Closing the gap: the link between social capital and microfinance services

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Abstract

Social capital has strengthened the solidarity funds when the legal mechanisms and institutions for monitoring and assistance are not present. The aim of this paper is to analyze the effect of social capital on productivity and performance of microfinance's cooperatives using the Mexican solidarity funds. For this, an estimator indirectly associated with inequality was obtained and extrapolation method was used. The results show that if the social capital rises 1%, the number of loans and the savings amount increases in percentage terms; for each additional producer that activates its social capital with its partners there will be a general increase in loans recoveries. In this sense, a greater investment in social capital will recover a larger amount of borrowed funds and will increase savings and loans to poor producers.

## 1.	Introduction

Access to formal financial services by the poor is nonexistent or difficult, considering that the poor do not have guarantees or collateral. The credit risk they entail and the resulting high interest rates they have to pay contribute to exclude them from the formal markets. Microfinance schemes that operate with social capital provide substitutes in terms of the social collateral and low-cost alternatives for lenders. Social capital is known as a set of individual characteristics that allow them to trust each other, cooperate and form networks useful for solving economic problems.

Social capital in microfinance facilitates access to credit and improves the performance of its financial operations. This allows microfinance schemes to achieve financial sustainability by raising their recoveries and reducing transaction costs and monitoring. The social capital in microfinance operates through information flows and better members' selection, diminishing frauds and the risk of bankruptcy.

The central objective of this paper is to analyze the effect of the social capital in the performance of the solidarity funds, on the understanding that greater social capital improves access to financial services to promote microfinance schemes. This could be relevant considering that there is little access to financial services in Mexico, especially within the poor.

Since it is not possible to directly measure the social capital it is associated with an indicator that relates inversely the social capital with inequality, as the literature shows (Kawachi, 1997). In order to relate social capital with microfinance's indicators, an extrapolation method is used to get social capital indicators at municipal level; this is obtained through an income inequality index. For this purpose, the following hypotheses are explored: a) social capital can be estimated through an inequality index; b) social capital affects the productivity, and c) social capital affects the financial performance of the solidarity funds.

To test the first hypothesis, social capital is estimated through an inequality index. The estimations are made with two methods and five indexes: Robin Hood, Variation Coefficient,

Gini and Relative Deprivation. The first method is based on a theoretical model that defines its nonlinear functional form. The social capital indicator consists on the resources offered by a person and it relates theoretically with a coefficient of sympathy, which represents the degree to which a person joins the welfare of another in its utility function, leading to share resources with others. The second method is the estimation of a linear equation that incorporates both a trust indicator from the World Values Survey and each of the four inequality indexes. From the statistical results, it is inferred that the best social capital estimator is the coefficient of variation.

To test the second and third hypothesis, the financial indicators from the solidarity funds and the estimator of social capital previously obtained are considered. Two equations are estimated to show the effect of social capital in the solidarity funds products (savings and loans). Productivity is estimated by the degree of dependence of loans on fund lending and social capital and the dependence of savings on the assets and social capital. To test performance, an equation that measures the dependence of the borrowed funds recoveries on loans average and social capital is proposed. The equations are represented by Cobb Douglas production functions and the social capital is incorporated as an indirect factor associated with the job.

From the estimation of the first equation, it is inferred that the number of loans depends positively on lending funds and social capital. The results suggest that with higher social capital and higher amount of resources available in the Solidarity funds the greater the number of loans is to be granted. From the second equation estimation, it is inferred that the number of savings transactions depends positively on assets and social capital. Therefore, the provision of greater resources through the expansion of assets generates greater savings; and higher social capital will produce greater trust to deposit resources in the solidarity funds.

From the third equation estimation it is inferred that recoveries of the borrowed funds depend on average loans and social capital. Then it is obtained that social capital has a positive effect in the performance of the Solidarity funds via recoveries and that these recoveries present a diverse behaviour when the average loans increase. Therefore, it is inferred that social capital has an effect on productivity and financial performance of the Solidarity funds.

The main outcome of this paper is that an increase of 1% on members' social capital increases loans in 0.29% and increases savings transactions in 0.46%, while each additional unit of social capital retrieves loans in 597 Mexican pesos, which otherwise would not be paid. In the process of achieving these results, it is confirmed that greater inequality in income distribution is associated with a lower trust among solidarity funds members, that is, with less social capital.

This article has been structured in 10 sections. The second section explains the definition of social capital and its different meanings, the definition to be used and the methodologies for its measurement. On the following section are described some reasons why the poor have restricted access to the financial system. Section four explains the solidarity funds operation and its relationship with social capital. Section five reports the financial solidarity funds indicators. Section six describes the methodology and data sources for estimating the social capital. Section seven develops a theoretical model that underlies the functional form and basis for estimating the relationship between capital and inequality. In section nine some

estimators are obtained and the working hypotheses are developed in addition to the estimated econometric equations. Finally section 10 concludes.

2. *Definition and measurement of social capital*

Social capital concept is relatively recent, developed by Pierre Bourdieu in the 1970s and early 1980s, as such it may be placed in the first half of the 20th century and its applications in the past 20 years. In the past, the concept was part of the skills, experience and knowledge that people used in isolation to transform into a productive process while human relations were found exclusively in the social structure. Coleman (1988) established that the relationships, when people try to make better use of their resources, are not only components of the social structure but resources for people.

Social capital refers to networks, norms and trust that facilitate cooperation for mutual benefit (Putnam, 1993). Social capital fosters reciprocity norms, allows the coordination and communication by creating channels through which information can flow from individuals, tested and verified. Contributes to solve problems of collective action and reduce the incentives for opportunism.

Social capital concept is based on trust that distinguishes it from legal and political bodies and civil society. Including customs and forms of association that are spontaneous and not necessarily dependent on laws. Through trust it promotes cooperation and contributes to the achievement of agreements that involve risks in making decisions. Trust allows reducing costs associated with the formation and negotiation of agreements.

In literature there are two sides in discussing this concept; the first is linked to the way resources are obtained. The information, ideas and support that people can obtain through the relationship with others are considered as capital. Another type of capital is obtained in a different ways such as physical or human, which are essentially property of the people and do not depend on others. The second concerns the nature and extent to which people engage in various informal networks and formal civic organizations. The term here is used to characterize the different ways in which individuals interact.

The concept also has three ways to interface to access resources. The first relates to the "bonding" social capital –show the bonds of people on the basis of their sociodemographic characteristics, such as those that occur between family members, neighbours, close friends and co-workers. The second relates to "bridging" social capital –the bonds between people that relate mainly in groups with similar characteristics. The third relates to "linking" social capital –show the ties that a person uses with a position of authority to get resources, as a public representative (police, political party leaders) and institutions (banks, security agencies) (Gittell and Vidal 1998, Narayan 2002, Putnam 2000, Woolcock 1999).

The "bridging" social capital is perceived as horizontal, while "linking" social capital is more vertical, connecting people to resources and key economic institutions. In the case of "linking", social capital is not the presence of the institutions which is an asset, but the nature and extent of social bonds between customers and suppliers, many of which are inherently a way to get resources and/or services.

Not always these three forms of social capital bring positive effects. They can be used for harmful purposes; for example, some exclusion rules are made to deny access to people for a service. The "linking" social capital can also be despotic or a mechanism for political favouritism. Then, the different dimensions of social capital not always provide useful results for the generation of goods and services.

From the scope, social capital definition also distinguishes two types (cognitive and structural) and two dimensions (macro and micro) (Grootaert et al 2002). The breadth of the concept has been seen as a sign of strength and weakness. The weakness lies in being a multidimensional concept, it could be too broad to provide specific conclusions about individual behaviour or more complex structures. The strength lies in the complementarities and substitution levels.

Social capital definition considered here is the following: "The sympathy that a person has towards another that causes that one offers social capital. People, who offer social capital, generate benefits, advantages and preferential treatment to others" (Robison and Siles, 1997). There are three reasons for adopting the above definition; on one hand, it takes into account the positive aspect of the concept. Secondly, it considers a micro level approach: a set of individual preferences that incorporates the well-being of others in the own welfare. Thirdly, it distinguishes what social capital is from what it makes and where it resides (Robison, Siles and Schmid, 2004).

The lack of an agreed definition of social capital, combined with multidisciplinary approaches can generate different interpretations and ways of estimating the concept. Measuring social capital depends on how it is defined. Depending on the definition, some indicators may be more appropriate than others.

Because definitions of social capital are multidimensional, incorporating different levels and units of analysis, such as organizations and community networks, makes it difficult to obtain a single measure of social capital. As a result, indexes are generated that approximate estimates of social capital. However, there is a risk that these measures could end up capturing different dimensions to the original concept.

One way to find a balance between these measures is to decompose the concept into its different dimensions and thus generate new comparable data sets. Some of the dimensions of social capital relate to the size (the number of people with social capital), geographical dispersion, density/integration, composition and homogeneity of members, frequency of contact between members, strength of ties (degree of intimacy, reciprocity, expectations of durability and availability), social participation and social anchorage (years of residence, neighbourhood and community participation). Using these dimensions has also the risk of mixing the determinants with the results, and sometimes its determinants could be even their results (e.g. health and cultural diversity).

In literature (Grootaert and van Bastelaer, 2002), the indicators generally used to measure social capital are trust in people or governments, culture, sympathy, affinity, solidarity, friendship, membership in civic organizations, time to maintain public services and conflict resolution, collaboration or cooperation with others, social mobility, social participation, social skills, building networks, shared norms, sense of obligation toward others and volunteering, among others.

However, indicators that measure participation and membership to groups vaguely capture the social capital by counting only the percentage of the population that belong to an organization. Participation in an organization can have different degrees, for example active membership is different than simple membership and within the active membership, and the degree of participation could be different in terms of the number of personal contacts and time spent on solving common problems.

Additionally, membership in an organization can reflect past investments in social capital and not the current state of the capital. Contacts in an organization may differ depending on the time in the organization or its investment in real capital. Thus, the membership may reflect a high level of social capital or a high depreciation. Also, belonging to an organization does not imply affinity or increased participation, and being a member of more than one organization does not necessarily have more value in terms of social capital than a greater involvement in one organization. Moreover, if a person belongs to an organization it tends to generate positive externalities, while an individual status tends to generate negative externalities, especially when it is a zero-sum game.

In relation to the trust indicators, they are not necessarily good measures of individual social capital. For example if a person trusts in another it does not necessarily imply reciprocity, then if people does not have a repayment for its trust, being more trusted will not be individually more productive.

Usually, social capital indicators are obtained from surveys, for example, some indicators like trust and civic cooperation are obtained from the World Values Survey (Knack and Keefer, 1997). Others like newspaper readers, membership in associations like football and coral clubs and confidence in public institutions come from the General Social Survey (Putnam, 1995). Teachers, Paasche and Carver (1997) used parent participation in meetings of community organizations, church youth groups involving their children and parental involvement in school affairs from the National Educational Longitudinal Survey.

Although there are surveys where social capital indicators can be obtained, it has not been possible to get a single variable for its measurement, this is due to several reasons: 1) definitions of social capital are multidimensional with different levels and units of analysis, 2) any attempt to measure concepts such as trust, networks, collaboration, participation and organization is problematic, mainly because of lack of agreement about its meaning, 3) few long-term surveys are designed to measure social capital so as to compare results over time, and 4) some social capital indicators are only at national level but not in more disaggregated units of analysis, like at the municipal level as the case of measures of trust in government, voter trends, members of civil society organizations, hours given to voluntary work.

Other social capital indicators are obtained through approaches to other variables. The variable commonly used is inequality, measured by different indices: Robin Hood, coefficient of variation. There is evidence of a strong negative correlation between social capital and inequality, although the causal relationship has not been defined, usually social capital explains a more equitable income distribution (Coleman, 1988) but in others, income inequality explains social capital, for example Knack and Keefer (1997) and Putnam (2000) where the decrease in inequality leads to more investment in social capital.

Some other studies relate social capital with income measures, for example Boisjoly, Duncan, and Hofferth (1995) measure social capital through the monetary and time support received by a household from family and friends, they found that people with higher incomes have greater access to cash assistance and people with low incomes have greater time help. Narayan and Pritchett (1997) estimated social capital with the extent and characteristics of people associational activity and their confidence in various institutions and individuals, this measure was associated with data from household income in rural communities, they found that social capital increases household income.

Other studies relate social capital with inequality measures, for example Kawachi, Kennedy, Lochner, and Prothrow-Stith (1997) estimated social capital with solidarity groups' density and the portion of individuals who believe that people could be confident. They inferred that investment in social capital reduces income inequality. Robison and Siles (1997) used as social capital indicators family integrity (percentage of households with female heads with children), educational level (percentage of graduates from high school), crime variables (rates of litigation) and employment variables (rates of labour force participation); they found that social capital changes have an effect on the level and disparity of household income.

The most common forms of social capital investment consist in sharing a social network. These networks can be formed by different types of people with common characteristics and have minimum social distance. People who have these characteristics create trust, loyalty and cooperation which could lead to flows of information, saving time and resources in physical and monetary terms.

There is empirical evidence of social capital investment trough networks built in microcredit groups (Knaff and Keefer, 1997, Narayan and Pritchett 1997, Temple and Johnson, 1998; Portes, 1995; Karageorgis and Light, 1994, Heller, 1996). These studies show that social capital generates information channels, facilitates transactions and reduces costs in these credit mechanisms. For example, lack of access to credit for the poor in developing countries is a consequence of limited information and the risk that credit applicants imply. Social capital allows agreements reducing these problems, even in the presence of imperfect information and therefore the credits are provided. Networks and trust attitudes reduce the opportunistic behaviour of some community members, for example the peer pressure mechanism in microfinance is used to prevent default problems. Using this tools social capital will be analyzed and measured.

3. *Characteristics of financial exclusion*

In Mexico there is limited access to formal banking services and delays in funding. For example, financial intermediaries, including banks, are serving less than 40% of the population and 77% of users know little about the bank contracts. The alternative of expanding the popular financial sector to cover the 60% remaining has had poor results and the Popular Savings and Credit Law (LACP) recently approved has created obstacles to financial intermediaries that serve this sector. On one hand, the approval has reduced costs but also has decreased the flexibility of adaption to the needs of this population[1].

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[1] Survey of Financial Culture in Mexico, 2008. Banamex-UNAM.

The microfinance sector has not achieved greater coverage and penetration in Mexico, mainly in rural areas, for example 80% of people from rural communities use cash as the only mean of payment. The savings system with more penetration is the informal through the Rotating Savings and Credit Association or ROSCA, "home savings", solidarity cooperatives for savings and savings with friends and parents. The 69% of the population lacks of information on financial products and services. This sector has failed to adapt their products to local demands and have problems of past-due loans. 77% of financial services users say they know and understand little or nothing of the contracts in this sector, 2 of 10 people surveyed had a record of their debts, expenses, income and savings, and 7 of 10 people are not informed about services and charges of financial instruments (BANAMEX-UNAM, 2008) [1]. Additionally, the creation of new technologies and products (which is limited) by the financial sector has been based on different characteristics of financial infrastructure.

The access to formal financial services is difficult for poor people considering that they don't have guarantees. Banks have no interest in small crops, animals, or appliances. In some cases, poor people have an acceptable guarantee (their lands); however, they cannot be used because of the lack of a legal property title, the same applies for the mortgage (Mansell, 1995). Therefore, banks base their decisions only on the credit history (information missing when speaking of poor people) or in the income level (which is usually irregular considering the unemployment periods). The lack of information and the credit risk of these borrowers, in addition to high interest rates and the situation described above exclude the poor from the formal financial markets.

Many times transaction costs may be higher on loans for the poor than for higher income individuals because the credit monitoring and contract enforcement are more difficult for the poor. Alternatively, lenders raise the interest rates to a certain level[2] to cover their costs. Thus, financial intermediaries in equilibrium ration the credit giving it to customers that imply less research and monitoring costs and whose contracts are cheaper to enforce. Even in the informal financial sector, interest rates do not balance the markets[3] and credit rationing exists.

Moreover, the transaction costs which the poor face and the cost in time are both high. As there are few intermediaries from the formal financial sector in low-income areas, if poor people go to the bank it may cause them a few hours off of work, including them to travel long distances by walking, use several transports and, quite possibly, make long lines. It may also involve filling forms that are difficult to understand, in addition to time and effort in order to gather the required documentation. These reasons explain why low-income borrowers are not only excluded from credit markets in the formal sector but also from many informal sources of financing.

4. Social capital in the solidarity funds

Social capital in microfinance works through ties of solidarity, neighbourhood and community organization, its principal asset is trust (Coleman, 1990) and operates through social collaterals, peer monitoring and peer pressure. Mechanisms that foster linkages and strengthen their solidarity bonds are self selection, groups of small size, the homogeneity among the members and their population density (Bastelaer, 1999). Social capital in

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[2]The interest rates are raised until the level that the highest marginal rates increase the probability of default, which would reduce their profits.
[3] Sometimes up to 10% per day.

microfinance provides substitutes with respect to individual collateral and generates low-cost alternatives for lenders.

Social capital is expressed in the solidarity funds on participation and how this financial instrument is set up: the producers meet voluntarily to establish funds. The members are involved in the process of creation and modification of statutes and operation rules, they are also involved in the designing, monitoring and evaluation process, which reduces their costs. They decide who can become a member because they have information about the members in their communities.

Members are also the owners and responsible for recovery. Using peer monitoring and peer pressure schemes can reduce fraud or default problems. The involvement of the members in the creation, discussion of operation rules, organization and monitoring enables them to adapt to their specific needs and expectations. They participate by attending meetings with all the members involved in order to take decisions that concern the group.

Funds representatives are selected in the Members General Assembly by majority vote; their positions are honorary in nature and therefore not remunerated for their performance. Members can be elected to any administrative post or representation. Through the local credit committee they decide who can become a member but they can also deny entry of a person when the applicant is known for his dishonesty and disrepute in the community. This selection mechanism has a positive effect in preventing risks of fraud or default problems.

The members represent the social guarantee that applicants need to obtain for a loan. For example, in the case of solidarity loans members can be the social collateral for loans. Also, members are responsible for monitoring the performance of their managers and the use of its funds through the supervision boards, management and credit committees. The funds keep a record of each member in addition to the books and the registration of members at meetings. This monitoring tool allows minimizing fraud and provides security to the members.

The operation system of the funds has its own implicit social oversight mechanism to avoid attempted fraud. However, in the case of fraud or default from a member, the board of directors decides to temporarily suspend or expel them from the Fund. But the punishment goes beyond an economic fraud, it is a social destitution restricting their participation in several community activities and limiting their access to the benefits of public services and assets created with the resources of the funds.

Responsibility and trust between members allows getting loans without excessive collateral. To the extent that customers are also owners and correspondents of the fund administration, it reduces the temptation to not pay and reduces the presence of fraud. In case it happens, their social system controller can detect them in time. This situation reduces the risk of bankruptcy, preventing its spread to other funds from other regions.

On the other hand, the solidarity funds do not have permission from the National Banking and Securities Commission (CNBV by its initials in Spanish) to operate as entities of Savings and Loan Associations (EACPs by its initials in Spanish) in terms of the Popular Savings and Credit Law (LACP by its initials in Spanish) because they are civil societies. They are not subject to the approval of the Ministry of Finance and Public Credit (SHCP by its initials in Spanish), or the inspection and supervision of the CNBV, or are located in the rules of the

Savings and Loan Societies (SACPs by its initials in Spanish), but they have auxiliary supervision and technical assistance from a Federation[4] and are considered by the LACP.

The funds have not been able to adjust their operation to the requirements established by the LACP; they are not required to comply with prudential rules as they apply only to entities that are subject to regulation by the SACPs and CNBV as credit unions or well, as public financial institutions like Banrural.

The funds are not SACPs because the requirements are costly and complicated. For example, they are obliged to contract managers and administrators with five and ten years of work experience, the call for its annual meetings have to be published ten days in advance in the newspapers of greatest circulation in the area, and the opening hours are rigid (it opens from Monday to Friday and close on weekends).

These requirements are difficult to fulfil in most of the funds. First, because there are populations in which the low level of education of its members makes it very difficult to secure a staff with technical training. Second, by its geographical dispersion, many of these communities have no access to newspapers or the media, and third, regarding the schedule, the weekend is the time when the members of the country side and surrounding communities come to town, where the offices of the solidarity funds are usually installed.

This status limits the financial development of the funds and prevents them from having the backing of the banking authorities, this still is not an obstacle to their development, but may be in the future. So, while for internal management, the funds do have statutes and rules of operation approved by the membership, it is necessary that they are supported and count with an appropriate legislation. In this sense, social capital has a special advantage on the legal aspect of the solidarity funds, its mechanisms of operation, supervision and control of funds gives them confidence and certainty to the partners on the use and recovery of resources, which could not be done otherwise, but because of its legal situation they cannot be governed under other statutes, implying a high cost for the funds forcing them in some cases to change their social denomination. In this sense, the mechanisms for participation, selection, supervision and monitoring act as substitutes for legal mechanisms and oversight.

5. *Income transfers and social capital model*

Social capital has been estimated through opinion surveys and indirect measures like inequality indices such as the Robin Hood index and the coefficient of variation. The results have shown that income inequality is negatively associated with social capital, which suggests that inequality, through a suitable functional form, can be a proxy of social capital.

In order to find a theoretical proxy of social capital through its relationship with inequality there will be used a model that shows the inverse relationship between social capital and inequality, through four indexes: Robin Hood, coefficient of variation, Gini and relative deprivation. The indicator of social capital consists of the resources offered by a person and relates theoretically with a coefficient of sympathy. This represents the degree to which a person incorporates the welfare of another in his utility function and that leads to sharing resources with other.

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[4] Federación Nacional de Cajas Solidarias, A.C.

In this way, social capital is observed in the transfer of income, as an individual with more income is concerned about an individual with less income because there is a relation of sympathy between them (if there is positive social capital). The individual with more income is interested into raising the welfare of the other with less income by transferring part of his income, thus generating a redistribution of income inequality that favours the worst. This behaviour is pleasing for both because the higher income individual raises his social capital invested in the poorer individual, and therefore his utility, and the individual with less income is receiving a transfer.

In this model there are two individuals (*i* and *j*) with equal utility functions, Cobb-Douglas type. Their functions depend on the final income itself (*If$_i$*) and the final income of another individual (*If$_j$*), which in turn depends on the amount of social capital between the two that is represented by a coefficient **K**. If social capital is positive, an increase in the income of individual *j* will give satisfaction to individual *i*, the opposite happens when social capital is negative, when **K=0** any change in the income of *j* is indifferent to *i*. In this model social capital is assumed positive. The following are the utility functions for individuals *i* and *j*:
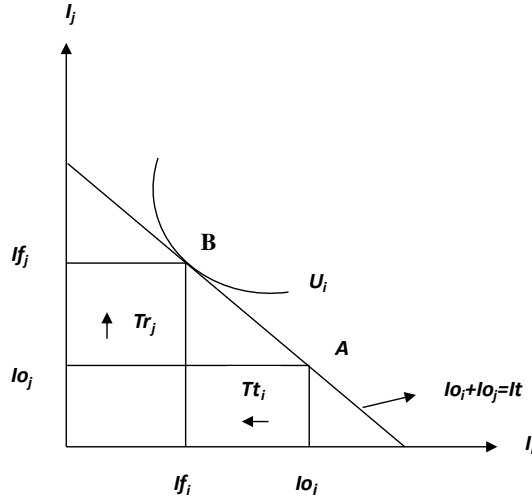
$$U_i = If_i \, If_j^{\,K} \tag{1}$$

$$U_j = If_j \, If_i^{\,K} \tag{2}$$

It is assumed that social capital is equal for *i* and *j* individuals (*K$_{ij}$=K$_{ji}$=K*), since the two individuals feel sympathy for one another in the same way. The income elasticity is given by the social capital coefficient $K=(\partial U_i/\partial If_j)(If_j/U_i)$, and lies between 0 and 1 (*0<K<1*), i.e. each individual appreciates the other, but not as much as they appreciate themselves. If **K<1**, the individual *i* appreciates more an increase of one percent of its final income than an increase of one percent of the final income of the individual *j*. If **K=1**, *i* appreciates the final income of *j* as much as his own income, if **K>1** for *i* the final income of *j* is more important than its personal income, if **K=0** individual *i* does not appreciates *j*.

The final income of *i* and *j* individuals is given by the sum of the initial income (*Io*) and net transfers (*Tn*), i.e. what an individual has minus the amount of transfers he gives (*If$_i$=Io$_i$+Tn$_i$* and *If$_j$=Io$_j$+Tn$_j$*). These net transfers consist of transfers received (*Tr*) minus transfers given (*Tt*) (*Tn$_i$=Tr$_i$-Tt$_i$* and *Tn$_j$=Tr$_j$-Tt$_j$*). Individuals will only differ from each other by their initial incomes, i.e., at the beginning there is inequality in their allocation of income.

In this model it is assumed zero transaction costs, i.e. transfers which gives the individual *i* are equal to the transfers received by individual *j*, in turn, transfers received from the individual *i* are equal to those granted by the individual *j* (*Tr$_j$=Tt$_i$ and Tr$_i$=Tt$_j$*). In this model, the total income of individuals does not change, otherwise income distribution could be affected by factors other than transfers, therefore, the income of the economy is fixed, the amount of final incomes of *i* and *j* is equal to the total income of the economy (*It=If$_i$+If$_j$*). In this economy, each individual transfers part of his income to another according to his preferences, thus generating a reallocation of income. The following explains the distribution graphically.

Diagram 1

Point **A** shows the initial allocation of income. In point **B** the individual **i**, according to its preferences decided to transfer part of his income to the individual **j**, which changed the distribution increasing the income of **j** and decreasing the income of **i**. The line **It** is the sum of individuals' incomes and is equal to the total income of the economy. If there is no social capital, the individual **i** is not worried about the individual **j** and the distribution would be equal to the original allocation located at point **A**, but because **i** feels sympathy for **j**, then **i** is concerned by **j** and tries to benefit him by transferring part of his income, thus changing the original distribution of income, standing now at the point **B**. If the final distribution has incorporated social capital, this could mean that the distribution is an indirect measure of social capital. Thus, the social capital measure is the change of the initial distribution with respect to the final distribution, i.e. the difference between **A** and **B**.

On the other hand, the only thing an individual can control are the transfers granted (**Tt**). The initial income (**Io**) and the transfers received (**Tr**) are exogenous, and then the variable that will determine the model is **Tt**. Therefore, the maximization problem arises in terms of transfers granted. Substituting the final income and net transfer equations in the utility function of each individual will get the problem of maximization of **i** and **j**.

$$\underset{Tt_i}{Max}\, U_i = \left(Io_i + Tr_i - Tt_i\right)\left(Io_j + Tt_i - Tt_j\right)^k$$

$$\underset{Tt_j}{Max}\, U_j = \left(Io_j + Tr_j - Tt_j\right)\left(Io_i + Tt_j - Tt_i\right)^k$$

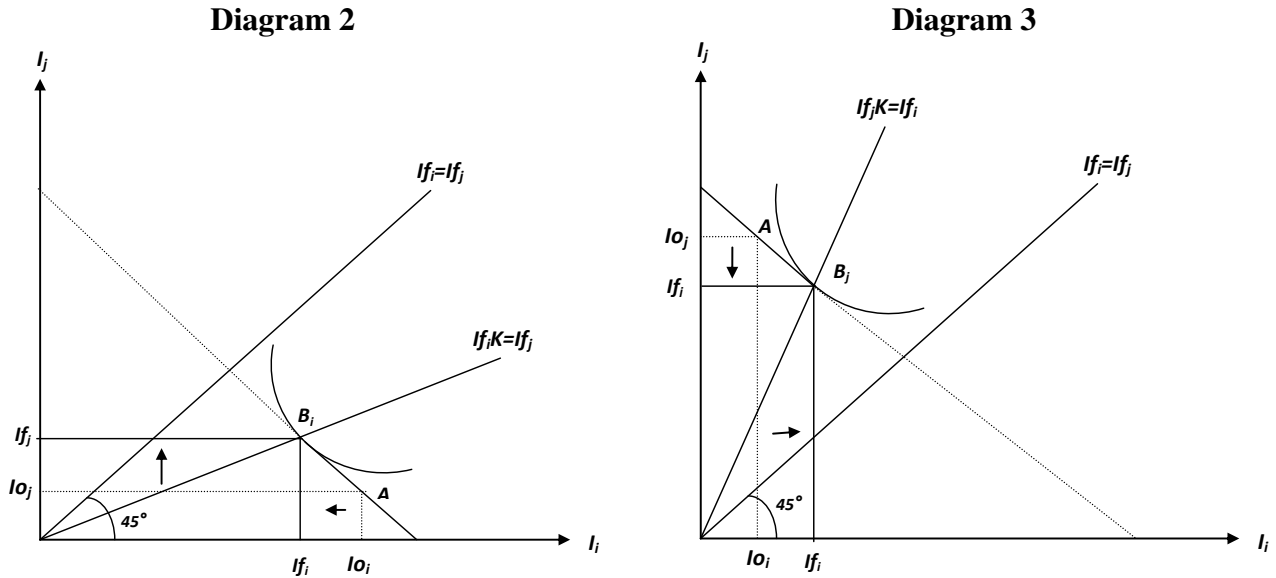The first order conditions ($\partial U_i/\partial Tt_i$ and $\partial U_j/\partial Tt_j$) are as follows:

$$\frac{\partial U_i}{\partial Tt_i} = -\left(Io_j + Tt_i - Tt_j\right)^k + K\left(Io_i + Tr_i - Tt_i\right)\left(Io_j + Tt_i - Tt_j\right)^{K-1} = 0$$

$$\frac{\partial U_j}{\partial Tt_j} = -\left(Io_i + Tt_j - Tt_i\right)^K + K\left(Io_j + Tr_j - Tt_j\right)\left(Io_i + Tt_j - Tt_i\right)^{K-1} = 0$$

Substituting again the final income of **i** and **j** individuals in the first order conditions gives the following optimization conditions.

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$$\text{For } i \qquad K = \frac{If_j}{If_i} \quad \text{or} \quad If_i K = If_j$$

$$\text{For } j \qquad K = \frac{If_i}{If_j} \quad \text{or} \quad If_j K = If_i$$

Just one of these two conditions applies. If there is inequality, the individual who has more income gives transfers and the individual with less income is the receiver. In this model it is not possible that the two individuals transfer their income at the same time. The following are the transfer's allocation from i to j (diagram 2) and from j to i (diagram 3).

Diagram 2   **Diagram 3**

Considering the optimization condition of i, individual i cannot receive income from j, the only thing he can do is to transfer part of his income to j moving from right to left on the line of total income. The optimization condition of i is at point B_i ($If_j=KIf_i$). The line where point Bi is located is different to the curve of 45° because the individual is concerned about the other, but more about himself, i.e. K is smaller than one. The initial income of j is at point A.

If the initial income of j was at point Bi, then i would no longer need to transfer part of his income to j. But if the endowment income of j is at a point on the right of the optimization condition of i, individual i can continue granting to j until point Bi. In the event that the initial income of j is above the condition of maximization, i cannot continue to grant transfers to j because that would be to move away from point Bi[5]. Therefore, in the dotted line, which is above of the optimal point Bi, i will not transfer income to j. This is shown in the following equations:

$$\text{If } Io_j \leq K\, Io_i \Rightarrow Tt_i > 0$$

$$\text{If } Io_j \geq K\, Io_i \Rightarrow Tt_i = 0$$

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[5] If the endowment income of j is found to the left of A, and i would like to move from left to right transferring income to j to reach his optimal point, this would be like stealing income to j, producing a reduction of j's income that instead of helping him it would hurt him. This behavior of i to j shows negative social capital.
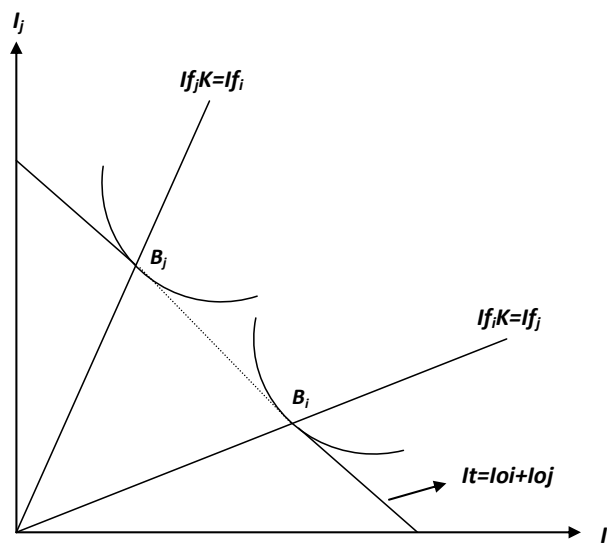
When there is social capital and *j* feels sympathy for *i*, *j* will transfer to *i*, so reducing his income by moving from left to right on the line of total income (*It*). His condition optimization is in the point B_j ($If_i=KIf_j$). This behaviour is shown in Diagram 3. In the case of *j*, where the initial income of *i* is above the optimization condition of *j*, as in *A*, then *j* will transfer part of his income to *i*, but if the initial income of *i* is below the point Bj, *j* will not transfer income to *i* because if he did, he will move away from the maximization condition, Hence on the dotted line that is below Bj, individual *j* will not transfer to *i*. This is shown in the following equations:

$$\text{If } Io_i \leq K \, Io_j \Rightarrow Tt_j > 0$$

$$\text{If } Io_i \geq K \, Io_j \Rightarrow Tt_j = 0$$

In the pre-conditions for maximization of *Bi* and *Bj*, where *i* transferred income to *j* and *j* to *i*, there is a relationship between social capital and inequality, in these areas one individual transfers to another and to be able to carry out such a transfer there should be a sympathetic relationship in which one wants to improve the other. In addition, if it happens an inequality situation is necessary, where one has more income than another and wants to benefit the other transferring some part of his own income.

Diagram 4

The areas where there is a relationship between inequality and social capital are located in the spaces above the conditions of optimization, not dotted areas of the total income line. In the dotted area, although there is social capital between *i* and *j*, there is no relation between social capital and inequality because there is no imbalance which encourages both *i* and *j* to transfer income away from the optimum.

In the area located to the right of *Bi*, where individual *i* transfers part of his income to *j*, an optimization condition of *i* is achieved and *j* condition is irrelevant because it cannot be reached. In the same way, in the area that lies to the left of *Bj*, where *j* transfers to *i*, the maximization condition of *j* is reached, but *i's* condition is irrelevant. The dotted area represents both incomes and their conditions can be achieved. If one condition applies the other does not, therefore, only one condition can be observed at a time. Thus, the case of individual *i* can be analyzed, which transfers income to *j*.

Previously, the final income of individual i was defined as follows: $If_i=Io_i+Tr_i-Tt_i$, but considering the case where only the optimization condition of i applied, i only transfers income and receives no transfers. Then his received transfers are zero and his final income is as follows: $If_i=Io_i-Tt_i$. Considering the individual j case, j only receives transfers from i and grants none, then transfers granted from j are zero and his final income is: $If_j=Io_j+Tr_j$. So in the case where only the i's condition apply, the transfers that i grants are the transfers that j receives, so the transfers are redefined as T and final incomes of i and j are as follows $If_i=Io_i-T$ and $If_j=Io_j+T$. Substituting these equations in the optimization condition of i the transfers given by i and received by j are obtained:

$$T = \frac{K Io_i - Io_j}{1+K}$$

Furthermore, by substituting this equation in $If_i=Io_i-T$ and redefining the total income as $It=Io_i+Io_j$, final income of i is obtained, which depends on the total income and the sympathy coefficient $If_i=[It/(1+K)]$, in the same way by replacing the transfers equation in $If_j=Io_j+T$ final income of j is obtained, it is expressed as follows $If_j=[KIt/(1+K)]$. The final average income of the two individuals involved in this economy is given by $\overline{If}= (If_i+If_j)/2$. Now, different income inequality indexes are incorporated to the model to observe the relationship of social capital with inequality. These indexes are: the Robin Hood index, the coefficient of variation, the Gini index and the index of relative deprivation. These indexes were selected based on the argument that the gap between rich and poor is contributing to lower levels of social cohesion and trust (Kawachi, et. al., 1997) and that inequality causes a feeling of envy and injustice that discourages investment in social capital (Podder, 1996) [6].

Robin Hood Index

The Robin Hood Index is defined as the proportion of aggregate income to be transferred from households above the median income to the households located below the mean in order to achieve equality in income distribution (Atkinson, 1992). Thus, the Robin Hood index in this economy is as follows: $RH=If_i- \overline{If}$ in the case of individual i. Substituting the equations of final income and average income in the Robin Hood index, it is expressed as follows: $RH=(If_i-If_j)/2$. Now considering the final income of i and j in the Robin Hood index, it is redefined as follows: $RH=0.5*\{[(1-K)It]/(1+K)\}$. The Robin Hood index in absolute terms corresponds to $RH=(If_i-If_j)/2$, in relative terms it is given by the ratio of the index and the total income ($rh=RH/It$). So replacing the equation of the RH index found in the relative Robin Hood index it is obtained the following result: $rh=0.5*[(1-K)/(1+K)]$.

Thus, the Robin Hood index shows a negative relationship between social capital and inequality: the higher social capital between i and j is, the lower income inequality in this economy will be. Social capital is then defined in terms of inequality resulting the following equation: $K=[1-(2*rh)]/[1+(2*rh)]$. In this equation, the maximum value of the rh index is a

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[6] "There is a direct relationship between the degree of inequality and the extension of the injustice sense in society with consequent dissatisfaction that causes conflicts of class," this sense of injustice caused by inequality hinders social collaboration for the welfare and discourages investment in social capital.

half because there are only two individuals in this economy, i.e. if an individual had 100% of income it should withdraw the 50% and move to another individual to reach perfect equality. If there are a large number of individuals, the maximum value of the Robin Hood index tends to one because it has to be redistributed the 100% of income if an individual is concentrating all the income. Therefore the formula for large populations related with social capital is the following:

$$K = \frac{1 - rh}{1 + rh}$$

From this definition, an inverse relationship between social capital and inequality is observed, as measured by the Robin Hood Index. It is noteworthy that the relationship between these two variables is nonlinear; an approximation could be a logarithmic functional relationship in which social capital grows more rapidly than the decrease on the Robin Hood index.

Coefficient of variation

On the other hand, the coefficient of variation is the standard deviation between the average incomes; it can be defined as follows:

$$CV^2 = \frac{1}{n} \sum_{i=1}^{n} \left(\frac{If_i}{\overline{If}} \right)^2 - 1$$

Substituting equations $If_i=[It/(1+K)]$ and $If_j=[KIt/(1+K)]$ in the equation above would result in the following equation: $CV^2=(0.5*\{It^2/[(1+K)^2*If^2]+(K^2*It^2)/[(1+K)^2*If^2]\})-1$. Since $It^2/\overline{I}^2=n^2$ and $n=2$, then the equation above would be defined as follows: $CV^2=\{0.5*[4/(1+K)^2+ (K^2*4)/(1+K)^2]\}-1$. Then social capital could be expressed in terms of the coefficient of variation.

$$K = \frac{1 - CV}{1 + CV}$$

It is important to observe the similarity between the equation of social capital obtained from the Robin Hood index and the results from the coefficient of variation, both equations coincide because this economy consists of two individuals. Now, obtaining the first order condition from $CV^2=0.5*\{4/(1+K)^2+ (K^2*4)/(1+K)^2\}-1$ we obtain the following expression: $\delta CV^2/\delta K=-[4/(1+K)^3]+[(4*K^2)/(1+K)^3] +[(4*K)/(1+K)^2]$. From this expression it is inferred that if $K \rightarrow 0$, i do not appreciate an increase in the final income of j, then $\partial CV^2/\partial K<0$, i.e. a decline in social capital brings an increase in inequality, represented by the coefficient of variation. Moreover, if $K=1$, i appreciates the final income of j as much as his income, then $\partial CV^2/\partial K=0$. From these it follows that at any point in the range $0 <K <1$, K increases if CV decreases.

Gini Index

The Gini index is the average relative distance of each individual with respect to the other; this can be expressed as follows:

$$G = \frac{1}{\overline{If}} \frac{1}{n^2} \frac{1}{2} \sum_{i}^{n} \sum_{j}^{n} \left| If_i - If_j \right|$$

15

Incorporating the equations $If_i=[It/(1+K)]$ and $If_j=[KIt/(1+K)]$ in the above equation gives the following expression: $G=(1/\bar{I})*(1/4)\{[It/(1+K)]-[(KIt)/(1+K)]\}$. Developing the equation it is obtained the following relationship between social capital and inequality: $K=(1-2G)/(1+2G)$. As in the Robin Hood index, the outcome for this equation is given for two individuals, generalizing for n individuals it would be obtained the following expression:

$$K = \frac{1-G}{1+G}$$

Again, social capital remains an inverse relationship with inequality, such behaviour shows a nonlinear relationship, like the Robin Hood index and the coefficient of variation.

Relative Deprivation Index

This index is an economic measure of relative deprivation; it shows the envy feeling through economic inequality. Empirical studies that have used this index relate this to social cohesion as social capital measure. Considering the case of two individuals, when an individual with envy feelings is compared with another that has no envy it arises a sense of relative deprivation (PR). Equality is the ideal state of society, but if there are disparities between individuals, then it is perceived disadvantage in the sense of relative deprivation.

This index does not show the same upper limits as the other indexes. In the three indexes above, the maximum *(M)* is achieved when an individual receives all the income, but in the relative deprivation index, the maximum is somewhere in an interior point between the upper and lower limits of the inequality. This is because individuals are not compared with the individual who possesses all the income, but with the situation of the other he feels envy. Considering this, the relative deprivation index *(IPR)* would be expressed as follows[7]:

$$IPR = \frac{PR}{M}, \quad \text{where} \quad PR = \ln If_i - \ln If_j \quad and \quad M = \left(\frac{n}{2}\right)^2 \ln\left(\frac{2It}{n}-1\right)$$

In the equation represented by *M*, $I_i < I_j$, *i* is the individual who is disadvantaged in this economy, he is the one who expresses the sense of relative deprivation. Because *n = 2* in this economy, then *M=ln(It-1)*. Now incorporating the incomes of *i* and *j* individuals in equations *If_i=[It/(1+K)]* and *If_j=[KIt/(1+K)]* and the maximum value *(M)* for n = 2, the *IPR* would be as follows : *IPR={ln[It/(1+K)]- ln[ItK/(1+K)]}/ln(It-1)*. The social capital in terms of the relative deprivation index could be expressed as follows:

$$K = \frac{1}{(It-1)^{IPR}}$$

There is also an inverse relationship between social capital and the relative deprivation index, but this relationship is different from that presented by the Robin Hood Index, the coefficient of variation and the Gini index, this is due to the difference that exists in their maximum values. Although the equations obtained an inverse association between social capital and inequality is inferred a causality is assumed as follows *KS= f (Inequality)* based on the arguments of Kawachi, et. al. (1997) and Podder (1996).

6. Estimation of the social capital indicator

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[7] Podder, Nripesh, "Relative deprivation, envy ad Economic Inequality", KYKLOS, vol. 49, 1996, Fasc. 3, pp. 353-376, equations 8, 13 y 15.

The similarities of social capital with other types of capital suggest that social capital can be studied with standard economic tools, i.e. investment in social capital can be seen as an economic problem of allocating resources. Social capital is measured by its association with other variables using the extrapolation method (Heckman and Vytlacil, 2000a. 2002; Heckman et al. 1990). This method is considered for the analysis period (1994) because there is no statistical information of social capital at a state level or municipality level, which is the maximum level of disaggregation used, and it is necessary to get social capital information at the municipality level to discuss the financial information for each of the solidarity funds.

In the estimations of social capital, there were used two methods, the first is derived from the model developed and has the following functional form: $KS=(1-D)/(1+D)$ where D is any of the inequality indexes listed in the theoretical model. The second method concerns the estimation of an equation that incorporates social capital indicators and indexes of inequality and also shows a negative relationship between social capital and inequality: $KS=\beta_1 + \beta_2 Inequality+u$.

Indicators of social capital were obtained from the World Values Survey for 76 countries with market economies from the waves of the periods 1981-1984, 1989-1993, 1994-1999 and 1999-2004. These surveys were used because they include the period of analysis, the period for which solidarity funds information is obtained. Social capital indicators were built from the following questionnaire questions: Do you trust in others? The answers are: most people can trust, young people trust in older people, older people trust in young people. Other questions are: do you trust in other people in your country?, how much do you trust your family, confidence on churches, armed forces, education system, the press, the government, among others?, do you belong to voluntary, ecology, human rights and social welfare among others groups?. A pooling with the different waves was made generating a size sample of 201 countries.

Indicators of social capital were based on Coleman (1990), Fukuyama (1995), Putnam (1993) and Gellner (1994) who believe that social capital contributes to better development of the institutions either at macro or micro level. They point out that trust promotes cooperation between people and this produces a better development of the institutions because of the active participation of citizens to collaborate, monitor, critique and limit restrict predatory tendencies positively affecting their performance. This article analyses the social capital influence in microfinance institutions such as solidarity funds.

After making some estimates and statistical tests described below, it was found that only the trust indicator was statistically significant, this is why it is the only indicator used. The trust indicator was built using the percentage of people in a country that answered "must people can be trusted" to the question: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?". For the countries reported, the average value was 28.6% and the standard deviation was 13.5. To construct the indicators of inequality were used the percentage share of household income, by percentile group of household from the annual world development reports of the World Bank, according to the quintile in which the units are located to each of the 201 countries surveyed for a near period to the mentioned waves.

It was built a pooling data from the 4 waves used for the survey periods 1981-1984, 1989-1993, 1994-1999 and 1999-2004 to generate a sample with 201 observations, taking into

account the countries that were reported in either survey. In order to test whether the construction of the pooling was statistically significant, dummies variables were tested for periods of time considered in the model. Social capital was estimated using inequality indexes for the period mentioned with three dummies variables for the periods 1989-1993, 1994-1999 and 1999-2004 (***LnKS=$\beta 1$+$\beta 2$Inequality+$\beta 3$Dummy+u***). These dummies were not significant, so we can expect that the union of the period mentioned does not create problems in the estimation of social capital.

To test the relationship between social capital and income inequality, the following equation was estimated: ***LnKS= β_1 + β_2LnInequality+u***, where LnKs is the natural logarithm of the social capital variable built with the indicators described above. Control variables were used to control country heterogeneity; these were: education level[8], political corruption, gender, age ranges, household stable relationship, household ownership, money saved in the past year[9], population and real GDP. These variables were chosen based on Brown and Ashman (1996); Fox (1994); Tendler and Freedheim (1994); Aldridge, Halpern *et al* (2002) and Pantoja (1999)[10]. We used the logarithmic form because there is theoretical evidence for the existence of a nonlinear relationship. The results obtained with OLS were:

Estimations of the social capital indicator with five inequality indexes

Trust = β_1 + β_2Inequality+…+β_nXn+u[17]					
Independent variables					
	I	II	III	IV	V
Gini$_1$	-0.3510*** (0.1028)				
Gini$_2$		-0.3493*** (0.0897)			
CV			-16.1594*** (5.5961)		
Robin Hood				-0.4280*** (0.1497)	
IPR					-0.2728*** (0.0952)
Education middle	-0.1086* (0.0537)	-0.0339 (0.0580)	-0.0337 (0.0584)	-0.0330 (0.0585)	-0.0346 (0.0584)
Education upper	0.1644* (0.0796)	0.1551* (0.0937)	0.1502* (0.0953)	0.1523* (0.0952)	0.1595* (0.0947)
Political corruption	-0.1075* (0.0668)	-0.1390*** (0.0669)	-0.1399*** (0.0671)	-0.1407*** (0.0671)	-0.1333** (0.0673)

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[8] In the estimation was not used low educational level to avoid multicolinelity problems, as did the age range and gender.
[9] Endogeneity problems were identified; for this a temporal instrumental variable was used named "save many last year", this is related with trust level, it was statistically significant.
[10] Brown and Ashman (1996); Fox (1994); Tendler and Freedheim (1994). Aldridge, Halpern *et al* (2002) suggest that social capital can be generated in the short term to support political and economic development, they found that the main determinants of social capital include: history and culture; whether social structures are flat or hierarchical; the family; education; the built environment; residential mobility; economic inequalities and social class; the strength and characteristics of civil society; and patterns of individual consumption and personal values. Pantoja (1999) identified: family and kinship connections; wider social networks of associational life covers the full range of formal and informal horizontal arrangements; networks; political society; institutional and policy framework which includes the formal rules and norms that regulate public life; and social norms and values.

Sex (male)	0.1420	0.2978	0.2928	0.3014	0.3250
	(0.3343)	(0.3318)	(0.3399)	(0.3398)	(0.3388)
Age (15-29 years old)	-0.1332	-0.0272	-0.0263	-0.0294	-0.0326
	(0.1260)	(0.1328)	(0.1401)	(0.1400)	(0.1392)
Age (30-49 years old)	-0.0272	-0.0283	-0.0228	-0.0265	-0.0420
	(0.1546)	(0.1560)	(0.1565)	(0.1566)	(0.1566)
Stable relationship	-0.0402*	-0.1014***	-0.1023**	-0.1021**	-0.1022**
	(0.0428)	(0.0505)	(0.0516)	(0.0516)	(0.0516)
Household ownership	0.2259*	0.1160***	0.1102***	0.1142***	0.1224***
	(0.1410)	(0.0533)	(0.0536)	(0.0535)	(0.0535)
Save money past year	0.0734*	-0.0608*	-0.0566*	-0.0592*	-0.0681*
	(0.0777)	(0.0880)	(0.0884)	(0.0885)	(0.0888)
Population	0.0006***	0.0010***	0.0009***	0.0010***	0.0010***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
GDP real	0.00001***	0.00002***	0.00002***	0.00002***	0.00002***
	(0.000004)	(0.000004)	(0.000004)	(0.000004)	(0.000004)
Constant	30.5899	16.3851	15.2458	15.5932	14.1325
	(16.0671)	(15.6772)	(16.5097)	(16.5496)	(16.4541)
N	144	133	132	132	132
R^2	0.5075	0.5316	0.5429	0.5322	0.5324
R Adjusted	0.4624	0.4847	0.4858	0.4851	0.4852
F	11.25	11.35	11.48	11.28	11.29
F-prob	0.0000	0.0000	0.0000	0.0000	0.0000

The $Gini_2$ is referred to the adjusted Gini by population. The terms in parenthesis are referred to the values of the standard errors. Significance levels are ***(99%), **(95%) and *(90%).

The estimation was conducted using the five indexes mentioned above and the values of social capital indicator from the World Values Surveys for the countries reported, this was done in order to ascertain the best estimate of social capital. Only in the estimation of the trust indicator among the five estimators of inequality considered were significant (the coefficient of variation, the $Gini_1$ index, the $Gini_2$ index, the Robin Hood and the Relative Deprivation indexes), the remainder of the estimated social capital indexes were not significant (they were mentioned above). The five inequality indexes were significant, but the CV showed better statistical estimators. Then the coefficient of variation index shows best statistical results and hence was selected as the best index to estimate the social capital variable.

Once the best indicator of social capital (trust) and the best proxy for estimating the social capital (the coefficient of variation) was found, the social capital for Mexico was estimated at the state level using the values of the coefficient of variation for the country. The coefficient of variation for Mexico was built using information from the total current income of households by deciles from the National Surveys of Income and Expenditure of Households comparable (1984, 1989, 1992, 1994 and 1996).

The estimate of the method 1 incorporated the coefficient of variation into the equation K = (1-CV / 1 + CV) to get the values of the social capital for each year. This equation is derived from the indicator obtained through the theoretical model. In Method 2 the trust variable was estimated, which represents the social capital. For this, the coefficient of variation and the values obtained from the coefficients β_1 and β_2 in the estimation of the equation number III pointed out above were incorporated into the equation LnTrust=β_1+β_2LnCV+u. LnTrust is a nonlinear indicator and represents the trust variable. The results with both methods are presented in the following table:

Estimations of social capital for Mexico under the two methods

Year of the ENIGH	Variation Coefficient	Method 1 $K=(1-CV^1)/(1+CV^1)$	Method 2 Trust $= \beta_1 + \beta_2 CV+u$
1984	0.8703	0.3725	22.32
1989	1.0141	0.3049	16.85
1992	1.0251	0.3000	16.49
1994	1.0333	0.2963	16.23
1996	0.9746	0.3228	18.21

Source: INEGI, National Survey of Income and Expenditure of Household, 1984, 1989, 1992, 1994 and 1996.

[1] There was used the adjusted coefficient of variation for this calculations. It was obtained from the functional form of the theoretical model.
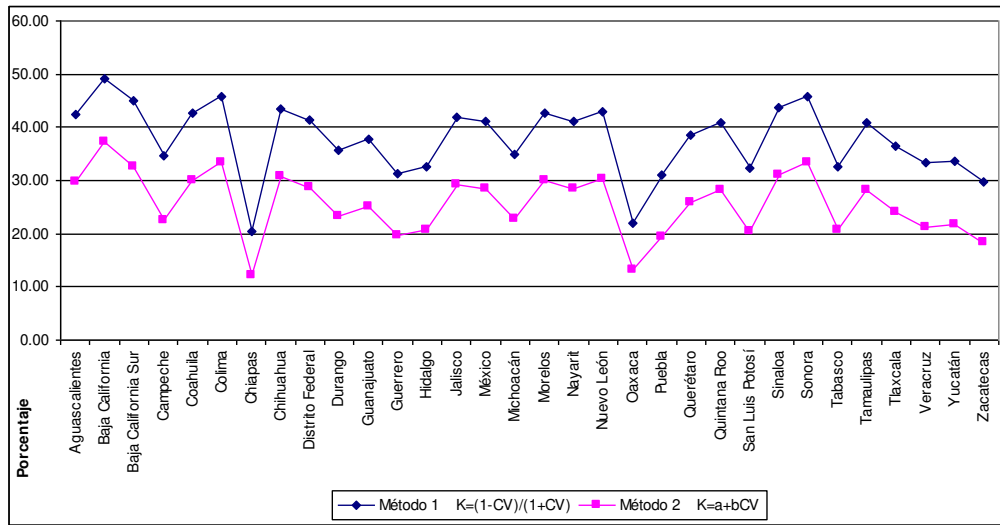
The results of social capital obtained under the first method are related to the percentage of sympathy that people feel and is represented by the KS parameter from the utility function and correspond to an index in which a value of zero percent means that there is no social capital and one percent means that households have as much sympathy for others as for themselves. Regarding the second method, the values obtained are related to the percentage of households that trust others, for example, in 1996, 18.21% percent of households reported by the ENIGH trusted people, i.e. they have social capital.

The results show the following trends: from 1984 to 1994 the coefficient of variation was increasing even in marginal terms, but this increase was shrinking. In the same way, the social capital estimated under the two methods was decreasing but in smaller proportion, from 1994 to 1996 the coefficient of variation decreased and social capital, estimated under the two methods increased. Therefore there is a similar trend in the behaviour of the social capital estimated under the two methods and an inverse relationship between social capital and inequality.

Once national results were reported, the social capital for the states was estimated with the two methods, but only for two years: 1990 and 1995. These years were used because only in these years the income data are available for the states and they are the closest years for which statistics are available in the balances reported by the solidarity funds. The information corresponds to the XI General Census of Population and Housing 1990 and the Population and Housing Count 1995 from the INEGI.

Income information obtained from these two sources concerns the population distribution by income groups according to minimum wages, from which the proportions of income generating the Coefficient Variation were built. Below are two diagrams showing the behaviour of social capital in these two years, estimated with the two methods described.
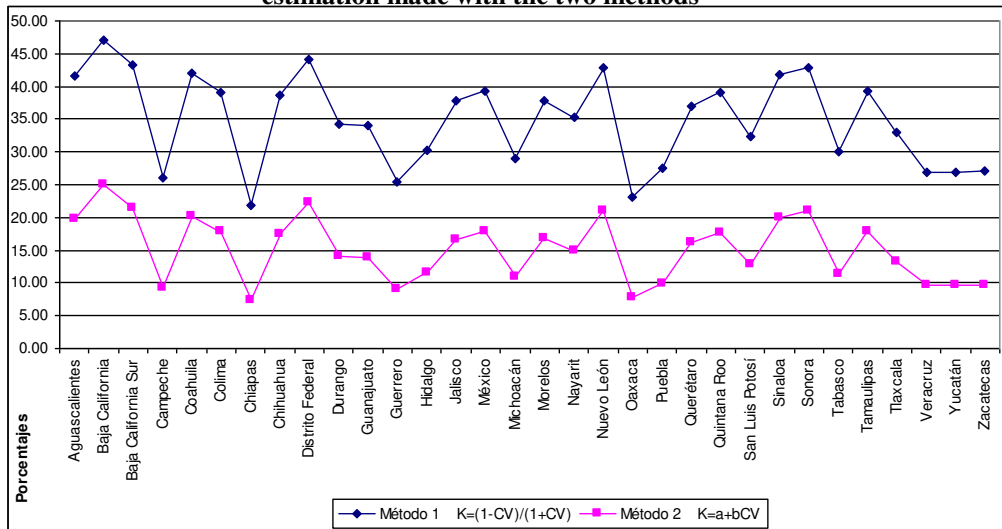
Diagram 5
Behaviour of the social capital by states in 1990,
estimation made with the two methods

Source: INEGI, XI General Census of Population and Housing, 1990.

The results of this diagram where built with the social capital estimation under the two methods: in method 1 the coefficient of variation of each state was incorporated into the equation **K= (1-CV /1+CV)**, method 2 incorporates the coefficient of variation of each state and the values of the estimators β_1 and β_2 were imputed in the equation **LnTrust = β_1 + β_2 LnCV+u**. Diagram 5 shows the same behaviour of the social capital under the two methods. In 1990, the five states that showed the highest social capital under the two methods were (from highest to lowest) Baja California, Sonora, Colima, Baja California Sur and Sinaloa, and those that presented the lowest social capital were (from lowest to highest) Chiapas, Oaxaca, Zacatecas, Puebla and Guerrero. The interpretation of the social capital value under the first method refers to the percentage of sympathy people from each Mexican state feel. Under the second method, social capital values refer to the percentage of population of each Mexican state that trusts on people.

Diagram 6
Behaviour of the social capital by states in 1995,
estimation made with the two methods

Source: INEGI, Counting of Population and Housing, 1995.

In 1995, the five states that showed the highest social capital under the two methods were (from highest to lowest) Baja California, Mexico, Baja California Sur, Sonora and Nuevo Leon, and those with the lowest social capital were (minor to high) Chiapas, Oaxaca, Guerrero, Campeche and Yucatan.

In Diagram 6 was observed, as in Diagram 5, similar behaviour in the percentages reported under the two methods used for estimating social capital, i.e. the states with greater inequality also have less social capital. Additionally, an inverse relationship between inequality and social capital for periods from 1984 to 1994 was observed, the coefficient of variation increased and the estimated social capital fell. From 1994 to 1996, inequality declined and social capital increased. Thus, the years in which the highest inequality was presented were also the years with lowest investment in social capital. It can be inferred that social capital at the state level coincides in their trends and their relationship with inequality under these two different methods in the two periods analyzed. Then, social capital can be estimated using an inequality index as proxy.

7. *Financial productivity of social capital: development of hypotheses*

Literature shows evidence on the productivity of social capital in the sense that it makes possible to achieve certain resources that could not be achieved in its absence or could do so only at great cost. In microfinance, social capital enables poor peasants to financial services; it helps to achieve financial sustainability by increasing their recoveries and reducing costs. To test this argument, productivity is measured through the financial products offered by the solidarity funds: loans and savings. The performance of the solidarity funds is estimated by debt recoveries.

In order to prove that social capital is productive in Solidarity funds, it is analyzed the effect of social capital (associated with the members, their bearers) in the loans allocation, deposits and the loan recoveries. For this purpose, the following hypotheses are explored: a) social capital affects the solidarity funds productivity, and b) social capital affects the financial performance of the solidarity funds.

1. One way to explain the productivity is through costs reduction and financial sustainability, this is done by expanding products, so as to generate economies of scale and the average cost of serving many small transactions begins to decrease and yields to rise (Johnson and Rogaly, 1997). The fact that social capital is productive in the solidarity funds means that there is a relationship between the outputs and inputs of the solidarity funds. The products supplied by the solidarity funds are loans and savings. The inputs are the loan assets integrated by the equity and savings. Members are also inputs because they are the bearers of social capital. The relations between outputs and inputs are as follows:
   a) The loans assets depend on the loanable funds and the social capital.
      i. Loanable funds consist of equity and savings. When the solidarity funds back their loans with savings, dependency can be avoided creating a greater chance of achieving long-term viability (Mansell, 1995). On the other hand, because equity resource belongs to the members, it represents a healthy way to finance and support the loans. Thus, the more equity and savings, the greater the loans and hence financial viability will be greater.

ii. Social capital contributes for the approval of loans and hence the loans allocation, those reducing the transaction costs because of the information flow provided with this resource.

b) Savings depend on the equity and social capital. Since each solidarity fund maintains its own active and passive interest rates, although these are very similar to the market and they are determined periodically by the Administration Board, there are variations in rates between fund and fund, this prevents to have registers of the interest rates. For this reason, it is considered that savings just depend on equity and social capital.

   i. Regarding equity, the greater equity the greater the resources available to provide financial services, in this case to capture savings or deposits.

   ii. It can be expected that savings and investment depend on social capital because there is greater trust from the members to the funds, this could allow increasing the deposits, which will generate greater financial products.

2. Social capital affects the financial performance of the solidarity funds. The recovered loans are one of the most important indicators of performance. Achieving high rates of recovery is a necessary condition for a sustainable microfinance scheme. Loan losses represent the largest cost incurred and the main cause of insolvency, lack of liquidity and dependence on government subsidies (Jacob, 1994). It is considered that recovery depends on the following relationships:

a) The recoveries of the borrowed funds are dependent on average loans and social capital.

   i. One of the main incentives for borrowers to pay their loans is the expectation that in doing so they will have greater access to credit. But if the program starts to indiscriminate excessive, lending it is less likely to recover (Mansell, 1995). Therefore, it is expected that loans and average recoveries relates in an inverted parabola form, i.e. higher average loan increases recoveries, but they reach a point where with a larger amount of loans control is lost and the recoveries are reduced rather than increased.

   ii. Social capital, through its components: peer pressure and peer monitoring, allows the loans recovery. Thus, the higher social capital the higher loans recoveries will be.

8. *Definition of the econometric equations*

The hypothesis will be tested by estimating three equations which imply relations between the dependent variables (production and performance) and independent variables (equity, social capital and average loans). To test the first hypothesis, social capital is productive; the services offered by the solidarity funds (savings and loans) are estimated through productivity equations represented by a Cobb Douglas[11] type of production as follows:

$$Y = A\,X_1^{\beta_1}\,X_2^{\beta_2}$$

where Y refers to the product offering the solidarity funds, X_1 is the input given by the amount of fund resources and X_2 is the social capital associated with the producers. By replacing the outputs Ys and inputs Xs and applying logarithms, the following functions are obtained:

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[11] It was considered a Cobb Douglas function because two characteristics: constant returns to scale (homogeneity of degree 1) and the marginal productivity which is positive and decreasing i.e. marginal returns of productive inputs.

$$LnLoans = C + \beta_1 Ln(Equity + Savings) + \beta_2 Ln(Members * SocialCapital) + u \qquad \textbf{(1)}$$

$$LnSavings = C + \beta_1 Ln(Equity) + \beta_2 Ln(Members * SocialCapital) + u \qquad \textbf{(2)}$$

Products are given by the number of loans and the number of savings. The number, not the amount, is considered because the fund transactions reflect the number of operations performed and not the amount. For example, a producer may receive a loan of 500 pesos, but 5 people may receive a loan of 100 pesos. The second operation involves more transaction costs than the first and this does not mean that the number of transactions being carried out is less.

A production function with constant returns to scale[12] is proposed; the factors coefficients represent the elasticities. In equation (1) the product depends on the amount of resources available to loan, these come from the equity and the amount of savings. In equation (2) the product depends on the equity. The two equations depend on the social capital that is embodied by the producers, more producers in the solidarity fund strengthens the Fund's social capital.

To test the second hypothesis, social capital affects the financial performance of the solidarity funds, it is used an equation that considers recoveries. It is introduced a squared term because it assumes a parabolic relationship where it is expected a positive relationship between the average recoveries and loans and a negative relationship with average loans squared. This variable was included because it captures the trend in the average loan and recoveries after reaching the peak. The proposed equation is the following:

$$Recoveries = C + \beta_1 Average\ Loans + \beta_2 Average\ Loans^2 + \beta_3 Social\ Capital * Members + u \qquad \textit{(3)}$$

Recoveries are related to the amount of loans paid, the average loan is related to the amount of resources allocated for producers and social capital is again a variable incorporated in the number of producers.

It is expected a positive relationship between the average loans and the recoveries because the highest average loans, the greater incentives producers will have to increase recoveries (it refers to the tiered system of credits). The system works as follows, loans are granted to producers, if they pay their loans they are candidates for higher credit, but if they do not pay or incur in moratorium, they are not eligible to apply for another loan. Thus, the funds can allocate loans to the highest point where they can control the recoveries, beyond that limit average loans instead of representing an incentive to the recoveries it may cause frauds and decapitalization for the funds. The highest point is the following:

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[12] Production increases in the same proportion that inputs increase Xi and Xj. The existence of constant returns to scale allows considering the inputs returns according to their marginal productivity, ie: $\textbf{Y} = \textbf{Pmg}_{xi}\,\textbf{Xi} + \textbf{Pmg}_{xj}\,\textbf{Xj}$. In the case of decreasing returns to scale ($\textbf{Y} < \textbf{Pmg}_{xi}\,\textbf{Xi} + \textbf{Pmg}_{xj}\,\textbf{Xj}$) production would increase by less than the input, therefore, the product would be insufficient to make payments to those factors according to their marginal productivity, and respect to increasing returns to scale the product would be greater than that payment.

$$\frac{\partial \text{Recoveries}}{\partial \text{Average Loans}} = \beta_1 + 2\beta_2 \text{Average Loans} = 0$$

Solving the equation it is obtained the maximum value of the average loans, which is a function of the estimators β_1 and β_2.

$$\text{Value that maximizes the average recoveries of loans} = -\frac{\beta_1}{2\beta_2}$$

On the other hand, social capital acts as an advocate for recoveries by selecting the best candidates for credit through information flows, peer pressure and peer monitoring. Thus, it is expected that a greater investment in social capital allows greater loan recoveries. The variables used in equations *(1), (2) y (3)* are described as follows:

a) *LLoans.* Are the loans logarithms and are of two types: a) automatic loans and b) solidarity loans allocated with the approval of a voluntary endorsement.

b) *LLending Funds*. Refers to the sum of the equity and the amount of savings in current pesos. The equity is comprised of three funds: a) the general reserve contributes to financial autonomy of the funds and could be used to provide loans, b) contingency fund is used to cover any eventuality regarding a financial deficit of the fund, and c) promotion and social development is used to support community projects. The amount of savings relates the resources from the deposits of members through the various accounts that record the funds.

c) *LSocialKT*. It refers to the social capital indicator that was built with the 1st. method $K = (1-CV) / (1 + CV)$ using the adjusted coefficient of variation. The term describes the relationship between this input and their carriers, SocialKT = social capital *producers.

d) *LSavings*. Refers to the number of transactions from the various savings accounts that record the funds as current accounts, systematic savings, youth savings and time deposits.

e) *LEquity*. It refers to equity described above.

f) *Recoveries*. It refers to the total amount of recoveries that are obtained from the loans allocated and is the difference between loans allocated and current loans. The current loans are those offered by the Funds and are payable in whole or in part, it includes the default loans but excludes the overdue loans.

g) *Average Loans*. The amount of loans given divided by the number of members in each solidarity fund.

The information of the indicators was obtained from the financial results reported by the Solidarity funds at the end of each year except the coefficient of variation; this was built with income information of the population living in the municipalities where the funds are located. This information refers to the employed population by level of monthly income in minimum wages registered by the XI General Census of Population and Housing, 1990, from the INEGI. The Census of 1990 was used because it is the closest information available at the municipal level to 1994, i.e. it is the year for which information is available for the profits and losses statement of the solidarity funds.

9. *Estimation of econometric equations*

It was used a sample with 54 observations of the 118 Solidarity funds registered in 1994 at the municipal level. The selection of this sample size deserves further explanation. The funds were constituted in 1992, formally began operations in 1993 and their first state of results in FONAES was in December 1993. That year the majority of the funds had not reported recoveries because they had distributed credits just a few days before or because of the lack of financial accounting knowledge from -the funds operators. Thus, in December 1994, the second year in which they reported their results, only 54 of them provided information on loans, savings and recoveries. Applying the method of ordinary least squares in the three cross-section equations, the following estimators were obtained.

Independent Variables	Dependent Variables		
	LnLoans	**LnSavings**	**LnRecoveries**
Ln^{1}Loan Funds	0.7687*** (0.1820)		
LnEquity		0.7684*** (0.6478)	
Average Loans			509.3913*** (37.0145)
Average Loans ^{2}			-0.0273*** (0.0024)
Ln SocialKT	0.2927*** (0.1351)	0.5874*** (0.4142)	627.7429^{3}*** (102.3964)
Constant	-6.6022*** (2.4718)	- 5.214** (4.4987)	-198693 (168445.8)
Percentage of illiterate population over 15 years old.	-0.0230* (0.0153)	-0.0057 (0.0392)	5511.886 (4693.434)
Percentage of population without primary completed aged 15 and more years old	0.0109 (0.0119)	0.0157 (0.0297)	1149.41 (4726.741)
Percentage of households' occupants without toilet or drainage.	0.0072 (0.0071)	-0.0141 (0.0201)	-971.921 (2024.441)
Percentage of households' occupants without electricity.	-0.0015 (0.0079)	-0.0027 (0.0253)	672.0309 (2181.835)
Percentage of dwellings without piped water.	-0.0011 (0.0071)	0.0202* (0.0187)	3177.239* (1877.545)
Percentage of households with overcrowding	-0.0173* (0.0109)	-0.0238 (0.0309)	-1886.447 (2543.655)
Percentage of occupants in houses with dirt floor	0.0118** (0.0065)	-0.0207* (0.0167)	-1925.089 (2455.353)
Percentage of population in localities with fewer than 5,000 inhabitants	-0.0045 (0.0053)	0.0209** (0.0124)	-358.7182 (1473.258)
Percentage of population with income less than 2 minimum wages	-0.0168** (0.0097)	-0.0455** (0.0247)	-4163.998** (2306.558)
N	54	46	42
R^{2}	0.5945	0.5247	0.9119
R^{2} adjusted	0.4883	0.4315	0.8754

[1] Ln=natural logarithm; [3]there are not included logarithms only in this term because the functional form of the recoveries equation. The terms in parentheses refer to the values of the standard errors. Significance levels are ***(99%), **(95%) y *(90%). The variables were significant in the joined form. [13]

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[13] F-estadistic is 5.60, 2.50 and 25.01, respectively and it probability is 0.0000 in the three cases.

Control variables were used from the marginalization index of CONAPO, 1990, such as population size, the percentage of illiterate population over 15 years, the percentage of population without complete elementary school aged 15 years, the percentage of occupants in houses without drainage or toilet, the percentage of occupants in houses without electricity, the percentage of occupants in houses without piped water, the percentage of households with overcrowding, the percentage of occupants in houses with dirt floors, the percentage of the population in localities with fewer than 5,000 inhabitants, the percentage of the population with income less than 2 minimum wages. We included these variables as controls in order to analyze the effects of social capital in the financial behaviour in the municipalities where access to financial services is limited and because the degree of marginalization of a municipality is highly correlated with lack of access to financial services Yaron, (1994) [14].

In the three equations, the econometric results reported that social capital was significant in loans, savings and recoveries. In all three cases the sign is positive. It was not observed a behaviour pattern in the control variables, with the exception of the indicator: Percentage of population with income less than 2 minimum wages, which was statistically significant in all three equations, i.e. when people earn less than two minimum wages they save less and there is less recovery. When isolating the components and estimating the three equations but only with the marginalization index integrated the results are as follows:

Independent variables	Dependent variables		
	LnLoans	LnSavings	LnRecoveries
Ln[1]Loan Funds	0.7255*** (0.1668)		
LnEquity		0.7012** (0.6887)	
Average Loans			505.9847*** (31.1905)
Average Loans^2			-0.0273*** (0.0019)
LnSocialKT	0.2302*** (0.1296)	0.5557*** (0.4434)	596.4765[3]*** (95.0629)
Constant	-5.0011** (1.9213)	- 5.6483** (4.4871)	-454341.7** (57084.64)
Index of marginalization	0.1736** (0.0965)	-0.2958** (0.1499)	60.493*** (20844.21)
n	54	42	42
R^2	0.4971	0.5014	0.8878
R^2 adjusted	0.4669	0.4011	0.8757

[1]Ln=natural logarithm; [3]there are not included logarithms only in this term because the functional form of the recoveries equation. The terms in parentheses refer to the values of the standard errors. Significance levels are ***(99%), **(95%) y *(90%). The variables were significant in the joined form. [15]

Again, in the three equations social capital was significant with positive sign. It was observed that when the equations were estimated with the marginalization integrated index it has an effect on the loans, savings and recoveries. That is, when the members of the solidarity funds are located in marginalized municipalities, the percentage of loans is higher but the

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[14] In 2000, only 13% of municipalities with high and very high marginalization in Mexico had some kind of financial intermediation in the region. Source: The portal of microfinance in Mexico http://www.microfinanzas.net

[15] F-estatistic was 16.47, 13.39 and 73.19, respectively, and the probability was 0.0000 in the three cases.

percentage of savings is lower (perhaps because the income effect), although the amount of recoveries is greater.

In the first equation, it is observed that 49.71% of the variation in loans is explained by the variation in the loanable funds and social capital. It can be inferred that the services provided by the solidarity funds via loans depend positively on the amount of resources available to loan compounds of the equity and savings, and social capital. It also follows that the greater the resources available to the Fund, the greater the number of loans to be granted. The same with social capital, with greater social capital more loans will be allocated. It was also demonstrated that there are constant returns to scale[16], which means that if the amount of each factor doubles (equity, savings and social capital), it the number of loans that are granted also doubles, *ceteris paribus*. Substituting the values of the estimated coefficients in the production function the result is as follows:

$$\text{Loans= 0.006 Loan Funds}^{0.7255} \text{ SocialKT}^{0.2302}$$

The value of the constant means that if the loanable funds and social capital are equal to one, the loans value is 0.006%[17], *ceteris paribus*, i.e., when the amounts of equity and savings are small and the sympathy between members is very low, the amount of loans that is granted is minimal and zero when they are close or equal to unity.

The loanable funds and social capital coefficients are the product elasticities of the loans. Thus, an increase of 1% in the loanable funds generates an increase of 0.7255% in the loans given, *ceteris paribus*. In the same way, if social capital rises by 1%, the product (measured by the loans) increases by 0.2302%, ceteris paribus. Although social capital has a significant impact on the loans allocation that is lower than that of the loanable funds, i.e. the provision of funds affects more than the existence of the total social capital to give more loans. After estimating the second equation, the values of the coefficients are obtained and replaced in the production function the result is as follows:

$$\text{Savings= 0.003 Equity}^{0.7012} \text{ SocialKT}^{0.5557}$$

From these results, it appears that changes in equity and social capital explain 50.14 percent of the variations in the number of collected savings. It can be inferred that the services provided by the solidarity funds via savings depend positively on the amount of resources for financing, and also on social capital. In this regard, most available resources, by expanding the equity, generate greater savings collection. In the same way, more social capital leads to greater confidence in the resource deposit in the solidarity funds. There were also constant returns to scale[18], which means that if the amount of equity and social capital doubles, the number of savings that are captured also doubles.

It also follows that the value of savings is 0.003[19] if the equity and social capital are equal to one, in other words, when the amount of resources to finance is small and the sympathy that exists between members is very low, the amount of savings that is captured is minimal or zero if they are close or equal to unity, *ceteris paribus*. The equity and social capital coefficients

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[16] Wald test (F-estatistic was 0.8013 and probability was 0.4012).
[17] $\exp^{-5.0011}=0.006$
[18] Wald test (F-estatistic was 0.9889 and probability was 0.1758).
[19] $\exp^{-5.6483}=0.003$

represent the product elasticities of the savings. Thus, an increase of 0.7012% in the savings is produced by a 1% increase in wealth, *ceteris paribus*. In the same way, the product (measured by the number of savings) rises at 0.5557% if the social capital increases by 1%, ceteris paribus. Again, social capital has a significant effect in attracting savings, but it is less than the equity, i.e., the provision of resources affects more to finance than the existence of social capital to attract more savings.

In the same way, using the sample with 54 observations the coefficients of the third equation were estimated. The 88.78% of the variation in recoveries was explained by the variation in average loans, square average loans and the social capital. It can be inferred that the performance of the funds (measured by recovery) depends positively on the amount of loans allocated by the producer, negatively on the square average loans and positively on the existing social capital. Substituting the values of the estimated coefficients in equation three the result is as follows:

$$\text{Recoveries} = -454341.7 + 505.98 \text{AverageLoans} - 0.0273 \text{AverageLoans}^2 + 596.47 \text{SocialKT}$$

From the estimations, it is inferred that if the total of social capital increases by one unit, the amount of recoveries is increased by 596.47 pesos, *ceteris paribus*. The interpretation of the above implies that for every additional producer that owns and activates their social capital with his partners there will be generated increases in the recoveries of loans by an amount of 596.47 pesos. In this sense, a greater investment in social capital will recover a greater amount of borrowed funds. In the same way, if the average loans in each Fund increase in one unit, the amount of recoveries will increase 505.98 pesos, *ceteris paribus*. If the square average loan in each fund increases in one unit, the amount of recoveries is reduced in 0.0273 pesos, *ceteris paribus*. In this way, a larger amount of average loans given by a Fund generates recoveries of the resources but after reaching a certain value they begin to decline with increased average loans. In marginal terms, increases in recoveries due to the increase in average loans will be higher than the reductions before reaching the maximum value. The peak is reached at:

$$\text{Value } that \text{ maximizes } the \text{ recoveries } of \text{ the average loans} = -\frac{505.98}{(2)(-0.0273)} = 9,267.03$$

The above result comes from the maximization of recoveries and implies that by increasing the solidarity funds loans per member by a unit the recoveries are increased in 505.98 pesos on average, but after that, when loans exceed the amount of 9267.03 pesos the recoveries start to decrease in 0.0273 pesos per average loan additional. If the social capital and marginalization index had a value of zero, at the inflection point, recoveries would be of 1,890,168.53 pesos. Loans by a producer in the sample of 54 observations are of 1,966.44 pesos on average and the amount of recoveries is of 410,591.11 pesos on average, meaning that funds may still allocate loans per producer of 7,300.59 pesos on average before reaching the peak and start to experience reductions in their recoveries.

The constant has a special treatment in this equation. Since negative values of the constant have no sense from the recoveries, the constant would only get the value of average loans when the recoveries are not obtained, which could be reached in 951.75 pesos if both social capital and the marginalization index had a value of zero.

It is important to note that although the amount of loans given to producers affected

significantly the amount of recoveries, the greatest effect is produced by the total social capital. Thus, it is expected that a greater investment in social capital allows greater recoveries of loans.

From the results obtained of the estimation of the third equation it is inferred that the recoveries of the borrowed funds are dependent on average loans and social capital. Furthermore, it shows that social capital positively affects the performance of the solidarity funds via recoveries and that they have a different behaviour with the increase in average loans. Therefore, it can be concluded that social capital has a significant effect on the productivity of the solidarity funds in the sense that it helps to attract more savings and to allocate more loans and it also affects the financial performance of the funds.

10. Conclusions

Classical economic theory assumes that the relations of sympathy or antipathy between individuals do not substantially affect the outcome of transactions. This implies that social distance between suppliers and purchasers is often very large so that these relations do not affect prices and quantities that are assigned are taken from the market. However, evidence suggests that relationships matter. They can alter and modify terms of market performance. Social capital refers to networks, norms and trust that facilitate cooperation for mutual benefit.

Given that social capital makes it possible to achieve certain resources that could not be achieved in its absence or could do so only at high cost, this allows poor producers to have access to financing and helps microfinance schemes to reach their financial sustainability. In Microfinance, social capital works by solidarity bonds, neighbourhood and community organization operates under the mechanisms of peer pressure and peer monitoring which allows them to minimize costs of monitoring and credit analysis. The problem of adverse selection is minimized because members select their peers to participate in these schemes. Their members use social collateral to obtain loans and as security for loan repayment, its principal asset is the trust that exists between them.

Social capital in the solidarity funds is expressed by participation, trust and responsibility of the members. They take the voluntary decision to constitute the funds with the loan recoveries given by government programs. They decide who can be a new member based on the information they have on their reliability and ability to pay shown in their own communities. They are owners of these mechanisms and responsible for the recovery of resources at the same time, they are also responsible for monitoring and evaluating the solidarity funds. Their involvement in the creation, discussion and monitoring of the operation rules has contributed to the organization and evolution of the solidarity funds. Both, peer pressure and peer monitoring scheme have reduced the problems of fraud or default, which has helped to reduce the risk of bankruptcy and prevent its spread to other regional economic sectors.

In order to prove that social capital is productive in the solidarity funds, the social capital effects were analyzed (associated with the members) in loans allocation, collection of savings and recovery of loans. To this objective the following hypotheses were explored : a) social capital can be estimated through an index of inequality by using extrapolation method; b) social capital affects the productivity of the solidarity funds, and c) social capital affects the financial performance of the solidarity funds.

From the results obtained in testing the first hypothesis by the extrapolation method, it was inferred an inverse relationship between social capital and inequality in two ways with five indexes of inequality and trust indicators of social capital. The results show that the best proxy for estimating social capital is the coefficient of variation. To verify this relationship social capital was estimated at country level and state level under the two methods. The results showed a similar trend in their behaviour and an inverse relationship between the variables of social capital and inequality. Thus, the years in which the highest inequality was presented are also the years with lowest investment in capital. In the same way, the states that showed the highest rates of inequality are also those who had the lowest percentages of social capital.

To test the second hypothesis the services offered by the solidarity funds (number of loans and savings) were estimated through two productivity equations represented by Cobb Douglas production functions . The inputs considered were loanable funds, equity and social capital. From these results, it was deduced that the services provided by the funds via loans depend positively on the amount of resources available to offer loans and the existing social capital. It was also noted that the greater the resources available in the Fund, the greater the number of loans to be granted and the greater the social capital, the greater the amount of loans to be allocated. In the same way it was observed that the number of saving transactions depends positively on equity and social capital; it was noted at the greater provision of resources through the expansion of equity, generates greater savings and also more social capital generates greater confidence to deposit resources in the solidarity funds.

To test the third hypothesis, it was estimated a performance equation through recoveries. The results show that the fund's performance, measured by recoveries, depends positively on the amount of loans allocated per member, negatively on square average loans and positively to the existing social capital. It was also noted that the average loan recoveries increase and reach a point where a larger amount of loans makes them lose control of the recoveries and instead of increasing them, they reduce.

Additionally, it was found that greater investment in social capital recovers a greater amount of borrowed funds. It was noted that although the amount of loans granted by producers affect the amount of recoveries, the greatest effect is produced by social capital. Thus, it is expected that greater investment in social capital allows higher loan recoveries.

It was analyzed the importance of social capital in the sense that the performance and productivity of a microfinance program can be expanded or limited by its social capital. However, these conclusions were deduced from a scheme with government participation, it is questionable whether public efforts in the allocation of credits can be successful without sufficient levels of social capital provided by the members. Therefore, it is appropriate to examine the assumptions outlined in microfinance schemes without government involvement, such as FINCA, CAME, among others.

The solidarity funds do not have the authorization from CNBV to operate as EACPs in terms of the LACP because they are civil societies. This status limits the development of these financial funds and prevents them from having the backing of the banking authorities, this is not a serious obstacle to their development, but may be in the future. So, while for internal management, the funds have statutes and operation rules approved by the membership, it is necessary to be supported and backed by the appropriate legislation. In this sense, social

capital has a special advantage on the legal aspect of the solidarity funds; its operation mechanisms, supervision and funds control gives confidence and certainty to the members on the use and recovery of resources. Otherwise this could not be observed because of the funds legal situation under which they could not be governed by other statutes that imply high costs for the funds or would change its social denomination.

Perhaps, the most important conclusion is that relationships influence the products and the loans recoveries, and so the economic recommendations include actions to build, maintain and increase social capital. Investment in social capital can be achieved when individuals are involved in cooperative or synergistic activities in which those involved have an interest in the success of others, and therefore have more communication, share common causes and responsibilities, offer more favourable trade terms, create social bonds and interact for the benefit of the community. The design of social programs that are based or encourage participation may boost this kind of synergistic activities.

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