

# Credit Information Systems in Less-Developed Countries: Recent History and a Test

*JEL Classifications: O12, O16, L31, L13*

*Keywords: Credit Markets, Credit Bureaus, Asymmetric Information*

Jill Luoto\*

University of California at Berkeley

Craig McIntosh\*\*

University of California at San Diego

Bruce Wydick\*\*\*

University of San Francisco

September 2004

Abstract: Increases in formal sector lending among the poor have created a need for credit information systems that provide potential lenders both positive and negative data about borrowers. In this paper we provide an overview of the development and use of credit information systems in industrialized and developing countries. We summarize the disparate literature on the topic, provide the historical context, and discuss the current state of credit information systems in different parts of the developing world. We then present a test of the effects of a newly implemented credit information system using fixed effects estimation on panel data from Guatemala. Results indicate that improved screening effects from the system caused the level of portfolio arrears to decline between 2 and 3.5 percentage points six months after it was implemented in branch offices.

\*Jill Luoto: Dept. of Agricultural and Resource Economics, Giannini Hall, University of California at Berkeley, Berkeley, CA 94720, e-mail: [jillluoto@yahoo.com](mailto:jillluoto@yahoo.com)

\*\*Craig McIntosh: School of International Relations and Pacific Studies, U.C. San Diego, 9500 Gilman Drive, La Jolla, CA 92093-0519, e-mail: [ctmcintosh@ucsd.edu](mailto:ctmcintosh@ucsd.edu)

\*\*\*Bruce Wydick: Department of Economics, University of San Francisco, San Francisco, CA 94117, e-mail: [wydick@usfca.edu](mailto:wydick@usfca.edu).

We wish to thank Alain de Janvry, Betty Sadoulet, Tomas Rosada, seminar participants at Princeton University, UC Berkeley, UC Davis, and the 2002 WEAI meetings in Seattle for helpful comments and encouragement. Financial support from the Leo T. McCarthy Foundation, BASIS/USAID, and the Fulbright IIE Program is gratefully acknowledged.

## I. Introduction

The microfinance revolution has brought about unprecedented competition in credit markets within many developing countries. This increased competition has resulted in a number of unforeseen difficulties. Recent findings report greater competition between lenders has increased problems of borrower over-indebtedness, reduced loan repayment incentives, and growing arrears for microfinance institutions (MFIs) in competitive environments (Campion, 2001; McIntosh and Wydick, 2004a).

This paper argues that the weakening performance of microfinance in competitive environments is due in part to the absence of information sharing in these markets. Because growing numbers of MFIs increase the level of asymmetric information between lenders, credit information systems (often called credit reporting bureaus or credit bureaus) can play a crucial role towards improving credit market performance and the credit delivery to the poor.

The importance of information in credit markets is well established in seminal papers such as Akerlof (1970) and Stiglitz and Weiss (1981). Credit information systems act as information brokers that increase the transparency of credit markets. However, in many developing countries credit information systems are still in their infancy and information sharing between lenders remains insignificant. As competition in microfinance lending intensifies in these countries, borrower information becomes all the more important. MFIs are increasingly utilizing their services to address a fundamental problem of all credit markets: asymmetric information between borrowers and lenders that can lead to adverse selection and moral hazard. Motivated by industry survival amidst increasing competition, a wide array of lending institutions in developing countries are becoming increasingly aware of the essential role that credit information systems play towards the creation and maintenance of an efficient financial system.

This paper offers both a descriptive account of the dramatic growth in credit information systems in developing countries and an empirical test of the effects of a newly implemented credit bureau in Guatemala. Section II provides a literature review of previous research on credit information systems. Section III then offers a brief history of the development of credit information systems and provides an empirical description of the credit reporting environments found today in various parts of the developed and developing world. In section IV we present the data set and estimation technique used to capture the screening effects of a newly implemented credit bureau in the increasingly competitive microfinance industry in Guatemala. In Section V we present results of our estimations. Results show the positive role that information sharing can play in improving lending performance. Results indicate that improved screening effects from the system caused the level of portfolio arrears to decline between 2 and 3.5 percentage points in the six months after it was successively implemented in each branch office. Section VI concludes with policy recommendations that stem from our research.

## **II. REVIEW OF CURRENT LITERATURE**

The increasing concern with the need for credit information systems among development practitioners has made them a topic of much interest among academics. However, there remains a limited body of literature covering the theoretical framework for credit information systems. An even more limited body of literature exists offering empirical estimations of their actual impact. The subject of credit information systems operating in the microfinance sector has been virtually untouched by the academic literature. Studies that do exist are limited to a number of case studies (Campion and Valenzuela 2001; Lenaghan 2001; Abreu 2001).

Using a pure adverse selection model, Jappelli and Pagano (1993) analyze the factors that lead to endogenous communication between lenders in a credit market. They find that information sharing is more likely to occur when the mobility of households is high, the pool of borrowers is heterogeneous, the credit market is large and the cost of information exchange is low. Fear of competition can make lenders hesitant to share their client information, yet a credit bureau is a “natural monopoly” with increasing returns to scale: when some lenders begin to share information, it creates an incentive for other lenders also to share information. Benefits of information sharing include an improved pool of borrowers, reduced default rates, and lower interest rates. There is an ambiguous effect on lending volumes: Credit bureaus will increase lending volumes only if high interest rates caused by adverse selection drive safe borrowers out of the market.

McIntosh and Wydick (2004b) show that the total effect of a credit bureau can be decomposed into two separate effects: a screening effect and an incentive effect. Moreover, the existence of a credit bureau may improve credit access for the poorest borrowers. Assuming that credit markets are competitive, information sharing lowers lender costs through lower default rates. This implies that in a zero-profit equilibrium, borrowers with lower levels of initial assets become added to micro-lender portfolios.

A full information-sharing arrangement may be inferior to one with limits. Vercammen (1995) and Padilla and Pagano (2000) argue that limits to the information exchanged between lenders can lead to more optimal results. Vercammen uses a multi-period model with adverse selection and moral hazard to show that a certain level of adverse selection is required in a credit market in order to give rise to borrower reputation incentives and thus aggregate welfare. He concludes a system of full information sharing may be less efficient than one designed to preserve some level of asymmetric information, such as

limiting the length of borrower data that is maintained. Padilla and Pagano (2000) focus on the effect of information sharing as a “borrower discipline device” under perfect competition. They conclude that borrowers have greater incentive to perform if only negative information is exchanged, arguing that sharing positive borrower characteristics can ease the negative impacts of default and mitigate the disciplinary effect of a credit bureau.

Jappelli and Pagano (2002) offer the first empirical investigation of the existence and impacts of credit bureaus in various economies around the world. They find that the presence of private credit bureaus or public credit registries is associated with broader credit markets and lower credit risk. They find no differential effect between public and private institutions on credit market performance, and argue that public credit registries are more likely to arise where there is no preexisting private credit bureau and creditor rights are poorly protected.

Margaret Miller’s *Credit Reporting Systems and the International Economy* (2003) offers the first comprehensive source for the institutional aspects of credit reporting. Miller’s own chapter uses results from a World Bank Internet survey to offer empirical data on the status of credit reporting activities around the world. She shows how credit bureaus can provide borrowers with “reputation collateral”, frequently viewed as more valuable than physical collateral by surveyed lenders. Furthermore, she argues that the types of data collected by a credit bureau often provide the best predictors of repayment.

Jappelli and Pagano (2000) conclude that the usefulness of credit bureaus is reduced in developing countries where large informal sectors exist in which enforcement of repayment compliance is difficult. They suggest that granting credit bureau access to informal lenders would increase the credit bureau’s usefulness for both formal and informal lenders, due to the economies of scale that defines the industry. Jappelli and Pagano also

argue that better information may lead banks to shift from collateral-based lending policies to more information-based ones, supporting Miller's empirical findings on lenders' preference for credit registry data.

Case studies conducted in the microfinance sectors of various countries support the notion that there is a need for credit bureaus to collect and disseminate information between the microfinance lenders operating in the same market in developing economies. For example, following an over-indebtedness crisis in Bolivia in 1999, Campion (2001) relates how private credit bureaus were allowed to form and are working to reduce instances of multiple borrowing in Bolivia's burgeoning microfinance sector.<sup>1</sup>

Despite new research offering empirical descriptions of credit reporting activities in various countries, the literature does not include references to credit reporting activities in the large and growing microfinance sectors of LDCs. Empirical research on the effect of credit bureaus in microfinance sectors of developing countries are very limited and do not include analysis of the ability of credit bureaus to increase access to credit among the poor. With the explosion and maturation of the microfinance industry throughout the developing world, this creates a large gap in the literature that this paper attempts to fill.

### **III. HISTORICAL DEVELOPMENT OF CREDIT INFORMATION SYSTEMS**

A credit information system improves the efficiency of financial systems through improving risk assessment of loan applicants, which then improves portfolio quality, which in turn reduces rates of arrears. In a competitive credit market, these efficiencies are passed on to borrowers in the form of a lower cost of capital. Improved information flows thus enhance the efficiency and stability of the entire financial system. Yet because of the public good characteristics of credit information systems, their natural emergence in the credit market is not always guaranteed.

Consequently, the breadth, depth and general efficiency of credit information systems vary greatly between countries. Credit reporting, at some level, is a critical part of the financial system in most developed economies; in developing countries it is often much weaker if not altogether absent. This is because repayment discipline in credit transactions typically happens through oft-repeated transactions between a borrower and a single familiar lender in LDCs, whereas repayment incentives in developed countries are typically enforced via threats to a borrower's credit rating. However because borrowers often lack the ability to send signals of their credit worthiness to the entire pool of potential lenders in LDCs, they are more susceptible to borrowing terms being dictated by a solitary lender with whom they have had a past borrowing relationship. In this way informational flows between lenders can actually shift market power to borrowers.

Two principal types of credit information systems are found worldwide. Private credit bureaus and public credit registries together constitute the two types of formal mechanisms for the exchange of information among lenders in financial markets. The primary distinction between these two arrangements is that participation in a public credit registry is compulsory and imposed by regulation, while private credit bureaus collect information from member-lenders on a voluntary basis. Both operate on a principle of mutual information exchange: Institutions supply information to the database on their clients in exchange for access to the rest of the database. However, membership in public credit registries is often compulsory by law, whereas in private credit bureaus membership is typically voluntary.

The type of information shared within both private credit bureaus and public credit registries lenders differs between institutions. Three distinct levels of information sharing are possible between institutions. Each affects the credit market in different ways.

The lowest level, of course, is that of zero information sharing. In such an environment, financial institutions have exclusive knowledge of their customer base. This makes shopping between lenders for the best terms difficult for a borrower, especially for those without collateral to offer: A creditor from whom the borrower has never taken a loan has no way to assess the borrower's associated risk. For the creditor, granting loans to borrowers without an accompanying reputation increases the level of risk since there is little way to ascertain the quality of the loan.

The next level of information sharing is the exchange between lenders of negative information, regarding borrower defaults and arrears. The creation of a public "black list" alone yields two positive results: First, it helps to cleanse lender portfolios of borrowers with past borrowing problems, and thus produces a *screening effect* which mitigates adverse selection problems. In addition, the fact that borrowers want to avoid being on the black list creates an *incentive effect* that helps to reduce the problem of moral hazard in loan repayment.

The most sophisticated information-sharing arrangements, however, include positive borrower data in addition to the negative data. Positive data, or a "white list", may include the debtor's overall loan exposure and guarantees, data from past credit history other than defaults and arrears, and debtor characteristics such as employment, income or line of business (Jappelli & Pagano 2000). The sharing of positive information allows for the debtor to create "reputation collateral" often in the form of a credit score, which can provide valuable information to the credit market, and signal a borrower's individual credit worthiness to a large pool of lenders. As shown in McIntosh and Wydick (2004), the sharing of positive information helps to mitigate borrower over-indebtedness, lower default rates in the overall credit market, and (in competition) to reduce equilibrium interest rates.



The motives for establishing a credit reporting system have varied throughout history as they have appeared in different areas of the world. The first appearance of a formal arrangement for credit information sharing was in the United States in the 1830s, when the creation of the first credit registries was a response to the problem of information asymmetry in trade markets (Olegario 2003). The 170-year history of credit bureaus in the United States has allowed them to evolve and adapt via experimentation and innovation over time. In addition, evolution of the institutions coincided with the advancement with US commercial and bankruptcy laws, allowing for their embedment into US business culture. However, *consumer* credit reporting was a much later development in the US, and only became a significant industry in the twentieth century (Olegario 2003). In recent years the credit reporting industry in the United States has been marked by rapid consolidation into three major credit information providers: *Trans Union*, *Equifax*, and *Experian*. As a credit bureau expands through the absorption of another, its database and coverage of the population also expands. Thus, given the economies of scale that describes the industry, a trend of mergers and acquisitions in credit reporting is not surprising.

Europe, like the United States, has a substantial history of credit reporting, yet the high value that European law places on individual privacy limits the depth of credit reporting relative to that allowed in the United States. While most credit bureaus in Europe are privately owned, seven of fifteen member countries of the European Union operate a public credit registry (Miller 2003). This and other institutional and cultural differences between European countries have made intra-European information sharing between financial institutions difficult. Credit reporting in Europe is in the midst of a transitional state currently as the 25-member European Union struggles to harmonize individual differences in

order to achieve full cross-border information sharing, trying to balance values of individual privacy with financial market efficiency.

The industrialized regions of the world such as North America and the European Union tend to have much more expansive information-sharing systems than the developing economies for several key reasons. First, the sheer volume and density of lending within the industrialized countries augments the demand for credit bureaus. Second, the industrialized countries typically have stronger legal infrastructures. A country with strong legal and regulatory frameworks is able to more successfully enforce information-sharing rules, and deal appropriately with concerns over issues such as consumer protection rights and individual privacy (Del Villar et al. 2003). Third, more sophisticated communications technology, such as the more widespread level of Internet access in industrialized countries, lowers the cost of information exchange. Fourth, developed countries typically have greater levels of borrower mobility and heterogeneity, making the services of credit bureaus of greater importance. Borrowers in developing countries are thus able to carry a credit rating with them that is independent of their geographical location.

Throughout the developing world, the growing availability of consumer credit and the heightened competition between microfinance institutions has made the necessity of credit information sharing all the more apparent. However, the extent and efficiency of information-sharing mechanisms varies greatly between countries and continents. African, Asian, and Latin American countries all remain at different stages in the development of a credit reporting industry.

### *Africa*

Africa remains the region of the world with the least developed credit information systems. However, both private and public credit-reporting institutions operate in the formal

sectors of many African countries. African countries with a public credit registry include Angola, Burundi, Madagascar, Mozambique, Nigeria, and Rwanda. Additionally, a public credit registry operating in western Africa is overseen by the Banque Centrale des Etats de l'Afrique de l'Ouest (BCEAO), a central bank representing the West African nations of Benin, Burkina Faso, Cote D'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo. Tanzania and South Africa also are actively considering creation of PCRs (Miller 2003). As of 2002, private credit bureaus existed or were in the process of development in Mali, Niger, Nigeria, Burkina Faso, Kenya, Benin, Senegal, The Gambia, Cote D'Ivoire, Ghana, Uganda, Tanzania, Botswana, South Africa, Swaziland, Namibia, Rwanda, and Togo (World Bank 2002).

Africa's growing microfinance markets have underdeveloped credit bureau coverage. Yet the recent explosion of microfinance lending activity in African countries has sparked interest in the feasibility of credit bureau coverage for microfinance lending. Development practitioners in the heavy-lending microfinance markets of Benin, Uganda, and Mali are all considering the establishment of credit bureaus to help manage borrower risk under heightened competition. The topic of borrower information sharing was a major subject of discussion at the 2003 annual conference in Gambia of AFMIN, the African Microfinance Network, a regional association of African microfinance institutions.

### *Asia*

The Asian financial crisis during the late 1990s led to an urgent call for transparency in credit information throughout Asia. After the crisis, a great number of local and foreign-based credit bureaus were created. The example of Thailand is representative of the booming demand for credit information systems in the region. Before the 1997 economic crisis, there had been plans under the Financial System Master Plan to implement a nation-wide public credit registry, but in the chaos of the financial sector bankruptcies of mid-1997, these plans

were aborted. After the dust of the economic crisis settled in 1998, the Ministry of Finance and the Central Bank established the Thai Credit Bureau, which began operating in 2000, under government guidelines and requirements for both negative and positive information sharing (Kitsin, 2004). At virtually the same time, however, the Central Credit Information Services in Thailand, a private credit bureau, was formed by 12 local commercial banks, Trans Union International, and Business Online. This private credit bureau now has 29 major members (The Nation (Bangkok) 3/25/2004). Growth in credit information-sharing in Thailand has been astounding: By June 2003, the Thai Credit Bureau alone had issued over 3 million credit reports, and the institution now claims 47 members. The Ministry of Finance has recently been trying to facilitate a merger between the two institutions into a single credit bureau that would serve the country with a single clearinghouse for credit information.

Credit bureau growth in the other emerging Asian economies has been no less astounding. Private credit registries that included positive information sharing began operations in Singapore and Malaysia in 2002. South Korea now has two large credit bureaus as well as a banker's trade association that contains negative data. Plans are underway for World Bank (IFC)-financed credit bureaus to begin operation in both Indonesia and Vietnam (*Viewpoints*, October 2003). Mongolia and Pakistan are also in the process of developing a public credit registry (World Bank 2002).

China has not remained on the sidelines of the burgeoning growth of credit information sharing in Asia. According to the manager of one Chinese credit-reporting agency, as of 2000 there were approximately 100 credit reporting agencies of different sizes operating in China, almost ten times the number of five years before (Olegario 2003).

Information on microfinance loans has largely been excluded from Asian credit reporting. Yet heightened competition among South-Asian MFIs is now generating interest

in the establishment of credit bureaus. In Bangladesh, increasing competition between large microfinance lenders such as the Grameen Bank, the Bangladesh Rural Advancement Committee (BRAC) and RD-12, has sparked a World Bank-assisted initiative to introduce a specialized credit bureau into the country's microfinance sector. This credit bureau aims to build a national database in order to manage any systemic risk that might be caused by the present uncoordinated competition among MFIs. It is hoped that a credit bureau can help to mitigate the rising problems of non-repayment of microloans and client overlap among the largest MFIs in Bangladesh.<sup>2</sup>

### *Latin America*

Latin America, like Asia, has experienced widespread growth in both public and private sector credit reporting, though unlike Asia this has occurred not over the last five years, but steadily over the last decade and a half. Fourteen of thirty-one surveyed private credit bureaus in Latin America reported beginning operations since 1989. Moreover, the public credit reporting sector has also grown rapidly, as nine of the seventeen public credit registries in Latin America were also established after 1989 Miller (2003). As a result, Latin America now appears to be the region of the developing world with the highest incidence of public credit registries. Not surprisingly, information sharing is somewhat more extensive in the more economically developed Southern Cone countries of South America and Mexico.

In Mexico, for example, the national *Buro de Credito* was established in 1997 under the auspices of the finance ministry as a commercial joint venture between the major Mexican banks, Dun & Bradstreet and Trans Union. The credit bureau it is regulated by the National Banking Commission, which requires banks to utilize the credit bureau to assess customers credit worthiness before credit can be approved. By law, customer consent is required before

a lender can access his record Indy credit bureau. The system currently maintains over one million commercial loan records.

Latin America's lead in credit information sharing has recently extended to the microfinance sector as well. But within the region, countries differ substantially in their stages of development of credit reporting practices. A key example of credit reporting development in the microfinance sector in Latin America is Bolivia. Believing credit data was too sensitive and important a topic to entrust to the private sector, Bolivian law forbade the existence of private credit bureaus prior to 1999 (Campion 2001). Meanwhile, its public credit registry had refrained from collecting information from its burgeoning microfinance sector while intense competition between MFIs was allowing clients to borrow from multiple institutions, and in numerous cases reaching unsustainable levels of debt. Default rates in the microfinance sector began to skyrocket, resulting in the Bolivian microfinance crisis of the late 1990s. The crisis revealed the critical role that credit information systems play in promoting financial sector transparency and led the Bolivian government to rewrite its laws allowing for the existence of private credit bureaus. Currently, specialized private credit bureaus are beginning operations in Bolivia with a focus on microfinance loans.

Credit information-sharing in Central America among microfinance providers is developing rapidly, but still varies greatly. While in El Salvador the newly developed *InfoRed* credit information network facilitates information sharing between microfinance providers, Nicaragua, with an arguably greater level of microfinance activity, is only just beginning to create plans for an informational infrastructure that serves MFIs. In Guatemala, development of a credit bureau in the microfinance sector lags behind El Salvador, but is now in its nascent stages. Multiple loan-taking by MFI clients had become so extensive by the late 1990s that REDIMIF, an association of 19 MFIs came together to establish CREDIREF, a

centralized microfinance credit bureau, which has been functional since March, 2002. The credit bureau now collects both positive and negative data from six of the largest microfinance lenders in the country, while other MFIs are slowly being incorporated into the system. Our empirical tests in Section V use data from the newly established CREDIREF to ascertain the degree to which the effects of credit information-sharing are consistent with the theoretical predictions made in the next section.

#### **IV. EMPIRICAL WORK: HYPOTHESES AND DATA**

The hypotheses for empirical tests in this paper come from McIntosh and Wydick (2004b) which postulates that the effects of credit information systems can be decomposed into two distinct and separable effects on default rates. The first of these effects is a “screening effect”, the ability of a credit information systems to reduce default rates through removing risky borrowers from the portfolio. As the credit history and current borrowing data of each new applicant is checked before loan approval, borrowers with high pre-existing debt are culled from the portfolio, leaving a portfolio of less-indebted, lower-risk borrowers, which after the completion of a single loan cycle will begin to reduce default rates. The second effect is an “incentive effect”. Some borrowers, those on the margins of undertaking a safe or risky investment behavior, are induced into the safe behavior as the improved circulation of information within the credit bureau increases the negative ramifications of defaults.

Clearly a knowledge of the existence of the credit information system is required to produce an “incentive effect”. Extensive interviewing during our fieldwork, however, showed a uniform lack of awareness about the implementation of the credit bureau by

borrowers. As a result, our empirical work consists of a test for the pure screening effect of the credit bureau.

The subject for our empirical work is CREDIREF, a newly implemented, specialized credit bureau covering the microfinance sector of Guatemala. To help manage growing competition, CREDIREF was founded by REDIMIF, a network of 19 microfinance institutions, along with the cooperative CONFECOOP and the formal lending institutions BanRural and BanCafé. CREDIREF officially began operations in March, 2002. Its database and operations have been growing steadily since inception. By January of 2003, its database held information on over 58,000 loans involving upwards of 120,000 borrowers.

As it stands, participation in CREDIREF includes a flat \$70 monthly membership fee, plus an additional cost per consultation that decreases as the number of consultations rises. The first 100 consultations made per month each cost \$1.60, and prices decrease steadily to \$0.67 per consultation made over 6400 per month.<sup>4</sup> Due to this fee structure and the potentially significant fixed costs of upgrading systems to provide digital reports, some small MFIs are unable to afford consultation fees. In other countries credit bureaus have alleviated this problem somewhat with the solution of charging a membership fee that is scaled to the size of each participating institution. For instance, Bolivia's public credit registry charges participating financial institutions an annual fee equal to 1/1000<sup>th</sup> of their total assets (Campion 2001).

CREDIREF collects and distributes a variety of data on microfinance borrowers, including positive and negative payment information. The data it collects on a borrower include the name, national identification number, size of current or most recent loan, whether the client is in default on any loan or payment, size and frequency of payments on current loan(s), and a two-year history on the borrower's repayment record. The name of the lending



institution is not included in a borrower's credit report in CREDIREF, an attempt to mitigate fears of client-stealing between lenders. Additionally, CREDIREF does not provide a credit-scoring service, leaving the individual institutions responsible for performing their own evaluations of potential borrowers. Eventually, CREDIREF hopes to expand their services to include the collection and distribution of additional data such as court rulings, public record information, press publications, and credit card and savings account information.

The data for our impact analysis comes from the accounts of Génesis Empresarial, a large-scale MFI and CREDIREF member which has 38 branch offices located throughout the country. The different branches began using the credit bureau at varying times. Panel data on the branch-level monthly arrears of Génesis provides a dynamic measurement of the credit bureau's impact as it was implemented office by office. To supplement this administrative data, during the summer of 2003 we carried out fieldwork, researching the implementation of CREDIREF in Guatemala. We surveyed 184 of Genesis' clients from six branch offices to learn about their experiences with microcredit and to learn what changes the introduction of a credit bureau has made in their borrowing behavior. The six branches visited were selected in order to have a wide range of implementation dates as branches enter into the credit bureau (see Appendix A2 for a map of the branches of Genesis, including labels of the offices selected for surveys).

Génesis provides both positive and negative client information to CREDIREF and is consulting the database on an increasingly high share of loans disbursed. In June 2003 Génesis branches made a total of 1266 consultations to CREDIREF's database, of which 787 provided information on outside borrowing activity, which would not otherwise have been observable to the lender. However, as mentioned previously, despite the growing importance of CREDIREF to Génesis operations, Génesis clientele had remained largely uneducated as

to the credit bureau's existence and operation. This finding is consistent with prior research showing despite the rapid development in Latin American credit reporting industries of recent years, virtually no attention has been paid to educating consumers as to their rights and responsibilities regarding credit reporting (Miller 2003).

Génesis clients were no different. Of 184 surveyed clients from 6 branch offices from June to August of 2003, not one was aware of the credit bureau's creation. This creates a major weakness in the effectiveness of the credit bureau, as the positive incentive effects will fail to be realized. If borrowers are unaware that their loan histories are being shared among various lenders and do not understand the implications of this, borrowing behavior will remain unchanged and the total effect of credit bureau implementation will consist of solely a screening effect.

Therefore, assuming our survey's findings extend to the Génesis client pool at large, our empirical estimate of the credit bureau's impact is of the isolated screening effect. We test the hypothesis that CREDIREF consultation should lower arrears rates of participating Génesis branches.

Using a fixed-effects model to estimate the branch-level monthly arrears rates among Génesis' 38 branch offices from September 2000 until February 2004, we test for treatment effects subsequent to entry into CREDIREF. Our data are an unbalanced panel since some Génesis branches began operations after September 2000. In total, the data have 1596 observations. By using fixed-effects at the level of the branch, we control for any unvarying cross-sectional differences between offices. Likewise, we account for any time-specific trends in our data by applying a dummy variable to each time period.

The implementation of CREDIREF was technologically complex, requiring the branch offices of Génesis to improve hardware, software, and networking capabilities. For

this reason, the rollout was staggered over the course of 18 months, taking place in nine different waves. Table 1 outlines the process:

TABLE 1: Credit bureau implementation dates across branches.

<b>Month of Introduction</b>	<b>Branch Name</b>
August, 2001	Metro Dos, Santa Lucia
February, 2002	Guatemala Personal, Guatemala Cartera y Cobros, Metro Tres, Chimaltenango, Antigua, San Juan Sacatepequez, Tecpan, El Castano
April, 2002	Coban, Salama, San Pedro Carcha, San Cristobal, Tactic
June, 2002	Esquintla, Suchitepequez, Retalhuleu, Chiquimulilla, Guastatoya
August, 2002	Jutiapa, Jalapa, Cuilapa
September, 2002	Zacapa, Chiquimula, Esquipulas
October, 2002	Peten, Poptun, Melchor de Mencos
November, 2002	Izabal, Raxruha, Sayaxche, Morales, Los Amates, El Estor
January, 2003	La Libertad
Not Included	Pozo Maya, Rabinal

---

*Note: Prior to March 2002, dates signify when offices began consulting INFORNET, a complementary risk-management database to CREDIREF. INFORNET closed operations in May of 2003 and now CREDIREF operates alone. INFORNET provided only negative information on press publications, court rulings, any public record information, credit card and bank account information. Treatment is considered to be the same whether date of introduction is to CREDIREF or INFORNET for each branch.*

While the order and timing of this rollout were based on technological concerns and were thus arguably exogenous to lending outcomes, we see that in fact the order is what we might expect from an endogenous rollout, with higher-default branches getting access to CREDIREF first (with a t-statistic of 3.88 on this relationship). The fixed effects estimation, however, nullifies any differences between branch offices in default, and we see that once we try to explain *changes* in default with the order in which the branches entered, the relationship is insignificant, with a t-statistic of 0.59. We therefore argue that this staggered rollout provides an excellent quasi-experiment with which to measure credit bureau impact.

Our theory demonstrates that information sharing will mitigate the problem of adverse selection in lending. At the beginning of CREDIREF consultation, each branch already knows its own bad clients, and thus the bureau is only useful in preventing future

default. Upon entering into CREDIREF and gaining a fuller picture of the client base, each branch can identify those clients that are *about* to have trouble repaying their debts, and will deny them a subsequent loan. We thus hypothesize that the effect will not be discontinuous, but rather will phase in gradually over time.

As a preliminary investigation in the impact of the bureau, we present Appendix A3, which gives the branch-level arrears rates before and after the implementation of CREDIREF. Even in this table, we can see some evidence for the positive effect of the credit bureau. While only half of the 22 branches with significant changes in default over this break have seen a drop in arrears, the *average* change has been negative. The strong cross-sectional variation in arrears rates is to be expected, as Genesis offices range from small rural agricultural environments to large urban lending centers, and similar variation is found in employee and technological capabilities across offices. Such variation will be controlled for by the fixed effects.

Branch 10, called ‘Guatemala Cartera y Cobros’, serves as an accounting vehicle for bad debts, and saw its arrears rate rise from 40% to 75% over the period of the study. Because increases in default in this branch imply bad loans being written off the books of other branches, we leave it in the analysis to avoid falsely attributing a drop in arrears to CREDIREF. Branch 4, called Metro Tres, represents the other outlier; its arrears rate hovers at a level roughly three times the rest of the institution. Despite the fact that this branch had major pre-existing problems and has subsequently been closed, we also leave it in the analysis on the grounds that cleaning up the portfolio in such problem branches may be one of the

primary potential attractions of bureaus for lenders. It is worth noting that CREDIREF had no significant effect on the high arrears rate in this branch<sup>5</sup>. We note, however, that our results of the credit bureau’s impact are robust to the exclusion of these outliers.

## V. EMPIRICAL RESULTS

We take the branch office as the unit of analysis, with monthly observations.

Regressions are performed both unweighted (which gives each branch equal importance) and weighted by the proportion of the total portfolio in each month held by each branch.

Because of the shifting of bad loans from other branches to branch 10, we believe that the weighted results are likely to be the most robust. Since we lack detailed control data on the branches, in every specification we utilize fixed-effects at the branch level. All regressions use the full 1327 observations; we use robust standard errors throughout.

**Specification 1:** Here we use month- and branch-level fixed effects, and a dummy to measure the average change in arrears after the bureau is introduced:

$$Arrears_{it} = \delta CB_{it} + \gamma_t + \alpha_i + \mu_{it}$$

### Specification 1: Results.

#### Fixed effects, unweighted:

	Coefficient	Std. Error	P> t
CB	-3.311859	0.7348094	0.000
F(42,1247)	=	1.38	

#### Fixed effects, weighted:

	Coefficient	Std. Error	P> t
CB	-2.158124	0.5371091	0.000
F(79, 1247)	=	164.51	

Here we see that the treatment effect is significant and negative at the 99% level using both weighted and unweighted data (coefficients for the month dummies are omitted in the

interests of parsimony). The difference in treatment effects indicates that the bureau was most efficacious in small branches, and the dramatically higher  $F$ -statistic in the weighted regression arises as a result of the fixed-effects being implemented through dummy variables rather than through the within estimator.

**Specification 2:** In order to study the *timing* of the treatment effect, we now run a distributed lag model wherein dummies are included for the bureau having been introduced in each branch in the current month, one month prior, two months prior, etc., through 15 months prior. These dummies are switched off in all subsequent months, so coefficients measure the total difference between outcomes in the month after a given number of lags and the pre-treatment outcome. We can continue to use month- and branch-level fixed effects because the implementation of the treatment was staggered, allowing us to separately identify these two time-level sets of dummies. The specification is now:

$$Arrears_{it} = \delta_1 CBLag0_{it} + \delta_2 CBLag1_{it} + \dots + \delta_{15} CBLag15_{it} + \gamma_t + \alpha_i + \mu_{it}$$

**Specification 2: Results.**

	Fixed Effects, unweighted		Time & Time <sup>2</sup> , unweighted		Fixed Effects, weighted	
	Coefficient	P> t	Coefficient	P> t	Coefficient	P> t
CBLag0	-1.008	0.389	-0.969	0.377	-1.266	0.106
CBLag1	-1.612	0.166	-1.610	0.143	-1.559	0.035
CBLag2	-2.076	0.075	-1.629	0.134	-1.985	0.005
CBLag3	-2.289	0.047	-1.870	0.082	-2.137	0.001
CBLag4	-2.622	0.024	-1.960	0.068	-2.161	0
CBLag5	-2.728	0.019	-1.884	0.079	-2.821	0
CBLag6	-3.420	0.003	-2.381	0.026	-2.965	0
CBLag7	-3.468	0.003	-2.212	0.039	-2.912	0.001
CBLag8	-3.566	0.002	-2.336	0.029	-2.621	0.009
CBLag9	-3.154	0.007	-1.899	0.076	-2.770	0.044
CBLag10	-3.389	0.003	-2.382	0.026	-3.050	0.042
CBLag11	-3.483	0.003	-2.266	0.035	-2.614	0.103
CBLag12	-3.334	0.004	-2.307	0.032	-2.371	0.143
CBLag13	-3.302	0.004	-2.381	0.027	-2.080	0.221
CBLag14	-3.141	0.006	-2.351	0.032	-2.383	0.152
CBLag15	-3.267	0.004	-2.607	0.018	0.764	0.539
	F(57,1232)=1.35		F(18,1271)=2.67		F( 94, 1232)=128.16	

Using fixed-effects, our results show a negative lagged effect of CREDIREF on arrears, which is quite robust to specification. The first and third sets of results use Specification 2 with unweighted and weighted outcomes, respectively, and the second replaces the month dummies with an ordinal variable for time and the square of that variable. We see that the differences in magnitudes of the point estimates between weighted and unweighted methods are similar to those found in Specification 1, with the unweighted estimates hovering slightly above 3% and those for the weighted estimates between 2-3%. The confidence intervals have dramatically different shapes, however, with the weighted estimates displaying standard errors increasing sufficiently after one year as to make the impact no longer significant.

Appendix A4 gives a graphical representation of the weighted and unweighted results above. Arrears begin to decline gradually following introduction of the credit bureau and the impact realizes its full effect approximately six months following initial treatment. This is perfectly in keeping with our predictions as to how credit bureaus should work in mitigating adverse selection, given the fact that the standard lending cycle for Genesis is six months and clients are only screened upon taking new loans. In addition, differences in the repayment performance of new clients in branches with and without the bureau will not be observed until unscreened bad borrowers have had time to develop repayment problems.

Our results also suggest that credit bureau implementation has no effect on the total lending volumes of the Génesis branches. Were the quantity of loans to increase when information over new applicants improves, we would see a discontinuous decrease in the percentage of arrears due to increasing loan volumes (the denominator in arrears calculations). We conclude that Génesis has a fixed loan portfolio and is capital-constrained.

It uses the information from CREDIREF to disburse the same absolute quantity of loans, but to different people.

One obvious concern raised by the lack of fluctuation in the treatment lags is the presence of autocorrelation in the data. The robust standard errors from the fixed-effects regressions do display strong positive AR(1) correlation. Indeed, given that our outcomes are highly aggregated, slow-moving financial measures, it would be surprising to find an independent temporal distribution. One method for dealing with this, suggested by Bertrand et al (2004) is to collapse the data into before- and after-treatment averages; this is done in the bottom columns of the chart in A3. The treatment effect is negative (although smaller than the estimate from fixed effects, and insignificant due to the diminished number of observations). Since the autocorrelation results only in improper variance estimates and not in bias, we conclude that the magnitude of the estimated effects are accurate but may be less significant than the standard errors would suggest. While the positive impact of the Guatemalan credit bureau is clear even in the raw data, given the low F-statistics on the within-variation fixed effects regressions, our results should be verified in other contexts to reach definitive conclusions about the short-to-medium term effects of credit bureaus.

These qualifications aside, our results indicate that the use of CREDIREF allows Génesis to enjoy an average decline in branch-level arrears rates of over 2 percentage points, declining from roughly from roughly 12.5% to around 10% of the portfolio at risk over 30 days, other factors held constant. It is important to emphasize that these results capture only the isolated screening effects of the newly implemented credit bureau. As Génesis clients become more educated as to CREDIREF's operations, incentive effects should add to the impact of screening effects on arrears. Consequently, our empirical analysis of credit bureau impact supports arguments in favor of information sharing.



## VI. CONCLUSIONS AND IMPLICATIONS FOR POLICY

Credit information systems help to build an efficient financial system by promoting transparency in lending. They are effective tools towards mitigation of adverse selection and moral hazard in credit markets, and have been found to lower overall default and interest rates and improve the pool of borrowers in formal credit markets. Our survey of credit information systems worldwide reveals that developing countries are quickly realizing the importance and usefulness of information sharing, and that there has been burgeoning growth in the implementation of such systems in the last decade, particularly in Latin America and Asia. The explosion in microfinance activity in developing countries has contributed to this need. We present evidence that the beneficial effects of credit information systems are to be found when bureaus are utilized in the microfinance sector. We believe that the increased competition in many regions among microfinance lenders has made credit bureaus a necessary step towards financial sector stability.

While the magnitude of the effects calculated here (a reduction of 2-3 percentage points in the arrears rate) may appear small, rough calculations show that such a reduction in arrears can have major financial implications. For example, the outstanding loan portfolio of Génesis is roughly \$20 million; assuming that this portfolio turns over twice per year, a sustained drop of 2.5 percentage points in the arrears rate (from roughly 12.5% to 10% of the portfolio at risk over 30 days) implies a \$1 million reduction in bad debt per year. These surpluses arising as a result of the use of CREDIREF can be used to bolster sustainability and decrease borrowing costs to clients.

Another implication of our results is the importance of the incentive effect described in McIntosh and Wydick (2004b) in realizing the full benefit of a positive information-sharing network. Our finding during fieldwork that not one surveyed client in Guatemala had been

aware of the credit bureau's existence was disturbing. With borrowers unaware of their role in an information-sharing arrangement, incentive effects cannot be realized. This causes the full potential for credit bureaus to remain unrealized in improving credit market performance. Client outreach and education in this regard may have efficiency benefits in addition to being equitable. As credit markets continue to expand and overlap, the functioning of credit bureaus takes on greater importance. While the microfinance revolution provided many with access to credit for the first time, its ability to continue to do so depends upon sustainability of the market. The potential for credit bureaus is immense in this area.

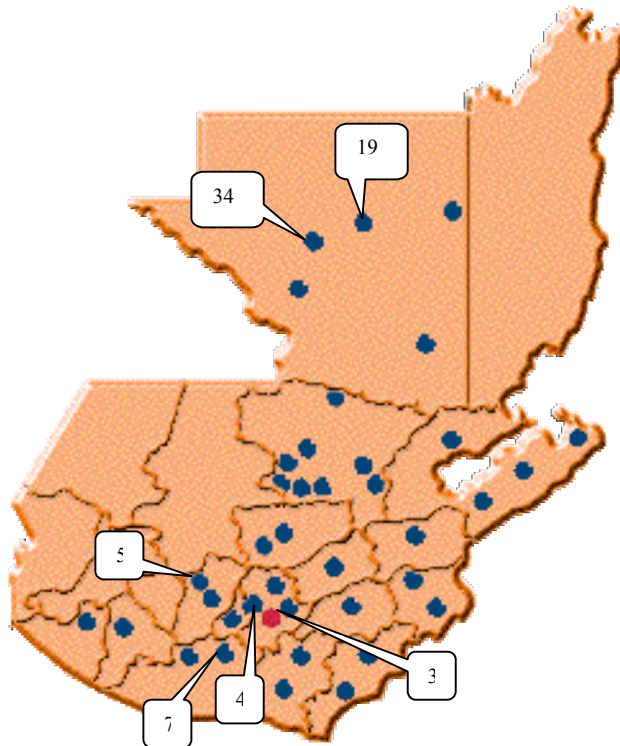
### Appendix A1.

Cost per CREDIREF consultation per month.

Number of monthly consultations	Price per consultation
1-100	\$1.60
101-200	\$1.47
201-400	\$1.33
401-800	\$1.20
801-1600	\$1.07
1601-3200	\$0.93
3201-6400	\$0.80
6401+	\$0.67

*Note: These prices are in addition to a \$70 monthly fee for CREDIREF membership.*

### Appendix A2.



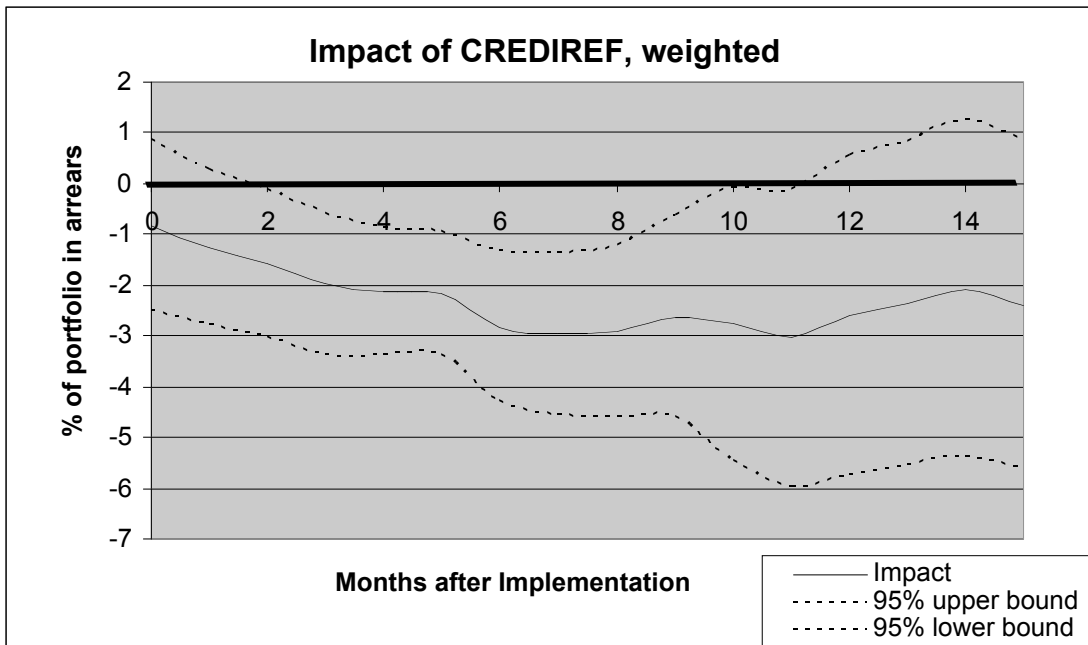
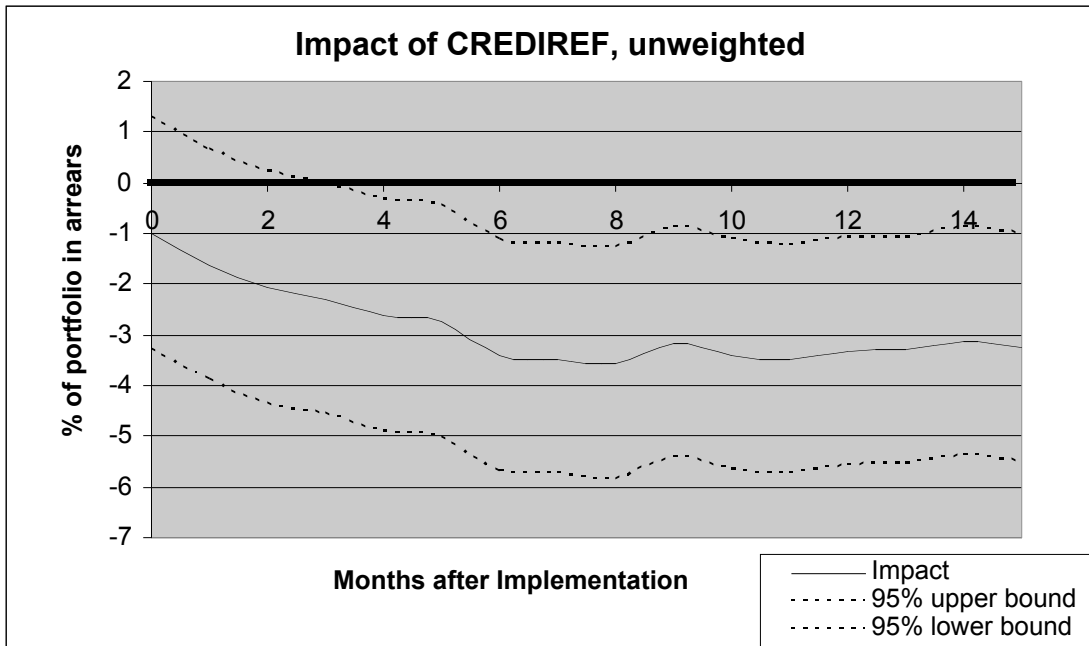
Geographic coverage of Génesis branches.

(Marked branches were part of field study undertaken summer 2003.)

**Appendix A3: Summary Statistics of Arrears across Branches**

<b>Branch</b>	<b>Pre-Treatment Arrears</b>	<b>Post-Treatment Arrears</b>	<b>Change</b>
1 Guatamala, Personal	1.87	0.85	-1.02***
3 Metro Dos, Zona 4	11.01	11.94	0.93
4 Metro Tres, El Castano	35.96	35.32	-0.64
5 Chimaltenango	12.37	10.09	-2.28***
6 Antigua	10.48	12.39	1.91**
7 Esquintla	17.11	19.39	2.28
8 Suchitepequez	4.1	2.29	-1.81
9 Retalhuleu	10.45	7.6	-2.85***
10 Guatemala Cartera y Cobros	40.08	75.25	35.17***
11 Izabal	14.33	12.44	-1.89***
12 Zacapa	3.73	4.16	0.43**
13 Chiquimula	11.93	10.55	-1.38
14 Coban	16.05	15.3	-0.75
16 San Juan Sacatepequez	11.18	6.67	-4.51***
17 Jutiapa	2.11	2.14	0.03
18 Jalapa	7.45	5.93	-1.52
19 Peten	1.16	2.98	1.82***
21 Cuilapa	4.49	2.61	-1.88***
22 Esquipulas	3.45	4.73	1.28***
23 Chiquimulilla	30.23	7.18	-23.05***
24 Santa Lucia	1.72	6.01	4.29***
25 Salama	11.21	10.37	-0.84
26 Guastatoya	18.69	21.41	2.72**
27 Pozo Maya	N/A	N/A	N/A
28 San Pedro Carcha	0.49	7.29	6.8***
29 Rabinal	N/A	N/A	N/A
30 Tecpan	0.32	2.12	1.8***
31 Raxruha	0.54	1.63	1.09***
32 Poptun	0.49	0.43	-0.06*
33 Sayaxche	6.22	3.67	-2.55***
34 La Libertad	1.69	1.19	-0.5***
35 Morales	20.91	11.52	-9.39***
36 Los Amates	1.23	3.84	2.61**
37 San Cristobal	11.65	13.11	1.46
38 Tactic	-	5.5	N/A
39 El Estor	-	10.28	N/A
40 Melchor de Mencos	-	2.03	N/A
41 El Castano	-	0.32	N/A
<b>Average</b>	<b>10.45</b>	<b>9.74</b>	<b>-0.71</b>
<b>Portfolio-weighted average</b>	<b>13.41</b>	<b>11.83</b>	<b>-1.58</b>

Appendix A4.



## REFERENCES

- Abreu, Saúl. 2001. "Case Studies of Selected Credit Bureaus in Several Latin American Countries". GTZ: Department 41, Financial Systems Development and Banking Services, October.
- Akerlof, George A. 1970. "The Market for 'Lemons'." *Quarterly Journal of Economics* 84 (3): 488-500.
- Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan, 2003. "How Much Should We Trust Difference-in-Differences Estimates?". *MIT Working Paper*, [http://econ-www.mit.edu/faculty/index.htm?prof\\_id=eduflo&type=paper](http://econ-www.mit.edu/faculty/index.htm?prof_id=eduflo&type=paper)
- Campion, Anita. 2001. "Client Information-sharing in Bolivia". *Journal of Microfinance* 3(1).
- Campion, Anita, and Liza Valenzuela. 2001. "Credit Bureaus: A Necessity for Microfinance?" *Microenterprise Best Practices*, Development Alternatives, Inc., Bethesda, Maryland.
- Del Villar, Rafael del, Alejandro Díaz de León, and Johanna Gil Hubert. 2003. "Regulation of Personal Data Protection and of Credit Reporting Firms: A Comparison of Selected Countries of Latin America, the United States, and the European Union." Margaret J. Miller, Ed. Cambridge, Massachusetts: MIT Press.
- Hoff, K., and Stiglitz, J.E., 1998. Moneylenders and Bankers: Price-Increasing Subsidies in a Monopolistically Competitive Market. *Journal of Development Economics* 55, 485-518.
- Jappelli, Tullio, and Marco Pagano. 2002. "Information Sharing, Lending and Defaults: Cross-Country Evidence." *Journal of Banking and Finance* 26 (10) (October): 2017-2045.
- Jappelli, Tullio, and Marco Pagano. 2000. "Information sharing in Credit Markets: A Survey." University of Salerno: CSEF Working Paper no. 36, March.
- Jappelli, Tullio, and Marco Pagano. 1993. "Information sharing in Credit Markets." *Journal of Finance* 48 (5) (December): 1693-1718.
- Kitsin, Samma. 2004. "Credit Information-sharing in Thailand". Conference on Credit Bureau Development in South Asia, mimeo.
- Lenaghan, Tom. 2001. "Microfinance and the Market for Credit Information in El Salvador". *Microenterprises Best Practices*, Development Alternatives, Inc., Bethesda, Maryland.
- McIntosh, Craig and Bruce Wydick. 2004a. "Competition and Microfinance." Working Paper, University of California at San Diego/University of San Francisco.

- McIntosh, Craig and Bruce Wydick. 2004b. "A Decomposition of Incentive and Screening Effects in Credit Market Information Systems." Working Paper, University of California at San Diego/University of San Francisco.
- Miller, Margaret J. 2003. "Credit Reporting Systems around the Globe: The State of the Art in Public Credit Registries and Private Credit Reporting Firms". Credit Reporting Systems and the International Economy. Margaret J. Miller, Ed. Cambridge, Massachusetts: MIT Press.
- Morduch, Jonathan. 1999. "The Microfinance Promise." *Journal of Economic Literature* 37 (4): 1569-1614.
- Olegario, Rowena. 2003. "Credit Reporting Agencies: A Historical Perspective." Margaret J. Miller, Ed. Cambridge, Massachusetts: MIT Press.
- Padilla, Jorge A., and Marco Pagano. 1997. "Endogenous Communication among Lenders and Entrepreneurial Incentives." *Review of Financial Studies* 10 (1) (Spring): 205-236.
- Padilla, Jorge A., and Marco Pagano. 2000. "Sharing Default Information as a Borrower Discipline Device." *European Economic Review* 44 (10) (December): 1951-1980.
- Vercammen, James A. 1995. "Credit Bureau Policy and Sustainable Reputation Effects in Credit Markets." *Economica* 62(248) (November): 461-478.
- Viewpoints*. (Fair Isaac Publication) October/November 2003, <http://www.fairisaac.com>.
- World Bank Maps of Private and Public Credit Reporting Institutions. 2002. [http://econ.worldbank.org/programs/credit\\_reporting/topic/16017](http://econ.worldbank.org/programs/credit_reporting/topic/16017)
- Stiglitz, Joseph E., and Andrew Weiss. 1981. "Credit Rationing in Markets with Imperfect Information." *American Economic Review* 71 (3) (June): 393-410.

---

<sup>1</sup> See Campion, 2001, "Client Information Sharing in Bolivia" for a more complete description of the credit reporting environment in Bolivia.

<sup>2</sup> See World Bank's CGAP Note Book 1: "Dimensions and Dynamics of MFI Competition in Bangladesh" for a more complete description of this project.

<sup>3</sup> The size of each of the two separate loans is likely to be larger than the size of the single loan, since the reduction in the interest rate from a smaller loan size induces a greater individual loan size for each of the two loans (see McIntosh and Wydick, 2004).

<sup>4</sup> See Appendix A1 for a complete breakdown of the price schedule for CREDIREF consultations.

<sup>5</sup> It turns out that branch 4 was one of the six that was selected for the field portion of our study. While we visited this office, our qualitative impressions were markedly different from the others. First, loan officers at this branch had worked for Génesis for very short periods of time and there was a high rate of turnover among both loan officers and clients. Also, this branch was located on the outskirts of Guatemala City in a neighborhood that suffered from high crime rates. Many Génesis clients from this branch worked at stalls in the Zona 11 Market nearby. Two days after surveying a number of clients at this market, there were four murders in its streets in a single day. Thus, we are not surprised to find that this office suffered from a high degree of delinquent loans and that introduction into the credit bureau failed to overcome these difficulties.