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Can Credit Registries Reduce Credit Constraints? Empirical Evidence on the Role of Credit Registries in Firm Investment Decisions

by
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1. Introduction

The important role played by asymmetric information in credit markets has received considerable attention in economic theory. The future-looking nature of credit contracts, which involve a promise to pay over time, makes the identity, and intentions, of the buyer a critical factor in the likelihood of repayment, and thereby profitability, of the loan. Information on potential borrowers and their investment projects is typically only partially disclosed to lenders; this can introduce adverse selection into the credit market. Once a loan is made, lenders face moral hazard—the possibility that borrowers may try to avoid repaying the loan or take actions that increase the risk of the investment project. Asymmetric information between borrowers and lenders regarding project (borrower) quality and risk of repayment keep loan price from serving to clear the credit market. As a result, credit is rationed and the market equilibrium results in higher prices and less availability of credit than would be the case under perfect information.

While an extensive theoretical literature discusses the role of information in credit markets, much less attention has been given to the institutional responses that actual lenders have developed to minimize the impact of asymmetric information. One such institutional response is credit registries, also commonly known as “credit bureaus,” which collect, distribute, and often analyze information on borrower behavior from a variety of sources, including numerous lenders.

Credit registries date back to at least the nineteenth century. In Latin America some of the oldest credit registries were formed by Chambers of Commerce (Camaras de Comercio) to record information on customers who did not pay accounts held with merchants. More recently, banks have organized in many Latin American countries to share information on delinquent customers. In addition, most Central Banks or Bank Superintendencies in Latin America now require supervised financial institutions to provide information on borrowers to a public credit registry, which then makes available a subset of the information to the financial system.

Credit registries have gained in importance in the last twenty years, in both developed and developing countries, due to changes in banking systems and advances in technology. In many countries the financial system has recently gone through a period of consolidation. Community-based institutions with a limited geographic focus have been acquired or closed in favor of large national, and even international, financial conglomerates. There is evidence that the process of mergers and acquisitions in a financial system results in a loss of what had been institution-specific knowledge on borrowers. In addition, larger institutions often want to centralize the credit decision process. These factors may increase reliance on and the importance of the standardized and easily transmitted information contained in credit registries. Parallel to the shift toward larger institutions, there has been rapid growth in computing capacity, which enables lenders to quickly and cheaply access and analyze data on massive numbers of borrowers. Credit scoring technologies, which provide a numerical ranking of borrower credit quality, have become a central part of the credit decision used in a growing number of credit markets. From their early use in the credit card market, credit scoring tools are now also a fundamental part of the mortgage market and small business loan market.

The small business loan market is perhaps the segment of the credit market where asymmetric information is most pronounced. Independent analysis of most small businesses (through ratings firms or stock prices) is usually not available. Small businesses are also very diverse, so it is difficult to identify clear predictors of success. Further complicating matters is the fact that many small business owners mingle their personal finances with those of their company. In Latin America, these problems are even greater due to economic volatility, poor accounting standards and widespread tax evasion.

The traditional response of banks—the main source of *untied* credit for small firms¹—has been to put significant resources into studying business plans and cash flows and requiring collateral to back loans. This approach is time-consuming and results in high fixed costs, making many small business loans too costly to undertake. Credit registries which collect standardized historical data on borrowers can create a new kind of collateral—reputation collateral—which can help both in reducing problems of adverse selection and moral hazard. Credit scoring technologies that make use of such data greatly reduce per-loan costs, thereby opening up new lending opportunities. Both data on small businesses *and on their owners* has proven to be relevant in determining the risk and profitability of small business loans.²

This paper analyzes whether credit information registries affect the ability of firms to access credit, using both an aggregate measure of firm access to credit as well as firm-level financial data. The empirical results in both cases confirm that credit registries contribute to more effective financial intermediation as evidenced by greater access to credit. In particular, the average debt/capital ratio for firms in a country is shown to be positively correlated with the quality of its credit registries, and on the firm level, better quality registries are shown to reduce financial constraints.

The paper is organized as follows: Section II discusses the relevant literature on the role of credit registries in credit market performance; Section III describes the data on credit registries as well as the firm level data used in the analysis; Section IV presents empirical results of the impact of credit information registries on access to credit; and Section V offers concluding remarks.

2. Literature on Credit Registries

The central role played by information in credit markets has been the focus of a significant theoretical literature, including Jaffee and Russell (1976) and Stiglitz and Weiss (1981). These papers show how asymmetric information between borrowers and lenders makes it impossible for price to serve a market clearing function. Stiglitz and

¹ Trade or supplier credit is perhaps the most common type of credit for small firms, but it is tied to specific purchases or transactions and usually very short term (30-90 days). The prevalence of trade credit in the small business market is likely due, at least in part, to the information advantages enjoyed by firms that share business relationships.

² The most common U.S. small business credit-scoring product, SBSS, which is sold by the Fair Isaac corporation, makes use of information on both small businesses and on their owners in creating the firm score. This credit-scoring product is used extensively in the small business market and has reduced loan processing times from hours or days to minutes.

Weiss suggest that the structure of the credit market will determine the extent to which either lenders or borrowers benefit from greater transparency of information. While greater access to information should increase the quantity of lending, Stiglitz and Weiss caution that it may not necessarily reduce the price of loans unless the credit market is competitive and information can be transferred between institutions.

Pagano and Jappelli (1993) provide the first rigorous treatment of information sharing mechanisms, such as credit registries. They discuss only how information sharing can affect the problem of adverse selection. Pagano and Jappelli also find that the structure of the credit market drives the impact of information sharing on lending; in a competitive market, informational rents fall and lending increases, whereas such benefits do not necessarily accrue when competition is lacking. Padilla and Pagano (1997) show that moral hazard can also be reduced when information sharing is present by imposing discipline on credit users.

Empirical research on the benefits of information sharing institutions, and on their impact on credit markets, is scarce. At the macro level, this has been due to a lack of cross-country data on the nature of different credit reporting systems. At the micro level, the confidential nature of credit registry information, much of it held by private firms, has limited access to the data for research purposes. In the last few years, however, several new papers have been written, using both macro data on credit reporting systems and data from credit registries themselves. Jappelli and Pagano (1999) developed their own survey of credit registries as part of the Inter-American Development Bank's Willingness to Pay research project. Their paper suggests that the performance of credit registries, proxied by the number of years they have operated and the type of information that they share (positive, negative or both) has a significant positive impact over the amount of consumer credit (relative to GNP) granted by the financial sector and the total amount of credit as well, and a negative impact over non-performing loans. These promising results must be analyzed cautiously, since these regressions are estimated considering a reduced number of countries (at most 31, and in many regressions only 17).

In terms of micro level analysis, several of the papers forthcoming in *Credit Reporting Systems and the International Economy* (MIT Press, early 2002) use data from credit registries to probe the importance of this information in lending decisions. Barron and Staten use consumer credit data provided by Experian and run simulations of credit scoring programs with full and restricted data sets. Barron and Staten find that greater availability of information reduces default rates and increases access to credit. Kallberg and Udell use data from Dun & Bradstreet (D&B) to evaluate whether credit registries containing firm-level data are important predictors of small business loan quality. They find that the credit information produced by D&B has substantially greater predictive power than the data contained in financial statements. Castelar Pinheiro and Moura use data from Brazil's largest private credit registry, SERASA, to study how sharing of credit information is different in a highly segmented credit market, such as that which exists in Brazil. They find that, especially in the middle market, banks may be unwilling to disclose information on clients even if this would reduce their risk, preferring to maintain their informational rents. Falkenheim and Powell use data from the Argentine Central Bank's public credit registry to test whether this information can be used to determine the risk of bank portfolios. Using simple

techniques to estimate expected losses and variance of losses, they compare the results they get with the Central Bank registry data to the provisioning requirements required by law. They find that in the riskiest cases, the requirements are more severe than statistically warranted by actual borrower behavior in the Argentine market.

In this paper we focus on a structural empirical question related directly with the microeconomics of credit markets. We use firm-Level data for over 20 countries to explore if the performance of credit registries has any impact over financial constraints. This empirical question is very important since it addresses the precise objective that any kind of information sharing mechanism wishes to pursue: to reduce the informational asymmetries that can lead to credit rationing. If information sharing institutions perform adequately, firms should be less credit-constrained, since specific types of informational asymmetries are being dealt with.

3. Description of Data

Data on the quantity and quality of credit information available in an economy was collected through the World Bank Credit Information Project in Fall 1999.³ The project began with a focus on credit registries in Latin America and was then expanded to study credit registries worldwide. Using on-line surveys, the project collected data on public credit registries in 34 countries and on private registries in more than 30 countries, making this by far the most detailed information source that exists on credit information sharing institutions.

The survey for public registers was sent to 81 countries and 59 responded, including 34 with public credit registries. The survey documented the growth in public credit registries in recent years, especially in Latin America. Seventeen of the 34 public credit registries participating in the survey were from Latin America, and nine of these were established after 1989.⁴ Coverage of Western Europe was also high, with 12 of the fifteen EU members responding, including all seven EU countries with public credit registries.⁵ A more limited response was received from other regions. The response rate to the public registry survey was 65.4% overall.

While previous research had suggested that public registries were more likely to be established in the absence of private registries, the World Bank survey found that private registries were operating in most nations and often predated their public counterparts. Surveys were sent to 138 private registries worldwide and 51 firms in more than 30 countries completed the survey. Approximately 30 private registries in 15

³ The papers written for this project were presented in June 2000 in Miami, Florida at the International Conference on Credit Reporting Systems, organized by the World Bank. An edited volume, *Credit Information and the International Economy*, based on the papers from the World Bank project and conference is forthcoming from MIT Press in early 2002.

⁴ The following public registries have been established in Latin America since 1989: Brazil (1997); Ecuador (1997); Guatemala (1996); Costa Rica (1995); Dominican Republic (1994); El Salvador (1994); Argentina (1991); Colombia (1990) and Bolivia (1989).

⁵ The following EU member countries have public credit registries: Austria, Belgium, France, Germany, Italy, Portugal and Spain.

Latin American countries responded to the survey, including the dominant registries in all the largest markets (Argentina, Brazil, Chile, Mexico).

The surveys of public and private credit registries had many questions in common and similar designs so that comparisons could be made between the two. Both surveys included the following main sections:

Section I – Contact information

Section II – Basic information about the organization of the registry

Section III – Description of data collected by the registry

Section IV – Description of how data is disseminated

Section V⁶ - Attention to consumers, legal and public policy issues

In order to explore the influence of information sharing on credit market dynamics we use firm-specific data from the World Scope database and some bureau development indicators constructed using the World Bank survey described above. Using World Scope, we construct a firm-level panel data set for the countries shown in Appendix 3 for the years 1988-2000. We focus on listed firms, since most of World Scope's sample of firms are listed, and use the accounting data provided by the data set. We concentrate on those firms for which at least three years of data are available and exclude outlier firms. Using our panel, we construct relevant firm specific variables, which are described below.

We construct several measures of public and private credit registry performance. Our primary data is the private and public credit registry surveys conducted by the World Bank. Using the data reported in Appendix 1, we construct several measures of credit market performance. Like Japelli and Pagano, we use the availability of positive and negative information as performance indicators, and we also include some additional indexes. We use the following additional measures:

NEGATIVE/POSITIVE: If the Credit Bureau provides only negative data of the potential borrower then the BLWH Index takes a value of zero. But if the Credit Bureau provides positive as well as negative data, then the BLWH will take a value of 1.

QUANTITY: This index shows the amount of information on individuals that is collected by the Credit Bureau. Its components are those of tables A1.2a and A1.2b in Appendix 1. We construct the index by assigning a 1 to each of the components if included in the credit registry and 0 if not, and add up the fifteen categories. The sum is divided by 15 in order to keep the index between 0 and 1. The more information collected, that is the closer to 1, the better the QUANT indicator.

⁶ Section V in the private credit bureau survey covers consumer attention, legal and public policy issues; in the public registry survey, the same type of data was collected in Section VII, "Accuracy of Database Information-Attention to Consumers" and in Section VIII, "Policy Issues." In addition, the public registry survey asked about the use of the data in supervision of financial institutions and the resources that had been devoted to the registry. The private registry survey finished with Section VI, which asks the respondents' views of the credit information industry in their country.

TYPE OF LOANS: This Index refers to the type of loans reported in the registry. All the categories that apply are the following: I) unsecured lines of credit, including credit cards; ii) overdraft lines; iii) auto loans; iv) home mortgage; and v) secured lines of credit. Tables A1.3a and A1.3b in Appendix 1 describe the data. This index follows the method described above.

ACCESS: This index groups the financial institutions that have access to the data collected by the Credit Bureau. The components of the index are those in tables A1.4a and A1.4b in Appendix 1. The calculated index follows the method described above.

TYPE OF REPORT: As POSITIVE/NEGATIVE this is also a zero-one index indicating if each loan or credit is described individually or if information is presented in an aggregate way per individual. The index takes the value 1 if loans are described individually.

BUREAU INDEX: The average of the above.

Table 1 reports some summary statistics for the diverse measures and compares them to international standards.

Table 1. Summary Statistics

		Loans Reported		Type of Loans Reported	Institutions Allowed to Access	Amount of Information	Aggregate Bureau Index
		(TYPE OF REPORT)	Positive and Negative Data Reported	(TYPE OF LOANS)	(ACCESS)	(QUANTITY)	
LATIN AMERICA	Average	0.11	1.00	0.78	0.50	0.63	0.62
	Std. Dev.	0.32	0.00	0.18	0.23	0.12	0.08
	Max	1.00	1.00	1.00	0.93	0.80	0.78
	Min	0.00	1.00	0.40	0.14	0.33	0.51
UNITED STATES	Average	1.00	1.00	1.00	0.57	0.73	0.86
OTHER DEVELOPED	Average	0.11	0.78	0.65	0.35	0.40	0.52

Source: World Bank Survey, Miller (2000) and authors' calculations.

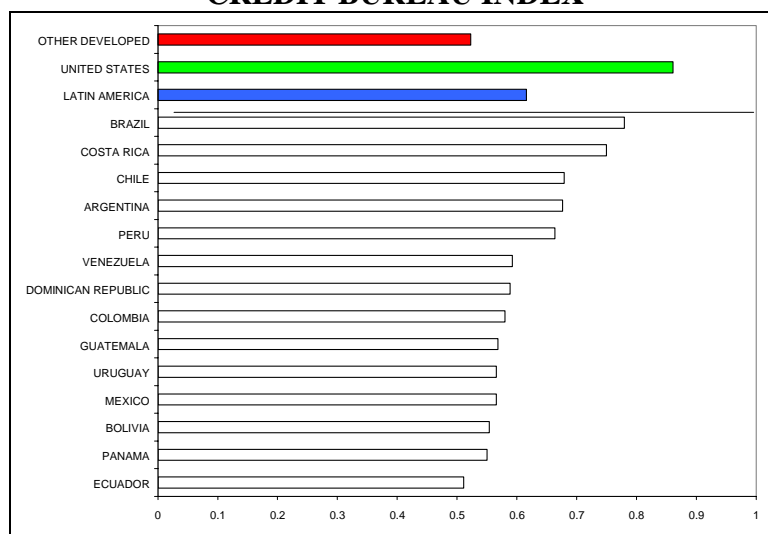
Table 1 reports the Bureau Index for Latin America and compares it also to other regions of the world. A first inspection of the data suggests that in Latin America, on average scores are high in each of the measures as well as in the index that averages them. There is high variance within the region, but the average value of the performance measures is comparable to the rest of the world.

The relatively strong performance of Latin America is due to a combination of factors. In no particular order, these factors include: (i) the absence of laws *prohibiting* or *greatly* restricting sharing of credit information within the financial sector; (ii) foreign direct investment in credit registries in all major Latin American markets (Argentina, Brazil, Chile, Mexico) and many smaller countries as well; (iii) a history of using credit registries in the retail sector, often organized via Chambers of Commerce; (iv) changes in banking systems that encourage information sharing (consolidation of the sector, a return of term lending due to macroeconomic stability, increased foreign presence requiring modernized lending practices).

The United States is shown in Table 1 to be the nation with the most complete and accessible credit reporting system. This is in line with general perceptions of the

credit reporting industry internationally. As opposed to Europe (most of the nations in “other developed” are European), the U.S. has a very open system for credit reporting, with a relatively light regulatory approach.⁷ The European Union, in contrast, has placed a significant regulatory burden on the credit reporting industry, and in 1998 the EU Privacy Directive came into effect, which greatly limits sharing of personal information, including credit data in credit registries. Some European nations, such as France, have even more stringent laws than the European Union with regard to credit registries, which accounts for the lower scores of the “other developed” category above.

Figure 1.
CREDIT BUREAU INDEX



Source: World Bank Survey (Miller, 2000) and authors calculations

Following on the results presented at the regional level in Table 1, Figure 1 presents the credit bureau index numbers for individual countries in Latin America, as well as for the United States and the category of “Other Developed” countries. The Latin American nations that fare best are Brazil, Costa Rica, Chile, Argentina and Peru. Brazil has a very established credit registry in which most banks participate. This Brazilian firm, SERASA, is by far the largest Latin American credit registry, with annual sales of approximately US\$150 million. In addition to SERASA, the extensive Chamber of Commerce system in Brazil operates a credit registry and bad check list on a state by state basis. Finally, the Brazilian Central Bank recently (1998) established a public credit registry to collect detailed information on all large loans. Argentina and Chile both have very strong private credit registries, both of which are now majority owned by Equifax. In addition, both Argentina and Chile have public credit registries, and much of the data on the Argentine public registry is accessible to the general public via the internet. In Chile, the Santiago Chamber of Commerce also runs one of the region’s oldest retail credit databases, and the information in this consumer database is actually superior in some ways (e.g., coverage, years of history) to the bank-led credit registry. Peru enjoys an unusually active credit reporting industry, with at least four

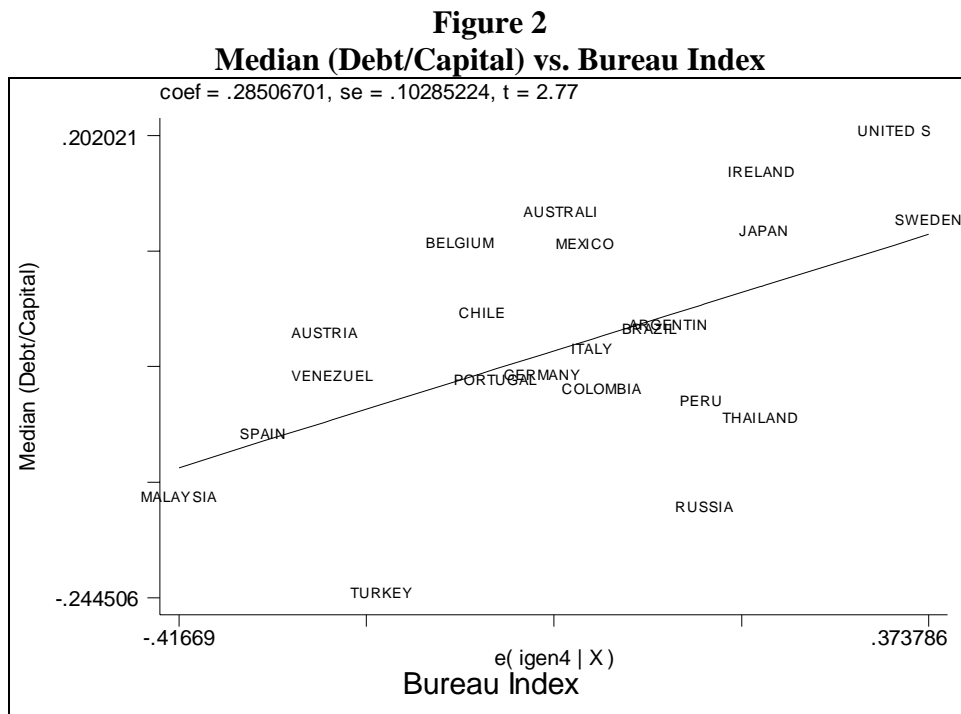
⁷ The U.S. has allowed a significant degree of self-regulation by the credit reporting industry; however, in 1997 the Fair Credit Reporting Act, which protects consumer rights with regard to credit registries, was amended to address growing consumer concerns with privacy abuses by the industry.

credit registries operating in that relatively small economy. In Central America, Costa Rica, which has enjoyed years of relative economic stability, has the region's most developed credit registry.

Of the countries that scored lower, Mexico is worth noting. In the wake of the 1994 "Tequila" crisis, the Mexican government helped to establish credit reporting. Trans Union corporation invested in a registry together with a local banking association, and that registry has a virtual monopoly on the industry. While the information it collects and distributes is considered of high quality, distribution of the data is restricted to protect the banking sector and competition is virtually non-existent, which may explain Mexico's relatively low ranking.

4. Do Credit Bureaus Reduce Financial Constraints?

Figure 2 reports the relationship between the median of the ratio of debt to capital obtained from the WorldScope database for a group of countries and the credit bureau index measure developed above after controlling for regional differences. Interestingly enough, it suggests that countries with a higher degree of credit bureau development enjoy higher lending rates.



Source: World Bank survey, World Scope and authors' calculations

According to Figure 2, there is a positive correlation between credit bureau performance and firms' debt access. That is, apparently information sharing plays a role in credit decisions. If this is the case, the degree to which investment decisions are affected by financial constraints must also depend on the way information-sharing institutions perform.

There is an extensive literature on the estimation of financial constraints that affect firms' investment decisions.⁸ The main intuition behind this literature is that if firms lived in a Modigliani and Miller type of world with perfect capital markets, investment decisions would depend exclusively on the nature of projects, and not on the financing structure of firms. Good projects would be financed and bad projects would not (i.e., the firm's capital structure should be irrelevant to its value). Internal and external funds should be perfect substitutes and investment decisions should not rely on financial ones. With imperfect capital markets due to informational asymmetries, costly monitoring, incentive problems, or contract enforcement problems, investment decisions do not depend solely on the nature of the projects, but tend to rely more on access to financial markets.

Hence, a natural way of testing for the importance of financial constraints is by assessing whether investment decisions depart from standard models derived under the perfect capital market assumption; that is, whether these decisions depend exclusively on project fundamentals or are more sensitive to fluctuations in the firm's internal net worth. One way of testing the degree to which firms are financially constrained is estimating an investment equation that depends on a measure of project fundamentals (Tobin's q , or a measure of the marginal productivity of capital) and a measure of internal financial funds as well.⁹ The higher the dependency on internal funds the higher the degree of financial restrictions. In a perfect capital market, world investment should depend exclusively on fundamentals and the estimated coefficient on internal funds should be zero.

The empirical model, usually estimated in the literature, can be derived from a firm's value maximization problem.¹⁰ In this paper we use Laeven's specification, which can be obtained by linearizing the first order condition of a dynamic model of investment, as follows:

$$\frac{I_{it}}{K_{it}} = c + \beta_1 \frac{I_{it-1}}{K_{it-1}} + \beta_2 MPK_{it} + \beta_3 FIN_{it} + \varepsilon_{i,t} \quad (1)$$

where i denotes the firm, t , is a time subscript, I is investment, K is the capital stock, MPK the marginal product of capital, and FIN the firm's internal funds. Additionally, one can include firm-specific effects and time effects. From an empirical perspective, the impact of credit constraints over investment decisions can be analyzed by estimating (1) and testing the significance of β_3 . If β_3 is positive and significant, financial constraints are assumed to be in place.

Our empirical goal is to analyze the impact of information sharing over credit constraints. Presumably in countries where information sharing works efficiently financial constraints should be relaxed, since an important informational asymmetry would be challenged. In order to capture the influence of information sharing

⁸ Recent surveys can be found in Hubbard (1998) and Schiantarelli (1996).

⁹ This methodology follows Fazzari *et al.* (1988) and has been developed further by numerous authors. The surveys cited in the previous footnote provide several references on empirical papers in this direction.

¹⁰ Recent examples of such models can be found in Laeven (2000) and Love (2000).

institutions on credit constraints, we can expand (1) to include an interaction between the internal funds variable and one of our measures of credit bureau performance. In order to account for macro shocks that can have impacts over aggregate credit markets we include also an interaction term between the cash flow measurement and the ratio of total private credit to GDP:

$$\frac{I_{it}}{K_{it}} = c + \beta_1 \frac{I_{it-1}}{K_{it-1}} + \beta_2 MPK_{it} + \beta_3 FIN_{it} + \beta_4 FIN_{it} * INDEX_c + \beta_5 FIN_{it} * \left(\frac{Credit}{GDP} \right)_{it} + \varepsilon_{i,t} \quad (2)$$

The coefficient β_4 measures the change in the sensitivity of investment decisions to availability of internal funds caused by credit bureau performance, and β_5 measures the change in the same sensitivity due to aggregate country-time shocks that have an impact on aggregate credit markets. If credit bureaus in fact help ease credit constraints, β_4 should be negative—that is, financial constraints should be smaller. Additionally, one would also expect financial constraints to be smaller in countries with deeper credit markets (i.e., β_5 is expected to be negative as well).

Like Laeven, we use Tobin's q as a proxy of the marginal productivity of capital. The cash flow variable that we use is the ratio of the firm's cash flow to the capital stock. Details on the construction of the variables are found in Appendix 2.

Given that the empirical model is set up as a dynamic panel of firms, and explanatory variables are likely to be simultaneously determined, we use GMM methods of the Arellano and Bond (1991) style. The results, using each of our credit bureau performance measures, are reported in Table 2. The choice of countries depends on the countries available in the *Worldscope* data set, the amount of available data after eliminating outliers, and the country coverage of the World Bank survey. Most estimations include 24 countries, and only one includes only 16 countries. We have firm level data for each country and we use information for the years 1988-1999. Appendix 3 reports the set of countries included in our estimations. The estimation includes year dummy variables, which are not reported, and an interaction between the cash flow variable and a Latin American dummy variable to test whether, regardless of fundamentals, Latin American countries face higher restrictions.

The first column reports our estimations, with the cash flow term interacted with the credit bureau index that averages its five components, and suggests that in fact the performance of credit bureaus has an impact by easing financial constraints (the estimated coefficient is negative and significant). It is important to note that this result is obtained even after controlling for macroeconomic disturbances that can have an adverse impact on credit allocation. The CREDIT/GDP interactive term is also negative and significant, which implies that countries with deeper credit markets are also less prone to financial restrictions. Moreover, the Latin American dummy interaction appears significant, which suggests that credit constraints are indeed tighter in Latin America than in other areas. However, the high ranking of Latin American countries in the bureau index suggests that these have played an important role in easing these constraints.

The factors driving the significance of the credit bureau index can be understood by decomposing the index into its five terms and evaluating them independently in our empirical model. We find that three of the five elements of our index have significant effects on the reduction of financial constraints. The type of information offered, whether positive and negative or only negative, the amount of information available, and the amount of institutions that are allowed to access credit bureau data play important roles in easing credit constraints.

Table 2. Regression Results
GMM Estimates of Investment Model

Dependent Variable: I/K										
I/K (t-1)	0.244 ***	0.243 ***	0.236 ***	0.240 ***	0.244 ***	0.243 ***				
	0.039	0.029	0.030	0.029	0.039	0.029				
Q	1.36E-04 *	2.30E-04 *	1.46E-04 *	2.16E-04 *	1.33E-04 *	2.38E-04 *				
	8.00E-05	1.30E-04	9.00E-05	1.30E-04	7.10E-05	1.30E-04				
CF/K	0.047 **	0.030 *	0.102 **	0.049 *	0.018	0.010				
	0.024	0.017	0.041	0.030	0.013	0.022				
CF/K*Index	-0.046 **									
	0.023									
CF/K*(POSITIVE/NEGATIVE)		-0.022 *								
		0.012								
CF/K*QUANTITY			-0.102 **							
			0.043							
CF/K*ACCESS				-0.044 *						
				0.025						
CF/K*(TYPE OF LOANS)					0.025					
					0.019					
CF/K*(TYPE OF REPORT)									-0.004	
									0.006	
CF/K*(CREDIT/GDP)	-0.019 *	-0.009	-0.049 **	-0.030	-0.039	-0.017				
	0.011	0.014	0.022	0.030	0.029	0.016				
CF/K*Latin American Dummy	0.036 **	0.036 *	0.027 *	0.028	0.014	0.043 *				
	0.018	0.020	0.016	0.017	0.009	0.023				
Constant	0.006	0.004	0.008 *	0.005	0.009 **	0.005 *				
	0.004	0.004	0.004	0.004	0.004	0.003				
Specification tests (p-values)										
Second-order serial correlation	0.426	0.955	0.616	0.926	0.408	0.950				
Sargan test	0.557	0.616	0.415	0.628	0.549	0.631				
Number of Observations	16910	24445	21666	23894	16910	24445				
Number of Firms	3714	5190	4630	5071	3714	5190				
Average number of Observations per Firm	4.55	4.7	4.7	4.7	4.5	4.7				

* Significant at 10% ** Significant at 5% *** Significant at 1%.

Specifications includes year effects. One step robust standard errors are reported.

The degree to which firms are constrained, once firm fixed effects and year effects are included depends on the performance of credit bureaus. In this sense one can emphasize the role of credit bureaus in the behavior of credit markets. Certain types of informational asymmetries are dealt with and credit constraints are eased. In Latin America, information sharing institutions have contributed significantly to the reductions of credit constraints. In order to understand the impact of credit bureaus on credit constraints we present the following simulation in Table 3. The first column shows our estimate of the sensitivity of investment to cash flows given by our model¹¹ assuming no credit bureau was present—that is, assuming that the credit bureau index takes the value zero. The second column reports the sensitivity coefficient estimated

¹¹ It is worth noting that some of the countries, namely Bolivia, Costa Rica, the Dominican Republic, Ecuador, Guatemala, Panama and Uruguay, were not included in the estimation in Table 2 due to lack of firm information. However we do have credit registry information on them, so we assume that the same coefficients estimated in Table 2 apply for these countries.

using our credit bureau index as reported in Graph 1. The third coefficient reports the percentage difference between columns 1 and 2. It is important to note that this simple exercise assumes that the change in the credit bureau index has no effect on the ratio of credit to GDP. If there were feedback in that direction the effects would be even larger.¹² On average, the performance of credit registries reduces the sensitivity coefficient by nearly 40%, which implies that investment decisions are much less sensitive to cash flows than what they would be with no Bureaus. The performance of information sharing institutions has had a significant impact on credit constraints in Latin America.

Table 3. Simulations

	Sensitivity of Investment to Cash Flows Assuming Bureau Index=0	Sensitivity of Investment to Cash Flows given current bureau index	Percentage Reduction in Coefficient
ARGENTINA	0.078	0.047	39.7%
BOLIVIA	0.072	0.047	35.3%
BRAZIL	0.078	0.042	46.2%
CHILE	0.071	0.039	44.2%
COLOMBIA	0.079	0.052	33.7%
COSTA RICA	0.079	0.045	43.4%
DOMINICAN REPUBLIC	0.078	0.051	34.5%
ECUADOR	0.076	0.053	30.9%
GUATEMALA	0.080	0.053	32.9%
MEXICO	0.080	0.054	32.4%
PANAMA	0.062	0.037	40.8%
PERU	0.078	0.047	39.3%
URUGUAY	0.074	0.048	35.4%
VENEZUELA	0.081	0.054	33.7%

Table 4 reports the impact of improving the performance of credit registries such that the credit bureau index reaches the US level. The third column reports the percentage reduction in the sensitivity coefficient of performing such an experiment. Again, as above, we are assuming no impact on the change in the credit bureau index over aggregate credit over GDP. Our simulations suggest that an improvement in credit bureaus could even further reduce the degree to which Latin American firms face credit constraints. On average, the sensitivity coefficient would fall by nearly 25%, that is, investment decisions would depend even less on internal funds and more risk sharing between credit suppliers and entrepreneurs would take place.

In order to investigate whether credit constraints differ across different-sized firms, in particular if credit constraints are tighter on smaller firms and if credit bureaus have a specific impact in reducing constraints on these firms, we estimated our regressions including different types of size effects. We included size dummies, we separated the sample using different kinds of size criteria (by assets, sales, and capital) and we re-estimated our regressions. Our results did not provide any significant

¹² Graph 2 suggests the existence of some relationship between aggregate credit and the bureau index, however due to data limitations we do not explore this issue any further.

evidence in favor of a different response of small firms to credit bureau quality. This, however, can be explained by the nature of our data set rather than by the lack of this event in itself. Our data set is basically a set of listed firms, which in turn are usually the largest firms in each country. Therefore the variance in firm size within each country in our sample is extremely low, and does not allow us to explore in detail questions related to size difference, mostly because in many cases the number of firms per country is reduced. This does not imply that size differences are not present and that SMEs are not affected by credit bureaus in a different way. This, however, is a question for future research, which requires the construction of SME specific data sets.

Table 4. Simulations II

	Sensitivity of Investment to Cash Flows	Sensitivity after increasing bureau index	Percentage Reduction in Coefficient
ARGENTINA	0.047	0.039	17.9%
BOLIVIA	0.047	0.033	30.0%
BRAZIL	0.042	0.038	8.8%
CHILE	0.039	0.031	21.1%
COLOMBIA	0.052	0.040	24.6%
COSTA RICA	0.045	0.040	11.2%
DOMINICAN REPUBLIC	0.051	0.039	24.3%
ECUADOR	0.053	0.037	30.5%
GUATEMALA	0.053	0.040	25.1%
MEXICO	0.054	0.041	25.0%
PANAMA	0.037	0.022	38.8%
PERU	0.047	0.038	19.1%
URUGUAY	0.048	0.034	28.5%
VENEZUELA	0.054	0.041	22.9%

5. Concluding Remarks

This paper provides microeconomic evidence that shows that countries with better developed credit registries enjoy lower financial restrictions than those where credit bureaus are underdeveloped. In particular, we find that well performing credit registries can account for significant reductions in the sensitivity of a firm's investment decisions to availability of cash flows, a measure that has typically been used in the literature as a proxy for financial constraints. For Latin American countries we find that the performance of credit registries has reduced, by nearly half, the sensitivity of investment decisions to internal funds. This in turn means that investment can be financed with external funds, namely credit, in a greater proportion than would be possible without these types of institutions. At the same time, we also show that there is still significant room for improvement in Latin America's credit reporting systems. Our results further suggest that, if the data quality in Latin America were equivalent to that in the United States, firms would enjoy significant additional improvements in access to credit.

Credit registries are an institutional response to the problem of asymmetric information in credit markets, but they are not the only possible response. Collateral pledges, and the threat of bankruptcy in extreme cases, are other tools that are used by

lenders to both screen applicants (address adverse selection) and encourage repayment (reduce moral hazard). Perhaps the fact that Latin America has advanced as far as it has in credit registries is not unrelated to the difficulties faced in many countries in the region with regard to seizing collateral.¹³ Developing a credit registry, either voluntarily in the private sector or under the auspices of the bank supervisor, may be easier than changing fundamental laws and judicial systems, as well as politically more palatable. It is also worth remembering a basic tenet of psychology: the best predictor of future behavior is past behavior. Information contained in registries has proven to have greater predictive power than collateral pledges in determining who will repay loans, and it is therefore more prized by bankers than even collateral.

Research on information sharing mechanisms, such as credit registries, in credit markets, is in its infancy. Promising avenues for future work include the importance of the ownership or organization of the registry (private vs. public, owned by banks or other lenders vs. independent third party ownership, etc.), the importance of use of credit registry data for bank (lender) performance and importance of registry data for modernization of credit markets, including issues related to e-finance.

Questions for the conference panelists:

1. What are your views on the importance of credit registries? How would you assess the quality and coverage of credit registries in your country and more generally in Latin America? How do you see credit registries evolving in Latin America, as well as in other regions of the world, in the next five years?
2. What is the appropriate role of the public sector in supporting the development of a responsible, timely and accurate credit reporting system?
 - i) What is the role of a public credit registry? How should public and private credit registries interact?
 - ii) What legal issues should be addressed to support a strong credit reporting system? For example, privacy issues, bank secrecy, etc.
 - iii) What regulatory framework is required for the development of credit registries? Examples include consumer protection, i.e., access to one's own data, ability to challenge erroneous data, etc., rules on distribution of data and access to data, etc.
 - iv) What is the role of competition policy in promoting strong credit reporting systems? For example, should government require information sharing as a way to promote competition? If so, when and in what way? Is it a public policy concern if lenders are choosing to share information only on some market segments and not others?
3. Are credit bureaus really relevant for small and microenterprises, or should greater emphasis be placed on other means of improving access to credit by these firms (such as group lending, savings and credit associations, etc.)?

¹³ See Galindo(2001) for a discussion.

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Appendix 1

Data on Private Credit Registries in Latin America

Table A1.1a. Reported Data: Private Credit Registries

Country	Each Loan Described Individually	Positive and Negative Data Reported	Amount of Positive Information on Consumers
Argentina	✓	✓	25% to 49%
Barbados	✓	✓	50% to 74%
Bolivia	✓	✓	Less than 5%
Brazil	✓	✓	na
Chile		✓	25% to 49%
Colombia	✓	✓	75% to 100%
Dominican Republic	✓	✓	75% to 100%
Ecuador		✓	25% to 49%
El Salvador		✓	10% to 24%
Guatemala	✓	✓	75% to 100%
Mexico	✓	✓	75% to 100%
Panama	✓	✓	na
Peru	✓	✓	50% to 74%
Uruguay		✓	75% to 100%

Table A1.1b. Reported Data: Public Credit Registries

Country	Each Loan Described Individually	Positive and Negative Data Reported
Argentina		✓
Bolivia	✓	✓
Brazil		✓
Chile		✓
Colombia		✓
Costa Rica	✓	✓
Dominican Republic		✓
Ecuador		✓
El Salvador	✓	✓
Guatemala	✓	✓
Haiti		✓
Mexico		✓
Nicaragua		✓
Paraguay		✓
Peru		✓
Uruguay		✓
Venezuela		✓

Table A1.2a. Reported Data II: Private Credit Registries II

Country	Name	Address	Taxpayer ID	Name of reporting institution	Amount of Loan	Interest rate	Maturity	Type of loan	Type of Collateral	Value of Collateral	Status or rating of loan	Ownership or participation in a business	Financial Data	Personal Information	Tax Information
Argentina	✓	✓	✓	✓	✓		✓	✓	✓		✓			✓	✓
Barbados	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
Bolivia	✓	✓	✓	✓	✓		✓	✓	✓		✓			✓	✓
Brazil	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
Chile	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓		✓	✓
Colombia	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			✓	✓
Dominican Republic	✓	✓	✓	✓	✓		✓	✓	✓		✓			✓	✓
Ecuador	✓	✓	✓	✓	✓		✓	✓	✓		✓			✓	✓
El Salvador	✓	✓	✓	✓	✓		✓	✓	✓		✓			✓	✓
Guatemala	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			✓	✓
Mexico	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			✓	✓
Panama	✓	✓	✓	✓	✓		✓	✓	✓		✓			✓	✓
Peru	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			✓	✓
Uruguay	✓	✓	✓	✓	✓		✓	✓	✓		✓			✓	✓

Table A1.2b. Reported Data II: Public Credit Registries

Country	Name	Address	Taxpayer ID	Amount of Loan	Interest Rate	Maturity	Type of Loan	Type of Collateral	Value of Collateral	Status or rating of loan	Ownership or participation in a Bussiness	Financial Data	Personal Information	Tax Information
Argentina	✓	✓		✓	✓									
Bolivia	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
Brazil	✓		✓	✓	✓		✓							
Chile	✓		✓	✓	✓									
Colombia	✓		✓	✓	✓									
Costa Rica	✓		✓	✓	✓									
Dominican Republic	✓		✓	✓	✓									
Ecuador	✓		✓	✓	✓			✓		✓				
El Salvador	✓		✓	✓	✓	✓	✓	✓						
Guatemala	✓		✓	✓	✓	✓	✓	✓	✓	✓				
Haiti	✓	✓	✓	✓	✓		✓	✓						
Mexico	✓	✓	✓	✓	✓		✓	✓						
Nicaragua	✓		✓	✓	✓	✓	✓	✓	✓					
Paraguay	✓		✓	✓	✓									
Peru	✓		✓	✓	✓									✓
Uruguay	✓		✓	✓	✓		✓	✓	✓	✓				
Venezuela	✓		✓	✓	✓									

Table A1.3a. Type of Loans Included: Private Credit Registries

Country	Unsecured Line of Credit including Credit Cards	Overdraft Lines	Auto Loans	Mortgages	Secured Lines of Credit
Argentina	✓	✓	✓	✓	✓
Barbados	✓	✓	✓		✓
Bolivia	✓		✓		
Brazil	✓		✓	✓	
Chile	✓	✓	✓	✓	
Colombia	✓		✓	✓	✓
Costa Rica	✓	✓		✓	✓
Dominican Republic	✓	✓	✓	✓	✓
Ecuador	✓		✓	✓	✓
El Salvador	✓		✓	✓	✓
Guatemala	✓		✓	✓	✓
Mexico	✓		✓	✓	✓
Panama	✓		✓	✓	✓
Peru	✓		✓	✓	✓
Uruguay	✓	✓	✓		✓

Table A1.3b: Type of Loans Included: Public Credit Registries

Country	Unsecured Line of Credit Including Credit Cards	Overdraft Lines	Auto Loans	Home Mortgage	Secured Line of Credit
Argentina	✓	✓	✓		✓
Chile		✓			
Colombia	✓			✓	
Mexico	✓				✓
Nicaragua	✓	✓	✓	✓	✓
Peru	✓			✓	✓
Uruguay	✓	✓		✓	✓
Venezuela	✓	✓	✓	✓	✓

Table A1.4a. Institution with Access to Information: Private Credit Registries

Country	Public Financial Institutions that provide data	Public Financial Institutions that do not provide data	Private Financial Institutions that Provide Data	Private Financial Institutions that do not provide data	The Central Bank	The Public Credit Registry operated by the Central Bank or Bank Superintendent, if one exists in your country	The Government Office of Tax Collection	Law enforcement agencies	Other Federal government offices	State/Provincial/Municipal Governments/Agencies	Credit Bureaus and Registries	Other Businesses	Individuals
Argentina	✓		✓	✓	✓		✓	✓		✓	✓	✓	✓
Barbados	✓			✓	✓						✓	✓	✓
Bolivia	✓		✓	✓	✓			✓		✓	✓	✓	✓
Brazil	✓		✓	✓	✓					✓	✓	✓	✓
Chile	✓		✓	✓	✓	✓				✓	✓	✓	✓
Colombia	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Costa Rica		✓			✓	✓	✓	✓		✓	✓	✓	✓
Dominican Republic	✓		✓	✓	✓		✓			✓	✓	✓	✓
Ecuador											✓	✓	✓
El Salvador											✓	✓	✓
Guatemala						✓	✓	✓			✓	✓	✓
Mexico						✓					✓	✓	✓
Panama												✓	✓
Peru	✓						✓	✓				✓	✓
Uruguay	✓						✓						✓

Table A1.4b. Institution with Access to Information: Public Credit Registries

Country	Public Financial Institutions that Provide Data	Public Financial Institutions that do not provide data	Private Financial Institutions that Provide Data	Private Financial Institutions that do not provide data	All/Most Departments of the Central Bank and Bank Supervisor	Unit Directly Responsible for the PCR	Office of Tax Collection	Law Enforcement Officials	Other Federal/Government Offices/ Agencies	State/Provincial/Municipal Governments/Agencies	Credit Bureaus and Registries	Marketing Firms	Other Businesses	Individuals
Argentina	✓		✓		✓	✓				✓				✓
Bolivia	✓		✓		✓	✓								✓
Brazil	✓		✓		✓	✓								✓
Chile	✓		✓		✓	✓								✓
Colombia	✓		✓		✓	✓		✓			✓			
Costa Rica	✓		✓		✓	✓								
Dominican Republic	✓		✓		✓	✓				✓				
Ecuador	✓	✓	✓		✓	✓							✓	
El Salvador	✓		✓		✓	✓								
Haiti	✓		✓		✓	✓								
Mexico	✓		✓		✓	✓			✓					
Paraguay	✓		✓		✓	✓								
Peru	✓		✓		✓	✓	✓							
Uruguay	✓		✓		✓	✓								
Venezuela	✓		✓		✓	✓								

Appendix 2. Variable Definitions

The firm level data comes from the November 2000 Worldscope database.
The following variables were used:

PPN: Property Plant and Equipment (net of depreciation)

KEXP: Capital expenditure

DEPAM: Depreciation and Amortization Expenses

K: Initial Capital stock= PPN-KEXP+DEPAM

I/K: KEXP/K

CF/K: (Operating Income + DEPAM)/K

Q : D+MV/K

D: Long term debt at the beginning of the period

MV: Market value at the beginning of the period

Appendix 3

Countries with information

	Negative and Positive	Quantity	Type of Report	Access	Type of Loans	Index
Argentina	✓	✓	✓	✓	✓	✓
Australia	✓	✓	✓	✓	✓	✓
Austria	✓	✓	✓	✓		
Belgium	✓	✓	✓	✓		
Brazil	✓	✓	✓	✓	✓	✓
Chile	✓	✓	✓	✓	✓	✓
Colombia	✓	✓	✓	✓	✓	✓
France	✓		✓	✓		
Germany	✓	✓	✓	✓		
Indonesia	✓	✓	✓			
Ireland	✓	✓	✓	✓	✓	✓
Italy	✓	✓	✓	✓	✓	✓
Japan	✓	✓	✓	✓	✓	✓
Malaysia	✓	✓	✓	✓	✓	✓
Mexico	✓	✓	✓	✓	✓	✓
Peru	✓	✓	✓	✓	✓	✓
Portugal	✓	✓	✓	✓		
Spain	✓	✓	✓	✓	✓	✓
Sweden	✓	✓	✓	✓	✓	✓
Thailand	✓	✓	✓	✓	✓	✓
Turkey	✓	✓	✓	✓	✓	✓
United States	✓	✓	✓	✓	✓	✓
Venezuela	✓	✓	✓	✓	✓	✓