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## Working Paper Series

Melina Papoutsi **Lending relationships  
in loan renegotiation:  
evidence from corporate loans**

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## **Abstract**

This paper presents evidence that personal relationships between corporate borrowers and bank loan officers improve the outcomes of loan renegotiation. Analysing a bank reorganization in Greece in the mid-2010s, I find that firms that experience an exogenous interruption in their loan officer relationship confront three consequences: one, the firms are less likely to renegotiate their loans; two, conditional on renegotiation, the firms are given tougher loan terms; and three, the firms are more likely to alter their capital structure. These results point to the importance of lending relationships in mitigating the cost of distress for borrowers in loan renegotiations.

*Keywords:* loan renegotiation, bank branch closures, loan officers, corporate credit

*JEL codes:* G21, L14, E44, E58, O16

## **Non-technical summary**

An important issue for bank governance, risk and credit supply is the management of lending relationships. On the one hand, such relationships can reduce asymmetric information and improve loan monitoring. On the other hand, they can contribute to ever-greening behavior and potentially to an increase in non-performing exposures. This paper studies these trade-offs by looking at interruptions in relationships between loan officers and borrowing firms and their implications for loan renegotiations and firms' sources of financing. Two motivations, among others, are to inform bank managers and supervisors about the implications of loan officer rotation as part of regular bank governance as well as resolution authorities about potential implications of bank restructurings, which may lead to the removal of loan officer.

The analysis draws on a novel dataset on corporate loans and bank reorganization in Greece in the mid-2010s, which helps to empirically identify the causal effect of interrupted relationships. The main findings are that when the relationship between a loan officer and a firm is interrupted: (1) the firm has a significantly lower probability to renegotiate a loan compared to a firm with a continuous relationship; (2) when renegotiation occurs, firms with interrupted loan officer relationships receive tougher loan terms – notably, significantly shorter maturities and higher collateral requirements, whereas interest rates hardly increase –; and (3) firms with interrupted relationships raise more equity, decrease leverage, and substitute partially lending from other banks. An interruption in the loan officer relationship could be caused by different reasons such as by the closure of branches, which is quite frequent nowadays as a consequence of digitization or consolidation, a loan officer rotation scheme, or a bank restructuring. The first and the last often happen in a situation of financial distress.

The results thus suggest that bank managers, supervisors, and resolution authorities need to be mindful of the potential costs of changed loan officers. For example, in a context of general stress multiple interruptions of bank relationships could have a significant effect on firms' capital structure and borrowing capacity. Overall, while the results indicate net benefits of continued relationships for firms, they do not lead to unambiguous conclusions for bank risk.

# 1 Introduction

Are personal relationships with bank loan officers consequential for corporate borrowers? Could stronger relationships help a firm secure better loan terms in a renegotiation? Most corporate credit is mediated by a personal relationship between a firm and a loan officer, as this connection helps to mitigate agency problems. Financial intermediation theory suggests that relationships can be beneficial because they reduce information asymmetries and alleviate moral hazard (through monitoring, screening, repeated interaction etc.).<sup>1</sup> At the same time, strong relationships between borrowers and lenders may give rise to other problems, e.g., soft-budget-constraint problems, hold-up problems, or nepotistic behavior.<sup>2</sup> Whether the benefits of these relationships offset the costs is a challenging empirical question.

In this paper, I study the impact of lending relationships between loan officers and firms on loan renegotiations and investigate whether these relationships have significant effects on the probability of renegotiation and on the newly agreed loan terms. A renegotiation can be initiated by either the creditor or the borrower prior to or coincident with default on a loan. Classic contract theory suggests that in unanticipated states of the world, renegotiation is Pareto improving due to the debt-overhang.<sup>3</sup> Especially when financial distress results from a macroeconomic shock, it is probable that both the bank and the borrower benefit from a successful renegotiation. Renegotiation relaxes inefficient constraints on the borrowers as well as the bank and can increase expected loan repayments.

There are two main challenges for accurately estimating the impact of personal relationships on loan renegotiation. The first is the difficulty of quantifying the value of a personal relationship. No direct measure of relationship intensity exists. The length of a given relationship may seem like a straightforward measure, but the endogeneity of the decision to sever an existing relationship will complicate the interpretation of the time span measure. The endogeneity factor creates the second challenge. A bank's decision to break an existing relationship may reflect its perception of the declining creditworthiness of the borrower. Under some circumstances a successful firm may seek to broaden its access to external finance by weakening its relationship with the particular bank. Such decisions are endogenous and would bias any results estimated by treating relationships as exogenous in a simple OLS framework.

To overcome these challenges, I use micro data and a 2013 bank reorganization in Greece. This

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<sup>1</sup>Classic references: Leland and Pyle (1977), Diamond (1984), Ramakrishnan and Thakor (1984), Allen (1990)

<sup>2</sup>Sharpe (1990), Rajan (1992), Dewatripont and Maskin (1995), Bolton and Scharfstein (1996)

<sup>3</sup>Hart and Moore (1988), Rajan (1992), Aghion, Dewatripont, and Rey (1994), Bolton and Scharfstein (1996), Hart and Moore (1998), Maskin and Moore (1999), Gorton and Kahn (2000), Garleanu and Zwiebel (2008)

experiment provides exogenous variation in the length of the relationships between loan officers and firms. Moreover, detailed confidential data on corporate loans allow me to quantify accurately the effect of interrupted relationships, by controlling for region, bank unit, and firm-specific effects. My central finding is that relationships between loan officers and firms have a significant positive impact on loan renegotiation. Firms with interrupted relationships are less likely to renegotiate a loan compared to firms experiencing continuous relationships. In addition, firms with interrupted relationships receive tougher loan terms on the loans that are renegotiated. I also observe that firms alter their capital structure after the relationship with the loan officer is interrupted.

The empirical setting is based on the consolidation of a major commercial bank in Greece with business activity throughout the country. Bank network consolidation is a common response of banks to financial distress, as consolidation reduces operating costs and centralizes lending decisions.<sup>4</sup> During consolidation, some bank units are closed and the loan accounts from those units are merged with accounts in other surviving units. A bank unit closure interrupts personal relationships between loan officers and firms because merged accounts obtain new loan officers. Thus, after consolidation, two types of firms are identified: one, those whose loans were transferred to another unit and whose personal relationships were consequently discontinued, and two, those that remained at the same unit for the entire period.

The criterion for bank units' consolidation was geographic location. My identifying assumption is that the decision to close a bank unit is orthogonal to firms' characteristics. I find support for that assumption in the data by testing for differences in observable characteristics. First, I compare the loan terms and performance, and firm financial variables of borrowers in closed and open units in the pre-unit closure period and I find no statistically significant differences. Second, I provide out-of-sample evidence that the identifying assumption holds by using the Amadeus Bureau van Dijk dataset to test for differences based on the zip codes of bank units.

I apply a difference-in-difference methodology to estimate the effect of relationship interruption. I define as *treated* the firms with exogenously discontinued personal relationships and as *control* those with continuing relationships. Hard information passed from one loan officer to another as the transfer happened within the same bank. Observed differences between the two groups in the post-consolidation period should be driven by the consequences of interrupted relationships.

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<sup>4</sup>Several banks in Italy, Spain, Portugal have consolidated their network during the recent crisis as well as banks in the United States.

I find strong evidence for the significant effect of personal relationships on loan renegotiations at both extensive and intensive margins. Loans to firms with interrupted relationships have a 13.4% lower probability to be renegotiated upon their transfer to another unit, compared to loans to firms that remained at the same unit. The unconditional probability of renegotiating a loan is 59% and the estimated effect corresponds to a 8% lower probability of renegotiation. Moreover, conditional on renegotiating a loan, affected firms received tougher loan terms on their renegotiated loans. The affected loan terms for firms whose accounts were transferred to another unit include higher interest rates, approximately 170% shorter maturities, and requirements that these firms pledge collateral with 65% higher value compared to firms that remained with their original bank unit for the entire period. The economic magnitudes of the impact on loan maturity and collateral are significant as they correspond, on average, to approximately two and a half years shorter maturity and an additional €0.78 of collateral for each euro of loan amount. The results remain robust when I exploit a within-firm variation and apply a difference-in-difference-in-differences methodology. This confirms that the effect of the interrupted relationships is not driven by any firm characteristics.

I also observe that firms alter their capital structure after their relationship with the bank is interrupted. The change in capital structure indicates that firms cannot substitute lending from other banks without cost when the relationship with one bank is exogenously interrupted. In particular, we observe that, when the relationship with one bank is interrupted, firms raise more equity and decrease leverage. Firms only partially substitute loans from other banks to make up for the borrowing reduction from the bank whose relationship was severed. This change in a firm's sources of financing is likely to have important implications for the firm's business model and investments.

A possible selection bias on renegotiation could change the interpretation of the results for loan term differences between interrupted- and continuing-relationship loans. If the loan officer chooses to renegotiate with firms based on their performance, the intensive margin results will be biased. To address this concern, I conduct two tests. First, I compare the pre-unit-closure period characteristics of the treated and control firms that renegotiated a loan in the post-unit-closure period and I find no statistically significant difference. Second, I consider all the hard information available to both the loan officer and the econometrician to identify the variables that can trigger a renegotiation. This test demonstrates that the loan officer who remained at the same unit for the entire period chose to renegotiate with treated firms with higher profitability prospects. Loan officer behavior, therefore, biases estimated coefficients towards zero, implying that my intensive margin results are conservative.

To further investigate the explanatory mechanism for the value of a relationship between a loan officer and a firm, I examine closer and more distant relationships separately. In most cases, a closer relationship entails fewer outside financing options, and when a closer relationship is interrupted, it causes a significant informational loss. In contrast, firms with more distant relationships and, hence, greater outside financing options are expected to have stronger bargaining power. To test for the value of a stronger relationship, I construct a measure of relationship strength. This analysis confirms the value of relationships, as a firm with a stronger previous loan-officer relationship displays a significant negative effect on its renegotiated loan terms when this relationship ends.

This paper's main conclusion is that personal relationships mitigate the cost of distress for the firm in a loan renegotiation. The firm is worse off following the interruption of its loan officer relationship, as it is less able to renegotiate, and receives tougher loan terms on renegotiated loans. Moreover, an interruption of the firm-loan officer relationship causes the firm to alter its capital structure and its sources of financing. These results may be driven either by a loss of valuable soft information or by unwarranted favoritism. From the results on loan performance we observe that firms with continuing relationships have similar performance with firms with interrupted relationships. Moreover, a few heterogeneity tests indicate that the impact of an interrupted loan officer relationship on the probability of renegotiating a loan and on the renegotiated loan's terms is stronger for firms with good repayment histories, high leverage, and positive EBITDA growth rate. These findings therefore support the hypothesis that lending relationships between a loan officer and a firm help to alleviate debt-overhang through the acquisition of information.

In the next section, I describe the paper's contributions to the literature. In section 3, I provide an overview of the institutional background and the dataset structure. In section 4, I present the empirical specification and a detailed comparison of the treated and control groups. The regression results are presented in section 5. A discussion about the underlying mechanism is included in section 6. In section 7, I conclude.

## **2 Related Literature**

This paper contributes to the literature by being the first to combine two classic research streams—relationship banking and contract renegotiation—and by estimating the consequences of personal relationships between loan officers and firms for loan renegotiations. Analysing this effect, this paper is the

first to provide empirical evidence that relationships between a loan officer and a firm help to alleviate debt-overhang.

The broader literature to which this study contributes addresses the role of relationships in credit markets. A rich theoretical literature on bank debt highlights the importance of informational asymmetry and moral hazard for financial intermediation.<sup>5</sup> Several empirical papers have examined the relationship between banks and borrowers for evidence to determine whether asymmetric information affects lending. Petersen and Rajan (1994) and Berger and Udell (1995) used the repeated interaction between a borrower and a financial institution as a measure of relationship. Mian (2006), Agarwal and Hauswald (2010), Canales and Nanda (2012), and Bolton, Freixas, Gambacorta, and Mistrulli (2016) define relationship lending as a function of geographic distance. Ongena and Smith (2001) analyze the duration of a bank relationship with a firm. Sufi (2007) and Ivashina (2009) explore informational asymmetries in a lending syndicate.<sup>6</sup>

The empirical literature to which this paper is most closely related identifies the effects of personal relationships between bank employees and borrowers. These studies focus on how loan approvals or performance can be influenced by different factors such as cultural proximity (Fisman, Paravisini, and Vig, 2017), social connections (Haselmann, Schoenherr, and Vig, 2018), hierarchical and geographical distance (Liberti and Mian, 2009), or the loan officer being on leave (Drexler and Schoar, 2014). Several papers examine the effect on interest rates of strong interpersonal connections between a banker and a firm (Engelberg, Gao, and Parsons, 2012), or the effect of a strong relationship as measured by the number of interactions (Herpfer, Working Paper), or the effect of an interruption of a relationship caused by an executive's death or retirement (Karolyi, 2018). Lastly, Hertzberg, Liberti, and Paravisini (2010) and Cole, Kanz, and Klapper (2015) provide insights on the effects of bank-specific governance policies on the moral hazard behavior of a loan officer.

Within the field of literature on relationship banking, this paper is the first to demonstrate how exogenous interruptions in bank-borrower relationships affect loan renegotiation. One important difference between new and renegotiated loans is the bank's prior exposure to the risk of default on pre-existing loans. The risk of a higher probability of default is magnified in a crisis period, such as in Greece in 2010-2015, when banks faced high delinquency ratios that drove their overall risk assessment. In such

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<sup>5</sup>Jaffee and Russell (1976); Stiglitz and Weiss (1981); Myers and Majluf (1984); Diamond(1984,1991); Ramakrishnan and Thakor (1984);Sharpe (1990); Besanko and Kanatas (1993); Rajan and Winton (1995);Bolton and Freixas (2000)

<sup>6</sup>Extensive surveys of this literature are provided by Ongena and Smith (2000), Boot (2000), Srinivasan (2014)



periods, the value of a successful renegotiation surges.<sup>7</sup> Moreover, by analysing the impact of lending relationships in loan renegotiations, this paper is the first to provide empirical evidence that relationships help to alleviate debt-overhang. Further, whereas existing literature focuses on estimating relationship effects on lending either at the extensive margin or on the interest rate only, this paper examines the impact on the probability of renegotiation as well as on the three main variables characterizing the loan structure (i.e., interest rate, maturity, and collateral).

Given that the main focus of this paper is loan renegotiations, the analysis also contributes to the literature on contract renegotiation. Several influential papers have examined renegotiation in incomplete contracts as an out-of-equilibrium phenomenon.<sup>8</sup> Although the existing theory of contract renegotiation has evolved significantly, the empirical evidence on this topic is limited due to data restrictions. This paper investigates renegotiation independent of previous defaults on a loan payment, and for that reason is also related to the work of Roberts and Sufi (2009), who analyze in detail the factors triggering a renegotiation, and those determining its outcomes. Roberts (2015) is the closest to my paper, as he shows that a corporate loan renegotiation happens frequently, modifies significantly the initial loan terms, and is affected significantly by the duration of the lending relationship. Although similar conclusions to those found in these two papers arise in my analysis regarding the frequency and the outcomes of a renegotiation, my paper advances beyond these to estimate the effect of the relationship between a loan officer and a borrower on the probability of renegotiation and the nature of its outcomes.

A few empirical papers have considered other factors affecting loan renegotiation. The importance of the liquidation value of collateral (Benmelech and Bergman, 2008) of the mortgage securitization (Piskorski, Seru, and Vig, 2010), and of policy intervention (Agarwal, Amromin, Ben-David, Chom-sisengphet, Piskorski, and Seru, 2017) on loan renegotiation are highlighted. James (1995) focuses on debt restructurings and shows that the financial condition of the firm determines the bank's incentives to make concessions. Lastly, Chodorow-Reich and Falato (Working Paper) show the importance of the financial institution's health on contracting credit using covenant violations.

This paper also complements literature examining the impact of bank branch consolidation. In this area, the most relevant papers are by Nguyen (2019), as she examines how branch closures in the United States affect local access to credit, and by Bonfim, Nogueira, and Ongena (Working Paper), as they show that branch closures in Portugal cause an increase in the interest rate that firms receive. Lastly, this paper

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<sup>7</sup>Karolyi (2018) highlights also the importance of lending relationships during recessions.

<sup>8</sup>Hart and Moore(1988 1998, Rajan (1992), Aghion et al. (1994), Von Thadden (1995), Bolton and Scharfstein (1996), Maskin and Moore (1999), Gorton and Kahn (2000), Garleanu and Zwiebel (2008), Tirole (2010)

is linked to the strain of European debt crisis literature that employs micro-level data to identify the impact on bank lending.<sup>9</sup>

## 3 Institutional Background & Data

### 3.1 Institutional Background

The identification setting and the data come from a Greek bank and cover the period 2012–2015. Several important facts characterize the economy and the banking sector of that period.<sup>10</sup> From 2008 and until the end of 2016, the Greek GDP contracted by approximately 25%; unemployment rose to approximately 26%; and investment declined by 75%. The collapse in investment was partially caused by a decreased access to credit. Access to finance was the most pressing concern for small- and medium-size enterprises (SMEs) operating in Greece, as 33% of SME owners consider this their most important problem.<sup>11</sup> This issue is critical given that SMEs account for more than 90% of private companies and 87% of total employment.

The Greek banking sector suffered during this period from a lack of access to international capital markets, deposit flight, and losses from the sovereign debt restructuring. Several banks were resolved and their deposits as well as a number of their loan portfolios were transferred to the four largest banks, thus causing a significant centralization of the sector. The four largest banks went through three large-scale recapitalizations (July 2013, May 2014, and December 2015) during this period. However, availability of long-term finance remained limited, and cost of credit was very high compared to EU standards. One of the main reasons for the limited credit supply was the deterioration of banking asset quality. In 2016, the nonperforming loans (NPLs) reached 45% of the loan portfolio, and provisions stood at 50% of total NPLs. In particular, in the corporate sector, about 60% of loans to SMEs were nonperforming. The rise of the NPLs ties up bank capital, thereby reducing profitability and increasing funding costs.

In this paper, I exploit a major internal reorganization that was implemented in one of Greece's largest banks, and led to the closure of bank units. It is important to clarify what a bank unit is and distinguish bank units from branch closures. In this case, a bank unit entails a center that manages corporate loans,

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<sup>9</sup>Acharya, Eisert, Eufinger, and Hirsch (2018), Bentolila, Jansen, and Jiménez (2017), Cingano, Manaresi, and Sette (2016), Popov and Van Horen (2015), De Marco (2019)

<sup>10</sup>Gourinchas, Philippon, and Vayanos (2017) provide a detailed empirical and theoretical analysis of the Greek crisis.

<sup>11</sup>OECD, 2016 Financing SMEs Report

and more centralized centers manage specific loan types. For the analysis that follows, a bank unit can be considered a type of branch, because, as in distinct branches, personal relationships develop between loan officers and the firm whose loans they manage.

The main goal of this internal reorganization was increased efficiency regarding NPL management. In response to the significant rise in the NPL ratio for corporate loans, the bank established specialized NPL workout units at the end of 2013. The new units were separate from the units responsible for loan origination and were responsible for monitoring, managing, or liquidating the nonperforming exposures. Approximately half of total loans to small- and medium-size corporations were transferred to these specialized NPL units.

The criterion that was used to decide which loans to transfer to the NPL units is very strict and is related with the performance of the firm. In particular, if all the loans that a firm had at the subject bank in 2013 were nonperforming, the management of this firm's loans is transferred to the NPL unit. Otherwise, if at least one of the firm's loans had no delays on payments in 2013, the management of all the firm's loans remained at the bank unit, irrespective of having a nonperforming loan. This strict rule can be seen at the data as if the ratio of a firm's nonperforming loans per total number of loans is equal to one, the probability to be transferred to the NPL unit is one, while if the ratio is smaller than one, the probability is zero.

This transfer of loans to the NPL units caused a significantly reduced workload for the original units assigned to manage corporate loans. Consequently, it became cost effective for the bank to consolidate the original units, by closing several and relocating the loans' management to the closest unit that remained open. Originally there were 112 units that managed corporate loans, and after the mergers, there were 37. The bank intended to retain its network across the country, ensuring clients would remain. For that reason, the main criterion for mergers was geographic location, and mergers would only take place in areas served by two or more units. The unit remaining open in a given area, would be the unit managing the largest volume of loans. An important feature of the consolidation was the relocation of the loan officers. Loan officers who had worked in units that closed were transferred to the newly established NPL units. Loan officers who worked in units that remained open continued to manage their old loans and became additionally responsible for the loans transferred from closed units. Because firms whose loans were transferred to the closest unit lost the relation with the loan officer who had managed their loans, the feature of unit mergers, provides a good setting for testing the effect of personal relationships on loan renegotiation.

### 3.2 Dataset structure and descriptive statistics

The main data used in this study come from one of the largest commercial banks in Greece. The dataset contains detailed annual information on corporate loans for approximately 8,000 small and medium nonretail enterprises (SME) covering four years (2012–2015). The construction of the sample is based on the ECB supervision guidelines for the Asset Quality Review (AQR). Under these guidelines, an SME is defined as a corporation that has annual turnover up to € 50 million and employs fewer than 250 persons.

For several reasons, a restricted sample of nonretail SMEs is the most appropriate sample for the proposed analysis. First, it is necessary to exclude large corporations as they have access to other sources of financing, such as international banks and the stock market. Moreover, credit for large corporations is approved at higher level at the bank, and for that reason, relationships with loan officers are expected to be irrelevant. Second, the retail sector is also excluded from the dataset, as a different department at the bank manages this sector. By focusing on nonretail SMEs, I gained access to credible firm financial information, since the majority of the firms in the sample have audited financial statements, which they are required to submit to the bank. Moreover, by excluding very small firms, we can expect sample firms to be unaffected by the narrow local economic environment. Firms in the sample operate either regionally or nationally and their performance is expected to be affected by the economic conditions at the region and industry level.

The dataset includes detailed information on the loan terms and performance as well as basic firm financial information. Each firm has multiple loans at this bank, and the loan types vary from the more secure, such as leasing, to the less secure, such as factoring, letters of credit, and revolving credit. Moreover, an indicator of the bank unit responsible for each loan is included, which allows for tracking transfers across units. Personal relationships develop between loan officers and firms at the bank unit and changes in the bank unit indicator reflect interruptions of such relationships.

As I focus on the merger of the original bank units, I exclude the loans that were transferred to the specialized NPL units. For that reason, the sample included is not representative of the Greek economy during this period, but rather represents the set of firms that performed relatively well during the crisis. The final sample consists of loans to 3,984 firms located across the 9 geographic regions of the country. Following the merger, a single bank unit managed on average 340 loans to 107 firms. Table 1 presents the summary statistics for the main variables in the pre-period (2012, 2013). A median firm in the sample

has two loans with a total balance of approximately € 536,000 and total collateral cover of € 187,630. The average interest rate is 5.97%, and the average remaining maturity of the loans is approximately one and a half years (528.34 days). The median firm performs well, with no nonperforming exposures, and has not delayed a payment. Regarding the firm's financial information, the median firm was medium-size with approximately € 6 million in total assets and € 4.25 million in total debt. It has a positive EBITDA of approximately € 270,000, and a high leverage equal to 0.69. The summary statistics confirm the fact that the sample is comprised of firms that performed relatively well during the crisis.

## 4 Empirical Methodology

### 4.1 Identification Strategy

The identification of relationship interruption is based on a bank's internal reorganization and the closure of bank units. I employ this exogenous variation, define appropriate treatment and control groups, and apply the difference-in-difference methodology to accurately estimate the effect of interrupted relationships between loan officers and firms on loan renegotiation.

The first step is to exclude loans that were transferred to the specialized NPL units. The sample is thus constrained to relatively good performing firms. The next step is to identify the firms whose accounts were transferred to another unit because their original unit closed. By using the closure of the original bank unit as the source of exogenous variation, I overcome the selection bias that may arise at the firm level. In particular, treated firms are defined as those whose loan accounts were transferred to another bank unit because their original unit closed. Control firms are defined as those whose loan accounts were managed at a bank unit that remained open during the whole period of the sample. This specification of treatment and control groups ensures that the variation comes only from the bank unit level and not from the firm level. I need to clarify that there is a set of firms whose accounts were transferred to other bank units without their original unit closing. Even though the transfer for these firms is driven by endogenous reasons, I include them in the control group because otherwise the control group would be biased.<sup>12</sup> The estimated coefficients present the intent to treat effect of the exogenous interruption of the relationship between a loan officer and a firm.

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<sup>12</sup>In previous versions of the paper I had excluded this set of observations from the analysis. The results remain robust under both specifications. The estimated results excluding these firms are available upon request.

The feature that allows me to identify an interruption in relationships between loan officers and firms is the relocation of loan officers. Loan officers who worked in units that closed were transferred to the new NPL units. Loan officers who worked in the units that remained open continued to manage their old loans and became responsible for the loans that were transferred from the closed units. For that reason, firms that were monitored by a unit that remained open would continue to interact with the same loan officers, while firms whose accounts were exogenously transferred had to establish a new relationship with a loan officer.

The baseline specification is a difference-in-difference, which allows me to compare the difference on the outcome variables between loans to firms in the treated group and those in the control group in the post-unit closure period (2014, 2015) relative to the difference that the two groups had in the pre-unit closure period (2012, 2013). The baseline regression is:

$$y_{ijurt} = \alpha + \alpha_j + \alpha_{pre-u} + \alpha_{post-u} + \alpha_{rt} + \delta(Post_t * Treat_{ijur}) + \varepsilon_{ijurt} \quad (1)$$

where  $y_{ijurt}$  stands for the outcome variable for firm  $j$  obtaining a loan  $i$  from bank unit  $u$  and located in region  $r$  in year  $t$ .  $Treat_{ijur}$  is a dummy variable equal to one for treated firms and zero for control firms.  $Post_t$  is a dummy variable equal to zero for the period before the bank units' closure (2012 – 2013) and one after the closures (2014 – 2015). The baseline specification includes firm fixed effects ( $\alpha_j$ ) to capture any time-invariant firm characteristics. Both pre-period bank unit ( $\alpha_{pre-u}$ ) and post-period bank-unit ( $\alpha_{post-u}$ ) fixed effects are included to capture any time-invariant characteristics of the original bank unit and of the bank unit that the loan was transferred in the post-period (e.g., different lending limits). Region-year fixed effects ( $\alpha_{rt}$ ) capture any region and time-varying shocks. The coefficient of interest is  $\delta$ , which measures the difference in the outcome variable for the firms that experienced an interruption in their relationship with the loan officers, relative to the firms that did not, controlling for the pre-period difference.

The outcome variables of interest belong to three groups: (i) the probability of renegotiating a loan (extensive margin); (ii) renegotiated loan terms (intensive margin); and (iii), firm level effects. Regarding the loan terms of the renegotiated loans, I use as outcome variables the interest rate, the remaining maturity of the loan, and the collateral value. I also construct two additional variables to capture the effect of collateral. The first is an unsecured loan dummy and the second is a type-of-collateral dummy. To capture firm outcomes from an interrupted relationship, I examine the firm's equity over total assets,

total debt over total assets, EBITDA over total assets, and the firm's total loan balance at the subject bank over its total debt.

## 4.2 Comparison of treated and control groups in the pre-unit closure period

The most important threat to identification is a possible selection bias that arises from the decision to close a bank unit. It is necessary to assume that the bank did not close units where debtors performed, or were expected to perform, worse. The main criterion for unit closure is geographic location: in areas where there were two or more units, the bank kept only one, while in areas with only one unit, it was optimal for the bank to keep it open and retain its clients.

A comparison between the two groups in the pre-unit-closure period (2012–2013) provides evidence that there are no statistically significant differences across the two groups. Tables 2 – 3 present this comparison and includes variables related to loan terms, performance, and firms' financials. Table 2 shows the comparison of all the observations in the sample, including those that were transferred to the NPL units, while in table 3 only the treated and control firms are included. In both tables, Column 1 shows the mean value and the standard deviation for firms in bank units that remained open, Column 2 for firms in bank units that closed, and Column 3 shows the  $p$ -value for the difference, with regional fixed effects included. The only variable significantly different across the two groups is the ratio of loans transferred to the NPL units from the originals: this variable is higher for the bank units that remained open. This difference indicates that, to the extent that units were selected for closure based on loan performance, the bank units that closed had better performing loans. For that reason, if a selection bias exists on which units closed, it will bias the results downwards. The fact that we do not observe any statistically significant difference for the loan terms, performance, and firms' financial information supports the assumption that the two groups shared similar characteristics. The probability is therefore high that the two groups would have continued to look similar if the personal relationships with loan officers had not been interrupted.

I report also parallel trend graphs in Figures 1 and 2 for the nonperforming dummy, as higher default ratios could predict the bank-unit closure. These graphs provide evidence against this hypothesis. Figure 1a plots the mean values for the treated and the control groups, and Figure 1b plots the mean values of the residuals from a regression of the nonperforming dummy on region fixed effects. Figure 2 plots the regression coefficients and confidence intervals from a regression of the nonperforming dummy on

region and bank-unit fixed effects. These graphs support the hypothesis that no pre-trend difference of the loan performance existed to predict bank-unit closure.

### **4.3 Out-of-sample comparison of firms located in exposed and control areas**

In this section, I perform an out-of-sample comparison of firms located in geographic areas where a bank unit closed (exposed areas), and firms in areas where a unit remained open (control areas). This test provides further evidence that the local economic conditions, and firms operating in exposed and control areas, are similar. The data for this comparison come from the Amadeus Bureau van Dijk dataset and cover the same period of the experiment (2012–2015). The Amadeus dataset provides information on firms' financial statements. In addition, I use the bank units' zip codes to identify exposed and control areas. I match the firms' zip code with the bank units' zip code, and construct a subsample of the Amadeus dataset appropriate for the out-of-sample comparison.

Table 4 presents the results comparing firms located in exposed and control areas. The first column shows the mean value and the standard deviation of firms located in control areas, and the second column for firms in exposed areas. The third column shows the  $p$ -value of the difference. The main variables of interest in Table 4 are those related to firms' financial performance. Any difference in these variables would suggest that the economic conditions differ between exposed and control areas. No statistically significant differences in these variables are observable (EBIT, net income, sales, etc.). There is a small and significant difference in total assets and the number of employees, which suggests that firms in control areas are larger. To account for this difference, I include the firm's total assets as a control variable in the baseline results in section 5.1.3. Moreover, in subsection 5.2.2, I restrict the sample to areas in which firms are similar to provide further evidence that local economic conditions do not explain differences between the two groups.

Lastly, to capture the potential differences associated with unobserved economic indicators, I use the firms' financial characteristics as dependent variables and apply the baseline regression 1 to examine whether there is an out-of-sample effect of a bank unit closure. Column 4 of Table 4 shows the estimated coefficients from the difference-in-difference regressions on firms' variables. No coefficient is statistically significant. The fact that there is no statistically significant difference across any specification for the firms' observable characteristics supports the assumption that economic conditions in the exposed and control areas are similar.



## 5 Results

First, I report the baseline results on loan renegotiation. I examine the impact of personal relationships between loan officers and firms on the probability of renegotiating a loan and, conditional on renegotiating a loan, I estimate the impact on the loan terms. Firm-level effects are included. Lastly, I examine how the strength of the relationship affects the results by using different measures of relationship strength.

### 5.1 Results on Loan Renegotiation

#### 5.1.1 Probability of Renegotiation

First, I analyze the extensive margin and the probability to renegotiate a loan after a firm's loans are transferred to another bank unit. I compare loans to firms that experienced an exogenous interruption in the relationship with their loan officer with those that did not. The outcome variable of interest is the probability that a firm's pre-existing loan is renegotiated. More formally, the dependent variable is a dummy variable equal to one if a loan is renegotiated and zero if a loan is not renegotiated. Table 5 presents the results with different specifications regarding fixed effects and control variables. It can be seen that loans to firms with interrupted loan officer relationships have a 13.4% lower probability of renegotiation, compared to firms with not exogenously interrupted relationships, when firm, pre-period bank unit, post-period bank unit, and region-year fixed effects are included.

A loan renegotiation can be initiated either by the bank or by the firm and does not require a delayed loan payment. A renegotiation is expected to be mutually advantageous, as otherwise one of the parties would not agree to the new terms. The firm benefits by renegotiating a loan, because one or more of the initial loan terms is relaxed. At the same time, the bank prevents a default or improves its covenants. Since renegotiation benefits the firms, firms with interrupted relationships receive worse treatment as the result of the transfer of their loans to another bank unit.

The results from four different specifications are presented in Table 5. In all specifications, both pre- and post- period bank unit fixed effects are included to capture any unit-level time-invariant variation, and the standard errors are clustered at the pre-period unit level. Even though bank lending policies are similar across units, a larger unit or a higher in the organizational hierarchy unit may have different limits on the loan terms it is allowed to approve. Moreover, I control for the regional differences by

adding region-year fixed effects. When constructing the region-year fixed effects, I define the region more broadly than strict geography to ensure that at least two bank units are open per region in the post-unit closure period and I combine only neighbouring regions that have similar industry composition. No adjustment is done on regions that have two or more bank units in the post-period. To control for firm level differences, firm fixed effects are included to capture any time-invariant firm characteristics of the firm such as size, industry, etc. In Columns 2-4, I add different firm-level time-varying control variables. The results remain robust under these specifications and this confirms that variations at the firm level are not driving the estimated coefficients.

### **5.1.2 Possible Renegotiation Outcomes**

After a renegotiation, both the loan terms and loan amount can be altered, depending on the firm's needs and the bank's constraints. A renegotiation can have one or more of the following outcomes: an increase in the loan amount <sup>13</sup>, a decrease or an increase in the interest rate, an extension of the loan maturity, and an increase or a decrease in collateral value. An increase in collateral is in most cases necessary if the loan amount is increased, but can be a requirement for other renegotiation outcomes as well. A decrease in collateral is possible, as it may be optimal for the bank to free up part of the assets previously pledged as collateral to let the firm use them for new loans.

I estimate the effect of an exogenous interruption in the relationship with a loan officer on the probability of receiving each of the possible outcomes. Table 6 presents these results using the baseline regression specification. Firms with interrupted relationships have a lower probability compared to the control firms to receive any renegotiation outcome, except for an increase in the collateral. In particular, they have approximately 3.4% lower probability of increasing the loan amount, 17% of decreasing the interest rate, approximately 2% lower probability of extending the loan's maturity, and approximately 4% lower probability of decreasing collateral. Treated firms have also approximately 4% higher probability of increasing collateral.

### **5.1.3 Loan Terms Conditional on a Renegotiation**

Figure 4 and Table 7 present the results for the newly agreed loan terms after renegotiating a loan. Overall, we observe that firms with interrupted loan officer relationships receive worse terms. Specifically,

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<sup>13</sup>more frequent in the case of a credit line

they receive 0.4% higher interest rates, 170% shorter maturities, and they have to pledge a 65% higher value of collateral. Even though the effect on interest rate is statistically significant, the economic magnitude is small. In contrast, the estimated effects on maturity and collateral are both statistically and economically significant. This difference is related to the fact that a pre-specified range for the interest rate exists, while the maturity and the collateral are determined by the negotiation with the loan officer.

Figure 4 plots the effect of an exogenous interruption in the loan officer relationship on renegotiated loans' terms, controlling for region and bank-unit fixed effects. Table 7 presents the same results under different specifications: column (a) presents the results of the baseline specification and in column (b) I include as time-varying firm control variables the lagged log of total balance and of EBITDA over total debt. Results are robust under the two specifications.

*Interest Rate:* From the baseline regression, firms with interrupted loan officer relationships receive a 0.4% higher interest rate on renegotiated loans, compared to firms with no exogenously interrupted relationships. The economic magnitude of this difference is small as it corresponds to only 0.04 basis points.

*Maturity:* Firms with exogenously interrupted relationships with their loan officers receive significantly shorter maturities on their renegotiated loans. Table 7 includes the results for the remaining maturity, as measured by the log of remaining days. Treated firms receive approximately 170% fewer days remaining on their renegotiated loans, which corresponds to approximately two-and-half-year-shorter maturity extensions.

*Collateral:* The outcome variable that is used to estimate the effect on the collateral is the log of collateral value. Firms with interrupted loan officer relationships pledge a significantly higher value of collateral on renegotiated loans. The baseline regression shows that treated firms pledge 62.7% more collateral after their loans are transferred, which corresponds to an additional €0.78 of collateral for each euro of loan amount.

#### **5.1.4 Renegotiated Loans' Collateral Type**

The focus of this section is on the qualitative information regarding collateral types. The value and the type of collateral are determined by the loan officer and for that reason, a measurable impact of personal relationships is expected on the collateral-related variables. In Table 8, the effect of sustained personal

relationships on relaxing collateral requirements is presented.

I construct two dummy variables that explore the impact on collateral pledged. The first is an *Unsecured Loan* dummy, which is one if the loan does not have any collateral pledged, and zero otherwise. Approximately 35% of the loans included in the analysis were unsecured in the pre-unit closure period, and no statistically significant difference occurs between the treated and the control groups.

A second dummy variable quantifies the effect on the type of collateral. This is important because the enforceability of collateral depends on its type. This variable is a *Secure Type of Collateral* dummy that is equal to one if the collateral is highly secure and zero otherwise. I define real estate (commercial and residential), ships, deposits, and debt securities as highly secure. As less secure collateral types, I define accounts receivable, equities or convertible bonds, and other types of guarantees. Both groups have pledged highly secure types of collateral in approximately 50% of their collateralized loans. In 2013, approximately 36% of the secured loans employ receivables as collateral, 30% real estate, and 20% deposits.

Table 8 presents the results for the two collateral variables. Column 1-a, shows that loans to firms in the treated group have a 4% lower probability of being unsecured after a renegotiation. Column 2-a, shows that an interruption in the loan officer relationship induces firms to pledge more secure collateral on their loans as treated firms are 11.7% more likely to pledge highly secure collateral compared to control firms.

### 5.1.5 Estimates using a within-firm variation

In table 9 I use a within-firm variation to estimate the effect of an interruption in the loan officer relationship on loan renegotiation. Some of the loan types that a firm has, such as corporate bond loans, letters of credit, and factoring, are managed at a centralized level. The relationship with the loan officer should not impact these loans that are not managed at the bank-unit level. In this section, I include all the loans that a firm has, both at a centralized and at a bank-unit level, and I exploit this within-firm variation using a difference-in-difference-in-differences specification. The specification for this test is the following:

$$\begin{aligned}
 y_{ijurt} = & \alpha + \alpha_j + \alpha_{pre-u} + \alpha_{post-u} + \alpha_{rt} + \delta_1(Post_t * Treat_{ijur} * Noncentralized_{ijur}) \\
 & + \delta_2(Post_t * Noncentralized_{ijur}) + \delta_4(Post_t * Treat_{ijur}) + \varepsilon_{ijurt}
 \end{aligned}
 \tag{2}$$

where  $Noncentralized_{ijur}$  is a dummy variable equal to one for loans at a noncentralized unit and zero for loans at a centralized unit. The variables  $y_{ijur}$ ,  $Treat_{ijur}$ , and  $Post_t$  are defined as in the baseline equation 1. This specification includes firm ( $\alpha_j$ ), pre- ( $\alpha_{pre-u}$ ) and post-period bank-unit ( $\alpha_{post-u}$ ), and region \* year fixed effects ( $\alpha_{rt}$ ). The main coefficient of interest is  $\delta_1$ , and it measures the difference in the outcome variable for loans to firms that experienced an interruption in their loan officer relationship and are managed at a noncentralized bank unit, relative to loans to firms that did not, controlling for the pre-period difference.

The results for all the outcome variables are presented in table 9. We observe that the estimated regression coefficients using the DDD approach remain robust for all outcome variables. These within-firm results confirm that the significant effect of the interruption of the firm-loan officer relationship is not driven by any firm characteristics (observable or unobservable, time-variant or invariant).

## **5.2 Addressing possible threats to identification**

### **5.2.1 Identifying Possible Selection Bias on Renegotiation**

One concern regarding the validity of the estimated effects of an interrupted relationship is a possible selection bias concerning whether a loan is renegotiated. In section 4.2, I demonstrated that firms in the treated and control groups share similar pre-unit closure characteristics. Two of my main findings are that firms with interrupted relationships have a lower probability of renegotiating a loan (section 5.1.1), and conditional on a renegotiation, these firms receive worse loan terms (section 5.1.3). If loan officers choose to renegotiate with interrupted-relationship firms based on different criteria than those used for the continuous-relationship firms, then the intensive margin results would be biased. If loan officers for interrupted-relationship loans granted renegotiation more frequently for firms with relatively inferior performance, while they did not do so for continuing-relationship firms, then the estimated effect on the renegotiation terms would exaggerate the true effect. In fact, however, I find the opposite, implying that my estimated effect of interrupted relationships on renegotiation terms is conservative.

I conduct two tests, which are presented in Tables 10 and 11. In Table 10, a similar analysis as in Table 3 is conducted, but for this test, I include only firms that renegotiated a loan in the post-unit closure period, and compare the pre-period characteristics between the treated and control groups. We observe no statistically significant difference in any of the variables. Firms in the two groups that renegotiated

loans in the post-period shared similar characteristics in the pre-period, which suggests no selection bias exists regarding whether a loan is renegotiated.

Table 11 presents a second test, which considers observable variables that can prompt a renegotiation. I regress a dummy variable for renegotiating a loan on the pre-period firm's variables and include bank-unit and region-year fixed effects. This test provides us with correlations that show which firms have a higher probability of renegotiating a loan, based on the previous year's hard information available to the loan officer and to the econometrician. Table 11, Column 1 presents the result for the whole sample, Column 2 for control firms in the post-period, and Column 3 for treated firms in the post-period.

The most interesting observations come from the pre-period EBITDA over Total Assets and the Total Debt over Total Assets. We observe that for the whole sample and for the control group there is no statistically significant correlation between renegotiation and the pre-period Total Debt over Total Assets ratio, while for the treated group in the post-period there is a negative statistically significant correlation. This implies that lower leveraged firms among the treated group are selected for renegotiation. Moreover, with respect to the correlation between EBITDA over Total Assets we observe a negative statistically significant correlation for the control group in the post-period, while no statistically significant correlations exist for the treated group. This implies that less profitable firms among the control group are selected for renegotiation. These findings indicate my estimates are conservative.

### **5.2.2 Controlling for firms' differences in zip codes locations**

Section 4.3 discussed the differences between firms located in areas where a bank unit closed (exposed) and in areas where a bank unit remained open (control). Based on the zip code comparison using the Amadeus dataset presented in Table 4, firms located in exposed areas are smaller in size. Even though I control for total assets in the estimated results, in this section, I provide further evidence that firms' differences across geographic locations are not driving the results.

To accurately control for potential differences in the geographic location of the exposed and the control areas, I restrict the sample to areas in which firms across the two areas have no statistically significant difference in financial variables. In particular, I exclude firms located in Attica, the region where Athens is located, and I repeat the analysis. Table 12 presents the results of the subsample on the comparison of exposed and control areas using the Amadeus dataset. This finding confirms that no significant difference in financial variables obtains between the two groups.

The next step is to show that, when I restrict the sample to areas where firms across the two groups are similar, the estimated results on the outcome variables hold. Table 13 presents these results. The estimated coefficients for both the probability to renegotiate a loan and the intensive margin results on loan terms are similar in economic significance to the baseline results. This confirms that the baseline results are not driven by the differences on the firm's characteristics nor by the economic conditions at the zip-code level.

### **5.2.3 Controlling for bank unit size**

If more than one unit operated in the same geographic area, the bank decided to keep the larger units open and close the smaller ones. Evidence of this rule is presented in figures 5a – 6. For that reason, a possible concern would be whether the difference in the size of the bank unit where the accounts were transferred explains the results. To address this concern, I perform an analysis controlling for the size of the bank unit.

To test for an effect from the bank unit size, I construct first a measure of the unit's size based on the number of loans managed per unit in 2013, the year before the reorganization. The relative rank of the units' size, for those that remained open, did not change after the reorganization. Second, I filter the observations based on the bank-unit size where the treated firms were transferred. In particular, I restrict the sample of the treated firms to those transferred to a unit that was at most 20% larger than their original unit. Also, I restrict the control firms to those managed at a unit that received loans from units that were at most 20% smaller (from the "filtered" treated group).

After I construct the subsample that allows me to control for unit size, I repeat the analysis of the outcome variables of interest. The results are presented in table 14. The results on the probability of renegotiating a loan and on the loan terms bear similar magnitude and significance to the baseline results. These findings show that the results in all outcome variables are not driven by differences in bank-unit size.

## **5.3 Results on Loan Performance**

In this section, I estimate the effect of an exogenously interrupted loan officer relationship on loan performance. For this test, I include all loans that a firm has at the subject bank. The results on all loans

reveal whether significant differences between the two groups on performance exist in the post-period.

Table 15 presents the results from the baseline specification. As measures of loan performance, I use three variables: a nonperforming dummy variable that is equal to one if the loan is characterized as nonperforming and zero otherwise; the log of the number of days past due; and the log of total loan provisions. We do not observe a statistically significant effect on any of the three variables related to loan performance between firms with interrupted relationships and the control firms. Thus, we cannot explain the results on the renegotiated loans' terms by worse firm economic performance.

The results on loan performance provide insights on the underlying mechanism.<sup>14</sup> From the results on loan performance we observe that firms with continuing relationships have similar performance with firms with interrupted relationships. This result suggests that the acquisition of soft information for firms with continuing relationships, as opposed to unwarranted favoritism, explains my findings. A more detailed analysis of the underlying mechanism is included in section 6.

#### 5.4 Firm-Level Effects

In this section, I examine whether the bank unit closure and the interruption in the loan officer relationship is associated with any effects on the capital structure of the firms that borrowed from the closed units. To test for firm-level effects, I apply the baseline specification 1 to the firms' financial variables provided by the bank. Even though table 4 column 4 shows no average real effect following a bank unit closure on the firms located at the same zip-code area, in this section I restrict the sample to the bank clients by using only the bank data. Table 16 presents these results.

The main conclusion from the firm-level effects is that the capital structure and the sources of financing changed after the relationship with the bank is disrupted. In particular, relative to control firms, treated firms raise 18.5% more equity over total assets and decrease their leverage<sup>15</sup> by 17.5%. Moreover, I examine the effect on a substitution of lending from other banks. I measure substitution by constructing a new variable, the *dependence ratio*, that is equal to the ratio of the amount of debt that a firm has at this bank relative to its total debt. The dependence ratio decreased 4% for treated firms relative to control firms, suggesting that treated firms partially substituted loans from the subject bank with loans from other banks.

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<sup>14</sup>Fisman et al. (2017) follow a similar approach to clarify the underlying mechanism.

<sup>15</sup>Leverage is measured as the ratio of total debt over total assets.



The results show that the main sources of external financing and the capital structure are altered for firms with exogenously interrupted loan officer relationships. The negative effects on both leverage and the dependence ratio show that firms increase their relative lending from other banks, but they substitute only partially their total debt from other banks when their relationship with the subject bank is interrupted. These results, combined with a significant increase in equity, suggest that, when firms experience an interrupted relationship, they cover their financing needs with new sources of funds, including funds from other banks.

## 5.5 Heterogeneity by Relationship Strength

In this section, I further investigate the value of a relationship between a loan officer and a firm by constructing a measure of relationship strength and comparing the impact of an interrupted relationship on firms with stronger relationships and those with weaker relationships. The main result is that the interruption of a strong relationship with a loan officer has a more significant negative effect on loan renegotiation.

One of the main assumptions for a mutually advantageous renegotiation is that the firm has outside options for financing, as those options would increase the firm's bargaining power. For small- and medium-size corporations, the outside options for financing are either other local banks, or raising equity. It follows that if a firm borrows from other banks and has an established relationship with them, it is easier for the firm to seek financing from other banks once the relationship with the subject bank is interrupted. On the other hand, if the firm depends mostly on the subject bank to satisfy its financing needs, then its negotiation power is limited. This section provides a comparison of these two groups, i.e., firms with closer relationships and fewer outside options versus firms with weaker relationships and more outside options.

As a measure of how close the relationship is, I estimate an indicator variable, the *Dependence Ratio*. The *Dependence Ratio* is defined as the ratio of the total amount of loans at this bank over the total debt that a firm had in 2013, the year before the bank units' closure. This measure shows whether a firm had an established relationship with other banks or whether it borrowed predominantly from the subject bank.

First, I estimate the correlation between the *Dependence Ratio* and the probability of renegotiating a loan. Table 17 presents the results. The first two columns show the results for the whole sample in

the pre- and the post-unit closure period, where Columns 3 and 4 report results for the control firms, and Columns 5 and 6 for the treated firms. Overall, there is a positive and significant correlation between the dependence ratio and the probability of renegotiating a loan, suggesting that firms with closer relationships have a higher probability of renegotiating. This correlation is negative for the treated group in the post-period. This suggests a loss in the value of close relationships between the firm and the bank once the relationship with the loan officer is interrupted. Treated firms that borrowed predominantly from the subject bank in the pre-period have a lower probability of renegotiating in the post-unit-closure period.

Figure 7 presents the density distribution of the *Dependence Ratio* in 2013. The higher the value of the ratio, the more dependent the firm is on this bank. The lower the value of the ratio, the less important this bank is to the firm, since it borrowed from multiple sources. As shown in Figure 7, the majority of firms borrow from multiple banks, while a smaller number borrows mostly from the subject bank.

Table 18 presents the results of this analysis. For this test, I include the *Dependence Ratio* as an interaction term. The specification is the following:

$$y_{ijurt} = \alpha_j + \alpha_{pre-u} + \alpha_{post-u} + \alpha_{rt} + \delta_1(Post_t * Treat_{ijur} * DependenceRatio_{ijur}) + \delta_2(Post_t * DependenceRatio_{ijur}) + \delta_4(Post_t * Treat_{ijur}) + \varepsilon_{ijurt} \quad (3)$$

Based on this analysis, firms that had a close relationship with the subject bank in the pre-unit closure period bear a significantly stronger cost of its interruption. Firms that had a strong relationship with the subject bank have a significantly lower probability of renegotiating a loan after the relationship is interrupted compared to firms that didn't have a strong relationship with the bank. Regarding the loan terms, firms with a closer relationship pay a higher cost from interruption by receiving tougher loan terms on the renegotiated loans. In particular, firms with close and interrupted relationships receive higher interest rates and significantly shorter maturities, and have to pledge more collateral, compared to firms with more distant and uninterrupted relationships.

## 6 Interpretation of the Results

Several mechanisms can explain the impact of personal relationships between loan officers and firms on lending. The most obvious implication of long-lasting relationships is the acquisition of soft information about the borrower through a continuing interaction between a loan officer and a firm. This could help

to alleviate the debt-overhang in a loan renegotiation. When a loan officer has more information about a firm's profitability and investment prospects, the debt-overhang could be solved and loan renegotiation can be Pareto improving, allowing highly leveraged firms to invest in positive NPV projects.

Alternatively, a dark side of relationships between loan officers and firms may explain the effect on lending. Personal relationships may create a propensity for unwarranted favoritism. In that case, a poorly performing firm with a close relationship would receive the same or better loan terms than a good-performing firm. This could be driven either by ever-greening or by a loan officer's moral hazard. In the case of ever-greening, loan renegotiation and maturity extensions would be offered to worse-performing firms to prevent loan defaults. In the case of a loan officer's moral hazard, loan renegotiation and its outcomes would be driven more by the personal relationship between the loan officer and the firm managers rather than by the firm's qualitative and quantitative characteristics.

In section 4.2, I demonstrated that firms in the treated and control groups have similar financial characteristics, loan terms, and loan performance in the pre-period. This suggests that there is no favoritism for the treated group in the pre-period. In other words, if only the treated group received favourable treatment in the pre-period, we would observe a difference either in the loan terms, with similar firm financial information, or in firm profitability and loan performance, with similar loan terms. Furthermore, from the results on loan performance in section 5.3 we observe that firms with continuing relationships have similar performance with firms with interrupted relationships. This result suggests that the acquisition of soft information for firms with continuing relationships, as opposed to ever-greening, explains my findings.

With the following tests, I shed light on the underlying mechanism and explore whether the results are explained by: (a) soft information to alleviate debt overhang; (b) ever-greening; or (c) loan officer's moral hazard. To do so, I employ three different heterogeneities that provide insights about the mechanism. These heterogeneities are: (i) by firms' pre-unit-closure period performance; (ii) by firms' pre-period leverage; and (iii), by firms' EBITDA growth rate.

### **Heterogeneity by Firms Pre-Unit-Closure Period Performance**

First, I analyze whether the firm's pre-unit-closure period loan performance influences the estimated results. I separate the sample between firms that delayed a loan payment in 2013, the year before the transfer, and firms that paid their loans on time. Table 19 presents the results of the main outcomes

separately for the two groups. We observe that both firms with good repayment behavior and those with delays in loan payments have a lower probability of renegotiating a loan when their loan officer relationships are interrupted.

The results on the intensive margins are not similar: Even though both groups receive a slightly higher interest rate when the relationship is interrupted, the results on maturity and on collateral vary significantly. In particular, among the firms with on time loan payments, treated firms receive significantly shorter maturities and are required to pledge higher collateral value. In contrast, among firms that delayed a payment in the past, we don't observe a statistically significant different effect on the maturity and the collateral.

The results indicate that the impact of an interrupted relationship on the renegotiated loan's terms is stronger for firms with good repayment histories. If the results were driven by an ever-greening behaviour, we would expect these to be stronger for firms with worse pre-period performance. Therefore, these findings, in combination with the results on loan performance in section 5.3, support the hypothesis that ever-greening is not explaining the estimated results.

### **Heterogeneity by Firms Pre-Unit-Closure Period Leverage**

The heterogeneity by firms' leverage provides also important insights as the main assumption for the debt-overhang is that a firm is highly leveraged and that constraints it from investing in positive NPV projects. I separate the sample between firms that had a low leverage in the pre-unit-closure period and firms that had a high leverage. Table 20 presents the results of the main outcomes of interest separately for the two groups. We observe that the average results both at the extensive and at the intensive margins are influenced by the highly leveraged firms. This finding is in line with the hypothesis that lending relationships help to alleviate the debt overhang through the acquisition of information.

In particular, we observe that among the lower leveraged firms, firms with interrupted loan officer relationships have a higher probability of renegotiating compared to the control firms. The result is opposite for firms with higher leverage. On the intensive margins, we observe that the results on the interest rate and the maturity are concentrated on firms with higher pre-period leverage when the loan officer relationship is exogenously interrupted, while both groups have to pledge a higher value of collateral.

## **Heterogeneity by Firms EBITDA growth rate**

Lastly, I examine the heterogeneity by firms' EBITDA growth rate to understand whether the profitability and the growth of the firm determines the results. Under the debt overhang hypothesis, a firm is constrained by its high leverage to undertake profitable investments thus an efficient loan renegotiation helps the firm to overcome this problem. Following this argument, if loan officer relationships help to make more efficient renegotiation decisions, we would observe the results to be concentrated among more profitable firms. To test this, I separate the sample between firms that had a positive EBITDA growth rate and firms that had a negative. Table 21 presents the results of the main outcomes of interest separately for the two groups.

We observe that the average results both at the extensive and at the intensive margins are influenced by firms with positive EBITDA growth rate. In particular, we observe that among firms that had a negative EBITDA growth rate, firms with interrupted loan officer relationships have a higher probability of renegotiating compared to the control firms. The result is opposite for firms with positive EBITDA growth rate. On the intensive margin, we observe that among firms with negative EBITDA growth rate, treated firms receive slightly higher interest rates and significantly longer maturities compared to the control firms. In contrast, among firms with positive EBITDA growth rate, treated firms receive slightly higher interest rates, significantly shorter maturities, and have to pledge collateral with a higher value.

Overall, the results from the heterogeneity tests indicate that the impact of an interrupted loan officer relationship on the probability of renegotiating a loan and on the renegotiated loan's terms is stronger for firms with good repayment histories, high leverage, and positive EBITDA growth rate. These findings therefore support the hypothesis that lending relationships between a loan officer and a firm help to alleviate debt-overhang through the acquisition of information.

## **7 Conclusion**

Lending relationships have a significant positive effect in corporate loan renegotiation, mitigating the costs of distress for firms. A relationship between a loan officer and a firm helps eliminate frictions that arise in loan renegotiation. When a relationship is interrupted, the renegotiation outcome is less likely to be beneficial and the efficient contract is less likely to be achieved. Using the consolidation of bank units as a source of exogenous variation, I analyze a proprietary dataset on corporate loans. I find

strong evidence that a relationship with a loan officer significantly affects loan renegotiation outcomes both at the extensive and intensive margins. Notably, I observe that firms with interrupted relationships have a lower probability of renegotiating a loan upon their transfer to another bank unit. Conditional on renegotiating a loan, affected firms also receive tougher terms (higher interest rates, shorter maturities, and higher value of collateral).

Firms also alter their capital structure after their relationship with the bank is interrupted. The change in the capital structure indicates that firms cannot substitute lending from other banks without cost when a lending relationship is exogenously interrupted. This change in a firm's sources of financing is likely to have implications for the firm's business model and investment decisions.

An important implication comes from the fact that the effect of relationships is estimated for firms with pre-established relationships with the bank. Hard information passed from one loan officer to another as the transfer happened within the same bank. Thus, the effect of relationships is unlikely to be mitigated by the introduction of a credit bureau and access to hard information.

In general, the result that firms with interrupted relationships receive tougher loan terms on renegotiated loans may be driven either by a loss of valuable soft information or by unwarranted favoritism. From the results on loan performance we observe that firms with continuing relationships have similar performance with firms with interrupted relationships. Moreover, a few heterogeneity tests indicate that the impact of an interrupted loan officer relationship on the probability of renegotiating a loan and on the renegotiated loan's terms is stronger for firms with good repayment histories, high leverage, and positive EBITDA growth rate. These findings therefore support the hypothesis that lending relationships between a loan officer and a firm help to alleviate debt-overhang through the acquisition of information.

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Table 1: Summary statistics based on the 2012–2013 values

Variable	Mean	Std. Dev.	Median
<i><u>Loan-Related Variables:</u></i>			
Total Balance	2,611,645	10,057,676.6	535,934.5
Interest Rate	.0597	.034	.0621
Total Collateral Value	3,234,279	20,128,240	187,630
Days Remaining (Maturity)	528.34	995.16	52.35
Unsecured loan (Dummy)	.35	.45	0
Secure type of collateral (Dummy)	.50	.45	.51
Number of loans per year	4.72	29.31	2
<i><u>Performance-Related Variables :</u></i>			
Nonperforming (Dummy)	.11	.31	0
Days Past Due	29.8	82.32	0
Days Past Due over Remaining Days	10.1	52.03	0
Total Provision	1,438,472	30,789,946	0
Debtor Renegotiated a Loan (Dummy)	.59	.49	0
At Least One Forborne (Dummy)	.05	.21	0
<i><u>Firm's Financial Information :</u></i>			
Total Assets	35,710,880	204,072,593	6,124,094
Total Debt	24,219,150	140,099,180	4,253,020
Total Equity	12,862,210	90,149,735	1,644,740
EBITDA	1,384,210	26,161,717	271,487
Total Debt over EBITDA ratio	-26.7	3,325.4	7.5
Leverage (Debt over Assets)	.72	.72	.69

This table displays summary statistics of the main variables. The variables are constructed at the firm level. A simple sum of all loans a firm holds each year is used for the total balance, total collateral value, number of loans, and total provision. A weighted average with weights equal to the ratio of the specific loan exposure over the total balance of the firm is used for the interest rate, days remaining, nonperforming (dummy), and days past due. All variables are based on the 2012–2013 values.

Table 2: Comparison of pre-period mean values for borrowers in branches that closed and in branches that remained open

Variable	(1) Open branch	(2) Closed branch	(3) <i>p</i> - value on Difference
<u><i>Loan-Related Variables:</i></u>			
Total Balance	1,421,785.2 (2,718,584.4)	1,584,081.7 (3,816,339.4)	(0.176)
Interest Rate	0.0621 (0.0286)	0.0657 (0.0194)	(0.371)
Days Remaining (Maturity)	465.5 (919.4)	595.1 (966.6)	(0.124)
Total Collateral Value	1,869,983.9 (4,681,179.9)	2,721,753.0 (8,727,438.5)	(0.800)
<u><i>Performance-Related Variables:</i></u>			
Nonperforming (Dummy)	0.266 (0.442)	0.357 (0.481)	(0.334)
Days Past Due over Remaining Days	40.35 (109.1)	63.61 (133.5)	(0.136)
Total Provision	313,959.3 (2471637.7)	256,923.8 (1341576.1)	(0.495)
Ratio of Loans Transferred to NPL specialized unit	0.462 (0.00107)	0.434 (0.00126)	(0.000)
<u><i>Debtor's Financial Information:</i></u>			
Total Assets	10,550,848.3 (13,079,221.7)	6,720,129.6 (7,440,125.0)	(0.527)
Total Debt over Total Assets	0.716 (0.262)	0.723 (0.238)	(0.111)
Total Equity over Total Assets	0.277 (0.262)	0.277 (0.238)	(0.101)
EBITDA over Total Assets	0.0454 (0.0839)	0.0579 (0.0666)	(0.862)

This table displays the mean values and standard deviations separately for borrowers in branches that remained open and for borrowers in branches that closed. The whole sample is included. Column 3 reports the *p*-value for the difference between Columns 1 and 2. *p*-values are obtained from a regression of the main variable on a treatment indicator and region fixed effects. All variables and estimations are based on the 2012–2013 values.

Table 3: Comparison of pre-period mean values for treated and control groups

Variable	(1) Control	(2) Treated	(3) <i>p</i> - value on Difference
<i>Loan-Related Variables:</i>			
Total Balance	1,782,115.2 (4,370,920.1)	1,724,894.9 (4,004,344.5)	(0.381)
Interest Rate	0.0626 (0.0310)	0.0665 (0.0197)	(0.400)
Days Remaining (Maturity)	548.3 (1072.2)	747.0 (1143.6)	(0.176)
Total Collateral Value	3,656,038.6 (21,937,932.8)	2,999,626.8 (9,154,860.3)	(0.761)
<i>Performance-Related Variables:</i>			
Nonperforming (Dummy)	0.159 (0.365)	0.210 (0.409)	(0.620)
Days Delayed over Remaining Days	15.64 (76.93)	26.36 (97.53)	(0.329)
Total Provision	196,894.4 (1,964,959.3)	245,419.9 (1,411,675.8)	(0.990)
<i>Debtor's Financial Information:</i>			
Total Assets	10,680,031.8 (13,234,163.3)	6,756,730.4 (7,656,548.0)	(0.474)
Total Debt over Total Assets	0.739 (0.752)	0.732 (0.243)	(0.360)
Total Equity over Total Assets	0.256 (0.753)	0.268 (0.243)	(0.327)
EBITDA over Total Assets	0.0412 (0.136)	0.0553 (0.0675)	(0.859)

This table displays the mean values and standard deviations separately for the treated and control groups. Column 3 reports the *p*-value for the difference between Columns 1 and 2. *p*-values are obtained from a regression of the main variable on a treatment indicator and region fixed effects. All variables and estimations are based on the 2012–2013 values.

Figure 1: Trends for the nonperforming dummy for the treatment and control groups

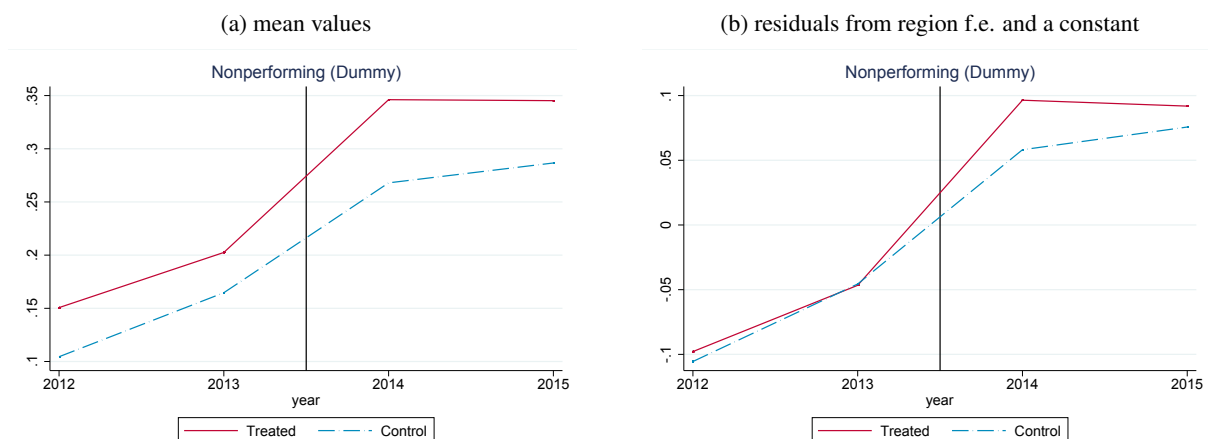


Figure 1a plots the mean values of the nonperforming dummy variable for the treated and the control groups from 2012 until 2015. Figure 1b plots the residuals from a regression of the nonperforming dummy variable on region fixed effects for the treated and control groups over the same period.

Figure 2: Regression coefficients and confidence intervals after controlling for region and bank-unit fixed effects

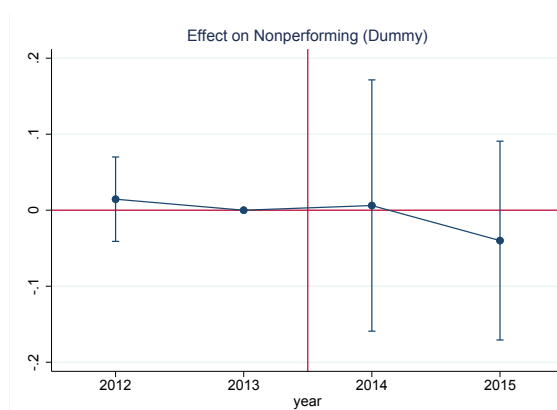


Figure 2 plots the effect of an interruption in the relationship between a loan officer and a firm on the nonperforming dummy variable. The coefficients are obtained from a regression of the nonperforming dummy on the treatment indicator and on region and bank-unit fixed effects. Bars show 95% confidence intervals.

Table 4: Summary statistics and Difference-in-Difference coefficients for firms in exposed and control areas - Match on the zip code

	(1)	(2)	(3)	(4)
	Mean values for Control areas	Mean values for Exposed areas	<i>p</i> - value on Difference	Coefficient from DiD
Total Assets	2,046,750.4 (2,213,766.2)	1,825,612.9 (2,042,689.0)	(0.053)	-1,198.2 (42,739.4)
Total Debt	498,087.1 (1,031,146.5)	458,946.9 (974,348.2)	(0.273)	12,978.2 (13,685.6)
Shareholders Funds	906,964.1 (1,336,612.6)	780,377.7 (1,086,455.0)	(0.015)	-18,101.5 (21,782.0)
Number of Employees	13.33 (15.84)	11.86 (12.78)	(0.034)	-0.131 (0.317)
EBIT	95,948.5 (215,807.3)	70,551.1 (186,164.2)	(0.138)	-2,360.2 (6,868.1)
EBIT Growth Rate	-0.450 (29.85)	-0.0356 (8.002)	(0.368)	2.070 (3.758)
Net Income	35,171.8 (162,093.6)	20,397.8 (146,359.9)	(0.396)	-2,071.4 (5,756.2)
Sales	1,609,808.0 (2,476,738.2)	1,401,415.3 (2,267,099.8)	(0.205)	25,852.7 (30,432.5)
Gross Profit	440,155.2 (584,430.4)	374,192.1 (528,494.3)	(0.102)	-1,232.8 (16,640.0)
Cash Flow	95,235.7 (194,803.9)	79,114.4 (171,806.5)	(0.094)	-1,455.9 (7,490.2)
Return on Total Assets (%)	3.153 (13.62)	2.784 (13.74)	(0.298)	-0.161 (0.652)
Profit Margin (%)	2.185 (20.73)	1.091 (21.09)	(0.527)	0.0524 (0.652)

The data source for this table is the Amadeus Bureau van Dijk database. This table in columns 1 and 2 displays the mean values and standard deviations for firms located in zip-code areas where a bank unit closed (exposed areas) and firms located in zip-code areas where a unit remained open (control areas). Column 3 reports the *p*-value for the difference between Columns 1 and 2. *p*-values are obtained from a regression of the main variable on an indicator of whether the firm is located at the zip-code area where a bank unit closed, and region fixed effects. Column 4 presents the estimate coefficients from difference-in-difference regressions on the firms' variables. All variables and estimations are based on 2012–2015 values.

Figure 3: Regression coefficients and confidence intervals on loan renegotiation after controlling for region and bank-unit fixed effects

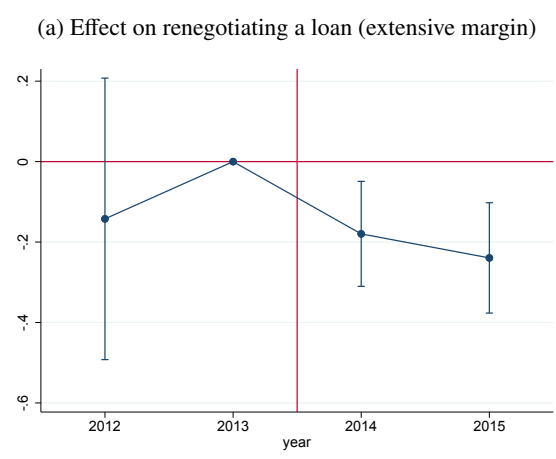


Figure 3a plots the effect of an interruption in the relationship between a loan officer and a firm on renegotiating a loan (extensive margin). The coefficients are obtained from a regression of the renegotiation dummy on the treatment indicator and on region and bank-unit fixed effects. The renegotiation dummy variable is equal to one if the firm  $j$  renegotiated a loan  $i$  at time  $t$  and zero otherwise. Bars show 95% confidence intervals.



Table 5: Effect on renegotiating a loan (extensive margin)

	(1)	(2)	(3)	(4)
<i>Post * Treat</i>	-0.134*** (0.0232)	-0.154* (0.0780)	-0.131*** (0.0160)	-0.133*** (0.0180)
Observations	20,626	10,774	18,507	17,787
$R^2$	0.133	0.044	0.137	0.135
Firm F.E.	✓	✓	✓	✓
Pre-period Bank Unit F.E.	✓	✓	✓	✓
Post-period Bank Unit F.E.	✓	✓	✓	✓
Region * Year F.E.	✓	✓	✓	✓
<i>Lagged log of EBITDA over Total Debt</i>		✓		
<i>Lagged log of Total Balance</i>		✓		
<i>Lagged log of Total Assets</i>			✓	✓
<i>Lagged Total Balance over Total Debt</i>			✓	
<i>Lagged log of Total Debt over Total Assets</i>				✓
Cluster Level		Bank Unit		

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

This table displays the results from estimating equation 1. The dependent variable is a dummy variable that is equal to one if the firm  $j$  renegotiated a loan  $i$  at time  $t$  and zero otherwise. The dummy variable *Treat* is equal to one if the loan  $i$  was monitored by a loan officer at a bank-unit that closed, and zero otherwise. The dummy variable *Post* is equal to one if the year of the observation is after the reorganization (either 2014 or 2015) and zero if it is before the reorganization (either 2012 or 2013). The bottom of the table depicts information on the fixed effects and the control variables included. Standard errors are corrected for clustering at the pre-period bank-unit level.

Table 6: Effect on different renegotiation outcomes (extensive margin)

	(1)	(2)	(3)	(4)	(5)
<i>Post * Treat</i>	<i>Increased Maturity</i> -0.0190** (0.00779)	<i>Increased Loan amount</i> -0.0336*** (0.00502)	<i>Increased Collateral</i> 0.0334*** (0.00741)	<i>Decreased Collateral</i> -0.0391*** (0.00854)	<i>Decreased Interest Rate</i> -0.170*** (0.0477)
Observations	20,626	20,626	20,626	20,626	20,626
R <sup>2</sup>	0.051	0.076	0.116	0.119	0.160
Firm F.E.	✓	✓	✓	✓	✓
Pre-period Bank Unit F.E.	✓	✓	✓	✓	✓
Post-period Bank Unit F.E.	✓	✓	✓	✓	✓
Region * Year F.E.	✓	✓	✓	✓	✓
Cluster Level			Bank Unit		

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

This table displays the results from estimating equation 1 for different renegotiation outcomes. The dependent variables are dummy variables that are equal to one if loan  $i$  of firm  $j$  received that particular renegotiation outcome at time  $t$  and zero otherwise. The dummy variable *Treat* is equal to one if the loan  $i$  was monitored by a loan officer at a bank-unit that closed, and zero otherwise. The dummy variable *Post* is equal to one if the year of the observation is after the reorganization (either 2014 or 2015) and zero if it is before the reorganization (either 2012 or 2013). In the regressions, firm, pre-period bank-unit, post-period bank-unit and region \* year fixed effects are included. Standard errors are corrected for clustering at the pre-period bank-unit level.

Figure 4: Regression coefficients and confidence intervals on renegotiated loans' terms after controlling for region and bank-unit fixed effects

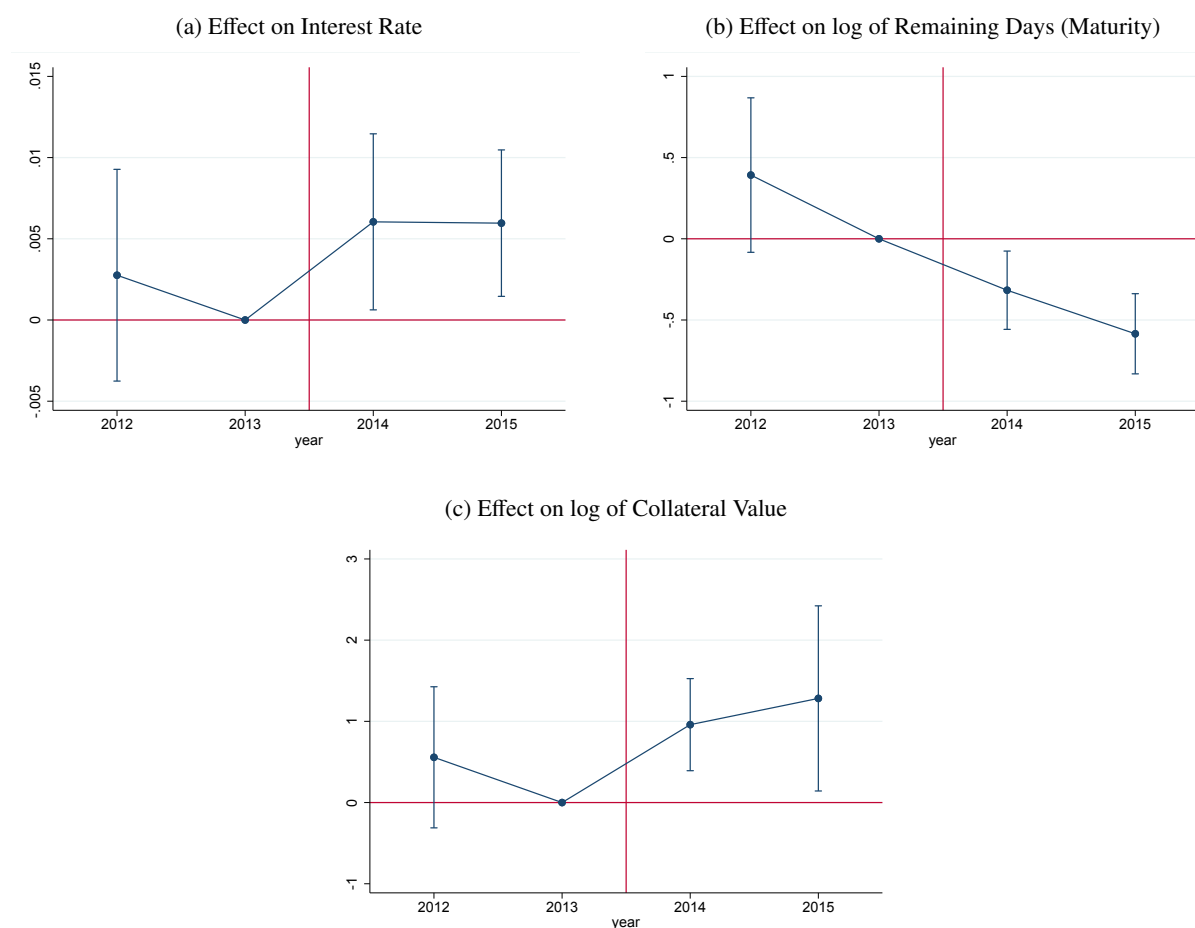


Figure 4 plots the effect of an interruption in the relationship between a loan officer and a firm on renegotiated loans' terms. The coefficients are obtained from a regression of the dependent variable on the treatment indicator and on region and bank-unit fixed effects. In figure 4a, the dependent variable is the interest rate of the renegotiated loans that firm  $j$  had. In figure 4b, the dependent variable is the log of days remaining as a measure of loan maturity. In figure 4c, the dependent variable is the log of collateral value. Bars show 95% confidence intervals.

Table 7: Effect on renegotiated loans' terms (intensive margin)

<i>Log of</i>	(1)		(2)		(3)		
	Interest Rate	Remaining Days (Maturity)	Collateral Value	(a)	(b)	(a)	(b)
<i>Post * Treat</i>	0.00425*** (0.00141)	0.00825*** (0.00150)	-1.743** (0.644)	11,892	6,367	0.627*** (0.141)	1.587*** (0.277)
Observations	11,892	6,367	11,892	6,367	11,892	6,367	6,367
$R^2$	0.215	0.230	0.105	0.154	0.007	0.006	0.006
Firm F.E.	✓	✓	✓	✓	✓	✓	✓
Pre-period Bank Unit F.E.	✓	✓	✓	✓	✓	✓	✓
Post-period Bank Unit F.E.	✓	✓	✓	✓	✓	✓	✓
Region * Year F.E.	✓	✓	✓	✓	✓	✓	✓
Firm level controls							
Cluster Level							

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

This table displays the results from estimating equation 1 only for loans that were renegotiated at least once over the sample period. In columns 1-a and 1-b, the dependent variable is the log of interest rate of the renegotiated loans that firm  $j$  had. In columns 2-a and 2-b, the dependent variable is the log of days remaining as a measure of loan maturity. In columns 3-a and 3-b, the dependent variable is the log of collateral value. The dummy variable *Treat* is equal to one if the loan  $i$  was monitored by a loan officer at a bank-unit that closed, and zero otherwise. The dummy variable *Post* is equal to one if the year of the observation is after the reorganization (either 2014 or 2015) and zero if it is before the reorganization (either 2012 or 2013). The bottom of the table depicts information on the fixed effects and the control variables included. In the regressions, firm, pre-period bank-unit, post-period bank-unit and region \* year fixed effects are included. Firm level controls include the *lagged log of Total Balance* and the *lagged log of EBITDA over Total Debt*. Standard errors are corrected for clustering at the pre-period bank-unit level.

Table 8: Effect on variables related to collateral type - Only renegotiated loans

	(1)		(2)	
	<i>Unsecured Loan</i>		<i>Secure Type of Collateral</i>	
	(a)	(b)	(a)	(b)
<i>Post * Treat</i>	-0.0386*** (0.0132)	-0.137*** (0.0222)	0.117*** (0.0139)	0.302*** (0.0251)
Observations	11,892	6,367	11,307	6,069
$R^2$	0.008	0.008	0.008	0.009
Firm F.E.	✓	✓	✓	✓
Pre-period Bank Unit F.E.	✓	✓	✓	✓
Post-period Bank Unit F.E.	✓	✓	✓	✓
Region * Year F.E.	✓	✓	✓	✓
Firm level controls		✓		✓
Cluster Level			Bank Unit	

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ 

This table displays the results from estimating equation 1 only for renegotiated loans for two variables related to loan collateral. The observations included in the analysis are the loans that were renegotiated at least once during the sample period. Columns 1-a and 1-b present the results for an unsecured loan dummy variable that is equal to one if loan  $i$  had no collateral at time  $t$  and equal to zero otherwise. Columns 2-a and 2-b present the results for a secure type of collateral dummy variable that is equal to one if loan  $i$  had more secure collateral at time  $t$  and zero otherwise. As more secure collateral, real estate (commercial or residential), ships, deposits, and debt securities are characterized. As less secure collateral, accounts receivable, equities or convertible bonds, and other types of guarantees are characterized. The dummy variable *Treat* is equal to one if the loan  $i$  was monitored by a loan officer at a bank-unit that closed, and zero otherwise. The dummy variable *Post* is equal to one if the year of the observation is after the reorganization (either 2014 or 2015) and zero if it is before the reorganization (either 2012 or 2013). The bottom of the table depicts information on the fixed effects and the control variables included. In the baseline regressions, firm, pre-period bank-unit, post-period bank-unit, and region\*year fixed effects are included. Firm level controls include the *lagged log of Total Balance* and the *lagged log of EBITDA over Total Debt*. Standard errors are corrected for clustering at the pre-period bank-unit level.

Table 9: Effect on the extensive and intensive margins using Difference-in-Difference-in-Differences

	Extensive Margin		Intensive Margin		
	(1)	(2)	(3)	(4)	(5)
	Renegotiation	Log of Remaining Days	Log of Collateral Value	Unsecured Loan	Secure Collateral
<i>Post * Treat * Noncentralized</i>	-0.506*** (0.172)	-0.325* (0.168)	1.411** (0.587)	-0.0964** (0.0411)	0.122*** (0.0297)
<i>Post * Noncentralized</i>	-0.0558** (0.0215)	0.184 (0.158)	0.344 (0.275)	-0.0240 (0.0240)	0.0538* (0.0280)
<i>Post * Treat</i>	0.355** (0.164)	0.915*** (0.284)	-0.944 (0.614)	0.0683 (0.0467)	-0.00532 (0.0349)
Observations	32,950	17,191	17,191	17,191	17,191
R <sup>2</sup>	0.123	0.135	0.004	0.003	0.007
Firm F.E.	✓	✓	✓	✓	✓
Pre-period Bank Unit F.E.	✓	✓	✓	✓	✓
Post-period Bank Unit F.E.	✓	✓	✓	✓	✓
Region * Year F.E.	✓	✓	✓	✓	✓
Cluster Level		Bank Unit			

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

This table displays the results from estimating equation 2. On the extensive margin the dependent variable is a dummy that is equal to one if firm  $j$  renegotiated loan  $i$  at time  $t$  and zero otherwise. For the estimations on the intensive margin, only loans that were renegotiated at least once over the sample period are included. Results are estimated for three loan terms and for two variables related to collateral type. The dummy variable *Noncentralized* is equal to one if the loan is managed under a noncentralized bank unit and zero if it is under a centralized unit. The dummy variable *Treat* is equal to one if the loan  $i$  was monitored by a loan officer at a bank-unit that closed, and zero otherwise. The dummy variable *Post* is equal to one if the year of the observation is after the reorganization (either 2014 or 2015) and zero if it is before the reorganization (either 2012 or 2013). In the regressions, firm, pre-period bank-unit, post-period bank-unit and region \* year fixed effects are included. Standard errors are corrected for clustering at the pre-period bank-unit level.

Table 10: Comparison of pre-period mean values for treated and control groups - Only firms that renegotiated a loan

Variable	(1) Control	(2) Treated	(3) <i>p</i> - value on Difference
<u><i>Loan-Related Variables:</i></u>			
Total Balance	2,134,086.2 (4,753,438.3)	2,017,921.8 (4,326,018.4)	(0.201)
Interest Rate	0.0674 (0.0276)	0.0681 (0.0178)	(0.824)
Days Remaining (Maturity)	665.3 (1,176.8)	746.7 (1,165.6)	(0.147)
Total Collateral Value	2,632,887.9 (6,125,240.2)	3,526,226.7 (10,063,546.5)	(0.520)
<u><i>Performance-Related Variables:</i></u>			
Nonperforming (Dummy)	0.149 (0.357)	0.238 (0.428)	(0.788)
Days Delayed over Remaining Days	13.01 (60.19)	40.73 (108.1)	(0.192)
Total Provision	1,343,820.7 (26,134,537.9)	691,718.3 (4,796,753.2)	(0.500)
<u><i>Debtor's Financial Information:</i></u>			
Total Assets	10,934,895.7 (13,367,736.0)	7,599,384.1 (8,059,656.1)	(0.947)
Total Debt over Total Assets	0.767 (0.847)	0.736 (0.261)	(0.315)
Total Equity over Total Assets	0.226 (0.847)	0.264 (0.261)	(0.202)
EBITDA over Total Assets	0.0414 (0.134)	0.0516 (0.0662)	(0.276)

This table displays the mean values and standard deviations separately for the treated and control groups only for loans that were renegotiated and for firms that renegotiated at least one loan. Column 3 reports the *p*-value for the difference between Columns 1 and 2. *p*-values are obtained from a regression of the main variable on a treatment indicator and region fixed effects. All variables and estimations are based on the 2012–2013 values.

Table 11: Selection on renegotiation

	(1) Whole Sample pre- and post-period <i>Renegotiation</i>	(2) Only control group post-period <i>Renegotiation</i>	(3) Only treated group post-period <i>Renegotiation</i>
<i>All variables are in lagged logs:</i>			
<i>Firm Variables:</i>			
Total Assets	-0.00217 (0.0122)	0.000251 (0.0106)	-0.0248 (0.0973)
Total Debt over Total Assets	0.0532 (0.137)	0.0914 (0.0676)	-0.670* (0.0919)
EBITDA over Total Assets	-0.202 (0.189)	-0.205* (0.106)	0.277 (1.352)
<i>Loan Variables:</i>			
Total Balance	0.0331** (0.0137)	0.0311*** (0.0102)	0.173 (0.161)
Interest Rate	0.142 (0.892)	0.133 (0.295)	4.189* (0.623)
Remaining Days	0.0608*** (0.00888)	0.0671*** (0.00515)	0.0371 (0.0112)
Collateral Value	0.0300*** (0.0104)	0.0340*** (0.00859)	0.000851 (0.0285)
Days Delayed	-0.00570 (0.0347)	-0.00968 (0.0154)	-0.0579 (0.0548)
$R^2$	0.203	0.208	0.455
Bank Unit F.E.	✓	✓	✓
Region * Year F.E.	✓	✓	✓
Cluster Level		Bank Unit	

This table displays the estimated coefficients from a regression of the renegotiation dummy variable on firm and loan variables. The independent variables are constructed as the average per firm based on each variable's value at the year before the transfer. Bank-unit and region\*year fixed effects are included, and standard errors are clustered at the bank-unit level. Column 1 reports the estimated coefficients for the whole sample (treated and control groups over the whole period). Column 2 reports the coefficients for the control group in the post-period. Column 3 reports the coefficients for the treated group in the post-period.



Table 12: Summary statistics and Difference-in-Difference coefficients for firms in exposed and control areas - Exclude Attica and match on the zip code

	(1)	(2)	(3)	(4)
	Mean values for Control areas	Mean values for Exposed areas	<i>p</i> - value on Difference	Coefficient from DiD
Total Assets	1,626,610.8 (1,743,132.7)	2,014,598.6 (2,138,976.2)	(0.399)	87,059.6 (71,485.0)
Total Debt	355,360.0 (790,474.9)	549,881.4 (1,038,056.8)	(0.110)	-19,373.3 (17,135.4)
Shareholders funds	785,544.4 (1,189,319.0)	907,094.8 (1,129,909.4)	(0.814)	33,374.6 (25,500.5)
Number of Employees	11.37 (12.07)	12.33 (13.80)	(0.459)	0.0734 (0.588)
EBIT	83,964.2 (172,477.7)	60,042.6 (169,693.1)	(0.114)	14,415.8 (12,099.1)
EBIT growth Rate	-3.783 (79.72)	-0.167 (9.234)	(0.161)	26.74 (26.61)
Net Income	32,158.8 (137,600.4)	9,409.9 (138,692.2)	(0.558)	9,655.2 (8,291.5)
Sales	1,189,756.5 (1,794,288.1)	1,474,594.3 (2,414,726.8)	(0.576)	63,702.5 (50,256.1)
Gross Profit	374,294.3 (454,295.2)	334,154.7 (475,334.0)	(0.436)	-4,988.0 (37,769.4)
Cash Flow	88,236.9 (175,649.1)	81,123.2 (168,534.7)	(0.192)	5,758.8 (14,592.4)
Return on Total Assets (%)	3.821 (14.44)	1.522 (11.76)	(0.180)	0.744 (1.113)
Profit Margin (%)	3.447 (21.71)	-0.876 (20.89)	(0.143)	0.906 (0.814)

The data source for this table is the Amadeus Bureau van Dijk database, and it excludes the Attica region. The sample is restricted to areas where firms are similar. Columns 1 and 2 show the mean values and standard deviations for firms located in the zip code areas where a bank-unit closed (exposed areas) and firms located in the zip code areas where a unit remained open (control areas). Column 3 reports the *p*-value for the difference between Columns 1 and 2. *p*-values are obtained from a regression of the main variable on an indicator of whether the firm is located at the zip code area where a bank-unit closed and region fixed effects. Column 4 presents the estimate coefficients from difference-in-difference regressions on the firms' variables. All variables and estimations are based on 2012–2015 values.

Table 13: Effect on the probability of renegotiating a loan and on renegotiated loans' terms - Only areas with similar characteristics

	Extensive Margin		Intensive Margin		
	(1)	(2)	(3)	(4)	(5)
	<i>Renegotiation</i>	<i>Log of Interest Rate</i>	<i>Log of Remaining Days</i>	<i>Log of Collateral Value</i>	<i>Unsecured Loan</i>
<i>Post * Treat</i>	-0.120*** (0.0198)	0.00396*** (0.00121)	-1.763** (0.810)	0.456** (0.215)	-0.105* (0.0564)
Observations	9,454	5,655	5,655	5,655	5,655
R <sup>2</sup>	0.130	0.239	0.124	0.012	0.022
Firm F.E.	✓	✓	✓	✓	✓
Pre-period Bank Unit F.E.	✓	✓	✓	✓	✓
Post-period Bank Unit F.E.	✓	✓	✓	✓	✓
Region * Year F.E.	✓	✓	✓	✓	✓
Cluster Level		Bank Unit			

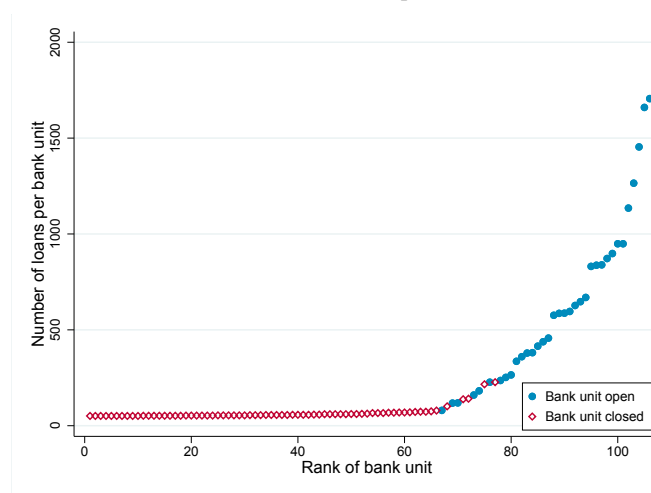
Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

This table displays the results from estimating equation 1 only for firms located in areas where firms have no statistically different characteristics, as it is shown at table 12. In Column 1 of the results on the extensive margin, the dependent variable is a dummy that is equal to one if loan  $i$  was renegotiated at time  $t$  and zero otherwise. For the estimations on the intensive margin, the observations included in the analysis are the loans that were renegotiated at least once during the sample period. Results are estimated for three loan terms and for two variables related to collateral type. The dummy variable *Treat* is equal to one if the loan  $i$  was monitored by a loan officer in a bank-unit that closed, and zero otherwise. The dummy variable *Post* is equal to one if the year of the observation is after the reorganization (either 2014 or 2015) and zero if it is before the reorganization (either 2012 or 2013). In the baseline regressions, firm, pre-period bank-unit, post-period bank-unit, and region\*year fixed effects are included. Standard errors are corrected for clustering at the pre-period bank-unit level.

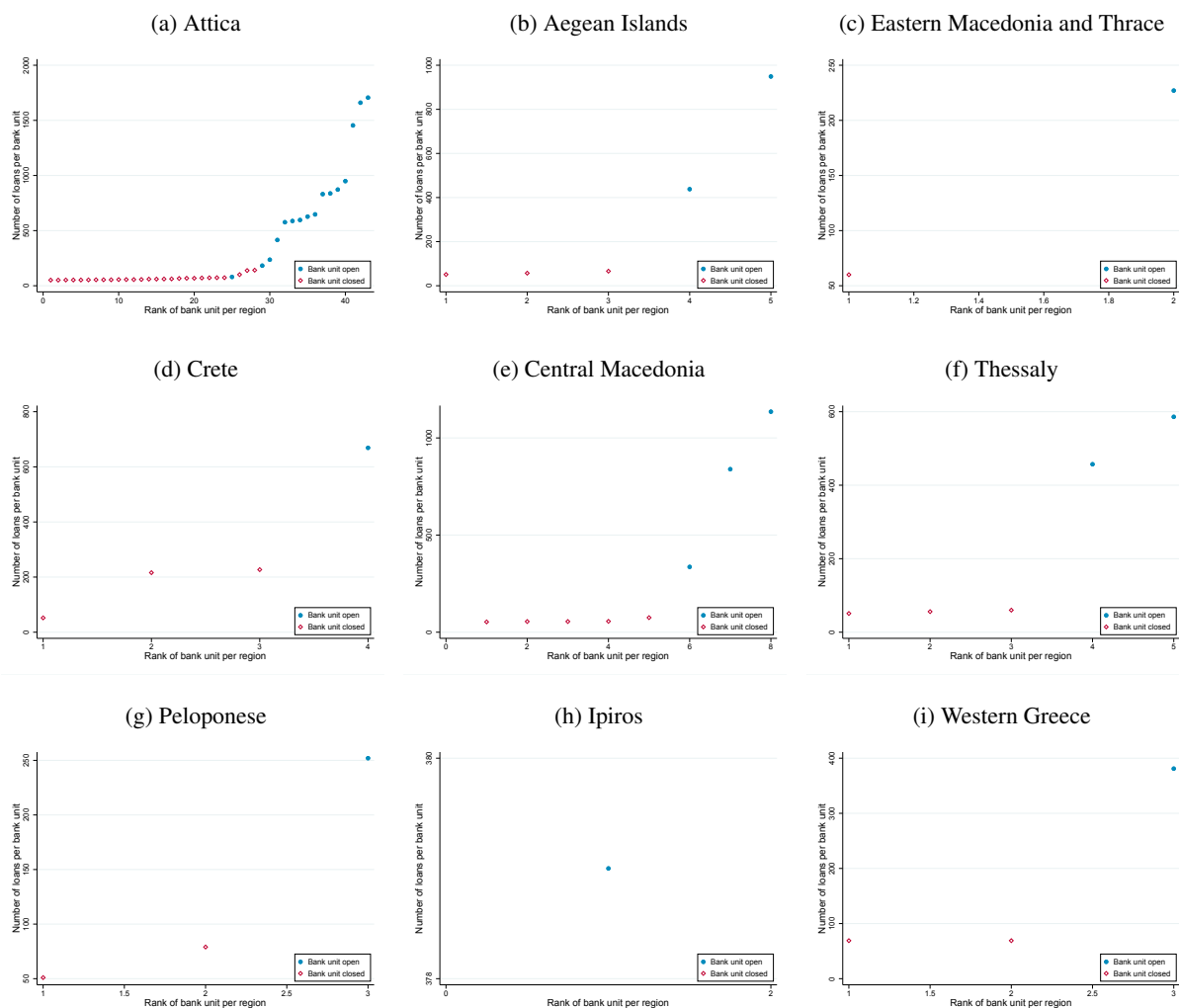
Figure 5: Rank bank units based on the number of borrowers per unit in 2013 - all bank units

(a) whole sample



Figures 5a - 6i plot the number of borrowers per bank unit in 2013 as a measure of relative size of the units. The red diamonds represent bank units that closed and the blue dots units that remained open. Figure 5a includes all the bank units in the sample, while figures 6a - 6i include the bank units per region.

Figure 6: Rank bank units based on the number of borrowers per unit in 2013 - per region



Figures 5a - 6i plot the number of borrowers per bank unit in 2013 as a measure of relative size of the units. The red diamonds represent bank units that closed and the blue dots units that remained open. Figure 5a includes all the bank units in the sample, while figures 6a - 6i include the bank units per region.

Table 14: Effect on the probability of renegotiating a loan and on renegotiated loans' terms - Control for bank unit size

	Extensive Margin		Intensive Margin		
	(1)	(2)	(3)	(4)	(5)
	<i>Renegotiation</i>	<i>Log of Interest Rate</i>	<i>Log of Remaining Days</i>	<i>Log of Collateral Value</i>	<i>Unsecured Loan</i>
<i>Post * Treat</i>	-0.104*** (0.0183)	0.00193*** (0.000426)	-0.349** (0.157)	2.438*** (0.151)	-0.205*** (0.00923)
Observations	2,381	1,686	1,686	1,686	1,686
R <sup>2</sup>	0.185	0.259	0.448	0.027	0.034
Firm F.E.	✓	✓	✓	✓	✓
Pre-period Bank Unit F.E.	✓	✓	✓	✓	✓
Post-period Bank Unit F.E.	✓	✓	✓	✓	✓
Region * Year F.E.	✓	✓	✓	✓	✓
Cluster Level					Bank Unit

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

This table displays the results from estimating equation 1 only for loans that were transferred to a bank unit that was at most 20% larger than their original bank unit. Observations on the control group are also restricted to those that were managed at the unit that received loans from units that were at most 20% smaller (from the “filtered” treated group). In Column 1 of the results on the extensive margin, the dependent variable is a dummy that is equal to one if loan  $i$  was renegotiated at time  $t$  and zero otherwise. For the estimations on the intensive margin, the observations included in the analysis are the loans that were renegotiated at least once during the sample period. Results are estimated for three loan terms and for two variables related to collateral type. The dummy variable *Treat* is equal to one if the loan  $i$  was monitored by a loan officer in a bank-unit that closed, and zero otherwise. The dummy variable *Post* is equal to one if the year of the observation is after the reorganization (either 2014 or 2015) and zero if it is before the reorganization (either 2012 or 2013). In the baseline regressions, firm, pre-period bank-unit, post-period bank-unit, and region\*year fixed effects are included. Standard errors are corrected for clustering at the pre-period bank-unit level.

Table 15: Unconditional effect on loans' performance

	(1)	(2)	(3)
	<i>Nonperforming</i>	<i>Log of Days Past Due</i>	<i>Log of Total Provision</i>
<i>Post * Treat</i>	0.00809 (0.0519)	0.0212 (0.271)	-0.781 (0.751)
Observations	20,626	20,626	20,626
$R^2$	0.132	0.230	0.654
Firm F.E.	✓	✓	✓
Pre-period Bank unit F.E.	✓	✓	✓
Post-period Bank unit F.E.	✓	✓	✓
Region * Year F.E.	✓	✓	✓
Cluster Level		Bank unit	

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

This table displays the results from estimating equation 1 for all loans that firms have in noncentralized bank units over the sample period. The dependent variables are a nonperforming dummy variable, the log of days past due, and the log of total provision for the loans that firm  $j$  had at year  $t$ . The dummy variable *Treat* is equal to one if the loan was monitored by a loan officer at a bank-unit that closed, and zero otherwise. The dummy variable *Post* is equal to one if the year of the observation is after the reorganization (either 2014 or 2015) and zero if it is before the reorganization (either 2012 or 2013). Firm, pre-period bank unit, post-period bank unit, and region\*year fixed effects are included. The bottom of the table depicts information on the fixed effects and the control variables included. Standard errors are corrected for clustering at the pre-period bank unit level.

Table 16: Firm level effects

	(1)	(2)	(3)	(4)
	<i>Equity over Total Assets</i>	<i>Total Debt over Total Assets</i>	<i>EBITDA over Total Assets</i>	<i>Total Balance over Total Debt</i>
<i>Post * Treat</i>	0.185*** (0.0159)	-0.174*** (0.0197)	-0.00375 (0.00267)	-0.0401*** (0.00994)
Observations	8,868	8,868	8,868	8,868
R <sup>2</sup>	0.011	0.013	0.007	0.082
Firm F.E.	✓	✓	✓	✓
Pre-period Bank unit F.E.	✓	✓	✓	✓
Post-period Bank unit F.E.	✓	✓	✓	✓
Region * Year F.E.	✓	✓	✓	✓
Cluster Level			Bank unit	

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ 

This table displays the results of an interruption in the relationship between a loan officer and a firm from estimating equation 1 on firm financial variables. In Column 1, the dependent variable is the ratio of equity over total assets for firm  $j$  at year  $t$ . In Column 2, the dependent variable is the ratio of total debt over total assets. In Column 3, the dependent variable is the ratio of EBITDA over total assets. In Column 4, the dependent variable is the ratio of the total balance at this bank over the total debt to all banks that a firm  $j$  has at year  $t$ . This is a measure of how much a firm borrows from this bank relative to its total debt from all banks. The dummy variable *Treat* is equal to one if the firm experienced an interruption on its relationship with the loan officer due to the bank unit closure, and zero otherwise. The dummy variable *Post* is equal to one if the year of the observation is after the reorganization (either 2014 or 2015) and zero if it is before the reorganization (either 2012 or 2013). Firm, pre-period bank unit, post-period bank unit, and region\*year fixed effects are included. The bottom of the table depicts information on the fixed effects and the control variables included. Standard errors are corrected for clustering at the pre-period bank unit level.

Table 17: Correlation of relationship strength with probability to renegotiate

	Whole sample		Only control		Only treated	
	(1) Pre-period	(2) Post-period	(1) Pre-period	(2) Post-period	(1) Pre-period	(2) Post-period
<i>Dependence Ratio</i>	0.0930*** (0.0138)	0.0676*** (0.0187)	0.0947*** (0.0140)	0.0798*** (0.0190)	0.108 (0.0713)	-0.282** (0.116)
Pre-period Bank unit F.E.	✓		✓		✓	
Post-period Bank unit F.E.		✓		✓		✓
Region * Year F.E.	✓	✓	✓	✓	✓	✓
Cluster Level				Bank Unit		

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

This table displays the estimated coefficients from separate regressions of the renegotiation dummy variable on the *dependence ratio*. The *dependence ratio* is the ratio of the total balance that a firm has at this bank over the total debt that the firm has at all banks. The *dependence ratio* is used as an approximate measure of relationship strength. Bank-unit and region\*year fixed effects are included, and standard errors are clustered at the bank unit level. The first two columns present the coefficients for the whole sample for the pre- and post-period separately. The second two columns present the coefficients only for the control group for the pre- and post-period separately. The last two columns present the coefficients only for the treated group for the pre- and post-period separately.



Figure 7: Density distribution of the *dependence ratio*

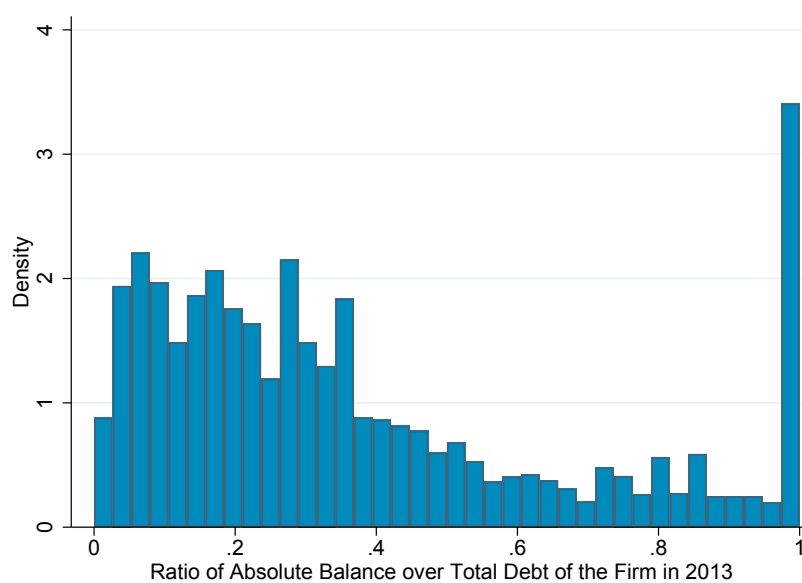


Figure 7 plots the density distribution of the *dependence ratio* as measured in 2013. The *dependence ratio* is defined as the ratio of the total balance that a firm has at this bank over the total bank debt of the firm.

Table 18: Heterogeneity by relationship strength - Effect on the probability of renegotiating a loan and on renegotiated loans' terms using Difference-in-Difference-in-Differences

	Extensive Margin		Intensive Margin		
	(1)	(2)	(1)	(2)	(3)
	Renegotiation	Log of Remaining Days	Log of Interest Rate	Remaining Days	Log of Collateral Value
<i>Post * Treat * Dependence Ratio</i>	-0.606*** (0.0464)	-2.255*** (0.191)	0.00520** (0.00213)		1.672*** (0.0374)
Observations	18,532	11,122	11,122	11,122	11,122
R <sup>2</sup>	0.139	0.197	0.011		0.009
Firm F.E.	✓	✓	✓	✓	✓
Pre-period Bank Unit F.E.	✓	✓	✓	✓	✓
Post-period Bank Unit F.E.	✓	✓	✓	✓	✓
Region * Year F.E.	✓	✓	✓	✓	✓
Cluster Level				Bank Unit	

This table displays the results from estimating the equation:

$$y_{ijurt} = \alpha_j + \alpha_{pre-u} + \alpha_{post-u} + \alpha_{rt} + \delta_1(Post_t * Treat_{ijur} * Dependence Ratio_{ijur}) + \delta_2(Post_t * Dependence Ratio_{ijur}) + \delta_3(Treat_{ijur} * Dependence Ratio_{ijur}) + \delta_4(Post_t * Treat_{ijur}) + \delta_5(Dependence Ratio_{ijur}) + \varepsilon_{ijurt}$$

On the extensive margin the dependent variable is a dummy that is equal to one if firm  $j$  renegotiated loan  $i$  at time  $t$  and zero otherwise. For the estimations on the intensive margin, only loans that were renegotiated at least once over the sample period are included. Results are estimated for three loan terms and for two variables related to collateral type. The variable *Dependence Ratio* is a continuous variable equal to the ratio of the total balance at this bank over the total debt to all banks that a firm  $j$  has at year 2013. This variable is a measure of how much a firm borrows from this bank relative to its total debt from all banks. The dummy variables *Treat* and *Post* are defined as in the previous sections of the paper. In the regressions, firm, pre-period bank-unit, post-period bank-unit and region \* year fixed effects are included. Standard errors are corrected for clustering at the pre-period bank-unit level.

Table 19: Heterogeneity by firm's pre-period performance - Effect on the probability of renegotiating a loan and on renegotiated loans' terms

(A) On time loan payment				
	(1)	(1)	(2)	(3)
	<i>Renegotiation</i>	<i>Log of Interest Rate</i>	<i>Log of Remaining Days</i>	<i>Log of Collateral Value</i>
<i>Post * Treat</i>	-0.121*** (0.0143)	0.00377** (0.00162)	-4.338*** (0.660)	0.381** (0.146)
Observations	11,025	5,507	5,507	5,507
R <sup>2</sup>	0.149	0.201	0.371	0.006
(B) Delayed loan payment				
	(1)	(1)	(2)	(3)
	<i>Renegotiation</i>	<i>Log of Interest Rate</i>	<i>Log of Remaining Days</i>	<i>Log of Collateral Value</i>
<i>Post * Treat</i>	-0.134*** (0.0320)	0.00573*** (0.000732)	-0.201 (0.608)	0.595 (0.511)
Observations	9,601	6,385	6,385	6,385
R <sup>2</sup>	0.124	0.191	0.114	0.014
Firm F.E.	✓	✓	✓	✓
Pre-Bank Unit F.E.	✓	✓	✓	✓
Post-Bank Unit F.E.	✓	✓	✓	✓
Region * Year F.E.	✓	✓	✓	✓
Cluster Level	Bank Unit			

This table displays the results from estimating equation 1 separately for firms that paid their loans on time in 2013 and for firms that delayed a loan payment in 2013.

In Column 1 of the results on the extensive margin, the dependent variable is a dummy that is equal to one if loan  $i$  was renegotiated at time  $t$  and zero otherwise. For the estimations on the intensive margin, the observations included in the analysis are the loans that were renegotiated at least once during the sample period. Results are estimated for three loan terms. The dummy variables *Treat* and *Post* are defined as in the previous sections of the paper. In the regressions, firm, pre-period bank-unit, post-period bank-unit, and region\*year fixed effects are included. Standard errors are corrected for clustering at the pre-period bank-unit level.

Table 20: Heterogeneity by firm's pre-period leverage - Effect on the probability of renegotiating a loan and on renegotiated loans' terms

<i>(A) Low Leveraged Firms</i>				
	(1)	(1)	(2)	(3)
	<i>Renegotiation</i>	<i>Log of Interest Rate</i>	<i>Log of Remaining Days</i>	<i>Log of Collateral Value</i>
<i>Post * Treat</i>	0.296*** (0.0689)	0.00238 (0.00253)	0.0829 (0.402)	0.925*** (0.282)
Observations	6,755	3,729	3,729	3,729
R <sup>2</sup>	0.141	0.195	0.195	0.006
<i>(B) Highly Leveraged Firms</i>				
	(1)	(1)	(2)	(3)
	<i>Renegotiation</i>	<i>Log of Interest Rate</i>	<i>Log of Remaining Days</i>	<i>Log of Collateral Value</i>
<i>Post * Treat</i>	-0.301*** (0.0477)	0.00336* (0.00177)	-4.039*** (0.694)	0.575*** (0.170)
Observations	9,039	5,651	5,651	5,651
R <sup>2</sup>	0.161	0.179	0.155	0.012
Firm F.E.	✓	✓	✓	✓
Pre-Bank Unit F.E.	✓	✓	✓	✓
Post-Bank Unit F.E.	✓	✓	✓	✓
Region * Year F.E.	✓	✓	✓	✓
Cluster Level		Bank Unit		

This table displays the results from estimating equation 1 separately for firms that had low leverage in 2013 and for firms that had high leverage in 2013. As a measure of leverage, the ratio of total debt over total assets is used.

In Column 1 of the results on the extensive margin, the dependent variable is a dummy that is equal to one if loan  $i$  was renegotiated at time  $t$  and zero otherwise. For the estimations on the intensive margin, the observations included in the analysis are the loans that were renegotiated at least once during the sample period. Results are estimated for three loan terms. The dummy variables *Treat* and *Post* are defined as in the previous sections of the paper. In the regressions, firm, pre-period bank-unit, post-period bank-unit, and region\*year fixed effects are included. Standard errors are corrected for clustering at the pre-period bank-unit level.

Table 21: Heterogeneity by firm's EBITDA growth rate - Effect on the probability of renegotiating a loan and on renegotiated loans' terms

(A) Negative EBITDA growth rate				
	(1)	(1)	(2)	(3)
	<i>Renegotiation</i>	<i>Log of Interest Rate</i>	<i>Log of Remaining Days</i>	<i>Log of Collateral Value</i>
<i>Post * Treat</i>	0.894*** (0.0719)	0.00273*** (0.000898)	0.704*** (0.146)	0.367 (0.232)
Observations	6,254	3,877	3,877	3,877
R <sup>2</sup>	0.177	0.210	0.178	0.009
(B) Positive EBITDA growth rate				
	(1)	(1)	(2)	(3)
	<i>Renegotiation</i>	<i>Log of Interest Rate</i>	<i>Log of Remaining Days</i>	<i>Log of Collateral Value</i>
<i>Post * Treat</i>	-0.149*** (0.0446)	0.00571*** (0.00124)	-2.252*** (0.756)	0.910*** (0.168)
Observations	11,762	6,938	6,938	6,938
R <sup>2</sup>	0.130	0.191	0.165	0.010
Firm F.E.	✓	✓	✓	✓
Pre-Bank Unit F.E.	✓	✓	✓	✓
Post-Bank Unit F.E.	✓	✓	✓	✓
Region * Year F.E.	✓	✓	✓	✓
Cluster Level	Bank Unit			

This table displays the results from estimating equation 1 separately for firms that had a negative EBITDA growth rate in 2013 and for firms that had a positive EBITDA growth rate in 2013.

In Column 1 of the results on the extensive margin, the dependent variable is a dummy that is equal to one if loan  $i$  was renegotiated at time  $t$  and zero otherwise. For the estimations on the intensive margin, the observations included in the analysis are the loans that were renegotiated at least once during the sample period. Results are estimated for three loan terms. The dummy variables *Treat* and *Post* are defined as in the previous sections of the paper. In the regressions, firm, pre-period bank-unit, post-period bank-unit, and region\*year fixed effects are included. Standard errors are corrected for clustering at the pre-period bank-unit level.

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## Melina Papoutsi

European Central Bank, Frankfurt am Main, Germany; email: [melina.papoutsi@ecb.europa.eu](mailto:melina.papoutsi@ecb.europa.eu)

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Postal address 60640 Frankfurt am Main, Germany

Telephone +49 69 1344 0

Website [www.ecb.europa.eu](http://www.ecb.europa.eu)

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