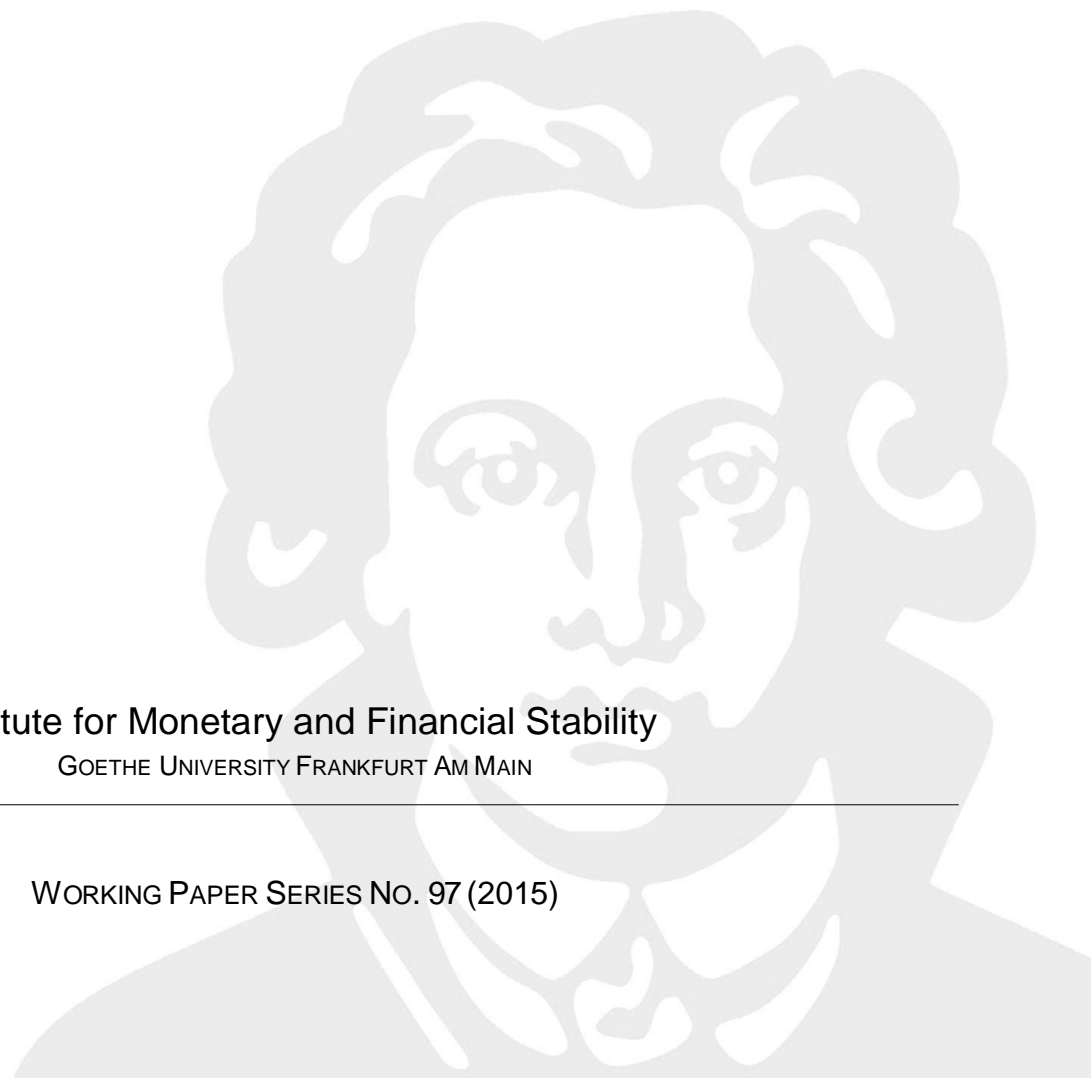JOSÉ MARÍA LIBERTI
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Information, Credit, and Organization[∗]

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Information, Credit, and Organization

Abstract

This paper investigates the effect of a change in informational environment of borrowers on the organizational design of bank lending. We use micro-data from a large multinational bank and exploit the sudden introduction of a credit registry, an information-sharing mechanism across banks, for a subset of borrowers. Using within borrower and loan officer variation in a difference-in-difference empirical design, we show that expansion of credit registry led to an improvement in allocation of credit to affected borrowers. There was a concurrent change in the organizational structure of the bank that involved a dramatic increase in delegation of lending decisions of affected borrowers to loan officers. We also find a significant expansion in scope of activities of loan officers who deal primarily with affected borrowers, as well as of their superiors. There is suggestive evidence that larger banks in the economy were better able to implement similar changes as our bank. We argue that these patterns can be understood within the framework of incentive-based and information cost processing theories. Our findings could help rationalize why improvements in the information environment of borrowers may be altering the landscape of lending by moving decisions outside the boundaries of financial intermediaries.

I Introduction

Financial intermediaries serve an important role in the economy. They screen projects, which allows for efficient allocation of resources from savers to the users with highest value. There has been a progressive shift in intermediation, with lending moving outside the boundaries of financial firms. For instance, intermediation through brokers in the mortgage market – where agents outside the bank are responsible for originating credit – in the United States grew exponentially over the past decade or so (Keys et al., [2010]). Several commentators believe that a large part of this change has been made possible due to evolution in information environment that allows for better access to information such as borrowers' credit scores. While such discussions are plentiful, there is no systematic study that investigates whether and how changes in information environment of borrowers impact the organizational design of lending.

The reasons for this lack of evidence are twofold. First, such inferences demand detailed time series organizational data of intermediaries, which is difficult to obtain. Second, one needs variation in the information environment of borrowers that, ceteris paribus, impacts a large portfolio of borrowers serviced by intermediaries. In this paper, we tackle both of these challenges and show that a change in the information environment of borrowers significantly alters the organizational design of lending in ways that is predicted by some theories.

We use detailed microdata on lending as well as organizational design from a large multi-national bank. The bank we study is a large international player in the Argentinean financial system, a market that is particularly well suited for studying informational problems facing lenders, and specializes in lending to large as well as small and medium-sized firms. In addition, we exploit a sudden exogenous change in the information environment faced by the bank – brought about by the introduction of a credit registry, an information-sharing mechanism across banks – for a subset of borrowers. Together, these features allow us to trace the effect of a change in the informational environment of borrowers faced by the bank on the organizational design of its lending.[1]

We exploit within borrower and within loan officer variation to show that the establishment of the credit registry improved efficiency of credit allocated by the bank and a concurrent change in its organizational design. There was an increase in the delegation of tasks to the loan officers and an expansion in the scope of activities of both loan officers and division managers. These findings help rationalize why improvements in the information environment of borrowers may be altering the landscape of lending by moving decisions outside the boundaries of financial

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[1] While there is research that information revealed by credit registries facilitates credit, it views the financial institution as a black box, and is silent about how financial institutions adapt to deliver this effect (see Japelli and Pagano [1993, 2002], Djankov, McLiesh, and Shleifer [2007]).

intermediaries.

Why should changes in information environment of borrowers affect the organizational design of lending? A large theoretical literature in organizational economics analyzes how information and communication costs affect the organizational design of firms (e.g., Bolton and Dewatripont [1994], Garicano [2000], Hart and Moore [1999] and Dessein and Santos [2006], among others).[2] Broadly, in the context of understanding the effect of change in information environment of borrowers on the organizational design of banks, these theories can be broken down into two broad categories: incentive-based theories and information cost processing theories. As we now discuss, while these theories establish a connection between information environment of borrowers and organization design of lending, the ultimate direction of this impact is theoretically ambiguous and an open empirical question.

On the incentive side, Aghion and Tirole [1997] provide a useful theoretical framework that helps connect the information environment of borrowers to appropriate organizational design of lending. Specifically, division managers must tradeoff between delegating to loan officers, which can have incentive effects for collecting information about borrowers, and loss of control with loan officers choosing 'biased actions that may not be in the interest of the bank. Thus, if availability of additional information about borrowers from the credit registry dampens the costs from loss of control for instance by making it difficult for loan officers to justify biased actions – one could see more delegation of tasks to loan officers (i.e., one would see less centralization). Moreover, in such a scenario, divisional managers would need to expand their span of control as a commitment to not interfere in loan officer tasks, thereby preserving incentives of loan officers. It is, of course, possible that additional information about borrowers would instead reduce the value of information collected by loan officers, leading to less delegation of tasks to loan officers. Thus, how changes in information environment of borrowers impacts organizational design of lending, as predicted by incentive based theories, is an empirical question.

The information cost processing theories, in particular, Garicano [2000], provide a model where agents are endogenously arranged in an organizational hierarchy in increasing order of their ability – higher-ability problem-solvers end up higher in the hierarchy.[3] The hierarchical design results from a trade-off between communication and acquiring information; those lower down must either learn the answers or ask for help from their superiors higher up in the hierarchy. To the extent that the credit registry makes it easier to obtain information about

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[2]For an extensive review on foundational literature that these papers build on see Aghion and Holden [2011]

[3]Another information cost processing based model argues that the extent of delegation trades-off the gains from specialization with the communication costs associated with coordinating the information generated by specialized agents (Becker and Murphy [1992]).

the borrowers, more such tasks could be assigned to loan officers (i.e., one would see less centralization). As well, in such a scenario, the task scope would become broader, as loan officers could deal with more cases themselves, requiring less help from their superiors. It is, of course, possible that additional information about borrowers would instead make processing a loan application more difficult since more sources of information have to be evaluated for instance. Consequently, how changes in information environment of borrowers impacts organizational design of lending as predicted by these theories is also an empirical question.

Guided by these theories, our empirical analysis investigates specific features of organizational design by focusing on the delegation of tasks to loan officers and scope of activities of both loan officers and division managers. The availability of detailed borrower-level data from before and after the credit registry expansion in the bank under study, allows for a simple empirical approach. We first classify borrowers as *exposed* (treatment) or *non-exposed* (control) depending on whether they were covered by the credit registry before its expansion in 1998 or not.[4] We then construct several metrics –interest rates, loan amounts, expenses, defaults and profits– and compare how these changed for borrowers in the different groups with the expansion of the credit registry. These tests allow us to assess if the shock to information environment of borrowers is useful and large enough for banks to alter its lending. In addition, we are able to exploit dynamic information on the bank's organization structure to assess the impact of this information event on the bank's organizational design. Notably, our data allow us to examine the changes to organizational design of lending on both the intensive (continuing borrowers) and extensive margins (new borrowers).

We start our analysis by confirming that the shock to information environment of borrowers was both useful and large enough to impact the bank's lending decisions. We observe very different patterns among treatment borrowers whose information in the credit registry is revealed to be good, relative to those who are revealed to be bad. In particular, the borrowers who are revealed to be of worse quality, based on credit assessment of other banks relative to our bank's internal rating, see a sharp decrease in their loan size. Moreover, these loans see an increase in interest rates. In contrast, borrowers who are revealed to be of better quality, again based on credit assessment of other banks relative to our bank's internal rating, see their loans increasing in size, while becoming less expensive. Importantly, there is no change in the lending pattern to borrowers in the control group, whose information was always available in the credit registry.

Next, the main part of the paper investigates how the bank alters its organizational form

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[4]We will use the terminology 'borrowers in treatment (control) group and 'exposed (non-exposed) borrowers interchangeably throughout the text. The latter is terminology that was used by the bank to refer to borrowers whose information became available in the credit registry after its expansion.

to adapt to the new informational environment. Given that the main task of loan officers is to collect and produce information about borrowers, now also available through the credit registry, we expect the event to impact the organizational design of our bank. Prior to the credit registry expansion, the bank was composed of ten divisions with each division headed by a manager and roughly five loan officers reporting to her. This structure changes significantly after the credit registry expansion. There is a reduction in loan officers whose lending portfolio is primarily composed of treatment borrowers (about 1.5 loan officers per division). Moreover, there is a significant increase in the load –the number of borrowers and the quantity of loans handled – of the remaining loan officers, who transact mainly with treatment borrowers. These loan officers also expand the scope of their activity by lending to borrowers across more industries than they previously did.

There were further important effects on the organizational design of the bank in response to the new informational environment. In particular, there is an increase in delegation of lending decisions of treatment borrowers to loan officers. Specifically, lending decisions of treatment borrowers – handled, on average, at the level of the division manager before the event – were made by loan officers after the event. Moreover, we find that a change in the organization at the loan officer level was accompanied by a concurrent change in the tasks performed by the division head. There was also a change in the scope of activity of the division head, with managers spending more time doing business development, which involves scouting for prospective clients. As was the case with lending decisions, we find no changes in organizational design associated with lending to borrowers in the control group.

We also find that the changes in loan officer and division manager tasks are reflected in other changes in lending decisions. In particular, there is an increase (decrease) in fee-based high-margin non-lending products (i.e., transactional products such as cash management and foreign transfers, among others) to treatment borrowers who are revealed to be good (bad). These tasks involve more intensive interaction with borrowers, which seems to have been facilitated by concurrent change in the organization design of lending for these borrowers, such as delegation. When we translate all the effects into lending profits, we find, on average, an improvement in per-period profits of about 2.4% in relative terms for exposed borrowers. Together, the lending and organizational changes seem to improve the efficiency of credit allocated by the bank. Overall, these patterns of changes in the organizational design of lending can be rationalized by both the incentive-based and information cost processing theories outlined earlier.

We conduct several additional tests to confirm that our findings are not spurious. First, there may be a concern that some of our findings might be driven by changes in the composition of borrowers after the shock. Notably, all of our analysis so far exploits within-borrower

variation where we follow the same set of borrowers before and after the shock. For completion, we also conduct our analysis separately on borrowers present only before or after the event – the extensive margin – and show similar inferences on this sample.

Second, one may be worried that borrowers in the treatment and control group differ in other aspects, which might impact how these borrowers reacted to the information event. This alternative is difficult to rationalize as we observe changes in lending and organizational design associated with treatment borrowers while observing no changes associated with the borrowers in the control group. Relatedly, we also provide evidence on how the outcome variables of interest change dynamically over time to further support our inferences. While we observe no effect prior to the shock – with similar trends among borrowers in the treatment and control group – there is a pronounced differential effect on the borrowers in the treatment group after the event. These effects occur about one to two quarters after the shock, which seems a reasonable time for changes in organization and lending to take place. Third, we further allay such concerns by studying the effect of the event only for a subset of borrowers around the threshold lending amount that classifies borrowers into the treatment and control groups. We find that the treatment group demonstrates similar patterns as our main sample. More importantly, even when we focus on a narrow set of similar borrowers in the control group, as before, we find no effects for these borrowers.

Finally, we explore what type of information may have been revealed by the credit registry expansion. First, the event may have revealed information about borrower quality because credit assessments of other banks that also lend to a given borrower became available. Second, the event may have also revealed information on the quality of collateral pledged by the borrower. For instance, lenders may generate better estimates of recovery rate in case of default based on their assessment of whether the collateral is likely pledged to more than one lender. Third, it may have also provided information on the quality of the loan officer as measured by the assessment of her portfolio of treatment borrowers relative to the same portfolio assessed by other banks. Fourth, it may have provided information on the lender competition for a given borrower, since the number of lenders lending to each borrower became known. We explore each of these channels and find strong support for the first two; the credit registry event seems to have revealed information about the quality of the borrowers as well as the collateral pledged by the borrowers.

We conclude our analysis and make a broader assessment of our finding by examining how other banks in the economy reacted to credit registry expansion. It is often asserted that although larger banks – like our bank – have better technology, they face a big disadvantage in dealing with soft information loans compared with their local competitors. Thus, legal

institutions and credit registries may tend to have a bigger effect on more hierarchical and larger banks (Buch [2003], Haselmann et al. [2010]). We find evidence consistent with this conjecture; larger banks tend to react similarly like our bank and seem to benefit more relative to smaller local banks.

This paper is related to several strands of the literature. First, our paper relates to the literature that empirically tests organizational design theories. Since organizational structures may be seen as a solution to incentives as in Aghion and Tirole [1997] or the result of coordination issues as in Antras et al [2006], Cremer et al. [2007] and Alonso et al.[2008] or linked simply to an automation process as in Autor et. al [2003], a growing body of empirical work has emerged in an attempt to test these theories (e.g. Aghion, Bloom and Van Reenen [2013]; Paravisini and Schoar [2015] and Skrastins and Vig [2014]). More broadly, by demonstrating that the type of activity conducted inside a firm's boundaries is impacted by its information environment, we connect to empirical work on the boundaries of the firm (e.g., Mullainathan and Scharfstein [2001]; Beshears [2010]; Bloom et al. [2014] and Seru [2012]).

Second, the paper is related to studies that examine the role of incentives and information in bank lending decisions (Agarwal and Hauswald [2010]; Einav et al. [2013]; Keys et al. [2010]; Liberti [2005]; Liberti and Mian [2009]; Rajan et al. [2012] and Qian et al. [2014]).[5] We add to this literature by exploiting a relatively clean setting and establishing that changes in information environment of borrowers could dramatically impact the organizational design of bank lending.

Third, it is related to the literature on law and finance that studies the reason for differences in nature of lending activity across countries (e.g., LaPorta et al. [1998]; Haselmann et al. [2010]). An important stream of literature in this area discusses the role of credit registries and information bureaus in helping reduce the informational problems that plague lending (e.g., Djankov, McLiesh, and Shleifer [2007]; Japelli and Pagano [2002]; and Garmaise and Natividad [2014]). We contribute to this literature by providing direct evidence on the channel through which such benefits are realized, the size of these effects, as well as evidence that such benefits are enabled through several organizational changes.

Finally, the paper is also related to the literature that discusses how firms remain competitive in changing environments (e.g., Roberts [2004] and Chandler [2005]). Several surveys

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[5]Notably, our paper exploits the same information event that was used first in Hertzberg, Liberti and Paravisini [2011] to study the role of public information in the lending decisions of a bank when it anticipates the reaction of other banks to the same firm. They exploit information before credit registry expansion and show that banks reduce lending to firms whose credit is of relatively mediocre quality – where such coordination concerns are more applicable – while finding no effects for firms whose credit is of relatively good quality. In contrast, we concentrate on the information revealed after the credit registry expansion and trace the effects of the shock to the information environment for a subset of relatively large good-quality borrowers.

by scholars in the management literature suggest that uncertainty in the environment is connected to decision making (Lawrence and Lorsch [1967]). We contribute to this literature by suggesting that some firms are better able to adapt to harness the benefits from change in their environment.

The rest of the paper is organized as follows. Section II describes the data and empirical setting. Section III and IV discuss our main empirical findings. Section V analyzes the different channels of information. Section VI explores the aggregate implications of the credit registry expansion, and Section VII concludes.

II   Data and Empirical Setting

II.A   The Setting

The bank under analysis is a large international main player in the Argentinean financial system. Before the credit expansion, the bank had an asset size of $7.2B. According to the bank's internal industry classification, it has a well-diversified portfolio of firms covering 39 different industries. In terms of a two-digit SIC code, the bank does not have an exposure bigger than 5% in any particular industry. The bank was in the top 5 in terms of total assets across all banks in the Argentinean financial system as of August 1997.

The corporate lending business of the bank is composed of 10 divisions. Each division has a division manager who acts as the corresponding division head, with loan officers reporting to the division manager. Approximately five loan officers reported to each division manager before the credit registry expansion. Each division handled lending worth approximately $600M before the credit registry expansion, with each loan officer handling an average loan portfolio of $96.5M. On average, each loan officer handled 43 borrowers. These statistics are reported in Panel A of Table 1. During the period we study, the bank's median borrower has a loan amount outstanding of $66,470. The creditworthiness is encapsulated by the internal rating of the bank, which goes from 1 to 5, with 1 representing the lowest default risk.[6]

The lending process is relatively standard. The borrower works with the loan officer to discuss the financing terms for various needs it might have. Loan terms require approval by the loan officer and in many cases by personnel higher up in the hierarchy, including the division manager. The hierarchy of authority has several levels, with the loan officer at level 1 and the division manager at level 2. The level of authority depends on the loan amount involved, as

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[6]About 4.36% of the bank's borrowers were delinquent or worse on their debt. This suggests that the bank in general had borrowers that had a relatively good credit standing.

well as other observable characteristics, such as amount and type of collateral and maturity (for more details, see Liberti and Mian [2009]). A loan typically requires about two layers of approval, with the range between 1 and 7. As we will discuss later, there is substantial heterogeneity in this variable (standard deviation = 1.039), as can be seen from Panel B of Table 1.

II.B Credit Registry and Its Expansion

Argentina's public credit registry was established in 1991. The credit registry is a database containing credit information on every borrower (i.e., public and private firms and individuals) that obtains credit from the formal sector of the financial system. Since the registry's inception, all formal financial institutions are required to submit to the Central Bank monthly reports that include the following information on each of its borrowers: (a) total debt outstanding; (b) amount of collateral pledged; (c) industry code; and (d) a credit rating that reflects the borrower's creditworthiness/default risk (an integer ranging from 1 to 5, with 1 representing the lowest default risk).[7]

The Argentine registry reform in July 1998 expanded the credit registry to include borrowers that were previously excluded. Before the reform, information was shared only for borrowers whose total outstanding debt was above $200,000 or whose credit rating reported by any financial institution was 3 or worse. In particular, there was public disclosure of borrower credit information that was previously only privately known by their lenders for around 540,000 borrowers (we henceforth refer to these borrowers as "exposed" borrowers) The expansion was unexpected and plausibly exogenous to the lending environment of the bank. The goal of the reform was to reduce the cost of distributing information for large numbers of small debtors. The reform was made possible by technological improvements that lowered the cost of distributing information. The adoption of CD-ROMs eliminated the need for the threshold and led to the credit registry expansion. This claim can be verified by examining press releases; this search produces mentions on credit registry expansion only after July 1998.[8] A detailed explanation of the reform and its documentation is available in Hertzberg et al. [2011].[9]

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[7]Banks can exercise discretion in assigning ratings of 1 and 2 based on their private assessment of the borrower's repayment prospects. Lenders are required to assign a rating of 3 to borrowers whose assessed potential default risk is high and also when the borrower has interest payments in arrears in excess of 90 days or requires principal refinancing. Ratings of 4 and 5 are mechanically determined by the repayment status of the borrower (i.e., missed a principal payment, interest payments more than 180 days in arrears, bankruptcy filings, collateral seized).

[8]The threshold was eliminated by sharing information for every borrower with a total debt above $50. The elimination of the threshold was implemented retroactively to January 1998.

[9]Note that, as opposed to Hertzberg et al. (2011), who use all the impacted retail and corporate borrowers (across banks) in their analysis, we focus on roughly 1,300 borrowers that are corporate clients of our bank.

It is worth noting that the subset of borrowers covered in the credit registry expansion account for a non-trivial part of the bank's business. In particular, there are about 1,300 borrowers of the bank whose information started being reported in the credit registry only after its expansion in July 1998. This represents around 57% of the total number of borrowers of the bank. The average loan portfolio of such borrowers was about 12% of the total portfolio of the bank.

II.C   Data

We focus our analysis on the pre-credit registry expansion from beginning of April 1997 to end of June 1998, and the post-credit registry expansion period from beginning of July 1998 to end of December 2000. We drop data after 2000 to avoid any confounding of inferences due to the massive Argentinean crisis that concluded with the collapse of the financial system toward the end of 2001. We compare the full pre- and post-credit-registry periods, because the changes in lending behavior inside the bank as well as organizational design may take some time to reflect in the data. Our data are available at quarterly frequency; therefore we have five periods before and ten periods after the credit registry expansion.

There were no broad macroeconomic changes during this time period. Nevertheless, in our analysis we will account for any pre-trends and contrast our findings with other banks that operated in Argentina at the same time. Panel B of Table 1 presents additional descriptive statistics at the borrower level over the pre-expansion period. The average interest rate of a borrower is around 11.9%, with a return on capital of 8.6%.

III   Main Results

III.A   Empirical Design

In the empirical analysis, we measure the effects of the credit registry expansion by estimating the change in different outcome variables between the pre-period (beginning of April 1997 to

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Moreover, we focus on the impact of information after the credit registry expansion, while their focus is on the period just before information revelation. Finally, we find effects largely in the sample of firms where Hertzberg et al. find bank coordination concerns to be absent. In particular, Hertzberg et al. find that banks reduce lending to firms whose credit is of relatively mediocre quality (i.e., those with an average credit registry rating of 2), while finding no effects for firms whose credit is of relatively good quality (i.e., those with an average credit registry rating of 1). As is clear from the summary statistics in Table 1, treatment firms in our analysis are primarily good quality (i.e., those with average credit registry rating of 1). As a comparison to illustrate that these are good quality borrowers, note that the average Central Bank credit rating for the exposed borrowers only in the pre-credit registry expansion period is 1.242.

end of June 1998) and the post-period (beginning of July 1998 to end of December 2000). The results we report rely on quarterly panel regressions of the following form:

$$y_{ijt} = \alpha_i + \alpha_j + \beta \text{ After}_{it} + \gamma \text{ After}_{it} * \text{Exposed}_{it} + X_{it}\delta + \epsilon_{ijt} \tag{1}$$

where i is a borrower, j is a loan officer, y is an outcome variable of interest, *After* is a dummy that takes a value of one in the post-period and zero in the pre-period, and X refers to borrower-level controls that are employed in some of the regressions. α_i and α_j are borrower (firm) and loan officer fixed effects. *Exposed*$_{it}$ is a variable that takes a value of one for treatment borrowers i.e., those who are exposed to the credit registry event – and zero otherwise. This variable is constructed by matching the borrowers of the bank with the credit registry, and identifying those whose information appears for the first time in the quarters after the expansion event. As will become clear, we also estimate regressions that are similar to this specification at the division and loan officer level.

This research design allows us to compare how different metrics changed for borrowers in two categories. The coefficient β gives us the effect on the control group of borrowers whose information environment did not undergo a change (*non-exposed* borrowers). The differential impact on treatment group borrowers (*exposed* borrowers), whose information becomes available in the credit registry, is given by γ. The identification of these coefficients relies on the pool of borrowers and broader economic conditions to be similar before and after the credit registry expansion. We now discuss how we deal with these issues.

The first issue –changes in pool of borrowers– can be addressed by estimating our regressions only for the *same* set of borrowers before and after the event. While doing so explores changes on the intensive margin, we can separately compare the new pool of borrowers faced by the bank before and after the shock to assess changes on the extensive margin.

The second issue –changes in economic conditions– is more subtle in how it might affect our findings. One could argue that such trends should have a fairly uniform effect on all the borrowers regardless of whether they were exposed or not. If so, the differential effects between exposed and non-exposed borrowers that we emphasize in the analysis will allow us to identify the impact of additional information. Related, one could be worried that these trends are, in fact, not uniform in the two sets of borrowers since firms in the non-exposed group are larger firms than those in the exposed group. We deal with this issue by providing evidence on the dynamic behavior of these changes in order to capture any particular pre-trend of the variable of interest. Moreover, to mitigate the concern that trends may differ across the two groups, we include borrower-specific trends in our estimation. Finally, we conduct our analysis on a subset of borrowers that are in close vicinity of the loan amount threshold that partitions them into

exposed and non-exposed borrowers. Such an analysis compares borrowers that are plausibly similar on all dimensions except that some will be exposed and some non-exposed.

III.B   Change in Lending Decisions

We start by assessing the changes in lending behavior – loan amount and interest rate on loans – after the credit registry expansion for exposed and non-exposed borrowers. To gain intuition, we first present the summary statistics in the two groups of borrowers before and after the credit registry shock in Panel A of Table 2. As is evident, we find that, on average, there is an increase in the amount of credit extended to exposed borrowers after the credit registry expansion. Moreover, there is a decline in the interest rates that are charged to these borrowers. At the same time, there is no change in lending for non-exposed borrowers. These patterns are consistent with improved screening by the bank once information about the credit quality of some borrowers is revealed after the credit registry expansion, while leaving the lending for non-exposed borrowers unaffected.

We test these patterns more formally in Panel B of Table 2 using our main specification (1). In column (1), we use the log of total loan amount to a borrower each quarter as the dependent variable. As noted earlier, the unit of observation in this specification is at the borrower-level, and these regressions include both borrower and loan officer fixed effects as well as borrower-specific trends. In this analysis we examine the intensive margin and follow the same borrowers before and after the credit expansion event. We follow a total of 2,227 borrowers.

As is evident from the results, we find that the amount of loans offered to the exposed borrowers went up ($\gamma > 0$) after the event, while there was no change in the amount of lending to non-exposed borrowers (β is insignificant). Similarly, in column (4), we use interest rates on these loans as the dependent variable and find that there is a decrease in interest rates on loans offered to exposed borrowers, while interest rates remain similar on loans for non-exposed borrowers. The effects are large: loans increase on average by 60.6% (column (1)) for exposed borrowers after the shock, and these loans are 1.4% (column (4)) less expensive in absolute terms.

We drill further into these results in columns (2) and (5) to shed light on the differential screening done by banks. In particular, we examine how the changed lending behavior reflects information about exposed borrowers that is revealed in the credit registry after the shock. In particular, we interact *After*Exposed* with a borrower-level variable called *Revealed Bad Rating*. This variable takes a value of one if the average rating in the credit registry across

all other banks that a given borrower borrows from is revealed to be worse than the rating assigned by our bank and zero otherwise.[10] The results show that, on average, there is an increase in lending to exposed borrowers who are revealed to be good relative to the bank's information and that these loans become less expensive. Moreover, there is a concurrent decrease in lending to exposed borrowers who are revealed to be bad relative to the bank's information, and these loans become more expensive. The magnitudes are again large. For instance, loans to exposed borrowers who are revealed to be good increase by 67.3%, while loans drop by 84.1% for borrowers who are revealed to be bad.[11] Notably, the tests in Table 2 reveal no change in lending behavior for non-exposed borrowers since the coefficient on *After* is insignificant across specifications. This suggests that the non-exposed borrowers serve as a reasonable control group for the exposed borrowers: there is no change in lending to these borrowers after a shock to information of the treatment group.

To mitigate the concern that trends in lending (and interest rates) differ across exposed and non-exposed borrowers, we construct a firm-specific trend measure and include it in the estimations presented in columns (3) and (6). Results are no different than the ones reported with no specific trends. To further support our identification assumption in Section IV.A we provide evidence on the time series dynamics of these changes. The sharp nature of effects being present in the exposed group after the credit registry expansion event while being absent in the non-exposed group confirm that pre-trends are not driving our main results.[12]

It is possible that the extent of information in the credit rating by other lenders depends on the extent to which those lenders know a particular borrower. In order to take into account this issue, in unreported tests, we construct two alternative measures of *Revealed Bad Rating*.

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[10]The rating for each bank is based on the average rating for a borrower from January 1998 to end June 1998.

[11]There are around 8.8% borrowers for whom *Revealed Bad Rating* takes a value of one. For these borrowers, the rating in our bank before the credit registry expansion is 1.08, while the average rating across other banks that is revealed when the credit registry expands is 1.84.

[12]We also conduct two more tests that support this assertion. Specifically, since our identification relies on time-series information, it is possible that some of the effects we document could be driven by broad trends in the bank that are unrelated to the credit registry expansion. In Appendix A.1, we present evidence that speaks to this issue. We construct lending patterns aggregated at the level of divisions. We follow a specification very similar to that in (1) estimated at the division level. Instead of using *Exposed*, which is a borrower-level variable, we augment the specification by interacting *After* with a variable that captures the proportion of exposed borrowers in the division (*Share Exposed*), defined as of end June 1998. As can be seen from column (1), there is more lending in divisions whose portfolio primarily consists of exposed borrowers. This suggests that after the event, the quantity of increase in lending to borrowers who are revealed to be good more than offsets the reduction in lending to borrowers who are revealed to be bad. In contrast, for divisions with primarily non-exposed borrowers, there is no change in aggregate lending. This evidence is quite revealing since one should expect a broad trend in the bank to impact all divisions in a similar fashion. Moreover, we also exploit data from international divisions of our bank that lend to firms outside Argentina – and are therefore immune to the credit registry event. Results in column (2) of Appendix A.1 suggest that there is no change in lending by these divisions. This evidence also suggests that the change in lending is not likely driven by broad trends in the bank that are unrelated to the credit registry expansion.

These measures weigh the ratings of all other lenders by the proportion of loans they make to the exposed borrower at the time of revelation. First, we construct a dummy variable that takes a value of one if the weighted average rating with weights based on loan amounts – across all other lenders for a given borrower is revealed to be worse than the rating assigned by our bank and zero otherwise. Second, we construct a continuous measure based on the difference between the weighted average rating across all other lenders for a given borrower and our bank's rating. We re-estimate regressions in Table 2. The results are qualitatively and quantitatively similar as those reported in Table 2 with the simple measure.[13]

Overall, these patterns are consistent with what one expects from how banks should respond to the availability of better information about borrower quality: more lending at better terms to borrowers revealed to be good and reduced lending at worse terms to borrowers revealed to be bad. As we will discuss in detail in Section V better information revealed during the event could have other facets besides allowing the bank to better assess borrower quality. In particular, the registry may also reveal how much collateral is pledged by the borrower to other lenders, allowing lenders to also have a better sense of the recovery rates on secured loans in the event of a default. The results of this section are consistent with the presence of either of these information channels. In Section V we will assess if both such channels might be present.[14] Together, our results suggest that the shock to the information environment was both useful and large enough to impact the bank's lending decisions.

III.C   Change in Organization Design

We next investigate how the bank alters its organizational form to adapt to the new informational environment. The bank is composed of ten divisions, with each division headed by a

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[13]A plausible concern is that competitors may manipulate the ratings they report to the credit registry in order to protect their informational rents. While this is certainly possible, note that banks are frequently audited by the central bank to ensure their public ratings match their private internal risk assessment. Notably, in response to additional information made available through credit registry expansion, our bank did change its lending and organizational design. The fact that these changes led to an improved efficiency of lending suggests that this new information even if it was manipulated to some extent – was useful. Nevertheless, we also construct the revealed bad rating measure using the average rating between January 1998 and end April 1998, a period when there was no discussion that credit registry would be expanding and as a result manipulation concerns should not exist. The results we obtain are similar to those reported in the paper that use information from January 1998 to June 1998.

[14]It is worth noting that there may be competitive effects in the lending market that are also reflected in some of our estimates in this section. In particular, better interest rates offered to borrowers that are revealed to be of good quality suggest the presence of sufficient competition in lending. With no competition, the bank would not need to lower rates for borrowers that are revealed to be of good quality. In Section V we will try to disentangle the extent to which the availability of better information about borrowers operates through competitive effects in lending. For now, our endeavor is on documenting the overall effects that are triggered by changes in the information environment of borrowers – which may include effects induced through change in competition.

manager and several loan officers reporting to her. As noted, the analysis in Section III.B suggests that additional information about affected borrowers after the credit registry expansion was useful for bank's lending decisions. Given that one important task of loan officers is to produce information about borrowers, now also available through the credit registry, we expect the event to impact the organizational design of our bank.[15] We now study the effect of the credit registry expansion on allocation of loan officers in divisions, the nature of tasks by loan officers and division managers, and the nature of task delegation regarding lending decisions.

III.C.1 Loan Officer Tasks

In Table 3 we start by examining the changes in organization of loan officers by estimating the following loan officer-level specification:

$$y_{jt} = \left(\ \alpha_j + \beta \ \text{After}_{jt} + \gamma \ \text{After}_{jt} * \text{Share Exposed}_j + \epsilon_{jt} \ \right), \tag{2}$$

where j and t refer to a loan officer and time period, respectively. α_j represents loan-officer fixed effects and *After* is as defined before. Since the event impacts some borrowers, we assess if these effects vary with the extent of such borrowers in a division. We do this by augmenting the specification by interacting *After* with a variable that captures the proportion of exposed borrowers in the division (*Share Exposed*), which captures the proportion of borrowers in the portfolio of the loan officer that are exposed as of end June 1998. Finally, we estimate these regressions by tracking loan officers before and after the shock.

In column (1), the dependent variable is *Pr(Reallocated=1))*, where *Reallocated* is a dummy variable that takes a value of one if a given loan officer in a given quarter is reallocated to a different division from the one the officer is in before the event. As can be observed from the coefficient on *After*, the propensity to reallocate a loan officer does not change differentially after the event. However, there is a large change in the propensity to reallocate loan officers in divisions with a large share of exposed borrowers. In particular, the estimates in column (1) suggest a 2.9% increase in probability of reallocation for a loan officer whose lending portfolio consists primarily of exposed borrowers.[16] This result suggests that the information made available in the registry may have partly substituted for input from of a loan officer. It is worth noting that since all loan officers in a division report to the division manager, tracking

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[15]For instance, several models of information and firm organization would suggest a reduction in number of loan officer if the information from the credit registry substitutes the information gathered by the loan officer (e.g., Stein [2002]).

[16]An alternative way to think about this result is to recall that there are about five loan officers per division. In Appendix A.2 we run a similar specification as (1). The estimate of interest in column (3) suggests a reduction of 3.3 loan officers in a division with primarily exposed borrowers.

reallocation of loan officers in a division over time also tracks changes in that division manager's span. Thus, this result suggests a decline in the span of divisional managers in divisions with higher proportion of exposed borrowers.[17]

To investigate this aspect in more detail, we next examine changes in the tasks of loan officers after the event. In columns (2) and (3) we study the change in number of borrowers and the amount of lending handled by a loan officer. The results suggest that there is an increase in the number of borrowers handled and the amount of lending done by loan officers after the event. The increase is large and economically significant for loan officers whose portfolios consist primarily of exposed borrowers. In particular, these loan officers have a doubling of the number of borrowers they handle as well as of the average loan amount their portfolios. Finally, in column (4), we also examine the scope of lending activity of a loan officer as defined by the number of industries that loan officer's lending portfolio encompasses. These results show an increase in the scope of the activity of loan officers with primarily exposed borrowers in their portfolio, as they start lending to borrowers in a wider set of industries than they did before the shock.[18] Notably, we find no such changes in loan officers who handle primarily non-exposed borrowers.

Overall, we find that the information event led to a reallocation of loan officers in divisions that were composed of exposed borrowers, which decreased the span of divisional managers. The reallocation results in an increase in the load and widening in the scope of tasks for the remaining loan officers in such divisions.

III.C.2   Loan Officer Delegation

We now empirically investigate the change in the nature of delegation regarding lending decisions to loan officer after the credit registry expansion. The extent to which lending decisions may be delegated by higher-level managers to lower-level loan officers can be interpreted through the lens of an incentive-based model (Aghion and Tirole [1997]) or an information processing-based model (Garicano [2000]). In an incentive-based model, the decision to delegate a task depends on the trade-off between provision of incentives for lower-level loan officers

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[17]Both incentive-based (Aghion and Tirole [1997]) and information cost processing (Garicano [2000]) theories are ambiguous on the effect of information on the span of a division manager. In particular, in an incentive model, the span of a division manager could go up or down depending on how much authority on lending decisions is delegated to the loan officers a decision that involves a tradeoff between value of information obtained by delegating versus the cost of losing control over which actions are chosen (Aghion and Tirole [1997]). Alternatively, in an information cost processing model, the number of loan officers reporting to a manager could go up or down depending on the change in complexity of lending process that is induced by the new information environment (Garicano [2000]).

[18]Specifically, the number of industries covered by these loan officers after the credit registry expansion increase on average from 1.18 to 2.51.

for information and potential loss of control for higher-level managers. The incentive theory is ambiguous about the direction of delegation after the credit registry event. If the new information substitutes for loan officer input, the benefit of loan officer initiative would go down, which may imply less delegation (Stein [2002]). However, if the cost of losing control goes down – for instance, due to information in the credit registry allowing the higher-level manager to monitor the loan officer lending decisions better – there could be an increase in delegation (Aghion and Tirole [1997]). Alternatively, the information cost processing model also has predictions on delegation of tasks to lower-level workers from higher-level managers depending on the change in complexity of lending decisions induced due to information availability from the credit registry (Garicano [2000]). An increase (decrease) in the complexity of tasks due to the availability of additional information from a credit registry should result in a decrease (increase) in the delegation of tasks to lower-level loan officers from higher-level managers.

In our analysis we first construct a variable *Layers of Approval* that tracks the number of approvals required before lending is extended to a borrower in a given period. This variable is 1 if the loan officer approves the decision herself, 2 if the division manager approves the decision, and 3 if the corporate head approves the decision.[19] We measure the extent to which the delegation of a loan officer changes for a given borrower by tracking the change in *Layers of Approval* over time.

Before providing formal analysis, we present the summary statistics of *Layers of Approval* for exposed and non-exposed borrowers in Panel A of Table 4. As can be observed, before the shock, the average layer of approval for exposed borrowers is similar to those of non-exposed borrowers. In other words, there is similar delegation for decisions relating exposed and non-exposed borrowers. The summary statistics also show a sharp reduction in the layer of approval for exposed borrowers after the event. In contrast, the layer of approvals remains similar for non-exposed borrowers. Consequently, there seems to be an increase in delegation for exposed borrowers, while there is no concurrent change for non-exposed borrowers. These results make intuitive sense because only the information environment of the first group changed around the event.

To evaluate these patterns more rigorously, we next turn to a more formal analysis. Panel B of Table 4 presents the results of regressions that mirror our main specification (1) and examine the change in number of approvals regarding a lending decision to a given borrower around the event. As mentioned before, these regressions are estimated at the borrower level

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[19]Though this variable can take values above 3 (till a maximum level of 7) which requires approval outside the corporate lending (e.g., risk management head and upper layers in the organization), the context involves loans that are exceptionally large and different from those considered in our sample of firms (e.g., government loans).

and account for borrower and loan officer fixed effects. We also include time-varying borrower-level variables, the total amount borrowed as of a given period and the internal rating of the borrower. As can be observed in column (1), on average, the layers of approval fall by more than half a level after the event for exposed borrowers. This estimate suggests that lending decisions of exposed borrowers are more likely to get approved at the loan officer level after the shock. In contrast, consistent with the summary statistics, there is no change in the delegation for non-exposed borrowers.

Next, using an alternative test, we confirm that a given loan of an exposed borrower is indeed more likely to be approved by lower levels in the organization. Broadly, we estimate the layers of approval formula that the bank uses in the pre-credit registry expansion period and use it to predict the levels of approval that the bank would follow in the post-credit registry expansion period, all else remaining the same. In other words, the predicted layers of approval in the post-expansion period give us the counterfactual on how the levels of approval would be, if nothing changed.

We start by using the pre-credit registry expansion data for exposed and non-exposed borrowers and estimate the empirical relationship between levels of approval and the variables that the bank used to assign borrowers to different approval categories. Specifically, the dependent variable in the regression is *Layers of Approval*, while explanatory variables include variables that determine the layer of approval as per the bank manual.[20] We then use the coefficients from this regression estimated on pre-credit registry expansion data to predict the number of layers of approval in the pre- and post-credit registry expansion. Finally, we compare the predicted layers of approval with the actual layers of approval and compute the residuals. The residuals are plotted in Figure 1 for exposed borrowers in both the pre- and post-credit expansion periods. As should be the case mechanically, the residuals are centered at zero for the pre-credit expansion period. However, the actual average layer of approval for exposed borrowers goes down relative to the predicted levels, during the post-credit expansion period since the residuals systematically shift to the left. This evidence suggests that the process of assignment of borrowers to approval categories clearly underwent a change after the credit registry expansion.

Next, we investigate how the reduction in layers of approval is related to the nature of

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[20]We have access to the three main variables that enter in the formula that assigns borrowers to layers: Total Facilities (i.e., amount of funding across loans available to the borrower), Objective Internal Financial Risk Rating, and a variable that indicates whether the company is delinquent/in default. Since this information is available quarterly, we also added borrower fixed effects to capture the time-invariant characteristics that enter the formula. The coefficients on the three main variables of interest are 0.120, 0.070, and 0.193, and they are all significant at the 1% level. These signs suggest that decisions on lending of a borrower are decided higher up in the hierarchy if they are given more funding, are likely to have a higher risk rating or are delinquent.

information that is revealed about the borrower by interacting *After*Exposed* with *Revealed Bad Rating*. The coefficient of interest in column (2) of Table 4 indicates that the increase in delegation is confined to exposed borrowers that are revealed to be good relative to the bank's information. There is also a decrease in delegation for exposed borrowers that are revealed to be bad relative to the bank's information (i.e., the *Layers of Approval* coefficient increases by almost one level [0.975] relative to those borrowers revealed to be good. It is worth noting that these results are not driven by a simple change in the increase in lending to exposed borrowers who are revealed to be good. If anything, all else equal, an increase in loan amount implies a decrease in delegation – since, as per bank rules, a higher loan amount mechanically increases the layers of approval.

Overall, using within borrower and within loan-officer variation, we present robust evidence that there was an increase in delegation of loan approval to loan officers for exposed borrowers that are revealed to be good. As noted before, these patterns can be rationalized by both the incentive-based and information cost processing theories we outlined earlier. Using incentive-based theories, one could argue that there is an increased delegation of tasks to the loan officers because information made available after the event may have dampened the costs from loss of control that result from allocating the tasks to loan officers. Similarly, information cost processing theories could rationalize these patterns if the introduction of the credit registry made the task of borrower screening by loan officers simpler.

The findings in this section could also rationalize some of our earlier results on loan officer reduction and expansion of scope of their activity. In particular, if delegation after the credit registry expansion reduces the time spent by loan officers in deciding on decisions, it could free up time that would, as we found, allow a loan officer to increase her load and scope of tasks.

III.C.3 Changes in Division Managers' Span and Scope

We end this section by examining if the changes in decision making at the loan officer level are accompanied by concurrent changes in the tasks performed by the division manager. As discussed before, there is a reduction in the number of loan officers with mainly exposed borrowers in their portfolio. This implies a reduction in the span of control for managers in divisions with many exposed borrowers. Moreover, as the results of the previous section show, there is also an increase in delegation of lending decisions to the loan officers with exposed borrowers, and no change for non-exposed borrowers. We therefore expect some changes in the nature of tasks conducted by division managers with exposed borrowers since they have fewer loan officers and less loan activity to monitor after the event.

We investigate this issue by focusing on one such activity that we can measure in the data. The activity –number of business development programs conducted in a period– involves scouting for prospective clients by division managers. Each program involves scouting roughly 20-30 prospective borrowers every quarter. We track how this task changes for a division manager after the credit registry expansion in column (5) of Table 3. The regression is estimated at the division-manager level with a specification similar to that employed in the first four columns. As can be observed, there is a change in the extent of business development activity conducted by managers of divisions with a high proportion of exposed borrowers. The effect is economically large. For instance, the mean business development program in the pre-credit registry expansion period is 2.5 (Table 1 Panel A), so the number of business development programs almost doubles for managers in divisions with only exposed borrowers after the expansion event.

This increase in nature of division-manager tasks is also consistent with the incentive and information-based theories discussed earlier. For instance, Aghion and Tirole [1997] suggests that division managers with formal authority delegate real authority on decisions to loan officers using their span of control as a commitment to not interfere in loan officer decisions. Since the reduction in number of loan officers reporting to a division manager in a division with exposed borrowers weakens this commitment, the managers could increase the intensity of business development activity to strengthen the commitment to not interfere in loan officer lending decisions. Similarly, Garicano [2000] could rationalize these patterns if we assumed that the introduction of the credit registry made lending decisions simpler for loan officers by reducing the cost of obtaining information about the quality of borrowers. This would result in an increase in lending tasks done at loan officer level and free up time for division managers to do other more complex activities.

III.D Changes in Profitability

We have seen that the credit registry expansion was a large enough shock for the bank to change its lending and organizational design. We conclude our main analysis by investigating whether these changes brought an improvement in the bank's lending decisions after the event. We do so by assessing the changes in the nature of profitability of the bank's lending decisions. We compute a measure of profitability for each borrower in a period and assess how this measure changed for exposed and non-exposed borrowers over time. In particular, we compute the profits from lending to a given borrower in a quarter as:

$$ROC_{it} = \frac{R_{it} - E_{it}}{L_{it}}, \tag{3}$$

where R_i is the revenue from lending products as well as fee-based transactional revenues from a given borrower i; E_i is the cost of the loan offered to the borrower that includes expenses for offering the products, and L_i is the total amount outstanding for the borrower in that period. We then use our main specification (1) using ROC as the dependent variable.

Before presenting the main results, we report the summary statistics on ROC in Panel A of Table 5. As can be observed, on average, the profitability of exposed borrowers increases after the credit registry expansion from 9.4% to 12%. Concurrently, there is no change in profitability of non-exposed borrowers after the event. This pattern –together with our findings on changes in lending decisions and organizational design– suggests that additional information about exposed borrowers may have improved efficiency of credit allocation decisions, which in turn increased bank profitability.

We investigate these patterns more formally in Panel B of Table 5. As can be observed in column (1), there is an overall positive effect of credit registry expansion on the profitability of exposed borrowers (around 2.4%). In column (2) we find that this improvement of profits is confined to exposed borrowers who are revealed to be of good quality relative to the bank's information; there is a decline in profits for the borrowers that are revealed to be of bad quality relative to the bank's assessment. The effect seems large. Profits per period differentially increased by 2.6% for borrowers who were revealed to be good quality and decreased by 3.3% for those borrowers who were revealed to be of bad quality.

Next, we investigate why profits increase for some exposed borrowers while declining for others. To assess this issue, we decompose ROC and study its various components. We start by investigating the change in the amount of high-margin transaction-based products extended to different borrowers in the next two columns. In particular, we construct the proportion of revenues from a borrower every quarter that are generated through fee-based products – a high-margin business for the bank – and call this variable *Transaction Revenues as % of Total Revenues*. These types of activities includes several products, such as Cash Management, Payroll Services, Trade Services and Investment Management, and involve more intensive interaction with the borrower. As can be observed from Panel B of Table 6, we find that there is a proportional increase in such lending for exposed borrowers on average (2.1% in column (3)) and, as before, this increase is confined among exposed borrowers that are revealed to be good. The differential increase for these borrowers is 2.6%, compared with the differential decrease of 7.5% of those borrowers revealed to be bad. As before, there is no change in this variable for non-exposed borrowers.

In columns (5) and (6), we conduct a similar exercise focusing on the expenses as a pro-

portion of the outstanding loan amount.[21] The results suggest that expenses fall for exposed borrowers after the event by 1.1%. Moreover, this decline is again confined to borrowers who are revealed to be of good quality relative to the bank's information. For those revealed to be of bad quality, there is a concurrent differential increase in expenses. These findings are consistent with our earlier results that showed that lending decisions were delegated to lower-level loan officers – making the lending process less expensive – for borrowers that were revealed to be of good quality. Similarly, these findings are also consistent with our earlier evidence that delegation to lower-level loan officers declined – making the lending process more expensive – for borrowers that were revealed to be of bad quality.

Finally, in the last two columns we investigate if there is a change in the nature of defaults for these borrowers around the credit registry expansion. In this analysis, we define borrower default as an event that takes a value of one if the bank keeps a loss reserve or writes off a loan of that borrower in that period. As can be seen, the rate of default remains similar for exposed borrowers after the event. This is the case for borrowers revealed to be either good or bad quality. There is also no change in the default behavior of non-exposed borrowers around the event. These results reveal that the difference in performance for exposed borrowers around the event is not driven by changes in default behavior but rather by changes in revenues and expenses incurred in serving the borrower.

Overall, our results paint a consistent picture. In conjunction with the results of the previous section, we can infer that the increase in profits of the bank after the credit registry expansion occurs due to improved targeting of credit to different borrowers. In particular, there is an increase in fee-based high-margin transactional services to some of the borrowers– a task that involves more intensive interaction with borrowers and is potentially facilitated by concurrent change in the organization design such as increased delegation in lending decisions to loan officers. Together, these changes seem to improve the efficiency of credit allocated by the bank.

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[21]These expenses are again computed at the borrower level. They include costs related to borrower interactions and consist of items such as transportation and communication expenses in monitoring the borrower and items such as loan officer salaries or other fixed costs of the division, apportioned to the borrower by the bank. We checked the lending manuals of the bank to confirm that the accounting process by which fixed costs are apportioned across borrowers remained the same during our sample period.

IV Additional Evidence

IV.A Dynamic Patterns

In this section we examine how the estimated effects we documented earlier evolve over time. We estimate a specification similar to (1) for all borrowers in the intensive sample and plot the coefficients in Figure 2. Specifically, we plot the differential effect of exposed borrowers relative to non-exposed borrowers by plotting coefficients of the interaction of *Exposed* and a set of quarterly indicators, q in Panel A, as well as coefficients on the interaction of *(1-Exposed)* and a set of quarterly indicators, q in Panel B. These plots confirm that changes in lending, interest rate, profitability, and delegation occurred only for the exposed borrowers after the credit registry expansion. There is no concurrent change in the variables of interest for the borrowers in the non-exposed group.

The analysis also shows that there are no changes before the event and that there is a sharp differential change in the outcome variables of interest for the exposed borrowers after the event. Moreover, the effects occur relatively quickly (i.e., after one quarter) for all outcome variables, except for delegation, where the effect appears to kick in only two quarters after the event, in December 1998. The relative quickness with which these changes occur may not be surprising, given that our bank is one of the more aggressive bank in the Argentinean economy.

IV.B Borrowers Around the $200K Threshold

One concern with our tests so far is that the borrowers in the exposed and non-exposed groups may be different –for instance, due to different investment opportunities. As a result, the differences in the two groups that we capture after the shock could reflect, in part, these inherent differences between the two groups. Our tests in Section III showed that the pre-shock differences between the two groups were constant before the credit registry event. Thus, to the extent that these differences remain similar after the shock, the effects we identified earlier will be reasonable. Notably, Appendix A.3 (Panel A) provides evidence that is consistent with this conjecture since pre-trends of the main variables of interest between the two groups before the shock are parallel. Nevertheless, we now provide an alternative empirical test to further allay such concerns.

We consider two subsets of borrowers that are likely to be similar on all characteristics, except that the information environment changes for one set of borrowers, while it remains the same for the other set of borrowers. We then assess the change in lending and organizational variables related to these groups of borrowers, before and after the shock. Specifically, we form

two subsets of borrowers: (a) Exposed: borrowers below the threshold whose total lending across banks was between $[155K, 200K)$; these are borrowers for whom information in the credit registry was available only after the shock; and (b) Non-Exposed: borrowers above the threshold whose total lending across banks was between $[200K, 245K]$; these are borrowers for whom information in the credit registry was always available. In our analysis, we assess the changes in lending and organizational variables for the former set of treated borrowers, with the latter set serving as a control group. Since we have restricted our sample, we are left with 189 and 161 unique borrowers in the treatment and control samples, respectively. As a reflection that the borrowers in these groups are well matched, note that the average net sales of borrowers in these two groups range between $350-$400K.

We start by assessing the changes in lending behavior and organizational design variables after the credit registry expansion for the treated and control borrowers around the $200K threshold. We present the summary statistics for the two groups of borrowers in Panel A of Table 6. The descriptive statistics are comparable, both qualitatively and quantitatively, to those using the unrestricted sample reported in Panel A of Table 2. In particular, on average, we observe changes in lending, profitability of lending, and delegation of decisions for exposed borrowers and observe no changes for the non-exposed borrowers. We test these patterns formally in Panel B of Table 6 using the same baseline specification as employed earlier. Our analysis shows that, on average, the bank delegated more to the loan officers when information about borrowers was made available in the credit registry. Moreover, we find that lending increased, interest rates fell, and bank profits went up for this subsample of borrowers. Concurrently, there was no change on these fronts for non-exposed borrowers around the event. Appendix A.3 (Panel B) shows that, similar to our main sample, pre-trends of the main variables of interest for the two groups considered here are also parallel.

We conduct several additional tests that suggest that our findings are robust. In particular, one could be worried that some (for instance, inherently good) borrowers may have manipulated their total lending above the threshold before the shock – given the benefits in terms of lending once their information is available across banks. As a result, the borrowers in the control and treatment groups would differ on some dimensions. Note that, unlike a formal regression discontinuity design, we do not compare the treatment and control groups around the thresholds to make any inferences. Instead, our assessments are based solely on observing changes in the lending and organizational variables for the treatment group relative to changes in the control group around the event. In addition, we conduct the analysis now placing the exposed borrowers in the bins between $[155K, 200K)$ using the retroactive information as of January 1998 only (which is well before the announcement of the credit registry

expansion). Our inferences remain unchanged. Nevertheless, to the extent that borrower manipulation could have occurred well before January 1998, our inferences should be interpreted with caution.

We also conduct another test restricting our analysis to a subset of firms for whom borrower information revealed under the credit registry expansion to our bank is not likely to be as important – i.e., for such borrowers the lending was primary done by our bank. Absent any competitive effects due to information revelation to competitors, we expect to find no changes in organization of lending for these firms. We focus on firms whose total lending from our bank *only* is close to the $200K, while still being below the threshold. We consider borrowers whose total lending from our bank is between $180K and $200K during the period from January 1998 to end June 1998. It is plausible that for these firms, the bank would not obtain much information from lending decisions of other banks. The reason is that very small loans were potentially obtained from other banks by this borrower (less than $20K at best).[22] After restricting the lending amount, we find 16 such borrowers in our sample. We present the analysis in Panel C of Table 6. As is evident, we find no changes in lending, interest rates, delegation, or profitability for these borrowers after their information is shared through the credit registry.

We conclude our analysis by studying the dynamic behavior of these two subgroups in order to compare the patterns of each group over time.[23] The patterns for each group are plotted in Figure 3. In particular, in Panel A (Panel B) we plot the coefficient on *Exposed* (1-*Exposed*) interacted with quarter dummies, q from an OLS specification similar to (1) between September 1997 and September 1999. The estimation uses the restricted sample around $200K, and the outcome variables used are log of Total Loans, Interest Rate, Return on Capital, and Layers of Approval.

A couple of observations can be made from the plots in Figure 3. First, after the credit registry expansion in July 1998, in Panel A we observe sharp changes in the outcome variable of interest for the exposed borrowers. These changes occur roughly between September 1998 ($q = 1$) and December 1998 ($q = 2$). Second, as shown in Panel B, there is no change in the outcome variables of interest after the event for the control group. The outcome variables for this group of borrowers remain relatively flat across the quarters. Overall, the findings in this section reinforce what was established in Section III.

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[22]As noted earlier, borrowers with a bad credit rating – reflecting difficulty in making payments to any of the banks the borrower borrows from – had their information shared at all times. This implies that the overall credit condition of borrowers who borrowed between $180K and $200K and whose information is not shared must be of reasonable quality.

[23]Appendix A.3 (Panel B) provides evidence that is consistent with this conjecture since pre-trends of the main variables of interest between the two groups before the shock are parallel.

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IV.C Extensive Margin

So far we have evaluated changes in the lending behavior and delegation on the intensive margin. For completeness, we now turn to examining these changes on the extensive margin. In Table 7, we start by presenting results on lending terms only for new borrowers. The data allow us to identify whether a given borrower is new, allowing us to restrict the sample to new borrowers in the pre-period and compare various outcome measures with the sample of new borrowers in the post-period. The sample consists of 1,050 new borrowers that enter during five quarters in the pre-credit registry expansion period and 2,028 new borrowers that enter in the ten quarters after the credit registry expansion has taken place.

As can be observed, the results in column (1) mirror the results on lending presented earlier. In particular, we find that, conditional on observables, there is 35% more lending to exposed borrowers. We also find evidence that this lending is done at a lower interest rate after the event. Similarly, column (3) shows that the profits earned by the bank on the new exposed borrowers is higher (i.e., ROC increases on average by 2.2%). Finally, column (4) shows that there is more delegation for new exposed borrowers after the credit registry event since the layers of approval decrease by about 0.67 for these borrowers. There is no such change for non-exposed borrowers. These results are consistent with our earlier discussion. There is better screening of new borrowers due to information that becomes available in the credit registry and more delegation for such borrowers as well.

There is an alternative interpretation of these results. In our discussion above, we assumed that the pool of borrowers that the bank faces in any given period remains constant. It is plausible that with information revelation, the pool of borrowers that applies to the bank shifts toward better-quality borrowers (on unobservables). For instance, after the event, borrowers who know they are of good quality may want to approach banks in hope of advantageous treatment. If so, several of our results in this section could simply reflect this improvement in quality of the pool of borrowers. However, the fact that the changes in outcome variables of interest are also present in the pool of existing borrowers as outlined in Section III and IV – that exploits only *within-borrower* variation – gives us comfort that at least part of these results are likely driven by changes in organization of lending, all else equal.

V   What is the Information About?

Our analysis so far has assumed that the information revealed by the credit registry expansion is only about creditworthiness of the borrower. In particular, results in Section III showed that

the registry may have revealed more information about creditworthiness of the borrower: loan officers and division managers were able to adjust the price and quantity of loans to exposed borrowers, as they were able to better assess their credit quality. However, the registry may bring about changes in information environment on three other fronts.

First, the registry may also reveal information about how much collateral is pledged by a borrower to other lenders. This might allow our bank to better assess recovery rates in case of default. Second, the registry may reveal information on the quality of loan officers. In particular, the bank may update on the loan officer's quality based on the degree to which the loan portfolio that is exposed by the event is deemed to be worse using new information from the credit registry than what the loan officer assessed. Finally, the registry can also reveal information on the degree of competition among lenders for a given borrower. This information could potentially be useful as the loan officer adjust the quantity and price of loans extended to the exposed borrower. We now examine which of these channels might also be at play.

V.A Collateral

If the registry reveals information about the quality of the collateral, we would expect secured lending for exposed borrowers to change after the event – for the same quantity of collateral that is pledged by the borrower. The reason is that information in the registry would allow lenders to get a better estimate of the recovery rates on secured loans in the event of a default. We explore this issue by assessing the change in lending secured by collateral in column (1) of Table 8. The regression mimics our main specification (1) that was employed in Table 2.

As can be observed, we find that there is an increase in secured lending for exposed borrowers. The estimate is large and suggests an increase of around 75% relative to non-exposed borrowers after the credit registry expansion. This finding is consistent with bank placing a higher estimate on recovery, in case of default on secured loans. In column (2), we re-estimate the specification and examine the change in secured lending for borrowers based on the nature of information about their credit assessment that is revealed during the registry expansion. Consistent with the overall lending results presented in Table 2, we find that the increase in secured lending is concentrated among borrowers who are revealed to be good. There is also a concurrent differential contraction in secured lending for borrowers who are revealed to be of worse quality (i.e., the coefficient *After* Exposed Borrower* Revealed Bad Rating* is negative and significant). We find no such patterns for unsecured loans such as unsecured lines of credit, unsecured term loans, and overdrafts in columns (4) and (5). This evidence suggests that there is a positive correlation between the assessment of borrower and collateral quality for the treatment group after the information is released through the credit registry. Notably,

we are also able to check that the amount and type of collateral pledged by the borrower before and after the credit expansion did not change. Thus, the change in nature of lending is not driven mechanically by changes in type or quantity of collateral that is pledged to the bank around the event.

Finally, in column (7) we consider the change in delegation of lending decisions based on the extent of collateralized lending. To assess this, we follow the same empirical design as in Panel B of Table 4. We construct a variable *% Unsecured Loans* that is the proportion of unsecured loans to total loans extended to a borrower. We interact this variable with *After*Exposed* to assess how the delegation of authority for exposed borrowers changes depending on the proportion of lending that is unsecured. We see no effect based on this coefficient estimate. In contrast, we find that more delegation occurs primarily for borrowers who have been extended secured loans. The coefficient *After* Exposed Borrower* is negative, non-trivial and statistically significant.

Viewed through the lens of an incentive-based model, these findings suggest that information revealed in the credit registry may have lowered the extent of downside for secured loans for the divisional manager. Consequently, delegation increases for exposed borrowers who primarily borrow using secured credit. Similarly, if the complexity of lending is reduced – because the information revealed makes it easy to evaluate the collateral – information cost processing theories would also suggest an increase in delegation.

V.B   Loan Officers

We have argued there may be a link between information released by the credit registry expansion and changes in the organizational design of lending. An alternative explanation is that the decrease in the number of loan officers in divisions with exposed borrowers is due to loan officers being revealed to be of bad quality. Specifically, since the credit registry expansion reveals new information about how the borrower was evaluated by other banks, it gives an opportunity for the division manager to identify who the 'bad-type loan officers are. Under this scenario, loan officers who are reallocated to other parts of the bank might be those who had a high proportion of exposed borrowers in their portfolio that were revealed to be of worse quality relative to loan officer assessment. We now explore if this is indeed the case.

To do so, we construct a portfolio of exposed borrowers for all loan officers who are present in our data before the credit registry expansion. We group these loan officers into four quartiles based on the percentage of exposed borrowers in the portfolio of a given loan officer as of end June 1998. The percentages of exposed borrowers in loan officer portfolio are 16.47% (lowest

quartile), 37.40%, 64.87%, and 82.34% (highest quartile). Next, in each quartile we compute the percentage of exposed borrowers in a loan officer's portfolio that were revealed to be of worse quality than loan officer's assessment. We do this for two groups of loan officers – those who were reallocated after the credit registry expansion and those who are not. We find no difference between the percentage of exposed borrowers that are revealed to be of worse quality than loan officer's assessment across the two groups in each of the quartiles. The percentage of exposed borrowers revealed to be bad for reallocated (not reallocated) loan officers is 12.90% (12.68%), 10.34% (10.37%), 8.89% (8.67%), and 3.43% (3.95%). None of the differences between the two groups in each quartile are statistically significant at the 10% level. In an unreported regression, we confirm this formally.[24] Thus, the evidence in this section suggests that information revealed by the credit registry expansion – and the resulting changes in lending and organizational design – were not likely about loan officer quality.

V.C Lender Competition

We discussed in Section III.B that some of the patterns we document may be due to competitive effects in the lending market after information is revealed through the credit registry expansion. As noted, we are documenting the overall effects triggered by change in the information environment of borrowers. This change may include effects through change in competition induced due to change in information environment. Several tests now suggest that such effects may, in fact, not be as important in our setting. First, we find that overall profits for the bank on the intensive margin – that is, borrowers in the treatment group – went up after information about these borrowers was revealed in the credit registry. Competitive effects might have suggested profits would go down.

Second, as noted in Section IV, we find no changes in lending or organizational behavior for the set of firms for whom information is revealed to competitors, but information revealed to our bank is not likely to be important. In particular, we find these patterns for exposed borrowers who are closed to the $200K threshold with our bank as its main lender (sometimes the only lender).

Finally, using a similar specification to (1), we explore whether the number of lending relations have a differential effect on the nature of lending. We find that there is no such effect. The coefficient estimate on *After*Exposed Borrower*Revealed Bad Rating*# of Lenders*

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[24]In particular, we estimate a regression similar to column (1) of Table 3, with an additional interaction term *After*Share Exposed Bad*. Here *Share Exposed Bad* is the proportion of borrowers in the portfolio of the loan officer that are exposed as of end June 1998 and are revealed to be of worse quality based on average rating in the credit registry across *all other banks* that a given borrower borrows from relative to the rating assigned by that loan officer. More specifically, the coefficient on the interaction term is 0.001 with large standard errors.

in Table 8 for unsecured (column (3)) and secured (column (6)) loans is not statistically significant. We also find that the number of lenders has no differential impact on the layers of approval as shown in column (8). We conclude that the new information on which lending organization of our bank changes is not likely to be about the competition it faces for a given borrower.

VI   Are the findings applicable more broadly?

We have examined changes in the lending decisions as well as organizational design only for the bank for which we have extensive internal bank data. A natural question that comes to mind is whether the credit registry expansion also altered lending decisions and organizational design of other banks in the economy. Data limitations hamper the extent to which we can do as detailed an analysis as what we did earlier. In particular, we do not have detailed borrower-level interest rate and lending information for other banks in the economy. As well, we do not have information on all the aspects of organizational design for these banks. We do, however, have aggregate data on lending and profitability across all 102 banks in the financial system.[25] In addition, we have detailed information on several measures of loan officer delegation inside these banks based on surveys about loan officer role and hierarchical structure.[26]

In our analysis we separately assess the changes in lending and organization design for large banks –similar to our bank – around the credit registry expansion and for small local banks. The reason for this separation is that the literature (e.g., Mian [2006]) asserts that although large banks have better technology, they face a disadvantage in dealing with soft information loans compared with their small and local competitors. Hence, changes in legal institutions and credit registries may have a bigger effect on large banks (Buch [2003], Haselmann et al. [2009]) and could level the playing field across banks. We assess this conjecture in this section.

We first conduct our analysis on a subset of banks in the economy that most closely resemble our bank. There are a total of 102 banks in the financial system. We classify banks according to their size before the credit registry expansion because we want to assess how

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[25]We use quarterly financial information on these banks, collected from the Superintendencia de Entidades Financieras, an entity that is governed by the Central Bank of Argentina. The descriptive statistics are reported in Table 1 Panel C.

[26]The surveys are conducted by an independent consulting company on an annual basis in order to analyze the competitive position of the bank relative to its competitors. These surveys are completed by a random set of borrowers of our bank on an annual basis from 1998 to 2002. Information collected in each year's wave corresponds to the prior year. The surveys report the perception of these borrowers on the extent of authority that loan officers from different banks have in making lending decisions when dealing with these same borrowers. These surveys explore a wide variety of issues, such as corporate image, product variety, loan officer roles, and organizational and hierarchical structure of the organization. We use an average of the responses across questions to derive our measure of delegation. For a detailed discussion of this measure, see Appendix A.4.

banks of similar size –and presumably similar screening technologies – reacted on dimensions of lending, delegation, and subsequent profitability after the credit registry expansion. We select all the banks whose pre-shock size is above the median as a comparison group since our bank is also in the above median group. Note that most banks in this group are private banking institutions in Argentina. The regression specification mirrors specification (1) but with quarterly bank observations. We construct the share of exposed borrowers for each bank, *Share Exposed Bank* as of end June 1998, using the information obtained from the credit registry.

In column (1) of Table 9 we examine the change in lending for these banks. The main explanatory variable is the share of total loans made by a bank to small, medium, and large enterprises that are exposed –that is, whose information was not available in the credit registry before the credit registry expansion. The coefficient on *After*Share Exposed Bank* is positive (1.746) and significant, suggesting that, similar to our bank, these banks also increased lending to their exposed borrowers. Notably, there is no change in lending by banks that have no share of exposed borrowers (i.e., the coefficient on *After* insignificant). If the same mechanism as in our bank is at play, after the credit registry expansion, there must be more lending to borrowers whose quality is revealed to be good relative to internal information on these borrowers with these banks. Unfortunately, we do not have data on borrower-level profitability or revealed quality relative to internal bank ratings for these banks. Therefore, we use a crude proxy and evaluate the change in efficiency of lending by assessing the change in profitability of the bank (*ROA*) around the event. The results on profitability are suggestive in this direction, as the coefficient on *After*Share Exposed Bank* is positive (0.009) and significant.

Next, we assess if there is a change in delegation of authority to loan officers across these banks. In particular, we estimate a regression similar to the regression in Section III.C.2. In column (3) we find an increase in delegation (i.e., a decrease in the layers of approval) of comparable banks whose lending portfolio consists a large share of exposed borrowers –that is, the coefficient on *After*Share Exposed Bank* is -2.337 and significant. In addition, there is no change in the delegation measure across banks whose portfolio consists largely of non-exposed borrowers (the coefficient on *After* is -0.077 and insignificant).[27] These findings are very similar to those we reported for our bank. Overall, the results in this section provide some suggestive evidence that the changes we document inside the bank might be applicable to other comparable large banks in the economy.

Finally, we also examine changes in aggregate lending, profitability, and delegation for small

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[27]As a check, we examined if our bank (also covered as part of the survey) saw a change in delegation in the survey. Indeed, the survey revealed an increase in delegation to the loan officers.

banks in the economy. To conduct this analysis, we follow the approach above and select a group of banks with below-median pre-shock size. There are 51 banks in this group. In column (4) of Table 9 we present the results on aggregate lending by these banks and find a reduction in lending by banks that have a large share of exposed borrowers. A bank whose portfolio is formed totally by exposed borrowers experienced a reduction of 88.5% in total aggregate lending. Although not significant, as shown in column (5), there seems to be a reduction in profitability of these banks if they have a large share of exposed borrowers in their portfolio. This suggests that smaller banks may have become worse off after the information change. Finally, there is also no change in delegation in these banks, as is shown in column (6).[28]

As noted earlier, the analysis in this section is based on data that has severe limitations. Thus the results in this section are, at best, suggestive. These results point to a direction that larger banks in the economy may have been better able to implement changes in their lending and organizational design after credit registry expansion. These results are consistent with arguments we alluded to earlier; larger banks have scale advantages but might be unable to evaluate soft information. Thus, additional information about borrowers which might be correlated with soft information about these borrowers – enabled through the credit registry expansion, would favor larger banks relative to smaller local ones.

VII   Conclusion

In this paper, we studied the changes in lending practices and organizational design at a large multinational bank due to expansion of a credit registry for a subset of its borrowers. Additional information about borrowers leads to an improvement in the efficiency of credit allocation decisions, which increases bank profitability. This change is enabled due to concurrent changes in the nature of tasks and the delegation of authority in lending decisions to loan officers in response to the new informational environment. More authority is delegated to loan officers handling exposed borrowers, which seems to enable both improved targeting of credit to borrowers and expansion in the scope of activity of division heads. We present evidence that credit registry also reveals information about collateral quality in addition to borrower quality.

The patterns of the paper can be rationalized under the umbrella of either incentive-based or information cost processing theories. Incentive-based models could rationalize our findings

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[28]While there is no change in profitability or delegation by smaller banks that lend primarily to non-exposed borrowers, there is a small increase in lending to these borrowers after the shock. It is difficult to assess reasons for this result without having access to detailed data on price and quantity of loans at the borrower level for these banks.

since the information made available after the credit registry expansion about borrower and collateral quality – reduces the potential cost of losing control for division managers when they delegate more tasks to loan officers. These patterns could also be rationalized by information cost processing models since the credit registry expansion made more information about borrower and collateral quality available to loan officers, thereby making their screening decisions simpler.[29] We think both these effects might be at play. Regardless of the exact theory that delivers these results, our findings could help rationalize why improvements in the information environment of borrowers such as availability of credit scores and credit records – may be altering the landscape of lending by moving decisions outside the boundaries of financial intermediaries.

Our findings are consistent with the idea that firms change their organization design in order to take advantage of the change in their environment, and this seems to affect their performance. This agrees well with the views of several academics who argue that the "fit" between organization design and environment is necessary for achieving high performance (Roberts [2004], Chandler [2005]).

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[29]It is worth noting that, given our results, we can interpret the credit registry expansion as having led to an improvement in information technology rather than communication technology using the parlance of Bloom et al. (2014). Improved communication technology reduces communications costs between loan officers and division managers, and would have led to more centralized lending decisions. On the contrary, information technology improvements reduce the cost of loan officers to access and process information, leading to, as we find, a more decentralized lending process.

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Table 1
Descriptive Statistics

This table reports the descriptive statistics of the key variables used in the analysis. *Panel A* presents statistics at the Division Manager Level (DM) and Loan Officer Level (LO) reported quarterly in the pre-credit registry expansion period. *Panel B* presents statistics at the Borrower Level reported quarterly in the pre-credit registry expansion period. The pre-credit registry expansion period is defined between April 1997 and ending June 1998 (5 quarters). The post-credit expansion period is between July 1998 and December 2000 (10 quarters). The samples reported in *Panel A* and *Panel B* are division managers, loan officers and borrowers who are present both before and after the credit registry expansion (i.e., intensive margin sample). There are a total of 10 divisions, 49 loan officers and 2,227 borrowers tracked over time. Pre No. Obs is the number of observations in the pre-credit registry expansion period. Pre + Post No. Obs is total number of observations in the 15 quarters. *Panel C* presents pooled cross-section statistics reported quarterly for all the financial institutions in the Argentinean financial system present between January 1997 and December 1999.

Panel A: Division Manager and Loan Officer Level (Pre-Credit Registry Expansion)							
	Mean	Std. Dev	Median	Min	Max	Pre No. Obs	Pre + Post No. Obs
Division Manager Level (DM)							
Total Loans ($000)	601,840	601,486	292,273	34,881	2,177,808	50	150
Share Exposed Borrowers	0.286	0.263	0.186	0.064	0.972	50	150
Number all LOs	4.900	2.359	5	4	7	50	150
No. of Development Programs	2.500	2.782	1	1	10	50	150
Loan Officer Level (LO)							
Total Loans ($000)	96,457	127,369	142,477	37.5	593,104	245	735
No. Borrowers in LO Portfolio	43.40	60.44	25	1	185	245	735
Share Exposed Borrowers	0.242	0.298	0.114	0	0.994	245	735
Scope of Activities	5.54	4.41	5	1	22	245	735

Panel B: Borrower Level (Pre-Credit Registry Expansion)							
	Mean	Std. Dev	Median	Min	Max	Pre No. Obs	Pre + Post No. Obs
Borrower Level							
Total Loans ($000)	3,368	29,312	66.47	0.110	1,135,159	11,135	33,405
Interest Rate	0.119	0.108	0.073	0.011	0.310	11,135	33,405
Layers of Approval	2.085	1.039	2	1	7	11,135	33,405
Return on Capital	0.086	0.064	0.080	-0.081	0.988	11,135	33,405
Central Bank Credit Rating (Exposed)	1.242	0.704	1	1	5	6,705	
Revealed Bad Rating (Dummy) (Exposed)	0.088	0.284	0	0	1	6,705	
Transactional Rev. as a % Total Rev.	0.368	0.194	0.344	0.000	1.000	11,135	33,405
Expenses as a % of Total Loans	0.054	0	0.057	0.000	0.927	11,135	33,405
Number of Lenders	2.811	2.926	2	1	25	11,135	33,405

Table 1 (cont'd)
Descriptive Statistics

Panel C: All Financial Institutions						
	Mean	Std. Dev	Median	Min	Max	Total Obs.
Bank Level						
Total Assets ($000)	1,594,697	3,093,504	393,601	10,162	18,300,000	1,224
Total Loans ($000)	276,879	536,993	71,259	0.000	3,386,824	1,224
Return on Assets	0.001	0.010	0.002	-0.027	0.040	1,224
Share Exposed Bank	0.226	0.148	0.223	0.018	0.750	1,224
Delegation Measure (Survey) (Yearly) (10-1)	1.338	0.805	1.275	0.002	2.857	204

Table 2
Credit Registry Expansion and Lending

This table reports results that examine the changes in lending behavior of borrowers around the credit registry expansion. The unit of observation is at the borrower level. The sample includes the same borrower before and after the credit registry expansion. There are a total of 2,227 borrowers tracked for 15 quarters. *Panel A* presents the summary statistics for exposed and non-exposed borrowers around the credit registry expansion. The table reports means and bootstrapped standard errors reported in parenthesis. *Panel B* reports OLS regressions including Firm and Loan Officer fixed effects. The dependent variable used in the regression is log of total amount of loans (columns (1)-(3)) and Interest Rate on loans each period (columns (3)-(6)). *After* is a dummy variable that takes a value 1 in the period after the credit registry expansion and 0 otherwise. *Exposed* is a dummy variable that takes a value of 1 for borrowers who are exposed to the credit registry event. This variable was constructed by matching the borrowers of the bank with the credit registry, and identifying those whose information appears for the first time in the quarter after the expansion event. *Revealed Bad Rating* is a dummy variable that takes a value of 1 if the rating in the credit registry across any other bank that a borrower borrows from is revealed to be worse than the rating assigned by our bank, and 0 otherwise. *Trend* is a continuous variable that takes values from 1 to a maximum of 15 defined for each borrower i in each of the quarters. Standard errors are reported in parenthesis and are heteroskedasticity-robust and clustered at the loan officer. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Panel A					
	log (Total Loans)			Interest Rate		
	Before	After	*Diff*	Before	After	*Diff*
Exposed Borrowers	8.906	9.774	0.868***	0.103	0.073	-0.030***
	(0.072)	(0.090)	(0.117)	(0.001)	(0.002)	(0.003)
Non-Exposed Borrowers	13.232	13.085	-0.147	0.072	0.069	-0.003
	(0.042)	(0.035)	(0.097)	(0.002)	(0.001)	(0.003)

	Panel B					
Dependent Variable	log(Total Loans)			Interest Rate		
	(1)	(2)	(3)	(4)	(5)	(6)
After	-0.088	-0.111	0.059	-0.001	-0.001	-0.001
	(0.093)	(0.088)	(0.123)	(0.003)	(0.003)	(0.003)
After × Exposed Borrower	0.606***	0.673***	0.687***	-0.014***	-0.016***	-0.015***
	(0.137)	(0.109)	(0.107)	(0.003)	(0.003)	(0.003)
After × Exposed Borrower × Revealed Bad Rating		-0.841**	-0.839**		0.028***	0.029***
		(0.420)	(0.422)		(0.006)	(0.006)
Trends			Yes			Yes
Borrower Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Loan Officer Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
No. Observations	33,405	33,405	33,405	33,405	33,405	33,405
R-Sq	0.88	0.88	0.88	0.66	0.66	0.66

Table 3
Credit Registry Expansion and Organization: Loan Officer and Division Manager Tasks

This table reports the results of OLS regressions that examine changes in loan officers' tasks in a division around the credit registry expansion. The unit of observations is at the loan officer level (columns (1) to (4)) and at the division manager level (column (5)). There are a total of 49 loan-officers and 10 division managers tracked for 15 quarters. The dependent variables used in the regressions are: probability of being reallocated (column (1)), log of number of borrowers in the loan officer's portfolio (column (2)), log of total loan amount in the loan officer's portfolio (column (3)), scope of activities (column (4)) and number of development programs (column (5)). *Pr(Reallocated)* is a dummy variable that takes a value 1 if the loan officer was reallocated to another division after the credit registry expansion and 0 otherwise. *Scope of Activities* is defined as the number of industries the loan officer portfolio encompasses every period. *No. of Development Programs* is the number of prospective programs developed by the division manager in order to target new clients. Each program targets between 20 to 30 new borrowers. *After* is a dummy variable that takes a value 1 in the period after credit registry expansion and 0 otherwise. *Share Exposed* is the ratio of borrowers exposed in the credit registry expansion to all borrowers in that division. Regressions include Loan Officer fixed effects (columns (1) to (4)) and Division Manager fixed effects (column (5)). Standard errors are reported in parenthesis. Heteroskedasticity-robust and clustered standard errors at the loan officer level are reported in columns (1) to (4) and clustered at the division level in column (5). ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Sample	Loan Officers				Division Managers
Dependent Variable	Pr(Reallocated)	Log(No. Borrowers in LO's Portfolio)	Log(Total Amount LO's Portfolio)	Scope of Activities	No. of Development Programs
	(1)	(2)	(3)	(4)	(5)
After	0.000	-0.220	-0.656	0.323	-0.856
	(0.001)	(0.188)	(0.599)	(1.156)	(0.088)
After × Share Exposed Borrowers	0.029***	1.213***	1.463*	1.433*	2.868**
	(0.007)	(0.439)	(0.810)	(0.746)	(1.106)
Division Fixed Effects	No	No	No	No	Yes
Loan Officer Fixed Effects	Yes	Yes	Yes	Yes	No
No. Observations	735	735	735	735	150
R-Sq	0.40	0.69	0.41	0.75	0.93

Table 4
Credit Registry Expansion and Organization: Loan Officer Delegation

This table reports results that examine the changes in delegation of a loan approval decision to a loan officer around the credit registry expansion. There are a total of 2,227 borrowers tracked for 15 quarters. The unit of observation is at the borrower level. *Panel A* presents the summary statistics for exposed and non-exposed borrowers around the credit registry expansion. The table reports means and bootstrapped standard errors in parenthesis. *Panel B* reports OLS regressions including Firm and Loan Officer fixed effects. The dependent variable is *Layers of Approval*. *Layers of Approval* is a categorical variable that captures the level a loan review undergoes every period in order to get approval inside the bank. It takes values between 1 (lowest approval level) to 7 (highest approval level). *After* is a dummy variable that takes a value 1 in the period after credit registry expansion and 0 otherwise. *Exposed* is a dummy variable that takes a value of 1 for borrowers who are exposed to the credit registry event. *Revealed Bad Rating* is a dummy variable that takes a value of 1 if the average rating in the credit registry across all other banks that a borrower borrows from is revealed to be worse than the rating assigned by our bank and 0 otherwise. *Trend* is a continuous variable that takes values from 1 to a maximum of 15 defined for each borrower in each of the quarters. Firm level controls include the log of the amount of the total loan and the credit rating of the firm. Standard errors are reported in parenthesis and are heteroskedasticity-robust and clustered at the loan officer level. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Panel A		
	Layers of Approval		
	Before	After	*Diff*
Exposed Borrowers	2.124	1.187	-0.965***
	(0.103)	(0.111)	(0.101)
Non-Exposed Borrowers	2.215	2.041	-0.174
	(0.132)	(0.112)	(0.124)

	Panel B	
Dependent Variable	Layers of Approval	
	(1)	(2)
After	-0.131	-0.189
	(0.184)	(0.173)
After × Exposed Borrower	-0.643***	-0.685***
	(0.186)	(0.136)
After × Exposed Borrower × Revealed Bad Rating		0.975***
		(0.244)
Trends	Yes	Yes
Borrower Fixed Effects	Yes	Yes
Loan Officer Fixed Effects	Yes	Yes
Borrower Level Controls	Yes	Yes
No. Observations	33,405	33,405
R-Sq	0.75	0.75

Table 5
Credit Registry Expansion and Bank Profitability

This table reports results that examine changes in the borrowers' bank profitability around the credit registry expansion. The unit of observation is at the borrower level. There are a total of 2,227 borrowers tracked for 15 quarters. *Panel A* presents the summary statistics for exposed and non-exposed borrowers around the credit registry expansion. The table reports means and bootstrapped standard errors reported in parenthesis. *Panel B* reports OLS regressions including Firm and Loan Officer fixed effects. The dependent variable in columns (1) and (2) is the bank's Return on Capital (ROC) every period for each borrower present before and after the credit registry expansion. The dependent variables in columns (3)-(4), (5)-(6) and (7)-(8) are the amount of *Transactional Revenues as a % of Total Revenues*, *Expenses as a % of Total Loans* every period, for each borrower present before and after the shock and *Default* respectively. *Default* is a dummy variable that takes a value of 1 if the bank created a loan-loss reserve or write-off the loan of the borrower after the credit registry expansion and 0 otherwise. *After* is a dummy variable that takes a value 1 in the period after credit registry expansion and 0 otherwise. *Exposed* is a dummy variable that takes a value of 1 for borrowers who are exposed to the credit registry event. This variable was constructed by matching the borrowers of the bank with the credit registry, identifying those whose information appears for the first time in the quarter after the expansion event. *Revealed Bad Rating* is a dummy variable that takes a value of 1 if the average rating in the credit registry across all other banks that a borrower borrows from is revealed to be worse than the rating assigned by our bank and 0 otherwise. Standard errors are reported in parenthesis and are heteroskedasticity-robust and clustered at the loan officer level. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Panel A		
	Return on Capital		
	Before	After	*Diff*
Exposed Borrowers	0.094	0.120	0.026***
	(0.001)	(0.000)	(0.001)
Non-Exposed Borrowers	0.075	0.076	-0.001
	(0.001)	(0.001)	(0.002)

Table 5 (cont'd)
Credit Registry Expansion and Bank Profitability

	Panel B							
Dependent Variable	Return on Capital		Transactional Revenues as % of Total Revenues		Expenses as % of Loan Amount		Default	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
After	0.002	0.002	0.003	0.001	-0.005	-0.005	-0.001	-0.002
	0.003	(0.003)	(0.007)	(0.006)	(0.004)	(0.004)	(0.002)	(0.001)
After × Exposed Borrower	0.024***	0.026***	0.021***	0.026***	-0.011**	-0.012***	-0.002	-0.001
	(0.003)	(0.003)	(0.007)	(0.006)	(0.004)	(0.004)	(0.001)	(0.001)
After × Exposed Borrower × Revealed Bad Rating		-0.033***		-0.075***		0.020***		-0.005
		(0.005)		(0.019)		(0.007)		(0.004)
Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Officer Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. Observations	33,405	33,405	33,405	33,405	33,405	33,405	33,405	33,405
R-Sq	0.25	0.25	0.67	0.67	0.20	0.20	0.22	0.22

Table 6
Evidence from Borrowers around the $200K Threshold

This table reports the statistics that correspond to the tests using borrowers around the 200K threshold. In *Panel A*, *Exposed Borrowers* (treated borrowers) consist of borrowers whose information becomes available in the credit registry after the expansion and whose total loan amount borrowed across banks is between 155K and 200K. The sample of this treated group consists of 189 unique borrowers. *Non-Exposed Borrowers* (control borrowers) consist of borrowers whose information is always available in the credit registry and whose total loan amount borrowed across banks is between 200K and 245K. The sample of this control group consists of 161 unique borrowers. The samples of unique borrowers are tracked over 15 quarters. We report means for the main outcome variables: Log(Total Loans), Interest Rate, Return on Capital and Layers of Approval for borrowers in the two groups. The table also reports bootstrapped standard errors in parenthesis. *Panel B* reports OLS regressions tracing the change in the same variables in *Panel A* before and after the credit registry expansion. Regressions include time trend and Firm and Loan Officer fixed effects. The sample includes the same borrowers in Panel A for the 15-quarters horizon available. The table reports means and bootstrapped standard errors in parenthesis. *Panel C* reports the same regressions as in *Panel B* for only 16 unique borrowers. The sample to conduct this test must satisfy two conditions: (a.) borrowers only borrow from our Bank; (b.) total lending of these borrowers is between 180K to 200K during the period January 1998 to June 1998. The information on total amount across banks that is borrowed by these borrowers is available for 15 quarters. Standard errors are reported in parenthesis and are heteroskedasticity-robust and clustered at the loan officer level in Panels B and C. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Panel A: Analysis Using Borrowers Around 200K [Between 155K-245K]					
	Log(Total Loans)			Interest Rate		
	Before	After	*Diff*	Before	After	*Diff*
Exposed Borrowers	11.186	11.780	0.594***	0.103	0.079	-0.024***
	(0.090)	(0.087)	(0.127)	0.060	(0.005)	(0.008)
Non-Exposed Borrowers	12.203	12.384	0.182	0.077	0.072	-0.004
	(0.148)	(0.097)	(0.174)	(0.007)	(0.006)	(0.010)
	Return on Capital			Layers of Approval		
	Before	After	*Diff*	Before	After	*Diff*
Exposed Borrowers	0.093	0.116	0.023***	2.999	1.753	-1.246***
	(0.002)	(0.004)	(0.004)	(0.114)	(0.107)	(0.142)
Non-Exposed Borrowers	0.081	0.084	0.003	1.641	1.738	0.097
	(0.003)	(0.003)	(0.005)	(0.039)	(0.069)	(0.074)

Table 6 (cont'd)
Evidence from Borrowers around the $200K Threshold

Panel B: Regression Analysis Using Borrowers Around 200K [155K-245K]

Dependent Variable	log(Total Loans)	Interest Rates	Return on Capital	Layers of Approval
	(1)	(2)	(4)	(5)
After	0.113	-0.001	0.000	0.085
	(0.258)	(0.008)	(0.005)	(0.259)
After × Exposed Borrower	0.553**	-0.013*	0.021***	-0.977***
	(0.261)	(0.008)	(0.003)	(0.154)
Trends	Yes	Yes	Yes	Yes
Borrower Fixed Effects	Yes	Yes	Yes	Yes
Loan Officer Fixed Effects	Yes	Yes	Yes	Yes
No. Observations	5,219	5,219	5,219	5,219
R-Sq	0.63	0.29	0.15	0.71

Panel C: Regression Analysis Using Borrowers Betweeen [180K-200K]

Dependent Variable	log(Total Loans)	Interest Rate	Return on Capital	Layers of Approval
	(2)	(3)	(4)	(5)
After	0.230	0.002	0.001	0.093
	(0.276)	(0.014)	(0.011)	(0.145)
No. Observations	236	236	236	236
R-Sq	0.01	0.00	0.02	0.00

Table 7
Changes on Extensive Margin

This table reports the results of OLS regressions that examine the changes in the main dependent variables presented earlier around the credit registry expansion using the extensive margin sample. The unit of observation is at the borrower level. The sample is composed only of *new* borrowers in the pre-period and *new* borrowers in the post-period (extensive margin). *After* is a dummy variable that takes a value 1 in the period after credit registry expansion and 0 otherwise. *Exposed* is a dummy variable that takes a value of 1 for borrowers who are exposed to the credit registry event. All regressions include Loan Officer and Firm fixed effects. All variable definitions are provided in the text. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	Log(Loan Amount)	Interest Rate	Return on Capital	Layers of Approval
	(1)	(2)	(3)	(4)
After	0.247	-0.008	0.008*	-0.395
	(0.170)	(0.010)	(0.004)	(0.296)
After × Exposed Borrower	0.353*	-0.020**	0.022***	-0.667***
	(0.189)	(0.010)	(0.003)	(0.290)
Loan Officer Fixed Effects	Yes	Yes	Yes	Yes
Borrower Fixed Effects	Yes	Yes	Yes	Yes
No. Observations	25,280	25,280	25,280	25,280
R-Sq	0.89	0.22	0.26	0.76

Table 8
What Information is Revealed by the Credit Registry Expansion?

This table reports the results of OLS regressions that examine the changes in collateralized (Secured), uncollateralized (Unsecured) lending and layers of approval for borrowers around the credit registry expansion. The unit of observation is at the borrower level. There are 2,227 borrowers tracked over 15 quarters. The dependent variables used in the regressions are: log of total amount of secured loans in columns (1) to (3), the log of total amount of unsecured loans in columns (4) and (6), and layers of approval in column (7) and (8). *After* is a dummy variable that takes a value 1 in the period after credit registry expansion and 0 otherwise. *Exposed* is a dummy variable that takes a value of 1 for borrowers who are exposed to the credit registry event. This variable was constructed by matching the borrowers of the bank with the credit registry, and identifying those whose information appears for the first time in the quarter after the expansion event. *% Unsecured Loans* is the ratio of non-collateralized loans to total loans in every period. Unsecured loans include uncollateralized lines of credit, unsecured term loans and overdrafts. *# of Lenders* is the number of lending relationships for each borrower. All regressions include Trend, Firm and Loan Officer fixed effects. *Trend* is a continuous variable that takes values from 1 to a maximum of 15 defined for each borrower *i* in each of the quarters. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	log(Secured Loans)			log(Unsecured Loans)			Layers of Approval	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
After	-0.095	-0.132	0.023	0.217	0.239	0.399**	-0.358	-0.465
	(0.109)	(0.105)	(0.190)	(0.155)	(0.152)	(0.186)	(0.276)	(0.313)
After × Exposed Borrower	0.751***	0.838***	0.735***	-0.531	-0.528	0.824	-0.672***	-0.626***
	(0.117)	(0.089)	(0.131)	(0.514)	(0.578)	(2.329)	(0.154)	(0.183)
After × Exposed Borrower × Revealed Bad Rating		-0.995**	-0.698**		0.001	-2.475		
		(0.451)	(0.332)		(0.601)	(2.813)		
After × Exposed Borrower × Revealed Bad Rating × No. Lenders			-0.086			0.810		
			(0.134)			(1.079)		
After × Exposed Borrower × % Unsecured Loans							0.140	0.189
							(0.123)	(0.321)
After × Exposed Borrower × % Unsecured Loans × No. Lenders								-0.016
								(0.071)
Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Officer Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. Observations	33,405	33,405	33,405	33,405	33,405	33,405	33,405	33,405
R-Sq	0.88	0.88	0.88	0.86	0.86	0.86	0.74	0.74

Table 9
How Broadly Applicable are our Findings?

This table reports the results of OLS regressions that examine aggregate changes in profitability, loan amount and delegation of loan officers in all financial institutions in the Argentinean financial system around the credit registry expansion. The unit of observation is at the quarter-bank level. There are 102 banks tracked over 10 quarters. Bank financial data come from the Superintendencia de Entidades Financieras; an entity that is governed by the Central Bank of Argentina. The dependent variables are: *Log (Total Loans)* (columns (1) and (4)), Return on Assets (*ROA*) (columns (2) and (5)) and a *Delegation/Layers* index from survey data (columns (3) and (6)). *Log(Total Loans)* is the log of the total wholesale lending of each bank to small, medium and large enterprises per quarter. This measure excludes retail lending. *ROA* is the ratio of net income over total assets (excluding retail loans). *Delegation/Layers* is a categorical variable that takes a value from 1 (Low Layer) to 10 (High Layer). The information used to construct this index is from an annual survey conducted by several independent consulting companies to roughly 450 random borrowers of the Bank. The survey was done in five different waves between 1998 and 2002. Each wave contains information of the prior year. Surveys are collapsed at the bank level. These measures report the perception of the borrowers on the extent of various organizational and technological topics for *all* the banks they borrow in the financial system. The survey is divided into five different modules: Customer Satisfaction, Corporate Image, Products, Operational Aspects and Organizational Aspects. The index is the average of *all* questions related to the organizational structure of the Bank and its loan officers in any of the modules. *Share Exposed Bank* is the number of borrowers exposed after the credit registry expansion as a percentage of all borrowers for each bank in each quarter. The sample of large (small) banks in first three (last three) columns consist of banks whose pre-shock size as measured by *Total Assets* is above the median in the sample of all the banks. All regressions include Bank and Time Fixed Effects. Standard errors are reported in parenthesis and are heteroskedasticity-robust and clustered at the bank level. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	Log(Total Loans)	ROA	Delegation/Layers (Survey)	Log(Total Loans)	ROA	Delegation/Layers (Survey)
	(1)	(2)	(3)	(4)	(5)	(6)
After	0.201	0.002	-0.077	0.458**	-0.001	-0.129
	(0.276)	(0.002)	(0.214)	(0.178)	(0.002)	(0.214)
After × Share Exposed Bank	1.746**	0.009*	-2.337***	-0.885*	-0.006	-0.555
	(0.823)	(0.005)	(0.589)	(0.494)	(0.007)	(0.351)
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
No. Observations	612	612	153	612	612	204
R-sq	0.96	0.32	0.12	0.96	0.35	0.04
Sample	Only *Good* Comparable Banks [51 Banks]	Only *Good* Comparable Banks [51 Banks]	Only *Good* Comparable Banks [51 Banks]	Only *Bad* Banks [51 Banks]	Only *Bad* Banks [51 Banks]	Only *Bad* Banks [51 Banks]

Figure 1
Loan Officer Delegation

This figure graphically presents additional evidence of the effect of the credit expansion on loan-officer delegation. The blue-solid line plots the residuals of an OLS regression of Layers of Approval on the "rule variables" used by the bank to assign layer of approvals to borrowers in the organization using data only from the pre-credit registry expansion. As should be the case, these residuals are centered symmetrically around zero. Using the coefficient estimates from this pre-credit registry expansion model we predict the number of layers of approval for exposed borrowers using data on rule variables in the period after credit registry expansion. The red-dashed line plots the residuals of the difference between the actual values and predicted model values.
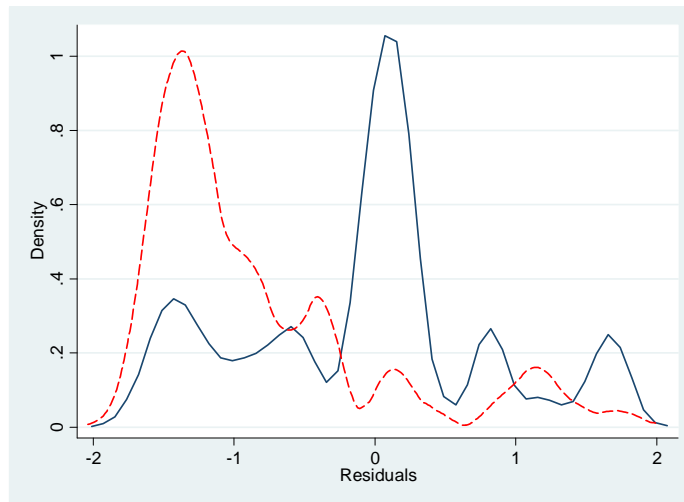
Figure 2
Dynamic Patterns

These figures plot the evolution of the effect of the credit expansion on the main outcome variables of interest. The graphs plot point estimates of the interacted coefficients *Exposed* and a set of quarterly indicators, *q* estimated from an OLS specification similar to the baseline specification (1). *q* measures the time, in quarters, elapsed before and after the expansion of the credit registry event. The estimation uses all the borrowers in the intensive sample for the period April 1997 -- June 1997 [*s* = -5] to October 2000 -- December 2000 [*s* = 10]. The unit of observation is a borrower *i*. The specification is of the form:

$$y_{it} = \alpha_i + \sum_{s=-5}^{10} 1[s=q][\beta_s \times Exposed_{it}] + \alpha_{Loan\ Officer} + i \times t + \varepsilon_{it}$$

Outcome variables, y_{it}, are plotted in the y-axis and include the log of Total Loans, Interest Rate, Return on Capital and Layers of Approval. The red-dash lines in Panel A and blue-solid lines in Panel B represent the point estimates for exposed and non-exposed borrowers with the corresponding 95% confidence intervals respectively. The omitted category is the dummy on period April 1997 -- June 1997. The figures plot the coefficients between September 1997 [*s* = -4] and September 1999 [*s* = 5].

Panel A: Exposed Borrowers

Log(Total Loan)

Interest Rate
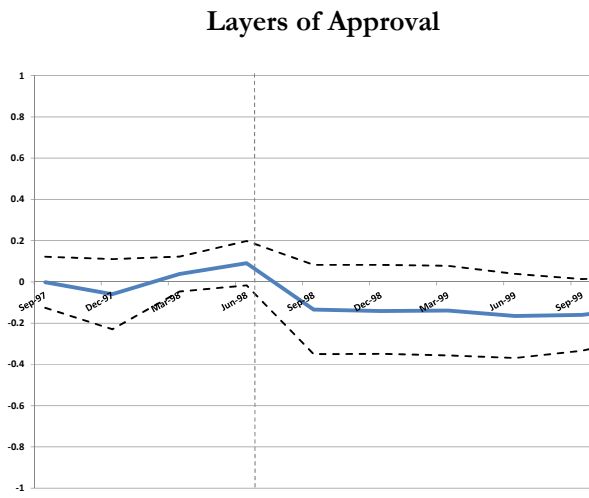
Return on Capital

Layers of Approval

Panel B: Non-Exposed Borrowers

Log(Total Loan)

Interest Rate
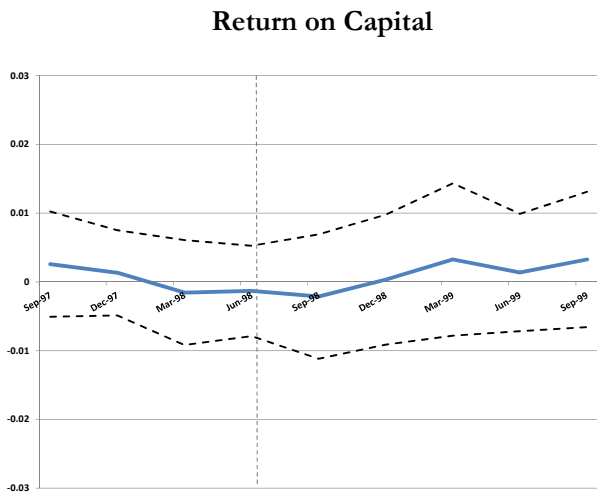

Return on Capital
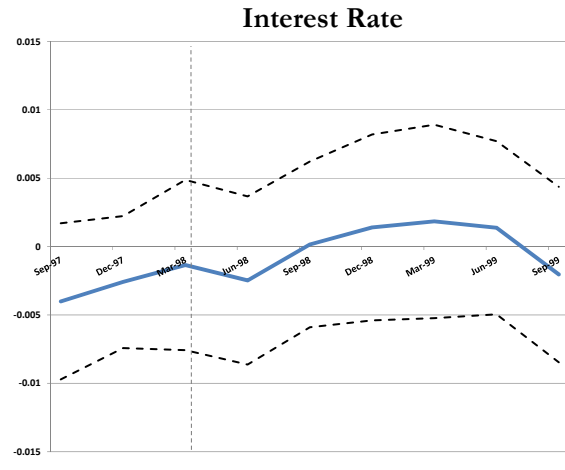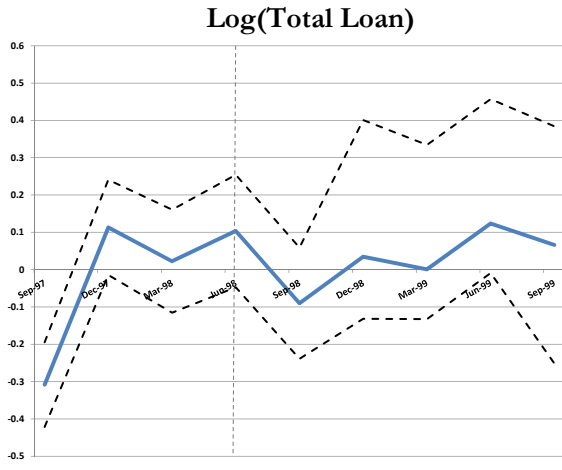

Layers of Approval
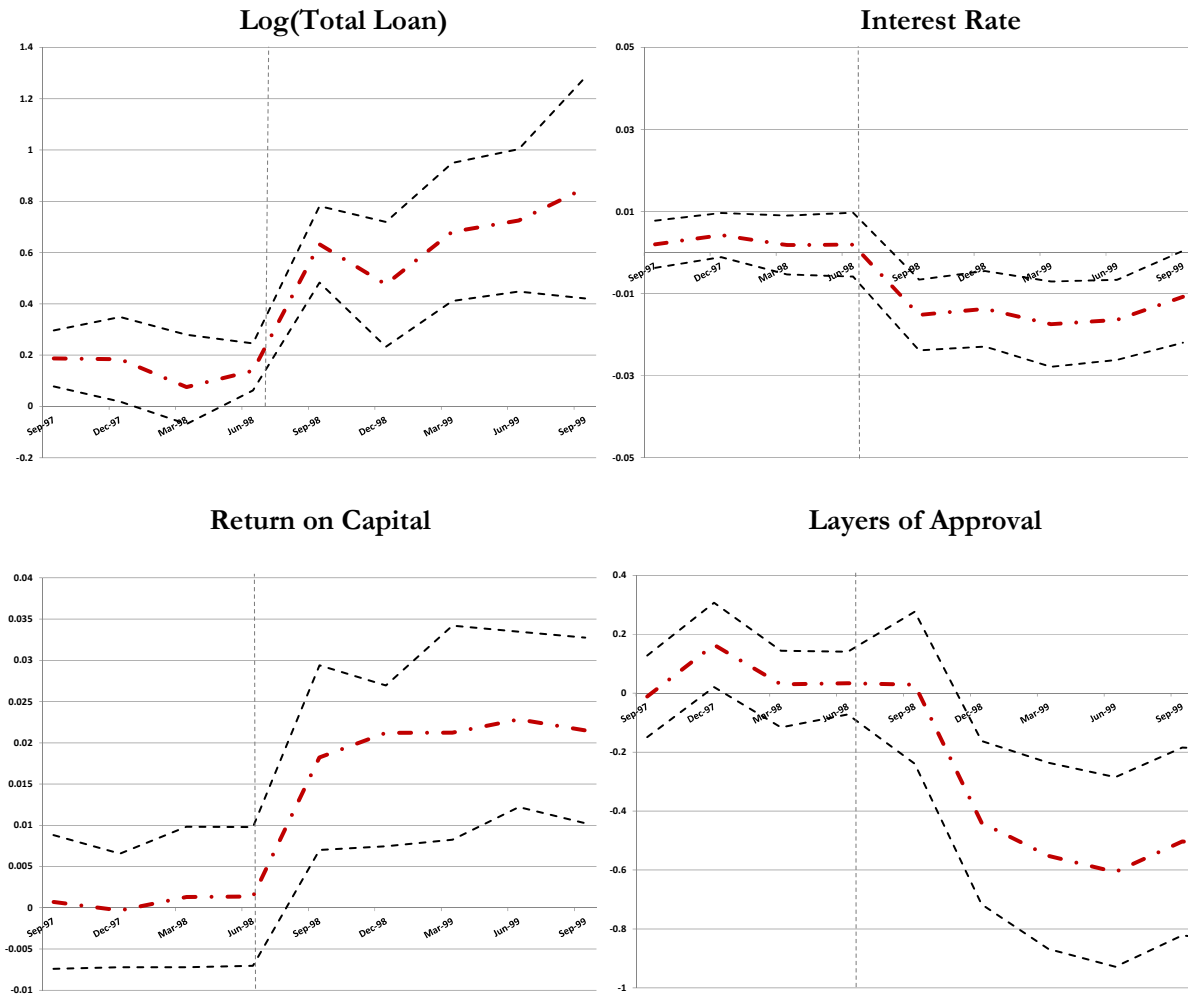
Figure 3
Evidence from Borrowers Around the $200K Threshold

These figures graphically present evidence of the effect of the credit expansion on the main outcome variables using only borrowers around 200K. The unit of observation is a borrower *i*. There are 189 unique exposed borrowers and 161 unique non-exposed borrowers tracked over 15 quarters. The graphs plot point estimates of the interacted coefficients *Exposed* and a set of quarterly indicators, *q*, from an OLS specification similar to our baseline specification (1). *q* measures the time, in quarters, elapsed before and after the expansion of the credit registry event. The estimation uses the restricted sample around $200K for the period April 1997 -- June 1997 [*s* = -5] to October 2000 -- December 2000 [*s* = 10]. The regression is of the form:

$$y_{it} = \alpha_i + \sum_{s=-5}^{10} 1[s=q][\beta_s \times Exposed_{it}] + \alpha_{Loan\ Officer} + i \times t + \varepsilon_{it}$$

Outcome variables, y_{it}, are plotted in the y-axis and include the log of Total Loans, Interest Rate, Bank's Return on Capital and Layers of Approval. The omitted category is the dummy on period April 1997 -- June 1997. The figures plot the coefficients between September 1997 [*s* = -4] and September 1999 [*s* = 5]. The red-dash lines in Panel A and blue-solid lines in Panel B represent the point estimates for exposed and non-exposed borrowers with the corresponding 95% confidence intervals, respectively.

Panel A: Exposed Borrowers

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Panel B: Non-Exposed Borrowers

Log(Total Loan)

Interest Rate

Return on Capital

Layers of Approval

52
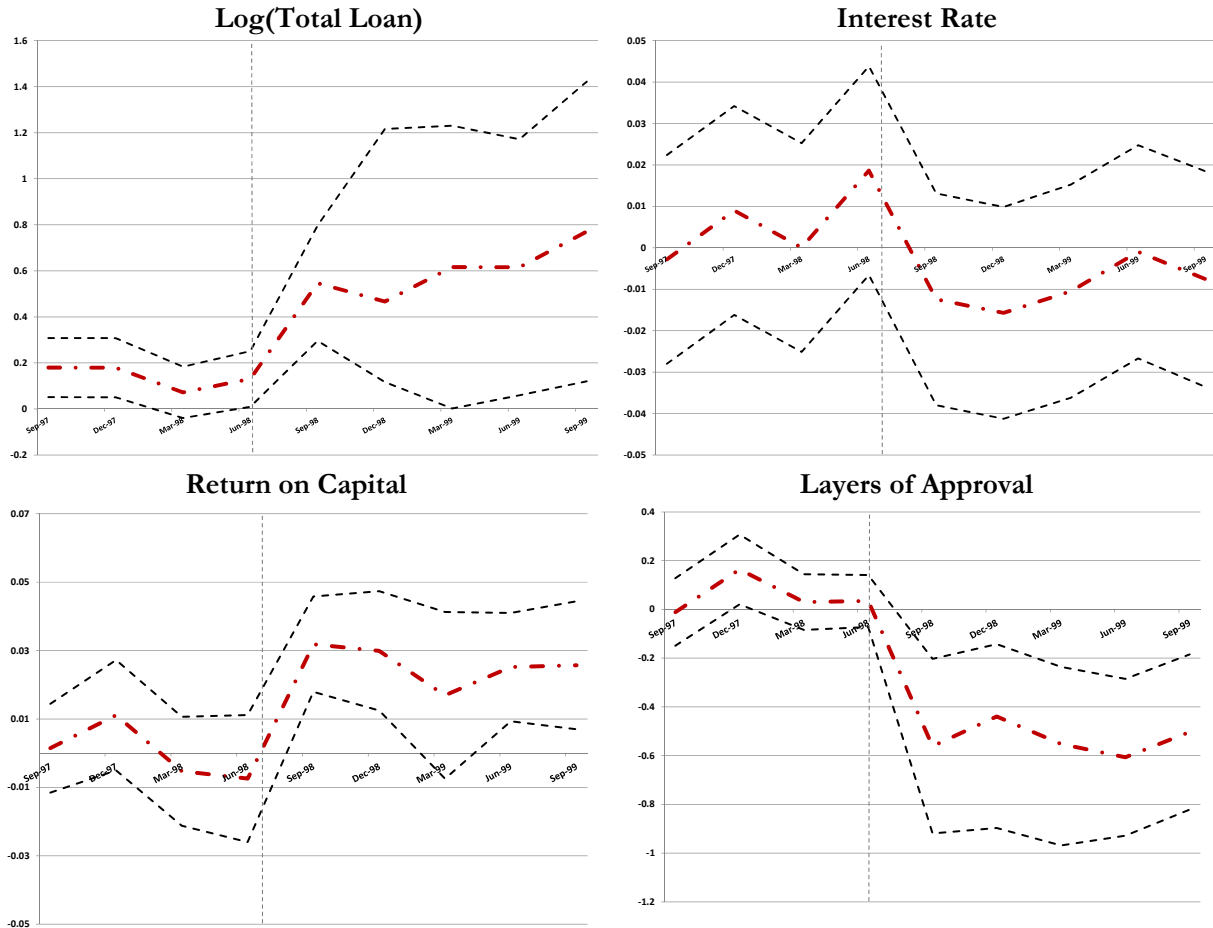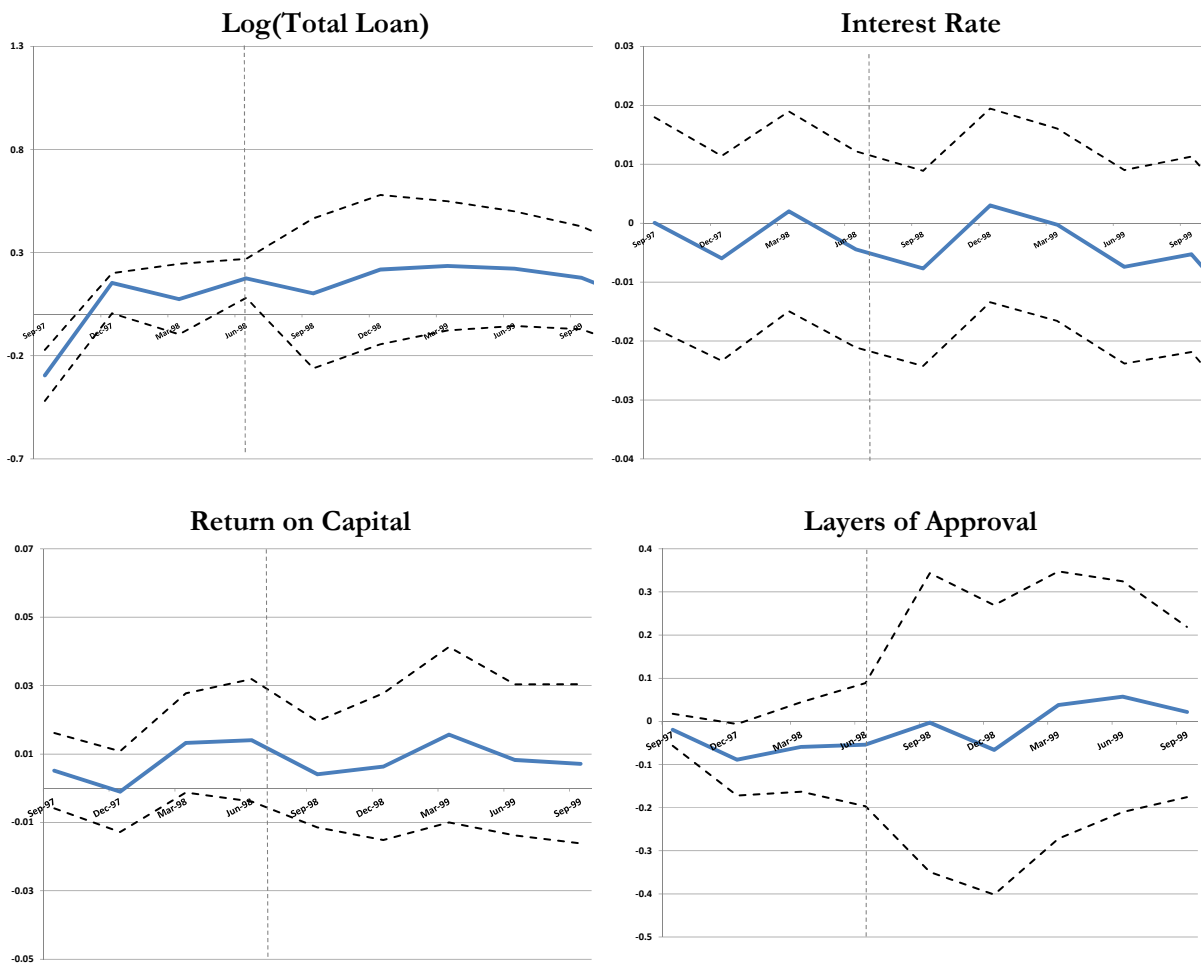
Appendix A.1
Aggregate and Macro Trends

This table reports the results of OLS regressions that examine the changes in lending behavior of borrowers around the credit registry expansion. The unit of observation is at the division manager level (column (1)) The dependent variable used in the regression is log of total amount of loans aggregated at the division manager level every period for our bank. *After* is a dummy variable that takes a value 1 in the period after credit registry expansion and 0 otherwise. For the control group in column (2), the dependent variable is the log of total amount of loans by all international divisions of our bank outside Argentina. *Share Exposed* is percentage of borrowers that are exposed in the credit registry expansion event as a percentage of all borrowers in that division. The regressions in columns (1) and (2) include Division Fixed Effects and Firm Fixed Effects, respectively. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	log(Loan Amount)	
	(1)	(2)
After	-0.472	-0.081
	(0.521)	(0.109)
After × Shares Exposed Borrowers	2.218**	
	(1.099)	
Division/Firm Fixed Effects	Yes	Yes
No. Observations	150	2,102
R-Sq	0.69	0.84
Sample	Inside Bank	International Divisions of the Same Bank

Appendix A.2
## Number of Loan-Officers at Division Level

This table reports the results of OLS regressions that examine the changes in number of loan officers in a division around the credit registry expansion. The unit of observation is at the division manager level. The dependent variable used in the regression is the number of loan officers aggregated at the level of divisions every period. The sample includes loan officers present before and after the shock. *After* is a dummy variable that takes a value 1 in the period after credit registry expansion and 0 otherwise. For the control group in column (4), the dependent variable is total employment in other operations/divisions in the Bank that are not into any corporate lending activity every period. *Share Exposed* is the percentage of borrowers that are exposed in the credit registry expansion event as a percentage of all borrowers in that division. Columns (2) and (3) include Division fixed effects. Standard errors are reported in parenthesis and are heteroskedasticity-robust and clustered at the division level. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

| Dependent Variable	No. Loan Officers Per Division			No. Employees
	(1)	(2)	(3)	(4)
After	-1.513**	-1.265*	-0.181	0.765
	(0.700)	(0.719)	(0.867)	(1.654)
After × Share Exposed Borrowers			-3.303*	
			(1.826)	
Division Fixed Effects	No	Yes	Yes	
No. Observations	150	150	150	12
R-Sq	0.06	0.85	0.87	0.12
Sample	Inside Bank	Inside Bank	Inside Bank	Other Operations Inside Bank

Appendix A.3
Pre-Trends for Exposed and Non-Exposed Borrowers

These figures plot trends of the level outcome variables of interest prior to the credit expansion for all the exposed and non-exposed borrowers in the intensive margin sample. The unit of observation is at the borrower level. The graphs plot the level of log of Total Loans, Interest Rate, Return on Capital and Layers of Approval in the pre-credit registry expansion period for the complete sample (Panel A) and the 200K sample (Panel B). The red-dash lines and blue-solid lines in represent the point estimates for exposed and non-exposed borrowers, respectively.

Panel A: Complete Sample

Log(Total Loan)

Interest Rate

Return on Capital

Layers of Approval

Panel B: 200K Sample

Log(Total Loan)

Interest Rate

Return on Capital

Layers of Approval
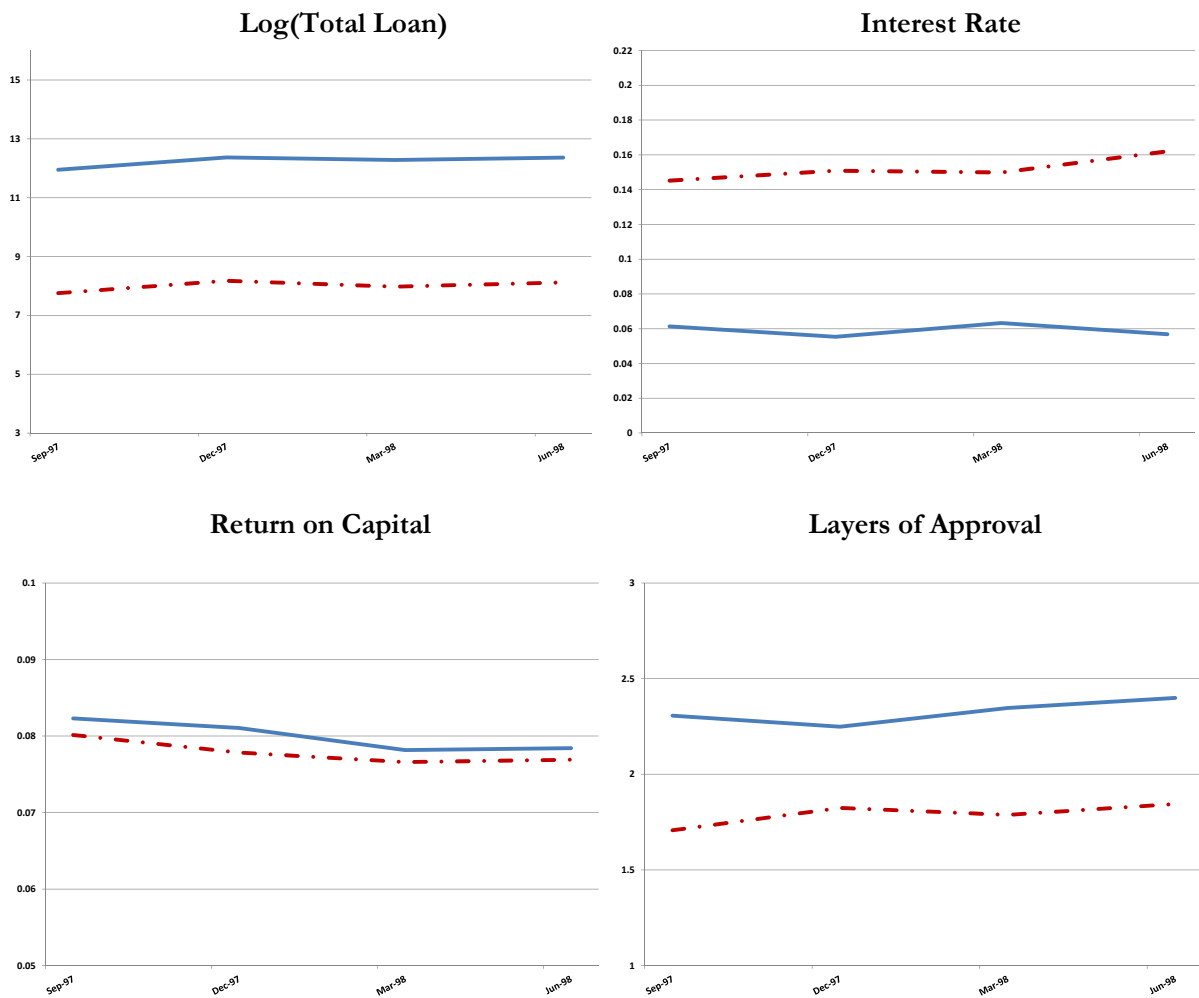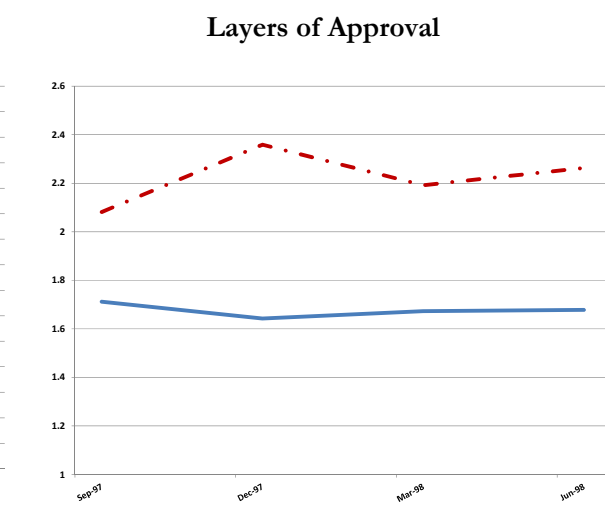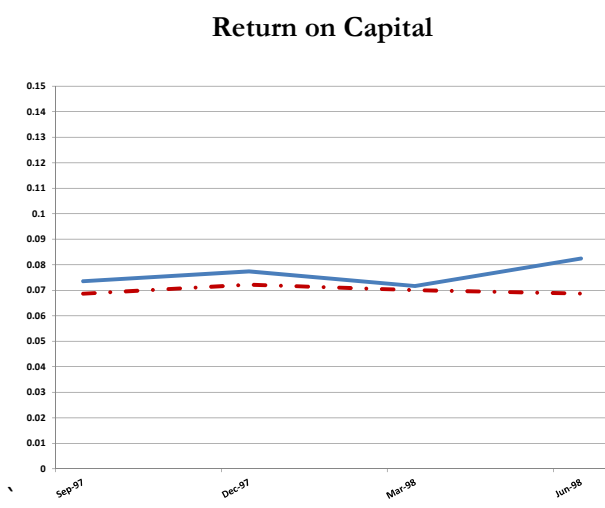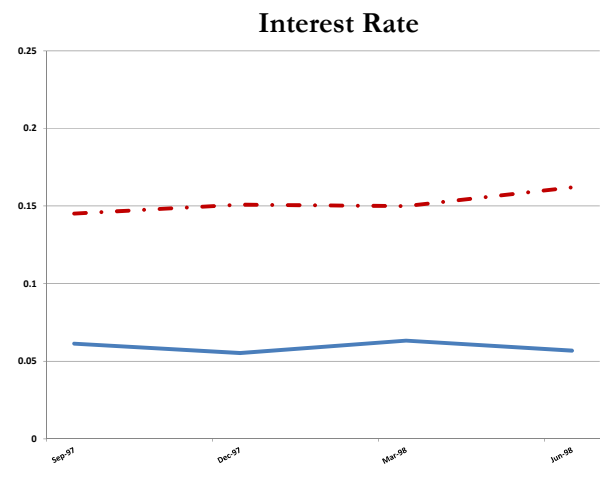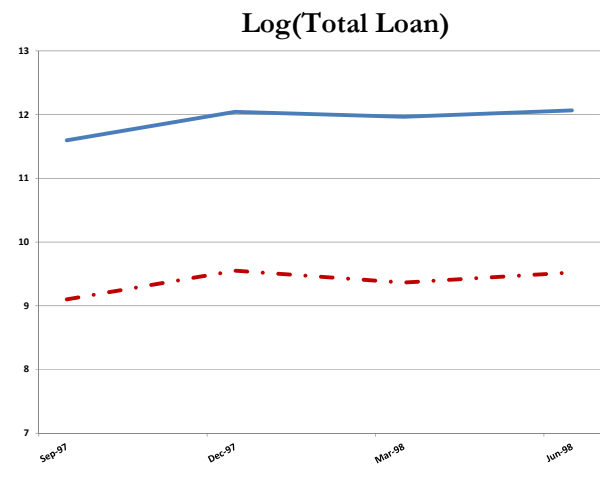
Appendix A.4
Financial Institutions Quality Surveys

The survey was conducted by a consulting company hired by the Bank on an annual basis from 1998 till 2002 as part of the Discovery Research Project. The project's main goal was to gather additional information from corporate clients in order to improve services and products provided to them. There were a total of 5 waves. Information collected in each year's wave corresponds to the prior year. Therefore, the surveys provide information for the period for the period 1997-2001. The field time was between September and October of each year.

The survey was tailor-made by the Bank to understand the needs of both corporate and prospect clients. It was quantitative in nature and conducted by both external consulting and local market research companies. Around 200 corporate borrowers, mostly target market companies, were randomly selected each year to answer questions on different topics about *all* the financial institutions that these borrowers had a banking relationship with. A total of 179, 185 and 154 completed the survey in 1997, 1998 and 1999, respectively. We only have access to the data at the financial institution level due to confidentiality agreements between the surveyed borrowers and the Bank. This means our results are already aggregated at the financial institution level.

The surveys were divided into five modules:

- Customer Satisfaction
- Corporate Image
- Loan Officer
- Operational Aspects
- Products

We constructed an index with *all* questions in any of the modules that was related to the organizational structure of the Bank and its loan officers. Among others, we used questions related to the solutions and response speed of loan officers, timely response to questions, professionals with decision power, creativity and innovation, ability to structure tailor made solutions and the flexibility to fit services to customer needs, among others. The original response to each question is a numerical score between 1 (worse) and 7 (best). We re-normalized this score in the 10 to 1 scale for ease of interpretation and to make it directionally consistent with the layers of approval results.

We now present the questions (and modules) used only to construct our delegation/layers of approval measure.

Module: Customer Satisfaction/ Corporate Image
- Solutions and response speed of loan officer
- Knowledge of customer needs
- Professionals with decision power
- Financial consulting/Advice quality

- Fast response to market changes
- Ability to structure tailor-made solutions
- Long term relationship approach
- Efficient use of technology
- Fair relationship
- Agility
- Creativity/Innovation
- Customer feel treated with exclusivity

Module: Operational Aspects
- Customer service provides fast turnaround for problem resolution
- Customer service fast response to information request
- Operational people listen and understand the needs
- Timely processing of transactions
- Error-free processing
- Efficient problem handling by customer service
- Agile processing of credit requests
- Error-free implementation

Module: Loan Officer
- Solutions and response speed
- Knows the company and financial needs
- Account manager has decision power
- Easily Accessible
- Highly capable to structure specific solutions for our company
- Account manager continuity
- Presents new ideas/Opportunities ahead of time
- Attention and dedication to the relationship
- Delivery exactly as promised
- Efficient coordination of people involved in the relationship
- Good criteria and common sense
- Account manager has credibility with the seniors of the firm

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