Lending in Social Networks

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Abstract

This paper employs a unique contract-level dataset on members of 211 social clubs in Germany, and uses a quasi-experimental research design to investigate how social connections between banks and firms affect the allocation of credit. We find that firms borrow a higher fraction of their total loans from in-group banks compared to out-group banks. Furthermore, the credit supplied by a bank generates a 3.23 percent lower return for in-group firms compared to loans given to out-group firms. Overall, our results provide evidence in support of a rent-seeking theory, with state-owned banks engaging most actively in crony lending.

JEL Codes: F34, F37, G21, G28, G33, K39.

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"*People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices.*"
Adam Smith, Wealth of Nations, 1776.

1 Introduction

Asymmetric information and *moral hazard* pose major impediments to financial contracting. These frictions create inefficiencies in the allocation of credit and increase the cost of funding. A recent and rapidly increasing body of literature examines the role played by social networks in alleviating these frictions (Karlan 2005, 2007; Karlan, Mobius, Rosenblat, and Szeidl 2009). By increasing the proximity of lenders and borrowers, social networks are understood to relax informational constraints that adversely affect lending (Guiso, Sapienza, and Zingales 2004).[1] However, there is a negative view of social proximity as well (Bandiera, Barankay, and Rasul 2009, Kramarz and Thesmar 2013). Social connections may lead to rent-seeking and favoritism, thus distorting the allocation of credit. This paper attempts to identify the dark side of social connections on bank lending.

The negative view on social proximity is exemplified in Adam Smith's *Wealth of Nations*, where he recognizes the possibility of collusion in social networks (see quote above). Unfortunately, despite the abundance of anecdotes on rent-seeking and collusion in social networks, there is scant empirical research on this topic.[2] This is certainly not because of its lack of importance; there is a growing recognition that rent-seeking and collusion is ubiquitous and imposes substantial costs on the society. But empirically identifying such behavior has proven to be very difficult, as both the bright-side (information and enforcement channels) and the dark-side views (collusion and favoritism) generate observationally equivalent outcomes.

Ever since Becker's (1957) seminal work, *The Economics of Discrimination*, economists have long struggled to distinguish empirically between taste-based (favoritism) and statistical discrimination (Arrow 1973, Phelps 1972). The challenge faced by scholars in identifying rent-seeking behavior is very similar in spirit to the challenge researchers face when trying to identify the presence of taste-based discrimination. To add to this, researchers have to grapple with serious selection issues – formation of social networks is not random and peo-

[1]Engelberg, Gao, and Parsons (2012) provide additional evidence in support of this view.

[2]This is especially the case when it comes to the allocation of bank credit, which is the focus of this paper. Two notable exceptions are La Porta, Lopez-de Silanes, and Zamarripa (2003) who investigate the negative consequences of *related lending* in Mexico and Khwaja and Mian (2005) who document the negative effects of *political connections* on lending in Pakistan.

ple often self-select into social groups that have interests aligned with their own (Lazarsfeld and Merton 1954). In our context, firms that are part of social networks might share characteristics that distinguish them from firms that are not part of the same network. The main identification challenge is to isolate the impact of social proximity from spurious effects caused by selection. Finally, data limitations pose a significant challenge for researchers. It is natural to expect the benefits of social networks to be more important for small and informationally opaque firms. Such granular micro-level data on small and medium-size enterprises and their network connections are difficult to obtain.

This paper identifies the dark side of social proximity on the allocation of credit, using service clubs in Germany as a laboratory. Germany provides a near ideal setting for several reasons. To begin with, the country has a strong culture of service clubs that bring together business and professional leaders to socialize on a regular basis. While these service clubs are organized through a global organization that is headquartered in the US, the individual service clubs operate locally through branches in almost every city in Germany. Furthermore, the Deutsche Bundesbank provides not only detailed contract-level information on all borrowers, available through its credit registry, but also financial statements of non-financial companies (USTAN).

We hand-collect data on members – both firms' CEOs and bank directors – for 211 service club branches, from 1993 to 2011, to capture both cross-sectional and time series variation in social proximity, and we obtain very detailed contract-level financial data on these members from the Deutsche Bundesbank. We are thus able to create a unique dataset on social networks that provides very granular information on social networks combined with detailed accounting information.

We tackle the endogenous selection issue in several ways. From the outset, it should be noted that our analysis focuses on firms that are members of the same service club organization. In other words, our analysis does not compare firms that are members of the club with firms that are not members of the club. Instead, we compare firms whose CEOs are members of a branch of a club (referred to as in-group) with firms whose CEOs are members of a different branch of the *same* service club in the *same* city (referred to as out-group). Since members of this service club are selected with the same ideological criteria, this should alleviate most selection concerns to a significant extent. Moreover, a bank that is an in-group bank for one club branch is an out-group bank for another club branch. By comparing the *same* bank's lending to firms whose CEOs are members of its club branch with firms whose CEOs are not connected to the bank, we are able to control for the time-invariant sources of unobserved bank heterogeneity.

We begin our analysis by investigating two events that generate perturbations in social proximity, namely: 1) entry of new members to a club branch, and 2) formation of a new club branch within a city.[3] Entry of firms is driven by rules, such as the 'one member per industry' rule. Thus, the entry of new members only takes place once their industry sector slot becomes vacant (i.e., existing members retire). Similarly, the formation of a new club branch, follows a highly regulated process that involves the agreements of a district extension committee and the district governor. Since these events are driven by pre-defined rules, it lends credibility to our research design. As will become evident, our analysis goes into great depth in ensuring that the exclusion restrictions are not violated.

The main identification strategy exploits mayoral elections. In Germany, the mayor of a district is often directly appointed the chairman of the supervisory board of the local state-owned savings bank.[4] In his capacity as a chairman of the supervisory board, the mayor commands a large influence on the loan-granting activity of the bank, especially for corporate loans.[5] So, while the elected candidate is always a member of the club branch, the degree of influence changes with the elections. Importantly, the mayoral election is independent of time series changes in firm characteristics. It is further independent of changes in bank quality that would be of concern in case of bank entry. The mayoral election thus provides exogenous time series variation in the members' ability to access and approve funds, free from other influences.

To quantify the effect of social proximity on lending, our empirical strategy, which is essentially a differences-in-differences methodology, compares for the same firm, quarter-by-quarter, the financing provided by in-group banks to that provided by out-group banks. This empirical strategy thus controls for demand-side effects, such as changes in investment opportunities that may arise due to enhanced social connections.

The following facts emerge from our analysis. In-group banks have a 18.35 percent higher market share among members of their own club branch, compared with members of other branches in the same city. On average, entry to branches leads to an increase of 10.03 percentage points in the fraction the firm borrows from the in-group bank. On examining mayoral elections, we find that when a club member is elected as a mayor and becomes the head of the local state bank, the share of loans from the state bank increases by 5.63 percentage points. The evidence on mayoral elections is reinforced by comparing firm lending around mayoral elections for which the mayor is not appointed as the chairman of

[3]It should be noted that membership is offered to individuals and not firms, so when we state that a firm joins a club branch, it implies that the firm's CEO joins a club branch.

[4]Whether the mayor is the chairman depends on the size of the city relative to the county. We discuss this issue in detail later in the paper.

[5]Since savings banks are small local banks, corporate loans, which tend to be relatively large loans, constitute a special risk to these banks. As a rule, decisions on large loans require approval by the credit committee (*Kreditausschuss*) which is often chaired by the mayor.

the supervisory board of the local savings bank. Using this event as a placebo test, we can isolate the effect of state bank proximity from the proximity to the mayor. If a club member is elected as a mayor, but is not appointed as the head of the local state bank, there is no effect on in-group financing. We further explore the dynamics of lending around these events and find that our results cannot be explained by pre-treatment trends.

We find that social proximity also significantly increases firms' total debt by 32.22 percent. This finding is confirmed when we examine branch formations and mayoral elections. On examining the *intensive* and the *extensive* margins, we find that an increase in the degree of social connectedness leads not only to more lending to firms that already have an existing relationship with the in-group bank, but it also increases the probability of forming a new relationship with this bank by 11.44 percent relative to out-group banks.

We further investigate the underlying mechanism from the bank's perspective, by calculating the returns on loans (ROL) that banks generate from in-group vis-à-vis out-group transactions. A simple informational or enforcement theory should lead to a better allocation of credit, thereby improving the profitability of the bank. A favoritism or a rent-seeking theory, on the other hand, predicts that the ROL are lower for in-group compared to out-group loans originated by the same bank. Since we are able to measure ex-post loan performance, all contract features that affect the banks' returns, e.g. differences in collateral, are accounted for. Thus, our analysis is robust to differences in contract features.

We find that a given bank generates a 3.23 percentage points lower ROL on in-group loans when compared to out-group loans. In addition, the ROL of in-group banks is significantly lower when compared to out-group banks for the *same* firm. Investigating the drivers of this difference in ROL, we find that the difference comes mostly from the difference in returns generated from lending to firms in financial distress. While the interest rates and recovery rates on loans are not much different for in-group loans compared to out-group loans, banks lend disproportionately more to in-group firms that are closer to distress, and thus the banks lose a lot more when these firms default. It is this excess continuation of firms as a going concern which stems from the *soft budget constraint* problem of in-group banks (Kornai 1986), especially state banks, this generates a lower ROL. It should be noted that not only banks make lower ROL on connected loans, but these loans earn returns well below the risk-free rate and often this connected loan portfolio generates a negative ROL for the bank. Furthermore, connected loans also exhibit a higher ROL volatility. Clearly, such a pattern cannot be rationalized by the action taken by a *risk-averse* lender who trades off ROL for lower *risk*.

Examining how firms deploy the extra financing they receive through their membership to the network, we find that firms *do not* use this extra financing to make new investments, something one would expect if social proximity to the lender relaxed financing constraints. Instead, firms use these funds to increase payments to the shareholders (pay out dividends), which in most cases means paying out to themselves, as most of these are relatively small, family-owned firms. Furthermore, the increase in bank credit leads to a significant increase in indebtedness. The total loans to assets ratio increases by 6.17 percentage points after firms join the club.

We next investigate how the social proximity effect varies with bank ownership. To do this, we compare how the proximity effect varies across state banks, private banks and cooperatives. Such a comparison across these different bank groups allows us to examine the effect of incentives and governance structures of banks on the social proximity effect.[6] We find that entry of firms to a club branch increases their share of financing by 6.45 percentage points more if the in-group bank is state-owned, compared to when this bank is privately-owned or a cooperative.[7] On examining the ROL, we find that, while the effects are present for both state and private banks, the ROL effect is significantly lower for state banks. More specifically, the ROL obtained by the state banks on their in-group loans is significantly lower (compared to the private bank) than the ROL they obtain on out-group loans.[8] Thus, state banks not only grant more loans to firms in their network, but they also generate much lower ROL within the branch. For cooperatives that present closest counterparts to state-owned savings banks, we find a significantly lower effect suggesting that better governance can mitigate some of the ill effects of social proximity on lending. These results are consistent with the view that state banks, due to blunt incentives, are more likely to engage in crony lending.

In this paper, we uncover the dark side of social proximity. There are two important contributions that are worth highlighting. In the related literature, La Porta, Lopez-de Silanes, and Zamarripa (2003) investigate the negative consequences of *related lending* in Mexico, where related lending is defined as loans to firms that are controlled and owned by the bank's owner. Similarly, Khwaja and Mian (2005) document the negative effects of *political connections* on lending in Pakistan. While this paper also identifies a negative side of proximity, the nature of connections is very different. In this paper, we examine the effect

[6]The key differences between state, private, and cooperative banks are detailed in Appendix B. In Germany, cooperative banks are organized very similarly to state-owned banks sharing the same regional focus. The ownership structure, however, is quite different. Cooperatives are owned by the members, whereas savings banks are state-owned (owned by the local government). The difference in ownership structure creates different incentives (Jensen and Meckling 1976), with cooperatives having a similar governance structure as private banks, whereas the governance in state-owned banks tends to be of lower quality (Engelmaier and Stowasser 2013).

[7]Very similar results are obtained if we look at formation of new branches.

[8]It should be stressed that this test controls for differences in objective functions that might exist between state-owned and privately-owned banks. Since we are looking at the wedge in ROL between in-group and out-group loans, for the *same* bank, we control for inherent differences in these different organizational forms.

of *social connections*, as opposed to *ownership* or *political* linkages. More importantly, our study is based on a developed economy, where corruption and other institutional ills are perceived to be low.

It is often argued that proximity between banks and firms mitigates informational problems (Petersen and Rajan 2002).[9] Our results suggest that proximity can be a double-edged sword, and that too much proximity may not always be desirable. Besides the literature on proximity and lending, this paper also contributes to a broader literature on social connections and economic outcomes.[10] Finally, our paper contributes to the understanding of the difference between state and private financing (La Porta, Lopez-de Silanes, and Shleifer 2002). Governments around the world are taking ownership of large parts of the banking system and, potentially, this public-sector involvement in the banking sector may have considerable long-term effects on all major industrialized countries.[11]

Section 2 describes the data and offers background information on service clubs in Germany. Section 3 outlines our empirical strategy. Sections 4, 5, 6 and 7 present the results. Section 8 offers a conclusion.

2 Institutional Background and Data

2.1 Service Clubs in Germany

To identify social connections, we focus on membership information of an important service club organization in Germany.[12] While the service club organization is organized through a global headquarter in the United States, the individual service club branches operate locally in almost every city or county in Germany. These clubs bring together members, all of whom are local businesses (mostly SMEs) and professional leaders, to meet within their club branch once a week over lunch or dinner to socialize. As part of the membership requirement, it is mandatory for each club member to attend the weekly meetings on a regular basis.[13] While

[9]See also Mian (2006), Fisman, Paravisini, and Vig (2012) for more papers on this topic.

[10]Granovetter (2005) describes the relationship between social connections and economic outcomes in the sociology literature; Shue (2013) discusses how executive peer networks affect managerial decision-making and firm policies; Lerner and Malmendier (2011) examines social networks and entrepreneurship; Jackson and Schneider (2010) document how social connections reduce moral hazard, Gompers, Mukharlyamov, and Xuan (2012) find that venture capitalists make worse investment decisions when they share social traits; Burchardi and Hassan (2013) show that social connections influence economic growth.

[11]Several papers have documented distortions in lending by state-owned banks and state-regulated banking sectors (Sapienza 2004). For theoretical evidence on this topic, see Krueger (1974) and Shleifer and Vishny (1993, 1994).

[12]For confidentiality reasons, we do not mention the name of the service club organization in this paper.

[13]Specifically, membership is taken away if a member misses four consecutive meetings or attends less than 50% of the meetings over a period of six months.

the stated objective of the service club is to raise funds for charitable work, having personal connections to other business leaders is often cited as an important membership perquisite.

On average, a local club branch has about 50 members and generally there is one branch in each city of about 20,000 inhabitants. In larger cities, formation of additional club branches is common. There are about 1,000 club branches with about 50,000 members in Germany. There are strict membership criteria new members have to fulfill that tend to be based on business or professional leadership. Our sample area comprises all branches of the service club organization described above in southern Germany (the northern boundary is Saarbruecken, Frankfurt, Erfurt and Hof), which are located in cities (and the surrounding areas of these cities), during the period 1993 until 2011.[14] Further details on the data collection of club membership information are described in Appendix A. We gather membership information on all corporate CEOs and directors of bank branches for 211 clubs in this area (Table 1, Panel A).[15] This provides data for 1,091 corporate CEOs whose firms are listed in the German credit register. Throughout the paper we refer to member firms whenever a CEO of this firm is member of a service club branch. Out of these sample firms, 141 firms became insolvent during our sample period. We exclude firms (five in total) which are listed on the German stock market index (DAX), since these are very large firms with many lending relationships.

The process for a potential new member joining a specific club branch is as follows: an existing member suggests a new candidate to the other members of a specific branch, who then decide by vote if the candidate can join the branch. Since membership of the service club organization is considered very prestigious, most CEOs and bank directors accept membership invitations to a particular branch. Each profession or business can only be represented once in each club branch, according to the 'one member per industry' rule. A candidate whose industry sector is already represented by an existing member can only join once the existing member completed 15 years.[16] Therefore, the timing of the entry of new members depends on the date when the industry sector slot of the candidate becomes available. During our sample period, 474 CEOs enter a club branch.

There are distinct rules that govern the formation of new club branches. The district governor, who is the local head of a district of the service club organization, appoints a district extension committee, tasked mainly with identifying communities that are currently

[14]The German credit register starts in the second quarter of 1993, and therefore this date marks the beginning of our sample period.

[15]A particular service club branch is included in our sample if there is at least one CEO whose firm has taken out a bank loan that is recorded in the credit register of the Deutsche Bundesbank. Our sample firms have the following legal structure: 944 are head of a limited liability firm (GmbH), 57 members are heads of a private firm (KG and OHG), and 90 are CEOs of publicly listed firms (AG).

[16]If a member reaches the age of 60 and has been a member of the club for at least 10 years, or reaches the age of 65 and has been a member for at least five years, a new member of his industry may join.

without club branches or communities that have existing branches, but where an additional branch is beneficial. The communities must meet the population criteria requirement for chartering a new branch. For instance, it is required that each branch must have at least 25 businessmen or professionals from the local community. In addition, for communities that have existing branches, it is the job of the extension committee to ensure that the establishment of the additional branch does not negatively affect the existing branches.

The 1,091 firms whose CEOs are club members take out loans from 542 distinct banks. We define a bank as a club bank if the director of the bank or local bank branch is a member of a club branch. In Germany, private banks have different organizational characteristics vis-à-vis state-owned and cooperative banks. Private banks, are generally larger in size, and provide a wide array of transaction services to the customers. Compared to state-owned savings banks and cooperatives that have more of a local presence, private banks operate in different geographical areas through their local branches. Cooperative and state-owned banks have a very similar business model, but different control structures; state-owned banks are controlled by local politicians, while cooperative banks are owned by their customers.[17] Given the differences in organizational structure, private bankers in our sample are directors (heads) of a local branch of a larger bank, while directors of public and cooperative banks are heads (CEOs) of local banks. We identify 352 club bankers,[18] 173 of which are of a private bank, 138 of a state bank and 41 of a cooperative bank.

Finally, there is an interesting feature of German saving banks that we exploit for identification in this paper. Since German savings banks are owned by local cities, the respective mayor is often also the chairman of their supervisory board. While he is not explicitly involved in managing the bank, he has a large influence on the banks' loan-granting activity.[19] The election of a member of a specific club branch member as a mayor thus generates a time series variation in the other branch member's ability to approve funds. In our sample, we identify 20 cases in which an existing branch member was elected as a mayor for the first time and subsequently became chairman of the state bank's supervisory board, in 16 cases an existing member is elected as a mayor and does not become head of the local state bank.[20]

[17]See Appendix B for a detailed overview of the German banking sector.

[18]Some clubs have two bankers among their members because some bankers have been connected to a club branch for more than 15 years and, thus, do not block the industry sector slot anymore.

[19]Since savings banks are, on average, small institutions, large loans bear a particular risk for these banks. Therefore, these banks have a credit committee in place to approve loans. Mayors (if they are the chairmen of the bank's supervisory board) also chair these credit committees.

[20]Whether an elected mayor becomes the head of the local state bank's supervisory board depends on the relative size of the city to its surrounding county. If the county is relatively large, the county administrator generally becomes chairman of the supervisory board of the regional state bank.

2.2 Loan and Financial Statement Data

We collect information on all individual lending relationships of our sample firms from the credit register of the Deutsche Bundesbank. The credit register provides contract-level information on all German firms, whose total outstanding loans in a given quarter exceed 1.5 million euros.[21] We define a loan as an in-group loan if both the CEO of the firm and the bank director of the specific bank or branch are part of the same club branch. As shown in Table 1, Panel B, our sample contains 54,123 firm-quarter loan observations. The average loan amount per lending relationship is 6.4 million euros and the average outstanding loan amount per firm is 13.4 million euros. The firms have, on average, 3.72 different lending relationships over the entire sample period.

We match loan-level data from the credit register with accounting information from the Deutsche Bundesbank's USTAN database.[22] This match yields a sample of 686 firms (5,474 firm year observations).[23] Panel B provides summary statistics on total assets, debt to assets, return on assets (ROA), cash to assets, and borrowing costs for this sample. We also report the corresponding summary statistics for the population of firms contained in the USTAN database to compare them with our sample firms. As can be seen below the reported sample statistics, the variables are fairly similar.

3 Empirical Strategy

Our basic identification strategy examines how perturbation in the degree of social connectedness between firms and banks affects the quantity of financing a firm receives. To identify the network effect, one essentially attempts to estimate the following specification:

$$q_{jt} \quad = \quad \alpha_j + \alpha_t + \varphi \cdot AFTER_{jt} + \epsilon_{jt} \tag{1}$$

where q_{jt} is the total financing that firm j receives at time t; α_j and α_t denote firm and quarter fixed effects; the indicator variable $AFTER_{jt}$ takes on a value of one from the year when firm j enters a club branch, and zero otherwise. In our empirical strategy we also exploit the formation of a new club branch and mayoral election as an event. In the latter case, the $AFTER_{jt}$ dummy takes on a value of one for all member firms that share membership with the elected mayor, and zero otherwise. The parameter φ measures how social connections affect firms' ability to access external finance and ϵ_{jt} captures firm-level demand shocks. It

[21] Please refer to Schmieder (2006) for a detailed description of the Deutsche Bundesbank credit register.

[22] Even though the credit register and the accounting information all come from the Deutsche Bundesbank, the two datasets need to be hand matched by company name and location of incorporation.

[23] Note that the loan-level information is available quarterly, while the balance sheet information is annual.

is, however, important to note that changes in the degree of social connectedness, captured by the $AFTER_{jt}$ variable, can also generate demand effects, such as increases in investment opportunities. Then, a potential bias in the estimate $\hat{\varphi} = \varphi + \frac{Cov(AFTER_{jt}, \epsilon_{jt})}{Var(AFTER_{jt})}$ is captured by the term: $\frac{Cov(AFTER_{jt}, \epsilon_{jt})}{Var(AFTER_{jt})}$.

To identify the supply side effect separately, we employ our contract-level data and compare, for the same firm, quarter by quarter, the quantity of loans granted by in-group banks with the quantity of loans granted by out-group banks. This allows us to control for firm-specific shocks, such as demand shocks, that may coincide with enhanced social proximity. In a regression framework, we estimate the following specification:

$$q_{ijt} = \gamma_{jt} + \gamma_{it} + \gamma_{ij} + \Delta \cdot AFTER_{jt} + \epsilon_{ijt}, \tag{2}$$

where q_{ijt} is the quantity loan from bank i to firm j, γ_{ij} are relationship-level fixed effects that control for any time-invariant effects between firm j and bank i; γ_{jt} and γ_{it} are non-parametric controls for firm and bank-specific shocks. In this specification, Δ is the variable of interest - it measures how social connections affect firms' ability to access external finance. For firms that have a single lending relationship, the coefficient Δ cannot be identified since $AFTER_{jt}$ is absorbed by γ_{jt}. Our identification thus compares for the *same* firm the quantity of loans granted by in-group banks relative to out-group banks around the event.

While the empirical strategy controls for firm-level demand effects, it generates an upward bias if firms substitute lending from the out-group bank to the in-group bank. To see this, consider two banks, i and i', where i is the in-group bank and i' is the out-group bank, both providing external financing to firm j. Assume that the perturbation in the degree of social connectedness, say by the entry event, generates a positive supply-side effect (Δ_1) from the in-group bank. This supply-side effect could come, for example, from a lower cost of financing that results from lower asymmetric information. A lower cost of financing would lead to more club financing, but also to less outside financing (outside financing is now relatively more expensive). Such a substitution effect, if present, is denoted by (Δ_2). This gives us the following system of equations:

$$\begin{aligned} q_{ijt} &= \gamma_{it} + \gamma_{jt} + \gamma_{ij} + \Delta_1 \cdot AFTER_{jt} + \epsilon_{ijt} \\ q_{i'jt} &= \gamma_{i't} + \gamma_{jt} + \gamma_{i'j} - \Delta_2 \cdot AFTER_{jt} + \epsilon_{i'jt}. \end{aligned} \tag{3}$$

Differencing the equations in (3) leads to: $q_{ijt} - q_{i'jt} = \gamma_{it} - \gamma_{i't} + \gamma_{ij} - \gamma_{i'j} + [\Delta_1 + \Delta_2] \cdot AFTER_{jt} + \epsilon_{ijt} - \epsilon_{i'jt}$, which can be empirically estimated in the regression framework:

$$\Delta q_{jt} = \gamma_{it} - \gamma_{i't} + \gamma_{ij} - \gamma_{i'j} + [\Delta_1 + \Delta_2] \cdot AFTER_{jt} + \epsilon_{ijt} - \epsilon_{i'jt} \tag{4}$$

It can be seen from equation (4) that estimation in differences may generate an upward bias in the coefficient of interest. Substitution of loans by firms from out-group to in-group banks would bias the estimated coefficient Δ upwards – the network effect is $\Delta_1 + \Delta_2$ instead of Δ_1. To deal with this bias, we transform the left-hand side variable to a firm's share of loans from its in-group bank to its total loans (henceforth, in-group bank share).

Shares of inside (i) and outside (i') banks are given by:

$$\begin{aligned} \frac{q_{ijt}}{\sum_i q_{ijt}} &= \alpha_{jt} + \alpha_{it} + \alpha_{ij} + \delta \cdot AFTER_{jt} + \epsilon_{ijt} \\ \frac{q_{i'jt}}{\sum_i q_{ijt}} &= \alpha_{jt} + \alpha_{i't} + \alpha_{i'j} - \delta \cdot AFTER_{jt} + \epsilon_{i'jt} \end{aligned} \tag{5}$$

Differencing equations in (5) we get:

$$\frac{q_{ijt}}{\sum_i q_{ijt}} = \frac{1}{2} + \underbrace{\frac{\alpha_{it} - \alpha_{i't}}{2}}_{\approx 0 \text{ on average}} + \underbrace{\frac{\alpha_{ij} - \alpha_{i'j}}{2}}_{\beta_j} + \delta \cdot AFTER_{jt} + \underbrace{\frac{\epsilon_{ijt} - \epsilon_{i'jt}}{2}}_{\epsilon_{jt}} \tag{6}$$

Since computing in-group banks' shares collapses the relationship-specific information from the two equations in (5) into one firm-level observation, this simplifies to:

$$\frac{q_{ijt}}{\sum_i q_{ijt}} = \beta + \beta_j + \delta \cdot AFTER_{jt} + \epsilon_{jt} \tag{7}$$

where the dependent variable is the share of the financing provided by the in-group bank. It should be noted that the specification is quite stringent and already controls in a non-parametric way for firm-specific shocks (α_{jt}), such as an increases in investment opportunities etc. that may coincide with increased social proximity. Importantly, our set-up also takes care of bank-specific shocks. In-group banks and out-group banks are not two distinct groups of banks; the same bank is an in-group bank to some and an out-group bank to other firms. Thus, on average, $\alpha_{it} - \alpha_{i't}$ is approximately zero.[24] The variable δ thus captures a supply effect that results from an increase in proximity to the in-group bank, provided that the covariance between $AFTER_{jt}$ and ϵ_{jt} is zero. Equation (6) highlights that the nature of a shock that may lead to a bias in δ would need to be a shock that is correlated with $AFTER_{jt}$ and that affects the borrowing of firm j from in-group bank i differently than its borrowing from out-group bank i'. Our empirical strategy tries to ensure that the $AFTER_{jt}$ variable

[24] We can further saturate the specification by adding quarter-fixed effects β_t in equation (7). We can even control for shocks to the local bank branch by adding quarter-county fixed effects. Our results remain unaffected by this alternation.

is exogenous from such shocks. Specifically, we look at the entry of firms to branches, the formation of new club branches as well as mayoral elections. As described in detail below, the election of a member as a mayor changes the proximity between firms and the in-group bank in a manner that is orthogonal to firm-specific shocks, allowing us to identify changes in borrowing free of spurious effects.

4 Social Connections and Lending Patterns

4.1 Structure of Financing

We start this section by reporting the average share of credit in a club branch that is provided by the in-group bank. This is measured as the ratio of financing provided to firms whose CEOs are members of a club branch by in-group banks to the total financing provided to these firms by all banks. As can be seen from Panel C of Table 1, these firms borrow 25.08 percent of their total loans from in-group banks.

To understand this number better, we exploit a distinct feature of our framework: our sample cities have multiple club branches. This allows us to examine the share of credit provided by in-group banks to firms that are members of 'other' club branches in the same city. The mean share these banks have within the other service club(s) within the same city is only 6.73 percent. The difference between these two shares (18.35 percent) is quite large and statistically significant. This difference uncovers an interesting pattern, namely: firms borrow substantially more from their in-group bank than they do from out-group banks. Since the same bank is an in-group bank for one branch, but an out-group bank for another branch, this suggests that these correlations are not driven by differences in quality of banks. Moreover, the fact that firms are selected under the same ideological criteria mitigates selection concerns related to the endogenous matching of banks to firms.

4.2 Entry of Firms to Clubs and New Club Formations

We exploit firms' entry to a service club branch to generate variation in the social proximity variable. As outlined in Section 2, a new candidate can only join if his industry sector is not already represented by an existing member. This pre-specified rule gives us an arguably exogenous source of variation in the timing of firms' entry to the network.

A graphical depiction of the average share of credit in a club that is given by the in-group bank is provided in Figure 1. As can be seen, we observe a sharp rise in the share of connected lending subsequent to entry; an increase from 14 percent to 24 percent. In addition, we find no evidence of pre-event trends. The results from running specification (7) are summarized in Table 2. Column I displays the results for the entire sample of firms which joined a club branch, while Column II displays findings only for those firms joining the club through new branch formation. Considering entries, the lending share of in-group banks increases by 10.03 percentage points. Firms that join a club branch through the formation, show an increase in borrowing share from in-group banks by 12.53 percentage points.

We documented that an increase in proximity altered the composition of financing towards more in-group financing. Here, we explore the effects of social proximity on total financing and leverage. Since the documented effects are consistent with a *supply-side* effect, it is thus natural to expect that proximity should lead to an increase in total firm borrowing.

We replace the dependent variable in equation (7) by the log of aggregate firm borrowing per quarter. The results are gathered in Table 2, Columns III and IV. Total borrowing is, on average, 32.22 percent higher after firms enter the network, relative to the pre-entry period. The magnitude is almost identical for firms participating in branch formation (38.06 percent). On examining leverage, we find that entry to a club branch, increases the leverage ratio by 6.17 percentage points (Column V).[25] For firms that participate in the formation of a new branch, the leverage increases by 6.73 percentage points (Column VI). Thus, the documented increase in total bank loans after entry is not explained by firms' asset growth after joining the club but rather depicts a change in debt usage. To sharpen our analysis further, in the next section we exploit mayoral elections as an additional source of identification.

4.3 Mayoral Elections: A Sharper Test

In this section, we exploit mayoral elections as a source of identification. Essentially, the mayor, being the head of the local municipal government, is generally also the chairman of the supervisory board of the local state bank (savings bank).[26] This position gives the mayor substantial executive powers to affect the banks' strategies going forward. The mayor not only has significant influence in the management board, but he also has a big say in the appointment of bank managers, in the distribution of banks' earnings and, in the case of large loans, he has to approve the disbursement of credit. In our sample, we identify 20 clubs in which an existing member is elected as a mayor and at the same time is appointed the chairman of the supervisory board. We use this mayoral election to generate an exogenous variation in the degree of firms' connectedness with the state bank.

[25]We include the log of sales and the log of earnings before interest and taxes (EBIT) in the loans to assets regression. While the estimates for the coefficients of both control variables are significant, the coefficient of the loans to assets ratio is almost identical to the estimation without control variables.

[26]Whether the mayor is appointed as the chairman of the supervisory board, depends on relative size of the city to its surrounding county. We will come back to this issue later.

A graphical depiction of the dynamics of average share of credit in a club branch that is provided by the state bank, is depicted in Figure 2. As can be seen, we observe a sharp rise in the share of 'connected lending' subsequent to the mayoral election from 17 percent to 28 percent. In addition, we find no evidence of pre-event trends. In Table 3, we define the $AFTER_{jt}$ dummy to be one from the year of the mayoral election for the firms in the 20 branches that experience a mayoral election. Interestingly, we observe that the share of state bank loans in total firm loans for affected firms increases by 5.63 percentage points following the election (Column I). We further examine whether the mayoral election has an impact on firms' total debt and their leverage ratio and find that the election of a member as mayor in branches with a state bank leads to an increase in total debt for club firms by 23.30 percent (Column II) and an increase of the leverage ratio by 4.97 percentage points (Column III).

It is worth highlighting that mayoral election provides us with a exogenous times series variation in this member's ability to access and approve funds. It thus allows us to identify changes in firms' borrowing structures in a setting that is free from other influences, such as time series changes in firm characteristics. A remaining concern might be that change in the proximity with the mayor also affects the firms' demand for loans. We therefore provide a placebo test by exploiting 16 elections of an existing club member as a mayor where the newly elected mayor does not become head of the state bank (Columns IV to VI). Whether an elected mayor becomes the head of the local state bank's supervisory board depends on the relative size of the city to its surrounding county. If the county is relatively large, the county administrator generally becomes chairman of the supervisory board of the regional state bank.[27] There is effectively no change in the share of state bank loans in total firm loans (Column IV), firms' total loans (Column V) and their loans to assets ratio (Column VII) around the mayoral elections that are not associated with the state bank chairman position. Thus, the change in proximity between the state bank and the other club members induced by the mayoral election drives the previous findings.

4.4 Dynamics of Network Borrowing

We further investigate the issue of reverse causality and CEO entry into clubs by focusing on the dynamics of CEO entry and the share of lending within the club branch. To do so, we replace the $AFTER_{jt}$ dummy variable with five dummy variables – the event dummy, two leads and two lags – that capture the dynamics of network borrowing before and after

[27]The *absolute* difference in the size of cities whose mayor becomes head of the state bank and cities whose mayor does not become head of the state bank is small (mean inhabitants is 60,000 for cities where the mayor becomes chairman of the savings bank and 50,000 for cities where the mayor does not become chairman).

the point of entrance (Table 4). Importantly, there is no significant pre-treatment trend for firms before entry (Column I), which can be inferred from the small coefficient on the dummy variable that capture the dynamics of network borrowing before entry (0.90 percent), in contrast to the much stronger and statistically significant value on the dummy variable in the year of entry (3.88 percent). The other dummy variables that capture changes in in-group bank shares after firms' entry to the club branch are all positive and mostly statistically significant, further indicating that perturbation in social connectedness of firms and banks through entry increases the share of loans that firms take out from socially connected banks. As can be seen in Columns II and III, the dynamics of network borrowing before the formation of new branches and mayoral elections show similar patterns.

Examining the corresponding dynamics for firms' total lending and leverage around firms' entry, formation of new branches, and mayoral elections (Columns IV to IX) indicates that there are no pre-treatment trends. Joining a network not only affects the composition of financing, but it also increases the amount of financing that a firm receives.

4.5 Intensive Margin and Extensive Margin

The documented increase in the share of in-group banks' lending could occur through existing relationships (intensive margin) and/or new relationships (extensive margin). In order to provide insights into this, we shift our analysis from the firm to the loan (relationship) level and estimate the following equation:

$$log\left(loans_{ijt}\right) = \alpha_t + \alpha_i \cdot \alpha_j + \omega \cdot AFTER_{jt} + \delta \cdot INGROUP_{ij} \cdot AFTER_{jt} + \epsilon_{ijt}. \quad (8)$$

The dependent variable is the log of loans from bank i to firm j. We include quarter (α_t) and relationship ($\alpha_i \cdot \alpha_j$) fixed effects. By including relationship fixed effects, we capture the change in lending following entry for the same lending relationship over time. Note that this implies that the identification of changes in loans only comes through relationships that exist before and after the event (intensive margin). The parameter ω captures the effect of the event on out-group banks and δ quantifies the additional effect if the bank is an in-group bank. While we find no effect on the quantity of out-group loans, in-group loans go up by 26.31 percent more (Table 5, Column I). In Column II, we saturate the specification by adding firm-event fixed effects.[28] This allows us to compare changes in loans from in-group and out-group banks for the *same* firm. Thus the interaction term $INGROUP_{ij} \cdot AFTER_{jt}$

[28] This specification bears close resemblance to the lending channel specification employed in Khwaja and Mian (2008). The main exception is that the staggered nature of our events allows us an additional level of differencing.

captures the difference in borrowing of the in-group bank relative to out-group banks as a response to the entry event for the *same* firm. The *same* firm borrowing from in-group and out-group banks experiences a 30.37 percent increase in lending from the in-group bank relative to lending by the out-group banks.

In Columns III to IV, we replicate this analysis for firms that enter a club through the formation of a new branch. As can be seen, the magnitudes for this event are slightly higher. The basic specification shows an increase in lending of 37.73 percent, which increases to 56.93 percent when we saturate the specification by adding firm-event ($\alpha_j \cdot AFTER_{jt}$) fixed effects. We also replicate our analysis for the intensive margin using mayoral elections as the event (Columns V and VI). Regarding the intensive margin we find that lending by state banks increases significantly (41.47 percent) after the election as compared to outside banks. As before, we saturate this specification by adding firm-event ($\alpha_j \cdot AFTER_{jt}$) fixed effects, as this allows us to compare changes in loans from state banks and out-group banks for the *same* firm. We find that *same* firm borrowing from state and out-group banks experiences a 47.70 percent increase in lending from the state bank relative to the lending by outside banks.

Columns VII to XII investigate the extensive margin. Specifically, we examine whether entry of firms to club branches results in formation of a new lending relationship with an in-group compared to an out-group bank. We define a dummy variable that takes the value of one if a relationship is formed between a firm and a bank, and zero otherwise. For this test we treat every connection between a particular firm and each bank lending to at least one firm in the county as a potential relationship. We regress this new relationship dummy variable on the interaction of the $AFTER_{jt}$ dummy and the $INGROUP_{ij}$ dummy variable using ordinary least squares.[29] As can be seen in Column VII, we find that the probability of forming a relationship with an in-group bank is 11.44 percentage points higher after a firm joins a branch relative to an out-group bank, when compared with the period before entry.[30] The effect is even stronger for firms joining by club branch formation (14.72 percentage points, Column IX). The increase in the likelihood of forming a new relationship after the mayoral election is about 10 percentage points higher for state banks relative to out-group banks (Column XI). Adding firm-event fixed effects to compare the probability of establishing a new relationship for the *same* firm does not alter our results (Columns VIII, X and XII).

[29] The results are qualitatively and also quantitatively almost identical to running a probit model.

[30] Since the time window before and after a firm's entry to a branch or participation in branch formation is not the same, only the interaction term can be meaningfully interpreted. The cross-sectional results are not affected when we focus on windows of similar durations both before and after the event.

5 Mechanism: Return on Loans

In the previous section we documented that membership to a service club changes the structure of financing and increases the equilibrium amount of financing that a firm receives. While these results provide support for the view that social proximity mitigates informational and enforcement problems, they are also consistent with the negative side of social proximity. In this section, we attempt to disentangle these two different views, by comparing the return on loans (ROL) that banks generate on loans given to in-group firms vis-à-vis out-group loans. Since the realized ROL takes into account both the interest payments that are collected on the loans and the losses, it offers an ideal metric to identify the mechanism at work.

5.1 Methodology

To calculate the return on a loan we follow a procedure that is very similar in spirit to Khwaja and Mian (2005). Specifically, we calculate the return per eurodollar investment on a loan made by bank i to firm j as follows:

$$ROL_{ij} = \sum_{t=1}^{T} \frac{\theta_t \cdot loan_{ijt}}{\sum_{t=1}^{T} \theta_t \cdot loan_{ijt}} \cdot \left[(1 - \mathbb{1}_{\{def=1\}}) \cdot r_{ijt} + \mathbb{1}_{\{def=1\}} \cdot (\kappa_{ijt} - 1) \right], \qquad (9)$$

where $\theta_t \cdot loan_{ijt}$ is the outstanding loan from bank i to firm j at the beginning of period t discounted at the risk-free rate.[31] Accordingly, $\frac{\theta_t \cdot loan_{ijt}}{\sum_{t=1}^{T} \theta_t \cdot loan_{ijt}}$ is the fraction of the discounted loan outstanding in the current period and the total volume of outstanding loans over the lending relationship from $t = 1$ to $t = T$. The indicator function $\mathbb{1}_{\{def=1\}}$ is one if the firm defaults in the period between t and t+1, and zero otherwise. The interest rate charged by bank i for firm j is denoted by r_{ijt}; the recovery rate is denoted by κ_{ijt}. Consequently, $(\kappa_{ijt} - 1)$ is the fraction of the loan forgone by the bank in the default period. The weighting is important since loans tend to have higher outstanding amounts in the beginning, and often, if a loan defaults, a considerable fraction of the loans is already repaid. Alternatively, we measure the return on loans as the loan's internal rate of return, which yields almost identical results.

The calculation can be understood using a simple example. Consider a scenario where a bank lends 3 million euro to a firm in period t=0. The outstanding balance at t=1 is 2 million euros, and 1 million euros at t=2. Assume that the bank charges interest rates of 5 percent in all periods. Further assume that the firm defaults in period t=2 and the recovery

[31] The discounting is simply done to account for the time value of money. Since most of our analysis is cross-sectional, the discounting has no significant effect on our results.

rate is 50 percent of the outstanding balance. In such a scenario, the bank earns 5 percent on the 3 million euro in the first period and the 2 million euro in the second period, and -50 percent on the 1 million euro in the third period. The resulting ROL is calculated as $\frac{5}{6} * 0.05 + \frac{1}{6} * (-0.50) = -0.0417$. While omitted here for simplicity, in the paper we discount outstanding loans with the risk-free rate to capture the time value of money. Importantly, if a low ROL is generated on small loans and a high ROL on large loans, results could be biased by relying on the estimation of individual ROL, which weights all loans equally. To account for this, we also calculate the value-weighted ROL on the portfolio of loans granted to firms inside the bank's own club and compare this with the value-weighted ROL on portfolio of loans granted to firms in other clubs.[32]

To calculate contract-specific ROL, we require information on relationship-specific interest rates and recovery rates. Interest rates can be obtained by matching the credit register with the financial statements (see Appendix C for more details). The credit register reports the amount of quarterly write-downs in case of default at the firm-bank relationship level. These write-downs allow us to compute the recovery rate of the loan.[33]

5.2 Results

To begin with, we conduct our analysis at the relationship level and investigate how social connections affect ROL. Table 6 reports descriptive statistics of ROL and components thereof. Overall, banks earn a 6.37 percent return on loans provided to our sample firms (median: 6.32 percent). ROL are considerably higher for loans granted by banks outside the club branches (7.30 percent), compared with those granted to in-group firms (4.23 percent). For the value-weighted portfolios, the average return is slightly higher, at 6.83 percent (median: 6.42 percent). Again, a bank's return is higher on the portfolio of out-group loans (7.49 percent), compared with the portfolio of in-group loans (5.00 percent). The average recovery rate once a loan defaults is 41.81 percent, and this remains relatively similar for in-group loans (38.24 percent) and out-group loans (43.69 percent). The annual default rate of loans is 1.81 percent, with a significant difference between loans made inside the branch (4.04 percent) and those made outside the branch (0.84 percent). The average interest rate on loans is 7.47 percent and is very similar for in-group loans (7.03 percent) and out-group loans (7.71 percent). While these descriptive results suggest that banks tend to make poor lending decisions with in-group loans compared with out-group loans, we now examine dif-

[32]The calculation is similar to equation (9). The only difference is that, before weighting a bank's earnings over time, the quarterly earnings are calculated from the bank's entire portfolio of loans. This provides us with one or two observations per bank (one observation if the bank either only lends to firms in its own club or outside its own club; two if it lends to both groups of firms).

[33]Where the recovery rates are missing, we use the industry average recovery rates.

ferences in ROL in a more systematic manner to ensure that these differences are not driven by selection concerns or some other factors, such as the risk-aversion of lenders.

We statistically examine the effect of social connections on banks' ROL by estimating:

$$ROL_{ij} = \alpha_j + \beta \cdot INGROUP_{ij} + \epsilon_{ij}, \tag{10}$$

where subscript i indexes banks and j indexes firms, α_j represents firm fixed effects. The variable ROL_{ij} measures the return on a loan given to firm j by bank i according to equation (9). The indicator variable $INGROUP_{ij}$ takes the value of one if the loan was originated by an in-group bank and zero if the loan was originated by an out-group bank. The coefficient of interest β allows us to identify the mechanism that generates the increased financing for firms that are members of the club branch. To the extent that lender is risk neutral, an assumption that we will discuss in detail later, the positive view of social networks should generate a higher ROL on in-group loans, whereas a favoritism story would predict a lower ROL on these loans.

Results are reported in Table 7. In Columns I to III, we focus on a subset of loans for which we were able to obtain the interest rate charged on the loans. The observation that the interest rate charged to a given firm by an in-group bank is not substantially different from the interest rate charged by a bank outside the branch allows us to estimate our regressions using the full sample, assuming identical interest rates on in-group and out-group loans in a given year in Columns IV to VI.[34] In Column I, we look at differences in ROL from a firm's perspective. We compare the ROL generated by in-group and out-group banks for the same firm. In-group banks generate a 2.02 percentage points lower ROL to the *same* firm compared with outside banks. In Column II, we re-estimate our regression specification with bank fixed effects instead of firm fixed effects. This allows us to compare the ROL generated by the same bank on loans given to firms that are members of the same branch with those given to firms that are members of other club branches in the same city. A simple information or enforcement story would, if anything, predict a higher ROL on in-group loans. We find just the opposite. The ROL on inside loans is significantly lower, by 3.03 percentage points, relative to loans granted outside the club branch. In Column III, we calculate the return at the portfolio level. Specifically, for each bank we compute the return on a value weighted portfolio on all in-group loans as well as out-group loans. This gives us exactly two observations per bank. As can be seen, the in-group portfolio generates a 3.23 percent lower return than its out-group portfolio. Clearly, the magnitudes documented are economically

[34] It is important to note that the assumption on equal interest rates is a conservative assumption, given the results we document. If anything, the interest rates charged for in-group loans are slightly lower, even though the difference is not statistically significant.

quite large.

The results are qualitatively similar when we redo this analysis on the entire sample.[35] We find that for the same firm the ROL generated by in-group banks is 0.85 percentage points lower than the ROL generated by out-group banks (Column IV). The same bank generates a 1.75 percentage points lower ROL on in-group loans when compared with out-group loans (Column V). Finally, for value-weighted portfolios, the difference in ROL between in-group and out-group loans is 1.40 percent (Column VI).

The results in Table 7 document that loans provided to socially connected firms relative to non-connected firms generate a lower ROL. We next examine how perturbation in social proximity between firms and banks affects ROL. Formally, we estimate:

$$ROL_{ijt} = \alpha_j + \beta_1 \cdot INGROUP_{ij} + \beta_2 \cdot AFTER_{jt} + \beta_3 \cdot INGROUP_{ij} \cdot AFTER_{jt} + \epsilon_{ijt}. \quad (11)$$

To analyze changes in ROL, we split all loans for each firm-bank pair into the loans originated before and after the event. We use the same three events ($AFTER_{jt}$) (i.e., firm entry to a club branch, branch formations, mayoral elections), as discussed in the previous section.[36] We compute the ROL for the set of loans issued before and after the event separately. A negative estimate of β_3 provides evidence of a deterioration in loan performance for socially connected loans after the event, compared to the pre-event period (diff-in-diff estimate).

Results of estimating equation (11) are gathered in Table 8. After firm CEOs enter a branch, socially connected banks earn a 3.29 percentage points lower return when lending to the same firm, as compared to a non-connected bank, relative to the pre-event period (Column I). The estimate is similar (3.53 percentage points lower) once we control for bank fixed effects (Column II). When comparing the performance of value weighted loan portfolios, the effect is 4.96 percentage points lower (Column III). The effects are very similar with slightly higher magnitudes recorded for new branch formations (Columns IV to VI). The effects are much larger when we examine mayoral elections where the in-group loans generate a 9.56 percentage points lower return than out-group loans after controlling for firm fixed effects (Column VII) and 9.21 percentage points lower returns when controlling for bank fixed effects (Column VIII). On evaluating the value weighted portfolio of in-group loans, we find that the in-group loan portfolio generates a 6.72 percentage points lower returns (Column IX).

All in all, across all the specifications, we find a fairly robust result that in-group ROL is

[35] The magnitude is somewhat lower, which is consistent with the notion that the assumption of identical interest rates in a given year for the same firm is conservative.

[36] When using mayoral elections as our event, $INGROUP_{ij}$ takes the value of one if the loan was originated by the local state bank in which the mayor becomes head of the supervisory board.

significantly lower than out-group ROL. Furthermore, these effects are economically large. While such a behavior is suggestive of a rent-seeking behavior, a few comments are in order.

First, the information channel would predict that banks face higher informational constraints when they lend to firms outside their club branch than when they lend to firms within the network. Given this difference in the degree of asymmetric information, which is larger for out-group firms, it is natural to expect that out-group firms will on average have higher credit quality than in-group firms. This argument is similar to the argument in the *statistical* discrimination literature, as pioneered by Gary Becker (Becker 1957). The ROL measure is free from this critique – lending to a borrower that is known to have higher observable credit quality does not imply a higher ROL for the lender. If anything, because credit worthiness of this borrower is public information, higher competition would reduce ROL. On the contrary, the in-group banks have an informational monopoly when they lend to in-group firms, which should generate a higher ROL on loans. This is not what we find.

Second, our analysis spans the years 1993 to 2011 and this period includes the recent financial crisis. It is important to note that the German real sector has been mostly insulated from the financial crisis. Not surprisingly, our results remain qualitatively similar for restricting the analysis on the pre-crisis period.

Finally, it can be argued that such a pattern (lower in-group ROL) can be explained by lenders' risk-aversion. A risk-averse lender may trade-off lower ROL for lower risk. We find that the ROL volatility is significantly higher is for in-group loans than out-group loans (see Table 5). Furthermore, the return on these *connected* portfolio of loans in most scenarios is lower than the risk-free rate, and often the connected portfolio generates a negative ROL (Column VII and Column VIII). Clearly, such a pattern is inconsistent with the actions taken by a risk-averse lender.[37]

5.3 Unpacking ROL

What generates a lower ROL on loans made within social networks? As documented, the interest rates charged by in-group banks to in-group firms are similar to those charged by banks outside the club branches. Furthermore, the financial contracts offered by in-group banks are very similar to the ones offered by out-group banks, leading to fairly similar recovery rates.[38] When we investigate further, we find the difference in ROL comes from the

[37]In fact, such a pattern cannot be rationalized from the perspective of an ambiguity-averse lender characterized by a set of preferences employed to explain departures from the expected utility framework, such as the Ellsberg paradox.

[38]If anything, the recovery rates for in-group lending relationships are lower compared to out-group lending relationships (see Table 6).

excess continuation of distressed firms by in-group banks. In other words, the lower ROL is an outcome of the *soft budget constraint* problem (Kornai 1986). This effect can be seen from Panel A of Figure 3, which plots the share of in-group banks in total firm loans as a firm approaches bankruptcy. The share of in-group banks rises as firms move closer to bankruptcy. This is particularly dramatic if the in-group bank also happens to be the firm's main lender. As can be seen, this pattern is peculiar to loans given to in-group firms. In the population of firms in the sample region, one does not find this pattern for the firms' main lenders. Thus, in-group banks continue to finance firms which are members of the club branch much longer or are reluctant to liquidate inefficient firms which are members of the club. This soft budget constraint problem generates the lower ROL on in-group loans and points to a *favoritism* or *rent-seeking* story rather than an *informational* or *enforcement* story, since continuation on better information should generate higher returns.

6 Exploring Heterogeneity Across Banks

It is often argued that private bankers have stronger incentives compared with state bankers and that these incentives may keep favoritism and rent-seeking in check (Bandiera, Barankay, and Rasul 2009). By comparing the behavior of state and private banks when operating in the same environment (service clubs), we are also able to shed some light on the efficacy of these organizational forms.

6.1 Structure of Financing

To examine if the degree of preferential treatment varies across these two bank groups, we modify our specification (7) to compare the differential effect of firm entry on state and private banks in the same club branch. As well as classifying banks as being either inside or outside the branch, we now also classify them by their ownership, that is, whether they are state- or privately-owned banks.

In a regression framework, this is achieved by estimating:

$$\frac{q_{ijt}}{\sum_i q_{ijt}} = \alpha_t + \alpha_j + \delta_1 \cdot AFTER_{jt} + \delta_2 \cdot AFTER_{jt} \cdot STATE_k + \epsilon_{ijt}. \tag{12}$$

As before, i indexes banks, j indexes firms, k indexes club branches, and t indexes time in quarters. The dummy variable $STATE_k$ is one for branches with a state bank and zero for branches with a private banks.

In Table 9, we investigate the differential effect across different groups of banks. The results in Columns I to III indicate that the increase in borrowing from in-group banks is higher for firms entering club branches with only a state bank as a member (10.82 percentage points), relative to firms entering a branch with only a private bank as a member (7.63 percentage points, shown in Column II) or a cooperative bank (4.72 percentage points, shown in Column III). The differential effect is statistically significant; 6.45 percentage points higher for state banks (Column IV). Cooperatives are organized in a very similar manner as the local state banks sharing the same regional structure. While local savings banks are state-owned, cooperatives are owned by their shareholders. Thus, differences between those two groups of banks originate from differences in the banks' incentive and governance structure.

To alleviate concerns that the differences in the increase in in-group bank lending shares could be driven by differences in firm quality across club branches, we examine differences in state and private/cooperative banks for the *same* firm. This is possible since some branches have a state and a private banker among its members. For firms in those branches we can compare changes, quarter by quarter, in in-group loans for private and state banks. To avoid double counting (an increase in the share of lending from the state in-group bank leads to a decrease of the private in-group bank) we replace the dependent variable by the share of the state in-group bank in total loans of both in-group banks (state plus private bank loans). Even with this stringent specification, one observes that the lending shares of the state banks, relative to all bank loans within club branches, increase by 14.26 percentage points (Column V). Finally, we exploit the fact that, in some branches, one of the members is the mayor of the respective city in which the branch is located, and simultaneously heads the board of the local state bank. We expect that, in branches in which those mayors are members and additionally have a state banker among its members, the incentives to provide additional loans to in-group members are even stronger. Indeed, branches with a state banker see a 6.26 percentage points increase in the share of loans made within the branch after firms enter, whereas there is an additional increase of 12.83 percentage points for branches with a mayor among members (Column VI).

6.2 Return on Loans

In the previous section, we documented a large increase in financing provided by state banks. While the increase in supply by state banks is consistent with state bankers being more vulnerable to collusion due to blunter incentives (particularly when the main supervisor of the state bank, the mayor, is also involved in the branch), it is also consistent with an informational or enforcement story. One could argue that state banks have poor screening and/or monitoring technologies, so the marginal benefit of proximity is much higher for them.

Notably, however, this would not explain why the effect is stronger when the head of the state bank board is also among the club members. To investigate the underlying mechanism further, we classify banks into three different categories: state banks, private banks, and cooperatives, and compare the ROL generated by different lenders.

We find that, while both private banks and cooperatives generate an only slightly lower ROL on in-group loans relative to out-group loans (1.87 and 0.26 percentage points, respectively, shown in Table 10, Columns II and III), the state banks' performance turns out to be quite dismal with a difference between ROL on in-group and out-group loans of 5.64 percent (Column I). The state banks generate an almost 4 percentage points lower ROL on in-group loans, compared with out-group loans, relative to private banks (Column IV). The difference in ROL between state-owned savings banks and private banks suggests that incentives play an important role in mitigating ill effects of social proximity on lending. Comparing cooperatives and savings banks is particularly striking as both banks are comparable in size, reach and have a similar organizational structure. What sets them apart is their ownership and governance structure. While savings banks are owned by the local government, cooperatives are owned by their members. The joint ownership structure of cooperatives keeps a check on the behavior of bankers.[39]

We interpret our state vs. private banks and state vs. cooperatives results as suggesting that state banks engage more in *crony* lending than private banks or cooperatives. Since the cooperatives present a good control group, these results highlight the important role that incentives play in mitigating this effect. Our results on state vs. private are not driven by differences in objective functions between state and private banks. While it is true in the data that state banks generate a lower ROL on the loans that they originate, compared to private banks, in our tests we compare the ROL generated by a state bank inside the network to the ROL generated by the same state bank in other club branches in the same city. This within-comparison controls for any differences in objective functions between state and private banks.

7 Additional Results

The broad array of results provides support for the view that lenders tend to favor firms with which they share social proximity. In this section, we provide additional results to

[39]The lower ROL of state banks comes from the soft budget constraint problem it faces. The soft budget constraint issue is visually apparent from Panel B of Figure 3. While for private banks in branches the increase in their share in total firm loans, before firms default where they are a main lender, is a relatively mild 4 percentage points within the last four years before the default quarter (gray line), the increase is significant for state banks at 16 percentage points (black line).

strengthen this claim.

7.1 Cross-selling by Banks and Transaction Costs

In addition to granting loans, banks also provide a significant amount of transaction-related services. While banks may earn a lower ROL made within branches, they might make up for it by earning higher returns from other services they provide to firms in the network. Furthermore, the firms, through referrals, may generate other business for the bank, which more than makes up for the lower ROL on a loan made within the club branch (Santikian 2011). While this proposition may appear plausible at first, it is unlikely for a number of reasons. First, as has been noted earlier, most of the drop in ROL for loans made within networks comes from state banks. The state banks, however, offer a very limited set of services to the borrower; most transaction-related services are offered by the *Landesbanken*.

Second, we can directly test whether banks that earn lower ROL on in-group loans as compared to out-group loans make higher overall profits. Since in-group loans represent only a fraction of the total loans granted by the banks, it might be the case that, while banks lose money on in-group loans, club membership generates more business for the bank and overall this increases the banks' profitability.

We test whether banks that earn lower ROL on in-group loans, compared out-group loans, make up for this shortfall elsewhere. To examine this, we investigate how this difference between the inside ROL vs. outside ROL for the same bank correlates with the overall returns for this bank. We find that banks that engage in more preferential lending in their club branches, also earn significantly lower returns for their shareholders.[40] Specifically, going from the lowest decile of wedge to the highest decile results in approximately a one percentage point lower ROE for the bank. This is substantial, since this represents roughly 19 percent of their returns as the average ROE of state banks is about 5.4 percent. Thus, banks that have a bigger drop in-group ROL, also generate lower returns in general.

These findings also rule out potential explanations based on lower transaction costs of in-group loans. It can be argued that the lenders have to expend less effort in screening and monitoring borrowers lowering the cost of providing loans inside the club branch. Since the ROL calculation does not take this into account, it is likely to understate the ROL generated on in-group loans. As we have shown, banks that have a higher wedge between the in-group ROL and the out-group ROL also generate lower returns on their loan portfolios. More importantly, as already documented in Section 5.2, banks often generate negative ROL

[40] This analysis already controls for bankers' ability since the independent variable is the difference between the ROL that the bank earns on their in-group loans vis-à-vis ROL they earn on out-group loans.

on connected portfolios. This would not be the case if they were actually saving on the transaction costs.

7.2 Deployment of Funds

Our results show that social proximity increases the total amount of funds that a firm receives from the banks. This raises a natural question: What do firms do with these funds? To investigate the deployment of funds, we substitute the dependent variable of specification (7) with investment to assets, where investment is measured by capital expenditure. Since we can only obtain balance sheet information for a subset of firms from the USTAN database, the sample is limited to 686 firms, compared with the 1,091 firms in the full sample. We find that, while entry to a club branch leads to increased financing, it does not result in an increase in firms' investment. The effect of club membership on capital expenditure is statistically indistinguishable from zero (Table 11, Column I). When we investigate where the additional funds are channeled to, we find that firms use the extra money from the in-group banks to increase their liquidity position and pay out more funds to the owners. Results in Columns II and III show that firms increase cash holdings to assets by 2.71 percentage points and increase the fraction of profits that they pay out to shareholders by 2.89 percentage points per year. Since most of the sample firms are SMEs, the CEO is often the owner of the firm. Thus, paying out dividends to shareholders typically means that CEOs pay out funds into their own pockets.

The increase in payout ratio, rather than using the funds for additional investment, leads to a change in firms' leverage. After entry to a club branch, firms' total loans to assets ratio increases by 6.17 percentage points (Column IV). This also confirms that the increase in bank loans that we observe is not explained by asset growth of firms after joining the club, but rather depicts a change in firms' financial structure. Moreover, we find that firms' profitability is virtually unaffected by entry to a club branch, further reducing concerns about club membership being related to changes in firm quality (Column V). Finally, we examine whether firms' costs of capital are significantly different after entering the network. We find that the average fraction of interest expenditures by debt decreases by 0.40 percentage points; however, this decrease is statistically insignificant (Column VI).

8 Conclusion

It is often believed that social proximity mitigates informational and enforcement problems that stifle lending. However, there is another possibility: proximity may result in collusion and rent-seeking. Favorable treatment might be driven by social pressure, as bank officials may face social sanctions for denying favorable treatment to members of the group. In addition, granting favors to friends may generate private benefits for the banker. Given these agency conflicts, the efficiency implications of social proximity are, a priori, not obvious, and despite the different theoretical arguments about the efficiency implications of social networks, empirical evidence on this question is rather scant.

In this paper, we examine how social proximity between lenders and firms affects the allocation of bank credit. Using a unique detailed micro-level dataset, we find that lenders not only grant more credit to in-group firms, but these loans also produce a much lower ROL for the bank. Similarly, using firm fixed effects and doing a within-firm comparison, we find that in-group banks generate a lower ROL than out-group banks. All in all, our results paint a picture of preferential treatment accorded to firms by in-group banks, with stronger results noted for state banks.

We would like to conclude with a few final remarks. It is important to note that, while we uncover some ill effects of social proximity, we do not make any efficiency claims here. It has been well noted by scholars that, in some situations, bribes and corruption can improve welfare. The theory of second-best (Lipsey and Lancaster 1956) cautions us against any welfare claims. That being said, our analysis provides some evidence that is consistent with the inefficient allocation of resources. From the perspective of the bank, the allocation of these funds is not efficient. Furthermore, we find that the extra financing that firms receive is not used for new investments, but rather to pay out funds to the owners.

It should be noted that, although the focus of this paper is on the effect of social proximity on lending, this paper also contributes to a larger literature on relationship banking (Petersen and Rajan 1995). By increasing proximity between lenders and borrowers, relationship-lending is argued to play an important role, reducing informational frictions that adversely affect lending. What we have shown in this paper is that proximity can be double-edged sword. While proximity between the lender and borrower can be useful in reducing informational problems, too much of proximity may have its unintended consequences. Importantly, the comparison of the effects of proximity on lending in state and private banks suggests that with proper incentives in place the negative effects of proximity can be mitigated. The paper thus highlights the importance of aligning incentives to harness the benefit of proximity.

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Table 1: Descriptive Statistics

Panel A: Network Data				
No. of club branches	211			
No. of CEOs within club branches	1,091			
No. of bankruptcies by CEOs	141			
No. of club branch entries by CEOs	474			
No. of club branch formations	43			
No. of banks	542			
No. of in-group banks	352			
No. of private in-group banks	173			
No. of public in-group banks	138			
No. of cooperative in-group banks	41			
No. of club members being elected mayor and becoming chairman of local state bank	20			
No. of club members being elected mayor not becoming chairman of local state bank	16			
Panel B: Loan & Firm Level Data				
	Mean	Median	Std.	Obs.
Loan Data (based on 1,091 firms):				
Loan amount - loan level (thousand euro)	6,433	4,000	6,100	54,123
Loan amount - firm level (thousand euro)	13,440	5,555	24,247	25,908
Lending relationships per firm (sample period)	3.72	2.00	4.50	1,091
Firm Data (based on 686 firms):				
Total assets (thousand euro)				
Sample	92,102	14,165	249,376	5,474
Population	93,367	9,677	1,261,264	200,531
Debt/assets				
Sample	0.2525	0.2235	0.1944	5,474
Population	0.2464	0.2038	0.2104	200531
ROA				
Sample	0.0621	0.0509	0.0952	5,474
Population	0.0691	0.0550	0.0985	200,531
Cash/assets				
Sample	0.0629	0.0241	0.0891	5,474
Population	0.0662	0.0206	0.1228	200,531
Borrowing costs				
Sample	0.0811	0.0707	0.0504	5,474
Population	0.0911	0.0560	0.1084	200,531
Panel C: Bank Lending Shares				
Lending share in bank's club branch	0.2508			
Lending share in other club branches (same city)	0.0673			
Difference	0.1835			
t-statistic	[10.56]			

Panel A depicts the data on social club branches: the number of club branches and CEOs in those branches, number of firms defaulting on a loan or filing for bankruptcy, number of firms joining a club branch during the sample period and number of branch formations, the total number of banks in the sample, number of bankers whose director is a club member and ownership of those banks, and the number of club members elected as mayors. The top part of Panel B provides information on loan data from the Bundesbank credit register, the bottom part shows balance sheet data for sample firms and the population of non-sample firms from the same geographic area from the Bundesbank USTAN database. Panel C depicts banks' lending share in club branches where they are members (a bank's loans to all firms in a club branch divided by all loans to those firms), in club branches where the bank director is not a member but are located in the same city, and the difference between both numbers including the significance level.

Table 2: Club Branch Entry by Firms and Branch Formations

	I	II	III	IV	V	VI
Dep. Var.:	$\left(\frac{In-group\ bank\ loans}{Total\ firm\ loans}\right)_{jt}$		$log\,(Debt)_{jt}$		$\left(\frac{Debt}{Assets}\right)_{jt}$	
	Entry	Formation	Entry	Formation	Entry	Formation
$AFTER_{jt}$	0.1003***	0.1253***	0.3222***	0.3806**	0.0617***	0.0673***
	[7.12]	[5.22]	[3.40]	[2.18]	[2.67]	[2.64]
Quarter FE	yes	yes	yes	yes	no	no
Year FE	no	no	no	no	yes	yes
Firm FE	yes	yes	yes	yes	yes	yes
Clustered SE	club branch	club branch	club branch	club branch	club branch	club branch
Observations	25908	19320	25908	19320	4364	3017
R-squared	0.538	0.525	0.734	0.727	0.762	0.749

The sample for this table comprises all 1091 firms from our sample. The dependent variable in columns I and II is firm j's loans from its in-group bank divided by firm j's total loans. In columns III and IV it is the log of firm j's total loans, in columns V and VI it is firm j's loans to assets ratio. The variable $AFTER_{jt}$ is a dummy variable taking the value of one from the year when firm j enters a club branch, and zero otherwise in columns labeled 'Entry'. It takes the value of one from the year when firm j joins a club branch through formation and zero otherwise in columns labeled 'Formation'. For columns V and VI the sample comprises the firms for which balance sheet data is available and data is annual. Information on fixed effect is provided at the bottom of the table. Standard errors correct for clustering at the club branch level. We report t-statistics in parentheses.

Table 3: Mayoral Elections

	I	II	III	IV	V	VI
	Mayoral Elections + Supervisory Board			Mayoral Elections + No Supervisory Board		
Dep. Var.:	$\left(\frac{State\ bank\ loans}{Total\ firm\ loans}\right)_{jt}$	$log(Debt)_{jt}$	$\left(\frac{Debt}{Assets}\right)_{jt}$	$\left(\frac{State\ bank\ loans}{Total\ firm\ loans}\right)_{jt}$	$log(Debt)_{jt}$	$\left(\frac{Debt}{Assets}\right)_{jt}$
$AFTER_{jt}$	0.0563**	0.2330**	0.0497*	-0.0443	-0.0131	-0.0135
	[2.45]	[2.20]	[1.86]	[1.28]	[0.09]	[0.94]
Quarter FE	yes	yes	no	yes	yes	no
Year FE	no	no	yes	no	no	yes
Firm FE	yes	yes	yes	yes	yes	yes
Clustered SE	club branch	club branch	club branch	club branch	club branch	club branch
Observations	25908	25908	4364	25908	25908	4364
R-squared	0.532	0.732	0.760	0.532	0.732	0.759

The sample in this table comprises all 1091 sample firms. The $AFTER_{jt}$ dummy takes the value of one from the year when an existing member is newly elected as a mayor and zero otherwise. In columns I to III only elections after which the mayor also automatically becomes the head of the local state bank's supervisory board are considered, in columns IV to VI only elections after which the mayor does not become head of the local state bank's board are considered. The dependent variable in columns I and IV is firm j's loans from the state bank divided by firm j's total loans, in columns II, and V it is the log of firm j's total loans, in columns III and VI it is firm j's total loans scaled by assets. In columns III and VI the sample is reduced to the 686 firms for which balance sheet data is available and the data is annual. The bottom of the table provides information on the fixed effects included. Standard errors are corrected for clustering at the club branch level. We report t-statistics in parentheses.

Table 4: Perturbation in Social Connectedness - Dynamics

	I	II	III	IV	V	VI	VII	VIII	IX
Dep. Var.:	$\left(\frac{In-group\ bank\ loans}{Total\ firm\ loans}\right)_{jt}$			$log(Debt)_{jt}$			$\left(\frac{Debt}{Assets}\right)_{jt}$		
	Entry	Formation	Mayoral Election	Entry	Formation	Mayoral Election	Entry	Formation	Mayoral Election
$Before_2$	0.0185	0.0262	0.0155	0.0680	0.0910	-0.1116	0.0114	-0.0296*	0.0218
	[1.46]	[1.12]	[0.50]	[0.90]	[0.49]	[1.26]	[0.42]	[1.74]	[0.51]
$Before_1$	0.0090	-0.0168	0.0169	0.0633	0.1246	0.0823	-0.0065	-0.0407	-0.0111
	[1.25]	[1.02]	[0.80]	[1.13]	[1.41]	[0.65]	[0.31]	[1.18]	[1.48]
$Before_0$	0.0388***	0.0503***	-0.0060	0.1412**	0.1823*	0.0409	0.0443***	0.0759*	-0.0055
	[4.73]	[2.97]	[1.34]	[2.49]	[1.95]	[0.31]	[2.58]	[1.90]	[0.32]
$After_1$	0.0104	0.0313**	0.0645*	0.0819**	0.0586	0.1941**	0.0015	0.0269	0.0568*
	[1.49]	[1.99]	[1.80]	[2.40]	[0.74]	[1.98]	[0.11]	[1.23]	[1.83]
$After_2$	0.0487***	0.0571**	0.0114	0.0457	0.0441	0.0323	0.0207	0.0075	-0.0065
	[3.87]	[2.48]	[0.76]	[0.89]	[0.52]	[0.29]	[1.42]	[0.44]	[0.92]
Quarter FE	yes	yes	yes	yes	yes	yes	no	no	no
Year FE	no	no	no	no	no	no	yes	yes	yes
Firm FE	yes	yes	yes	yes	yes	yes	yes	yes	yes
Clustered SE	club branch	club branch	club branch	club branch	club branch	club branch	club branch	club branch	club branch
Observations	25908	19320	25908	25908	19320	25908	4364	3017	4364
R-squared	0.539	0.526	0.532	0.735	0.728	0.732	0.762	0.750	0.760

The sample for this table comprises all 1091 firms from our sample. The dependent variable in columns I to III is firm j's loans from its in-group bank(s) divided by firm j's total loans. In column III the in-group bank is the state bank in which the mayor becomes head of the supervisory board through her election. In columns IV to VI the dependent variable is the log of firm j's total loans, in columns VII to IX it is the ratio of firm j's loans to assets. Data is quarterly in columns I to VI an annual in columns VII and IX. In columns labeled “Entry” the dummy variables are defined as follows: The dummy variable $Before_2$ ($Before_1$) takes the value of one from two years (one year) before the firm enters a club branch and zero otherwise, $Before_0$ takes the value of one from the year when the firm enter a branch, $After_1$ ($After_2$) takes the value of one from the year (two years) after the firm enters a branch. In columns labeled “Formation” and “Mayoral Election” the five dummy variables are defined the same way with respect to the year when firm j participates in a new club branch formation or an existing member is elected as a mayor and becomes head of the supervisory board of the local state bank. For columns VII to IX the sample comprises the firms for which balance sheet data is available. Each regression includes time and firm fixed effects. Standard errors are corrected for clustering at the club branch level. We report t-statistics in parentheses.

Table 5: Bank Lending and Firm Borrowing Channel

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
	Intensive Margin						Extensive Margin					
Dep. var.:	$log(Loans)_{ijt}$						$New\ relationship_{ijt}$					
	Entry		Formation		Mayoral Election		Entry		Formation		Mayoral Election	
$AFTER_{jt}$	0.0612		-0.0151		0.0349		0.0124***		0.0083***		-0.0115**	
	[0.83]		[0.15]		[0.26]		[3.46]		[3.08]		[2.42]	
$INGROUP_{ij}$							0.0709***	0.0709***	0.0691***	0.0713***	0.0151	0.159
							[5.94]	[5.90]	[3.42]	[3.49]	[0.57]	[0.59]
$AFTER_{jt} * INGROUP_{ij}$	0.2631**	0.3037*	0.3773**	0.5693*	0.4147***	0.4770***	0.1144***	0.1143***	0.1472***	0.1428***	0.1076*	0.1059*
	[2.26]	[1.85]	[2.20]	[1.94]	[2.93]	[3.10]	[4.99]	[4.88]	[3.86]	[3.69]	[1.92]	[1.91]
Quarter FE	yes	yes	yes	yes	yes	yes	no	no	no	no	no	no
Firm FE	no	no	no	no	no	no	yes	yes	yes	yes	yes	yes
Firm-Bank FE	yes	yes	yes	yes	yes	yes	no	no	no	no	no	no
Firm-Event FE	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes
Clustered SE	club branch	club branch	club branch	club branch	club branch	club branch	club branch	club branch	club branch	club branch	club branch	club branch
Observations	54123	54123	39145	39145	54123	54123	60334	60334	21176	21176	11796	11796
R-squared	0.737	0.744	0.716	0.761	0.735	0.736	0.098	0.151	0.081	0.118	0.051	0.080

The sample for this table comprises all 1091 firms from our sample. The dependent variable in columns I to VI is the log of bank i's loans to firm j. In columns VII to XII the dependent variable is replaced by a dummy variable that is one if bank i and firm j start a new lending relationship and zero otherwise. In columns VII to XII, there are two observations per firm-bank relationship, one for the period before the event and for the period after the event. Accordingly, the samples for this test are restricted to firms that are subject to the respective event during the sample period. In this test for each firm j every bank that provides a loan to at least one firm in the city in which firm j's club is located is considered as a potential lending relationship for firm j. The dummy variable $AFTER_{jt}$ takes the value of one from the year when firm j joins a club branch and zero otherwise in columns labeled "Entry", it takes the value of one from the year when firm j joins a branch through formation in columns labeled "Formation", and it takes the value of one after an existing club branch member is elected as mayor zero otherwise in columns labeled "Mayoral Election". The dummy variable $In\ group\ bank_{ij}$ takes the value of one if bank i is in-group bank to firm j, and zero otherwise. In columns labeled "Mayoral Election" the in-group bank is the local state bank in which the mayor becomes the head of the supervisory board through her election. The bottom of the table depicts information on the fixed effects included. Standard errors are corrected for clustering at the club branch level. We report t-statistics in parentheses.

Table 6: Returns on Loans - Data

	Mean	Median	Std.	Obs.
Return on loan (equal weighted) :				
All loans	0.0637	0.0632	0.0714	681
in-group loans	0.0423	0.0585	0.0995	206
out-group loans	0.0730	0.0657	0.0524	475
Return on loan portfolio (value weighted) :				
All loans	0.0683	0.0642	0.0563	339
in-group loans	0.0500	0.0594	0.0671	89
out-group loans	0.0749	0.0695	0.0505	250
Recovery rates :				
All loans	0.4181	0.3612	0.2826	126
in-group loans	0.3824	0.3494	0.2795	51
out-group loans	0.4369	0.4040	0.2846	75
Default rates :				
All loans	0.0181	0.0000	0.0911	681
in-group loans	0.0404	0.0000	0.1511	206
out-group loans	0.0084	0.0000	0.0414	475
Interest rates (contract level) :				
All loans	0.0747	0.0679	0.0474	6197
in-group loans	0.0703	0.0657	0.0445	2191
out-group loans	0.0771	0.0693	0.0487	4006

This table reports descriptive statistics relevant for the computation of banks' returns on loans. This comprises banks' return on individual lending relationships, recovery rates in case of loan defaults (available from 2008-2011), loan default rates, contract-level interest rates, and the return on value-weighted loan portfolios.

Table 7: Returns on Loans - Results

	I	II	III	IV	V	VI
	Contract-Level Interest Rates			Firm-Level Interest Rates		
Dep. Var.: ROL_{ij}	Relationship		Portfolio	Relationship		Portfolio
$INGROUP_{ij}$	-0.0202**	-0.0303***	-0.0323***	-0.0085**	-0.0175**	-0.0140**
	[2.24]	[3.24]	[3.44]	[2.37]	[2.02]	[2.28]
Constant	1.0687***	1.0718***	1.0745***	1.0729***	1.0751***	1.0755***
	[391.27]	[315.03]	[266.57]	[1302.85]	[648.54]	[522.38]
Firm FE	yes	no	no	yes	no	no
Bank FE	no	yes	yes	no	yes	yes
Clustered SE	club branch	club branch	club branch	club branch	club branch	club branch
Observations	681	681	339	2082	2082	755
R-squared	0.731	0.376	0.749	0.789	0.183	0.802

This table summarizes the results for banks' returns on loans. In columns I to III the sample is limited to the 681 lending relationships with contract-level interest rates, the sample in columns IV to VI consists of the 2082 bank-firm relationships for which loan and balance sheet data is available assuming interest rates to be the equal for the same firm in the same year for all contracts. Columns I, II, IV, and V display results for individual lending relationships, columns III and VI for value weighted loan portfolios. For each bank we compute the return on a value weighted portfolio of all loans within their club branch and loans to firms outside their club branch separately. Thus, there are at most two observations per bank. The dependent variable ROL_{ij} is bank i's payoff per one dollar investment over the life time of the lending relationship with firm j (or loan portfolio in columns III and VI). Details on the computation of banks' returns on individual loans and loan portfolios can be found in the text. The dummy variable $INGROUP_{ij}$ is one if bank i and firm j are connected through membership in the same club branch, and zero otherwise. The bottom of the table provides information about fixed effects and level of clustering. We report t-statistics in parentheses.

Table 8: Returns on Loans around Events

	I	II	III	IV	V	VI	VII	VIII	IX
		Entry			Formation			Mayoral Election	
Dep. var.: ROL_{ij}	Relationship		Portfolio	Relationship		Portfolio	Relationship		Portfolio
$AFTER_{jt}$	-0.0068	-0.0123	-0.0187*	0.0086	0.0004	-0.0107	-0.0047	-0.0049	0.0001
	[1.08]	[1.52]	[1.97]	[0.77]	[0.03]	[0.69]	[0.63]	[0.46]	[0.00]
$INGROUP_{ij}$	-0.0006	-0.0159	-0.006	-0.0045	0.0147	0.0053	0.0127	0.0129	-0.0162
	[0.06]	[1.23]	[0.41]	[0.29]	[0.85]	[0.23]	[0.63]	[0.49]	[0.55]
$AFTER_{jt} * INGROUP_{ij}$	-0.0329***	-0.0353**	-0.0496***	-0.0393***	-0.0475**	-0.0613**	-0.0956***	-0.0921***	-0.0672**
	[2.88]	[2.46]	[2.95]	[2.27]	[2.62]	[2.45]	[4.63]	[3.10]	[2.25]
$Constant$	1.0725***	1.0810***	1.0892***	1.0784***	1.0673***	1.0814***	1.0678***	1.0674***	1.0689***
	195.12	154.36	137.69	108.77	98.97	78.82	216.24	156.80	144.56
Fixed Effects	firm	bank	bank	firm	bank	bank	firm	bank	bank
Clustered SE	club branch	club branch	club branch	club branch	club branch	club branch	club branch	club branch	club branch
Observations	411	411	304	174	174	141	232	232	130
R-squared	0.736	0.623	0.672	0.668	0.708	0.710	0.722	0.542	0.717

This table summarizes the results for banks' returns on loans for which it is possible to extract contract-level interest rates (see Appendix C) for firms that are affected by the respective event specified at the top of the table (entry, formations, mayoral elections). For each firm-bank pair we split the loans in two groups: those originated before the event and those originated after the event and compute the return per one dollar investment separately for both groups. Columns I, II, IV, V, VII, and VIII display the results for individual lending relationships, columns III, VI, and IX for value weighted loan portfolios. For the portfolio tests we compute the return on a value weighted portfolio of all loans within their club branch and loans to firms from outside their club branch separately for each bank. Thus, there are at most two observations per bank. The dependent variable ROL_{ij} is bank i's payoff per one dollar investment over the life time of the lending relationship with firm j (or the loan portfolio in columns III and VI). Detailed explanation of the computation of banks' returns on individual loans and loan portfolios can be found in the text. The dummy variable $INGROUP_{ij}$ is one if bank i and firm j are connected through membership in the same club, and zero otherwise. In columns VII to IX the 'in-group' bank is the local state bank in which the newly elected mayor becomes head of the supervisory board through her election. The bottom of the table provides information about fixed effects and level of clustering. We report t-statistics in parentheses.

Table 9: Lending Shares of In-group Banks - By Bank Ownership

	I	II	III	IV	V	VI
Dep. Var.:		$\left(\frac{In-group\ bank\ loans}{Total\ firm\ loans}\right)_{jt}$			$\left(\frac{State\ in-group\ bank\ loans}{Total\ in-group\ bank\ loans}\right)_{jt}$	$\left(\frac{In-group\ bank\ loans}{Total\ firm\ loans}\right)_{jt}$
	State	Private	Cooperatives	One bank	Multiple banks	State
$AFTER_{jt}$	0.1082***	0.0763***	0.0472	0.0592***	0.1426*	0.0626**
	[3.63]	[4.66]	[1.28]	[4.56]	[1.94]	[2.20]
$AFTER_{jt} * STATE_k$				0.0645**		
				[2.34]		
$AFTER_{jt} * MAYOR_k$						0.1283***
						[2.89]
Quarter FE	yes	yes	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes	yes	yes
Clustered SE	club branch	club branch	club branch	club branch	club branch	club branch
Observations	4214	6936	866	12016	12696	4214
R-squared	0.511	0.445	0.363	0.473	0.662	0.554

For the dependent variable in this table we divide firm j's loans from its in-group bank by firm j's total loans in columns I to IV and VI. The sample in columns I to IV is limited to club branches with only one in-group bank, which is either a state bank (column I), a private bank (column II) or a cooperative bank (column III). The sample in column V comprises all club branches that have two in-group banks one of which is a state in-group bank and one of which is a private or cooperative in-group bank. The dependent variable is replaced by firm j's state in-group bank loans divided by firm j's total loans from all in-group banks. The variable $AFTER_{jt}$ is a dummy variable taking the value of one from the year when firm j enters a club branch, and zero otherwise. The $STATE_k$ dummy takes the value of one for firms associated to a club branch with a state banker and zero for firms associated with branch that have no state banker among its members. For a subsample of branches the mayor of the respective city is member of the branch (and simultaneously heading the board of the state bank). For those branches the $MAYOR_k$ variable takes the value of one, whereas for branches with no mayor it takes the value of zero. The sample in column VI is restricted to branches in which the in-group bank is a state bank. Each regression includes quarter and firm fixed effects. Standard errors are corrected for clustering at the club branch level. We report t-statistics in parentheses.

Table 10: Returns on Loans - By Bank Ownership

Dep. Var.: ROL_{ip}	I State	II Private	III Cooperatives	IV All
$INGROUP_{ij}$	-0.0564***	-0.0187**	-0.0026	-0.0166
	[2.88]	[2.02]	[0.16]	[1.40]
$INGROUP_{ij} * STATE_i$				-0.0398**
				[2.11]
$Constant$	1.0680***	1.0744***	1.0866***	1.0745***
	[111.21]	[267.68]	[237.13]	[271.62]
Bank FE	yes	yes	yes	yes
Clustered SE	club branch	club branch	club branch	club branch
Observations	105	175	59	339
R-squared	0.671	0.744	0.982	0.761

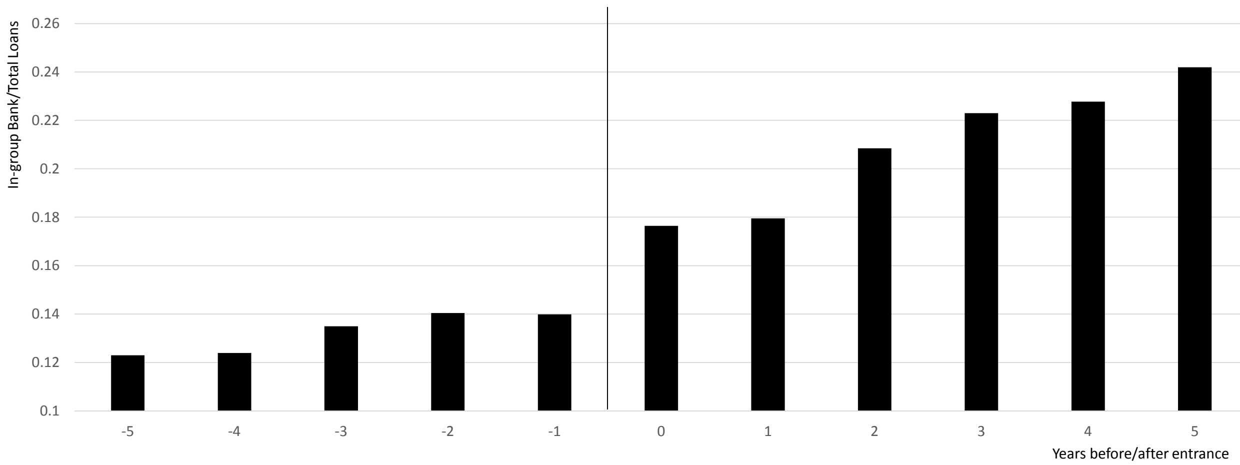
This table summarizes the estimation results for portfolio-level returns on loans for different bank groups. The sample comprises the firms for which contract-level interest rates can be computed (see Appendix C). We compute the return on a value-weighted portfolio separately for loans to firms within the club branch and firms in other branches. Thus for each bank there are at most two observations. The dependent variable ROL_{ip} is bank i's payoff per one dollar investment over the life time of portfolio p. A detailed explanation of the computation of portfolio-level returns on loans can be found in the text. The dummy variable $INGROUP_{ij}$ is one if bank i and the firms in portfolio p are connected through membership in the same club branch, and zero otherwise. The $STATE_i$ dummy takes the value of one if bank i is a state bank, and zero otherwise. All regressions include bank fixed effects. Standard errors are corrected for clustering at the club branch level. We report t-statistics in parentheses.

Table 11: Firms' Usage of Capital

Dep. Var.:	I $\left(\frac{Investments}{Assets}\right)_{jt}$	II $\left(\frac{Cash}{Assets}\right)_{jt}$	III $\left(\frac{Payouts}{Assets}\right)_{jt}$	IV $\left(\frac{Debt}{Assets}\right)_{jt}$	V $\left(\frac{EBIT}{Assets}\right)_{jt}$	VI $\left(\frac{Interest\ exp.}{Debt}\right)_{jt}$
$AFTER_{jt}$	-0.0063	0.0271***	0.0289***	0.0617***	0.0018	-0.0040
	[0.65]	[2.71]	[2.83]	[2.67]	[0.28]	[1.33]
Year FE	yes	yes	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes	yes	yes
Clustered SE	club branch	club branch	club branch	club branch	club branch	club branch
Observations	4751	5474	4751	4364	5474	5094
R-squared	0.402	0.698	0.379	0.762	0.558	0.404

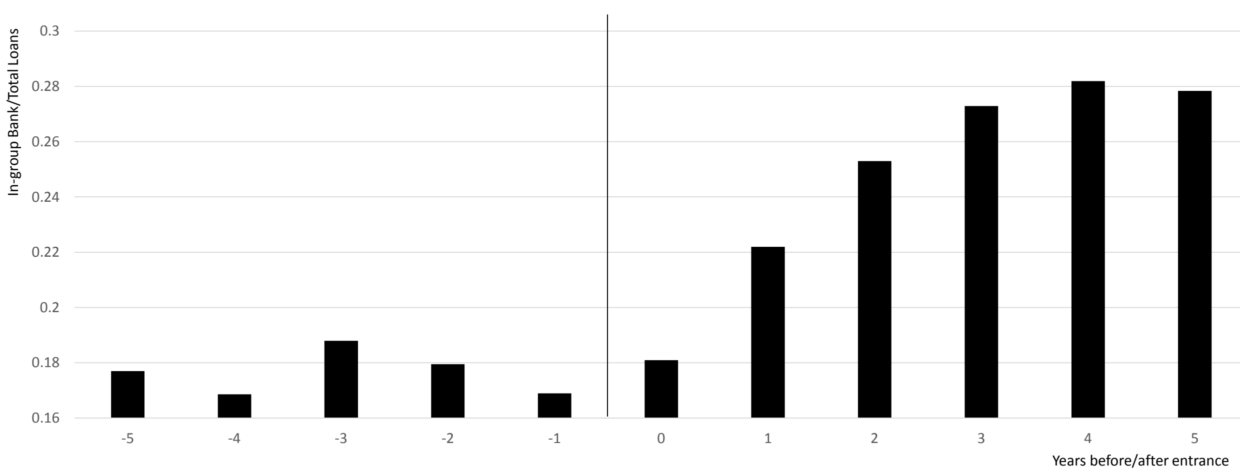
This table depicts changes in firm-level variables for the subsample of 686 firms for which balance sheet data from the USTAN database is available. Information on the dependent variable of each regression is provided at the top of the table. The dummy variable $AFTER_{jt}$ takes the value of one from the year when firm j joins a club branch and zero otherwise. All regressions include year and firm fixed effects. Standard errors are corrected for clustering at the club branch level. We report t-statistics in parentheses.

Figure 1: **In-group Bank Share in Total Firm Lending Around Entry to a Branch**



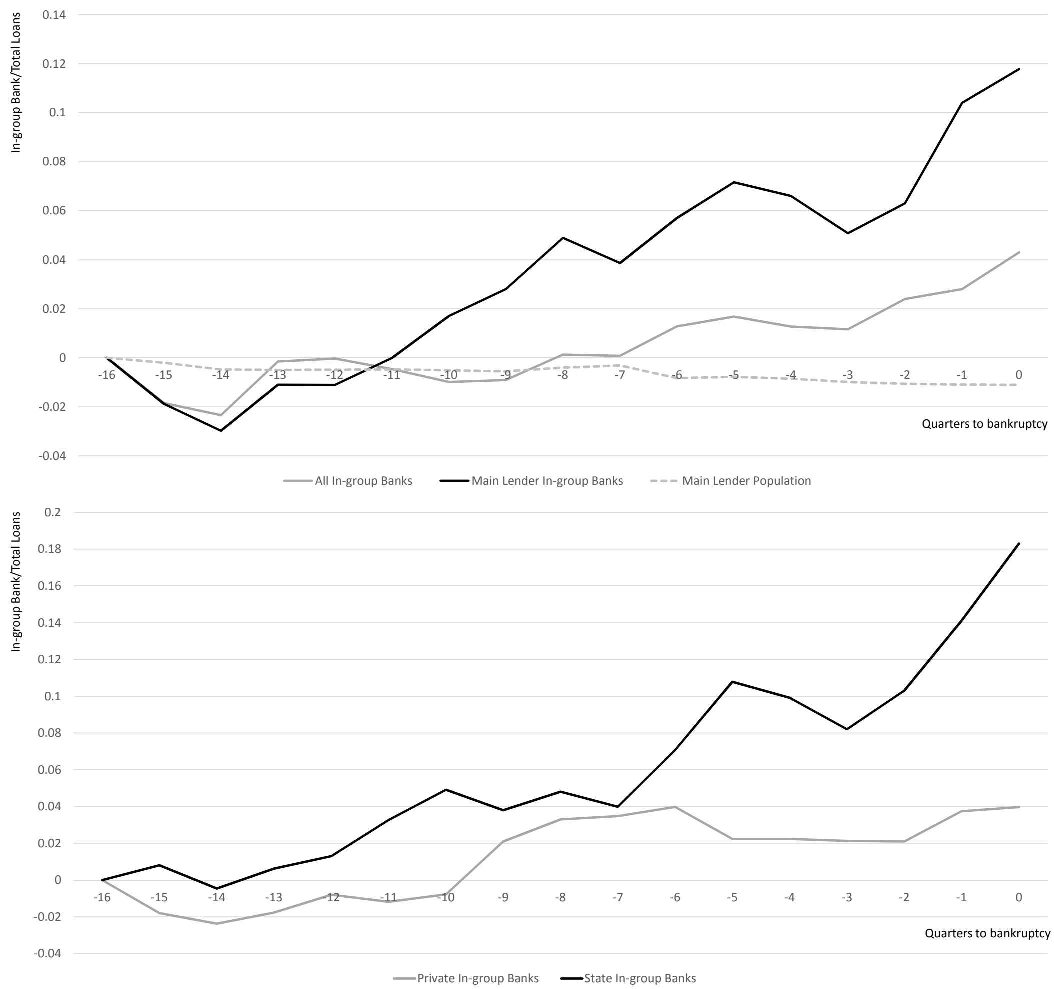
This figure depicts the share of loans from a firm's in-group bank divided by the firm's total loans for the sample of 474 firms that enter a branch during the sample period. To compute the in-group bank shares on the y-axis we align firms around the year they enter a branch and calculate the average in-group bank share for all firms with the same distance to entry. The x-axis displays the distance to firms' entry to a branch in years. The value zero indicates the year in which the firm officially obtains member status in the branch.

Figure 2: **State Bank Share in Total Firm Lending Around Mayoral Elections**



This figure depicts the share of loans a firm borrows from the state bank divided by its total loans for the sample of 109 firms that are members of a club branch in which an existing member in elected as a mayor for the first time during the sample period and thereby becomes head of the local state bank's supervisory board. To compute the state bank shares on the y-axis we align firms around the year of the mayoral election and calculate the average state bank share for all firms with the same distance to the mayoral election.

Figure 3: **Bank Lending Shares before Bankruptcy**



Panel A of this figure plots the share of in-group bank in total firm loans in the sixteen quarters before firms' default on the y-axis (solid lines). We plot in-group bank shares relative to the share sixteen quarters before bankruptcy which we set to zero. The x-axis lists the distance to the official bankruptcy date in quarters. The gray solid line comprises all firms with a default event in the sample, whereas the black solid line only includes those firms for which additionally the in-group bank is their main lender. The gray dashed line depicts the share of loans from firms' main lender in total firm loans for the population of all firms in the sample region that are not club members (and therefore not part of our sample). Panel B plots the share of in-group bank in total firm loans for the firms with a default event whose in-group bank is the main lender separately for firms for which the in-group bank is a state bank (black line) and for firms for which the in-group bank is a private bank (gray line).

Not for Publication

Appendix A. Data collection of service club members

This appendix describes the construction of the dataset on service club members. Many of these service club branches provide their entire membership section through their website. Other service club branches only provide the names of current members and the official function within the branch (e.g. president, vice-president, treasury), as well as the names of members that had an official function in the past. Since the branches tend to be small (on average 50 members) and we are only interested in members that are either a firm's CEO or a bank director, we obtain most member names by this search strategy. We complete our sample by interviewing club members from our sample region.

Membership information includes an entrance date, as well as information on the member's profession. If the information regarding a member's profession is incomplete, we update our sample by internet research. Names of CEOs of limited liability and public firms can be obtained through the federal German corporate register (*elektronischer Bundesanzeiger*).[41] We also use the latter source to identify whether the firms in the service clubs filed for bankruptcy during our sample period. All sample banks list their regional directors on each bank's website.

Appendix B. The German banking sector

The German financial sector is bank-based with a universal banking system. The German banking sector consists of 2,277 banks and nearly 40,000 bank branches.[42] One of the distinct features of the German banking sector is the so-called three-pillar structure which refers to the three different types of legal ownership of German banks - state owned banks (*Landesbanken* and *Sparkassen*), private banks, and credit cooperatives. The market shares of these different types of banks according to banking assets are distributed as follows: 39 percent are held by private banks, 45.5 percent by state banks (that break down in 25 percent by savings banks (*Sparkassen*), and 20.5 by Landesbanken), and 15.5 percent by cooperative banks. While savings banks and cooperative banks share a regional structure, private banks tend to have one headquarter (mostly in Frankfurt) and operate bank branches throughout Germany. An illustration of the most important institutional features of these three different types of banks is provided in Table A.1.

[41] https://www.ebundesanzeiger.de

[42] Within Europe, Germany is among the countries with the highest number of credit institutions, branches, and bank employees; see ECB (2007) for details.

Table A.1: Banks in Germany

	Private Banks	State-Owned Banks (excl. Landesbanken)	Cooperative Banks
Ownership	shareholders	local government	customers are shareholders (members)
Geographic Outreach	national	regional (local)	regional (local)
Liability	limited liability of shareholders	public guarantee obligation until 2005; implicit public guarantee through state ownership	liability of members (if losses exceed equity, members have to inject new capital)
Deposit Insurance	private fund to secured the deposits of customer up to a ceiling of 30 percent of the liable capital of each bank	federal association of state owned banks to support entire bank (not just deposits); capital injections from regional government	federal association provides an insurance fund to provide deposit guarantees
Market Share	39 percent	25 percent	15.5 percent

This table provides information about the organizational structure of the three groups of German banks: private banks, state-owned banks (savings banks, excl. Landesbanken), and cooperatives. It depicts information on ownership of the banks, their geographic outreach, owners' liability, deposit insurance, and their respective market share according to banking assets.

The structure of the state banking sector is the result of laws (*Sparkassengesetz*) implemented at the beginning of the twentieth century and after the Second World War, which gave rise to a country-wide community savings banking sector. Savings banks are owned and controlled by the local politicians exercise governance through the supervisory board of the savings banks. Furthermore, local politicians are members of a so called credit committee (*Kreditausschuss*) that has to approve lending decisions on large loans of the savings banks. Thus, local politicians have a direct influence on the state banks management decisions. The regional principle requires savings banks to foster credit supply in the city/county of their location. The objectives of state banks, as laid down in the respective laws (e.g., *SpGNRW* and *SpGBW*), are besides generating income to the local government manifold: e.g., ensuring the availability of credit to enterprises and communities, as well as facilitating individual savings.[43] Since regional state-owned banks are owned and controlled by the local politicians, these politicians may use taxpayers money to support these banks in case of distress.

German cooperative banks are organized in a very similar way as state-owned banks. They have the same regional organization but operate independent of the local government. Thus, the main difference between these two types of banks is their ownership structure.

[43]Commonly this legal framework includes a statement that profit maximization is not the only objective of state owned banks. Other objectives are to provide a checking account to every private person independent of her income and the economic education of the youth (see the *Sparkassengesetze*, *Sparkassenordnung* and *Landesbankgesetz of the Länder in German*.

While savings banks are owned by the government, cooperative banks are owned by private shareholders (i.e., referred to as members). According to the institutional set-up of cooperatives, only customers of the bank may become shareholders of the banks. Furthermore, in case a bank encounters losses that are higher than its equity, shareholders are required to inject further capital (no limited liability). Thus, the governance of cooperative and private banks is basically very similar since both types of banks are controlled for by shareholders that benefit from higher bank profits. Savings banks, however, are controlled by the local politicians. In this case, the budget of the city/county would benefit from high profits by the savings bank, while there is no direct benefit for the politician. We exploit this difference in governance that is very likely to be stricter for private and cooperatives as opposed to state-owned banks. For further details see Engelmaier and Stowasser (2013).

Appendix C. Computation of Interest Rates

Combining the quarterly Bundesbank credit register with annual firm-level accounting information from USTAN allows us to back out effective annual interest rates on the loan contract level.

Step 1: As a first step, we use quarterly information from the credit register on the bank-firm relationship level to identify individual loan contracts. From the repayment structure of the initial loan amount, we can infer the maturity of the loan contract (e.g., whether it is repaid at the end of the contract period; linearly or de/progressively). If the outstanding loan of a lending relationship increases, we identify a new loan contract. Some lending relationships include a current account for the client with a loan amount that fluctuates around a fairly stable mean. Therefore, we only identify a new loan contract if the increase in total loans per firm-bank relationship exceeds 33.33 percentage points. Following this procedure, we extract all individual loan contracts per firm from the credit register (see Table A.2, Panel A).[44]

[44]The tables in this section help to guide the reader through the computation of interest rates by illustrating one hypothetical example.

Table A.2: Contract Extraction

A - Quarterly Data	I	II	III	IV	V
Quarter	Bank A	Bank B	Contract 1 (A)	Contract 2 (A)	Contract 3 (B)
1998 Q4	12000	-	12000	-	-
1999 Q1	10000	-	10000	-	-
1999 Q2	8000	-	8000	-	-
1999 Q3	6000	-	6000	-	-
1999 Q4	11000	-	4000	7000	-
2000 Q1	9000	-	2000	7000	-
2000 Q2	7000	-	-	7000	-
2000 Q3	7000	-	-	7000	-
2000 Q4	7000	-	-	7000	-
2001 Q1	7000	-	-	7000	-
2001 Q2	7000	-	-	7000	-
2001 Q3	7000	5000	-	7000	5000
2001 Q4	-	4000	-	-	4000
2002 Q1	-	3000	-	-	3000
2002 Q2	-	2000	-	-	2000
2002 Q3	-	1000	-	-	1000
B - Annualized Data	**I**	**II**	**III**	**IV**	**V**
Year	IR	Spread	Contract 1 (A)	Contract 2 (A)	Contract 3 (B)
1999	0.0700	0.0381	9000	-	-
2000	0.0853	0.0367	1500	7000	-
2001	0.0803	0.0399	-	7000	1250
2002	0.0800	0.0451	-	-	2500

Panel A of this table lists a firm's total loans from Bank A in column I and Bank B in column II derived from the credit register. Columns III to V display the contracts extracted from the quarterly loan information. Panel B depicts the annualized data. Column I shows the annual firm-level interest rate from balance sheet data, column II the spread of the interest rate over the EURIBOR. Columns III to V lists the average annual loan for Contracts 1 to 3. Details on the identification of loan contracts can be found in the text.

To match loan and balance sheet data, we annualize the loan data by averaging the loan amount over four quarters (December$_{t-1}$, March$_t$, June$_t$, September$_t$). We match contract-level information with interest payments derived from balance sheet information[45] (see Table A.2, Panel B). In rare cases, firms have interest-relevant debt in excess of bank loans. In this case, the sum of all bank loans from the credit register does not sum up to the amount of loans reported in a firm's balance sheet. We deal with this discrepancy by treating the difference as an additional lending relationship.

Step 2: The combination of both datasets allows us to compute contract-level interest rates by solving the equation system:

$$r_{jt} = \sum_{d=1}^{D} \frac{x_{djt}}{\sum_{d=1}^{D} x_{djt}} \cdot r_{dj}, \tag{C.1}$$

$$for\ t = t - int(D/2), ..., t, ..., t + int((D-1)/2)$$

[45] Annual firm-level interest rates are defined as interest expenses minus interest expenses to related firms (ap174-ap175) divided by the average loan amount in the same year.

where D is the number of relationships. The variable r_{jt} is the average interest rate paid by firm j in year t. We winsorize firm-level interest rates at the 5/95 percent quintile to account for unduly extreme outliers. The individual contract volume for firm j's contracts is denoted by x_{djt}, and thus, $\frac{x_{djt}}{\sum_{d=1}^{D} x_{djt}}$ is contract d's share in firm j's total borrowing. The variable of interest is r_{dj}, the interest rate on the individual loan contract.[46]

Each contract can either be a fixed or floating rate contract.[47] Equation system (C.1) can also be solved for floating rate contracts by replacing r_{dj} by $(s_{dj} + EURIBOR_t)$, where s_{dj} is the spread over the EURIBOR for contract d. As we do not have information about the type of contract, we allow all possible combinations for each firm at every point in time. For a firm with D contracts at a given point in time, we solve 2^{D} different equation systems. Additionally, for D contracts to solve the equation system for r_{dj}, D independent equations are required. Solving the equation system provides us with contract-specific interest rates/spreads (see Table A.3).

Step 3: To identify the correct combination of contract types, we first calculate the average absolute deviation from the mean interest rate/spread for each contract:

$$\sigma_{djt} = \frac{1}{T} \cdot \sum_{t=1}^{T} \left| r_{djt} - \sum\nolimits_{t=1}^{T} \frac{r_{djt}}{T} \right| \tag{C.2}$$

where T is the maturity of contract d in years. Next, we compute the average deviation for each of the 2^{D} equation systems as the average deviation over all contracts as ς_j. For each firm, we pick the combination of fixed and floating rate contracts that leads to the lowest value of ς_j (see Table A.3). Finally, we calculate the annual firm-bank relationship level interest rate as the value-weighted interest rate of all contracts of a firm-bank relationship for a given year. This approach allows us to compute firm-bank level interest rates for a subsample of lending relationships for which equation system (C.1) is solvable.

[46] In the example from Table A.2, the equation system for the year 2000 with fixed interest rates is: $\begin{bmatrix} 0.0853 \\ 0.0803 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0.1765 & 0.8235 \end{bmatrix} \times \begin{bmatrix} r_1 \\ r_2 \end{bmatrix}$.

[47] In Germany, floating rate contracts use the FIBOR as base rate until 1998 and the EURIBOR as of 1999.

Table A.3: Solutions

	(r,r,r)	(s,s,s)	(r,s,s)	(r,r,s)	(r,s,r)	(s,r,r)	(s,r,s)	(s,s,r)
1999								
Contract 1 (A)	0.0700	0.0381	0.0700	0.0700	0.0700	0.0381	0.0381	0.0381
Contract 2 (A)	-	-	-	-	-	-	-	-
Contract 3 (B)	-	-	-	-	-	-	-	-
2000								
Contract 1 (A)	0.0700	0.0381	0.0700	0.0700	0.0700	0.0381	0.0381	0.0381
Contract 2 (A)	0.0886	0.0364	0.0400	0.0886	0.0400	0.0850	0.0850	0.0364
Contract 3 (B)	-	-	-	-	-	-	-	-
2001								
Contract 1 (A)	0.0700	0.0381	0.0700	0.0700	0.0700	0.0381	0.0381	0.0381
Contract 2 (A)	0.0886	0.0364	0.0400	0.0886	0.0400	0.0850	0.0850	0.0364
Contract 3 (B)	0.0339	0.0595	0.0395	-0.0065	0.0799	0.0540	0.0136	0.0999
2002								
Contract 1 (A)	-	-	-	-	-	-	-	-
Contract 2 (A)	0.0804	0.0390	0.0390	0.0794	0.0400	0.0804	0.0794	0.0462
Contract 3 (B)	0.0800	0.0451	0.0451	0.0451	0.0800	0.0800	0.0451	0.0451
σ(Contract 1 (A))	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
σ(Contract 2 (A))	0.0101	0.0031	0.0012	0.0113	0.0000	0.0057	0.0069	0.0120
σ(Contract 3 (B))	0.0345	0.0108	0.0042	0.0387	0.0001	0.0195	0.0236	0.0411
ς	0.0149	0.0046	0.0018	0.0166	0.0000	0.0084	0.0102	0.0177

The first line of the table indicates the combination of fixed rate contracts (r) and floating rate contracts (s). The optimal combination of contracts to solve the equation system is (r,s,r). The interest rate for Contract 1 is 0.08, the spread for Contract 2 is 0.04, and the interest rate for Contract 3 is 0.07. This leads to annual interest rates of 0.0700 in 1999, 0.0853 in 2000, and 0.0804 in 2001 for Bank A, and 0.0800 in 2001 and 2002 for Bank B.