

Banco Central de Chile  
Documentos de Trabajo

Central Bank of Chile  
Working Papers

N° 528

Octubre 2009

**THE EFFECT OF THE NUMBER OF LENDING  
BANKS ON THE LIQUIDITY CONSTRAINTS OF  
FIRMS: EVIDENCE FROM A QUASI-EXPERIMENT**

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Documentos de Trabajo del Banco Central de Chile  
Working Papers of the Central Bank of Chile  
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## THE EFFECT OF THE NUMBER OF LENDING BANKS ON THE LIQUIDITY CONSTRAINTS OF FIRMS: EVIDENCE FROM A QUASI-EXPERIMENT

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### Resumen

En este trabajo exploramos si las firmas tienen un objetivo para el número de bancos con los cuales deciden endeudarse, y si la presencia múltiples acreedores afecta su liquidez. La fusión de los bancos Santander y Santiago constituye un *shock* externo al número de acreedores para las firmas que mantenían deuda con ambas instituciones al momento de la fusión. En este estudio encontramos que una fracción significativa de las firmas que sufrieron una reducción en el número de acreedores por efecto de la fusión, vuelve al número original de bancos con los que trabajaba antes de la fusión. En particular, la probabilidad de agregar un nuevo acreedor en los cinco años que siguen a la fusión es 23% mayor para las firmas cuyo número de bancos disminuye de dos a uno como resultado de la fusión, comparada con la probabilidad de agregar un nuevo acreedor para firmas similares cuyo número de bancos no fue afectado por la fusión. Adicionalmente, encontramos que una reducción en el número de bancos a consecuencia de dicha fusión reduce el acceso al crédito para las firmas afectadas. En particular, pasar de dos relaciones bancarias a una genera, en promedio, una reducción de 14.4% en el monto total prestado a estas empresas comparado con el monto prestado a empresas similares que no fueron afectadas por la fusión.

### Abstract

We empirically explore whether firms have a target for the number of banks from which they borrow, and whether having multiple bank relationships has an impact on firms' liquidity situation. A bank merger in Chile provides a quasi-experiment as it constitutes an exogenous reduction in the number of lenders for firms that were previously borrowing from both merging banks. We find that a significant percentage of firms whose number of bank relationships was reduced by the merger regain their original number of lenders. In particular, firms whose number of bank lending relationships was reduced from two to one as a result of the merger have a 23% higher probability of adding a new bank lending relationship in the five years following the merger than similar firms unaffected by the merger. Overall, we find that a reduction in firms' number of bank lenders resulting from the merger reduced firms' access to credit. In particular, a reduction from two to one bank lending relationships generated, on average, a 14.4% decrease in loan size for the affected companies compared to firms unaffected by the merger.

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Please send all questions and comments to [alejandrodrexler@mcombs.utexas.edu](mailto:alejandrodrexler@mcombs.utexas.edu). We are grateful for the comments and suggestions of Antoinette Schoar, Roberto Rigobon, Gustavo Manso, Stewart Myers, Nittai Bergman, Carola Frydman, Serdar Dinc, Jiro Kondo and Luis Opazo. We also want to thank the participant in the seminars at The University of Texas at Austin, The University of Cornell, The University of Pennsylvania, The University of Southern California, and the University of Maryland. Finally we want to thank Kate Gordon for precious help in writing the paper. All remaining errors are our own.

# 1 Introduction

Borrowing from multiple banks is common practice among firms. Most new firms begin by borrowing from a single bank, but soon add new bank lending relationships. Farinha and Santos (2002) show that in Portugal 28% of firms have more than one bank lending relationships after two years of operations, and 35% of the firms have more than two bank lending relationships four years after startup.

In a frictionless market, as proposed by Modigliani and Miller (1958), the number of bank lending relationships a firm uses will have no impact on its value or the funds available to it. However, there are multiple potential frictions, such as commitment problems, information asymmetries and transaction costs that can make a firm's number of bank lending relationships affect its liquidity situation. There is ample theoretical work that studies these frictions (see Rajan (1992), Bolton and Scharfstein (1996), and Thakor (1996)). However, the literature is far from providing a unanimous prediction as to how the number of lenders affects firm liquidity, as different models yield different implications. Furthermore, the empirical literature has been unable to satisfactorily corroborate the importance of these frictions because sample selection, endogeneity and unobservable variable biases pose serious challenges to empirical inference.

This paper attempts to address these problems by studying an exogenous shock to the number of bank lending relationships that occurred in Chile during 2002 and unexpectedly reduced the number of bank lenders for some firms. This is the first study that uses an exogenous source of variation to identify the effect of the number of lenders on firms' liquidity constraints. This paper focuses on two central questions: (1) Do firms set targets for their number of bank relationships? (2) Does the number of bank relationships a firm establishes impact the amount of credit that the firm can access?

Turning to the first question - whether firms have specific targets for their number of bank relationships - if the number of lending relationships a firm establishes affects costs and/or access to credit, we should observe firms adjusting their number of lenders to minimize costs and maximize credit availability. However, if these frictions are unimportant we should observe that firms do not seek a specific number of bank lending relationships. We find evidence that strongly suggests that firms have targets for their number of bank relationships. In fact, we observe that a significant percentage of firms who saw their number of bank relationships reduced by the merger return to their pre-merger number of lenders. For example, the firms whose number of banks was reduced from two to one have a 23.2% higher likelihood of adding a new lending relationship compared to similar firms

unaffected by the merger.<sup>1</sup>

Secondly, we study whether having multiple bank relationships has an impact on the firm's liquidity situation. We find that on average the decrease in the number of lenders reduced the total loan size of firms affected by the shock. For example, a reduction from two to one bank lending relationship on average generated a 14.4% decrease in total loans to the affected companies, as compared to similar companies unaffected by the merger.

These results were obtained by studying a natural-experiment generated by the merger of two major banks in Chile during 2002, which was a (minor) consequence of the merger of two financial conglomerates in Spain that each owned significant stakes in the two Chilean banks. As the Chilean banks made up less than 1% of the value of the Spanish conglomerates it is reasonable to assume that the merger of the Spanish conglomerates was not driven by the desire to merge their Chilean financial holdings. In turn, this makes it plausible that the reduction in bank relationships caused by the merger was an exogenous shock for firms with relationships with both banks before the merger.

The treatment group in this quasi-experiment is composed of firms that were borrowing from both of the merging banks prior to the merger, while the control group is composed of firms that were borrowing from banks that did not merge.<sup>2</sup> After the merger, the companies in the treatment group had only one bank lending relationship, while firms in the control group still had two bank lending relationships. We use a difference-in-difference approach to estimate the change in the probability of adding new bank lending relationships after the merger, and to estimate the effect of the merger on credit availability.

The data for this study is from the database of the Bureau for Bank Regulation in Chile (SBIF). This database contains financial information on the three million individuals and firms that have debt in the formal Chilean financial system. From this database, we constructed a panel with the financial information on the 6,000 firms included in the treatment group and the 13,000 firms in the control group. This panel contains yearly information for the period 1998-2006.

The results in this paper strongly suggest that firms have specific targets for the number of banks they wish to borrow from. In the five years following the merger, firms whose number of lenders were reduced by the merger had on average a 18.7% higher probability of adding a new bank lending relationship compared to similar firms unaffected by the

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<sup>1</sup>Within 5 years of the merger.

<sup>2</sup>To make the control and treatment groups comparable, we exclude from the sample firms receiving credit from a government owned bank, and firms receiving loans from a bank that was less than 50% of the size of the target.

merger. This effect is strongest for firms whose number of banks were reduced from two to one; these firms have a 23.2% higher probability of adding a new bank lending relationship in the five years following the merger, compared to similar firms unaffected by the merger. The effect decreases as the number of bank relationships per firm increases, as can be seen in the table below. This diminishing effect is not surprising, since we expect that the effect of the merger should be strongest for firms that have less outside financing options.

Firms whose number of banks was reduced	from 2 to 1	from 3 to 2	from 4 to 3	average (all)
Increased probability of adding a banking relationship compared to firms unaffected by the merger	23.2%	18.8%	14.1%	18.7%

We also find that the probability of adding a new bank lending relationships in the five years following the merger does not depend on loan size (the effect ranges from 16.41% to 17.17% and the differences are not statistically significant). However, firms in the fifth loan size quintile add new bank relationships more quickly than firms in the remaining loan quintiles. Within two years of the merger, firms in the fifth loan quintile already have a 14.6% higher likelihood of adding new bank lending relationships compared to similar firms unaffected by the merger. Firms in the remaining loan quintiles have only a 9.3% higher probability of adding new bank lending relationships in the same time frame. This suggests that it is easier for firms in the fifth loan quintile to add new bank lending relationships, probably because they experience weaker asymmetric information problems.

The analysis of this quasi experiment also suggests that the decrease in the number of lenders generates a reduction in the availability of credit. In particular, firms whose number of lenders was reduced from two to one as a result of the merger experience a reduction of 14.5% in their total loan amount, as compared to similar firms unaffected by the merger. We also find that firms try to offset this reduced access to credit by establishing new bank lending relationships. However, even with these additional banking partners, most firms are not able to fully offset the reduction in credit availability. A potential explanation is that adverse selection makes it difficult for firms to start new bank lending relationships and when firms are able to establish new relationships, the new lending partners may only be willing to lend a fraction of what the original lender was willing to lend. While large firms with many bank lending relationships before the merger are able to fully offset the reduction in access to credit, small firms cannot, even if they had multiple lenders before

the merger. This suggests that adverse selection can reduce firms' access to credit, even in the context of pre-existing bank relationships.

One explanation for the significant reduction in the availability of credit for firms affected by the merger is that the newly merged bank decided to diversify its portfolio post-merger, believing itself to be over-exposed to certain clients. However, the average loan size (even after the merger) is negligible compared to the total assets of the bank. Nonetheless, such a diversification explanation is still plausible if there are agency problems between the bank and its loan officers. Since loan officers are usually paid according to the size and default rate of their portfolio, and given that their portfolio is a fraction of the bank's total portfolio, loan officers may have incentives to over-diversify.

A second mechanism, modeled by Bolton and Scharfstein (1996), is that an increase in the number of lenders may complicate firm renegotiation in the event of financial distress: if firms anticipate a difficult renegotiation process this may deter them from strategically defaulting on the loan. This can help explain our finding that a reduction in the number of lenders reduces access to credit. According to the Bolton and Scharfstein model a reduction in the number of lenders will increase the probability of a successful loan renegotiation. If firms anticipate lower renegotiation costs they may engage in more risky projects, which in turn will increase the default rate. Furthermore, even if firms do not engage in riskier projects they may have incentives to strategically default in order to renegotiate the terms of the loan. Cutting loan sizes could be the bank's reaction to firms' increased incentives to engage in risk shifting in their investment decisions and to strategically default.

A third explanation is provided by Thakor (1996). In his model, the bank observes the quality of the firms with noise, so good firms risk of being taken as poorly performing clients and being denied credit. If the noise in the screening process is not perfectly correlated amongst banks then increasing the number of lending relationships should reduce the risk of being mistakenly identified as a poorly performing client.

A potential concern with the methodology used in this paper is that the results could be driven by changes in the post-merger lending policy of the merged banks. To address this concern, we perform a difference-in-difference analysis for firms with a single lending relationship with one of the merged banks, relative to a comparison group of firms that had a single bank lending relationship with a bank outside of the merger. If our findings in the quasi-experiment were driven by changes in the lending policy of the merged bank, the findings should also hold in the estimation for firms with single bank relationships. To test if our findings were driven by policy changes we test whether (1) firms with a single

lending relationship with one of the merged banks are more likely to add new bank lending relationship after the merger, compared to firms with a single lending relationship from a bank that did not merge; and (2) whether firms with a single lending relationship with one of the merging banks experience a reduction in their total loan amount compared to firms with single lending relationships that were unaffected by the merger. We find that firms with a single bank lending relationship with one of the merged banks were 2% less likely to add a new bank lending relationship within the year that follows the merger compared to firms having single lending relationships with banks that did not merge. This result is in the opposite direction to the effect for firms that were borrowing from both merging banks pre-merger, providing further evidence that firms that see their number of lenders reduced by the merger add new bank lending relationships because they have specific targets for their number of lenders, and not because they face a change in the lending policy of the merged bank. Second, we find that the loan size is 2.9% smaller for firms borrowing from one of the merging banks compared to the loan size of firms borrowing from a bank that did not merge. However this reduction in the availability of credit is five times smaller than the reduction for firms that were borrowing from both merging banks pre-merger. This result shows that a potential change in the policy of the merged bank does not explain the reduction in the loan amount, and supports the hypothesis advanced here that the reduction in loan size is a result of the decrease in the number of lenders.

In short, this robustness check provides grounds for confidence that the results of the quasi-experiment are due to a change in the number of bank relationships and not the result of a changed post-merger lending policy.

The rest of the paper is organized as follows. Section 2 provides a brief review of related work, Section 3 details the methodology, Section 4 presents the data and summary statistics, Section 5 presents results, Section 6 presents a robustness check and Section 7 concludes.

## **2 Related Literature**

### **2.1 Theoretical Literature**

There is ample theoretical literature that explores the relationship between firm liquidity constraints and the number of banks they employ. In this section, we present the most relevant theoretical models that study how the number of lending banks firms employ impact the availability of funds, the probability of defaulting on loan payments and the



probability of successfully renegotiating loans.

Rajan (1992) develops a model where firms choose between informed lenders and arm's-length investors. The benefit of borrowing from informed lenders is that they will closely monitor the firm, make informed lending decision and give advice on the investment decisions of the firm. Lending will be more flexible, in the sense that the lender will adapt the loan to the needs of the firms. The cost of borrowing from informed lenders is that they can extract rents from the firm, because the bank gains monopoly power by having information about the firms that is difficult to obtain by competitor banks. On the other hand, arm's length lending mitigates the rent extraction problem, but is less likely to monitor or control the investments and adapt the loan to the needs of the firm. In Rajan's framework, firms with a single "informed" lender will have a more flexible access to finance and therefore less inefficient default than firms that engage in "arm's length" lending. Rajan's model suggests that the most important reason to engage in multiple lending is to reduce the capacity of the informed lender to extract present and future rents. Nonetheless, Von Thadden (1995) shows that rent extraction can also be mitigated by long term contracting with a single bank. This suggest that firms should have other reasons to lend from multiple lenders beyond mitigating rent extraction. The findings in our work indeed suggest that firms chose to engage in multiple bank lending relations for diverse reasons.

Gertner and Scharfstein (1991) and Scharfstein and Bolton (1996) model the renegotiation problems associated with widespread debt holding. Gertner and Scharfstein (1991) argue that renegotiation problems arise due to coordination problems among bondholders. More specifically, debt holders who do not renegotiate can see the value of their bonds rise if the rest of the bondholders forgive some of the debt. This can lead some bond holders to hold out from renegotiation, causing a breakdown in the process. Scharfstein and Bolton (1996) argue that the costs at which the creditors can sell the firm's assets, in the event of a liquidation, increases with the number of lenders. This increase in the liquidation value reduces the incentives for strategic default, but also increases the probability of inefficient liquidation in the event of liquidity defaults. The higher risk of inefficient liquidation present in these models may deter firms from strategically defaulting, thus reducing default rate. In turn, the decrease in the probability of strategic default may increase the loan size that banks are willing to lend ex ante.

Thakor (1996) focuses on the effect of capital requirement on aggregate bank lending. To answer this question he models the firm's choice about the number of lenders they seek when they need a bank loan. Thakor (1996) assumes that banks will screen firms with noise,

therefore creditworthy firms will prefer applying to more banks to reduce the probability of being denied credit. However applying to more banks will reduce the incentives for banks to screen, because the higher competition will reduce the likelihood of being able to extract the firm's rent in the future. The companies will therefore have an optimal number of banks to apply that balances these two effects. Even though Thakor focuses on the number of banks a firm applies to, it is easy to extend his model to the number of banks a firm borrows from. Indeed if we think that banks will decide on the loan size based on noisy screening (instead of deciding between lending or not lending) then a firm may want to borrow from multiple lenders to improve their liquidity situation.

## 2.2 Empirical Studies

Gilson, Kose and Lang (1990) find that having more debt owed to banks, and less distinct classes of debt bond holders, increases the probability of a private renegotiation success. However, Asquit, Gertner and Scharfstein (1994) find that the fraction of public debt does not have a significant effect on renegotiation success. Rather, they find that the number of times the firm issues debt (which they use as a proxy of debt complexity) is associated with renegotiation success. Although these papers disagree as to what causes renegotiation complications, they come to the same conclusion that more widespread lending is associated with a lower probability for renegotiation success.

In more recent empirical work, Brunner Krahen and Pieter (2007) investigate the effect that multiple lending has on renegotiation success by studying bank pools, an institution that coordinates the action of banks during debt reorganization, in Germany. Brunner Krahen and Pieter find that the probability for successful renegotiation is higher and time spent in default is shorter when distressed firms have fewer bank lending relations. They also show that pool formation is more likely when the debt is evenly distributed among banks, suggesting that even distribution facilitates coordination.

The previous three papers discuss the implication of having multiple lenders on renegotiation. As discussed in the theory section Bolton and Scharfstein (1996) predict that the potential renegotiation complication will have implications on the lending decisions of the banks. In the rest of this section we briefly describe the papers that study the relationship between number of lenders and liquidity.

Petersen and Rajan (1994), use a data set on small businesses in the United States to explore the benefits of relational lending. They find that concentrated borrowing is correlated with greater availability of credit. They also find that adding one additional

banking partner increases late payments by almost two percentage points. However, they find little evidence that the price of loans changes when lending is more concentrated. In our study, we also explore the extent to which concentrated borrowing affect the total outstanding loan and the probability of default.

An empirical work closely related to our study is Farinha and Santos (2002). Using a data set on Portuguese firms, they explore the factors that lead companies to switch from one bank relationship to multiple banking relations. They argue there are two principal reasons why a firm would wish to increase its number of banking partners. First, a firm may wish to expand banking relations if they have had rapid growth and one bank can no longer meet their financial demands. It also follows that firms that have better growth opportunities may be inclined to using multiple banks. Second, companies with a low indication of profitability, or that are in arrears, may expand their bank relations to continue to receive financing.

While the aforementioned empirical studies set forth a strong framework from which to study the impact of multiple banking, a common problem among the literature is that firms endogenously select their number of banking partners (or bond financing). This problem is not fully addressed in the former papers and therefore the interpretation of the results is challenging. In our work, we use an exogenous shock to isolate the effect that the number of lenders has on multiple banking from the inherent characteristics that lead firms to select different debt structures.

### **3 Methodology**

The majority of empirical studies that examine the impact that multiple banking has on firms are challenged by the fact that firms internally decide their quantity of banking partners. We use a quasi-experiment that provides an exogenous reduction to the number of lenders some firms use. This allows us to identify the effect of the number of lenders in the liquidity situation of the firm.

The quasi-experiment we study was a result of the merger of two major banks in Chile in August 2002. The merger generated an exogenous reduction in the number of banks for firms that previously borrowed from both of the merged banks. The merger was a result of the union of two financial holdings in Spain, Banco Santander and Banco Central Hispano, that merged into Banco Santander Central Hispano (BSCH). Banco Santander was also the owner of Banco Santander Chile, while Banco Central Hispano had a 40%

participation in Banco de Santiago. In April 2002 BSCH bought 35% of Banco de Santiago raising its participation from 40% to 75%. Banco Santander Chile and Banco de Santiago merged their operations in August 2002, after the Chilean antitrust bureau declared that the merger was not a threat for the competition in the Chilean financial markets.<sup>3</sup> However, the banks in Chile represented less than 1% of the operations of the holdings in Spain. Therefore, it can be fairly assumed that the merger was driven by contingencies in the Spanish financial markets and not by contingencies in the Chilean markets.

The merged bank had a dominant position in the Chilean bank industry with 27% of the market share, its closest competitor was Banco de Chile with 22% market share. Given the magnitude of the merger, it raises concerns regarding potential changes in the lending policies of the merged banks. We address these concerns in the robustness checks section. A second concern is that the banks could have merged for endogenous reasons. We already make the point that the merger was triggered by the merger of two holdings in Spain, other than that the two banks had no commercial ties before the merger of the Spanish Holdings. This makes it unlikely that the two banks may have merged in the absence of the BSCH merger.

In our analysis, the treatment group consists of firms that before the merger were borrowing from both of the merged banks. The control group consists of firms that had loans from banks that did not merge.<sup>4</sup> After the merger, the companies in the treatment group end up having only one bank lending relationship. However firms in the control group still have two bank lending relationships after the merger.

In Figure 1 we show a diagram of the loans for firms in the treatment and firms in the control groups. We see in the picture that both firms in the treatment group and firms in the control group have two bank lending relationships before the merger. However, after the merger firms in the treatment group have only one bank lending relationship.

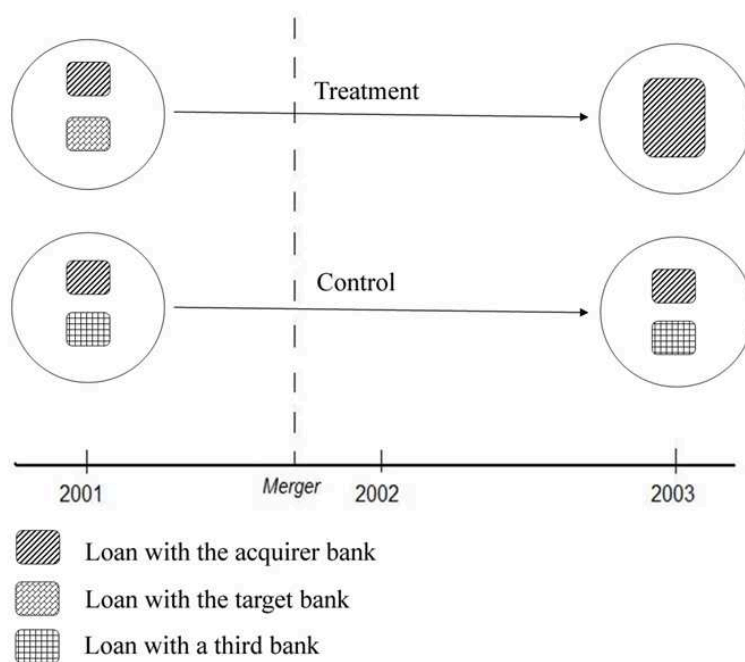
To further sharpen the identification in our analysis, we construct both the control group and the treatment group with firms that prior to the merger had a bank lending relationship with the acquirer, this way we aim to make both groups more similar. Firms in the treatment group have a second bank lending relationship with the bank that was acquired while firms in the control group have a second bank lending relationship with a bank that was untouched by the merger. Furthermore we drop from the control firms

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<sup>3</sup>See Jose Tomas Morel (2003) for details

<sup>4</sup>For simplicity, in the methodology section we describe the setup for the analysis of a reduction from two lender to one lender. However we also estimate the more general case of a reduction from N lenders to N-1 lenders

**Figure 1: Treatment and Control Groups**



that had as a second lender a publicly owned bank, or a bank that was less than 50% the size of the target. Government owned banks usually have political considerations in their lending policy (for details see La Porta, Lopez-De-Silanes and Shleifer 2002 and Sapienza 2004). Small banks are more willing to engage in relational lending than big banks and therefore also engage in different lending practices (see Berger, Miller, Petersen, Rajan and Stein 2005). We call "potential targets" all banks that were used to construct the control groups. The assumption in our analysis is that the firms in our sample could have chosen the "potential targets" instead of the realized target as their second lending banks.

In table 16 we see that the target and potential target banks are similar in the year that preceded the merger.<sup>5</sup> The target and the potential target banks have similar default rates (9.92% the target vs. 9.48% the "potential target") and they have similar quantities of firms with 1, 2 and 3 bank lending relations. The target has 30.22% clients with 1 lending while the "potential target" has 33.47%. The comparison for clients with two bank lending relationships is 35.36% in the target and 36.6% in the potential target and the comparison for clients having three bank lending relationships is 21.14% in the target and 19.42% in the "potential target". One important difference between the two groups is

<sup>5</sup>This table presents the characteristics of the target and potential target for all their clients, not only the ones included in our analysis. our analysis only considers those clients that have bank lending relationships with both the acquirer, target and potential target which is about 5% of the total clients.

the average loan size, which is 30% higher for the target. This difference is explained by the fact that the target had a smaller division for micro credit lending. In order to overcome this potential problem, we estimate the change in the relevant variables matching by loan size. All the results in the paper are presented by loan size. An aggregated estimation, using equal weights for each loan quintile, is also presented in each table.

## 4 Data and Summary Statistics

The data for this study are obtained from the Chilean Office for Bank Regulation (SBIF), which contains information on every firm that has debt in the formal Chilean financial system.

For each relationship between bank  $i$  and a firm  $j$  the database contains yearly information on total loan size, amount past due for 60 days or less, amount past due for less than 90 days, and amount past due for more than 89 days<sup>6</sup>. In addition to the variables contained in the database, we constructed the following variables: number of bank lending relations of each firm defined as the number of banks the firm borrows from, aggregated loan size defined as the total debt the firm has in the financial system, and a dummy variable for default which is defined as 1 if the firm has any amount past due in the financial system for more than 90 days and 0 otherwise.

The treatment group consists of all the firms that have bank lending relationships with both the acquirer and the target. The control group consists of firms that have a bank lending relationship with the acquirer and a bank that is not the target.

In table 1, we present the basic summary statistics for the treatment and the control groups before the merger. The average loan size for firms in the treatment group is US\$ 55,000 while the average loan size for firms in the control group is US\$ 30,000. To control for this difference, we divide both the firms in the treatment group and the firms in the control group into quintiles according to their loan size. By construction, the average loan size among the loan quintiles is almost identical. We make all our estimations by quintile and then evaluate the average using a simple matching estimation with equal weights for each quintile. The average loan size for firms in the first quintile is approximately US\$ 1,300 and for firms in the second quintile is US\$ 3,400. For the remainder of the quintiles, the average loan size is US\$ 6200, US\$ 12000 and US\$ 230,000, respectively.

The aggregated default rate before the merger is 7.37% for the treatment group and

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<sup>6</sup>The value corresponds to the variable at December the 31st of each year

8.85% for the control group. In both groups the default rate does not change monotonically with the loan size. In the treatment group, firms in the lowest loan quintile have the lowest default rate and firms in the highest loan quintile have the second lowest default rate. In the control group, firms with the lowest and highest loan size also have the smallest default rates, but firms in the highest loan quintile are the ones with the lowest default rates.

In table 2 we present summary statistics for the sample after the merger. The default rate increases in both the treatment and control groups, but the increase is much sharper for the treatment group ( from 7.37% to 10.69%) than for the control group ( from 8.85% to 10.82%). When we observe the default rates by quintile, the sharp increase in the default rates of the firms in the treatment group comes mainly from loan quintiles 3, 4 and 5. From loan quintile 4, the increase is especially dramatic (changes from 8.32 to 12.98).

## 5 Results and Discussion

The main analysis of this paper are presented in tables 3 through 9. In tables 3 and 4 we explore how an exogenous reduction in the number of lenders affects the probability of adding a new bank lending relationship. In tables 5 to 8 we study whether the reduction in the number of lending banks affects the firm's access to credit. Finally in table 9 we study how a reduction in the number of bank lending relationships affects the probability of default.

In tables 3 and 4, we observe that firms have specific targets for the number of banks they wish to borrow from. In particular, in table 3 we see that firms whose number of bank relationships were reduced from two to one as a consequence of the merger have a 23.23% higher probability of adding a new bank lending relationship within five years after the merger, compared to similar firms which were not affected by the merger. This effect is less strong for firms whose number of banks relationships were reduced from three to two (18.83% effect) and for firms whose number of banks were reduced from four to three (14.06% effect). The diminishing likelihood of adding a second bank as the number of banking relationships increase is not surprising. One would expect that the effect of a reduction in the number of lenders would be strongest for the firms that do not have other outside financing option.

In table 4, we explore to what extent loan size affects the probability of a firm adding a new bank lending relationship after the reduction in the number of lenders. We find that the effect of the merger on the probability of adding a new bank lending relationship within five

years after the merger is similar across all loan quintiles (ranging from 16.41% to 17.17%). However, on average, firms in the fifth loan quintile add new bank lending relationships faster than the rest of the firms. More specifically, firms in the fifth loan quintile have a 14.61% higher probability of adding a new bank lending relationship within two years after the merger, compared to similar firms which were not affected by the merger. This represents 85% of the overall effect observed within five years. For the remaining firms, the probability of adding a new bank lending relationship within two years after the merger is 9.34% higher compared to similar firms that were unaffected by the merger. This represents 56% of the effect observed within five years for the firms in the fifth loan quintile. There are two potential explanations for this finding. First, it may be more costly for firms in the fifth loan quintile to finance with fewer lenders. If they experience a higher reduction in the access to credit or a higher increase in the interest rates. Second, it may be easier for firms in the fifth loan quintile to add new bank lending relationships. For instance, they may have lower asymmetric information problems. Using our data set, we can rule out the possibility that firms in the fifth quintile return more quickly to their original number of lenders because of a larger reduction in access to credit. In fact, in table 5, we show that firms in the fifth loan quintile experience a lower reduction in credit availability than firms in the second, third and fourth loan quintile. It is likely that firms in the fifth quintile are able to return to their original number of lenders because they depend less on relational lending and more on arm's length lending. In fact, large firms usually have more verifiable cash flows and can therefore engage in arm's length lending relationships which can be initiated faster than relational lending relationships.

In tables 5 through 8, we explore how a reduction in lenders, brought about by the merger, impacts total loan size for firms. In table 5, we present the change in loan size for the firms whose number of bank lending relationships were reduced from two to one. Overall, there is a 14.5% decrease in the total loan amount. There are several potential explanations for this finding. The first, and the most natural explanation, is that there was a bank wide policy change after the merger. In the robustness checks section, we rule out this explanation by studying the effect that the merger had on firms which had a single bank lending relationship with one of the merging banks. For these banks, their quantity of banking partners remained constant following the merger, but they would have been exposed to the same policy changes as the firms who had a decrease in their number of banking partners. In the robustness checks section we provide evidence that show that this



effect was not driven by a change in the policy of the merged bank.<sup>7</sup> A second possible explanation is that the bank wanted to diversify its portfolio because it felt that after the merger it was over exposed to certain clients. However, after the merger the average loan size is negligible compared to the assets of the bank. Nonetheless, the diversification motivation is still possible if there are agency costs between the bank and its loan officers. A potential agency problem between the bank and its loan officers can be understood as follows: Loan officers have strong power in the loan evaluation process. Sometimes they directly decide on the loan size, but even if they do not directly decide the size of the loan, they can affect the decision of the bank by manipulating the information they present about the client. Loan officers are usually paid according to the growth and default rate of their portfolio. However they manage a small fraction of the banks' portfolio. Therefore they can have strong incentives to diversify their portfolio more than what is efficient for the bank. This could eventually be solved by implementing more sophisticated contracts between the bank and its loan officers, however anecdotal evidence suggest that banks do not implement complex contract with its loan officers. Furthermore in order to compensate officers for the medium or long term profitability of their portfolio, the bank should reduce the rotation of loan officers. However reducing the rotation of loan officers can increase the relevance of other friction like moral hazard in communication (see Hertzberg, Liberty and Paravisini 2008).

A third explanation for why the average loan size is smaller for firms whose number of banking partners were impacted by the merger is given by Bolton and Scharfstein (1996). In their model, an increase in the number of lenders complicates renegotiation and may deter firms from entering strategic default. Given their logic, in our quasi experiment where we see a reduction in the number of lenders, we should find the opposite effect. The reduction in the number of lenders can facilitate the renegotiation of loans in the event of default, because firms now only have to negotiate with one party. This may change the risk incentives of firms. If firms anticipate that the cost of defaulting will be lower they may ex ante be willing to engage in more risky projects thus increasing the default rate. Second, even if firms' project generate enough cash flows to pay back the loan, firms can decide to strategically default in order to renegotiate better terms for the repayment of the loan. The observed reduction in loan size may be a reaction of the bank to the expected increase in default rate generated by these effects. To understand to what extent renegotiation complications could explain the reduction in credit size we studied whether

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<sup>7</sup>A complete description of the robustness checks estimation is presented in a separated section

the probability of leaving default was affected by a reduction in the number of lenders. In table 5 in the appendix we observe that in average the probability of leaving default does not experience a significant increase as a consequence of a reduction in the number of lenders. However in table 6 in the appendix, where we divide the sample according to the distribution of the credit amongst the lending banks, we observe that firms with a similar amount of credit in each on the lending banks <sup>8</sup> experience an increase in the probability of leaving default, on the contrary firms that have most of their debt in one of the lending banks experience a reduction in the probability of leaving default. This suggests that the reduction in total loan amount for firms with most of their debt concentrated in one of the lending banks is not explained by the mechanism described in Bolton and Scharfstein.

A fourth explanation is given by Thakor (1996). In his model firms will borrow from multiple lenders to reduce the risk of being denied credit. The mechanism works as follows; If banks observe the quality of the clients with noise, creditworthy firms are at risk of being labeled as poor performing clients and experience an inefficient reduction in their access to credit. By having multiple lenders firms reduce the risk of being denied credit because of noisy screening.<sup>9</sup> In our quasi experiment, firms that were originally borrowing from both merging banks have a reduction in the number of lenders and therefore may experience an increase in the probability of being labeled as bad clients that may explain the reduction in their credit availability.

We also observe in table 5 that firms in the lowest loan quintile (micro credit below US\$ 3,000 in total loan amount) do not experience a reduction in access to credit. This suggests that firms in the micro credit segment benefit by concentrating their loans with only one bank, as predicted in the model of Rajan (1992) and as shown in Petersen and Rajan (1994). Nonetheless all the other mechanisms, presented previously, that go in the direction of reducing the credit availability still hold, and may offset the benefits from a more informed lending relationship (see Bolton and Scharfstein (1996) and Thakor (1996)). It is puzzling however that the effect described in Rajan (1992) is only present for firms with loans below US\$ 3,000, as it seems reasonable to assume that firms with loans below US\$10,000 would still benefit from informed bank relations. This puzzle may be explained by the model in Petersen and Rajan (1995). In their model, they describe how intense competition in the credit markets makes it difficult for banks to extract rents from firms in the future. This in turn will make it less attractive for banks to engage in relational lending.

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<sup>8</sup>The firms in this sub group have at least 30% of their credit in each of the lending banks.

<sup>9</sup>The only assumption that has to be made is that the noise in the screening process is not perfectly correlated among banks.

The Petersen and Rajan model could explain this puzzle if competition in the Chilean credit markets is less intense for firms with small loan sizes. In unreported estimations, we find evidence supporting this explanation: firms with loans between US\$ 3,000 and US\$ 10,000 have a 7.2% greater probability of transiting from a single to a multiple lender relationship than firms with loans below US\$ 3,000. We can also note in table 5 that the reduction in the loan size is decreasing in the size of the loan for firms in the second, third, fourth and fifth quintiles. Even though this relationship is not statistically significant, it suggests that larger firms experience a smaller reduction in credit.

To better understand why larger firms experience a lower reduction in credit availability, we look to see the impact of merger on the total loan amount that firms receive from their original lenders, this analysis differs from the estimation in table 5 in that it excludes the loans these firms received from bank relationships started after the merger (see table 6). The reduction in loan size from the original lenders observed for firms in the first loan quintile is significantly lower than the reduction in loan size for firms in the higher loan quintiles. This finding supports the explanation that micro credit firms benefit from concentrating their loans with only one borrower. Contrary to what we observe in table 5, in table 6 we see that firms in the second, third, fourth and fifth loan quintiles experience a similar decrease in the lending from their original lenders. This suggest that the smaller reduction in credit availability observed in table 5 for firms in higher loan quintiles may be explained by a higher capacity of bigger firms to offset the reduction in credit by lending from alternative sources, and not by a smaller reduction in the loan size they got from the merging bank.

In table number 7, we present the reduction in total loan amount for firms that were borrowing from three or more lenders before the merger. The difference between the estimations in this table and the estimations in table 5 is that the firms studied in table 7 had three or more bank lending relationships before the merger, and therefore after the merger had at least one alternative source of funding in addition to the merged bank. The results in this table are similar to those in table 5. One interesting difference is that firms in the highest loan quintile that had three or more bank lending relationships before the merger do not experience a significant reduction in their total loan amount. There are at least two explanations for this finding; The first one is that firms in the highest loan quintile, with three or more lenders before the merger, did not experience a reduction in lending from the merged bank. The second explanation is that these firms experienced a reduction in credit from the merged bank but were able to offset this reduction in credit by borrowing

from alternative sources. In table 13, were we present the reduction in credit size these firms received from the merged bank, we see that firms in the highest loan quintile that had three or more bank lending relationships before the merger, experienced a reduction of 28% in the lending from the merged bank, furthermore this reduction is not statistically different from the reduction experienced by firms in the second, third and fourth quintiles. This provides evidence that large firms, having multiple lending relationships before the merger, were similarly affected by the reduction in credit from the merged bank as firms in other loan quintiles, however only firms in the highest loan quintile were able to offset the reduction in credit by lending from alternative sources. It is interesting to note that small and medium sized firms were not able to offset the reduction in credit availability even if they had multiple lending relationships before the merger. This suggests that adverse selection affected the capacity of small and medium sized firms to get credit even from pre existing bank relationships.

In table 8, we present the reduction in the availability of credit by the length of the bank lending relationship with the acquirer.<sup>10</sup> we find that firms having long relationships with the acquirer experience a larger reduction in the availability of credit as a result of a decrease in the number of bank lending relationships than firms having a relatively new bank lending relationship with the acquirer. This effect holds for firms in all loan quintiles, however it is only statistically significant for firms in the first loan quintile. This difference is also significant in the aggregated, but only at the 10% level. One explanation for this finding is that the merged bank implemented a larger reduction in the access to credit for clients having a long term relationships with the acquirer.

In table 9, we present the change in default rate for firms whose number of bank lending relationships were reduced from 2 to 1 as a consequence of the merger. Overall the default rate for these firms is 1.26% larger compared to similar firms unaffected by the merger. This finding supports the prediction in Bolton and Scharfstein (1996), according to this model a reduction in the number of lender will make it easier for the firms to renegotiate the terms of its debt. The positive effect on renegotiation can have to negative effects on the incentives of the firm's management. First, knowing the cost of renegotiation will be lower they may decide to engage in more risky projects, second even if they engage in efficient projects they may decide to strategically default on the loan to improve the terms of the loan contract. The findings in table 9 support only the later mechanism.

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<sup>10</sup>Given data limitations, we divide the sample into two groups: (1) firms having a bank lending relationship with the acquirer greater than or equal to two years and (2) firms having a bank lending relationship with the acquirer for less than two years

If firms were risk shifting in their investment decision we should observe higher default rates that are persistent in time. However we find that the increase in default rate is transient and disappears four year after the merger. The effect on default rates being transient could be better understood if it is driven by strategic default. Firm could decide to strategically default on the loan just after the merger to improve the terms of the loan contract, however after the terms are renegotiated the firms should not show higher default rates compared with similar firms unaffected by the merger. We also observe in table 9 that firms in loan quintiles 1 and 2 do not show an increase in default rate, furthermore firms in the second loan quintile show a decrease in the default rate. There are two potential explanation for this finding. First these firms may be benefited from a more concentrated lending. According to Rajan (1992) model and in lines with the result in Petersen and Rajan (1994) small firms have lower default rates when they engage in relational lending usually associated to single lending. A second explanation also supported by Rajan (1992) is that small firms engaging in relational lending will be closely monitored by the bank and therefore it will be difficult for them to engage in strategic default.

## 6 Robustness Checks

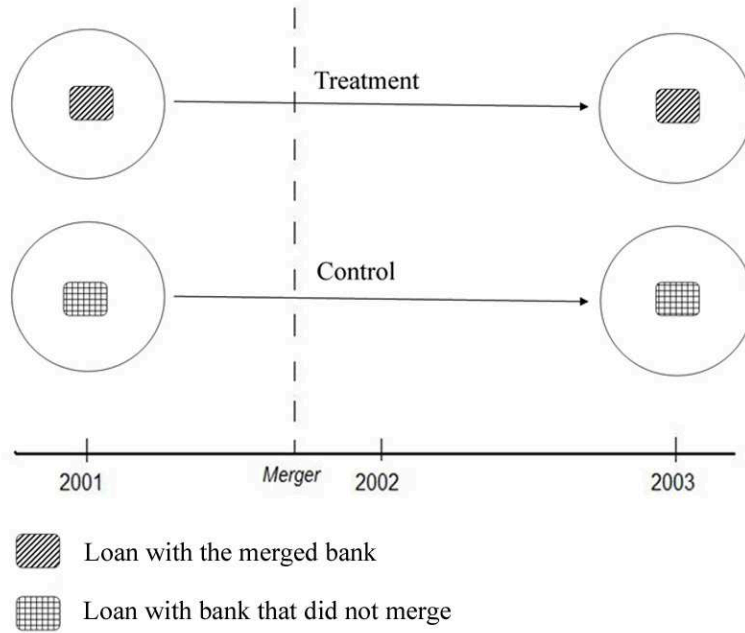
### 6.1 Potential Change in Lending Policy

A principal concern with the methodology we used in our results section is that the observed results could be driven by changes in the lending policy of the merged banks. To address this concern, we study whether the findings in the quasi-experiment analysis are also observed in firms that had a single bank lending relationship with one of the banks that merged. For these firms, their number of lending banks was unaffected by the merger, but they would have been exposed to the merged bank policy changes.

Figure 2 displays information regarding the control and treatment groups for the robustness check estimation. We can see that all the firms included in this estimation have one bank lending relationship before and after the treatment and thus none of these firms experienced a change in their number of banking relationships. However, firms in the treatment group are affected by potential changes in the policy of the merged bank, while firms in the control group are not affected by a change in the policy of the merged bank, because the do not have a lending relationship with the bank.

I perform a difference-in-difference analysis for the group of firms having a single lending relationship with the merged banks, relative to a comparison group of firms that had a

**Figure 2:** Robustness Check: Treatment and Control Groups



single bank lending relationship with a bank that did not merge. If our findings in the quasi-experiment were driven by changes in the lending policy of the merged bank, the findings should still hold in the estimation for firms with single bank relationships. In tables 10, 11 and 12, we present the results of this robustness check estimation. In table 10, we present the analysis for the probability of adding a new bank lending relationship. In table 1.11, we display our analysis for the total loan amount. Lastly, in table 1.12, we present our analysis for the change in default rates.

In table 10, we present the difference in the probability of adding a new bank lending relationship after the merger between firms that borrowed from only one the merging banks compared to firms that borrowed from a single bank that did not merge. We observe that in average firms that were borrowing from only one of the merging banks have a lower probability of adding a new bank lending relationship than firms which were borrowing from a single bank that did not merge. This is not too surprising since firms borrowing from one of the banks that merged probably got access to some new services after the merger (provided by the merged banks from which the firms was not borrowing).

In table 11, we present the estimation for the change in the outstanding loan before and after the merger. We observe that the change in total loan amount for clients holding loans with either the acquirer or the target (third column) is five times smaller than the effect

for clients holding loans with both the target and the acquirer (fourth column), 2.95% compared to 14.35. However, there is important variation across quintiles. Firms in the first loan size quintile increase their total outstanding loans in 4.44%. On the contrary, firms with loans in the third loan size quintile have a reduction in their total outstanding loans of 8.43%. This high fluctuations casts some concerns regarding the interpretation of the results for this variable in the quasi-experiment. However, even the maximum observed reduction in the total loan amount for firms with single bank relationships (8.43% for firms in the third quintile) is still less than 50% the effect in the quasi-experiment. It is also interesting to note that clients borrowing only from the acquirer experience a significant increase in their total loan amount while clients borrowing only from the target experience a significant decrease in their total loan amount. This result suggest that some information is lost for clients with loans in the target (as some of the loan officers in the target were fired after the merger), however this hypothesis cannot be fully identified given data limitation. Another interesting result is that the biggest reduction in total loan amount is experienced by clients having bank relationships with both the acquirer and the target bank who hold most of their debt with the acquirer, because this clients should be well known by the acquirer loan officers (who were not fired) we cannot explain this reduction by an information problem, therefore this finding suggest that it is the reduction in the total loan amount is explained by the reduction in the number of lending banks.

## 6.2 Potential Differences Between Treatment and Control Group

Another concern is that the findings in this study could be explained by differences between the treatment group and the control group. By using an exogenous shock to the number of banks we are already addressing this issue.

To further address this concern in tables 14 to 15 we estimate the effect of the merger on the probability of adding a new bank lending relationship and in the total loan amount for the fraction of the sample for which we have information on sales and assets.

In table 14 we estimate the effect of the merger on the probability of adding a new bank lending relationship controlling for companies' assets and sales. We observe that the findings in this estimation are consistent with the findings in tables 3 and 4, where we run a difference in difference estimation, for the entire sample but without controls . In particular in table 14 we observe that the probability of adding a new bank lending relationship as a consequence of the merger is 5% after 1 year, 11% after 2 years and 10.9% after 3 years, whereas in table 4 the estimation for this variable was 5.47% after 1

year 10.39% after 2 years and 14.67% after 3 years. Even though the estimations are not exactly the same they are similar in direction and order of magnitude.

In table 15 we estimate the effect of the merger on the total loan size controlling for companies' assets and sales. We observe that the findings in this estimation are consistent with the findings in table 5. In particular in table 15 we observe that the merger generates a decrease in the loan size of 21.9% after controlling for sales and assets, whereas in table 5 the reduction ranges from 21.52% to 13.38% depending on the loan quintile.<sup>11</sup> Summarizing both estimations go in the same direction and are not statistically different.

In short, both robustness checks provides grounds for confidence that the results of the quasi-experiment are due to an exogenous change in the number of bank relationships and not the result of changed post-merger lending policy.

## 7 Conclusion

This paper examines how the number of lenders used by firms affects their access to funds, by means of a quasi-experiment generated by the merger of two major banks in Chile in 2002. This merger exogenously reduced the number of bank lenders for some firms in Chile and this exogenous shock is used to address the potential endogeneity, self selection and unobservable variables biases in previous empirical work.

In a frictionless financial market such as the one described in Modigliani and Miller (1958), firms are indifferent with respect to the number of bank lending relationships they have. However, in a market with asymmetric information, commitment problems or transaction costs the number of bank relationships it has can affect the firm's ability to raise funds and its incentives to exert effort and repay the loan (see for example: Rajan (1992), Bolton and Scharfstein (1996) and Thakor (1996))

This paper provides evidence that, contrary to what would happen in a frictionless market, companies appear to have a target for the number of banks from which they borrow: firms whose number of banking partners was reduced by the merger were about 19% more likely to add a new bank lending relationship compared to similar firms unaffected by the merger.<sup>12</sup>

To distinguish between different theories that explain this finding, we examine the effect

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<sup>11</sup>This range is for quintiles 2, 3, 4 and 5. Quintile 1 is not considered because most firms in this quintile do not have assets and sales information and therefore are not included in the estimation in table 15

<sup>12</sup>Defined as the probability of increasing the number of banking partners in the five years following the merger



of the number of bank lending relationships on the firm's total debt outstanding.

I find that firms which went from having two to one bank lending relationships as a result of the merger experienced on average a 15% reduction in the total loan size, compared to similar firms unaffected by the merger.

These findings are consistent with the model in Bolton and Scharfstein (1996) in that the outstanding loan decreases and the default rate increases after a reduction in the number of bank lenders. However, the predictions in Rajan (1992) are not observed in the aggregate results, although for firms with loans in the lowest loan quintile, we do observe evidence supporting Rajan's predictions. A potential explanation is that the asymmetric information problem that explains the benefit of informed lending in Rajan is more relevant for smaller firms, where hard information about the firm is less likely to be available for the bank.

The observed reduction in the total outstanding loan amount is also consistent with the model in Thakor (1996) in that the outstanding loan amount falls after a reduction in the number of lenders. An alternative explanation for the reduction in loan size, not explored in the literature, is that agency problems between the bank and the loan officers generate incentives for the loan officers to over-diversify compared with what is optimal for the bank. This may happen if each loan officer's wage is linked to the default rate of his own portfolio, which is a small fraction of the bank's portfolio. Further theoretical research is needed to explore this alternative explanation.

Important questions remain unanswered and provide avenues for future research. For example, due to data limitations this study does not explore the effect of the number of lenders on the price of the loan, which would help understand the motivations of firms in choosing the number of bank lending relationships. It would also be of interest to consider whether a reduction in the number of bank lending relationships has any effect on the sales, profits, costs and productivity of firms. However, this would require more detailed information on firms than is currently available.

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# Appendix

Table 1: Summary Statistics Before the Merger

In this table we present summary statistics for the treatment and control groups. All the firms in both groups have two bank lending relationships. The firms in the treatment group have lending relationships with the acquirer and with the acquired banks while the firms in the control have lending relationships with the acquirer and with a bank that did not merge. The debt presented in this table is the sum of the loans in each of the lending banks and we present the standard deviations in parentheses. The default rate was calculated as the fraction of firms having past due payments of 90 days or more at the end of 2001, but we excluded from the calculation the firms that were already in default at the end of 1999. The probability of leaving financial distress was calculated as the fraction of firms without past due payments of 90 days or more at the end of 2001. Only firms in default, at the end of 1999, were used in this estimation.

variable	Treatment	Control
General Variables		
number of firms	5648	9897
loan mean	55423 (1013205)	29665 (261675)
loan p25	2889	1849
loan median	6212	3815
loan p75	13946	8187
default rate	7.37	8.85
prob. Leave def.	35.32	34.62
Variables by quintile		
Number of firms		
quintile 1	1128	3272
quintile 2	1130	2373
quintile 3	1130	1754
quintile 4	1130	1311
quintile 5	1130	1187
Loan mean		
quintile 1	1265 (646)	1333 (609)
quintile 2	3460 (655)	3396 (656)
quintile 3	6293 (1001)	6173 (1004)
quintile 4	11956 (2947)	11681 (2778)
quintile 5	254047 (2255061)	214851 (729551)
Default rate		
quintile 1	6.21	8.01
quintile 2	8.23	9.69
quintile 3	7.43	9.92
quintile 4	8.32	9.92
quintile 5	6.64	6.74
Probability of leaving financial distress		
quintile 1	39.13	33.18
quintile 2	48.94	38.85
quintile 3	27.66	35.42
quintile 4	23.4	28.33
quintile 5	37.5	35.09

Table 2: Summary Statistics After the Merger

In this table we present summary statistics for the treatment and control groups. All the firms in both groups have two bank lending relationships. The firms in the treatment group have lending relationships with the acquirer and with the acquired banks while the firms in the control have lending relationships with the acquirer and with a bank that did not merge. The debt presented in this table is the sum of the loans in each of the lending banks and we present the standard deviations in parentheses. The default rate was calculated as the fraction of firms having past due payments of 90 days or more at the end of 2003, but we excluded from the calculation the firms that were already in default at the end of 2001. The probability of leaving financial distress was calculated as the fraction of firms without past due payments of 90 days or more at the end of 2003. Only firms in default, at the end of 2001, were used in this estimation.

variable	Treatment	Control
General Variables		
number of firms	5780	12131
loan mean	45672 (597505)	23182 (285356)
loan p25	2804	1609
loan median	6470	3348
loan p75	15900	7105
default rate	10.69	10.82
prob. Leave def.	34.69	37.18
Variables by quintile		
Number of firms		
quintile 1	1155	4291
quintile 2	1156	3278
quintile 3	1156	2149
quintile 4	1156	1249
quintile 5	1157	1164
Loan mean		
quintile 1	1107 (639)	1198 (589)
quintile 2	3433 (731)	3327 (719)
quintile 3	6562 (1159)	6421 (1159)
quintile 4	13374 (3295)	13022 (3239)
quintile 5	203708 (1324161)	201982 (902082)
Default rate		
quintile 1	6.84	8.58
quintile 2	10.21	13.24
quintile 3	11.68	12.19
quintile 4	12.98	11.05
quintile 5	11.75	9.54
Probability of leaving financial distress		
quintile 1	35.42	39.23
quintile 2	30.61	40.09
quintile 3	40.82	35.87
quintile 4	26.53	28.36
quintile 5	40	30.43

Table 3: Increase in probability of adding a bank lending relationship after an exogenous reduction in the number of bank lenders

In this table, we study whether an exogenous reduction to the number of lending relationships increases the likelihood that the firm adds a new bank lending relationship. The estimation is evaluated as the probability that a firm whose number of lending relationships was reduced by the merger adds a new bank lending relationship compared to the probability that a similar firm that was unaffected by the merger adds a new bank lending relationship. The results are presented by the number of banks that the firms had pre-merger. Each row presents the probability that a firm that had N banks before the merger (and therefore N-1 after the merger) adds a new bank lending relationship after the merger, compared to similar firms that were unaffected by the merger. The last row presents the average estimated using equal weights for firms having two, three and four banks pre-merger. The different columns present the probability of adding a new bank lending relationships for different time frames (one, two, three, four and five years after the merger).

quintile	P(1 <sup>st</sup> year)	P(2 <sup>nd</sup> year)	P(3 <sup>rd</sup> year)	P(4 <sup>th</sup> year)	P(5 <sup>th</sup> year)
Two banks	6.38*** (0.69)	14.53*** (0.8)	19.28*** (0.82)	21.81*** (0.83)	23.23*** (0.84)
Three banks	6.87*** (0.59)	12.3*** (0.65)	17.07*** (0.68)	18.33*** (0.67)	18.83*** (0.68)
Four banks	6.85*** (0.71)	9.86*** (0.77)	13.21*** (0.78)	14.25*** (0.75)	14.06*** (0.77)
average	6.7*** (0.38)	12.23*** (0.43)	16.52*** (0.44)	18.13*** (0.43)	18.71*** (0.44)

#### Estimation example

Number of banks	group of firms	P(new bank) 2 years	P(new bank) 5 years
Two banks	affected by merger	34.08	44.86
Two banks	unaffected by merger	19.55	21.63
Difference		14.53	23.23

Table 4: Increase in probability of adding a bank lending relationship after an exogenous reduction in the number of bank lenders

In this table, we study whether an exogenous reduction to the number of lending relationships increases the likelihood that the firm adds a new bank lending relationship. The estimation is evaluated as the probability that a firm whose number of lending relationships was reduced by the merger adds a new bank lending relationship compared to the probability that a similar firm that was unaffected by the merger adds a new bank lending relationship. The results are presented for each category of debt (divided by quintiles according to the total loan amount). The aggregated effect is presented in the last row “aggregated” and is evaluated using a simple matching estimation with equal weights for each loan quintile.

quintile	P(1 <sup>st</sup> year)	P(2 <sup>nd</sup> year)	P(3 <sup>rd</sup> year)	P(4 <sup>th</sup> year)	P(5 <sup>th</sup> year)
quintile 1	5.33*** (0.77)	8.59*** (0.87)	13.67*** (0.93)	15.5*** (0.93)	16.41*** (0.95)
quintile 2	4.37*** (0.8)	11.34*** (0.93)	16.11*** (0.97)	16.67*** (0.96)	16.58*** (0.98)
quintile 3	4.4*** (0.86)	8.53*** (0.96)	14.03*** (1.01)	16.45*** (1)	16.51*** (1.02)
quintile 4	4.98*** (0.96)	8.9*** (1.08)	11.03*** (1.11)	14.58*** (1.09)	17.17*** (1.12)
quintile 5	8.25*** (1.06)	14.61*** (1.2)	18.51*** (1.21)	17.4*** (1.21)	17.09*** (1.22)
aggregated	5.47*** (0.4)	10.39*** (0.45)	14.67*** (0.47)	16.12*** (0.47)	16.75*** (0.48)



Table 5: Reduction in total debt outstanding for firms reducing their number of bank lending relations from two to one

In this table, we present the reduction in the total value of the outstanding loans generated by a reduction in the number of lending relations. Each reported coefficient is the outcome of a difference in difference estimation. The first difference is the average loan size increase over a period of two years (since the merger) for firms that reduced their lending relations from two to one, as a consequence of the merger, minus the average loan size increase of similar firms that were not affected by the merger. To control for any pre-existing differences, we subtract the difference in loan increase (over a period of two years) that the two groups had right before the merger. The difference in the total debt outstanding is presented two, three and four years after the merger to test whether the effect is persistent over time. The results are presented for each category of debt (divided in quintiles according to loan size). The aggregated effect is presented in row ALL and is evaluated using a simple matching estimation with equal weights for each loan quintile. In table 1.5.b, we present an example of the calculations used to estimate table 1.5.

quintile	effect after two years	effect after three years	effect after four years
quintile 1	-1.16 (5.38)	3.09 (5.41)	0.62 (5.43)
quintile 2	-21.52*** (4.99)	-20.38*** (5.25)	-24.15*** (5.43)
quintile 3	-19.11*** (4.63)	-20.16*** (5.07)	-21.4*** (5.37)
quintile 4	-16.6*** (4.78)	-23.8*** (5.23)	-23.47*** (5.64)
quintile 5	-13.38*** (4.29)	-14.57*** (4.78)	-11.56** (5.23)
ALL	-14.35*** (2.29)	-15.16*** (2.44)	-15.99*** (2.54)
N treatment	4817	4526	4286
N control	10126	9464	8897

#### Estimation example

quintile	change before merger	change after merger	difference in difference
ALL	39.05	34.6	
ALL	37.72	51.25	
First Difference	1.33	-16.65	-14.35

Table 6: Reduction in outstanding loans from the original lenders

In this table, we redo the estimation in table 1.5 excluding the loans that firms got from new bank lending relationships.

quintile	effect after two years	effect after three years	effect after four years
quintile 1	-7.16 (5.64)	-7.76 (5.96)	-17.57*** (6.15)
quintile 2	-23.89*** (4.78)	-27.54*** (5.18)	-36.06*** (5.54)
quintile 3	-26.51*** (4.25)	-30.77*** (4.7)	-35.34*** (5.05)
quintile 4	-23.13*** (4.47)	-32.39*** (4.87)	-36.01*** (5.26)
quintile 5	-22.59*** (3.85)	-25.31*** (4.24)	-27.86*** (4.66)
ALL	-20.65*** (2.19)	-24.75*** (2.36)	-30.57*** (2.5)
N treatment	4817	4526	4286
N control	10126	9464	8897

Table 7: Reduction in outstanding loans for firms with 3 or more bank lending relationships pre merger

In this table, we repeat the estimations in table 1.5 considering firms that had 3 or more bank lending relationships before the merger. The purpose of this table is to evaluate to which extent having an alternative source of funding other than the merging bank helps to offset the reduction in lending from the merging banks.

quintile	effect after two years	effect after three years	effect after four years
1	-5.79 (5.47)	-4.26 (5.71)	-5.45 (5.87)
2	-18.94*** (4.59)	-18.13*** (5.14)	-24.54*** (5.48)
3	-11.4*** (4.24)	-10.01** (4.81)	-14.59*** (5.26)
4	-15.1*** (4.5)	-17.05*** (5.06)	-23.88*** (5.59)
5	-0.39 (4.32)	-3.05 (4.93)	-2.06 (5.45)
ALL	-10.32*** (2.14)	-10.5*** (2.37)	-14.1*** (2.53)
N target	3699	3389	3208
N mock target	8050	7387	6918

Table 8: Reduction in total debt outstanding for firms reducing their number of bank lending relations from two to one by length of relationship with the acquirer.

In this table, we present the effect of a reduction in the number of lenders on the firm's total loan amount. We divide the sample into firms that had a bank lending relationship of more than 2 years with the acquirer and firms that had a relationship of less than two years with the acquirer. Each row presents the estimation for a different loan category (divided by quintiles according to the loan size). In the last row we present the aggregated effect evaluated using a matching estimation with equal weights for each loan quintile. In column one we presents the effect of a reduction in the number of lenders on the total loan amount of firms that had a lending relationship of less than two years with the acquirer. In column 2 we present the effect of a reduction in the number of lenders on the total loan amount of firms that had a lending relationship of more than two years with the acquirer. Finally in column three we present the difference between the effect for firms with long relationships with the acquirer and firms with short relationships with the acquirer .

quintile	less than two year relationship	more than two year relationship	$\Delta$
quintile 1	8.17 (6.92)	-7.9 (6.24)	16.07* (9.32)
quintile 2	-16.69** (7.07)	-23.87*** (5.52)	7.18 (8.97)
quintile 3	-17.33*** (6.46)	-20.04*** (5.12)	2.71 (8.25)
quintile 4	-14.93** (7.29)	-17.05*** (5.21)	2.12 (8.96)
quintile 5	-8.48 (7.34)	-14.89*** (4.49)	6.42 (8.61)
ALL	-9.85*** (3.14)	-16.75*** (2.39)	6.9* (3.95)
N target	1509		3308
N mock target	3467		6659

Table 9: Increase in default rate for firms reducing their number of bank lending relations from two to one

In this table we estimate the change in default rate spurred by a reduction in the number of lending relations. Each reported coefficient is the outcome of a difference in difference estimation. The first difference averages the default rate of firms that reduced their lending relations from two to one, as a consequence of the merger, minus the average default rate of similar firms that were not affected by the merger. To control for any pre-existing differences, we subtract the difference in the variables that the two groups had immediately preceding the merger. The estimation is presented for two, three and four years after the merger to test whether the effect is persistent over time. The results are presented for each category of debt (divided in quintiles according to loan size). The aggregated effect is presented in row ALL and is evaluated using a simple matching estimation with equal weights for each loan quintile. In table 1.9.b, we present an example of the calculations used to estimate table 1.9.

quintile	effect after two years	effect after three years	effect after four years
quintile 1	0.07 (1.22)	0.43 (1.28)	-0.56 (1.28)
quintile 2	-1.57 (1.48)	-2.21 (1.51)	-2.73* (1.56)
quintile 3	1.97 (1.58)	0.63 (1.65)	1.42 (1.7)
quintile 4	3.52** (1.77)	1.75 (1.86)	0.72 (1.91)
quintile 5	2.32 (1.65)	2.16 (1.75)	2.08 (1.74)
All	1.26* (0.69)	0.55 (0.73)	0.19 (0.74)
N treatment	5780	5780	5780
N control	12131	12131	12131

#### Estimation Example

group	quintile	default before merger	default after merger	dif in dif
treatment	ALL	7.37	10.69	
control	ALL	8.85	10.82	
First Difference		-1.49	-0.13	1.26

Table 10: Change in the probability of adding a new bank lending relationship for firms having a single bank lending relationship.

In this table we present the difference in the probability of adding a new bank lending relationship after the merger between firms that borrowed from only one of the merging banks compared to firms that borrowed from a single bank that did not merge.

quintile	P(1 <sup>st</sup> year)	P(2 <sup>nd</sup> year)	P(3 <sup>rd</sup> year)	P(4 <sup>th</sup> year)	P(5 <sup>th</sup> year)
quintile 1	-3.33*** (0.24)	-3.04*** (0.29)	-3.38*** (0.3)	-3.8*** (0.31)	-3.04*** (0.32)
quintile 2	-3*** (0.5)	-2.94*** (0.58)	-3.56*** (0.61)	-3.39*** (0.61)	-2.18*** (0.62)
quintile 3	-1.58** (0.64)	-0.8 (0.75)	-1.02 (0.79)	-2.12*** (0.8)	-0.99 (0.81)
quintile 4	-0.34 (0.68)	1.7** (0.8)	1.76** (0.84)	1.13 (0.86)	1.18 (0.88)
quintile 5	-0.58 (0.6)	2.75*** (0.69)	3.1*** (0.73)	2.75*** (0.75)	2.09*** (0.77)
aggregated	-1.77*** (0.25)	-0.47 (0.29)	-0.62** (0.31)	-1.08*** (0.31)	-0.59* (0.32)

Table 11: Effect of the merger on outstanding loans for firms holding one bank lending relation

This table is similar to table 1.5 because it evaluates the increase in outstanding loans as a result of the merger. However, unlike table five where clients have two or more bank lending relationships, one of which is held with the acquired bank, table 11 evaluates firms that have only one bank relationship. To further understand the effect of the merger on the total loan amount of firms, we also present the effect of the merger on the loan size of firms that have most of their debt with the acquirer bank (more than 50%). This table aims to identify potential changes in the policy of the merged bank.

quintile	acquirer	target	either	both	mainly acquirer
quintile 1	18.86*** (1.18)	-9.98*** (1.36)	4.44*** (0.9)	-1.16 (5.38)	-11.23 (8.42)
quintile 2	9.11*** (1.81)	-15.05*** (1.86)	2.97** (1.3)	-21.52*** (4.99)	-21.99*** (7.4)
quintile 3	-0.79 (2.11)	-16.88*** (2.04)	-8.83*** (1.47)	-19.11*** (4.63)	-19.57*** (6.92)
quintile 4	0.3 (2.6)	-15.09*** (2.11)	-7.4*** (1.67)	-16.6*** (4.78)	-27.52*** (7.11)
quintile 5	7.42*** (2.16)	-7.39*** (1.49)	0.01 (1.31)	-13.38*** (4.29)	-18.76*** (6.45)
ALL	6.98*** (0.87)	-12.88*** (0.87)	-2.95*** (0.62)	-14.35*** (2.29)	-19.81*** (3.45)

Table 12: Effect of the merger on the default rates of firms holding one bank lending relationship

In this table we replicate the analysis from table nine, using firms that have only one bank relationship and therefore do not have overlapped banks. Similarly to table nine, the first group consists of firms holding bank lending relations with the acquirer, or the acquired bank, while the second group consists of firms holding relations with banks did not merge. This table provides evidence to identify potential changes in the policy of the merged bank.

quintile	Change in default rates
quintile 1	-0.19 (0.21)
quintile 2	-0.82* (0.44)
quintile 3	-0.75 (0.58)
quintile 4	-1.31* (0.68)
quintile 5	-0.98** (0.49)
ALL	-0.81*** (0.17)
N merged	107975
N other banks	72975

Table 13: Reduction in the size of the loan received from the merged bank. Effect for firms having 3 or more bank relationships before the merger.

In this table, we study the reduction in the loan size received from the the merged bank by firms having 3 or more bank lending relationships before the merger, and whose number of bank lending relationships were reduced as a consequence of the merger.

quintile	effect after two years	effect after three years	effect after four years
quintile 1	-18.87*** (5.83)	-30.62*** (6.32)	-39.18*** (6.51)
quintile 2	-24.96*** (5.29)	-35.92*** (5.87)	-46.2*** (6.17)
quintile 3	-28.19*** (5)	-29.63*** (5.49)	-39.69*** (5.95)
quintile 4	-32.61*** (5.27)	-34.97*** (5.79)	-44.12*** (6.28)
quintile 5	-28.06*** (4.8)	-30.38*** (5.34)	-37.33*** (5.87)
ALL	-26.54*** (2.36)	-32.3*** (2.59)	-41.31*** (2.75)
N target	3699	3389	3208
N mock target	8050	7387	6918

Table 14: Increase in probability of adding a bank lending relationship after the merger

In this table we estimate a logistic model for the probability of adding a new bank lending relationship after the merger. The estimations in this table only consider the subs-ample of firms that have sales and assets information.

variable	estimate 2002	estimate 2003	estimate 2004
sales	0.06 (0.49)	0.05 (0.55)	0.63 (0.55)
assets	0.3 (0.48)	0.42 (0.54)	-0.2 (0.54)
merged	5.01*** (1.49)	11.75*** (1.68)	10.9*** (1.66)
C	9.36*** (2.8)	11.5*** (3.17)	10.96*** (3.12)
N	2350	2350	2350
adj. $R^2$	0.0045	0.0209	0.0182

Table 15: Increase in total loan amount as a consequence of the merger.

In this table we estimate the effect of the merger on the loan size of firms borrowing from both merging banks, in this estimation we consider the subset of firms that have sales and assets information.

variable	estimate
sales	-7.3*** (2.39)
assets	7.69*** (2.36)
merged	-21.88*** (7.28)
C	-69.08*** (13.71)
N	2350
adj. $R^2$	0.007



Table 16: Summary statistics for the Chilean financial system

In this table I present basic statistics to better understand the differences and similarities between the acquirer, target and banks that did not merge. I also present one column with the value of the variables for the complete Chilean Financial System. These statistics only include business loans (loans for individual without economic activity are excluded).

variable	ALL system	Acquirer	Target	Control
General Variables				
loan mean	11261543 (45733526)	14030149 (54853299)	20683108 (62150884)	14258330 (53945311)
loan p25	687937	1179302	1595038	900637
loan median	2008466	2858728	4522880	2565312
loan p75	5754259	7074747	14331691	7235073
default rate	9.02	11.65	9.92	9.48
prob. Leave def.	30.65	31.02	28.91	32.23
Fraction of firms with N banks				
1 bank	46.78	15.9	30.22	33.57
2 banks	33	42.45	35.36	36.6
3 banks	14.1	26.65	21.14	19.42
4 banks	4.51	10.64	8.96	7.3
5 banks	1.61	4.36	4.32	3.11
Loan mean for firms with N banks				
1 bank	7254258 (35887575)	9559333 (45024324)	10984656 (36754835)	7010631 (34364521)
2 banks	10305567 (39316109)	8452516 (35255560)	16058292 (46593000)	11203186 (41603014)
3 banks	15888013 (51533623)	13733645 (49823682)	23459279 (62763554)	17729083 (56597966)
4 banks	26626901 (74312072)	24334681 (74524608)	36459658 (87145558)	29324660 (80100817)
5 banks	63614293 (134025980)	61295486 (133867431)	80100486 (149210333)	71450322 (144413050)
Default rate for firms with N banks				
1 bank	5.91	5.61	5.85	5.64
2 banks	9.78	9.95	8.87	8.89
3 banks	13.65	14.03	12.73	12.78
4 banks	17.14	17.6	16.17	16.56
5 banks	20.47	21.21	20.15	20.64
Probability of leaving financial distress for firms with N banks				
1 bank	26.87	17.44	17.49	23.35
2 banks	34.04	34.19	32.92	37.02
3 banks	33.17	33.75	31.36	35.48
4 banks	29.89	30.22	29.82	30.51
5 banks	25.9	25.63	24.32	25.33

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