of income, participate to the same economic and social activities, and live in the same district. A second indicatory of homogeneity used is the number of different families to which belongs the five group members.

engagement and to pay on the agreed time. The works of Matin (1998) indicate likewise that the education reduces meaningfully the probability of default.

The empirical study shows a positive correlation between the external delinquency and the borrower's marital status. This result is not surprising because the married borrowers have a lot of charge to support and must always make facing the negative shocks (increases unforeseen of the consumption costs, illness of the family's member, etc). With a very limited budget, a married borrower meeting the aforementioned problems will in most cases delay the repayment of his instalment or even to miss his engagements.

The access to non financial services reduced considerably the internal or external delinquency of groups. The access to this kind of service (Accounting, Management, Marketing) improves borrowers faculties while allowing them a good affectation of their loans in the most profitable use, an efficient exploitation of business opportunities, and a good choice of productive project generating a considerable profit that will help them thereafter to repay their instalments and to keep a good relation with the MFI.

As we foresaw the ***TIES WITH THE LOAN OFFICER*** affects strongly the delinquency. The meaningful and negative sign of its coefficient clarifies the fact that the persistent relation between the loan officer and the group members let the aforementioned look for external or internal solutions in order to support the member with repayment problems. The argument behind this effort is not solely to guaranty the defaulting member but also to avoid trouble caused to the loan officer with the MFI. Apart from the relation loan officer-borrowers there is a familiarity that is born with time letting members share problems between them (including the loan officer), and try always to find the adequate solutions.

The coefficient associated with ***DIST*** has the tendency to affect the external delinquency as foreseen, but its coefficient is not meaningful suggesting that members do not significantly rely on mutual observation to enforce repayment discipline. Moreover, it would seem to imply

that the most important component of relational capital may be interpersonal trust between members rather than underlying threat of social sanctions for non contribution. The coefficient of *VISQUOT* has a negative sign as waited indicating that the exchange of visits between the group members facilitates the mission of control and reduces the occurrence of delinquency problems even to detect them before occurring but inopportunately it is not meaningful. The variable *PERIOD* also has the negative effect waited on the internal delinquency but his coefficient doesn't have a sense.

Contrary to the two other coefficients of homogeneity the coefficient associated with *SAMEDUC* has the negative sign foreseen from the beginning nevertheless, it is not meaningful. The coefficient associated with *OTHERSOURCES* is not meaningful and doesn't have the negative impact waited on delinquency. Similarly, the coefficient associated with *CRERAT* is not meaningful nor having the waited negative sign. The demand of credit amounts superior to their needs guaranteed to borrowers a sufficient amount for their business even after the credit rationing by the MFI. This strategy can let the credit rationing without effect on delinquency. Finally, the positive sign of the *GROUP SIZE* coefficient untangles that the more the number of members in the group increases, the more the delinquency problems tends to occur however, it is not meaningful.

Conclusion

We conduct two empirical studies with a Logit model in order to present the main factors behinds the delinquency of group lending. Results of two experimentations allows us to conclude that there are several factors susceptible to affect the internal and external delinquency at the same time, as well as others that act separately on every dimension of delinquency.

The internal regulation *INTRULE* which is a proxy of peer monitoring affects delinquency negatively. In the same way, the variable *SAMEBUS* that is also a proxy of peer monitoring acts solely on the internal delinquency while reducing the occurrence of this type of problem within groups. Two social tie proxies: the knowledge of other group members *KNOWMEMBERS* and the group age *GROUPE* are meaningful and act on delinquency. The *KNOWMEMBERS* reduce considerably the occurrence of repayment problems while the *AGEGP* nourishes solely the external delinquency since group membership is relatively fluid; it is likely that the frequent influx of new members prevents the groups to reach a sclerosis stage that affects their repayment performance. The *PEER PRESSURE* and the *SELECTION* prove to be negative and meaningful contributing to improve the group repayment performance. The group homogeneity is only meaningful on two levels: the homogeneity age *SAMEAGE* and the homogeneity sex *SAMESEX* affecting positively the group delinquency. For the variables relative to personal features, the empirical study shows that *AGE* doesn't affect delinquency; the *SEX* contributes to improve the repayment performance while acting negatively on the external delinquency, the *EDUCATION* reduces considerably the occurrence of delinquency problems, and finally, the *MARITAL STATU* with a positive sign increases the problems of external delinquency. With regard to control variables, only one variable contributes to improve the group repayment performance; it is the *NON FINANCIAL SERVICES* displaying a coefficient with negative sign. And in a worry to contribute to the empirical studies relative to the group lending we tested the impact of a new variable that to our knowledge has not been treated by the previous studies. This variable is the *TIES WITH THE LOAN OFFICER*. We planned a negative sign for this variable and effectively the empirical study confirmed our waiting.

In a worry to improve their repayment performances, the MFI must target in priority women as well as the single borrowers and aim at the groups homogeneous in their business that present according to our empirical study a good repayment performances. It is preferred that the MFI's give the chance to the group members to select themselves since they monitor efficiently each other and exercise a strong pressure on the defaulting members.

Finally, our study presents insufficiencies articulating essentially around the variable subjects of the empirical investigation. It tests only some variables in each set (peer monitoring, social ties, etc), and it may be that the missed variables influence considerably the repayment performance.

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