



Artigo Original

The impacts of information asymmetry in determining bank spreads

Renato Cesar Ottoni Barbosa¹, Emerson Fernandes Marçal²

¹ Centro de Ciências Sociais e Aplicadas (CCSA) – Universidade Presbiteriana Mackenzie.

² Centro de Ciências Sociais e Aplicadas (CCSA) – Universidade Presbiteriana Mackenzie.
Escola de Economia da Fundação Getúlio Varga (EESP-FGV).

Correspondência: E-mail: efmarcal@gmail.com

Resumo

Um grande esforço de pesquisa tem sido feito para avaliar os determinantes dos spreads bancários. Neste estudo utilizam-se os dados da pesquisa do Banco Mundial *Doing Business* para avaliar em que medida a assimetria informacional influencia o nível de *spread* bancário. Os resultados encontrados neste trabalho sugerem que os *spreads* sofrem influência do nível de assimetria informacional. Nas taxas de baixo risco (*prime rates*) um grau pequeno de assimetria informacional pode reduzir de 2 a 4% o nível do *spread*. Conjectura-se que maiores reduções podem ser obtidas para dívidas de maior risco. A metodologia econométrica utilizada consiste em técnicas de painel estático. Para confirmar ou refutar os resultados deste trabalho estudos com amostra maiores devem ser feitas assim que novas informações sobre a pesquisa *Doing Business* estejam disponibilizadas.

Palavras-chave: setor bancário, assimetria informacional, taxa de juros.

Abstract

A large effort in research was made in order to assess which are the determining factors in bank spreads. Employing information asymmetry indicators based on the World Bank's *Doing Business* survey, we aim to investigate the role that information asymmetry plays in bank spreads. The results found in this paper suggest that the existence of a lesser degree of information asymmetry in credit markets reduces bank spreads. This conclusion was obtained based on

a study of prime loan rates. The effect would be between a 2% to 4% permanent reduction in spreads. It is argued that larger reductions could be obtained for other kinds of greater risk credit. The relation was obtained based on econometric panel data models with static effects and seems to be solid from the statistical viewpoint. Nonetheless, new studies involving larger samples should be performed in order to confirm this relationship.

Keywords: banking sector, informational asymmetry, interest rates.

Resumen

Uno gran esfuerzo en pesquisa tiene sido hecho para conocer los factores determinantes del spread bancario. Indicadores de asimetría de información basados en los datos de *Doing Business* del World Bank son empleados para investigar el papel de la asimetría de información en spread bancario. Los resultados sugieren que la existencia de un bajo nivel de asimetría de información en los mercados de crédito reduce spreads bancarios. La conclusión es basada en un estudio de tasas de bajo riesgo que reducen permanentemente el spread entre 2% y 4%. Mayores reducciones podrían ser obtenidas para otras tasas de riesgo. La relación fue obtenida con base en un modelo econométrico con datos painel y efectos estáticos, presentando características sólidas por la óptica estadística. Nuevas pesquisas con muestras mayores deberían ser hechas para confirmar esa relación.

Palabras-clave: sector bancario, asimetría de información, tasa de interés.

Introduction

There is an ample research on the determining factors in bank spreads. Studies focused on determining factors in the level of credit supplied in the market, as well as analyses to break down bank spreads into a number of components have been frequent, and a series of variables have been found to explain and assist in better understanding their behavior.

Information asymmetry among lenders and borrowers in connection with project quality, the behavior by borrowers and the risk of default, create impacts on the cost of funds to borrowers. While there is an extensive theoretical literature on the role played by information in credit markets, little attention has been paid to the institutional answers to reduce this asymmetry's impact (Galindo 2001).

This paper aims to evaluate if the differences in spreads observed among countries may be explained by the greater or lesser degree of information credit sharing. What is the role that information asymmetry plays to explain bank spreads difference among countries?

The paper is divided in the following parts. This introduction is followed by a review of the literature on information asymmetry, its role in credit markets and the key studies on this topic. In a third section there is a description of the econometric methodology employed and the survey's key results are presented. Finally, the key conclusions are drawn.

Literature review

Information asymmetry

In the field of microeconomic theory, a line of research investigates the role that information asymmetry plays in the dynamics of a number of markets. The basic concept of asymmetric and imperfect information as employed in this paper is that in some markets purchasers and sellers or service providers are unable to gain access to the same information, either owing to the high cost involved in obtaining it or because it is totally impossible to confirm a participant's degree of willingness to repay. The consequences of this fact vary between an incorrect definition of the price of market transactions owing to the high risk by one of the parties (moral hazard) and the latter's complete lack of feasibility (adverse selection process) (Akerlof 1970, Varian 2000, Eaton 1999).

A number of markets can be used in order to provide examples of the concepts involved here. Akerlof (1970) begins his study with the automobile market, selected more because of its tangible nature and ease of understanding than because of its importance or realism. In this example information asymmetry is developed as of the moment in which a car owner is acquainted with all qualities

of the car put up for sale, while all likely buyers are not. In this case it would not be possible for buyers to detect whether it is a quality automobile or a lemon. As a result, in this market buyers will usually pay average prices based on the perception of the percentage of good and bad cars in the market (and not really on quality as this is a latent characteristic). When a person decides to try and sell a bad car, this affects the perception of buyers on the average quality of cars in the market, with the resulting decrease in the price of such goods.

This external feature drives off the sellers of good cars (who expect to receive a fair price for their goods), causing a fault in the market, also known as adverse selection (Varian 2000:718). When this condition takes place consecutively, at most it creates the concept of a lemons market in which good quality goods are forced out of the market and only the poor quality items will remain.

Another example mentioned in literature refers to the insurance market. The same information asymmetry and adverse selection reasoning may apply, now in the opposite sense, with the increase in the price for the goods and services.

According to Eaton (1999:162), should the insurance companies be able to detect the risk features of each one of their insured customers, in a perfect balance, then they would be able to provide infinite types of insurance in the market, each one with a price adequate to each customer, under a situation of complete information.

However, owing to the existence of latent characteristics arising from the prohibitive costs in obtaining this information, price is determined by the relative dimensions of each group, whereby an average price is found. In this case the low-risk insured parties will subsidize the insurance policies for high-risk individuals. An adverse selection takes place inasmuch as the proportion of high-risk purchasers of insurance increases, by increasing excessively the cost (and the subsidy) for low-risk purchasers, who will consequently be removed from the market.

Another paradox discussed in micro-economic theory is the moral hazard problem. The concepts previously described were related to the latent characteristics of the quality of the goods and services or of the parties to which services are provided. According to Eaton (1999:167), the moral hazard problem is one more class arising from situations with asymmetrical information, with regard to latent actions.

Varian (2000:722) suggests that if the individuals have something completely insured, they would tend not to be so careful as they would not have to account for the cost of their actions. As a result, their incentive to take care of an insured object would be reduced. When compared to standard market behavior, which assumes that the amount of goods traded in a competitive market is determined by the condition under which demand is equal to supply, a paradox appears. With the existence of moral hazard, such as in this case involving the insurance

market, consumers would like more and more to purchase additional insurance, insurance companies would be willing to sell more insurance if they could count with customer willingness to be more careful, but the latter would rationally choose to be less careful.

Once more it is pointed out by this author that markets with a moral hazard may tend to disappear in the adverse selection process. It is also contended that markets in which some of the parties are unable to detect any features or actions, in a balanced situation they may act with some form of rationing. In the case of the credit market, even those companies wishing to supply more credit than they do, would not be willing to do so owing to the change in customer incentives to act adequately.

In the light of the risk of reducing business arising from information asymmetry and the resulting negative impact, a number of mechanisms are naturally created by market participants in order to reduce the effects of quality uncertainty. The individuals penalized are encouraged to find a way out of the dilemma imposed by the latent features, a reaction known as signaling (Eaton 1999:164).

Another process emphasized by this author to minimize the impacts of asymmetry in information is the sorting process made by companies, which should be performed as far as possible. Insurance companies seek to qualify their customers as much as possible with the creation of as many profiles as possible, using their certificates to adapt them to each risk group. Companies in an admission process employ formal (experience, titles) or informal (references) certificates to select their employees. In conclusion, potential purchasers may rate goods according to the guarantees provided.

Information asymmetry in the credit market

Information asymmetry is especially important when assessing the credit market. Several authors have related this condition to adverse selection situations in the market, resulting in problems between likely lenders and borrowers and including situations of credit rationing, impacts on competitiveness and market structure. In summary, these authors emphasize that information asymmetry plays an important role in the credit market's dynamics. Furthermore, the authors point out the number of actions by credit market participants in minimizing the impacts of information asymmetry.

Initially, the credit market's activities should be defined, in particular the credit granting process and the resulting specification of interest rates. According to Pinheiro and Moura (2001), a credit decision varies in accordance with the nature of bank and borrower. Credit applications are handled automatically through statistical methods, based on information supplied by customers and information

available in credit agencies. Bearing in mind each borrower's nature, a score is attributed which serves to define each customer's credit limit or a maximum loan amount, and the appropriate interest rate for that customer.

The moment when information asymmetry in the credit market becomes more apparent and its effects more important, are in those situations in which banks are less aware than their borrowers of the risks assumed in financing a project (or of their real payment ability, in the case of individuals). In these cases competitive balance may be inefficient.

Leland and Pyle (1977), in accordance with the work of Akerlof (1970), suggests that information asymmetry in the financial market is particularly pronounced. According to the authors, borrowers have information on their willingness to repay, on their already pledged collateral, or further, companies are aware of their skills in industry and of internal information on their projects.

However, on the other hand all this information is difficult to access by lenders. This results in a moral hazard process in which the natural exaggeration of positive qualities, whether of individuals or of the projects defended by companies in search of loans, prevents the existence of a direct transfer of information with quality among market participants. The authors go on to contend that without a transfer of information, a process which reduces asymmetry, the financial markets operate inefficiently.

Problems related to information may be mitigated by a number of actions, such as the use of collateral or financial commitment by borrowers, by funding part of a project themselves (Costa and Blum 2007). Another instrument to mitigate the effects of asymmetry pointed out by Freixas and Rochet (1999:29) is monitoring, a clear form for improving efficiency regarding information asymmetry, with the *ex-ante* use of sorting.

Costa and Blum (2007) point out that one of the forms for reducing problems with information is the use of a borrower's reputation, built by means of a positive performance background in situations during and prior to a loan. However, Leland and Pyle (1977) propose that there may be organizations that compile and sell information on particular assets classes, as this information may benefit other potential lenders.

Freixas and Rochet (1999:246) assert finally that one of the main forms of reducing information asymmetry, and as a result reducing bank risks, could be achieved by reducing the cost of information and by increasing its quality. To this end, banks in some markets may agree to share information, compiling information on individuals. There are institutions in this process known as "credit bureaus" in the United States and Canada, "credit reference agencies" in the United Kingdom and Australia, and "credit registration centers" in Belgium and France. For this paper's purpose, the term credit bureau will be employed regardless of the country under consideration.

This paper focuses on the quality of information available and shared in the markets, as a proxy of the level of information asymmetry in the credit market. Greater details will be provided below from the studies that assessed the impacts of the shared use of credit information and its effects in the market.

Sharing credit information and the financial market

As previously defined, this paper will employ the term credit bureau to describe institutions that work with sharing information in a certain market. In general these institutions operate basically in three key activities. The first attempts to develop an information gathering chain based on the development of channels whereby institutions that have a relationship with the market's credit users will inform data in connection with contractual interactions regarding credit procedures in a constant manner, and as far as possible, as automated as possible.

A credit bureau's second function is to store data, organizing them in the form of information that makes up a credit background profile of consumers. In conclusion, the most important activity is the disclosure of information on consumers, on demand, to support the analysis procedures for new loan agreements to be provided by the lending institutions active in the market, hence increasing information asymmetry on borrowers. Subsequently several academic definitions of these institutions will be detailed.

Pagano and Japelli (1993) define Credit Bureaus as those institutions that gather, file, and disclose information voluntarily provided by associates, operating under a reciprocal principle: lenders that do not supply data may not access the bureau's files.

Freixas and Rochet (1999:147) add that association to a credit bureau allows banks to access more information on potential borrowers, in exchange for a lender's private information on the behavior of its current customers. Djankov, McLiesh and Shleifer (2006) add that these institutions gather credit background and current liabilities by borrowers, and share these with lenders. Galindo and Miller (2001) also point out that these institutions generally analyze information and supply the results of credit scoring to participants.

Chu (2002) asserts that a credit bureau's main role is to attenuate problems in connection with information asymmetry between lenders and borrowers in loan transactions, decreasing the likelihood of moral hazard, adverse selection, and excessive indebtedness. The author contends that a credit bureau provides a more accurate estimate of a loan's payment possibilities, based on the borrower's nature.

Furthermore, Miller (2000) asserts that once there is a loan transaction, the borrower is aware that its performance will be reported to a credit bureau. Hence, this information is converted into “reputation collateral”, as any delay in payments or default by the borrower will reduce this “collateral’s” value, which may jeopardize future loans. Hence, borrowers are encouraged to pay their loans in time.

Galindo and Miller (2001) point out the fact that credit bureaus have become more important in the last 20 years, in developed countries as well as in those under development, owing to changes in banking systems (arising from merger and acquisition processes and the need by a number of institutions to concentrate their credit procedures), and technological advance. Miller (2000) adds that macroeconomic forces, either positive (stabilization of volatile economies) or negative (economic crises), have encouraged the development of credit reports. The banks value this kind of institution, as well as central banks which in addition to the objectives of improving credit granting processes employ the same information for the purposes of bank supervision.

Pagano and Jappelli (1993) developed the first strict treatment of mechanisms for information sharing, and proposed their importance owing to the increase the degree of competitiveness in the credit market, raising credit allocation efficiency and the volume of loans. The authors surveyed and grouped a sample of 14 countries. The authors concluded that information sharing decreases default, reduces interest rates, and encourages the expansion of credit in the market.

Galindo and Miller (2001) tested the impacts of credit information in the ability of companies of gaining access to credit. They employed data from companies in 20 countries, creating a number of credit market performance measurements. The authors contend that credit bureaus contribute to a more effective financial intermediation, evidenced by the increase in the supply of credit. They explain that the average equity/indebtedness ratio by companies in the countries is positively correlated with the quality of their credit bureaus, and that from the viewpoint of companies, the better the existing credit quality the lower would credit restrictions be.

Jappelli and Pagano (2000) prepared a review of the economic effects of information sharing, reviewing theory and several sparse empirical studies. The authors initially asserted that the key objective would be to reduce adverse selection. As a result, bank spreads would be decreased by institutions, as there would be greater competition for loans with the increased encouragement for borrowers to pay.

In addition, other effects were detected, such as increased discipline by borrowers due to reputation effect. The authors detected a drop in borrowers’ over- indebtedness, as the practice of obtaining loans from several financial institutions at the same time would be reduced when there is information sharing among financial institutions.

Gelos (2006) describes the determining factors in bank spreads, using a cross-section of 85 countries. Among the factors that can be found in the literature as determinants for spreads the author argues that a greater availability of information on potential borrowers would reduce the risk of default and therefore of bank spreads. The results found by this author evidence that there is a moderate negative correlation between the availability of information on companies in the country and spread levels.

Bank spread determining factors

One of the key determinants for price in the financial market spreads is the level of information asymmetry of the market. The level of information sharing is employed as a *proxy* in this study. Nonetheless, there are also other macro and microeconomic variables with a substantial impact on bank spreads.

In recent years a large number of empirical studies have been developed with the purpose of explaining the determining dynamics in loan pricing and bank spreads. Ho and Saunders (1981) were one of first studies in the empirical literature. Some of the studies in this line of research are Angbazo (1997), Saunders and Schumacher (2000), Maudos and Guevara (2004), Barajas et al. (1998) who aims to explain Colombian market data. Demirgüç-Kunt and Huizinga (1999) is a World Bank study which lists 11 macro and microeconomic factors determinants of spreads. Gelos (2006) analyses the determinants factors on bank spreads in Latin America.

Saunders and Schumacher (2000) use a sample of 746 banks in seven countries (United States, Germany, France, United Kingdom, Italy, Spain, and Switzerland) during the 1988-1995 period. They have obtained the results that among microeconomic variables, the greatest impact on bank spreads comes from the fiscal and regulatory component, consisting in the implicit payment of interest (with the need by banks to increase their margins in the majority of countries) and in equity capital requirements. Among the macro-economic variables, interest rate volatility and market structure have a positive and statistically significant impact on bank spreads, albeit the heterogeneous effects among countries.

Another model for detecting bank spread determining factors in countries was prepared by Demirgüç-Kunt and Huizinga (1999). The authors assessed bank spread determining factors by means of disconnected banking statistics involving 7,900 commercial banks in 80 countries from 1998 to 1995. With regard to macro-economic variables, it was found that the inflation rate has a positive yet statistically insignificant impact on bank spreads, and that the short-term real interest rate has a positive and statistically significant effect on bank spreads, yet lower in developed countries than in developing countries. These authors note

that the real GDP's growth rate and that of per capita GDP do not appear at the world level to have any statistically significant impact on spreads.

Another study employing panel data to study the bank spread determinants in Latin American countries was prepared by Brock and Rojas-Suárez (2000). The authors used a sample of banks in six Latin American countries (Argentina, Bolivia, Colombia, Chile, México, and Peru) from 1992 to 1996. The main conclusion by the authors was that the macroeconomic variables have a different impact according for each country. The interest rate volatility has a positive and strong impact on bank spreads in Chile and Bolivia. Inflation rates increases spreads in Colombia, Chile, and Peru. The real GDP's growth rate had a negative impact on spreads in Chile and Argentina.

Afanasieff, Lhacer, and Nakane (2001) uses panel data techniques for 142 commercial banks from February 1997 to November 2000. The authors concluded that increases in the base rate, risk premium, GDP growth, and taxes have a significant impact on spreads. On the other hand, the inflation rate affect spreads adversely.

Bignotto and Rodrigues (2005) employed a theoretical model proposed by Ho and Saunders (1981) for a sample of Brazilian banks from 2001 to 2004. The authors found that credit and interest rate risks and administrative costs have greater positive impacts on spreads as do the level of bank liquidity, market share, and revenues from banking services.

Laeven and Majnoni (2003) investigated the effects of legal efficiency on bank spreads, surveying and grouping data encompassing 106 countries and individual bank data for 32 countries, for the year 2000. The authors employed variable controls such as inflation and the number regulatory characteristics on banks. The study includes an indicator of the degree in which credit information would be publicly available. Their results suggest that legal efficiency, in addition to inflation, seemed to be the key determinants for the level of interest rate spreads. Moreover, the authors found that the existence of credit bureaus, among other variables, did not seem to have significant effects on bank spreads.

Some studies pointed out the availability of credit information on borrowers as a determining factor for spreads. Gelos (2006) considers that accessibility by financial institutions to information on likely lenders reduces the risk of default, therefore reducing spreads. Chu and Schechtman (2003) states that it is important for financial institutions to have elements in order to assess whether customers will in fact be good payers at a correct price.

Nakane and Costa (2005) describe a number of common errors in less careful studies on the subject, related to the definition of spreads and their measurement. The problem is found in the set of loan transactions being employed as a basis for their calculation. There are several types of loans such as qualitative credit at subsidized rates, in addition to freely priced credits, with

large differences between the spreads for each one of these. Hence, the interest rate used in the comparison should be defined in order to preserve a conceptual consistency.

In addition, risk ratings should be considered. Some countries may report a market average from the low and high risks operations. In the specific case of IMF database it is possible to access what type of rates is reported for a number of countries available in this datasets.

Econometric methodology and results

In this study it is discussed whether or not there is a relationship between the existence and the quality of a country's credit information on bank spreads. Hence, bank spreads and their determining factors, including the quality of shared information in the market, are quantified by employing specific indicators. Panel techniques are used as a base for the analysis.

Sample

In this paper, the number of countries with prime rate data information recorded in the IMF and World Bank databases for the years under study will define the sample's maximum size. In order to avoid problems in international comparisons a detailed assessment is required to define and measure loan rates recorded in the IMF database. Each country data has an explanatory note that contains a brief description of the nature and characteristics of the rate reported (IFS 2002:xx-xxi).

Hence, based on a universe of 196 countries with a total of 980 notes, a sample was selected containing 14 countries with valid data, with recorded loan rates intended for a lower-risk public (prime rates) with 70 notes from 2002 to 2006. Though the data on spreads are available for periods prior to 2002, they cannot be employed as the information asymmetry indicators were prepared based on the World Bank's *Doing Business* not available for the period prior to 2002.

Description of the variables employed

This study will deal with the associations between a dependent variable a country's average bank spread, selected to measure the cost of bank loans in the credit market, and independent variables, all of which assessed under a macro perspective and grouped by countries, representing the quality and scope of information sharing in the market, as follows: (i) Credit Information Rate, which

measures rules regarding scope, access, and quality of credit information; (ii) Degree of Coverage of the population of public credit bureaus; and (iii) Degree of Coverage of the population of private credit bureaus. The following control variables were also employed: (i) the Country's Tax Burden; (ii) Equity Capital Requirements; (iii) Inflation; (iv) Default Level; and (v) Quality of the legal system.

Statistical models

There are two basic models employed in panel analysis fixed effects and random effects. The fixed effects approach considers that individual effects are a constant specific term and constant in time at an individual's level.

The basic equation for this model is:

Equation 1

$$y_{it} = \alpha_i + \beta_1 x_{it} + \varepsilon_{it}$$

Where α_i is a fixed component connected to the unit i which represents the several unknown intercepts under estimation, one intercept per country.

The random effects model is:

Equation 2

$$y_{it} = \alpha + \beta_1 x_{it} + \mu_i + \varepsilon_{it}$$

Where μ_i represents the random shock describing the i^{th} note and is constant throughout the time (Greene 2000:560, Jonhston, Jack and Dinardo 2001:424).

Survey results

The models selected for this study are: pooled OLS (ordinary least square), fixed effects models FD (first differences), and LSDV (least square dummies variables), and random effects models GLS (generalized least square).

Table 1. Results of the estimates for the equation (XX) by OLS, FD, LSDV, and GLS.

LnSP_Deposit	OLS ^a				FD ^a				
	Coefficient	Std.Error	t-value	t-prob	Coefficient	Std.Error	t-value	t-prob	
D1	0.000000				0.000000				
D2	-0.004407	0.009960	-0.442	0.660	0.001121	0.002433	0.460	0.648	
D3	-0.024790	0.016850	-1.470	0.147	-0.007141	0.005214	-1.370	0.179	
D4	-0.026388	0.013050	-2.020	0.048	**	-0.009586	0.007066	-1.360	0.183
D5	-0.041211	0.012490	-3.300	0.002	***	-0.012298	0.008028	-1.530	0.134
D6	-0.045401	0.009149	-4.960	0.000	***	-0.019407	0.009775	-1.990	0.054 *
PPRV	0.000200	0.000459	0.435	0.665	0.000074	0.000595	0.125	0.901	
PPRV2	0.000005	0.000011	0.486	0.629	0.000008	0.000014	0.575	0.568	
PPRV3	0.000000	0.000000	-1.320	0.192	0.000000	0.000000	-1.320	0.193	
CAPIT	0.000229	0.000859	0.266	0.791	0.000970	0.000911	1.060	0.294	
INFPIB	0.000864	0.000798	1.080	0.284	0.000450	0.000553	0.813	0.422	
IMPLU1	0.000808	0.000396	2.040	0.046	**	0.001660	0.000558	2.970	0.005 ***
IMPLU2	0.000428	0.000216	1.980	0.052	*	-0.001518	0.000551	-2.760	0.009 ***
INAD	0.001548	0.000535	2.890	0.006	***	0.001443	0.000624	2.310	0.026 **
PROPMIN	-0.052563	0.008748	-6.010	0.000	***	-0.015727	0.010930	-1.440	0.158
PROPMED	-0.029289	0.006412	-4.570	0.000	***	0.000000			
PROPMAX	-0.046159	0.009130	-5.060	0.000	***	0.000000			
Constant	0.055313	0.017750	3.120	0.003	***	-0.000546	0.000875	-0.624	0.536
R ² 0.8980923					R ² 0.4764915				
no. of observations 70					no. of observations 56				
no. of parameters 18					no. of parameters 18				
number of individuals 14					number of individuals 14				
longest time series 5 [1 - 5]					longest time series 4 [2 - 5]				
shortest time series 5 (balanced panel)					shortest time series 4 (balanced panel)				
Specification tests					Specification tests				
Wald (joint): Chi ² (17) = 1.580e+005 [0.000] **					Wald (joint): Chi ² (17) = 1.191e+005 [0.000] **				
Wald (dummy): Chi ² (1) = 9.713 [0.002] **					Wald (dummy): Chi ² (1) = 0.3893 [0.533]				
AR(1) test: N(0,1) = 2.229 [0.026] *					AR(1) test: N(0,1) = 1.073 [0.283]				
AR(2) test: N(0,1) = -0.6681 [0.504]					AR(2) test: N(0,1) = -1.656 [0.098]				
					Continues				
LnSP_Deposit	LSDV ^{a1}				GLS ^a				
	Coefficient	Std.Error	t-value	t-prob	Coefficient	Std.Error	t-value	t-prob	
D1	0.000000				0.000000				
D2	0.012713	0.002231	5.700	0.000	***	-0.002659	0.012080	-0.220	0.827
D3	0.002431	0.005068	0.480	0.634		-0.022806	0.010530	-2.170	0.035 **
D4	-0.000634	0.006706	-0.095	0.925		-0.024685	0.008367	-2.950	0.005 ***
D5	-0.005093	0.007601	-0.670	0.507		-0.038550	0.009766	-3.950	0.000 ***
D6	-0.017139	0.008869	-1.930	0.061	*	-0.042758	0.009346	-4.580	0.000 ***
PPRV	0.000102	0.000719	0.142	0.888		0.000132	0.000465	0.285	0.777
PPRV2	0.000011	0.000017	0.656	0.516		0.000007	0.000012	0.595	0.554
PPRV3	0.000000	0.000000	-1.620	0.113		0.000000	0.000000	-1.400	0.168
CAPIT	0.000138	0.001191	0.116	0.908		0.000306	0.000592	0.517	0.607
INFPIB	0.000318	0.000568	0.561	0.578		0.000852	0.000399	2.140	0.037 **
IMPLU1	0.002073	0.000928	2.240	0.031	**	0.000734	0.000398	1.850	0.071 *
IMPLU2	-0.002058	0.001040	-1.980	0.055	*	0.000455	0.000256	1.780	0.081 *
INAD	0.001212	0.000493	2.460	0.019	**	0.001498	0.000398	3.770	0.000 ***
PROPMIN	-0.044587	0.021580	-2.070	0.046	**	-0.051620	0.007726	-6.680	0.000 ***
PROPMED	-0.028911	0.016600	-1.740	0.089	*	-0.029657	0.007801	-3.800	0.000 ***
PROPMAX	-0.030783	0.023370	-1.320	0.195		-0.045461	0.008129	-5.590	0.000 ***
Constant	0.095364	0.019440	4.910	0.000	***	0.054336	0.013120	4.140	0.000 ***
R ² 0.9653761					R ² 0.8833998				
no. of observations 70					no. of observations 70				
no. of parameters 31					no. of parameters 18				
number of individuals 14					number of individuals 14				
longest time series 5 [1 - 5]					longest time series 5 [1 - 5]				
shortest time series 5 (balanced panel)					shortest time series 5 (balanced panel)				
Specification tests					Specification tests				
Wald (joint): Chi ² (17) = 5807. [0.000] **					Wald (joint): Chi ² (17) = 266.5 [0.000] **				
Wald (dummy): Chi ² (14) = 1.053e+004 [0.000] **					Wald (dummy): Chi ² (1) = 17.14 [0.000] **				
AR(1) test: N(0,1) = -1.487 [0.137]					AR(1) test: N(0,1) = 2.582 [0.010] **				
AR(2) test: N(0,1) = -2.626 [0.009] **					AR(2) test: N(0,1) = -0.4773 [0.633]				

^a Temporal dummies were not included as they are not significant.

¹ Contain dummies of individuals.

Source: prepared by the authors.

The effect of sharing information as compared on the dependent variable LN_SP_Deposit (bank spread considering the opportunity cost at a deposit's average rate) can be seen in Table 1, which consolidates the results.

The choice of the technique employed will depend on the assumptions regarding the existence of correlation between random errors (ε_{it}) and regressors (x_{it}), and regarding random errors and fixed effects (α_i) in order to obtain consistent estimators and with the desired efficiency properties. All parameters standard deviations were calculate using robust to heterocedasticity and autocorrelation matrix.

The parameter estimates obtained by OLS and of those obtained for the fixed effects models (FD and LSDV) differ and this indicate that the assumption of the fixed effect is not orthogonal to the regressors. In this case the estimates obtained by OLS would be biased. An analysis of the specification tests did not give evidence in favor of necessity of dynamic models. We opt not to estimate dynamic panel data models.

The Hausman test was performed in order to assess which model would be preferable: Fixed Effect (LSDV) and Random Effect (GLS). Under the null hyptothesis, the Fixed Effect as well as the Random Effects models gives consistent parameters estimators, and the latter proved to be more efficient. Under the alternative hypothesis, the Random Effects model provides an inconsistent parameter estimate, and hence the difference between both estimators should be different from zero in the alternative hypothesis and equal to zero in the null hypothesis.

Table 2. Hausman Test LSDV and GLS.

	Hausman test				
	Dif. Coef ^2	Var (LSDV)	Var GLS	Var(LSDV)-Var(GLS)	Chi^2 (1)
D2	0.000236	0.000084	0.000146	-0.0000622	-3.798
D3	0.000637	0.000114	0.000111	0.0000034	187.597
D4	0.000578	0.000129	0.000070	0.0000593	9.759
D5	0.001119	0.000184	0.000095	0.0000885	12.649
D6	0.000656	0.000291	0.000087	0.0002040	3.217
PPRV	0.000000	0.000001	0.000000	0.0000004	0.003 **
PPRV2	0.000000	0.000000	0.000000	0.0000000	0.110 **
PPRV3	0.000000	0.000000	0.000000	0.0000000	1.033 **

Source: Prepared by the author using regressions without robust errors.

It can be seen in Table 2, that probably the assumption of regressors are orthogonal to the fixed effects should not be a valid for the information sharing variables (D1 to D6). The Hausman statistics is significant at standard levels. The only regressors for which Hausman's statistics are not significant were the coverage degrees by the Private Bureaus. In the case of the D2 variable, a

negative Hausman statistics was found, a possible fact by virtue of the difference between the variances in both models are not necessarily always positive.

In general, estimated parameters display the signs expected by theory. With regard to the control variables, the larger part of the coefficients appeared statistically significant. The IMPLU1 variable suggests that countries with a higher tax burden on income have greater bank spreads. Furthermore, the IMPLU2 Variable suggests that a country's improved tax composition to the benefit of direct taxation (less distortional) is associated with a reduction in bank spreads. Similarly, a variable INAD controls the impact of default on spreads. On the other hand, the variables which represent the legal system's quality confirm the results obtained by Laeven and Mdjouri (2003), suggesting that a legal system more severe with borrowers results in lower bank spreads. The remaining explanatory variables, INFPIB, the country's inflation rate, CAPIT, the market capitalization structure, show the expected results.

A preliminary comment on results has to do with the D2 variable, which despite recording in the LSDV model a positive and statistically significant coefficient, which would be counter-intuitive, i.e., spreads would rise with the increased quality of information sharing. An assessment of the database leads to the explanation for this result, which arises from the fact that there is only one country rated as D2. Therefore the result should not be considered.

The coefficients D4 to D6 (which point to levels 4, 5, or 6 in the World Bank's INDINF) are negative in all the econometric methods. However, only those parameters associated to the 6 quality indicator (under which the country is deemed to meet all the quality assessment criteria for shared information), has proved to be expressive in all the models, while the D3 to D5 variables are expressive and with the sign expected only for the GLS model.

The results obtained here suggest the existence of a negative relation between the level of information sharing in a certain country, and the level of bank spreads (for prime rate customers). In accordance with the results found, *ceteris paribus*, countries with a high level of credit information sharing have a spread roughly 2% below that in other countries (bearing in mind the fixed effect model's coefficient, a preferable specification), and as low as 4% (random effect model, specification which is not a good model from statistical tests).

Conclusions

The main result of this paper is that the existence of a lesser degree of information asymmetry in credit markets can reduce bank spreads. This conclusion was obtained based on prime rates debts data analysis from IMF data. The estimated effect varies from 2% to 4% permanent reduction in spreads. It is conjectured that greater reductions could be obtained for other kinds of risk

credits and not just for lower risk customers. The relationship obtained seems to be robust in statistical terms. Nonetheless, new studies involving longer samples data should be performed in order to confirm this relation as they become available in the *Doing Business* World Bank publication.

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