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**THE INDIVIDUAL MICRO-LENDING CONTRACT: IS IT A BETTER
DESIGN THAN JOINT-LIABILITY?
- EVIDENCE FROM GEORGIA -**

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Abstract: We analyze the incentive mechanism of individual micro-lending contracts and we compare its key factors with those of joint-liability loan contracts. Using our data set, we firstly show that in the individual contract there are three elements, the demand for non-conventional collateral, a screening procedure which combines new with traditional elements, and dynamic incentives in combination with the termination threat in case of default, which ensure high repayment rates of up to 100%. We further show that the joint-liability approach may lead to similar repayment rates, however based on a different incentive system. We reveal that the target group which can be efficiently served by either one of the two mechanisms is different.

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1 INTRODUCTION

When talking about poverty alleviation, the slogan “to help the people help themselves out of poverty” has become ubiquitous. One of the central means to realize this goal are the new micro-finance approaches which all over the world lend small amounts of working-capital to poor people who are without access to credit facilities. These small amounts should enable them to increase their incomes above the poverty line by switching from day-labor, from unemployment or from under-employment to self-employment. However, discussions about the best way out of poverty often turn out to be ideologically driven. And so we can observe within the micro-finance ‘movement’ two differing approaches which were developed over the years and whose protagonists are charging each other’s model as inadequate.

Micro-Finance Institutions (MFIs), in order to mitigate the typical problems created by the informational asymmetries between the contracting parties, basically use two different contract designs: the individual and the group micro-lending contract. Under the group contract, loans are given to individuals but these individuals – instead of providing a collateral – have to form groups of three to ten persons where all members are held mutually responsible for all credits of the group until the last group member has fully repaid his loan. Under the individual contract, lenders demand collateral for the loan but they also employ new screening procedures combining elements from the traditional credit technology with methods which are also used in the group-lending technology.¹

Methods used in both schemes are the so-called credit rationing², the termination threat, regular repayment schedules and the dynamic incentives of eventually increasing loan sizes. In addition, MFIs (more under the individual than under the group scheme) rely on detailed analysis of the borrower’s business and household. Both kinds of contracts are able to induce high repayment rates among borrowers (many MFIs report rates little less than 100%). And both kinds of contracts are able to secure financially self-sustainable institutions, thus, showing that the respective MFI is working successfully. Nevertheless, proponents of both methods charge the work of the other side often as “not helpful” and suggest that one method should be substituted by the other. The main argument raised against the individual contract is that the collateral requirement makes it impossible to reach the target group of poor people since it is in particular them who have nothing to pledge as collateral (see Khandker [1998]).

Against the group-loan contract it is raised that the screening, monitoring and enforcement cost, for which originally the lender is responsible and which are partly transferred from the lender to the group of borrowers (by having group meetings, monitoring of the group members etc.), are too high for the borrowers (see e.g. Schmidt and Zeitinger [1997]). A second complaint (see Madajewicz [1999]) is that group-loans decelerate the development of

¹ There is a substantial theoretical literature on the group lending scheme. For an overview, cf. Morduch [1999].

² cf. Stiglitz and Weiss [1981] for the fundamental analysis of the incentives created by credit rationing.

businesses due to its restrictive increase of loan sizes. A third argument is that only with the “relatively richer among the poor” (those who have collateral) it is possible to make ‘serious business’ of a size which has an impact on the private sector.

The aim of the present paper is, therefore, by comparing a sample of individual with another sample of group lending contracts, to better understand the advantages and the limits of both mechanisms. To make such comparison meaningful we, firstly, analyze the individual loan contract in its facets beyond the collateral requirement. We ask in particular which components of the individual loan contract are responsible for the high repayment rates. Then, we compare the incentive mechanisms of the individual with the group scheme (which is more deeply analyzed in Vigenina and Kritikos [2003]) and we develop a test to determine those factors which induce each borrower to choose either one of the two contracts.

The data used for testing the impact of all lending components and for the comparison of the two lending schemes were obtained through questionnaires given to borrowers of two MFIs, the Microfinance Bank of Georgia (MBG) which employs an individual lending scheme, and the Foundation Constanta which uses a group lending scheme. Both micro-finance institutions have branches in Batumi, Georgia, operating in a fully identical cultural and economic environment and have partially overlapping target groups. Their different lending technologies are the only factor responsible for the observed differences in (1) the outreach and (2) the efficiency of the employed incentive mechanisms. This allows us to provide a direct comparison between both programs and to answer the key research questions.

The rest of the paper is organized as follows. Section 2 describes the lending technology of MBG. In section 3, a brief overview is given over the theoretical and empirical literature on individual micro-lending mechanisms. Section 4 presents the empirical analysis of the individual micro-lending technology. Section 5 compares its outcomes with the group-lending method. Having determined the main factors responsible for the high repayment performance we also address in section 5 the group versus individual lending debate. In section 6 some conclusions are drawn with respect to the viability of both lending methods.

2 Lending at MBG, Georgia

The Lending Methodology: MBG Batumi (Microfinance Bank of Georgia) is an officially licensed banking institution providing micro and small loans to individuals who *are* able to pledge collateral.³ Its target is to support micro and small entrepreneurs by granting them loans which are specifically tailored to their needs. The loan size ranges from US\$ 200 to US\$ 25.000 and has to be repaid within 1 month to five years (depending on the loan size and the cash-flow of the borrower).⁴ The nominal monthly interest rate varies with the credit size. For

³ It follows the credit technology of the German firm “Interdisziplinäre Project Consult” (IPC), which is designed for micro and small enterprises, see also Churchill [1999].

⁴ Most commercial banks in Georgia focus on loans above \$ 10.000.

loans up to US\$ 5.000 it ranges between 2,5% and 3% and is calculated on the basis of the outstanding balance of the credit. MBG aims to establish a long-term relationship with its borrowers and, thus, offers subsequent loans if previous ones were repaid on time.⁵

Loans are usually repayable in monthly installments, and are backed by collateral, the value of which should equal or exceed 150% of the amount due. MBG Batumi requires two kinds of collateral – one covering the whole amount due (including interest rates) and the second one covering two to three monthly installments.⁶ As a second collateral the bank takes gold (due to its high liquidity).⁷ The main role of the second collateral is to discipline current borrowers and decrease the losses for the bank when a default occurs. This requirement can be seen as a self-selection mechanism separating diligent from non-diligent borrowers. The credible threat of selling the gold in case of default discourages non-diligent borrowers from taking a loan.

The Lending Procedure and Enforcement Measures: The central role is given to the loan officers. They bear the responsibility for the entire lending process – screening, monitoring, and enforcement. In order to recognize the borrower's risk type and to analyze his repayment capacity, the loan officers make detailed cash-flow based analyses of the applicant's household and business. For reasons of risk diversification, MBG (as all micro-finance organizations) does not separate the finances of the enterprise from those of the household and analyzes all sources of revenues and expenses. In addition, the personal aspect is an important part of the whole analysis on borrower's creditworthiness. Most loan officers guess that the ability to correctly analyze the clients' personality with respect to his entrepreneurial skills is crucial for their success. As the loan size increases, the importance of the personal analysis diminishes at the expense of the financial analysis. Depending on their findings, the loan officers determine repayment conditions that will fit possibly best the borrower's repayment capacity. The loan terms vary from client to client depending on the profitability of the business project and on the client's ability to show his creditworthiness.

The main monitoring tool of the loan officers is the regular repayment schedule. In addition, they make unannounced informal visits at the borrowers' sites. In case of delinquency the enforcement measures depend on the reason of default. In case of temporary problems repayment schedules are restructured. In case of permanent repayment problems the collateral is seized and sold within few days if the borrower rejects repayment.

Branch Performance: MBG Batumi reached the operational break even point after five months. At the time of our investigation the branch had over 1000 active borrowers, a total net loan portfolio of around US\$ 2 700 000, and a 100 % repayment rate. The approximate number of clients per year served by one loan officer is around 100 persons.

⁵ The core data of MBG correspond to the credit conditions offered by similar institutions in other countries, if financial self-sufficiency is targeted. For an overview, see MicroCreditSummit [2002].

⁶ For loans up to US\$ 2.500 the bank usually takes as collateral cars, TVs, VCRs, stoves, refrigerators, and other household appliances. For larger amounts, above US\$ 2.500, a mortgage on the house is required.

⁷ For the residents of this area keeping gold at home is a long national tradition.

3 Existing Approaches and Research Agenda

3.1 Approaches on Individual Micro-Lending

While most research is concerned with the analysis of the group lending scheme, we will concentrate on the individual incentive mechanism, i.e. on non-conventional collateral, screening processes by the MFI, regular repayment schedules, and dynamic incentives.

When a loan contract should be concluded, the lending institution needs to find an effective way to overcome the adverse selection, moral hazard and enforcement problems. The main mechanism addressing all three problems is given when the respective borrower is able to signal his willingness for full loan repayment by pledging collateral which covers the loan amount and the interest payment – as is required at MBG. In addition to the signaling process by the borrower, at MBG (as in other individual micro-lending institutions, cf. e.g. Gonzales Vega et al. [1997] or Churchill [1999]) the adverse selection problem is further directed by a complementary screening process of the loan officer (see section 2) who aims to generate as much information about the borrower's repayment capacity as possible. In this process, as Armendariz and Morduch [2000] note, "documentary evidence tends to be de-emphasized relative to standard banking practices and local character assessment gains prominence." Two results are expected out of this combined signaling and screening process: Firstly, only borrowers whose investment project promises a high probability of success are selected. Secondly, borrowers may have access to higher loan volumes with less screening efforts by their loan officer, if previous loans have been repaid on time (see also Madajewicz [1999]).

Section 2 has also highlighted the role of regular repayment schedules to prevent the borrower from moral hazard behavior. There are two main reasons for employing this feature. First, if the loan contract foresees regular installments, the loan officer receives early information if the borrower faces a problem in his business. Second, regular repayments, in particular if the repayment has started before the investment has created income to the borrower, enables the MFI to lend against further income streams of the borrower's household.

When it comes to the enforcement of loan contracts, the loan officer is again enabled to intimidate the borrower with several sanctions if the loan officer adjusted the size of the actual loan to the current needs of the borrower and if he had given perspectives for a stream of future loans of larger size. Besides the already mentioned threat of selling the collateral within some days, loan officers can cut off defaulting borrowers from further access to loans, which they may need to continue their business. (The effects of non-refinancing threats were first formalized in Stiglitz and Weiss [1983].) Borrowers have an incentive to repay their current loan as scheduled so that they will have access to further loans of increasing volume.

Going through the process of a typical loan contract at MBG, the present paper, firstly, aims to find out to what extent each part of the incentive mechanism and the screening activities of

the loan officers contribute to the high repayment rates at this particular MFI. Secondly, we address the question to what extent potential competitors of MBG may reduce the provided incentive to the borrowers of MBG to return the received capital. Third, having determined the main reasons for the borrowers to repay their loans, we will compare them with the most important factors leading to similarly high repayment rates in group-lending schemes.

3.2 Approaches on the Comparison of Micro-Lending Contracts

Induced by the discussions of different proponents of micro-lending we will employ in the present paper a direct and a rather indirect comparison of the two contract designs with respect to their incentives schemes. We aim to answer the questions to what extent

- a) borrowers perceive the group-lending scheme as a mechanism being too costly for them,
- b) the development of businesses is hampered by insufficient loan increases in the group lending scheme,
- c) only group-lending schemes are adequate to reach the poor among the population.

Some of the questions were addressed from a theoretical point of view. If potential borrowers lack collateral, Madajewicz [1999, p. 28.] shows that a group contract might be preferable to an individual contract because “peer monitoring is more efficient than is monitoring by the lender even when both have access to the same monitoring technology.” Vice versa, for the richer among the poor borrowers (those who have collateral) the choice of the individual contract is more efficient than the group contract because at the same cost they may get access to larger loans. Thus, according to Madajewicz [1999] the choice of the contract (with either lender or peer monitoring) is supposed to depend on wealth.

These theoretical assertions are supported by the empirical evidence from different group lending programs in Bangladesh. In Madajewicz [1999] it is shown that group loans are larger than individual loans at a low level of wealth while individual loans are larger than group loans above a certain wealth level. It is concluded that the businesses of wealthier clients which are financed by individual loans grew larger due to the access to higher loan volumes than businesses financed by group loans. It seems, thus, that the main determinant for the development of a business is the current wealth status of the borrower which determines the access to either one of the two contract designs. As a consequence, one may expect that the wealthier among the poor (those who are able to pledge collateral) may prefer individual to group contracts.⁸ In the present paper, therefore, we further aim to find out whether

- d) all wealthier among the poor borrowers prefer individual to group loans?
- e) the current wealth status of a borrower determines the future development of his business.

This culminates to the general question whether there is a better micro-lending design when we compare the two kinds of contracts.

⁸ Such evidence is given e.g. in Otero and Rhyne [1994] and in Gonzales-Vega et al. [1997].

4. Empirical Test of the Individual Micro-Finance Contract

In this section the sampling design and the data are presented. Along the line of the theoretical propositions presented in section 3.1, our survey instrument focused on the borrowers' socio-economic characteristics and their interactions with the MFI. The borrowers of the two MFIs were surveyed in winter 2001/2002. The interviews were carried out in and around the Georgian City of Batumi. Since we were interested in the micro-lending activities of both Institutions, the survey sample consists only of micro-entrepreneurs who received loans less than 2.500 USD. We interviewed 125 randomly selected borrowers from MBG (13% of all borrowers who received a micro loan in this branch) and 108 randomly selected groups from Constanta (24% of the total number of borrowing groups). 11 clients of Constanta and 4 of MBG were excluded from the final sample as we found inconsistencies in their responses⁹. The questionnaires given to the clients of Constanta and MBG were designed in a similar way. Questions addressing the same program features (e.g. progressive lending, regular repayment schemes) were kept fully identical.

For the subsequent tests we use an econometric model which replicates the two stage nature of the principal-agent interaction: the stage where the borrowers are screened before the contract is signed, and the stage where the repayments are enforced.

4.1 Testing the efficiency of the screening procedure

4.1.1 Hypothesis

The individual micro-lending technology implies a direct credit analysis on the borrower's creditworthiness in addition to the collateral requirements he has to meet (see sect. 2). Before signing the contract, previous models (e.g. Armendariz and Morduch [2000]) predict that the more efforts loan officers put into the assessment of the borrower's business and household to identify the risk type of every potential client the better will be tackled the adverse selection problem which every lender faces. In Hypothesis 1, we operationalize this assertion:

Hypothesis 1: The higher the loan officer's screening efforts, the higher the probability to recognize the risk type of a borrower.

The process is replicated in equation (1). We specify an ordered logit model to estimate the parameter coefficients.

$$\boxed{\begin{array}{c} \text{Borrower's Risk} \\ \text{Type, } Y_1 \end{array}} = \boxed{\begin{array}{c} \text{Screening} \\ \text{Efforts,} \\ \text{SE} \end{array}} + \boxed{\begin{array}{c} \text{Written} \\ \text{Records,} \\ \text{WR} \end{array}} + \boxed{\begin{array}{c} \text{Industry} \\ \text{Sector,} \\ \text{IS} \end{array}} + \boxed{\begin{array}{c} \text{Education,} \\ \text{E} \end{array}}$$

⁹ We tested the trustfulness of the information given by the clients by comparing the answers to certain questions with the information we obtained directly from the loan officers. 121 interviewees answered truthfully and were included in the sample.

$$\ln \left[\frac{\sum_{k=1}^J P(Y_1 = j)}{1 - \sum_{k=1}^J P(Y_1 = J)} \right] = \alpha^j + \beta_1 SE + \beta_2 WR + \beta_3 IS + \beta_4 E \quad (1)$$

where $j = 1, 2, \dots, J$ indicates the ordered categories in the dependent variable.

The dependent variable, Y_1 , reflects the default probability of the surveyed borrowers which we denote as risk type. The borrowers were classified into three groups according to the risk profile of their business projects¹⁰: The clients ordered into group 1 were assessed as “higher risk”, the clients from group 2 as “intermediate risk”, and those from group 3 as “low risk”. In contrast to all other questions in the survey instrument, this classification was done by the *loan officers* of the MBG Batumi. Their evaluation is based on the initial screening process and in particular on the permanent updating process which is done by the loan officers by considering the borrowers’ repayment behavior, their most recent cash-flow analysis, their entrepreneurial characteristics and any other information which changed the risk profile.

Equation (1) reveals to what extent the individual lending technology is able to recognize the borrower’s risk type if the screening effort is increased. The first independent variable, SE , reflects the loan officers’ screening efforts. It is measured by the number of meetings between the borrowers and the loan officers that took place prior to the loan disbursement.

Besides the *screening efforts*, the right-hand side contains the variables *written records (WR)*, *education (E)*, and the *industry sector (IS)* of the client’s investment activity, factors which are observable. They allow to test whether the lender (using further available information) is able to better identify certain borrower types. E is a dichotomous variable taking a value of 1 if the respondent has a university degree and 0 otherwise¹¹. The parameter coefficient should be positive if the assumption holds that higher educated people become better entrepreneurs. WR (a dichotomous variable) shows whether the entrepreneur has any accounting skills or not. The last variable, IS (a value of 0 for trade & services, 1 for production), allows to test whether the borrowers involved in manufacturing activities are more successful than traders.

4.1.2 Empirical Results

Hypothesis 1 will not be rejected if the β -coefficient of the *screening efforts* variable proves to be significantly different from zero. Table 1 offers descriptions of all variables used in the model. The tests of parameter significance are listed in Table 2. The z-statistics are estimated

¹⁰ The loan officers were asked to evaluate on an ascending scale the business projects of their clients (from 1 – “very problematic” to 5 – “very stable and promising”). None of the businesses but one was assessed as “very problematic” or “somewhat problematic”.

¹¹ The level of education in Georgia is high. In our sample 40% of the borrowers are university graduates.

using the White heteroscedasticity-consistent covariance matrix to calculate standard errors ¹².

- insert Tables 1 and 2 about here -

The empirical analysis reveals that *screening efforts* is significant with a positive coefficient.

Result 1: (1) The screening technology employed by MBG proved to be effective as its more intensive implementation significantly increases the probability that the selected borrowers will be of a better investment risk.

Result 1 is central in two ways: On the one hand, it supports the assertion that a micro-lender cannot become successful as long as he bases the decision to borrow capital to a micro-entrepreneur on his willingness to pledge collateral (even if it theoretically covers the full loan amount). Only an additional costly assessment of the risk characteristics enables the MFI to keep the later monitoring and enforcement cost at a low level. Since the MFI prefers to select borrowers who will punctually repay their installments instead of having to seize their collateral after a break down of their firm, the screening cost seem to be a “good investment”.

All other variables proved to be insignificant. It seems that the better education and the higher accounting skills do not give any advantages to the local micro-entrepreneurs.

4.2 Testing the efficiency of further incentive mechanisms

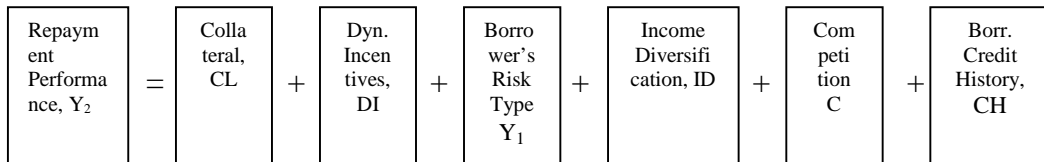
4.2.1 Hypothesis

After the loan disbursement, theory predicts that the MFI may rely on different incentives, such as collateral requirements, regular repayments, and the threat of excluding defaulting borrowers from the access to further and to increasing loans (cf. Stiglitz and Weiss [1983], Bolton and Scharfstein [1990]). In addition, earlier research (see inter alia von Pischke [1991]) made clear that the repayment probability is also increased when households have different kinds of income. In particular if the business project does not develop as expected (where dynamic incentives stopped to have any influence on the repayment ability) the chances of due repayment are the higher, the better the borrower’s income is diversified. Moreover, Armendariz and Morduch [2000] made clear that the dynamic incentives will be weakened if competition between MFIs becomes increasing, at least if there is no credit rating agency. In order to estimate to what extent each part of this mechanism ensures that MFIs are able to sufficiently solve the moral hazard and enforcement problems, and to what extent these incentives are weakened by potential competitors, we provide

¹² C.f. White [1982].

Hypothesis 2: The higher a borrower values his collateral and the opportunity to establish a long-term relationship with the bank and the better the income of the borrower is diversified, the better his repayment performance will be.

Hypothesis 2 is analyzed by testing for parameter significance of the variables *collateral*, *dynamic incentives*, *income diversification*, *competition (between banks)*, and *borrower's risk type*, the dependent variable of hypothesis 1, in relation to the repayment performance of each borrower. To examine the data we apply a tobit model.



$$Y_2^* = \alpha + \gamma_1 CL + \gamma_2 DI + \gamma_3 Y_1 + \gamma_4 ID + \gamma_5 C + \gamma_6 CH + \varepsilon, \quad (2)$$

$$Y_2 = 0 \text{ if } Y_2^* \leq 0, \quad Y_2 = Y_2^* \text{ if } Y_2^* > 0,$$

Equation (2) is introduced to capture the second stage of the principal-agent interaction. The borrower's *repayment performance* is used as a dependent variable. Each borrower is expected to pay monthly installments according to his individual schedule. Payments are due on a particular day of the month. At the time of our investigation, there were no cases of default or late payments in MBG Batumi. The case is quite the reverse. A large share of the payments were contributed in advance. The managers of the bank consider this behavior as a good indicator of the clients' repayment performance. Since loan officers pay penalty fees to the bank for each late payment of a borrower served by them, they encourage their clients to make early installments so that they are able to avoid the occurrence of repayment failures. And because the borrowers know that early repayments would help them build a good credit history with the bank, they are willing to do so whenever they can. For the purpose of our study we measure the *repayment performance* as the number of monthly installments paid by the borrower in advance divided by the total number of contributed installments. The necessary information we obtained directly from the borrowers' files kept in the bank.

With respect to the independent variables, next to the five variables with which we test in Hypothesis 2, we added the factor *borrower's credit history*, assuming that it will influence the repayment performance, as well. Starting with the description of the first independent variable, *collateral*, borrowers were asked to evaluate on an ascending scale from 1 to 5 how much time and effort it would take them to restore the collateral if the bank seized it. According to standard theory, we expect to find evidence of a positive correlation between the variable and the borrowers' repayment performance. *Dynamic incentives* indicates to what extent the client values the opportunity to receive larger subsequent loans. It is computed as

the difference between the borrower's actual credit needs and the value of the loan received, expressed as a percentage of the loan amount: $\frac{CreditNeeds - LoanSize}{LoanSize}$. The higher the ratio,

the higher the needs for additional financial means and hence the stronger is the borrower's motivation to apply for a larger loan. Thus, in the line of Bolton and Scharfstein [1990], we expect a positive correlation between dynamic incentives and the repayment performance. The same holds for the variable *borrower's risk type* (see hypothesis 1) where it should be expected that the repayment performance is better the lower the risk type of the borrower.

Further variables that are assumed to influence the borrowers' repayment performance are: *Competition* which is a dichotomous variable taking a value of 1 if the client reported to know other financial institutions in the region he/she could borrow money from. According to Armendariz and Morduch [2000], we expect that the greater the likelihood of being financed by a second lender, the weaker will be the incentive to repay the first one. *Income diversification* (in the household) is a scale ranging from 1 to 5 indicating to what extent the alternative income sources in the borrower's household exceed the income from the investment project. In line with von Pischke [1991] we expect that the higher the income diversification, the higher are the chances that the borrower will repay. *Borrower's credit history* is a dichotomous variable taking the value of 1 if the client reported to have borrowed money for business purposes prior to joining the lending program of MBG.

4.2.2 Empirical Results

In Table 3 we report the results from the applied tobit model. As in equation (1) we use the White heteroscedasticity-consistent covariance matrix to calculate standard errors. The empirical results support hypothesis 2. The borrowers' repayment behavior is significantly influenced by the following variables: *collateral*, *dynamic incentives*, *borrower's risk type*, and *income diversification*.

- insert Table 3 about here -

The present analysis underlines the importance of the collateral requirement as central method to differentiate between high and low risk borrowers and to mitigate moral hazard behavior among the chosen borrowers. The present analysis also supports those micro-finance approaches which suggest that the mere collateral requirement is not sufficient to realize high repayment rates. As the significance of the variable *dynamic incentives* shows, it is of similar importance to employ step-lending measures which restrict the offered loan amount to the actual needs of the client and which open the perspective to the client for having further access to higher loan volumes only if he repays the current loan as agreed in the contract.

The significance of the variable, *borrower's risk type*, underlines that, besides the self-selection induced by the collateral requirement and the dynamic incentives, it is necessary for

the financial success of the MFIs to run a screening procedure. The repayment performance depends on the ability of the loan officers to correctly recognize the risk type of their clients in order to avoid or reduce later enforcement cost such as seizing the collateral. *Income diversification* is the last significant variable. Alternative income sources in the household can be considered as a kind of insurance against delinquency in case of a business failure.

With respect to the variable *competition*, we expected to find evidence of a negative correlation with the *repayment performance*. The coefficient is insignificant and close to zero, showing that MBG does not have direct competitors in the region whose activities could jeopardize its financial soundness. The insignificance of *borrower's credit history* shows that the earlier borrowing experience does not give any additional information to the bank about the clients' repayment behavior.

Result 2: To mitigate the moral hazard and enforcement problems MBG relies mainly on (1) the efficiency of the loan officers' work before the loan is disbursed and (2) the borrowers' willingness to both preserve the collateral and establish long-term relationships with the bank which offers them access to subsequently higher loans.

Result 2 stresses the necessity of having a complementary screening procedure in addition to the self-selection processes created by the demand for collateral. Finally, it is remarkable that before and after the loan disbursement positive incentives (assessment as a "good risk", access to higher loans) as well as negative sanctions (strong restrictions on the initial loan size, pledging collateral which can be seized) are part of the incentive system.

5. Individual and Group Lending

5.1 Comparison of Key Factors of Individual and Joint-liability Loan Contracts

The aim of this study is also to compare the dynamics of individual loan contracts with joint-liability. For revealing the crucial factors driving the repayment in both approaches, we need, first of all, to give an overview of the main variables which lead to these repayment rates at the MFI Constanta, the micro-lender who offers joint-liability contracts and who is situated in the same area as MBG (and shares even offices). Similar to the above analysis, we separate the key factors of joint liability with respect to the timing of their impact.

Self-selection is the main variable which determines whether or not a person will get access to a group loan. It describes a process which implicitly contains two steps. The first step is the process of assortative matching. Induced by joint liability, low-risk borrowers group with other low-risk borrowers (by using local information which the MFI is unable to obtain) and high-risk borrowers team up with high risk borrowers. The second step of the self-selection process ensures that the joint-liability contract attracts only low-risk borrowers because it pays only for them to accept the obligations of a group loan (being responsible for the full

loan repayment of all group members). Thus, if the group loan-contract is designed in a sufficient way it is possible to attract only borrowers with low risk characteristics.

After the loan disbursement, one has to distinguish between two states with respect to the repayment performance. In state one, when the business development enables every group member to pay his installment, group members usually make their loan repayments in order to preserve their *access* to further loans. In state two, when the business development of one (or more) member(s) in the group causes arrears, the incentive system and/or the complementary pressure of the loan officers activates mutual processes within the borrowing group. With respect to the borrowers of Constanta we could observe that, depending on the reasons of the arrears, group members either gave financial *peer support* to delinquent partners, or increased the *controlling* of their activities, or put the delinquent borrowers under *peer pressure* to make their installments. These mutual activities forced delinquent borrowers to repay their debt (with delay), but at the end they were able to realize repayment rates of nearly 100%. It is also necessary to emphasize that these high repayment rates could only be realized because of the *complementary* screening and enforcement process carried out by the loan officers.¹³

Comparing now the key factors it becomes clear: At Constanta the self-selection process is secured by assortative matching, while at MBG it is induced by collateral which the borrowers are ready to pledge, in MBG supported by higher screening efforts of the loan officers than in Constanta. Accordingly, at Constanta one loan officer serves up to 450 clients, while at MBG their number does not exceed 100 Clients. Obviously, loan officers at Constanta have only complementary duties in the self-selection process while the loan officers at MBG play a major role with respect to the risk assessment of the borrowers.

Under the individual loan-contract it is the pressure of the loan officers to sell the collateral in case of default which instigates borrowers to pay back their loans. And it is the prospect of access to *higher* loans which induces the borrowers to repay on time or even earlier. Under joint-liability contracts the members of the group take over part of the controlling and of the pressure towards delinquent borrower(s) in particular if the latter himself is responsible for the arrears. The loan officers again have “only” complementary duties aiming to secure the necessary mutual processes at an early stage of the delinquency. It is further remarkable that access to *subsequent* but not to higher loans is part of the reason to pay on time. At Constanta, only a minority of borrowers increased their loan size to the extent allowed by the MFI.

The comparison of the key factors clarifies certain aspects that were controversially discussed in theory and practice: On the one hand, the collateral is confirmed to be crucial in the individual lending contract. It cannot be discarded without substitute, as suggested in Armendariz and Morduch [2000, 401] who argue that programme features as “direct monitoring, regular repayment schedules, and the use of non-refinancing threats” ... will

¹³ For more details, cf. Kritikos and Vigenina [2003].

“generate high repayment rates from low-income borrowers without requiring collateral and without using group lending contracts that feature joint liability”. On the other hand, the collateral may be fully substituted by a joint-liability approach. Joint-liability serves as a self-selection criterion and as an enforcement device of similar power as a collateral and is able to ensure high repayment rates, as well.¹⁴

Moreover, loan volumes offered by the two MFIs are different. At Constanta, the average loan size is 220 Euro, at MBG it is 965 Euro. In order to be profitable (at similar interest rates which Constanta is charging in comparison to MBG), under joint-liability the efforts of the loan officers need to be reduced. Since the necessary amount of efforts is more or less the same irrespective of the loan size, the major part of these efforts needs to be transferred to somebody else, unless interest rates are increased to the amount local usurers are charging.¹⁵ And so it happened at Constanta where the group of borrowers handle most of these tasks while the loan officers are restricted to some complementary duties so that the transaction cost for the bank staff could be reduced at the expense of their clients.

The differing incentive systems allow for a first conclusion: The two MFIs target different types of borrowers. This induces selection processes not only with respect to the question whether a potential borrower is able to show his creditworthiness but also with respect to the MFI the borrower will choose. It would have been impossible with the incentive system of MBG to select those clients without collateral which successfully applied for a loan contract at Constanta and it would have been impossible for Constanta to serve the borrowers of MBG with the adequate loan product fitting to the incentive structure of the group-loan contract.

5.2 Factors Determining the Choice of the Lending Contract

5.2.1 Hypothesis

While in the last section we employed a rather indirect comparison between the two designs, in this subsection, we focus on the direct comparison of group with individual lending contracts. In particular we want to find out, which product is preferred by the borrowers and which reasons may account for the revealed preferences.

Earlier research highlighted the benefits of individual loans and the disadvantages of group loans. Madajewicz [1999] emphasized that group-loans are usually highly standardized and offer the same loan terms and conditions to all clients without taking into account their individual needs. Gonzales-Vega et al. [1997] and Diagne [1997] pointed out that under the

¹⁴ See e.g. Gonzales-Vega et al. [1997], Paxton [1996] and Sadoulet [1997] where doubts were raised that joint-liability could serve as a full substitute for collateral.

¹⁵ See e.g. Diagne [1997] who describes the excessive costs of joint liability. Our comparison makes clear that those borrowers who lack collateral and need small amounts have the choice between joint-liability contracts and the offer of the local usurer. It is then obvious that low-risk borrowers for whom joint liability is *not* leading to excessive costs will prefer group contracts and high risk borrowers will prefer the offer of the usurer.

group-loans borrowers may suffer from increased transaction cost because of their obligations to participate in meetings, to be present for jointly signing contracts, to monitor their peers, and to impose social sanctions. In contrast to this, the same three approaches stress that the individual lending contracts are usually personalized which means that the loan terms and conditions match the client's demand and the cash flows of his enterprise. Besides, borrowers do not bear the risk of losses from extra payments when other group members do not repay.

If we confront now these arguments with each other, we could derive the simple hypothesis that borrowers are supposed to prefer individual to group-lending contracts. Micro-entrepreneurs may become borrowers at a group-lending program only if they do not have access to individual loans either because they do not possess any collateral to pledge or because there is no MFI in their neighborhood offering individual contracts.

Empirical results do not fully support these assertions. If it holds we should expect that all borrowers of Constanta lack sufficient assets to pledge as collateral. However, we found that 11% of them were able to secure their loans at the time they signed the joint-liability contract. Apparently, there must be other reasons inducing some micro-entrepreneurs to deliberately choose a group-lending contract.

At the end of section 5.1 we suggested that there might be a self-selection process where clients choose a MFI for reasons other than their wealth status. In particular, we showed that dynamic incentives had no significant influence on the repayment behavior of the borrowers of Constanta, but did matter at MBG. In this case, it would not be the loan product which determines the size of the investment. It may be 'the other way around', namely that there are borrowers demanding different loan amounts. In recent research (Lazear [2003] and Kritikos and Wießner [2004]), it is suggested that entrepreneurs might be classified into different types characterized by their skills in the decision process of developing a business project. Depending on these skills, there might be entrepreneurs who are able to plan a business of increasing size (to be classified as *dynamic business* throughout the rest of the paper). Due to the dynamic perspective of their investment, these entrepreneurs might become borrowers who need increasing loan volumes. And there might be entrepreneurs who are planing – due to their lower skills - a business with lower dynamic perspective (to be classified as *static business*). Due to the lower dynamic perspective of their investments, these types may become borrowers who do not need substantial increases in the loan volume. This leads to

Hypothesis 3: If an individual and a group lending organization operate in the same market niche, there will be a self-selection process not only with respect to the wealth status but also with respect to the financial needs which are determined by the expected dynamics of the borrower's business.

Hypothesis 3 will not be rejected if we find significant differences in the business development between the clients of MBG and of those clients of Constanta who are able to

pledge collateral. For the test we apply equation 3 inserting the variables *business development*, *interest rate* and *education*. To obtain the coefficient estimates we employ a binary logit model.

$$\boxed{\text{Type of lending contract (Individual or Group), } Y_3} = \boxed{\text{Business Development, BD}} + \boxed{\text{Interest Rate, IR}} + \boxed{\text{Education, E}}$$

$$\ln \left[\frac{P(Y_3 = 1)}{1 - P(Y_3 = 1)} \right] = \alpha + \delta_1 BD + \delta_2 IR + \delta_3 E \quad (3)$$

where $Y_3 = 1$ if the borrower has an individual lending contract, 0 otherwise. The data we use for the test include only those borrowers who had sufficient assets to pledge collateral.

The dependent variable in equation 3 is determined by the choice of the contract. *Business development (BD)* is the first factor which is expected to influence the choice of the lending contract. It reflects (on an ascending scale from 1 to 5) the development of the borrower's business project since the borrower received his first loan. We expect the borrowers with faster developing businesses to favor personalized, individual contracts.

The second independent variable, *interest rate (IR)*, measures the sensitivity of credit demand to interest rate. It is a dummy variable taking a value of 1 if the entrepreneur said he would have taken a loan at interest rate of 5 – 8% per month.¹⁶ Expectations are that group-loan borrowers will be less sensitive to the cost of borrowing than individual loan borrowers, because the former ones basically need access to loans of a size where the credit cost in relation to the generated income are rather small. Marginal returns on the uses of these funds are higher than the cost of borrowing. The higher, however, the size of the loan amount (as in the individual loan contract) the more matters its cost in relation to the generated income. We, thus, expect that borrowers of very small loans (those who use group-loans) are not sensitive to changes in interest rates and that borrowers (who use individual loans) become more and more sensitive to changes in the interest rate as the loan amount is increased. *Education* stands for higher knowledge. For its description see hypothesis 1.

We also aim to find out to what extent borrowers themselves were satisfied with the products offered by the two MFIs. For that we analyze to what extent the borrowers' needs were met by the products offered by the two MFIs and we will compare the respective results. We asked all surveyed borrowers to self-evaluate on a scale from 1 to 5 (1) how well the repayment schedule fitted with their cash flows, and (2) how well the received loan covered their business needs. The two scales are used to measure the degree of borrower's satisfaction. The null hypothesis states that there is no significant difference in the distributions of both populations. According to earlier empirical evidence of Gonzales-Vega [1997] we state as

¹⁶ At the time of our investigation Constanta charged an interest rate of 4%, MBG 3%, local usurers of 10%.

Hypothesis 4: Borrowers who signed an individual lending contract are more satisfied with the loan terms and conditions than borrowers who signed a group contract.

The hypothesis is tested by applying a *two independent-samples t-test for equality of means*.

5.2.2 Empirical Results

Hypothesis 3 is tested by employing equation 3. The descriptive statistics on the key variables and the parameter estimates are presented in Tables 4 and 5. The empirical results speak in favor of our inference that the two MFIs attract different types of borrowers. The first significant variable *business development* supports the earlier suggestion that there is a self-selection process in the choice of the lending contract which depends on the expected dynamics of the business project.

- insert Tables 4 and 5 about here -

IR is the second significant variable. Its negative coefficient shows that the demand for group loans is less sensitive to interest rate than the demand for individual loans. This finding supports the assumption that borrowers who sign joint-liability contracts care more about access to capital than about price. *Education* is statistically insignificant.

Result 4: (1) Besides the wealth status, the other main factor determining the choice of the lending contract is the dynamics of the business project. Borrowers with dynamic business projects prefer individual loans, borrowers with static business projects rather prefer group loans. (2) Businesses with a dynamic perspective who have higher financial needs are more sensitive to the cost of borrowing than static businesses.

This outcome, if true, faces one severe limitation. The original reason for installing joint-liability approaches is the aim to provide those borrowers with working capital who lack collateral. Since there is no perfect correlation between the two selection criteria, one has to find solutions for those borrowers who lack collateral but plan a dynamic business and those borrowers who have collateral and a static business ahead.

With respect to the latter ones the solution is straightforward. As we showed, Constanta is also open to borrowers who possess collateral. This poses no problem as long as there are not too many borrowers with collateral in one and the same group (cf. Kritikos [1999], Woolcock [1999]).¹⁷ The existence of say one member with assets in a group of borrowers without collateral may have even a stabilizing function for the group.

The solution for borrowers of dynamic businesses without collateral is different. In the beginning their only way to signal creditworthiness is via a joint-liability contract. As soon as

¹⁷ In the latter case, major mechanics of the incentive system do not work. In particular the termination threat loses its power if the group consists only of borrowers with collateral.

their business shows positive dynamics and as soon as they have collected enough assets, they may switch to the individual approach, having gone through several loan periods in the group approach. In fact, loan officers at MBG offensively target borrowers of Constanta if they gathered some form of collateral. Being in a status of no wealth and no collateral does not mean that this state is irreversibly given. Rather to the contrary, by a combination of group loans in the beginning and individual loans after a graduation period, it becomes possible that very poor borrowers may become dynamic entrepreneurs. No business is hampered then and the initial wealth status loses its impact on the future development of the borrower.

Turning to hypothesis 4 we first perform the test by using the full dataset of MBG and Constanta borrowers. According to the *t-test for equality of means*¹⁸ the mean values of both scales are significantly higher in the sample consisting the borrowers of MBG. The difference comes mainly from the fact that at Constanta both the loan size and the repayment schedule were reported to fit the needs of the borrowers “well” or “very well” while at MBG they fit “very well” or “extremely well”.

Comparing the level of satisfaction of the clients of MBG with those of Constanta who were able to pledge collateral shows that the difference is insignificant. The fact that Constanta offers smaller loans with shorter maturity terms does not induce that its loan characteristics fit worse the business needs of this particular group of borrowers. This finding supports our earlier assertion that the group-lending scheme also attracts relatively wealthier entrepreneurs.

Result 5: The individual lending contract is better designed to meet the needs of the micro-entrepreneurs. The difference between the two designs diminishes, when we compare the borrowers of MBG with those borrowers of Constanta who are able to pledge collateral.

6. Conclusions

The focus of the present paper is twofold. On the one hand, we analyze the key factors of individual micro-lending contracts. On the other hand we compare these with the key factors of joint-liability contracts and address the discussion which of the two is the better mechanism to provide entrepreneurs and self-employed persons with micro-loans in an efficient manner.

Starting with the key factors of individual micro-loan contracts we showed that the variable collateral is the crucial variable in the self-selection process. However, if it is aimed to realize high repayment rates, the MFI has also to undertake intensive screening activities of the borrowers’ business and household incomes. When the contract is signed, reliable borrowers get access to further and higher loans. Less reliable persons are threatened with termination of

¹⁸ The null hypothesis states that the difference between the two sample means for each of the tested variables is zero. $t = \frac{\text{sample_one_mean} - \text{sample_two_mean}}{\text{std._error_of_the_difference_in_means}}$

the contract and with the selling of the collateral in case of delinquency. MBG is able to realize a 100% repayment rate by making use of this combination of incentives and threats.

In comparison to the individual micro-lending contract, we showed that joint-liability is able to work as a perfect collateral substitute since it selects creditworthy borrowers among those who *lack* collateral. We also showed that a second difference between the two approaches is that the incentives inducing high repayment rates may be completely different. Individually-based contracts may rely on dynamic incentives and on collateral. Joint-liability approaches rely on the (group) access to further (but not to higher) loans and on peer processes.

This leads directly to the further questions, formulated in section 3.2. Repeatedly, it was argued that the cost of joint liability are excessive. Taking ‘voting by feet’ as the best measure of acceptable cost, the present paper made clear that within the existing market alternatives those borrowers who chose joint-liability, perceive its cost as lower as the lending cost of the local usurer. Individual micro-loans, often used as benchmark for “acceptable cost”, are not relevant as long as the prerequisite for being able to borrow from them is not met.

It appears to be more remarkable that there are also wealthier borrowers who deliberately choose joint-liability contracts although they are able to pledge collateral and although the interest rate of the individual lender is lower. This observation contradicts earlier assertions that peer measures resulting out of joint-liability are only to be interpreted as a matter of a cost transfer from the lender to the borrower. Most borrowers who deliberately stay with Constanta made clear that they are willing to provide peer support within the group. These borrowers may also derive positive utility out of group contracts: Peer support works like an insurance against repayment problems of a borrower. If he had to manage his problems independently, as in the individual approach, he might have failed with higher probability.

This puts also into question whether the current wealth status of a borrower determines the future development of his business. We believe that we have discovered a parallel self-selection process with respect to the choice of the micro-lending contract, at least in this region. Business approaches with a rather static development perspective and, accordingly, a demand for relatively low loan volumes prefer the joint-liability approach of Constanta. Business approaches with a dynamic development perspective and a demand for relatively high or increasing loan volumes are attracted by the offers of MBG.

This kind of self-selection is important to note insofar as it implicitly contains an efficiency component. Earlier research (see e.g. Paxton [1996]) proved that joint-liability approaches face in the long run mismatching problems when groups are formed whose businesses develop in a dynamic way. In groups where some businesses were generating very high profits and others not, the willingness for being jointly responsible for the repayment of the loans dramatically decreased. In Kritikos and Vigenina [2003] we found out that in groups where the businesses show a rather static development “with no ups and downs”, the

willingness for peer support even increased so that these groups provided a stable environment with no mismatching problems in the long run. Thus, parallel offers of individual and joint-liability approaches by one and the same or by two different MFIs would lead to an efficient allocation of credit risks and lending costs, if the products are designed in a way that the corresponding self-selection process is induced.

Then no businesses are decelerated and no borrower will complain about the additional screening, monitoring and enforcement cost. Under this condition, the future development of a client' business is only determined by the skills and abilities of the entrepreneur. Non-wealthy clients with plans for a dynamic business but without collateral, however, will have to make the "detour" via the joint-liability approach. Otherwise, they will not be able to signal their creditworthiness, when they apply for a loan contract for the very first time.

Therefore, with respect to the question whether there is a superior design of micro-lending contracts, we conclude as follows: There is a large spectrum of loans for micro-businesses which are not served by the commercial banking system. In Georgia for example, where our research was carried out, the commercial banking system starts to offer loans above 10.000 Euro. Loans of smaller amounts are available only from so called Micro Finance Institutions where smaller loans between 50 Euro and 500 Euro are offered by the joint-liability approach of Constanta and loans between 200 Euro and 10.000 Euro are offered by MBG using individual contracts. Therefore, a combination of both approaches is necessary if it is aimed to reach all creditworthy borrowers irrespective of their initial wealth status and their ability to provide collateral and irrespective of the expected dynamics of the client's business. If only individual loan contracts are offered, creditworthy borrowers without collateral are excluded. If only joint-liability loan contracts are offered, dynamic businesses will be hampered and borrowers are not able to leave the poverty status behind them or – if the joint-liability loan contracts should be increased to meet the demands of the more dynamic businesses – the groups will run into mismatching problems where the willingness of being jointly responsible for the repayment of the group loans is diminished over time.

To put it in a nutshell: If poverty alleviation is aimed to be fully realized where all kind of entrepreneurs have a lasting access to credit, a combination of individual and group loans should be offered. There is no better design. Individual and joint-liability contracts dovetail the micro-finance movement.

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TABLE 1. MBG BATUMI: DESCRIPTION OF THE KEY VARIABLES

<i>Description</i>	<i>Frequency (%)</i>	<i>Mean (Std Deviation)</i>
Dependent Variables:		
Borrower's Risk Type (Categorical Variable): 3 - Low risk borrowers; 2 – Intermediate risk borrowers; 1 - Higher risky borrowers.	3 – 21 (22.1%) 2 – 49 (51.6%) 1 – 25 (26.3%)	
Repayment Performance: Number of installments paid by the borrower in advance over the total number of contributed installments.		
Independent Variables:		
Screening Efforts: Number of meetings between the borrower and the loan officer prior to the loan disbursement.		2.391 (1.667)
Credit Needs: Actual credit needs (in USD)		2946.05 (1952.09)
Education (Dichotomous Variable): 0 – secondary school or college; 1 – university.	0 – 61 (60.4%) 1 – 40 (39.6%)	
Written Records: Dichotomous Variable with a value of 1 if the borrower was able to present his/her own income-expense written records before receiving the first loan, 0 otherwise.	0 – 31 (30.7%) 1 – 70 (69.3%)	
Industry Sector (Dichotomous Variable): 0 – trade & services; 1– production.	0 – 66 (65.3%) 1 – 35 (34.7%)	
Collateral: Score (from 1 to 5) indicating how much time and efforts it would take the borrower to restore the collateral in case the bank seized it.		3.45 (1.13)
Dynamic Incentives: The difference between the actual credit needs of the borrower and the value of the loan received, expressed as a percentage of the loan amount.		0.80 (1.09)
Competition: Dichotomous Variable taking a value of 1 if the client reported to know other financial institutions in the region he/she could borrow money from.		2.65 (1.48)
Income Diversification: Score (from 1 to 5) indicating how much the alternative income sources exceed the income from the business project.		1.61 (.86)
Borrower's Credit History: Dichotomous Variable with a value of 1 if the client reported to have borrowed money for business purposes before joining the lending program of MBG, 0 otherwise.	0 – 74 (72.5%) 1 – 28 (27.5%)	

TABLE 2. MBG: ORDERED LOGIT MODEL OF BORROWERS' PROBABILITY OF SUCCESS

	Number of obs =	99			
	Wald chi2(4) =	4.92			
	Prob > chi2 =	0.2952			
	Pseudo R2 =	0.0241			
Log pseudo-likelihood = -100.10234					

Borrower's Risk Type	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]

Screening Efforts	.256786	.1275675	2.01	0.044	.0067583 .5068137
Education	.2970942	.4898641	0.61	0.544	-.6630218 1.25721
Industry Sector	.0397173	.3179168	0.12	0.901	-.5833881 .6628228
Written Records	-.1023359	.4516666	-0.23	0.821	-.9875861 .7829143

Intercept 1	.1518408	1.187274	(Ancillary parameters)		
Intercept 2	2.466685	1.213019			

The table presents the results from the ordered logit model used to test hypothesis 1 (equation (1)). The regression coefficients are listed in column 2. The robust standard errors calculated by using the White heteroscedasticity-consistent covariance matrix are shown in column 3. The z-statistics and the p-values are presented respectively in column 4 and 5.

TABLE 3. MBG: TOBIT MODEL OF BORROWERS' REPAYMENT PERFORMANCE

Log pseudo-likelihood = -57.397712		Number of obs = 92	Wald chi2(6) = 23.64	Prob > chi2 = 0.0006	
Repayment Performance	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]
Collateral	.1135741	.0387953	2.93	0.003	.0375366 .1896116
Dynamic Incentives	.1008585	.0349025	2.89	0.004	.0324509 .1692662
Borrower's Risk Type	.1578087	.0647202	2.44	0.015	.0309595 .2846579
Income Diversification	.0994986	.051626	1.93	0.054	-.0016865 .2006837
Borrower's Credit History	.0430619	.0962837	0.45	0.655	-.1456506 .2317744
Competition	.006889	.0310511	0.22	0.824	-.0539702 .0677481
Intercept	-.6278609	.2553391	-2.46	0.014	-1.128316 -.1274054
Observation summary:		68 uncensored observations	24 left-censored observations		

The table presents the results from the tobit model of borrowers' repayment performance used to test hypothesis 2 (equation (2)). The regression coefficients are listed in column 2. The robust standard errors calculated by using the White heteroscedasticity-consistent covariance matrix are shown in column 3. The z-statistics and the p-values are presented respectively in column 4 and 5.

TABLE 4. INDIVIDUAL VS. GROUP-LENDING: DESCRIPTION OF THE VARIABLES USED IN THE ECONOMETRIC MODEL

Description	Frequency (%)
Dependent Variable:	
Individual or. Group Lending Contract: Dichotomous Variable = 1 if the borrower is a client of MBG Batumi; = 0 if the borrower is a client of Constanta	0 – 11(0%) 1 - 115 (90%)
Independent Variables:	
Business Development: Score (from 1 to 5) indicating how well the borrower's business project has developed since the disbursement of the first loan.	3.97 (.495)
Education (Dichotomous Variable): 0 – secondary school or college; 1 – university	0 – 77 (64%) 1 – 44 (36%)
Interest Rate: Dichotomous Variable with a value of 1 if the borrower would have taken a loan at an interest rate of 5 – 8%, 0 otherwise.	0 – 127 (96%) 1 – 5 (4%)

TABLE 5. INDIVIDUAL VS. GROUP LENDING: BINARY LOGIT MODEL

Log pseudo-likelihood = -36.35528		Number of obs = 126	Wald chi2(3) = 15.75	Prob > chi2 = 0.0013	Pseudo R2 = 0.1729
Individual or Group Lending	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]
Interest rate	-2.35874	.9112711	-2.59	0.010	-4.144798 -.5726811
Education	.251415	.6822037	0.37	0.712	-1.08568 1.58851
Business Development	1.590841	.6310934	2.52	0.012	.353921 2.827762
Intercept	-4.391869	3.095708	-1.42	0.156	-10.45935 1.675608

The table presents the results from the binary logit model defined in equation (3). The regression coefficients are listed in column 2. The robust standard errors calculated by using the White heteroscedasticity-consistent covariance matrix are shown in column 3. The z-statistics and the p-values are presented respectively in column 4 and 5.

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