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BANKING & MONITORING THEORIES WITHIN HETEROGENEOUS CREDIT MARKETS: EVIDENCE FROM FIRST-TIME LOAN APPLICANTS IN MEXICO.

Florencio López de Silanes (EDHEC Business School)
Raúl Rosales (Princeton University)
Guillermo Zamarripa (FUNDEF)

Serie de Documentos
de Trabajo
2018-01

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ABSTRACT

This paper uses a novel data set of full information of first-time loan applicants to 15 financial institutions operating in Mexico, from six different credit sectors *(Mortgages, Automobile, Durable Goods, Working Capital, Credit Cards and SMEs)* to assess the results of traditional Banking and Monitoring theories regarding credit-granting determinants within an heterogeneous context. We grouped all the collected data in 7 disparate clusters (*socio-demographic profile, financials, labor, assets, collateral, reputation, and bank's internal assessment)* and found strong evidence that without banking relationships, financial institutions use all applicants' data to mitigate information asymmetries *(including that prohibited by law);* at the aggregate level and across credit sectors. Nevertheless, the effect of each cluster *(and the variables within)* is widely heterogeneous across markets; which we conclude is attributable to their corresponding business model. We concentrate our efforts to assess the impact and interaction of collateral and reputation in this environment. We find that for some sectors, they act as complements, for others, as substitutes, and in some cases, they show to be independent one from each other.

In this paper we study credit-granting decisions to new customers *(without past credit history with the institution)* of 15 financial institutions operating in Mexico across 6 different credit sectors to study the disparate effects that the applicant attributes have over the decision of the institution regarding whether or not to provide a loan. In particular, we study the contrasting role that collateral and reputation play in this process. Moreover, taking advantage of the sample, we shed light on the results of a variety of financial intermediation and monitoring theories regarding credit-granting determinants and we provide new evidence that calls into question previous findings stated in the existing literature.

Granting and managing credit is a costly process characterized by information asymmetries over the intent and capacity of repayment of borrowers at each stage of the credit process *(from promotion, to screening, to monitoring and enforcing repayments)*. To ameliorate this problem and make lending feasible, financial intermediaries have developed diverse mechanisms and technologies that help them assess the credit risk and probability of repayment of each credit applicant; all of them strongly based on a credit reputation system and the right of repossessing assets as collateral. Moreover, during the last decades, banks have developed different technologies to infer the creditworthiness of potential customers from relevant personal characteristics that also influence repayment capacity. For instance, their social and demographic profile, their labor situation, their financial capacity and stability, their credit reputation within financial institutions, amongst others. Financial institutions usually develop credit scoring systems to be able to use these observable conditions to determine whether a loan is worth granting. While these scoring techniques are usually maintained private, several empirical papers in the literature have attempted to measure the effects of some of these factors over the likelihood of obtaining a credit *(e.g. Jacobson, 2003; Behr, 2011; Cole, 2004; Blanchflower, 2003)*. It is important to mention that during the last years, several new financial entities have emerged to provide an alternative source of funding to households and firms. For example, those institutions pertaining to the shadow banking sector and most recently, the FinTech industry. However, the importance of both collateral and credit reputation has not changed, as they remain being used as the main sources to discriminate between credit applications. As a result, there has been a continuous effort in past and current literature to assess of the effects of collateral and reputation over credit-granting decisions.

A first strand of the literature has emphasized the crucial role of collateral and the protection of creditors' rights of repossession "without these rights, investors would not be

able to get paid, and therefore firms would not have the benefit of raising funds from these investors" *(La Porta, López de Silanes, Shleifer and Vishny, 1998).* The impact on access to financing has been extensively studied, and the evidence provided indicates that the presence of collateral strongly increases the probability of obtaining a loan *(e.g. Freixas, 1997; Stiglitz, 1981; Bester, 1987; Menkhoff, 2006; Ono 2009)*. Moreover, collateral theories have also been used to explain the availability of credit in contexts of higher credit risk and relatively low resources to lend; for instance in emerging markets, in comparison to mature financial markets *(Menkhof et. al., 2006)*. Besides, the effects of collateral as a tool for mitigating information asymmetries over repayment can also be seen in the conditions of the credit. Bester (1985) argues that entrepreneurs are willing to trade higher collateral requirements for a reduction in interest rates, and that they are more willing to do so when their projects are less risky (and therefore have a lower expected loss regarding the value of their collateral). Yet, some other theories like Stiglitz *(1981)* emphasize that collateral leads to a self-selection process of potential borrowers that are inherently riskier, as they have successfully taken risks in the past and have been able to acquire these assets. Also, in Rajan and Winton's *(1995)* model, collateral is associated with riskier customers that foresee the potential for obtaining a loan. Under this hypothesis, collateral warrants more intensive monitoring of the loan repayment by banks. Yet there is a discussion in the literature on the limited function that collateral serves in credit granting. For example, Manove, Padilla and Pagano *(2001)* argue that an excessive emphasis on collateral and creditor's rights relies on the idea that moral hazard is the main problem of credit relationships, and sidelines another essential function of banks which is screening the quality of borrowers.

Another strand of the literature instead, has underscored the role of reputation for credit availability. The traditional theories indicate that those individuals with no credit history tend to face greater barriers to access credit; and for those with bad reputation, it is very difficult and even impossible to access new forms of financing. In Diamond's model *(1989)*, a good repayment reputation is valuable for firms as it signals the lender about the type of project that the firm undertakes, and in a competitive context enables borrowing at lower interest rates. Fehr and Zender (2006) develop a model in which, given the absence of any third party enforcement of contracts, credit markets only exist due to reputational concerns by actors who have repeated interactions. Moreover, some empirical studies have found evidence that reputation of bankruptcy or past delinquencies negatively affects the probability of obtaining credit in the future *(Blanchflower, 2003; Musto, 2004; Cole, 2004; Elul, 2015).* In fact, Elul and Gottardi (2015) argue that that reliance on past reputation might lead to credit rationing above what would be optimal, as risk-taking entrepreneurs that faced previous bankruptcies due to the inherent risks of productive projects might benefit from their history being forgotten; mainly those that have projects with a larger expected probability of success.

Many studies have explored the relation between collateral and reputation. Noticeably, most of the literature emphasize that collateral and reputation are substitutes as determinants of credit. Following this view, in a context where banks specialize in conducting screening services for investors, and these screening contracts are imperfectly enforced, the right to repossess collateral will lead to a socially sub-optimal supply of screening *(arguing that for banks, collateral and screening are substitutes).* Some empirical studies have found evidence of this relation for specific sectors. Behr (2011) provides evidence that for the microcredit industry, collateral requirements fall as clients develop a credit reputation with the institution; also, as it would be expected, moderate collateral requirements enable credit granting, but large collateral requirements preclude it, given the nature of the targeted population. A similar relation as substitutes is also found empirically for the SMEs sector, both in Europe *(in Degryse and Van Cayseele, 2000)* and Japan *(in Ono &*

Uesugi, 2009). Yet the results of these studies are limited in terms of the scope of credit sectors and the limitations of the datasets.

Regarding other screening factors used to determine whom to assign credit, many empirical studies have assessed the effects of other applicants' characteristics over the probability of getting a loan. In general, most of the literature finds that indicators of financial capacity and stability are associated with a larger probability of obtaining credit and with better conditions for borrowers. For instance, Jacobson and Roszbach (2003) use credit application-level data and find that a larger reported income is associated with a greater access to credit. Other studies that have focused on small businesses, have found that the size (either through assets or sales) and the longevity of the business (i.e. number of years in operation) increase the probability of getting a loan and lead to lower interest rates (*Petersen and Rajan,2002; Cole,2004 ; Blanchflower,2004).* In the same sense, some studies have found that the sociodemographic profile does influence this kind of decisions, even though it is legally prohibited, across financial institutions *(Jacobson, 2003; Behr, 2011).*

To shed light on which of the mechanisms to mitigate informational asymmetries has a greater role on informing the decision of granting a loan and assess the disparate effects that can occur depending on the credit sector, we gathered a novel and unique database on information from new credit applications, which allows us to overcome the usual barriers and biases of other data sources. We exploit the variation on the information gathered from these credit applications and analyze simultaneously the effect of collateral and reputation, both at the aggregate level and differentiating across credit sectors. While there are many studies that have explored the effect of these factors on the decision to grant a loan, most of the empirical work on the determinants of credit relies on limited sources of information and reduced sample sizes, as data from credit applications is usually scarce and confidential in nature. Furthermore, most studies lack external validity of the results, as their samples are limited in terms of the number of institutions or credit sectors. On the contrary, this paper uses a unique data set of 10,870 new credit applications (*to avoid relationship-banking effects over credit-granting)* to 15 financial institutions on 6 different credit sectors that represent more than 70% of the total assets of the Mexican banking system. The completeness of the dataset allows to test the effects of collateral and reputation simultaneously to provide evidence on the theories that emphasize each one of these factors. Moreover, our results are robust in terms of the scope of different institutions and credit sectors studied. We provide evidence that at the aggregate level both collateral and reputation matter for explaining the credit granting decision and that they have a complementary effect *(the marginal effect of each factor is greater in the presence of the other factor).* This relation, however, is not constant across all credit sectors. In some sectors, such as credit cards and loans for the purchase of durable goods, collateral and reputation act as substitutes in terms of the probability of obtaining a loan *(as the effect of each one is larger in the absence of the other factor).* This result is robust across different specifications of the model, the inclusion of most relevant control variables *(as we gained access to most of the data gathered by financial institutions in credit applications)* and across different definitions of reputation.

I. Two motivating examples

We focus on the characteristics of applicants that make the approbation of credit more likely. The average profile of an applicant is the result of a self-selection process. Individuals that think themselves more likely to obtain credit, and those that need credit the most, either as the projects that need financing re high quality, or as they have liquidity needs, are more interested in applying for a loan.

A. Self-selection and purpose of the loan

As a result of this self-selection process, the average applicant profile *(including their sociodemographic and financial profile as well as their availability of collateral and past credit*

reputation) differs considerably across credit sectors depending on the destination and intended use for the loan. Table I.A displays the available data statistics on credit applications for all credit sectors and a statistical test of difference of means between loans with a specific purpose *(mortgages, automobile, durable goods)* and those without one *(credit cards, working capital and SMEs)*.[1] Our data shows that on average, applicants to legally collateralized loans, such as automobile or mortgages, have characteristics that indicate less financial capacity. On average, applicants to specific purpose loans have a lower income than applicants to other loans. This is consistent with the lazy bank hypothesis associated with Manove, Padilla and Pagano (2001), and with the self-selection of riskier customers with collateral, associated with Rajan & Winton (1995). Applicants for loans with a specific purpose know that banks take for granted that the underlying asset will be used as collateral, and anticipate that they will have a larger probability of obtaining the loan even if some of their characteristics make them riskier customers. This could also explain the fact that a smaller proportion of applicants for loans with a specific purpose work in the formal economy (42% vs 68% of applicants for loans without a specific purpose).[2] Consistently with the previous fact, applicants for these loans have a shorter tenure in their current employment (6 years vs 7 for no-specific purpose loans) and on their current residence (16 vs 17 years); as well as less years of education (11 vs 12 years). Nonetheless, one fact stands out from these results, which is that a larger share of applicants for specific purpose loans are salaried workers as opposed to independent professionals (56% of salaried workers vs 45% for non-specific purpose loans). That is to say, applicants for specific purpose loans may know that even that the implicit collateral of the credit may ameliorate worst financial attributes, it is essential to have stable flows of income to warrant the repayment of the loan in the long run.[3]

Regarding credit reputation, on average the proportion of applicants with antecedents within Bureaus is almost equal, though it slightly leans towards applicants to loans without a special purpose. However, those loans with a specific purpose have a better reputation than applicants to loans without a defined one. Both of these facts are mainly explained by the mortgages sector, which is the one for which the smallest share of applicants have credit records as a result of the market's structure. Notice that, given the long-term nature of these loans, applicants for this sectors are the youngest on average and therefore are the ones that have less of a credit history (though in most cases the lack of a credit history in this sector is assessed as positive by financial institutions).[4] As it would be expected, the differences between applicants for specific purpose and non-specific purpose loans is natural and thus, also reflected in asset ownership. On average, house and automobile ownership is larger for applicants to loans without a specific purpose than to loans with one. Yet, this also reflects the nature of the costs of these goods, which are seldom purchased given their costs. In fact, most applicants need the loan in order to even be able to acquire it. It follows that by the nature of the loans, more applicants without a car or a house apply for a loan in order to acquire their first one. Finally, applicants for specific purpose loans also have better assessments on average by credit bureaus and by banks' internal models than those who apply to non-specific loans. An explanation for this difference in assessments is that, even though on average their financial capacity and stability variables indicate less repayment ability per se, the availability of an explicit or implicit collateral leads financial institutions in this sector to assess applications more favorably.

1 See more on the data gathering process on the next section.
2 The informal economy in Mexico is mainly associated with small non-tax paying businesses; but also with some independent professions that avoid filling taxes and usually manage cash for their transactions (e.g. dentists, physicians, architects). Yet, on average, the informal economy is intensive in self-employment and low-productivity businesses
3 Yet, this last fact is also a result of the structure of the mortgages sector in Mexico in which labor laws mandate contributions by patrons for salaried workers to special accounts, which are destined to be an in-advance payment for a mortgage loan; and as most of these loans are co-financed with national housing institutes that benefit salaried workers with a considerable tenure in their employment.
4 Regarding this sector, the self-selection bias for applying for a loan would probably explain the fact that less applicants have a credit history compared to other sectors, since there exists a belief in Mexico that credit bureaus only keep track of negative information.

B. Target population and the reliance on collateral and reputation

The average profile of applicants also differs between sectors that target low-income segments of the population *(working capital and durable goods consumption)* and those that target middle and high-income segments *(mortgages, automobile, credit cards and SMEs)*. Table I.B displays the statistical test of difference of means between both groups. As expected, the average characteristics of applicants behave according to the expected socio-demographic profile. Durable goods loans are usually provided by institutions to low-income customers. The typical structure of these loans consists of small but frequent *(bi-weekly or even weekly)* payments and high rates, which allow to mitigate the risks and make monitoring easier. Moreover, granting institutions are usually related parts to the outlets that sell the appliances *(for instance, Banco Azteca).* Working capital loans are also provided to low-income customers for the purchase of basic tools and appliances used for productive tasks, and have a similar payment and rate structure. Almost by definition, applicants to sectors that target higher-and middle income population have more implicit and explicit collateral (thus, making collateral less informative when it is more common). In fact, the lack of collateral for loans aimed at low-income population has led to monitoring and payment schemes such as the ones described above. Regarding past reputation, a lower share of applicants to sectors that aim at middle and higher income segments have a credit reputation. Yet, this is mainly explained by the mortgage sector (for the reasons above discussed). In fact, the assessments of the credit records for applicants of either segments are virtually the same; which reinforces the notion that in the mortgage sector, a non-existing previous history is assessed positively.

Also consistently with this profile, applicants to loans for low-income sectors are younger on average, have less years of education, are more likely to be married and a larger share of them are women. Moreover, a considerably larger share of applicants to low-income loans work in the informal economy, and most noticeably in retail commerce (which heavily leans towards the informal sector). This result stems from the risk-profile of institutions in this sector for which formality is not a necessary requirement for loan granting. It should also be noted that the verification rate is significantly higher in the low-income sectors. This is due to the screening processes of these institutions, which usually verify the place of residence to assess the informal income of the applicant and for future collection purposes. Even though this verification is costly, it is usually considered as a necessary expense in order to provide the loan given the unreliability of information over income flows to applicants from this income stratum, and the intensiveness of monitoring in their internal processes. Notice that the differences in these profiles are surely underestimated as informal sector's workers do not usually apply for loans in formal institutions.

According to the interviews performed with financial institutions' managers and the existing literature, the selection of the attributes that are weighted in the banks' internal assessments *(credit scoring models)* is based on the predictive power of each variable to estimate the probability of repayment. Many of the variables tend to be obvious *(i.e. those that reflect the stability and financial capacity of the applicant)*; however, other variables are not (*e.g. sociodemographic profile).* Regarding the latter, the literature on credit scoring *(e.g. Thomas et al., 2002 and Siddiqi., 2012)* indicates that any information that helps predict the credit risk of the applicant must be introduced to the model, regardless of whether it has a logical explanation; excluding only data that for legal reasons should not be incorporated in the process *(e.g. sex, race, religion and marital status)* for being potentially discriminatory. In the next section we confirm that not only does the income strata from the population matters to differentiate between the main determinants that affect credit-granting amongst sectors but also the sociodemographic profile and other unexpected applicants' attributes.

Table I.A: means of explanatory variables per purpose of the loan.

Variable	Aggregate	Specific Purpose (SP)				No Specific Purpose (NSP)				Test of means
	Total	**Total**	**Mort-gages**	**Auto-mobile**	**Durable goods**	**Total**	**Working Capital**	**Credit Cards**	**SME**	**NSP - SP**
Implicit collateral										
Owns a car (%)	**0.24**	**0.16**	0.34	0.10	0.13	**0.31**	0.16	0.30	0.92	**0.14**^{a}
Owns a home (%)	**0.52**	**0.44**	0.29	0.59	0.43	**0.58**	0.37	0.69	0.88	**0.14**^{a}
Explicit collateral										
Guarantee (%)	**0.20**	**0.41**	1.00	1.00	0.00	**0.02**	0.00	0.00	0.18	**-0.39**^{a}
Guarantor (%)			0.21	0.67					0.53	
LTV (%)			0.65	0.87						
Reputation										
Bureau records (%)	**0.66**	**0.65**	0.25	0.72	0.76	**0.67**	0.60	0.71	0.75	**0.02**^{b}
Positive bureau records (%)	**0.69**	**0.74**	0.73	0.73	0.75	**0.63**	0.70	0.56	0.79	**-0.11**^{a}
Financial										
Ln (income)	**9.24**	**9.07**	9.82	9.78	8.58	**9.39**	9.22	9.62	8.40	**0.31**^{a}
Labor										
Sector: wholesale commerce (%)	**0.09**	**0.03**	0.03	0.05	0.02	**0.14**	0.04	0.19	0.35	**0.12**^{a}
Sector: retail commerce (%)	**0.17**	**0.15**	0.02	0.18	**0.19**	0.19	0.33	0.09	0.11	**0.04**^{a}
Sector: other services (%)	**0.16**	**0.15**	0.18	0.05	0.17	**0.17**	0.23	0.14	0.07	**0.02**^{a}
Sector: industry (%)	**0.07**	**0.05**	0.02	0.09	0.05	**0.08**	0.07	0.05	0.24	**0.02**^{a}
Sector: other (%)	**0.13**	**0.18**	0.05	0.52	0.11	**0.09**	0.06	0.10	0.14	**-0.09**^{a}
Formal employment (%)	**0.56**	**0.42**	0.71	0.38	0.34	**0.68**	0.54	0.73	1.00	**0.26**^{a}
Salaried worker (%)	**0.50**	**0.56**	0.67	0.46	0.56	**0.45**	0.44	0.54	0.00	**-0.11**^{a}
Years in current employment/firm	**7**	**6**	7	5	6	**7**	7	7	10	**0.93**^{a}
Social										
Age	**39**	**39**	36	39	39	**39**	38	39	44	**0.29**^{c}
Years of education	**12**	**11**	14	11	10	**12**	10	13	14	**0.96**^{a}
Married (%)	**0.59**	**0.56**	0.47	0.69	0.54	**0.63**	0.71	0.55	0.68	**0.07**^{a}
Sex (%, female)	**0.47**	**0.43**	0.36	0.26	0.52	**0.51**	0.63	0.45	0.29	**0.07**^{a}
Demographics										
Residence: Mexico City (%)	**0.62**	**0.56**	0.11	0.58	0.70	**0.68**	0.49	0.93	0.14	**0.11**^{a}
Years in current residence	**17**	**16**	11	20	16	**17**	18	16	18	**1.0**^{a}
Bank's internal assessment										
Repayment capacity (%)	**0.67**	**0.76**	0.78	0.46	0.85	**0.61**	0.61	0.64	0.40	**-0.15**^{a}
Data verification (%)	**0.83**	**0.75**	1.00	0.32	0.82	**0.89**	0.89	0.91	0.82	**0.14**^{a}

Source: FUNDEF, data as of 2008.

Test of means difference: No specific purpose total - Specific purpose total.

^{c} $p < 0.10$, ^{b} $p < 0.05$, ^{a} $p < 0.01$.

Table I.B: means of explanatory variables per target population.

Variable	Aggregate	Low Income (LI)			Middle & High Income (MHI)					Test of means
	Total	**Total**	**Durable goods**	**Working capital**	**Total**	**Mortgages**	**Auto-mobile**	**Credit Cards**	**SME**	**MHI - LI**
Implicit collateral										
Owns a car (%)	**0.24**	**0.14**	0.13	0.16	**0.33**	0.34	0.10	0.30	0.92	**0.19**^{a}
Owns a home (%)	**0.52**	**0.41**	0.43	0.37	**0.62**	0.29	0.59	0.69	0.88	**0.22**^{a}
Explicit collateral										
Guarantee (%)	**0.20**				**0.39**	1.00	1.00		0.18	**0.39**^{a}
Guarantor (%)			0.21	0.67					0.53	
LTV (%)			0.65	0.87						
Reputation										
Bureau records (%)	**0.66**	**0.69**	0.76	0.60	**0.63**	0.25	0.72	0.71	0.75	**-0.05**^{a}
Positive bureau records (%)	**0.69**	**0.73**	0.75	0.70	**0.64**	0.73	0.73	0.56	0.79	-0.08^{a}
Financial										
Ln (income)	**9.24**	**8.86**	8.58	9.22	**9.62**	9.82	9.78	9.62	8.40	**0.76**^{a}
Labor										
Sector: wholesale commerce (%)	**0.09**	**0.03**	0.02	0.04	**0.15**	0.03	0.05	0.19	0.35	**0.13**^{a}
Sector: retail commerce (%)	**0.17**	**0.25**	0.19	0.33	**0.10**	0.02	0.18	0.09	0.11	**-0.15**^{a}
Sector: other services (%)	**0.16**	**0.20**	0.17	0.23	**0.12**	0.18	0.05	0.14	0.07	**-0.07**^{a}
Sector: industry (%)	**0.07**	**0.06**	0.05	0.07	**0.07**	0.02	0.09	0.05	0.24	**0.01**^{b}
Sector: other (%)	**0.13**	**0.09**	0.11	0.06	**0.18**	0.05	0.52	0.10	0.14	**0.09**^{a}
Formal employment (%)	**0.56**	**0.43**	0.34	0.54	**0.69**	0.71	0.38	0.73	1.00	**0.26**^{a}
Salaried worker (%)	**0.50**	**0.51**	0.56	0.44	**0.49**	0.67	0.46	0.54	0.00	**-0.02**^{c}
Years in current employment/firm	**7**	**6**	6	7	**7**	7	5	7	10	**0.31**^{b}
Social										
Age	**39**	**38**	39	38	**39**	36	39	39	44	**0.57**^{a}
Years of education	**12**	**10**	10	10	**13**	14	11	13	14	**2.48**^{a}
Married (%)	**0.59**	**0.61**	0.54	0.71	**0.57**	0.47	0.69	0.55	0.68	**-0.04**^{a}
Sex (%, female)	**0.47**	**0.57**	0.52	0.63	**0.38**	0.36	0.26	0.45	0.29	**-0.19**^{a}
Demographics										
Residence: Mexico City (%)	**0.62**	**0.61**	0.70	0.49	**0.64**	0.11	0.58	0.93	0.14	**0.03**^{a}
Years in current residence	**17**	**17**	16	18	**17**	12	21	16	18	**-0.91**^{a}
Bank's internal assessment										
Repayment capacity (%)	**0.67**	**0.75**	0.85	0.61	textbf0.61	0.78	0.46	0.64	0.40	**-0.14**^{a}
Data verification (%)	**0.83**	**0.85**	0.82	0.89	**0.81**	1.00	0.32	0.91	0.82	**-0.04**^{a}

Source: FUNDEF, data as of 2008.

Test of means difference: Middle & High income total - Low income total.

^{c} $p < 0.10$, ^{b} $p < 0.05$, ^{a} $p < 0.01$

III. Financing institutions and credit applicants' attributes

A. Credit-granting assessment process

Before we assess the impact of applicants' individual characteristics over credit-granting decisions, and particularly the role that reputation and collateral play in this matter, we briefly analyze financial institutions credit-granting processes, their business models and the applicants' characteristics of the sample. To better understand the mechanisms for credit allocation by financial institutions, we gained access to internal credit manuals describing their processes in detail to grant a loan *(from the marketing stage to its approval, its monitoring and enforcement measures if applicable)* and we conducted several interviews with managers from the institutions of the sample involved in the procedure to clarify certain qualms. We found that the decision processes are very similar to those documented in the literature, even though they differ in the number of steps and screening mechanisms depending on the final destiny of the loan as stated in López de Silanes & Zamarripa, 2018.

In summary, the approval of a loan involves five stages: first, the client completes a credit application *(personally or electronically);* second, the institution checks the internal history of the applicant within the institution and requests the credit history of the client in credit bureaus;[5] third, investigation procedures are conducted to verify the applicant's formal income *(e.g. tax declaration and financial statements)* and informal income *(e.g. socioeconomic study and patrimonial ownership),* and depending on the credit sector, the existence and value of collaterals *(both personal and material)* are verified; fourth, the creditor evaluates the applicant's risk using credit scoring models *(hereinafter, Parametric);* and fifth, the risk rating is reviewed and analyzed. Depending on the internal policies each financial institution, the loan is approved or rejected. This final stage is less formalized, leaving room for discretion.[6]

According to the interviews performed with financial institutions' managers and the existing literature, the selection of the attributes that are weighted in the banks' internal assessments *(credit scoring models)* is based on the predictive power of each variable to estimate the probability of repayment. Many of the variables tend to be obvious *(e.g. those that reflect the stability and financial capacity of the applicant);* however, other variables are not (*e.g. sociodemographic profile).* Regarding the latter, the literature on credit scoring *(e.g. Thomas et al., 2002 and Siddiqi., 2012)* indicates that any information that helps predict the credit risk of the applicant should be introduced in the model regardless of whether it has a logical explanation; excluding only data that for legal reasons should not be incorporated in the process *(e.g. sex, race, religion and marital status).* Later on, we will show that institutions do not comply with this rules always.

B. Data construction and homogenization

To assess the main determinants of the credit-granting decision we use a unique data set tailored for this specific purpose, created in collaboration with the Financial Studies Foundation *(FUNDEF),* of exclusively first-time loan applications to 15 large credit-granting

[5] The SICs, better known as Credit Bureaus, are public or private institutions, responsible for collecting, storing and distributing information voluntarily granted by their members. In general, these operate under the principle of "reciprocity"; that is, each institution can access only the information that is willing to contribute. The information they store varies significantly between countries *(given the characteristics of the market and their legislative framework),* the most important being the credit history of the borrowers, both individuals and legal entities. For example, the number of current and settled credits, their outstanding balance and the days of delay in all their loans, amongst other characteristics. Additionally, they provide private services, the most important being the generation of a generic score of the credit risk of the applicant, constructed with the historical information they have accumulated over time. This score is usually of high value for smaller institutions, as it is very expensive for them to generate their own models, or for institutions that introduce new credit products, since they lack of own historical information to generate an internal model.

[6] There are different approaches regarding the interpretation of the final score generated by credit scoring models: there are markets in which the interpretation is very strict *(e.g. credit cards)* in which if the final score is lower than the predetermined threshold, the loan is automatically rejected. The most common is that in which if the final score is very close to the threshold, the credit department makes a more detailed assessment of the application to issue a final opinion, either incorporating qualitative information of credit providers *(soft information),* requesting additional information or increasing the requirements to strengthen profiles with greater risks *(e.g. insurance and greater collaterals).* There are also policies, in which although the application exceeds the breaking point, the system throws alerts to perform a more detailed review, given the weaknesses in attributes characterized as high risk *(e.g. bad credit history).* Finally, some institutions establish different thresholds, such that, the greater the quality of the applicant, the greater the probability of obtaining a loan and the better the contractual clauses of the contract.

institutions operating in Mexico in 2008 *(11 banks and 4 SOFOLES)*, representative of six credit sectors.[7] The financial institutions included in the sample are both national and international entities, which at the time of collection of the sample, represented 70% of the total assets of the Mexican banking system and 24% of the total assets of SOFOLES. Based on the banking literature, the information disclosed in each institution credit manual, and the data requested in their loan applications' formats, each financial institution was asked to provide, in chronological order *(to avoid selection biases)*, full information of the first thousand credit applications of new customers received in July 2008 across all the country *(from the sociodemographic profile to the credit history and the bank's internal assessment)*.[8] Annex 1 presents examples of the front of the information requests and the answers of several financial institutions. Additionally, to assess the degree of veracity of the information provided, each institution was asked to supply hard copies of the first 50 applications reported which were randomly verified afterwards with the information contained within the databases *(over 84 % of the data was validated)*.[9]

Finally, all financial institutions were classified in 6 different credit sectors according to three criteria that characterize the main differences across their business models following the procedure stated in López de Silanes & Zamarripa, 2018: i) the final destiny of the loan, ii) the target customer base, and iii) the legal requirement of a collateral to back up the repayment of the loan. In total, we received information of 10,870 loan applications from 15 financial instiutions, of which 43.7% were approved.

As shown in Table II, the approval rate varies significantly amongst credit sectors; from a minimum of 23% for the SME sector to a maximum of 79% for the Mortgage sector. As expected, the highest rates were found in those sectors where it is easier to execute guarantees for credit recovery and their value does not decrease easily over time *(Mortgages)* or that have preference for risk diversification as the amount granted and maturity of the loan tend to be smaller *(the Durable goods and Working capital sectors)*. On the contrary, for less diversified sectors or where the costs of credit recovery tend to exceed expected losses, approval rates are significantly lower *(23%, 29% and 32%, for the SMEs, Credit Cards and Automobile sectors, respectively)*.

Table II. Description of credit sectors

Final destiny of the loan	Target customer base	Collateral requirement	N° Institutions	Observations	Approval rate
1. Mortgage Sector:					
Long-term loans for housing acquisition, construction, remodeling or expansion of the current house. As of July 2008, this sector represented around 16% of total commercial banking financing in Mexico.	Oriented to all socioeconomic strata. Although the amounts of loans granted tend to be very high, there are products that are adequate to the payment capacity of the lower-income population.	Explicit: the underlying asset of the loan. Implicit: assets of the borrower.	1	989	78.6%

[7] Unlike Commercial banks, SOFOLES were financial entities only authorized to carry out credit operations within a single sector *(e.g. mortgages)* that could not raise funds from the general public *(in the form of deposits or savings accounts)*. By July 2013, the legal figure of SOFOL disappeared.

[8] Main elements of the information request by client: (i) ID file; (ii) Type of customer *(new or with previous history within the bank)*; (iii) Purpose of the credit; (iv) Personal data of the client reported in the credit application and used for the decision to grant credit *(including age, gender, civil status, state of residence, number of economic dependents, ownership of a car or house, etc.)*; (v) Credit Bureau's results; (vi) Existence of collateral and estimated value *(if applicable)*. (vii) Internal evaluation of the bank, including data obtained from visits or interviews; (viii) Decision *(approved or rejected)*; (ix) For approved applications: loan characteristics *(amount, term, and interest rate)*; and (x) For rejected applications: justification to reject the loan.

[9] The information that could not be verified was associated, mainly, with problems related to the identification of the client in the databases *(derived from the principle of the financial institution to preserve the anonymity of the customer)*, the illegibility and incompleteness of the files provided, and in some cases, due to errors of omission or capture.

Table II. Description of credit sectors

Final destiny of the loan	Target customer base	Collateral requirement	N° Institutions	Observations	Approval rate
2. Automotive Sector					
Loans for the acquisition of new or used cars, for private or work usage (in some cases, the banks grant these loans to the automobile distribution companies which transfer them to their customers). As of July 2008, this sector represented around 3% of total commercial banking financing in Mexico.	Middle-low, middle and upper-class segment of the population.	Explicit: the underlying financed car. The pledged asset remains in the hands of the creditor, but its use is limited to the agreement signed between the parties. Implicit: assets of the borrower.	1	1,006	31.5%
3. **Consumption of Durable Goods Sector**					
Loans for the acquisition of durable consumer goods *(appliances, computers, among others).* In general, the institutions that belong to this sector offer the financed products in their own facilities (that is, they also act as appliances stores).	Aimed for the lowest income strata of the population.	Explicit: not required. Implicit: assets of the borrower and the underlying asset of the loan.	3	3,002	43.5%
4. **Working Capital Sector**					
Microcredits aimed for the acquisition of working capital and/or investments. Their maturity, amount and finance destiny of the loan are very variable. As of July 2008, this sector and the Consumption of Durable Goods Sector represented around 6% of total commercial banking financing in Mexico.	Oriented to micro entrepreneurs and producers from the lowest socioeconomic stratum that lack of verifiable financial flows, credit history, or collateral to support the repayment of the loan.	Explicit: not required. Implicit: assets of the borrower.	3	2,305	58.8%
5. **Credit cards sector**					
Loans for the acquisition of goods and services in the nation and abroad. They are characterized by the use of a plastic as a means of payment and by having a credit limit that is renewed when the balance used is settled *(revolving credits).* As of July 2008, this sector represented around 14% of total banking financing in Mexico.	Aimed at the middle and upper-class segment of the population.	Explicit: not required. Implicit: assets of the borrower.	6	3,000	29.0%
6. **SMEs sector**					
Loans granted to small- and medium-sized firms, for investment and/or working capital. These can be revolving or fixed credits. As of July 2008, this sector represented around 15% of total banking financing in Mexico.	Aimed at the middle and upper-class segment of the population.	Secured with movable and immovable assets of the firm or through guarantees granted by development banks.	2	568	22.7%
Total			15	10,870	43.7%

When comparing the information reported by all financial institutions, we found great heterogeneity in the number and type of variables across entities *(to a lesser degree, amongst those institutions pertaining to the same credit sector).* To perform a comparative assessment, we carried out a process of simplification and homogenization of the universe of explanatory variables based on two main criteria following the related literature: first, maintain those variables with greater explanatory power of the decision to approve a loan and poorly correlated between themselves; and second, keep the greatest number of variables in common between databases, both at the aggregate level *(for all institutions in the sample)* and by credit sector. Additionally, definitions from different sources were used to originate a set of new, independent and homogeneous variables that incorporate the information contained in existing variables, but reported heterogeneously between banks.

Finally, the remaining explanatory variables and controls were grouped into eight categories for all credit sectors according to their intrinsic nature: (i) implicit collateral *(asset ownership);* (ii) explicit collateral *(legal guarantees and guarantors)*; (iii) credit reputation; (iv) financial capacity; (v) labor condition; (vi) sociodemographic profile; (vii) demographics and (viii) bank's internal assessment. Likewise, we conducted a principal component analysis for each group of variables to reduce the size of explanatory variables and increase comparability between credit sectors in robustness tests, as well as to simplify our assessment and main findings. See Table III. To our knowledge, there is no other study with the completeness and homogeneity of this data, regarding the information that financial institutions gather to determine the approval of a loan, and in particular, for so many different credit sectors.

Table III. Definitions of the credit granting decision's explanatory variables

Variable	Description
Decision	Dummy variable that equals 1 if the application was accepted, 0 otherwise.
1. Implicit Collateral	
Automobile	Dummy that equals 1 if the applicant owns a car; 0 otherwise.
Type of housing	Ownership status of the house in which the applicant lives: 1 (owned by the applicant's family), 2 (owned by the applicant), 3 (rented), y 4 (applicant is a guest or the house is mortgaged).
2. Explicit collateral	
Guarantee	Dummy that equals 1 if the applicant has a material guarantee to legally back the repayment of the loan; 0 otherwise.
Guarantor	Dummy that equals 1 if the applicant has a guarantor or co-creditor who can legally back the repayment of the loan; 0 otherwise. Although these legal figures are in essence different, they all represent a third party that will back the credit's re-payment in case the borrower defaults. Co-creditor: person(s) who is obliged, together with the creditor, to re-pay the total amount of the loan (the total payment can be demanded either from the creditor or from any of the co-creditors). Guarantor: third party that guarantees the payment of a credit in case the original creditor defaults; in this figure, the creditor is first required to re-pay by legal means and subsequently, re-payment is required to the guarantor.
Value of collateral	Value of the real or personal property that will be financed, and that is legally used as collateral to back the payment of the financing (real 2008 pesos).
Loan-To-Value (LTV)	Requested loan/value of collateral. The greater this ratio, the greater the fraction of the total value of the underlying asset that is financed by the institution. In present value, this ratio increases with the depreciation of the asset over time.
Collateral	Dummy variable that equals 1 in the applicant has explicit or implicit collateral. The definition of implicit or explicit collateral depends on the credit sector: i) **Consumption of Durable Goods, Credit Cards and Working Capital:** 1 if the applicant owns either a residence or an automobile, 0 otherwise. ii) **Mortgages:** 1 if either the applicant has a personal guarantor or if the loan to value ratio is less than 75%, 0 otherwise. iii) **Automobile:** 1 if either the applicant has a personal guarantor or if the loan to value ratio is less than 90%, 0 otherwise. iv) **SMEs:** 1 if either the loan is backed by a legal guarantee or guarantor, 0 otherwise.
3. Credit reputation	
Bureau hit	Dummy that equals 1 if the applicant has a background in any of the credit bureaus or SICs when consulted (hit); 0 otherwise. An individual may not have a background in these entities for 4 reasons: i) there is no record of the client consulted in that specific SIC; ii) a financial institution has not reported the client's file for its integration into the database (this happens when the client obtained a loan shortly before the consultation); iii) the credits do not appear in the credit report because they are in the database of rejected records; and iv) the client's name or address was captured with errors and thus there is no match.
Positive bureau	Dummy that equals 1 if the financial institution considers the credit history reported by the credit bureaus or SICs as acceptable; 0 otherwise. It is important to note that various financial institutions reward the absence of background (no hit) in the credit bureaus and this is one of the criteria used to qualify the client's credit history as acceptable.
Good Reputation	Dummy variable that equals 1 if Bureau hit=1 and Positive bureau =1; 0 otherwise.

Table III. Definitions of the credit granting decision's explanatory variables

Variable	Description
4. Financial Capacity	
3.1 Households	
Income	Monthly reported income (real, 2008 pesos). The income for SMEs applicants is approximated by net utility in hundreds of pesos.
3.2 Firms	
N° of workers	Number of full-time employees working in the company at the time the loan was requested.
Assets	Total assets in the last balance sheet (hundreds of real 2008 pesos).
Liabilities	Total liabilities in the last balance sheet (hundreds of real 2008 pesos).
Equity	Total equity in the last balance sheet (hundreds of real 2008 pesos).
Sales	Total sales in the last financial statement (hundreds of real 2008 pesos).
Net utility	Total net utility (profits) in the last financial statement (hundreds of real 2008 pesos).
Leverage	Total liabilities/total assets. This ratio indicates the fraction of total financing which comes from third parties. The optimal value of this financial ratio depends on each firm's strategy. On the one hand, the cost of financing through debt is less than the cost of issuing equity; moreover, debt financing also generates tax benefits since the cost of interest is deductible. On the other hand, more liabilities increase the company's risk, since these require a fixed interest payment (if the business does not generate enough cash to pay its liabilities, this can lead to financial distress and even bankruptcy).
Profits' margin	Liquidity, efficiency and profitability ratio (Net profits/sales). This ratio indicates the fraction of the total sales net of operating expenses, taxes and interest payments. The higher this indicator is, the more profitable, liquid, and solvent is the firm.
Equity multiplier	Solvency ratio (Assets/Equity). This ratio illustrates the fraction of total assets which are owned by the shareholders. The optimal value depends on the firm's strategy.
ROA	Efficiency and profitability indicator (Net profits/Assets). This ratio measures the firm's ability to transform its assets' productivity into profits. It is a useful measure to compare the performance across firms within an industry (the higher a firm's ROA is when compared the industry's average, the more efficient are the firm's operations when compared to its competitors).
ROE	Efficiency, profitability and risk ratio (Net profits/Equity). This ratio is the rate of return that the firm's owners get for each peso invested in the firm. In general, the greater the risk of the company's activities, the greater the value of this financial ratio.
Asset turnover	Efficiency and profitability ratio (Sales/Assets). This ratio indicates how much of sales are generated for each peso invested in assets. A high indicator indicates a more productive use of assets.
SMEs financial principal component	First component of a Principal Components Analysis of the common variance of the following variables: No. of workers, Leverage, Profits margin, Equity multiplier, ROA, ROE and Asset turnover.
5. Labor condition	
Economic activity	Industry of the applicant's employment, according to the North American Industrial Classification System (NAICS, 2013). Values: 1 (Wholesale Trade), 2 (Retail Trade), 3 (Professional, Scientific, and Technical Services including Management of Companies and Enterprises), 4 (Financial, Insurance, Real Estate, Rental, Leasing, Administrative and Support and Waste Management and Remediation, Educational, Health Care and Social Assistance services, Arts, Entertainment, and Recreation, Accommodation and Food Services, and Other Services except Public Administration), 5 (Mining, Quarrying, and Oil and Gas Extraction, Utilities, Construction, and Manufacturing), and 6 (Agriculture, Forestry, Fishing and Hunting, Transportation and Warehousing, Information, and Public Administration).
Years employed	Number of years in the current employment.
Formal economy	Dummy variable that equals 1 if the applicant works in the formal economy and 0 otherwise. Informal economy considers persons or activities that are not constituted as a firm and that do not have proper accounting standards (includes all applicants who did not present income declarations or tax fillings).
Salaried	Dummy that equals 1 if the applicant reports being a salaried employee (receives a timed and constant income) and 0 if the applicant reports being and independent professional (they do not have a fixed and predictable salary).
Labor principal component	First component of a Principal Components Analysis of the common variance of the following variables: Years employed, Formal economy, and Salaried.
6. Sociodemographic profile	
Age	Age of the applicant (years in operation in case of firms).
Gender	Self-reported, legal gender of the applicant. Dummy variable that equals 1 for female and 0 for male. For the case of SMEs this refers to the owners of SMEs that are the main applicants of the loan.
Civil Status	Marital status of the applicant: 1 (married), 2 (single), 3 (free union), and 4 (widowed or divorced). For the case of SMEs this refers to the owners of SMEs that are the main applicants of the loan.
School years	Number of years in school completed by applicants. The values are normalized through Mexico's public educational system: 6 (Elementary school), 9 (Middle school), 11 (Technical school), 12 (High school), 17 (Bachelor's degree), 19 (Master's degree), y 22 (Further graduate school). For the case of SMEs this refers to the owners of SMEs that are the main applicants of the loan.
Economic dependents	Number of persons that rely for subsistence on the credit applicant (e.g. spouse, children, parents, siblings, etc.). For the case of SMEs this refers to the owners of SMEs that are the main applicants of the loan.
Social principal component	First component of a Principal Components Analysis of the common variance of the following societal variables: Age, Gender, Civil status, school years and economic dependents.
7. Demographics	
Years in residence	Number of years living in the current residence.
Place of Residence	Dummy variable that equals 1 if the applicant resides in Mexico City and 0 otherwise.
Demographic principal component	First component of a Principal Components Analysis of the common variance of the following variables: Years in residence and Place of Residence.

Table III. Definitions of the credit granting decision's explanatory variables

8. Bank's Internal assessment
Dummy that equals 1 if the financial institution's score system (internal assessment) considers the applicant's repayment capacity as acceptable; 0 otherwise.
Dummy that equals 1 if the financial institution validated some or all of the information provided by the applicant (e.g. personal references, income level, employment and housing, among others) through home visits or calls; 0 otherwise.
First component of a Principal Components Analysis of the common variance of the following variables: repayment capacity and data verification.

C. Applicants' profile:

Finally, Table IV shows summary statistics of all explanatory variables *(means)* at the aggregate level and by credit sector.[10] In summary, the average age is between 36 and 44 years old; the average level of schooling is higher than basic education *(more than 9 years);* around 60% of applicants are married; the distribution by gender is representative at the national level *(47% women and 53% men for total applications);*[11] the average number of economic dependents is around two; and more than 60% of the total number of applicants reside in Mexico City.

Around 50% of the applicants are salaried workers; the average time in the current employment is around 5 years; and with exception of two sectors, more than 50% of the applicants work in the formal sector of the economy. With respect to financial capacity, we reported the variable's median as most of them showed an asymmetric distribution. Table IV shows that the median income varies significantly amongst credit sectors; directly correlated with the socioeconomic level of their targeted population. Regarding financial characteristics of the firms within the SMEs sector, the annual sales' median amounts to $ 2.5 million pesos and the number of workers to 9. When analyzing financial ratios, it can be observed that leverage is around 16% of total assets; profit margins around 20% and the levels of asset rotation, ROA, and ROE seem quite efficient *(59%, 11%, and 15%, respectively).*

With respect to asset ownership, the rate of individuals with their own car is significantly lower than those with their own house *(24% vs 52% in the aggregate, respectively);* consistent with investment-needs assessments. Finally, when comparing approved applications with the total, these rates increase the most for not legally collateralized sectors. These results make sense if it is assumed that institutions use asset ownership as a proxy to assess borrower's financial capacity or as implicit collateral to support the repayment of the loan.

When analyzing collateral statistics, it can be observed that only 24% of all applications have a legal guarantee to back up the payment of the credit. Regarding personal guarantees, the average proportion is 21% and 67% for the Mortgage and Automobile sectors, respectively. This, as the maturity and the value of the underlying assets for mortgages tend to be significantly higher than those of auto loans. Therefore, finding a personal guarantee willing to support this financial burden may be harder. Finally, the average LTV ratio in the Automobile sector is 87% and in the Mortgage sector is 65%; and these rates are lower for approved applications *(in -1 p.p and -4 p.p., respectively).*

Table III shows that 66% of all applicants have prior records within a Credit Bureau', and more than 50% received an acceptable credit rating for all credit sectors.[12] Finally, with respect to bank's internal assessment, it can be observed that the verification rate is 83% for the total applications, going from a minimum of 32% for the Automobile sector to a maximum of 100% for the Mortgage sector. With respect to the parametric, 67% of the total applications were rated as satisfactory, passing from a minimum of 40% for the SMEs sector to 84% for the Durable Goods sector. When comparing total applications with those approved, the aggregate rate increases by 22 percentage points, as expected.

[10] Summary statistics across all credit sectors for all available data and correlations are provided in Annex 5.
[11] Distribution by gender in Mexico: 49% men and 51% women. Source: INEGI. Population and Housing Census 2010.
[12] The importance of credit history for the approval of a loan is in fact not entirely clear. According to the credit manuals provided by the institutions, some entities reward its absence and it is one of the criteria used to qualify the client's credit history as acceptable. Probably, because this is an indicator of the lack of additional financial obligations with other creditors or because it represents a business opportunity in the future when building a banking relationship with the client.

To compare the data of all loan applications and those approved, the table reports whether mean differences are statistically different. The comparisons permit two particular observations: first, at least one variable's value within each group is statistically different between total applications and those approved. In fact, with exception to married status, all explanatory variables' values are statistically significant at the aggregate level. Second, and more importantly for our analysis, the percentage of applicants with good reputation and collateral (including asset ownership) seem to be higher for approved loans, with the difference being statistically significant for all credit sectors.

Table IV. Descriptive statistics for credit-granting's explanatory variables

Mean total applications (Mean approved applications)

This table shows the mean of the explanatory variables of the credit granting decision between all the financial institutions in the sample; for both the aggregate level and by credit sector. The data was obtained from the first thousand loan applications of new clients (without credit history within the institution) gathered in July 2008 in Mexico. There are 15 financial institutions in the sample. To ensure comparability, we only include common information between al financial institutions in the sample. The table also reports the significance levels of difference-in-means *t*-tests between total loan applications and those approved. "N/A" indicates that the data are not available. Detailed definitions of each variable are provided in the Annex 4. ***indicates significance at 1%, **indicates significance at 5%, and *indicates significance at 10%.

Credit Sector	Aggregate		Mortgages		Automobile		Consumption of Durable Goods		Working Capital		Credit Cards		SMEs	
	Total	Approved	Total	Approved	Total	Approved	Total	Approved	Total	Approved	Total	Approved	Total	Approved
Decision (approved)	44%	N/A	79%	N/A	32%	N/A	43%	N/A	59%	N/A	29%	N/A	23%	N/A
1. Sociodemographic														
Age	39	39***	36	36***	39	41***	39	41***	38	39***	39	39	44	45
Economic dependents	N/A	N/A	1	1	1	1***	2	2	2	2***	1	1***	N/A	N/A
Years of education	12	12***	14	14***	11	11	10	11***	10	10	13	14***	14	14
Gender	47%	55%***	34%	34%	26%	29%	52%	52%	63%	82%***	45%	49%***	29%	32%
Civil status: married (d)	59%	60%	47%	47%	69%	75%**	54%	62%***	71%	67%***	55%	49%***	68%	70%
Civil status: single (d)	28%	26%***	43%	43%	24%	20%*	26%	21%***	14%	15%	37%	40%*	25%	25%
Civil status: free union (d)	8%	9%*	7%	7%	4%	3%	15%	11%***	8%	11%***	4%	5%***	4%	4%
Civil status: other (d)	4%	5%***	3%	3%	4%	3%	5%	5%	7%	8%**	4%	5%***	2%	2%
Mexico City (d)	62%	48%***	11%	10%***	58%	60%	70%	57%***	49%	31%***	93%	98%***	14%	13%*
2. Labor condition'														
Formal economy (d)	56%	64%***	71%	74%***	38%	57%***	34%	43%***	54%	63%***	73%	86%***	100%	100%
Salaried (d)	50%	44%***	67%	73%***	46%	28%***	56%	50%***	44%	26%***	54%	51%**	0%	0%
Years employed	7	8***	7	7***	5	6***	6	7***	7	8***	7	86%***	10	12*
3. Financial capacity''														
Income (thousands pesos)'''	$10	$13***	$19	$21***	$16	$18***	$5	$5***	$8	$21***	$14	$20***	$440	$672*
4. Asset ownership														
Car (d)	24%	29%***	34%	38%***	10%	12%*	13%	12%	16%	25%***	30%	47%***	92%	93%
Housing: family (d)	37%	34%***	43%	44%	34%	31%*	46%	38%***	50%	37%***	23%	19%***	7%	5%
Housing: own (d)	52%	57%***	29%	29%	59%	64%**	43%	54%***	37%	57%***	69%	77%***	88%	90%
Housing: rent (d)	11%	9%***	27%	27%	7%	5%	11%	7%***	13%	6%***	8%	4%***	5%	5%
Housing: other (d)	1%	1%	6%	6%	1%	1%	0%	0%	1%	0%***	1%	1%	3%	2%
Years in residence	17	18***	11	11*	20	21	16	18***	18	19***	16	18***	18	24***
5. Collateral														
Guarantee (d)	20%	24%***	100%	100%	100%	100%	0%	0%	0%	0%	0%	0%	18%	54%***
Collateral value (thousands)	N/A	N/A	$487	$481*	$114	$101**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Guarantor (d)	N/A	N/A	21%	25%***	67%	74%***	N/A	N/A	N/A	N/A	N/A	N/A	53%	61%**
Loan-to-value (LTV)	N/A	N/A	65%	64%***	87%	83%***	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6. Credit reputation														
Bureau: hit (d)	66%	64%***	25%	30%***	72%	63%***	76%	77%**	60%	52%***	71%	91%***	75%	95%***
Bureau: positive (d)	69%	86%***	73%	79%***	73%	91%***	75%	91%***	70%	83%***	56%	87%***	79%	93%***
7. Internal bank's assessment														
Repayment capacity (d)	67%	89%***	78%	86%***	46%	62%***	85%	98%***	61%	82%***	64%	99%***	40%	81%***
Data verification (d)	83%	99%***	100%	100%	32%	100%	82%	97%***	89%	100%***	91%	100%***	82%	95%***

(') The economic activity of the applicant is omitted. ('') Financial variables for moral persons are omitted *(see Annex for more details).*

(''') The median is reported instead of the average. For the aggregate, the net profit of MIPYMES is used in hundreds of pesos. N/A: Not applicable.

IV. The role of collateral, reputation and other screening factors over the credit granting decision

To assess the effect of collateral and reputation on the credit-granting decisions we use a Probit model. This model has been consistently used in the literature *(Grablowsky and Talley, 1981, Thomas et al., 2002, Kaplan and Urwitz, 1979)*, as it accommodates to the data structure and since it is the model that underlies a vast majority of credit scoring technologies.[13] Table V presents Probit regressions' average marginal effects of the control and explanatory variables on the probability of the loan application of being approved, both at the aggregate level *(including all common variables between all financial institutions as controls)* and by credit sector *(including variables that are specific to each sector and which increase the explanatory power of each particular model).* Panel A showcases explanatory power of all control variables (social, demographic, financial and labor variables) over the credit granting decision, except for the bank's internal assessment. We include fixed effects by credit sector for the aggregate model to control for their intrinsic differences, and for all models we included fixed effects of the economic sector of credit applicants. At the aggregate level, these controls account for a Pseudo R-squared of 20%; and for each credit sector, their explanatory power ranges from 11% in the durable goods sector to 41% in the SMEs sector.

Because of its nature, collateral has been the most used mechanism within the banking literature to reduce information asymmetries in credit markets *(e.g. Bester 1985, 1987, 1994; Thakor, 1991).* Therefore, its impact on access to financing has been extensively studied. In fact, much of this literature places collateral as a substitute of other screening and monitoring mechanisms, as it modifies the incentives of creditors *(by generating lax processes)* and those of borrowers *(by increasing the expected loss of default)*; and by reducing the costs of granting credit *(e.g. Manove, 2001; Rajan 1995; and Bester 1985).* Panel B includes all controls in Panel A and adds the implicit and explicit collateral measures, to obtain a partial analysis of the effects of collateral. At the aggregate level, implicit collateral *(i.e. owning a car or a home)* increases the probability of obtaining a loan by 15% and having an explicit collateral (i.e. guarantee) almost doubles this effect on the probability (29%). Notice that these effects differ widely across credit sectors. Implicit collateral is strongly significant for three of the six sectors studied *(automobile, working capital and credit cards)* with the largest effect on the working capital sector *(it increases by 32% the probability of obtaining a loan),* which is the one in which applicants have the least asset ownership from the ones that we study. It is important to remember that on the one hand, institutions might directly link ownership with financial capacity. On the other hand, being the owner of a home or a car at the moment of the credit application reduces the likelihood that the borrower will acquire additional financial obligations in the future *(e.g. a mortgage or automotive credit)* that could in turn deteriorate her payment capacity. Additionally, these assets serve as a last resource for funding re-payment. With respect to explicit collaterals, the existence of a guarantor has a significant positive and quantitatively large marginal effect on credit granting across all the sectors with this explanatory variable *(SMEs, automobile and mortgage)*. Also, as it would be expected for the legally collateralized sectors, a higher loan to value ratio has a negative and significant marginal effect on credit granting, which is larger in magnitude for mortgage loans *(consistent, as mortgage loans are considerably larger, and thus, the LTV for each individual credit becomes more relevant for financial institutions)*. Using Panel A as a baseline to compare the increase in explanatory power, collateral by itself increases the goodness-of-fit for the Probit model, both at the aggregate level and across all credit sectors.

[13] For example, Jacobson and Roszbach (2003) use a Probit model to estimate which attributes of the credit applicant and the borrower predict the rates of approval and credit default, respectively. Cohen-Cole et al., (2009), Behr et al., (2011), and Asiedu, Freeman et al., (2012) use a Probit to estimate the impact banking relationships over default, of race, ethnicity and gender, and on the probability of obtaining a loan; respectively. On the other hand, Demiroglu et al., (2012) evaluate the impact of banking standards on credit lines; Ono and Uesugi (2009) estimate the impact of the characteristics of the borrowers on the probability of using a personal collateral or guarantee to obtain financing; amongst other studies.

Table V. Credit-granting determinants by credit sector

The table presents the average marginal effects of Probit regressions with the decision to approve a loan as a dependent variable (1 = approved, 0 = rejected). Aggregate regression includes all common variables between all credit sectors. **(d)** Reflects dummy variables constructed with respect to a reference value for the categorical variable.

	(1) Aggregate	(2) Mortgages	(3) Automobile	(4) Durable Goods	(5) Working capital	(6) Credit cards	(7) SMEs
Panel A: controls							
Observations	9991	955	916	2819	2238	2779	273
Pseudo R^2	0.197	0.176	0.246	0.105	0.387	0.218	0.414
Panel B: collateral							
Owns a car or home (d)	0.15^a	0.03	0.11^a	0.04^c	0.32^a	0.14^a	-0.07
	[11.61]	[1.16]	[2.99]	[1.65]	[13.74]	[8.00]	[-0.26]
Guarantee (d)	0.29^a						0.06
	[4.42]						[0.59]
Guarantor (d)		0.14^a	0.11^a				0.70^a
		[6.26]	[3.28]				[9.76]
LTV		-0.20^a	-0.58^a				
		[-2.76]	[-4.88]				
Observations	9884	947	851	2776	2238	2779	273
Pseudo R^2	0.21	0.21	0.31	0.11	0.42	0.23	0.57
Panel C: reputation							
Bureau records (d)	0.02	0.14^a	0.14^a	-0.06^b	-0.37^a	0.15^a	0.46^a
	[1.20]	[5.44]	[3.47]	[-2.30]	[-19.30]	[8.05]	[7.38]
Positive bureau records (d)	0.34^a	0.14^a	0.16^a	0.37^a	0.49^a	0.30^a	0.42^a
	[30.98]	[4.36]	[3.79]	[18.39]	[15.80]	[18.47]	[7.58]
Observations	9682	955	916	2734	2115	2704	248
Pseudo R^2	0.26	0.23	0.26	0.18	0.46	0.36	0.56
Panel D: collateral and reputation							
Owns a car or home (d)	0.13^a	0.00	0.09^b	0.03	0.22^a	0.10^a	0.13
	[9.69]	[0.10]	[2.45]	[1.32]	[10.08]	[5.55]	[0.82]
Guarantee (d)	0.30^a						0.32^a
	[4.65]						[2.76]
Guarantor (d)		0.10^a	0.11^a				0.71^a
		[3.48]	[3.34]				[7.38]
LTV		-0.17^b	-0.61^a				
		[-2.54]	[-5.11]				
Bureau records (d)	-0.00	0.11^a	0.18^a	-0.07^b	-0.33^a	0.13^a	0.42^a
	[-0.06]	[3.54]	[4.41]	[-2.54]	[-17.72]	[7.18]	[6.74]
Positive bureau records (d)	0.34^a	0.14^a	0.21^a	0.37^a	0.47^a	0.30^a	0.40^a
	[30.10]	[4.35]	[4.92]	[17.88]	[15.13]	[18.24]	[6.45]
Observations	9577	947	851	2693	2115	2704	248
Pseudo R^2	0.27	0.25	0.33	0.18	0.49	0.37	0.69
Financial	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Labor	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Social	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demographic	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank's internal assessment	No	No	No	No	No	No	No
Fixed effects by credit sector	Yes						
Fixed effects by economic activity	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: FUNDEF, data as of 2008.

(d) for discrete change of dummy variable from 0 to 1

^{c} $p < 0.10$, ^{b} $p < 0.05$, ^{a} $p < 0.01$

With respect to reputation, the existing literature shows that the exchange of information amongst creditors, on the credit quality of their clients, has proved to be a natural and essential tool to mitigate the problems that arise from imperfect information by improving resource allocation and even, by increasing competition in credit markets *(Vives, 1990).* The benefits of information-sharing are magnified the greater the heterogeneity among borrowers, the lower the concentration of the credit market and the greater the development of technology to process the existing information *(Pagano, 1993).* The traditional theories indicate that those individuals with no credit history tend to face greater barriers to access credit; and for those with bad reputation, it is very difficult and even impossible to access new forms of financing (Blanchflower, 2003; Musto, 2004; Cole, 2004; Elul, 2015). The results

of some sectors contradict the first hypothesis, at least when it comes to new clients. In Panel C we add the reputation variables to the controls in Panel A. While having a positive reputation matters and has a large positive effect over the credit granting probability across all sectors *(although, lower in magnitude for legally collateralized sectors such as mortgages and auto loans),* the results on the effect of having a record on credit bureaus are mixed. On one hand and regarding the existence of antecedents within credit bureaus, a positive effect over the credit granting probability is observed at sectors targeting higher-income segments of the population *(automobile, credit cards, mortgages and SMEs)*; and the converse effect is observed for sectors that target lower-income segments *(working capital and consumption of durable goods).* This result is consistent with the previously developed intuition that the latter sectors profit from targeting traditionally unbanked segments *(usually without credit history)*. Additionally, this might indicate that banks are optimistic about the lack of antecedents for new customers, probably as they do not have additional financial burdens -or even, to face future competition *(they would be the first ones to attract them as clients to generate banking-relationships that could be highly profitable in the future).* On the other hand, and as expected, a positive assessment of the record with credit bureaus increases the probability of the loan being approved between 14% *(for mortgages)* to 42% *(for SMEs).*

Panel D presents a comparison of the marginal effects of collateral and reputation variables in a multivariate setting. The effects of asset ownership remain consistently significant at the aggregate level and for the same three sectors, though their magnitudes decrease. Material guarantees remain significant in the aggregate and become significant for SMEs loans when controlling for reputation. This might be stemming from conditions that are specific to Mexico's SMEs sector. Given that these firms are usually informal businesses without sound accounting practices, the financial information presented by SMEs is of poor quality and in general, is not very trustworthy by financial institutions. The marginal effect of positive assessments of the credit record remains large and significant both at the aggregate and by credit sector. In fact, except for the LTV ratio in legally collateralized sectors and guarantors for SMEs, it has an effect of a larger magnitude than any other of the collateral and reputation variables. A likely explanation for this result is that, as financial information lacks trustworthiness, having the loan legally guaranteed by the main owner of the business effectively signals the intent of repayment and acts as an indicator for the bank of the quality of the project. That is, a guarantors adds up to the probability of access to credit in this sector not only as it reduces the expected losses, but also as a signal of creditworthiness by the entrepreneurs *(consistent with the findings of Dower and Potamites, 2010, for material guarantees).*

Finally, Annex III shows the desegregate results by type of variable at the aggregate level and by credit sector. The first notable result is that all categories of variables explain *(at least to some extent)* the credit-granting decision for all credit sectors. That is, at least for new loan applicants, financial institutions from all sectors use all the available information to determine their credit-granting decisions regardless of their particular business models or their technologies used to assess them. Nevertheless, while some similarities were found within the main factors that affect credit granting across sectors, a wide variation *(in terms of the magnitude, direction and significance)* was observed. When assessing the results by type of explanatory variables, with respect to sociodemographic variables and at the aggregate level, it stands out that the age, gender and state of residence of the applicant have a significant effect. According to these results, women are on average between 4% and 9% more likely to obtain a loan as stated by Jacobson (2003) and Behr (2011); contrary to Cole (2004) and Blanchflower (2003), who found no evidence, and by law itself, which states that gender should not be part of credit-granting processes. In the case of Mexico this result is foreseeable, given the cultural conditions that still prevail. Household's greatest share of financial obligations tend to fall on men, so controlling for other factors *(e.g. income),* women possess greater financial capacity for repayment. Moreover, some literature shows that women tend to be more responsible and less profligate *(one reason behind why most household´s conditional cash-transfers around the world are granted to them)* which may be incorporated within financial institutions' lending standards.

The age of the applicant is negatively correlated with the probability of obtaining a loan; a 10-year increase in age results in a 3%-4% reduction in the probability of approval. These

results once again support Jacobson (2003) conclusions, and do not support the evidence presented by Behr (2011) and Cole (2004), who present results in the opposite direction. The negative and significant age coefficient indicates that banks might prefer catering to younger customers since this might help them foster banking-relationships in the future; it could also be the case that older applicants tend to possess larger financial burdens, and thus, are less attractive to financial institutions. An interesting result is that Mexico City residents are between 12% and 28% less likely to obtain a loan, than those applicants who reside in other states of the country; Jacobson (2003) also finds that people living in metropolitan areas are less likely to be granted a loan. There are various factors that might explain this result: since most banks' parent companies are located in Mexico City they might have stringer screening mechanisms; additionally, the cost of living tends to be higher and caeteris paribus, average financial capacity is thus smaller. With regard to the school-years of applicants, the results show the usual sign. For example, applicants with more than 9 years of education *(middle school graduates)* have more than 20% chance of acquiring a loan, and the coefficient is slightly greater for individuals with 16 or more years of education (*college graduates*). Regarding marital status, and in line with Jacobson (2003) results, we found no consistent evidence that this variable affects the outcome of the credit-granting decision; on the contrary, Fisher et al (2004) found that married applicants are significantly more likely to obtain a loan. By sector, the applicant's age has a negative impact on the probability of obtaining credit over the automobile, mortgage and credit card sectors, and a positive effect on the durable goods consumption sector. A possible interpretation is that in sectors that target medium and high-income population, when controlling for financial capacity variables and reputation, a younger applicant may be more attractive given her potential to generate a new banking relationship and given her expected income curve over time; yet, on segments such as the durable goods consumption sector *(which target low-income population and which do not have a collateral to guarantee the loan repayment),* age serves the purpose of signaling more maturity and repayment capacity. A similar explanation may be applicable to the mortgage, automobile and working capital sector; in which gender (i.e. identifying as a woman) has a significant effect over the probability of getting credit. In the first two sectors (targeted to medium and high-income population) there is a self-selection bias in which female applicants tend to possess a higher financial capacity of repayment (given the cultural issues that still prevail in Mexico). For the Working capital sector, the result may be biased as the banks' targeted population of this sector are women. With respect to years of education, an analogous interpretation can be inferred as this variable is only significant for those sectors where education levels tend to be lower and/or lack of collateral (i.e. working capital, durable goods consumption and credit cards). For instance, unlike those sectors in which the variable is not significant, for these sectors average schooling could provide information about the degree of financial stability and ability to repay the loans in case of negative income shocks; particularly, when there is no legal asset or collateral that warrants the repayment of the loan (e.g. is more likely for a higher educated individual to find a job in case of dismissal).

With respect to labor variables, some common trends are found. First, one of the results that stands out the most at the aggregate level, is that salaried workers *(those with a steady source of income)* are significantly less likely to obtain a loan *(between 8% and 16%)* than independent workers for all specifications. A possible explanation for this counterintuitive result is found in the prevalent idiosyncratic practices in Mexico. Independent workers *(e.g. doctors and lawyers)* tend to report less income than what they actually earn in order to evade taxes. Thus, these results could imply that financial institutions have already incorporated this information in their credit-granting processes, hence forecasting a higher financial capacity for these workers than that reported. In addition, working in the informal sector reduces the probability of acquiring a loan up to 23%. The informality coefficient presents evidence aligned with recent literature that states that informal workers are excluded from formal financing means (Gatti and Honorati, 2007), and informal credit markets have risen as a result of this exclusion. Moreover, having a longer employment tenure significantly increases the probability of acquiring a loan. This result is also intuitive since this variable is a proxy for financial stability and thus payment continuity in the future. By credit sector, a positive and significant effect associated with working in the formal economy is observed across all credit sectors (with variances in magnitude). Also, consistently with the aggregate

results, the model shows a significant and negative effect of being a salaried worker across all sectors (except mortgages), though with a wide variance in the magnitude of the average effects (from 5% in the credit cards sector to nearly 60% in the automobile sector). As well, there are significant positive effects of the years in current employment over credit granting in the sectors that target higher-income segments such as automobile, credit cards and SMEs (where loans are larger and written over longer terms).

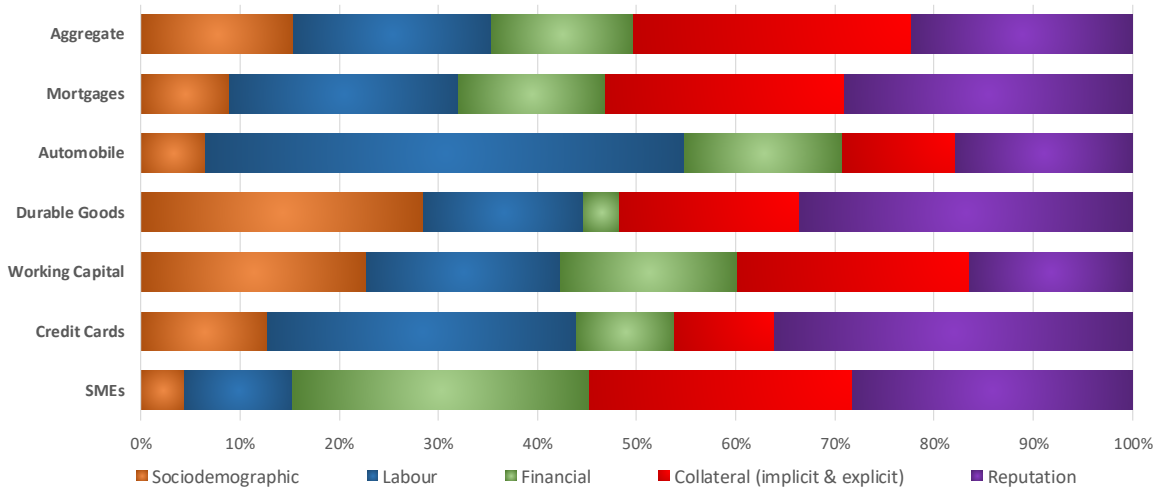
Regarding variables that signal the financial capacity of applicants, at the aggregate level it can be observed that the higher the income level, the greater the probability of obtaining financing. By sector, the effects of the applicant's income over the credit authorization probability is positive and significant for all sectors, except SMEs and durable goods consumption. Regarding the latter, the correlation between higher income and the probability of obtaining a loan is negative, which although counterintuitive at first glance, it could be explained by this sector's business model. This sector focuses on long-term, small-amount and high-rate loans for low-income segments of the population to finance the acquisition of house appliances or furniture (in fact two of the largest participants in this segment are also the dominant appliances and furniture stores in Mexico). Therefore, banks may want to engage with lower income clients as they have higher repayment rates (as it has been extensively studied) or as they prefer longer periods to repay; and thus, generate more profits with commissions and surcharges. Regarding SMEs, institutions undertake financial analysis of the main components of the firm's balance sheets to assess their repayment capacity. When analyzing the effects of financial ratios over SMEs loans, the results of the model for most variables (except the ROE) are consistent with financial literature. That is, firms that are larger, more profitable and less leveraged have a greater probability of obtaining a loan. The result that is indeed unforeseen is the negative effect of a higher ROE, since it is an indicator that measures firm's profitability; however, it can also be interpreted as a metric of the company's risk (riskier projects tend to generate higher ROE rates). In that sense, given that the model includes other profitability indicators, this result could be reflecting that institutions do use the ROE as an indicator of risky behavior (a characteristic symptom of SMEs).

B. Relative importance of each group pf explanatory variables:

As it can be observed in Figure 1, the predictive power of each group of variables, studied individually is very heterogeneous across sectors. However, the first notable result is that, measured by the individual Pseudo R^2 per type of variable, all categories of variables explain the credit-granting decision for all credit sectors *(at least for first-time loan applications).* The effect of each type of variable is widely heterogeneous; which can intuitively be explained by their corresponding business models. Nevertheless, the power of collateral and reputation stands out among most credit sectors, followed by labor variables *(signs of financial stability),* financials *(income flows),* and social and demographic profile of the applicant, in that order. For instance, while reputation matters the most for the mortgage, durable goods and credit card sectors, it is one of the groups with the lowest individual effect in the working-capital and automotive sectors. Furthermore, and as expected, while the sociodemographic profile of the applicants has the smallest effect over legally collateralized sectors, it has the second strongest effect among those that serve the low income segment of the population. Additionally, and compared with other sectors, financial variables seem to be the most important explanatory attributes within the SMEs credit market, etc. It is important to note that the intent of Figure 1 & 2 is to provide a general ranking of the impact of each type of variables, across credit sectors. The reader must not confuse this ranking with the absolute explicative power of each group of variables within each credit sector. For instance, even though the rank of reputation is lower for the working capital sector with respect to the durables sector, in absolute terms, reputation explains a higher percentage of the total variation of the decision of whether or not to gran a loan vs the predictive power that these variables in the latter sector have over the same dependent variable (19% vs 9%, respectively).

Figure 1. Relative importance of each group of explanatory variables*

(P-seudo R2 in parenthesis, per group of explanatory variables)



*/ To assess the relative importance of each group of variables, figure 1 shows normalized McFadden Pseudo R^2 of individual probit regressions for each group of explanatory variables *(using the classification stated above)* and with the decision of the institution as dependent variable. To compare the relative importance of each group of variables across sectors, we normalize the resulting Pseudo R^2s dividing each of them by the sum of all Pseudo R^2 of all group of variables, within each credit sector. See Annex 2 for a complete detail of each R2.

V. Robustness

To test the robustness of the results we conducted three exercises: first, we assess the relative importance of collateral and reputation and their interlinkages to determine credit-granting decisions using principal components analysis to simplify the process; second, we ran all regressions including the bank's internal assessment of the application as explanatory variable and finally, we conduct the exercise with alternative specifications of the model.

A. Collateral and reputation: substitutes or complements?

Table VI.A presents the results *(average marginal effects)* of a Probit model in which we include the discrete variables for collateral and good reputation *(as previously described in Table III)*. This allows us to test the relation between these factors by including the interaction term between these variables in the model. We also include the main principal components of each group of control variables and control by the income of the applicant. To interpret the results regarding the relation between collateral and reputation, note that the sign of the coefficient of the interaction term determines whether each factor's marginal effect is larger or smaller in presence of the other. Considering the aggregate model, both collateral and good reputation have a standalone effect on the probability of obtaining a loan, although the effect of reputation is larger in magnitude. In this case, collateral and good reputation have a complementary *relation (as for both, collateral and good reputation, their total average marginal effect –with and without the other factor- is larger than their marginal effect in the absence of the other factor).* Having collateral *(without having a good reputation)* increases the probability of the application being accepted by 8.2% and a good reputation *(without having collateral)* increases the probability by 31.3%. The total average marginal effect of collateral is of 18.6%, and that of good reputation is 41.7%. This relation, however, is different across credit sectors. Chart 1 displays the average marginal effects of collateral and reputation for all credit sectors considering the effect of the interaction. In some cases, collateral and reputation have the opposite relation. For institutions that grant loans for the consumption of durable goods use collateral and good reputation as substitutes for determining whether or not to grant credit. When one of each of these factors is present the other one matters less. While collateral alone *(without good reputation)* increases the probability of the institution approving the loan by +18.5%, good reputation reduces this marginal effect of collateral by 8.6 percentage points *(the total effect of collateral becomes +9.9%).* Similarly, collateral reduces the standalone effect of good reputation over the probability of getting the credit from +37.4% to +28.8%.

For mortgage loans only good reputation matters (it increases the probability of getting credit by 20.8%). Collateral (measured *as either having a guarantor or a sufficiently low loan to value)* does not have a statistically significant effect on credit granting *(neither in the absence nor presence of good reputation).* This may reflect the fact that given the legal right to repossess the underlying estate, loan-to-value ratios do not inform the bank's decision. This result also holds true for the SMEs' credit sector where good reputation is the only explanatory variable that matters and where it has an average marginal effect that is larger in magnitude than any of the controls (+38.2%). In the case of automobile loans, collateral and good reputation act as perfect complements as they only affect the credit granting decision then both are present. In fact, the effect is relatively large, as having both of them increases the probability of the loan's approval by 27%. For credit card loans, collateral and reputation matter and both are independent from each other. Since the coefficient of the interaction term is not statistically significant, the total average marginal effect of both collateral and good reputation is the same as the standalone marginal effect. Finally, for working capital loans good reputation matters regardless of collateral, but collateral only matters (positively) when it is accompanied by good reputation.

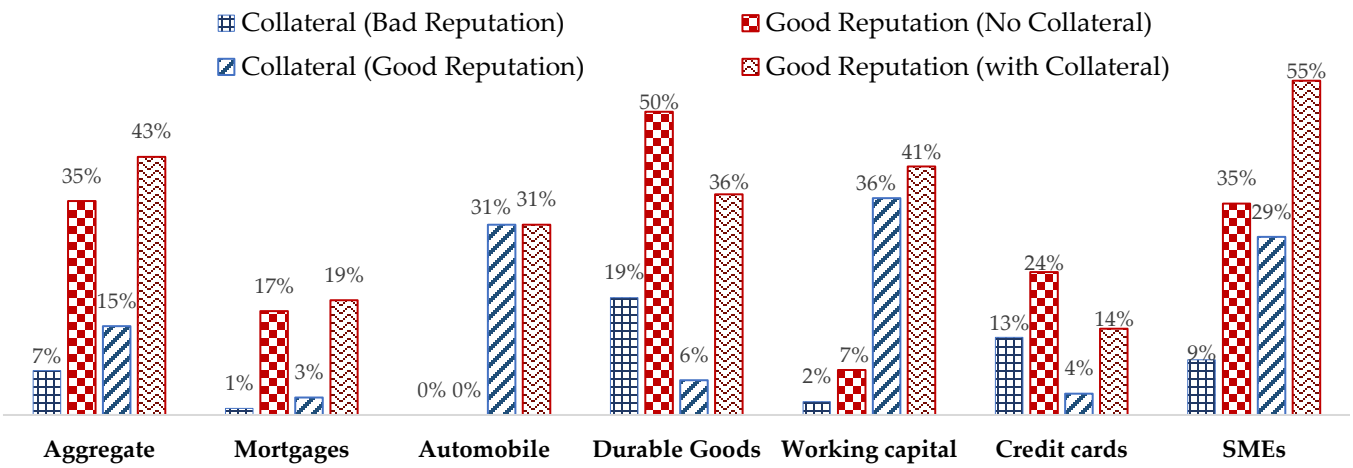
Table VI.A Credit-granting determinants by credit sector

The table presents the average marginal effects of Probit regressions with the decision to approve a loan as a dependent variable (1 = approved, 0 = rejected). Collateral takes different definitions across credit sectors: Mortgage (dummy, 1 if loan to value ratio < 75%, 0 otherwise), Automobile (dummy, 1 if loan to value ratio < 90% or if the applicant has a legal guarantor, 0 otherwise), Consumption of durable goods, Working capital and Credit Cards (dummy, 1 if applicant has either guarantor or implicit collateral –a home or an automobile) and SMEs (dummy, 1 if the applicant has either a legal guarantee or guarantor). **(d)** Reflects dummy variables. **Significance:** (c) 10%; (b) 5%; (a) 1%.

	Aggregate	Mortgages	Automobile	Durable Goods	Working capital	Credit cards	SMEs
Decision variables							
Collateral (d)	0.082a	0.012	0.066	0.185a	0.046	0.158a	-0.001
	[4.24]	[0.51]	[0.46]	[4.39]	[1.25]	[4.99]	[-0.00]
Good Reputation (d)	0.313a	0.208a	-0.173	0.374a	0.113a	0.370a	0.382a
	[22.71]	[5.81]	[-0.82]	[14.52]	[4.13]	[11.26]	[4.59]
Collateral*Good Reputation	0.104a	0.022	0.270b	-0.086c	0.424a	-0.071	0.288
	[4.91]	[0.80]	[2.12]	[-1.77]	[15.67]	[-1.49]	[0.97]
Controls							
Ln (income)	0.102a	0.087a	0.270a	-0.106a	0.140a	0.091a	0.143a
	[12.59]	[4.14]	[6.51]	[-5.84]	[10.68]	[7.04]	[4.00]
SMEs principal component							-0.03
							[-1.01]
Labor principal component	0.120a	0.026c	0.209a	0.108a	0.064a	0.099a	-0.048
	[19.77]	[1.86]	[9.72]	[9.10]	[5.68]	[11.38]	[-0.80]
Social principal component	0.003	0.004	0.019	-0.043a	0.031a	0.047a	0.021
	[0.64]	[0.37]	[0.79]	[-5.77]	[3.19]	[5.78]	[0.58]
Dem. principal component	0.008	-0.047a	-0.018	0.031a	0.040a	0.045a	0.092b
	[1.21]	[-3.40]	[-1.21]	[2.80]	[3.11]	[4.12]	[2.30]
FE by credit sector	Yes						
FE by economic activity	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9754	907	855	2798	2236	2700	248
Pseudo R-squared	0.262	0.121	0.264	0.135	0.42	0.337	0.374

Source: own elaboration with data from FUNDEF. Data as of 2008.

Chart 1: Average Marginal Effects of Collateral and Reputation per Credit Sector



As good reputation has a more consistent and larger effect across all sectors than collateral, we run another specification to further analyze the effects of reputation. Table VI.B displays the results of the same Probit model with a variation in the reputation measures: we include both dummy variables available for credit reputation *(existence of a credit history and credit history being deemed as positive).* The inclusion of both reputation variables drops the standalone effect of collateral over the credit granting decision at the aggregate level. Yet, collateral matters when reputation is present and there remains a complementary relation between reputation and collateral. Having collateral and a credit record *(bureau hit)* increases the probability of getting credit by 27.1%, and the combination of collateral and a positive record increases it by 5.7%. A positive assessment of this credit history increases the probability of getting credit by 34.3% in the absence of collateral and 40% in its presence. Notice that the standalone effect of credit records *(bureau hit)* is negative in the absence of collateral *(and also when controlled by a positive assessment by the credit bureau).* In this case, for individuals with a credit history that is not positive, collateral can mitigate this negative effect *(the total effect of a credit history over the probability of getting credit is +13%).*

As in the previous analysis, the results differ across sectors. Chart 2 displays the average marginal effects of collateral and background within credit bureaus for all credit sectors considering the effect of the interaction and Chart 3 displays the same exercise for positive reputation considering the effect of antecedents within credit bureaus. For the mortgage sector collateral does not have a standalone effect; it increases the credit granting probability in the presence of a credit record, but does not add to the marginal effect of a positive assessment of the record. For the automobile sector only the interaction between collateral and good reputation matters, and it increases the probability of the loan being approved by 31%. For loans destined to durable goods' consumption collateral does not have a standalone effect, neither complements good reputation; yet, it also mitigates the negative standalone effect of a credit record. A good reputation, however, has a quantitatively large effect on the probability of loan approval (+38%) regardless of the presence of collateral. For credit cards, collateral and the existence of a credit record both have a positive an moderately large marginal effect on the probability of the loan's approval (+10.2 and +10.8%), and are independent from each other in informing this decision. A positive credit

record has a larger marginal effect (+34.6%), which is lower in the presence of collateral (indicating that these are substitutes). For SMEs loans the existence of a credit record increases the probability of getting credit by 39.6% in the absence of collateral and 82.6% in the presence of collateral. A positive assessment of the credit history of the SME applicant increases this probability by 38% both in the presence and the absence of collateral.

Table VI.B Credit-granting determinants by credit sector

Includes two measures of reputation: whether applicant has background; whether background is good

The table presents the average marginal effects of Probit regressions with the decision to approve a loan as a dependent variable (1 = approved, 0 = rejected). Collateral takes different definitions across credit sectors: Mortgage (dummy, 1 if loan to value ratio < 75%, 0 otherwise), Automobile (dummy, 1 if loan to value ratio < 90% or if the applicant has a legal guarantor, 0 otherwise), Consumption of durable goods, Working capital and Credit Cards (dummy, 1 if applicant has either guarantor or implicit collateral –a home or an automobile) and SMEs (dummy, 1 if the applicant has either a legal guarantee or guarantor). **(d)** Reflects dummy variables. **Significance:** (c) 10%; (b) 5%; (a) 1%.

	Aggregate	Mortgages	Automobile	Durable Goods	Working capital	Credit cards	SMEs
Decision variables							
Collateral (d)	-0.026	-0.007	-0.083	-0.016	0.778a	0.102b	-0.314
	[-1.16]	[-0.33]	[-0.27]	[-0.22]	[28.92]	[2.14]	[-1.08]
Bureau Hit (d)	-0.141a	0.119a	0.027	-0.116a	-0.065a	0.108a	0.396a
	[-7.96]	[4.45]	[0.13]	[-3.31]	[-7.72]	[3.02]	[5.04]
Collateral*Bureau Hit	0.271a	0.172a	0.162	0.260a	-0.993a	0.073	0.430b
	[11.80]	[5.17]	[0.85]	[5.06]	[-846.48]	[1.48]	[2.08]
Bureau Positive	0.343a	0.146a	-0.188	0.379a	0.117a	0.346a	0.381a
	[24.07]	[4.14]	[-0.71]	[13.13]	[5.90]	[10.41]	[5.39]
Collateral*Bureau Positive	0.057a	-0.02	0.311b	-0.057	0.024a	-0.077c	0.32
	[2.61]	[-0.72]	[2.20]	[-1.05]	[2.98]	[-1.65]	[1.07]
Controls							
Ln (income)	0.094a	0.080a	0.260a	-0.110a	0.018a	0.072a	0.154a
	[11.62]	[4.10]	[6.26]	[-5.94]	[5.70]	[5.46]	[3.94]
SMEs principal component							-0.042
							[-1.24]
Labor principal component	0.121a	0.02	0.262a	0.102a	0.008a	0.096a	-0.133b
	[19.56]	[1.56]	[9.86]	[8.37]	[3.99]	[11.20]	[-1.96]
Social principal component	0.006	0.013	0.037	-0.042a	0.005a	0.041a	-0.069c
	[1.19]	[1.29]	[1.55]	[-5.53]	[2.72]	[5.03]	[-1.66]
Dem. principal component	0.005	-0.039a	-0.024	0.040a	-0.006b	0.030a	0.109b
	[0.82]	[-3.07]	[-1.55]	[3.48]	[-2.44]	[2.62]	[2.44]
FE by credit sector	Yes						
Bank's internal assessment	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE by economic activity	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9709	907	853	2798	2193	2700	248
Pseudo R-squared	0.273	0.164	0.282	0.15	0.459	0.355	0.49

Source: own elaboration with data from FUNDEF. Data as of 2008.

Chart 2. Average Marginal Effects per Credit Sector of collateral and background in credit bureaus

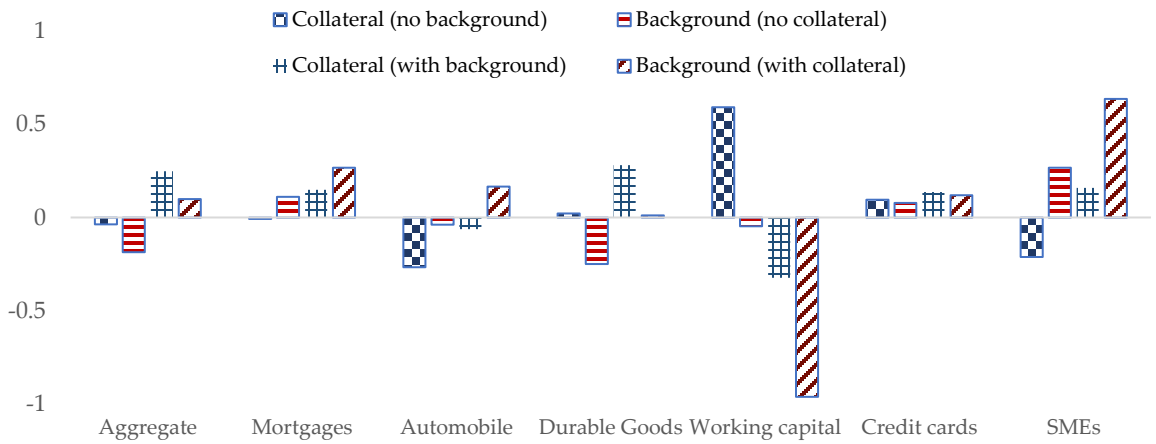
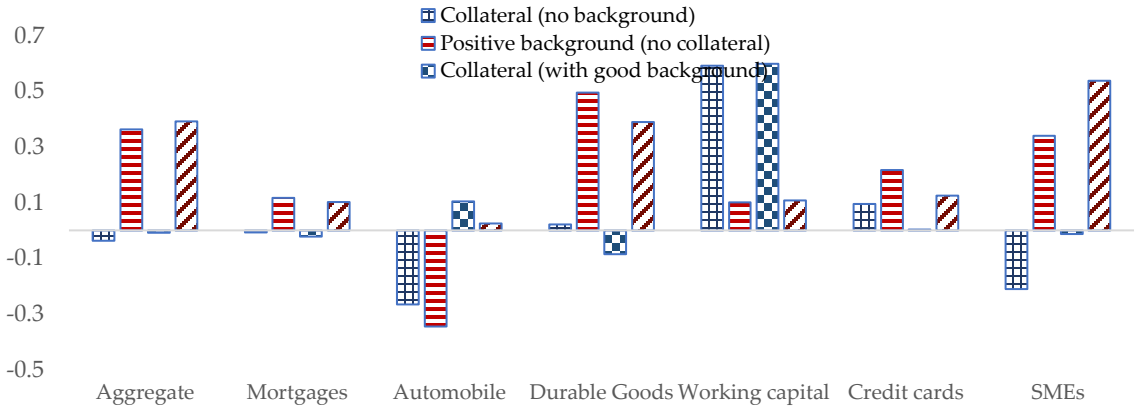


Chart 3. Average Marginal Effects per Credit Sector of collateral and good background



B. *Bank's internal assessments*

To test the robustness of the model we ran all regressions including the bank's internal assessment of the application. While we do not have a continuous measure of the quality, this dichotomous variable provides information on whether, given all observable characteristics, the bank has a positive assessment of the application. Table VII is analogous to Table V; it presents the average marginal effects on the credit granting decision of the main explanatory variables, and includes the internal assessment as a control. Notice that the main results in Table VII are robust to the inclusion of the bank's internal assessment, in terms of the direction of the effects and their significance. Yet, notice that the magnitude of the marginal effects of implicit and explicit collateral falls in most cases and in the aggregate, which indicates that the internal assessment contains information related to the availability of collateral. On the contrary, the marginal effects of reputation variables increase in magnitude in the aggregate and in most cases, indicating that the internal assessment and past reputation have a complementary effect informing the decision. Finally, as it would be expected, the explanatory power of the model as a whole increases substantially with the incorporation of the internal assessment. Annex 1 presents all regression tables including the internal assessment. The same results regarding the significance and magnitude of the marginal effects hold for the regressions in which we test the complementary or substitute relation of collateral and reputation. Finally, Table VIIII presents the results of a Probit

regression in which we estimate the marginal effect of our variables of interest and control variables over the probability of the application obtaining a positive assessment by banks, to see which of these variables are more correlated with this assessment. Asset ownership has a positive and significant effect on this assessment at the aggregate level and for the same three sectors for which it has a positive effect on credit granting. The existence of records and a positive assessment of bureau records also increase the likelihood of a positive assessment of the application at the aggregate and for most sectors. Likewise, financial capacity *(income)*, and stability variables *(formal employment, tenure and salaried condition)* have a positive marginal effect at the aggregate and for most sectors as well. One notable exception to this trend is the durable goods sector, where a positive assessment of bureau record and larger income have a negative and significant marginal effect on the probability of a positive assessment of the application. The reason for this might be that, as institutions in this sectors take advantage of moderate delinquency (since delay fees are large and these loans are constantly repaid), a larger repayment capacity would not be as attractive as one sufficiently large to ensure payments with slight delinquency.

Table VII. Credit-granting determinants by credit sector with parametric

	(1) Aggregate	(2) Mortgages	(3) Automobile	(4) Durable Goods	(5) Working capital	(6) Credit cards	(7) SMEs
Panel A: controls							
Observations	9945	955	913	2819	2195	2779	273
Pseudo R^2	0.471	0.234	0.343	0.339	0.775	0.408	0.572
Panel B: collateral							
Owns a car or home (d)	0.12^a	0.03	0.08^b	0.05^b	0.19^a	0.09^a	0.04
	[7.99]	[1.20]	[2.03]	[2.21]	[4.35]	[5.69]	[0.19]
Guarantee (d)	0.22^b						
	[2.12]						
Guarantor (d)		0.13^a	0.13^a				0.57^a
		[5.96]	[3.83]				[6.19]
LTV		-0.17^b	-0.39^a				
		[-2.44]	[-2.95]				
Observations	9839	947	849	2776	2195	2779	273
Pseudo R^2	0.477	0.259	0.385	0.343	0.785	0.418	0.655
Panel C: reputation							
Bureau records (d)	-0.02	0.14^a	0.14^a	-0.17^a	-0.17^a	0.10^a	0.31^a
	[-1.44]	[5.69]	[3.20]	[-4.45]	[-5.82]	[6.44]	[5.39]
Positive bureau records (d)	0.35^a	0.12^a	0.14^a	0.47^a	0.31^a	0.15^a	0.33^a
	[27.59]	[3.88]	[3.11]	[27.56]	[5.74]	[8.67]	[6.63]
Observations	9636	955	913	2734	2072	2704	248
Pseudo R^2	0.515	0.280	0.357	0.489	0.810	0.468	0.684
Panel D: collateral and reputation							
Owns a car or home (d)	0.11^a	0.01	0.07^c	0.07^b	0.06^a	0.06^a	0.08
	[6.70]	[0.19]	[1.68]	[2.54]	[3.19]	[4.06]	[0.67]
Guarantee (d)	0.22^b						0.15
	[2.08]						[1.42]
Guarantor (d)		0.09^a	0.13^a				0.53^a
		[3.61]	[3.90]				[5.19]
LTV		-0.15^b	-0.41^a				
		[-2.26]	[-3.14]				
Bureau records (d)	-0.04^b	0.11^a	0.18^a	-0.20^a	-0.14^a	0.09^a	0.28^a
	[-2.35]	[3.98]	[3.99]	[-4.91]	[-5.19]	[5.90]	[4.69]
Positive bureau records (d)	0.35^a	0.12^a	0.19^a	0.47^a	0.27^a	0.15^a	0.30^a
	[26.80]	[3.88]	[4.19]	[26.95]	[5.45]	[8.54]	[5.27]
Observations	9532	947	849	2693	2072	2704	248
Pseudo R^2	0.519	0.292	0.406	0.494	0.820	0.473	0.756
Financial	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Labor	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Social	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demographic	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank's internal assessment	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects by credit sector	Yes						
Fixed effects by economic activity	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: FUNDEF, data as of 2008.

(d) for discrete change of dummy variable from 0 to 1

^{c} $p < 0.10$, ^{b} $p < 0.05$, ^{a} $p < 0.01$

Table VIII. Results per credit sector

The table presents the average marginal effects of Probit regressions with the decision to approve a loan as a dependent variable (1 = approved, 0 = rejected). Collateral takes different definitions across credit sectors: Mortgage (dummy, 1 if loan to value ratio < 75%, 0 otherwise), Automobile (dummy, 1 if loan to value ratio < 90% or if the applicant has a legal guarantor, 0 otherwise), Consumption of durable goods, Working capital and Credit Cards (dummy, 1 if applicant has either guarantor or implicit collateral –a home or an automobile) and SMEs (dummy, 1 if the applicant has either a legal guarantee or guarantor). **(d)** Reflects dummy variables. **Significance:** (c) 10%; (b) 5%; (a) 1%.

	Aggregate	Mortgages	Automobile	Durable Goods	Working capital	Credit cards	SMEs
Decision variables							
Collateral (d)	-0.037	-0.007	-0.266	0.021	0.591a	0.095b	-0.211
	[-1.32]	[-0.35]	[-0.84]	[0.25]	[6.48]	[2.54]	[-0.82]
Bureau Hit (d)	-0.186a	0.111a	-0.038	-0.249a	-0.047a	0.078a	0.266a
	[-8.93]	[4.74]	[-0.19]	[-5.56]	[-3.32]	[2.83]	[3.41]
Collateral*Bureau Hit	0.285a	0.156a	0.204	0.260a	-0.915a	0.041	0.370c
	[10.17]	[5.71]	[1.21]	[3.78]	[-40.11]	[0.98]	[1.91]
Bureau Positive	0.363a	0.117a	-0.345	0.495a	0.101a	0.217a	0.340a
	[22.62]	[3.54]	[-1.38]	[23.02]	[2.72]	[6.47]	[6.35]
Collateral*Bureau Positive	0.028	-0.015	0.370a	-0.106c	0.007	-0.092b	0.198
	[1.02]	[-0.58]	[3.29]	[-1.89]	[0.64]	[-2.33]	[0.69]
Controls							
Ln (income)	0.021b	0.02	0.187a	-0.106a	0.008a	0.028a	0.085b
	[2.25]	[1.16]	[4.27]	[-4.70]	[2.79]	[2.86]	[2.11]
SMEs principal component							-0.028
							[-0.97]
Labor principal component	0.147a	0.030b	0.303a	0.109a	0.008a	0.087a	-0.078
	[19.08]	[2.38]	[10.51]	[7.24]	[2.58]	[9.60]	[-1.19]
Social principal component	0.017a	0.008	0.039	-0.026a	0.005b	0.034a	0.045
	[2.87]	[0.82]	[1.59]	[-2.99]	[2.13]	[5.10]	[0.86]
Dem. principal component	-0.026a	-0.045a	-0.046a	-0.011	-0.003	0.018b	0.104b
	[-3.20]	[-3.75]	[-2.88]	[-0.84]	[-1.09]	[1.98]	[2.54]
FE by credit sector	Yes						
Bank's internal assessment	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
FE by economic activity	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9709	907	853	2798	2193	2700	248
Pseudo R-squared	0.514	0.204	0.322	0.447	0.745	0.441	0.581

Source: own elaboration with data from FUNDEF. Data as of 2008.

C. Alternative specifications.

We ran several alternative specifications to check the robustness of the results to the model chosen. Table IX presents the results of the baseline Probit model *(with and without the bank's internal assessment),* the Probit model including non-linear effects in the control variables replicating the methodology of Thomas et.al. (2002) for creating the optimal cuts in non-continuous variables, as well as an OLS and Logit specification with the same independent and dependent variables. The results (signs and significance) for collateral are consistent across models; and regarding the results for reputation, bureau records only lose significance under the OLS model. While magnitudes vary considerable across specifications (for instance they are larger in all cases for the Logit model), these are either inherent features of the probability distribution or linear specification. For control variables almost all results remain consistent across specifications, with most exceptions occurring for the OLS model *(which is usually considered an inadequate model for dichotomous dependent variables).*

Table IX. Robustness to the model specification

	(1) Probit	(2) Probit w/parametric	(3) Non-linear effects	(4) OLS	(5) Logit
main					
Collateral					
Owns a car or home (d)	0.13[a]	0.11[a]	0.10[a]	0.06[a]	0.54[a]
	[9.65]	[6.64]	[6.14]	[6.54]	[7.01]
Guarantee (d)	0.31[a]	0.22[b]	0.58[a]	0.13[b]	1.13[b]
	[4.66]	[2.09]	[9.70]	[2.55]	[2.46]
Reputation					
Bureau records (d)	-0.00	-0.04[b]	-0.04[b]	0.01	-0.16[b]
	[-0.05]	[-2.33]	[-2.45]	[1.16]	[-2.16]
Positive bureau records (d)	0.34[a]	0.35[a]	0.34[a]	0.19[a]	1.78[a]
	[30.06]	[26.76]	[27.61]	[21.38]	[22.81]
Financial					
Ln (income)	0.10[a]	0.03[a]		0.01	0.12[a]
	[11.58]	[2.63]		[1.24]	[2.68]
Income: ($15K to $20K pesos] (d)			0.13[a]		
			[4.86]		
Income: +$20K pesos (d)			0.09[a]		
			[4.66]		
Labor					
Formal employment (d)	0.15[a]	0.24[a]	0.22[a]	0.15[a]	1.18[a]
	[11.74]	[15.72]	[14.68]	[17.87]	[16.10]
Salaried worker (d)	-0.10[a]	-0.15[a]	-0.12[a]	-0.09[a]	-0.69[a]
	[-8.13]	[-9.58]	[-8.10]	[-10.84]	[-9.66]
Years in current employment/firm	0.01[a]	0.01[a]		0.01[a]	0.05[a]
	[11.66]	[8.21]		[10.91]	[8.42]
Years employed: (2 to 3 yrs.] (d)			0.13[a]		
			[5.30]		
Years employed: (3 to 6 yrs.] (d)			0.24[a]		
			[11.86]		
Years employed: +6 yrs. (d)			0.25[a]		
			[12.63]		
Social					
Age	-0.00[a]	-0.00[a]		-0.00[a]	-0.02[a]
	[-4.46]	[-3.85]		[-4.59]	[-4.58]
Age: 29-39 y/o (d)			-0.06[a]		
			[-2.86]		
Age: 40-48 y/o (d)			-0.05[a]		
			[-2.59]		
Age: +48 y/o (d)			-0.10[a]		
			[-4.42]		
Years of education	0.01[a]	0.01[a]		0.01[a]	0.05[a]
	[4.08]	[4.61]		[4.72]	[4.38]
Years of education: [10 to 15 yrs.] (d)			-0.00		
			[-0.02]		
Years of education: +15 yrs. (d)			0.01		
			[0.50]		
Married (d)	0.03[c]	0.00	-0.01	0.00	-0.07
	[1.90]	[0.07]	[-0.73]	[0.45]	[-0.86]
Sex (d)	0.06[a]	0.05[a]	0.04[a]	0.02[a]	0.23[a]
	[4.58]	[3.46]	[2.70]	[2.59]	[3.55]
Demographic					
Residence: Mexico City (d)	-0.12[a]	-0.18[a]	-0.17[a]	-0.10[a]	-0.93[a]
	[-8.31]	[-9.28]	[-9.08]	[-10.80]	[-9.47]
Years in current residence	0.00[a]	0.00[b]		0.00[a]	0.01[b]
	[5.79]	[2.30]		[3.21]	[2.45]
Years in residence: +10 yrs. (d)			0.05[a]		
			[2.92]		
Bank's internal assessment					
Repayment capacity (d)		0.57[a]	0.55[a]	0.36[a]	3.55[a]
		[48.21]	[46.90]	[41.11]	[32.07]
Data verification (d)		0.56[a]	0.53[a]	0.49[a]	5.80[a]
		[66.63]	[64.58]	[41.84]	[16.85]
Fixed effects by credit sector	Yes	Yes	Yes	Yes	Yes
Fixed effects by economic activity	Yes	Yes	Yes	Yes	Yes
Observations	9577	9532	10021	9532	9532
Pseudo R^2	0.27	0.52	0.53		0.53

Source: FUNDEF, data as of 2008.

(d) for discrete change of dummy variable from 0 to 1

[c] $p < 0.10$, [b] $p < 0.05$, [a] $p < 0.01$

VI. Conclusion

The alternative theories on the determinants of the decision to grant a loan were outlined in the introduction. Our findings provide robust evidence to contrast these theories in a unique manner. We use a dataset so comprehensive that allows to assess and test the complementary effects of the main theoretical and empirical determinants of the credit granting decision to new credit applicants, and allows to do so across many credit sectors. Several results are noteworthy and have implications for traditional financial intermediation theories.

We find that both collateral and reputation matter for granting credit at the aggregate level. Their relative importance, however, varies across credit sectors and is closely related with the business model and target customer base of the credit sector. For instance, we find that for sectors that are legally collateralized and that grant the largest amounts of credit (SMEs and mortgages), the fact of having a guarantee does affect the probability of being granted a loan, but a good credit reputation does increase this probability. In contrast, the sector that targets the lowest income segment of the sample (working capital), both collateral and reputation affect the probability of obtaining credit.

We also provide evidence that the relation between these two factors also varies across sectors. For instance, institutions that grant working capital loans (lowest income segment and not meant for a specific purpose) collateral and reputation have a complementary effect on the probability of obtaining credit. On the contrary, for institutions that grant credit cards (aimed at middle and upper income strata, and without a specific purpose), collateral and reputation act as substitutes for informing the credit granting decision.

Our results show that financial institutions use all the types of information available to mitigate information asymmetries with new prospective clients. This is relevant, as in most cases financial institutions are legally prohibited from taking into account certain types of variables (e.g. gender). These results indicate the importance of considering the different business models and behavior of financial institutions for the adoption of policy measures. For instance, limits to loan-to-value ratios on mortgages might have a limited effect on the number of loans granted by financial institutions, as reputation and not the size of collateral seems to be the larger driver for the decision to grant a loan in this sector. Moreover, they also point out to the importance of considering the differences across sectors for understanding the credit process as a whole.

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Annex 1: Example of information request *(Automobile sector)*

[redacted]

Oficio núm. [redacted] 947/2008

[redacted]

Director General de Banco [redacted] México S.A.
Institución de Banca Múltiple
P r e s e n t e

México, D.F., 30 de Julio de 2008.

Por este medio, [redacted] solicito a usted, en un plazo que no exceda de 20 días hábiles a partir de la fecha en que reciba el presente oficio, la siguiente información respecto de esa institución financiera:

I) **DATOS DE LAS PRIMERAS 1,000 SOLICITUDES DE CLIENTES NUEVOS DE CRÉDITO RECIBIDAS DURANTE EL MES DE JULIO DE 2008**

a) **Requerimiento:** Se solicita un listado que contenga las primeras 1,000 solicitudes en orden cronológico de clientes nuevos (i.e., que nunca hayan tenido un crédito con la institución), de entre las solicitudes de crédito automotriz solicitadas en el numeral I. a) anterior.

b) **Información requerida para cada una de las solicitudes de crédito que integren el listado:** Se solicita una hoja de cálculo que contenga el listado referido en el punto a) anterior, con la siguiente información por cada uno de los créditos:

(i) Número de crédito o expediente.

(ii) Tipo de cliente.

(iii) Datos del cliente: incluir todos los datos personales del cliente que se encuentren capturados y que fueron utilizados para la decisión del otorgamiento o rechazo. Dichos datos deben incluir, enunciativa, más no limitativamente: En el caso de una Persona física: Edad, Sexo, Estado Civil, Profesión, Entidad Federativa de residencia, situación familiar (i.e., número de hijos), actividad profesional, flujos de ingresos, si tiene casa o automóvil propios, historial anterior con la institución, etc.

(iv) Resultado de la consulta al buró de crédito, y resultados o información obtenidos durante la visita o entrevista al potencial cliente (en caso de haber habido visita; de lo contrario, informar que no hubo tal).

(v) Destino o Uso del crédito manifestado por el solicitante.

(vi) Decisión de la institución (Aprobado o Rechazado).

(vii) En el caso de los crédito otorgados por un monto inferior al solicitado por el cliente: Justificación de la decisión de la institución de no otorgar el monto solicitado, pero si uno inferior.

(viii) En caso de los créditos otorgados: Monto de crédito otorgado, Plazo del crédito, Tasa de Interés Ordinaria, Existencia o no de Garantía, Existencia o no de Aval, Valor Estimado de la Garantía respecto del Monto de crédito otorgado, Pago de intereses mensual y amortizaciones, con alguna periodicidad distinta, o al final del crédito.

(ix) En caso de créditos no otorgados: Monto del crédito solicitado, Existencia o no de aval, Existencia o no de garantía, Tipo de garantía y Valor estimado de la garantía y Justificación de la decisión de la institución de no otorgar el crédito.

II) **COPIAS DE LOS EXPEDIENTES DE LAS PRIMERAS 50 SOLICITUDES DE CRÉDITO RECIBIDAS DURANTE EL MES DE JULIO DE 2008**

a) **Requerimiento:** Se solicita copia simple, testada respecto del nombre de la persona física solicitante del crédito, de los expedientes completos que tenga la institución respecto de los primeros 50, de entre las 1,000 solicitudes de crédito automotriz solicitadas en el numeral II. a) anterior.

Annex 1: Example of information request *(Mortgage sector)*

[redacted]

Oficio núm. [redacted]/954/2008

[redacted]

[redacted]

Director General d[redacted].A. de C.V.
Sociedad Financiera de Objeto Limitado
P r e s e n t e

México, D.F., 30 de Julio de 2008.

Por este medio [redacted] solicito a usted, en un plazo que no exceda de 20 días hábiles a partir de la fecha en que reciba el presente oficio, la siguiente información respecto de esa institución financiera:

I) **DATOS DE LAS PRIMERAS 1,000 SOLICITUDES DE CLIENTES NUEVOS DE CREDITO RECIBIDAS DURANTE EL MES DE JULIO DE 2008**

a) **Requerimiento:** Se solicita un listado que contenga las primeras 1,000 solicitudes en orden cronológico de clientes nuevos (i.e., que nunca hayan tenido un crédito con la institución), de entre las solicitudes de crédito hipotecario solicitadas en el numeral I. a) anterior.

b) **Información requerida para cada una de las solicitudes de crédito que integren el listado:** Se solicita una hoja de cálculo que contenga el listado referido en el punto a) anterior, con la siguiente información por cada uno de los créditos:

(i) Numero de crédito o expediente

(ii) Tipo de cliente

(iii) Datos del cliente: incluir todos los datos personales del cliente que se encuentren capturados y que fueron utilizados para la decisión del otorgamiento o rechazo. Dichos datos deben incluir, enunciativa, más no limitativamente: En el caso de una Persona física: Edad, Sexo, Estado Civil, Profesión, Entidad Federativa de residencia, situación familiar (i.e., numero de hijos), actividad profesional, flujos de gastos e ingresos, si tiene casa o automóvil propios, historial anterior con la institución, etc.

(iv) Resultado de la consulta al buró de crédito, y resultados o información obtenidos durante la visita o entrevista al potencial cliente (en caso de haber habido visita; de lo contrario, informar que no hubo tal).

(v) Destino o Uso del crédito manifestado por el solicitante

(vi) Decisión de la institución (Aprobado o Rechazado)

(vii) En el caso de los crédito otorgados por un monto inferior al solicitado por el cliente: Justificación de la decisión de la institución de no otorgar el monto solicitado, pero si uno inferior

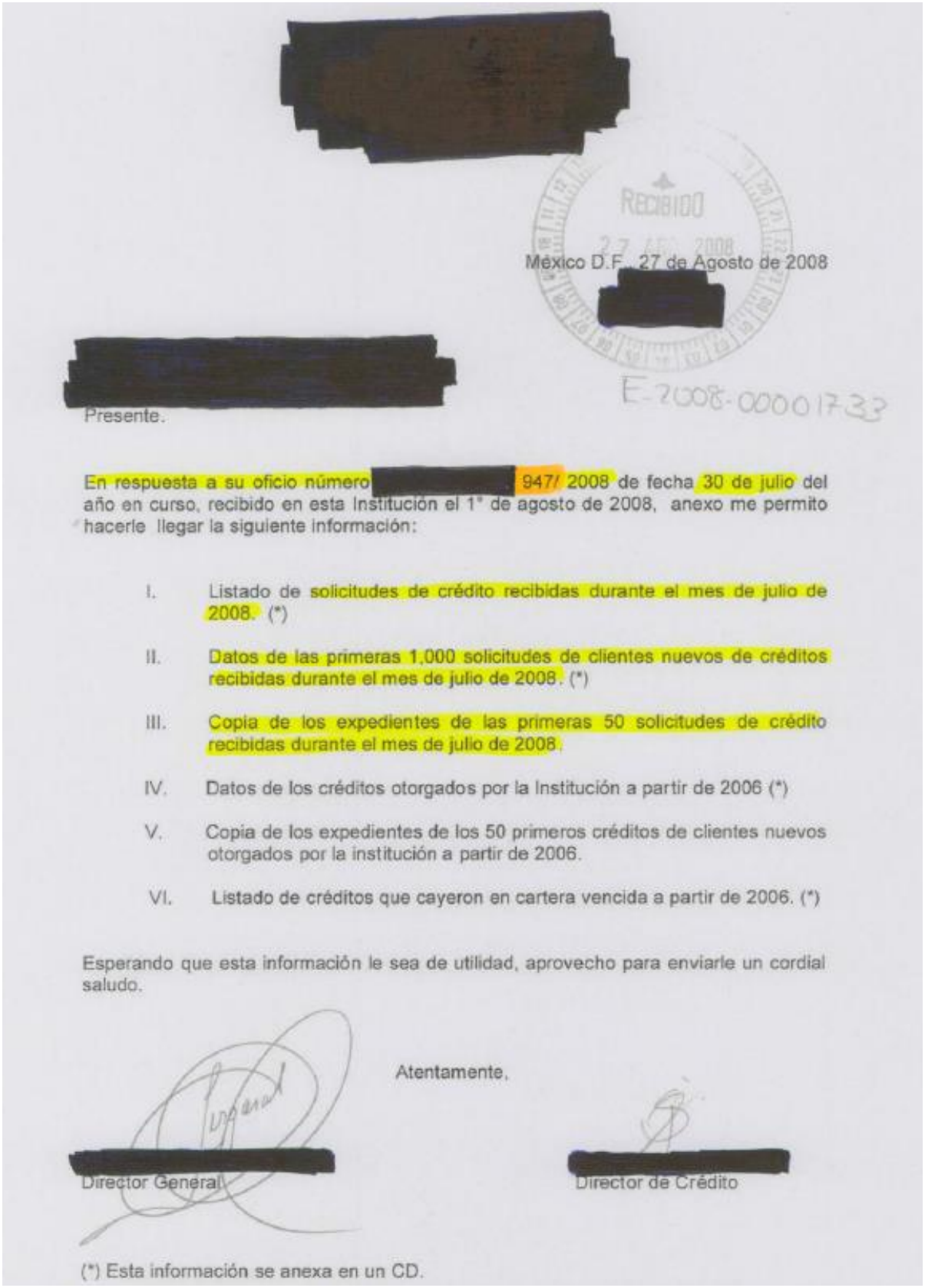
(viii) En caso de los créditos otorgados: Monto de crédito otorgado, Plazo del crédito, Tasa de Interés Ordinaria, Existencia o no de Garantía, Existencia o no de Aval, Valor Estimado de la Garantía respecto del Monto de crédito otorgado, Pago de intereses mensual y amortizaciones, con alguna periodicidad distinta, o al final del crédito.

(ix) En caso de créditos no otorgados: Monto del crédito solicitado, Existencia o no de aval, Existencia o no de garantía, Tipo de garantía y Valor estimado de la garantía y Justificación de la decisión de la institución de no otorgar el crédito.

II) **COPIAS DE LOS EXPEDIENTES DE LAS PRIMERAS 50 SOLICITUDES DE CREDITO RECIBIDAS DURANTE EL MES DE JULIO DE 2008**

a) **Requerimiento:** Se solicita copia simple, testada respecto del nombre de la persona física solicitante del crédito, de los expedientes completos que tenga la institución respecto de los primeros 50, de entre las 1,000 solicitudes de crédito hipotecario solicitadas en el numeral II. a) anterior.

Annex 1: Example of the answer to the information request signed by the Intitution's General Director *(Automobile sector)*



[redacted]

RECIBIDO

México D.F. 27 de Agosto de 2008

[redacted]

[redacted]

E-2008-0000173?

Presente.

En respuesta a su oficio número [redacted] 947/ 2008 de fecha 30 de julio del año en curso, recibido en esta Institución el 1° de agosto de 2008, anexo me permito hacerle llegar la siguiente información:

I. Listado de solicitudes de crédito recibidas durante el mes de julio de 2008. (*)

II. Datos de las primeras 1,000 solicitudes de clientes nuevos de créditos recibidas durante el mes de julio de 2008. (*)

III. Copia de los expedientes de las primeras 50 solicitudes de crédito recibidas durante el mes de julio de 2008.

IV. Datos de los créditos otorgados por la Institución a partir de 2006 (*)

V. Copia de los expedientes de los 50 primeros créditos de clientes nuevos otorgados por la institución a partir de 2006.

VI. Listado de créditos que cayeron en cartera vencida a partir de 2006. (*)

Esperando que esta información le sea de utilidad, aprovecho para enviarle un cordial saludo.

Atentamente,

[redacted]

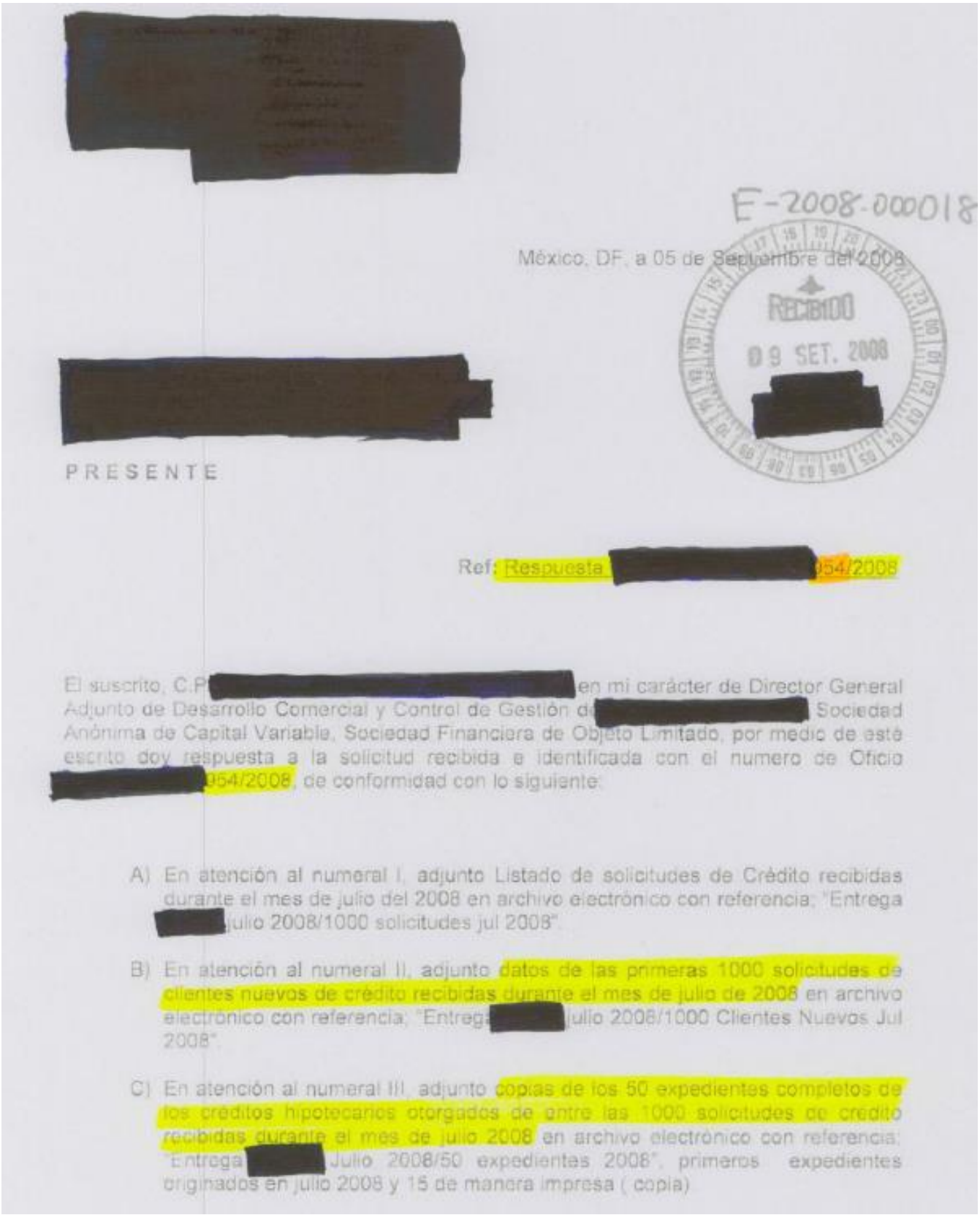
Director General

[redacted]

Director de Crédito

(*) Esta información se anexa en un CD.

Annex 1: Example of the answer to the information request signed by the Intitution's General Director *(Mortgage sector)*



[redacted]

E-2008-000018

México, DF, a 05 de Septiembre del 2008

RECIBIDO
09 SET. 2008
[redacted]

[redacted]

PRESENTE

Ref: Respuesta [redacted] 954/2008

El suscrito, C.P. [redacted] en mi carácter de Director General Adjunto de Desarrollo Comercial y Control de Gestión d[redacted] Sociedad Anónima de Capital Variable, Sociedad Financiera de Objeto Limitado, por medio de este escrito doy respuesta a la solicitud recibida e identificada con el numero de Oficio [redacted] 954/2008, de conformidad con lo siguiente:

A) En atención al numeral I, adjunto Listado de solicitudes de Crédito recibidas durante el mes de julio del 2008 en archivo electrónico con referencia: "Entrega [redacted] julio 2008/1000 solicitudes jul 2008".

B) En atención al numeral II, adjunto datos de las primeras 1000 solicitudes de clientes nuevos de crédito recibidas durante el mes de julio de 2008 en archivo electrónico con referencia: "Entrega [redacted] julio 2008/1000 Clientes Nuevos Jul 2008".

C) En atención al numeral III, adjunto copias de los 50 expedientes completos de los créditos hipotecarios otorgados de entre las 1000 solicitudes de crédito recibidas durante el mes de julio 2008 en archivo electrónico con referencia: "Entrega [redacted] Julio 2008/50 expedientes 2008", primeros expedientes originados en julio 2008 y 15 de manera impresa (copia)

Annex 2:

Determinants of the credit-granting decision

Aggregate-level model

The table presents the average marginal effects of Probit regressions with the decision to approve a loan as a dependent variable (1 = approved, 0 = rejected). **Includes all common variables between credit sectors:** mortgage loans, automobile credit, consumption of durable goods, working capital, credit cards and SMEs. **(d)** Reflects dummy variables. **Reference values for categorical variables:** Age (up to 28), Civil status (married), Type of residence (own), Years employed (up to 2), Income (up to $15 thousand pesos), Years in residence (up to 10). The income of SMEs is approximated by net utility in hundreds of pesos. Standard errors are not displayed. **Significance:** (*) 10%; (**) 5%; (***) 1%.

	Loan approval					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
1. Sociodemographic						
Age	-0.003***	-0.004***	-0.003***	-0.003***		
Age: 29 - 39 y/o (d)					-0.028	-0.051**
Age: 40 - 48 y/o (d)					-0.048**	-0.046**
Age: more than 48 years (d)					-0.070***	-0.082***
Years of education	0.002	0.001	0.007***	0.010***		
Years of education :(9 to 15] (d)					0.167***	0.211***
Years of education : more than 15 (d)					0.146***	0.220***
Civil status: single (d)	-0.074***	-0.089***	-0.024	0.004	-0.012	0.010
Civil status: free union (d)	-0.005	-0.047**	-0.007	-0.009	0.020	0.021
Civil status: other (d)	0.021	0.073**	0.016	0.076**	0.023	0.085**
Gender: female (d)	0.091***	0.086***	0.053***	0.045***	0.047***	0.043***
Residence: Mexico City (d)	-0.246***	-0.275***	-0.134***	-0.187***	-0.121***	-0.181***
2. Labor status						
Sector: formal economy (d)	0.085***	0.133***	0.153***	0.238***	0.138***	0.231***
Employment type: Salaried (d)	-0.077***	-0.134***	-0.108***	-0.158***	-0.094***	-0.147***
Years employed	0.014***	0.011***	0.013***	0.010***		
Years employed: (2 to 3] (d)					0.110***	0.114***
Years employed: (3 to 6] (d)					0.237***	0.224***
Years employed: more than 6 (d)					0.293***	0.247***
3. Financial capacity						
Ln (Income)	0.075***	0.005	0.089***	0.024**		
Income: ($15 to $20 thousand pesos] (d)					0.286***	0.151***
Income : more than $20 thousand pesos (d)					0.296***	0.160***
4. Applicants' asset ownership						
Own automobile (d)	0.098***	-0.022	0.126***	0.058***	0.129***	0.048**
Type of housing: owned by the family (d)	0.026*	0.030*	-0.096***	-0.091***	-0.066***	-0.071***
Type of housing: rent (d)	-0.028	-0.029	-0.124***	-0.092***	-0.076****	-0.054**
Years in residence	0.003***	0.004***	0.004***	0.003****		
Years in residence: more than 10 (d)					0.109***	0.071***
5. Collateral						
Guarantee (d)	0.430**	0.323***	0.296***	0.206*	0.324***	0.218**
6. Credit reputation						
Bureau: hit (d)	-0.040***	-0.008	-0.011	-0.047***	-0.029**	-0.061***
Bureau: positive (d)	0.334***	0.334***	0.338***	0.347***	0.328***	0.340***
7. Internal bank's assesment						
Repayment capacity (d)		0.500***		0.576***		0.573***
Data verification (d)		0.536***		0.562***		0.557***
Observations	9,513	9,468	9,513	9,468	9,513	9,468
McFadden Pseudo R^2	21.9%	46.8%	27.5%	52.6%	31.7%	54.6%
Internal bank rating	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**
Fixed Effects by economic activity	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Fixed Effects by credit sector	**No**	**No**	**Yes**	**Yes**	**Yes**	**Yes**
Non-linear effects	**No**	**No**	**No**	**No**	**Yes**	**Yes**

Source: own elaboration with data from FUNDEF.

Annnex 3:

Determinants of the credit-granting decision by credit sector

The table presents the average marginal effects of Probit regressions with the decision to approve a loan as a dependent variable (1 = approved, 0 = rejected). Aggregate regression includes all common variables between all credit sectors. **(d)** Reflects dummy variables constructed with respect to a reference value for the categorical variable. **Reference values for categorical variables:** Civil status (married), Type of residence (own). Standard errors are not displayed (specified as heteroscedasticity-robust standard errors). **Significance:** (*) 10%; (**) 5%; (***) 1%.

Loan Approval							
	Aggregate	**Mortgages**	**Automobile**	**Consumption of Durable Goods**	**Working Capital**	**Credit Cards**	**SMEs**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. Sociodemographic							
Age	-0.003***	-0.005***	-0.004*	0.004***	0.000	-0.004***	0.006
Years of education	0.010***	0.002	-0.003	0.018***	0.005***	0.006**	-0.005
Civil status: single (d)	0.004	-0.005	0.180*	0.029	-0.014	0.026*	0.099
Civil status: free union (d)	-0.009	-0.004	-0.011	-0.051	0.001	0.090*	0.120
Civil status: other (d)	0.076**	-0.014	-0.01	0.045	0.010	0.127**	0.096
Gender: female (d)	0.045***	0.043*	0.116*	-0.019	0.074***	0.012	0.079
Residence: Mexico City (d)	-0.187***	-0.107**	-0.082**	-0.212***	-0.100***	0.054**	0.036
Economic dependents		-0.005	-0.035**	0.028***	0.002	0.008	
Years in operation (d)							-0.038***
2. Labor							
Sector: formal economy (d)	0.238***	0.120***	0.247***	0.227***	-0.001	0.138***	
Employment type: Salaried (d)	-0.158***	0.052*	-0.592***	-0.145***	-0.060***	-0.051***	
Years employed	0.010***	0.007***	0.017***	0.000	0.001	0.011***	0.009*
3. Financial							
N° of workers (d)							0.010***
Ln (income)[1]	0.024**	0.038**	0.283***	-0.102***	0.014**	0.024**	-0.032
Leverage[2]							-0.566*
Profits' margin[2]							0.760**
Equity multiplier[2]							0.140**
ROA[2]							0.933
ROE[2]							-0.595*
4. Applicants asset ownership							
Automobile (d)	0.058***	0.038	0.103	0.056	0.030***	0.053***	0.131
Type of housing: owned by the family (d)	-0.091***	-0.002	-0.030	-0.099***	-0.054**	-0.017	-0.062
Type of housing: rent (d)	-0.092***	0.021	0.056	-0.153***	-0.132*	-0.027	0.103
Years in residence	0.003***	-0.003**	-0.003**	0.006***	0.002**	0.001*	0.006*
5. **Collateral**							
Guarantor (d)		0.086***	0.129***				0.599***
Guarantee (d)	0.206*						0.284**
Loan-To-Value (LTV)		-0.152**	-0.436***				
6. Credit reputation							
Bureau: hit (d)	-0.047***	0.088***	0.177***	-0.206***	-0.111***	0.095***	0.309***
Bureau: positive (d)	0.347***	0.109***	0.191***	0.466***	0.223***	0.152***	0.338***
7. Internal bank's aasesment							
Repayment capacity (d)	0.576***	0.233***	0.466***	0.545***	0.540***	0.243***	0.353***
Data verification (d)	0.562***			0.524***	0.841***	0.132***	
Observations	**9,468**	**904**	**847**	**2,678**	**2,067**	**2,700**	**248**
McFadden Pseudo R^2	**52.6%**	**29.2%**	**41.5%**	**50.1%**	**82.1%**	**47.1%**	**73.4%**
Fixed Effects by economic activity	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Fixed Effects by credit sector	**Yes**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**