Mutual Loan-Guarantee Societies in Credit Markets with Adverse Selection: Do They Act as a Sorting Device?*

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Abstract

Mutual Loan Guarantee Societies (MLGSs) are crucial players in credit markets of many European and non-European countries. In this paper we provide a theory to rationalize the *raison d'être* of MLGSs. The basic intuition is that the foundation for MLGSs lies in the inefficiencies created by adverse selection, when borrowers do not have enough collateralizable wealth to satisfy collateral requirements and induce self-selecting contracts. In this setting, we view MLGSs as a wealth pooling mechanism that allows otherwise inefficiently rationed borrowers to obtain credit. We focus on the case of large, complex urban economies where potential entrepreneurs are numerous and possess no more information about each other than do banks. Despite our extreme assumption on information availability, we show that MLGSs can be characterized by assortative matching in which only safe borrowers have an incentive to join the mutual society. In the last section, we show that the available evidence on the structure and performance of MLGSs active in Italy is consistent with some implications of our theory concerning their diffusion, the average number of their associates and the average default rate on guaranteed loans in developed and backward regions.

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1. Introduction

Asymmetries of information between banks and borrowers lie at the root of significant misallocation in credit markets. Due to the lack of information on individual borrowers, banks can cause the interest rate to become inefficiently high such that worthy borrowers are driven out of the credit market (Stiglitz and Weiss 1981; Mankiw 1986). Alternatively, borrowers with negative net present value projects could obtain financial support in the credit market by taking advantage of cross-subsidisation of borrowers with worthy projects (De Meza and Webb 1987). In both cases, the reason for market failure is that banks are unable to recognize the actual riskiness of borrowers and are forced to offer the same contract to borrowers with a different probability of success.

As is amply clarified in the literature, when borrowers' wealth is large enough, banks may overcome informational asymmetries by offering a menu of contracts with collateral requirement acting as a sorting device. In this case, risky borrowers will self-select by choosing contracts with high repayment and low collateral, while safe borrowers will choose contracts with high collateral and low repayment (Bester 1985; Besanko and Thakor 1987).

Typically, informational problems are particularly severe for small and micro enterprises. They have a short credit history, meet less rigorous reporting requirements and the availability of public information on them is scarce. Moreover, the difficulty of banks in assessing the creditworthiness of small borrowers often goes hand-in-hand with inadequate availability of collateralisable wealth from the latter. Lack of information and collateral are, therefore, universally seen as the major structural features explaining the reluctance of banks to lend to small business.

In many countries, public and private credit guarantee schemes have been employed to facilitate the access of small business to the credit market. In this perspective, also in the

light of the new Basel agreement on banks' capital requirement and the rules established to attenuate credit risk by supplying physical and personal guarantees, Mutual Loan-Guarantee Societies (from now on MLGSs) are assuming ever-increasing importance.[1] The role of such institutions is to mitigate inefficiencies deriving from imperfect information, when the pledgeable collateral owned by firms is less than enough to get financed. In the words of the European Commission (2005, p. 10), MLGSs are "collective initiatives of a number of independent businesses or their representative organisations. They commit to granting a collective guarantee to credits issued to their members, who in turn take part directly or indirectly in the formation of the equity and the management of the scheme. The philosophy is based on the mutualisation of responsibility, decision-making by peers and operation within a market economy".

In the European Union there is a long tradition of mutual associations providing associates with loan guarantees. According to the AECM (2005), in 2003 their member systems, represented by 29 federations of MLGSs operating in 15 EU countries, granted € 15 billion to more than 2 million small firms. Apart from Europe, the system of MLGSs is well developed in South and North America (Riding 1996; Oehring 1997), East Asia (Hatakeyama 1997) and North Africa (De Gobbi 2003).

Surprisingly, in spite of their real-world diffusion and the attention paid to them by policy-makers, very few papers have been devoted to analyzing the *raison d'être* of MLGSs. Moreover, research has confined itself to giving an informal account of the role and functioning of MLGSs (Levitsky 1993; De Gobbi 2003), while there has been no attempt to formally model the incentives behind their formation and the circumstances under which MLGSs can improve the pool of borrowers and the efficiency of credit markets.

[1] The Basel II agreement, for instance, is intended to qualify most MLGS as "guarantors", provided that the guarantees granted are in line with the regulatory requirements.

The theoretical underpinning of the policy debate on MLGSs is the literature on microfinance and group lending, which emphasises the importance of local information and social embeddedness in reducing asymmetric information and the advantages of borrowers in screening and monitoring their peers.[2] In this context, two mechanisms are usually mentioned to account for the good performance of loans guaranteed by MLGSs in terms of repayment rate: *peer selection*, that mitigates adverse selection problems, and *peer monitoring* that alleviates moral hazard and improves the enforcement of contracts. Both these mechanisms, however, can be reasonably thought to lose effectiveness as we move away from the village economy and small individual group lending of the microfinance literature and consider large groups of small firms in urban economies of countries like France, Germany or Italy where the MLGS system is firmly in action. It is hard to believe that within groups made up by hundreds of associates, working in different trades and dispersed over a wide area usually consisting of many municipalities, a single member could have informational advantages about partners over local banks or greater capacities to impose social sanctions on bad members.[3]

In fact, there are several differences between loans granted through a typical microfinance programme[4] and loans intermediated by MLGSs. In the first case, banks provide very small loans to individuals organised into small and self-selected groups. Each

[2] For comprehensive surveys on microfinance and group lending see Ghatak and Guinanne (1999) and Morduch (1999)

[3] To be sure, the importance of very small, geographically concentrated groups for the viability of microfinance programmes was amply acknowledged from the first contributions to the literature (Stiglitz 1990). It is the policy debate on MLGSs that does not take such features into due account and often uses uncritically the type of reasoning developed in microfinance literature.

[4] Actually, microfinance programmes do not share all the same rules and may significantly differ from one another (Morduch 1999).

group member is jointly liable for the repayment of loans granted to any other group member. Loans are made sequentially to the group member and the repayment is diluted in several instalments. Lastly, the loan contract does not provide for collateral. By contrast, loans guaranteed by an MLGS are granted to small and micro firms through a standard debt contract which provides for collateral. No MLGS member is liable for the repayment of loans granted to other members. She only shares the credit risk of the latter through its participation in the guarantee fund of the MLGS.

In the present paper we provide a theory based on the contractual features of MLGS lending. Namely, we develop an adverse selection model where banks cannot distinguish among borrowers and the latter do not possess enough collateralisable wealth to make separating contracts feasible. We assume that the bank holds all the bargaining power within the lending relation, but the borrower gains non-observable private benefits from accessing the credit market and conducting an entrepreneurial activity. Moreover we assume that borrowers are uninformed about other potential entrepreneurs.

The major contribution of this paper is to show that, abstracting from any alleged informational advantage of borrowers about each other, an MLGS acts as a simple wealth pooling mechanism that makes separating contracts feasible and improves efficiency. While MLGSs play other important roles like the screening and monitoring of their associates and conducting collective bargaining with banks, it is the granting of collateral which is the distinctive function of MLGSs, a function often astonishingly left back-stage.

When the pooling contract results in rationing good borrowers, they have an incentive to pool their wealth in an MLGS so as to have a positive probability of accessing the separating contract and gain the private benefit of becoming an entrepreneur. In turn, bad borrowers may also find it worth becoming members of a MLGS, since by participating in a MLGS they dilute the risk of losing the wealth pledged as collateral with the safe

associates. However, this benefit comes at the expense of a positive probability of not obtaining the MLGS's guarantee and relinquishing the benefit of entrepreneurship. Where the latter benefit is sufficiently high, bad borrowers prefer to borrow individually and the MLGS formation acts as a sorting device.

Our analysis is clearly related to the literature on peer group formation with adverse selection (Ghatak 1999, 2000; Van Tassel 1999; Armendáriz de Aghion and Gollier 2000; Laffont and N'Guessan 2000 Ghatak and Kali 2001; Laffont 2003). The main feature distinguishing our model is the motivation behind the formation of the group. In the existing literature, groups are formed in order to access the group lending contract with joint liability offered by lenders. In our model, instead, MLGSs are created with the purpose of pooling personal wealth and accessing the individual separating contract with collateral requirement. Consequently, while the existing literature on group formation assumes away the presence of collateralisable wealth, we explicitly admit that potential entrepreneurs possess a certain amount of it. Moreover, in our model the assortative matching property of the group is triggered by the different incentives to constitute an MLGS of good and bad borrowers and not by the peer selection effect among borrowers who know each other perfectly. In this respect, our analysis is similar in spirit to Armendáriz de Aghion and Gollier (2000), Laffont and N'Guessan (2000) and Laffont (2003) that consider the case of potential entrepreneurs who do not know each other's type. However, in these papers, taking away the informational advantages of peers, joint liability is no longer a feature which is sufficient to attain assortative matching in the formation of groups. In particular, considering the same mean-preserving-spread project environment as that we propose, Armendáriz de Aghion and Gollier (2000) show that, in the presence of auditing costs, peer group formation may solve the inefficient credit

rationing of safe borrowers by reducing the probability of audits. However, the prevailing equilibrium is of a *pooling* type, where all kinds of group compositions are equally probable.

The rest of the paper is organized as follows. Section 2 presents the basic model. Section 3 derives the optimal individual lending contracts. Section 4 characterizes the incentives to build an MLGS and the condition under which the assortative matching property holds. Section 5 concludes.

2. The model

2.1. *Endowment, technology and preferences*

Consider an economy populated by a continuum of risk-neutral investors of measure 1. Each investor is endowed with the technology to start up a one-period investment project and, like in Besanko and Thakor (1987), with an end-of-period collateralisable wealth W. Starting up the project requires a beginning-of-period monetary investment I, such that investors have to borrow from a bank I units of money.

Project returns follow a two-point distribution: if successful the project yields a positive return Y, otherwise it yields zero. There are two types of borrowers. 'Safe' borrowers are endowed with a project that succeeds with probability p_s, yielding a return Y_s. 'Risky' borrowers are endowed with a project that with lower probability $p_r < p_s$ yields a higher return $Y_r > Y_s$ in the case of success. All projects are positive net present value, but the expected return on safe borrowers is no lower than that on risky borrowers:

Assumption 1: $p_s Y_s \geq p_r Y_r > I$.[5]

[5] This assumption on project returns can therefore accommodate both the Stiglitz and Weiss (1981) mean preserving spread model and the Mankiw (1986) model.

In addition to monetary yields, borrowers derive a non-monetary reward equal to B from undertaking an entrepreneurial project. This non-monetary reward can be understood in terms of social status and self-estimation of being an entrepreneur, elements that in low-employment regions may represent an important motivation to start up entrepreneurial projects. B is assumed to be non-observable by banks and therefore non-contractible.

2.2. *Banks, information and contracts*

Given Assumption 1, all individuals are potential borrowers. A fraction θ of them are safe and a fraction $1-\theta$ are risky. In the following, we assume that θ is sufficiently small, the meaning of which will be made clear below.

Assumption 2: $\theta < \dfrac{(p_s - p_r)}{(p_s - p_r) + p_s p_r (1-p_s)(1-\beta)}$.

Each individual knows her own type, whereas banks cannot distinguish safe from risky borrowers and only know their proportion in the population of investors. Banks are risk-neutral and maximise expected returns. We assume that each bank lends in a monopoly regime and collects deposits elastically at a zero interest rate. The monopoly assumption seems to be a good approximation for credit markets populated by small and wealth-constrained borrowers. For this kind of borrower, information about bank policies is scarce and the fixed costs of searching for a loan are usually dramatically high in terms of time and effort (and sometimes money). In such cases, it can be very difficult for potential borrowers to compare different bank offers. Moreover, if banks are not legally committed to contracts once announced to the public of potential borrowers and if, given the

smallness of borrowers, reputation costs for banks are small, the existence of high search costs gives each bank a quasi-monopoly power towards their applicants.

Banks lend by offering standard debt contracts $L_j = \{R_j, C_j\}$, where R_j denotes the gross repayment and $C_j \in [0, W]$ the collateral requirement, with $j = r, s$. The use of debt contracts in an environment *à la* Stiglitz and Weiss can be justified by assuming that project returns are costly for a court to verify. In this case, an equity type contract is not feasible, because whatever the realized project returns, borrowers have incentives to announce that the fail state has occurred.

Under limited liability constraint, when a borrower fails to honour the contract, banks can seize up to the amount of the verified returns plus the borrower's collateralised wealth fixed in the contract. However, due to inefficiency in contract enforcement or disparity in collateral valuation, we assume that repossessing collateral is costly for the bank, which can recover only a fraction β of its face value.

3. Debt contracts under individual lending

As is well known, banks may sort safe and risky borrowers by simply offering two contracts, one with lower interest rates and higher collateral than the other. However, in some circumstances the available wealth to borrowers is insufficient to make separating contracts feasible and banks can only design an undifferentiated pooling contract.

3.1. *Separating contracts*

In this case the bank offers two contracts $L_s^S = \{R_s^S, C_s^S\}$ and $L_r^S = \{R_r^S, C_r^S\}$ such that the former is selected by the safe borrower and the latter by the risky borrower, and on both

contract borrowers the bank earns non-negative profits. Formally, the bank's maximisation program is given by:

$$\max_{R_s, R_r, C_s, C_r} v_b = \theta\left[p_s R_s^S + (1-p_s)\beta C_s^S\right] + (1-\theta)\left[p_r R_r^S + (1-p_r)\beta C_r^S\right] - I$$

$$\text{s.t.} \quad p_s\left(Y_s - R_s^S\right) - (1-p_s)C_s^S \geq 0$$

(PC_s)

$$p_r\left(Y_r - R_r^S\right) - (1-p_r)C_r^S \geq 0$$

(PC_r)

$$p_s\left(Y_s - R_s^S\right) - (1-p_s)C_s^S \geq p_s\left(Y_s - R_r^S\right) - (1-p_s)C_r^S \qquad (IC_s)$$

$$p_r\left(Y_r - R_r^S\right) - (1-p_r)C_r^S \geq p_r\left(Y_r - R_s^S\right) - (1-p_r)C_s^S \qquad (IC_r)$$

Figure 1 depicts indifference and isoprofit curves in the plane (*C*, *R*). The line $u_s = 0$ and $u_r = 0$ represent the locus of all contracts that would entail zero expected profits for the safe and risky borrowers respectively. Assumption 1 ensures that u_r is steeper than u_s and that the single-crossing property holds. Since *C* and *R* enter negatively in borrowers' utility, the latter is higher on lower indifference curves. The dashed lines v_{bs} and v_{br} are the isoprofit lines for the bank on loans to *s*- and *r*-type borrowers respectively. Disparity in collateral valuation (i.e., $\beta < 1$) makes isoprofit lines less steep than borrower indifference loci. Bank profits are higher on higher isoprofit curves.

[Figure 1 approximately here]

Since collateral is costly, borrowers are required to pledge collateral to the minimum extent necessary to make the separation feasible. Now consider the pair of contract L_s^S and L_r^S, such that (PC_s), (PC_r) and (IC_r) are binding. This is given by:

$$(1) \qquad L_s^S = \left\{ R_s^S = \frac{p_s Y_s - p_r Y_r + p_s p_r (Y_r - Y_s)}{(p_s - p_r)}; C_s^S = \frac{p_s p_r (Y_r - Y_s)}{(p_s - p_r)} \right\};$$

$$L_r^S = \left\{ R_r^S = Y_r; C_r^S = 0 \right\}$$

From (1), clearly the repayment required by the bank with contract L_s^S is feasible, $R_s^S < Y_s$, and (IC_s) is also met.

In principle, however, even a lower collateral requirement would be feasible, at the cost for the bank of not extracting all the rent from risky borrowers. In particular, all pairs of contracts like $\tilde{L}_r^S$ and $\tilde{L}_s^S$, represented by the bold lines $Y_r Y_s$ and $Y_s L_s^S$ in Figure 1 respectively, satisfy participation and incentive constraints by ensuring that banks have higher expected profits on loans to *s*-type borrowers but lower profits on loans to *r*-types. More exactly, if, starting from the contract L_r^S in (1), the bank reduces by dR_r^S the repayment required of risky borrowers as in $\tilde{L}_r^S$, the loss in expected profits is equal to $(1-\theta) dR_r^S$. By accepting a lower repayment on risky contracts, banks soften the incentive constraint for risky borrowers and can therefore require safe borrowers to pledge a lower collateral and pay a higher interest rate. Substituting R_s^S obtained from (PC_s) into (IC_r), we easily find that, we easily find that, with respect to the contract L_s^S, the contract $\tilde{L}_s^S$ provides an increase in interest rate equal to $p_r (1 - p_s)(p_s - p_r)^{-1} dR_r^S$ and a reduction in

the collateral equal to $p_s p_r (p_s - p_r)^{-1} dR_r^S$. For the bank, these changes in the contract entail an expected gain equal to $\theta p_s p_r (1-p_s)(1-\beta)(p_s - p_r)^{-1} dR_r^S$ Assumption (2) implies that for any dR_r^S, the expected loss on contracts like $\tilde{L}_r^S$ is for the bank always higher than the expected gain on contracts like $\tilde{L}_s^S$. Therefore, we can state the following:

Proposition 1: Under Assumption 2, the separating equilibrium is unique and is given by the pair of contracts L_r^S and L_s^S in (1). Any other pair of contracts is either not self-selecting or not profit-maximizing for the bank.

Of course, since banks extract all the rent from both types of borrowers, their only net utility deriving from access to the credit market will be given by the private utility *B*. Hence:

(2) $$U_s^S = U_r^S = B$$

3.2. *Pooling contract*

Assume that $W < C_s^S$. In this case, collateral cannot be used as a screening device and the bank has to design only one pooling contract. Given the costs of collateral liquidation, the optimal pooling contract proposed by the bank requires only an interest repayment R^P . From the participation constraints, *j*-type borrowers will subscribe to the contract only if $R^P \leq Y_j$, with $j = s, r$. Therefore, the expected profits for the bank are:

$$(3) \qquad v_b^P\left(R^P\right)=\begin{cases} p_\theta R^P - I & \text{if } R^P \le Y_s \\ (1-\theta)\left[p_r R^P - I\right] & \text{if } Y_s < R^P \le Y_r \\ 0 & \text{if } R^P > Y_r \end{cases}$$

where $p_\theta = \theta p_s + (1-\theta) p_r$ denotes the probability of success of a borrower randomly chosen from the population of investors. Obviously, the bank will seek an interest repayment $R^P = Y_s$ or $R^P = Y_r$ according to $v_b^P(Y_s) \gtrless v_b^P(Y_r)$, that is on the basis of the share of *s*-type borrowers present in the population of investors. More exactly:

Proposition 2: The pooling equilibrium is unique and given by the contract:

$$(4) \qquad L^P = \begin{cases} R^P = Y_s;\ C^P = 0 & \text{if } \theta \ge \tilde{\theta} = \dfrac{p_r(Y_r - Y_s)}{(p_s - p_r)Y_s + p_r Y_r - I} \\ R^P = Y_r;\ C^P = 0 & \text{if } \theta < \tilde{\theta} = \dfrac{p_r(Y_r - Y_s)}{(p_s - p_r)Y_s + p_r Y_r - I} \end{cases}$$

Using Assumption 1, it is easy to show that a threshold value $\tilde{\theta}$ less than 1 always exists. Hence, under pooling contract the overall utility of safe and risky borrowers depends on the share θ of safe borrowers in the economy . If $\theta \ge \tilde{\theta}$ risky borrowers may exploit their informational rent and obtain positive expected profits which add to the private benefits *B*. If $\theta < \tilde{\theta}$ safe borrowers are excluded from the credit market and lose the private benefits of being an entrepreneur *B*. In symbols:

$$(5) \qquad U_s^P = \begin{cases} B & \text{if } \theta \ge \tilde{\theta} \\ 0 & \text{if } \theta < \tilde{\theta} \end{cases}; \quad U_r^P = \begin{cases} p_r(Y_r - Y_s) + B & \text{if } \theta \ge \tilde{\theta} \\ B & \text{if } \theta < \tilde{\theta} \end{cases}$$

4. Borrowing through mutual loan-guarantee societies

In this section we show under what circumstances investors who have no information about each other's type have incentives to form a mutual loan-guarantee society (MLGS) and under what circumstances MLGSs display the property of assortative matching, all their associates being of the same type.

4.1. *MLGS lending*

Investors who participate in an MLGS contribute with a part $w \leq W$ of their wealth to a collective fund. This fund will be employed to pledge the collateral required by the bank in favour of MLGS members who thus become jointly liable for each other's loan repayment.

Since the MLGS does not have any informational advantages with respect to the bank, the latter does not modify the separating contracts (1) individually offered to borrowers. Hence, the repayment and collateral required of a borrower covered by the guarantee of the MLGS (hereafter MLGS contract) are exactly those provided in L_s^S, which we now indicate with L^M:

$$L^M = \left\{R^M = R_s^S; C^M = C_s^S\right\} \tag{6}$$

Each member is entitled to apply for the loan guarantee of the MLGS. However, since $W < C_s^S$, guarantees can be granted only to a share $q = w/C_s^S$ of the members. We assume that those members who are refused the loan guarantee cannot apply to the bank for individual lending in the same period. Finally, borrowers not affiliated to the MLGS are charged the *r*-type separating contract L_r^S.

4.2. *The formation of MLGSs: assortative and non-assortative matching*

Let $U_{j\tilde{z}}^{M}$ be the net utility for a *j*-type investor from participating in an MLGS with $\tilde{z}$-type members, with *j*, $\tilde{z}$ = *s*, *r*. Given the MLGS contract (6) and since $q < 1$, clearly $U_{j\tilde{z}}{}^{M} < U_{j}{}^{S} = B$ for any *j* and $\tilde{z}$. Therefore, from (5) it follows that if the percentage of safe entrepreneurs is large enough to allow both safe and risky investors access to the credit market, $\theta \geq \widetilde{\theta}$, it is not worthwhile for either *s*- or *r*-type borrowers to found an MLGS.

Things change if the percentage of safe entrepreneurs in the population of investors is low $\theta < \widetilde{\theta}$. In this case the net utility of *s*-type borrowers under the pooling contract is zero and they have incentives to establish an MLGS and pool their wealth for applying for the MLGS contract. In turn, *r*-type may find it worth joining the MLGS. This is because under the MLGS contract they can borrow at conditions that are equivalent to those required with the *r*-type separating individual contract (recall that for risky borrowers the incentive constraint is binding and $L_r^S \sim L_s^S$), but they can still take advantage of the joint liability and reduce the probability of losing their wealth.

Therefore, in principle an MLGS can display alternatively assortative and non-assortative matching of investors. In other words, we can prove the following proposition:

Proposition 3: *Suppose that investors cannot observe each other's type, that banks cannot observe the private benefit of becoming entrepreneur B and* $\theta < \widetilde{\theta}$.

Part I. *When the private benefit of being an entrepreneur is sufficiently high, i.e.,* $B \geq \widetilde{B} = \theta\left(p_s - p_r\right)WC_s^S\left(C_s^S - W\right)^{-1}$, *risky investors will prefer to borrow individually through the separating contract, whereas safe investors will gain from forming an MLGS.*

Part II. *When B is lower than* $\widetilde{B}$*, risky investors have an incentive to join an MLGS in which safe investors participate. In turn, safe investors have an incentive to join an MLGS in which risky investors participate only if* $B \geq \hat{B} = (1-\theta)(p_s - p_r)C_s^S$*. In this case, a necessary condition for a non-assortative equilibrium to exist is* $W/C_s^S > (1-\theta)$.

Proof. *Part I.*. In order for an assortative matching to prevail either $U_{rr}^M > U_r^P$ and $U_{sr}^M \leq U_s^S$ or $U_{ss}^M > U_s^P$ and $U_{rs}^M \leq U_r^S$ have to hold, where:

$$\text{(7)} \qquad \begin{cases} U_{rr}^M = \dfrac{w}{C_s^S}\left[p_r\left(Y_r - R_s^S\right) + B\right] - (1-p_r)w \\ U_{ss}^M = \dfrac{w}{C_s^S}\left[p_s\left(Y_s - R_s^S\right) + B\right] - (1-p_s)w \end{cases};$$

$$\begin{cases} U_{rs}^M = \dfrac{w}{C_s^S}\left[p_r\left(Y_r - R_s^S\right) + B\right] - (1-p_\theta)w \\ U_{sr}^M = \dfrac{w}{C_s^S}\left[p_s\left(Y_s - R_s^S\right) + B\right] - (1-p_\theta)w \end{cases}$$

Recalling that $(1-p_\theta) = \left[(1-p_r) - \theta(p_s - p_r)\right]$ and the pair R_s^S and C_s^S are such that the participation constraints for *s*- and *r*-investors as well as the incentive constraint for the *r*-type are all binding, the two expressions in (7) can be simplified and rewritten as:

$$\text{(7')} \qquad U_{rr}^M = U_{ss}^M = \frac{w}{C_s^S}B; \qquad \begin{cases} U_{rs}^M = w\theta(p_s - p_r) + \dfrac{w}{C_s^S}B \\ U_{rs}^M = -w(1-\theta)(p_s - p_r) + \dfrac{w}{C_s^S}B \end{cases}$$

Since the net utility from forming an MLGS, $U_{jz}^M - U_j^P$, is not decreasing with *w* for any *j* and *z*, investors find it optimal to participate in the MLGS's guarantee fund with all their wealth and maximise the probability of gaining access to the loan guarantee. From (7') and (5) clearly $U_{rr}^M < U_r^P$ always holds and the only possible assortative equilibrium is that with

safe investors in the MLGS and risky investors borrowing individually out of the MLGS. Again from (7') and (5), obviously $U_{ss}^{M} > U_{s}^{P}$ always holds, while $U_{rs}^{M} \leq U_{r}^{S}$ holds only if $B \geq \widetilde{B}$.

Part II. When $B < \widetilde{B}$, $U_{rs}^{M} > U_{r}^{S}$ and risky investors find it profitable to join an MLGS with safe investors. The latter gain from participating in an MLGS with risky investors only if $U_{sr}^{M} > U_{s}^{P}$, that is, from (7') and (5), if $B \geq \hat{B}$. Therefore, a non-assortative equilibrium exists if $\widetilde{B} \geq \hat{B}$, that is, substituting for their expressions reported in Proposition 3, if $W / C_{s}^{S} > (1-\theta)$. □

The intuition of this result is simple. When $\theta < \widetilde{\theta}$, safe entrepreneurs are inefficiently price-rationed in the credit market and cannot individually apply for a loan. In this case they lose the private benefit of becoming an entrepreneur. By establishing an MLGS they reduce the probability of being rationed to $(1-q) = (C_{s}^{S} - W) / C_{s}^{S}$ and gain the benefit *B*. For risky investors, instead, joining the MLGS means accepting a positive probability of being rationed and incurring the loss of the private benefit of becoming an entrepreneur but gaining the opportunity to share the risk of losing their wealth with the safe investors. When *B* is high, the expected loss of rationing outweighs the benefit of risk sharing and induces *r*-investors to borrow individually. In this case, an assortative equilibrium prevail with MLGSs formed by only *s*-type associates. When $B < \widetilde{B}$, risky investors find it profitable to join an MLGS with safe investors. However, in order for an assortative equilibrium to prevail, safe investors too must gain from participating in an MLGS with risky partners. This is the case if the incentive of having a positive probability of obtaining

the private benefit of entrepreneurship is strong enough to outweigh the negative effects of sharing the credit risk with risky partners *B*, i.e., if $B \geq \hat{B}$.

Obviously, the concurrent participation of risky and safe investors to an MLGS is possible only if the threshold level of *B* which makes it profitable for safe investors to participate in a non-assortative MLGS, is no higher than the threshold level of *B* which makes the participation of risky investors profitable (i.e., $\widetilde{B} \geq \hat{B}$). This condition is satisfied only if the probability of obtaining the guarantee of the MLGS, $q = W / C_s^S$, exceeds the share of risky partners in the MLGS, $(1-\theta)$.

It can be realistically argued that the values of *B* and $\widetilde{B}$ both depend on the degree of development of the economy where the MLGS has to be formed. In backward economies, becoming an entrepreneur is often a major way to find a job and gain social status. Hence the non-monetary benefits of entrepreneurship *B* are probably high compared to monetary investment returns. At the same time, in backward economies personal wealth is typically low, as is the share of safe entrepreneurs, and $\widetilde{B}$ thus tends to be low. Consequently, the assortative matching condition $B \geq \widetilde{B}$ is more likely to occur for MLGSs operating in less developed areas.

In our setting the non-assortative MLGS is a possible equilibrium simply because the bank cannot observe the value of *B* and therefore cannot anticipate the members' composition of MLGSs. Were the private benefit of entrepreneurship observable, the bank would be able to know when both risky and safe borrowers gain from building an MLGS and would offer the profit maximising contract L^P instead of $L^M \equiv L_s^S$. Thus, if *B* were observable, the MLGS could be formed only when $B \geq \widetilde{B}$.

However, MLGSs are also widespread in developed regions where, as we have said, *B* is typically low. Therefore, one should therefore argue that, if *B* were observable, the reason for establishing MLGSs in developed regions cannot be found in the pooling of wealth in the attempt to gain access to the credit market. On the contrary, it must be sought elsewhere, for example as a device to acquire bargaining power with respect to banks in an attempt to trigger lower interest rates.

Whatever the reason, loans that take advantage of the MLSG's guarantee exhibit, on average, a lower rate of default than individual loans both in the case of assortative and non-assortative matching. This is due to the simple fact that the MLGS is joined by safe investors that would otherwise be excluded from the credit market and not to the better screening and monitoring capacities of peers. In particular, we can state the following:

Proposition 4: *Suppose that* $\theta < \widetilde{\theta}$ *and an MLGS is established. The ratio of default on MLGS loans to default on individual loans is* $d_{ss}^{M} = (1-p_s)/(1-p_r)$ *in the case of assortative matching and* $d_{rs}^{M} = (1-p_\theta)/(1-p_r)$ *in the case of non-assortative matching with* $d_{ss}^{M} < d_{rs}^{M} < 1$.

5. Empirical implications and evidence

Our theory suggests a number of interesting empirical implications concerning the structure and performance of MLGSs in developed and backward regions. In particular, assuming that in backward economies *B* is typically higher than in developed economies, whereas *W* and θ are lower, the following three testable implications can be deduced from the model.

I1: In backward economies, since the inefficient credit rationing of safe borrowers is more likely, the number of MLGSs is therefore higher (with respect to the number of firms in the economy) than in developed economies (see Proposition 2).

I2: In backward economies, since the assortative matching equilibrium is more likely to prevail with only safe investors having interest to pool their wealth in a mutual society, MLGSs usually have fewer associates than in developed economies (see Proposition 3).

I3: In backward economies, for the same reason as in I2, the repayment rate of loans guaranteed by MLGSs is higher (with respect to the riskiness of local borrowers) than in developed economies (see Proposition 4).

Although herein we do not develop a genuine and original test for three such implications, they seem to be interestingly consistent with the descriptive and econometric evidence made available recently for Italy by Columba *et al.* (2006). There are two main reasons for which the Italian experience can be considered particularly important and illustrative of more general events. First, due to the huge number of small and micro enterprises that characterizes Italian industry, private schemes of mutual loan guarantee are widely in use in Italy. Data reported by the *Association Européenne de Cautionnement Mutuel* for their associated members clearly show that the Italian MLGSs ("Confidi") are the most actives in Europe in terms of number of beneficiaries, own funds, outstanding amount of guarantees and the value of guarantees granted yearly (see Table 1). Secondly, Italy is characterized by profound economic and social differences that divide the southern regions (the so-called *Mezzogiorno*) from centre-northern regions, thus representing a natural experiment for our theory.

[Table 1 approximately here]

Structural indicators for Italian MLGSs reported in Table 2 are strikingly consistent with I1 and I2. First, the southern regions contain 44% of the total number of MLGSs

listed in the register of "Ufficio Italiano Cambi" (UIC – *Italian Office of Exchanges*), whereas the number of firms with fewer than 20 employees operating in the south amounts to only 27% of the total. As a consequence, the number of MLGSs per 10,000 firms is twice the number in centre-northern regions. Secondly, the average number of associates, as well as the MLGSs' own funds and the outstanding guarantees in portfolio, are far lower in southern MLGSs than in MLGSs located elsewhere (moreover, these numbers are highest in the most developed regions of the north).

[Table 2 approximately here]

Columba *et al.* (2006) also present an interesting analysis of the creditworthiness of a large sample of 385,000 small firms associated to Italian MLGSs by region. Again, their findings are remarkably consistent with I3. First, the simple statistics reported in Table 3 show that the average repayment rate of loans granted to southern small firms associated to MLGSs included in the sample analysed by Columba *et al.* (2006) is much lower than the repayment rate of other small firms operating in same region. For the former, indeed, the ratio of non-performing loans to total loans is 73% lower than for the latter (if we consider the total number of firms in the south, this decreases slightly to 67%). In the case of small firms associated to centre-northern MLGSs the ratio of non-performing loans is 3.5% (a number significantly lower than that experienced by firms associated to southern MLGSs). However, if we compare this ratio with the average riskiness of firms in the area, the reduction in the repayment rate for MLGS members is only 47% (43% if we consider the total number of northern-centre firms).

[Table 3 approximately here]

The higher repayment rate of loans guaranteed by southern MLGSs is also proved by the multivariate analysis discussed in Columba *et al.* (2006). Specifically, they estimate a probit model with fixed effect by sector of activity where the dependent variables analysed

are, alternatively, the probability that a firm is classified as non-performing by at least one lending bank and the probability that a firm is classified as non-performing between June 2004 and June 2005. To assess whether firms associated to southern MLGSs are relatively less risky than firms associated to northern-centre MLGSs, Columba *et al.* introduce as regressors both a dummy variable for firms associated to an MLGS and a multiplicative dummy variable for firms associated to a MLGS and located in southern regions. In Table 4 we report the estimated coefficients for these two dummy variables, according to which the probability of default for small firms is lower if they belong to an MLGS than if they do not. But, consistently with I3, this probability is reduced by a further 5 percentage points if the firms are associated to southern MLGSs.

[Table 4 approximately here]

6. Conclusions

Mutual Loan Guarantee Societies (MLGSs) are crucial players in credit markets of many European and non-European countries. An ever-increasing number of small and micro enterprises are members of an MLGS and gain access to bank loans thanks to (or, at least, with the help of) the collective guarantee granted by such institution.

In this paper we advanced a theory to rationalize the *raison d'être* of MLGSs. It is based on the analysis of the typical role of MLGSs, the pledging of collateral to loans granted to their members.

The basic intuition is that the foundation for MLGSs lies in the inefficiencies created by adverse selection, when borrowers do not have enough collateralisable wealth to satisfy collateral requirements and induce self-selecting contracts. In this setting, we view MLGSs as a wealth-pooling mechanism that allows otherwise inefficiently rationed borrowers to obtain credit.

We abstract from any peer selection, peer monitoring and social enforcement effects, emphasised by the literature on group lending, and focus on the case of large, complex urban economies where potential entrepreneurs are numerous and they possess no more information about each other than do banks.

Despite our extreme assumption on information availability, we have shown that MLGSs can be characterized by assortative matching in which only safe borrowers have incentives to join the mutual society. This is because the incentives of good and bad borrowers to pool wealth in a MLGS are different. Belonging to an MLGS means, firstly for the good borrower, gaining access with positive probability to the credit market, and then for the latter, mitigating the risk of losing collateral with the safe members. However, these benefits come at the expense of a positive probability of being rationed. Therefore, bad borrowers pooling their wealth in an MLGS may entail a negative benefit. In this case, assortative matching prevails and the MLGS acts as a sorting device.

Finally, we showed that the available evidence on the structure and performance of MLGSs active in Italy is consistent with some implications of our theory concerning their presence, the average number of their associates and the average default rate in developed and backward regions.

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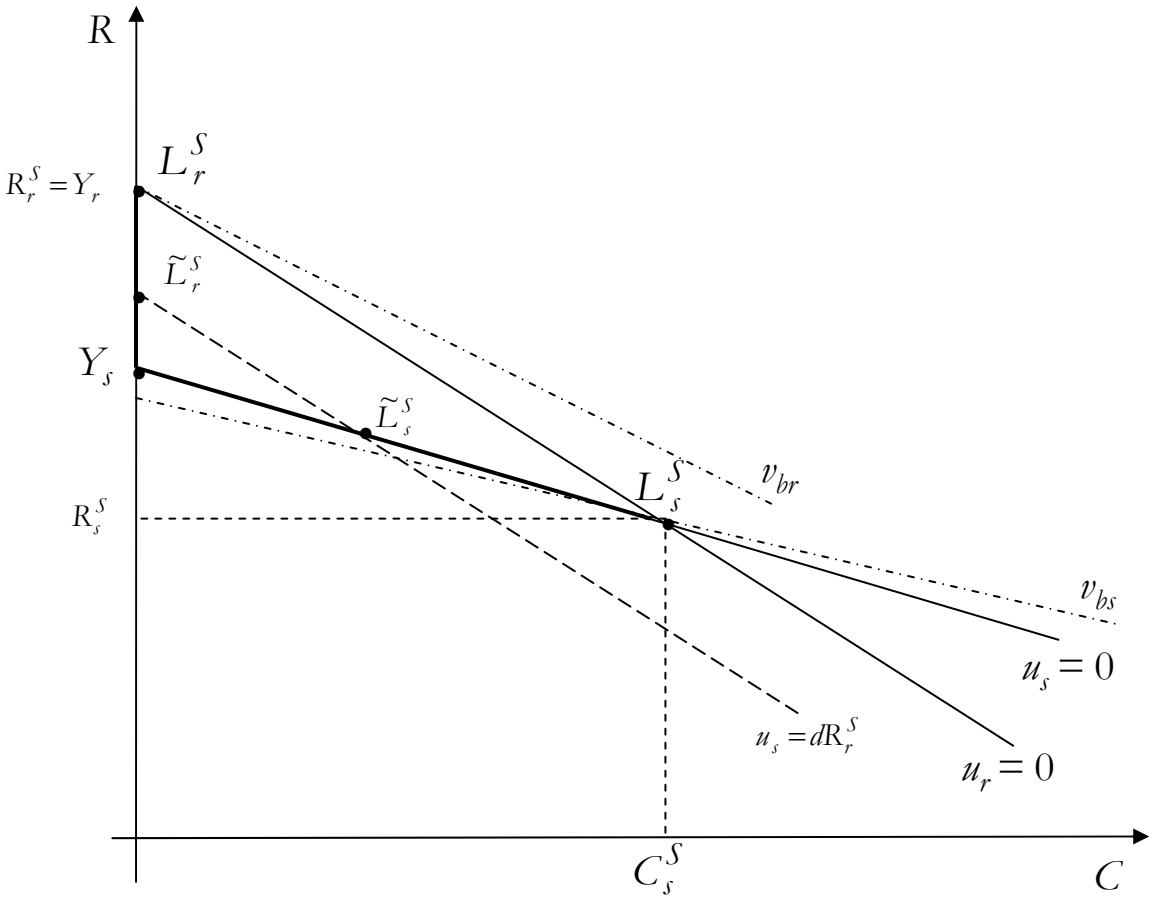

Figure 1 – Borrowers' indifference and bank's isoprofit curves.

Table 1: Mutual loan guarantee societies in European countries (December 2003).

Country	Guarantee Scheme	Number of beneficiaries		Own fund		Portfolio guarantees		Guarantees granted
		2003	Index 2003/2000	2003	Index 2003/2000	2003	Index 2003/2000	2003
Austria	A.W.S. – Bürgshaftsgesellschaft	9,592	105	71,400	205	418,900	97	124,900
Belgium	SCM/MOB – Sowalfin	6,557	114#	67,661	94#	123,794	81#	56,214
Czech Rep.	CMZRB	2,000	133	122,620	162	252,340	154	87,270
Estonia	KredEx	360	973	6,118	99	17,150	553	10,126
Finland	Finnvera	4751	95	300,306	123	758,500	161	407,100
France	Socama – Siagi – Sofaris	304,543	104##	438,737	87##	7,989,979	102##	2,687,548
Germany	Bürgshaftsbanken	42,822	98	290,000	116	5,040,719	102	906,095
Hungary	Hitelgarancia – AVHGA	32,101	221	125,349	117	604,812	149	548,810
Italy	Fincredit – Federartfidi – Federconfidi – Fincredit – Federasconfindi – Federfidi – Fondo interbancario	1,156,015*	102**	1,833,791*	122**	19,379,739*	158**	8,280,623*
Lithuania	Invega – Rural Guarantee Fund	1,007	78+	18,330	144+	64,700	124+	59,274
Portugal	SPGM/SCM	900	360	21,108	165	126,461	167	68,814
Slovak Rep.	SZRB	3,206	128^	71,758	120^	57118	111^	26,840
Romania	FCC Rural – RLGF SMEs – NCGF	17,806§	Na	27,230	97§§	35,468	442§§	54,643
Spain	SGR/CERRA	69,010	119	337,861	146	2,829,271	128	849,134
Turkey	Teskomb – Kredi Garanti Fonu	390,000°	156	62,695	93	511,704	275	401,115

Notes. Data source: AECM (2005). # Except Sowalfin; ## Except Sofaris; * Federfidi data from 2002; ** Except Fondo interbancario; + Except Invega; ^ SCRB data from 2001; § FGC Rural and RLGF SMEs data from 2001; NCGF data from 2003; §§ FGC Rural and RLGF SMEs data from 2001; except NCGF; ° Except Kredi Garanti Fonu.

Table 2: Structural indicators for Italian MLGSs by macro-region (December 2004)

	Number of MLGSs included in the register of the Ufficio Italiano Cambi	Number of MLGSs included in the register of UIC per 10,000 firms with less than 20 employees	Average number of associates per MLGS	Own Funds (million of euros)	Average size of outstanding guarantee (million of euros)
North	584*	2*	3,076	71	2.8
Centre	--	--	1,992	35	2.1
South and Islands	462	4	797	13	0.6

Notes: Data are from Columba *et al.* (2006). * The number is for Northern-Centre regions.

Table 3: The ratio of non-performing loans to total loans (% - June 2005)

	Small firms in the sample guaranteed by MLGSs	Small firms in the sample	Small firms
Centre-North	3.5	6.6	6.1
South	6.2	22.9	19.0
Italy	4.9	9.8	8.7

Notes: Data are from Columba *et al.* (2006).

Table 4: The probability of being non-performing

Dependent variable / Independent variables	Probability of being classified as non-performing by one of the lending banks	Probability of being classified as non-performing by one of the lending banks between June 2004 and June 2005
Firms belonging to an MLGS	-0.052***	-0.014***
Firms belonging to an MLGS and located in southern regions	-0.058***	-0.021***

Notes. Source Columba *et al.* (2006). Probit estimates with fixed effects by sector of activity. Marginal effects calculated for a discrete change of the dummy variable from 0 to 1. Number of observations 385,008. Control variables: Firms located in southern regions; artisanal firms; loan size; multiple lending. *** indicates a 1% level of significance.