Losing my connection:
The role of interlocking directorates

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Abstract. The paper examines the causal impact of bank-firm interlocking directorates on firm's access to credit. We exploit a matched bank-firm panel data containing information on firms' loans and on governing bodies of both banks and firms. To identify the connection premium, we adopt a difference in difference matching estimator and we exploit the exogenous loss of connection that occurs when the bank is placed under special administration and its board members are removed. We find that loss of connection is associated to a significant and large drop in firms' credit lines. We also show that the advantages of connection in terms of granted loans are mainly due to favoritism behaviors rather than to privileged information flows.

Keywords: interlocking directorates, board of directors, conflict of interest, asymmetric information, difference in difference matching estimator.

JEL classification: G14, G32, G34, K20.

1. Introduction

Conflicts of interest when the same person sits on the banks' and firms' board of directors are at the roots of frequent scandals, renewing the interest of academic research on bank governance and increasing public scrutiny on board composition. Moreover, poor lending policies stand out among the causes of recent banking crises, in particular in banks with poor corporate governance. In light of these facts, one of the most recurrent policy recommendations for crisis management and bank resolution is to empower the credit authorities with early intervention powers, including the power to remove directors and statutory auditors. In this paper we contribute to this issue by providing causal evidence on the value of bank-firm connections (as measured by interlocking directorates) in terms of firms' access to credit and by shedding light on the mechanisms driving this result.[1]

We exploit matched bank-firm panel containing information on firms' loans and balance sheet data, and on people in governing bodies of both banks and firms. In order to identify the causal effect of connection we exploit the exogenous break in the relationship due to banks placed under special administration. The proper control group is identified by means of a propensity score matching procedure. Our difference-in-differences matching estimates indicate that losing the connection entails a 26 per cent drop in short term credit lines, those that the bank can freely manage. This result is confirmed after a number of robustness checks, including outlier sensitivity. The reduction in outstanding short term loans is not counterbalanced by an increase in the long term loans. As far as the cost of credit is concerned, we don't find any effect on interest rate.

In the second part of the paper, we examine the alternative mechanisms (having relevant differences in terms of welfare implications) that can account for the more favorable lending conditions enjoyed by connected firms. On the one hand, the presence of bankers in the company board typically bring a broader range of financial experience and may favor the access to credit by monitoring the lending relationship and the day-by-day management of the firm. Therefore the connection may be seen as a tool to solve agency problems and increase the efficiency of the market relations. We call this optimistic assessment of connection as the "information view". On the other hand, conflict of interest may arise whenever bank's and firm's payoffs are not aligned. This, in turn, may lead to a

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[1] In our case interlocking directorates exist if the same person sits on the governing bodies of both bank and firm.

diversion and misallocation of resources. We call this pessimistic assessment of connection as "conflict of interest view". Admittedly, elements of both mechanisms are likely to be simultaneously present and, ultimately, it is an empirical question whether connection is, on balance, positive or negative. In order to discriminate between these two views, we perform a number of tests. First, we show that firms loosing connections show higher default rates during the subsequent periods. This may signals that connected borrowers might have benefited of favorable and inefficient evergreening practices in the lending process. Second, we find that the negative effect of loss of connection is concentrated a) among less opaque firms, for whom the loss of information is less relevant, b) among more risky firms, for whom the divergence of interest with the bank is more severe, c) in local credit markets where the banks have higher market power and, therefore, less pressure to pursue an efficient credit allocation, and d) among connections where the banker has been involved in criminally relevant behaviors, suggesting that the favorable conditions where presumably due to non-market reasons. Overall, these pieces of evidence are all consistent with the conflict of interest view.

Our paper is related to an extensive literature that studies interlocking directorates between banks and non-financial firms. In a widely cited paper, Kroszner and Strahan (2001) show that in the U.S. bankers tend to be on the boards of firms in which conflicts of interest are likely to be relatively unimportant. Similar conclusions are reached by Byrd and Mizruchi (2005). On the contrary, La Porta et al. (2003) find that firms controlled by the bank's owners benefit from better credit conditions while experiencing a higher probability of default; these results are interpreted as a manifestation of looting. More recent papers (Güner et al., 2008; Dittman et al., 2010; and Ferreira and Matos, 2012) exploit extensively panel data and within-firm variation in the presence of bankers on the board, while controlling unobserved firm heterogeneity through fixed effects. These papers share a common view on the fact that bankers help non-financial firms in terms of access to credit.[2] However, existing empirical evidence is not completely convincing in finding a causal evidence. Indeed, the causality may be reverse if firms' financing needs determine the board representation of financial institutions. Moreover, there may be unobserved (time-varying) shocks that may affect both the company's financial needs and a change in the governance of the firm. These

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[2] Engelberg et al. (2012) focus on personal connections rather than more formal bank-firm links and show that they lead to more favorable loan contract terms. They address endogeneity issues exploiting the fact that personal relationship (e.g. having attended to the same college or worked at the same company) are formed several years prior to the banking deals.

empirical challenges are not addressed by simply adding firms' fixed effect in the regression analysis.[3]

Our paper is also related, though to a lesser extent, to the studies focusing on whether "politically" connected firms (usually defined as firms where a member of the board is also a member of a political body) get preferential access to credit. Khwaja and Mian (2005) examine corporate lending in Pakistan and find that politically connected firms borrow more loans and have higher default rates. Claessens et al. (2008) find that firms that contribute more to political campaign in Brazil enjoy increased access to bank finance. As far Italy is concerned, Infante and Piazza (2014) find that politically connected firms benefit from lower interest rates. Advantages from political connections are typically interpreted with the grabbing hand hypothesis and associated to rent-seeking. On the contrary, bank-firm connections is a more complex phenomenon and deal with issues that stand at the core of microeconomic theory: agency problems such as information asymmetries and conflicts of interests are sublimated in bank-firm interlocking directorates.

The remaining of the paper is structured as follows. Section 2 discusses the identification issues and describe our empirical choices to address them. Section 3 presents the data, the variables and descriptive evidence. Section 4 shows the main results and the empirical tests to disentangle the information and the conflict of interest views. Section 5 concludes the paper.

2.   Empirical strategy

The econometric analysis of the role of connection has proven to be extremely challenging. Roberts and Whited (2013) introduce their chapter of the Handbook of finance arguing that endogeneity is "the most important and pervasive issue confronting studies in empirical corporate finance".[4] Indeed, connected and unconnected firms may be different along many dimensions, most

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[3] Stacchini and Cau (2012) study the impact of banks' presence on corporate boards on the lender-borrower relationship in the Italian context. They focus on firms with multiple lenders to control for unobserved firm heterogeneity. However they cannot control for the endogenous bank-firm connection.

[4] In a similar vein, Adams et al. (2010) state: "unlike the situation in some other areas of economics, there are no cure-all instruments that one can use to deal with this endogeneity. Ultimately, much of what one learns about boards is about equilibrium associations. Causality, in the usual sense, is often impossible to determine. Because the directors in question were determined through some equilibrium selection process, one does not have a classic experiment in which different director types are randomly assigned to control and treatment pools."

of which are difficult to observe and may be correlated with the probability of being connected and with the outcome variable. Reverse causation and errors in the measurement of the connected status are pervasive too.

Our first answer is to rely on panel dataset that provides us with the means to handle, in a simple way, endogeneity that is related to time-invariant unobserved effects, while exploiting the variation over time of connectedness. This is essentially a difference in difference (DID) estimation.

However, endogeneity is still a concern since fixed effects do not eliminate reverse causation and omitted variable bias due to unobserved firm shock affecting both variables at the same time. For example, increase in granted debt may call for a presence of the banker in the board in order to decreases monitoring-related contract costs and prevent opportunistic behaviors of the firms' managers. Alternatively, the banker may extend credit lines and lower costs expecting to be rewarded with a seat on the firm's board. Finally, there may be unobserved (time-varying) shocks such as the implementation of a new business strategy or an M&A operation that may affect both the company's financial needs and a change in the governance of the firm.

In order to address this second concern, we exploit exogenous loss of connection due to banks went under special administration. Indeed, under the Italian law the special administration status reset the governing bodies (see more on this below) so breaking the connections. This treatment is clearly exogenous with respect to bank-firm loans after controlling for bank-firms and bank-time fixed effects. We focus on banks that went under special administration and compare firm-bank relationships that lose the connection with a comparable group of not connected firms. Our DID estimating equation reads as:

$$y_{fbt} = \alpha + \beta L_{fbt} + \gamma X_{ft} + \delta_{fb} + \rho_{bt} + \varepsilon_{fbt} \qquad (1)$$

where y_{fbt} if the log of loans that firm f borrows from bank b in period t; L_{fbt} is a dummy variable that equals 1 for treated firm f (i.e. those who were connected before t) from period t on (i.e. when they lose the connection) and equals to 0 otherwise. β is the parameter of interest and measure the percentage increase/loss in credit lines due to the connection loss.[5] The specification also include a set of firms' time-varying controls X_{ft} (turnover controlling for size, Z-score as a proxy of creditworthiness, sector trends and geographical area trends)

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[5] Using the standard terminology, connected firms are the treated units, while special administration (i.e. break in the bank governing board) is the treatment.

as well as firm-bank and bank-time fixed effects (δ_{fb} and ρ_{bt} respectively). Periods are quarters from 2006Q4 to 2014Q4.

The credibility of the DID estimator crucially relies on the assumption that in absence of the treatment, the average outcomes for treated and controls would have followed parallel paths over time. This assumption may be implausible if pre-treatment characteristics that are thought to be associated with the dynamics of the outcome variable are unbalanced between the treated and the control group. For example, differential trends might arise if treated and control units operate in different markets and/or are exposed to distinct macro shocks. In this case DID will not consistently estimate the treatment effect.

In order to address this last concern we adopt a combination of matching with DID as proposed in Heckman et al. (1997), thus pairing each connected firm with "similar" control units. We adopt the method of propensity score matching due to Rosenbaum and Rubin (1985), which suggests the use of the probability of receiving treatment conditional on observables characteristics. Specifically, we adopt the nearest-neighbor matching, selecting the unconnected firms with a (predicted) probability of being treated that is closest to that of the connected. For each treated units, we use the ten nearest neighbors, with each neighbor receiving equal weight in constructing the counterfactual unit.[6] We match with replacement, which allows a given unconnected to get matched to more than one connected firm. Finally, we implement matching separately for each bank. That implies that the complete matching procedure has been implemented separately for each bank. This is analogous to insisting on a perfect match (as far as bank is concerned) and then carrying out propensity score matching. This procedure is recommendable since we expect the effects are heterogeneous across banks (and because the treatment – i.e. loss of connection – occur in different periods across banks).[7]

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[6] We have chosen the ten closest observations because this is frequently done in the related empirical literature (Blundell and Costa Dias, 2009).

[7] In unreported evidence we replicate the analysis using the full sample or a subsample selected through exact matching. Namely, exact matching is obtained partitioning the population of firms in cells defined by the product of the following variables: the bank they borrow from (40 banks), firm size (5 classes), sector of activity (20 groups), firm riskiness (3 levels) and geographical area (Centre-North and South). This makes about 25,000 possible combinations, with treated firms matched to control units belonging to the same cell. In both case our main findings are confirmed.

3. Data and descriptive analysis

Our data are restricted to a sample of banks that went under special administration between 2007 and 2013. The rules governing special administrations are discussed in subsection 3.1, while the matched bank-firm panel data, and how it has been built, is fully described in subsection 3.2. Finally, subsection 3.3 shows some descriptive evidence.

3.1 Special administration

In Italy, the procedures for managing bank crises are governed by Title IV, Chapters I and II of Legislative Decree 385/1993 and subsequent amendments (the Consolidated Law on Banking). These rules have as their primary objective the protection of savings in view of, amongst other things, the strong social impact of crises on the various individuals concerned such as depositors, other creditors, employees and shareholders.

The rules envisage different crisis management procedures, depending on how critical the situation is. If there are signs that the crisis can be resolved, the bank can be placed under special administration. This is approved by decree of the Minister for the Economy and Finance, issued following a proposal to this effect by the Bank of Italy, whose task it is to nominate the special bodies. Specifically, the Bank of Italy is responsible for the appointment of one or more special commissioners and a monitoring committee, composed of three to five members: the commissioners shall exercise the functions and powers of the directors of the bank; the monitoring committee shall carry out control functions. If, instead, the crisis appears to be irreversible, the bank is placed under compulsory administrative liquidation, by decree of the Minister for the Economy and Finance, issued following a proposal to this effect by the Bank of Italy. Also in this instance the Bank of Italy is responsible for appointing the liquidating bodies.

The banking supervision bulletin, published by the Bank of Italy, monthly reports the list of banks placed under special administration. Figure 1 reports the number of banks placed under special administration from 2007 to 2013 and included in our sample.[8] The procedures involved 40 banks, mainly small banks, although recently they have also concerned some medium-sized banks operating

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[8] We excluded a handful of (small) banks because they had no connections with non-financial firms (e.g. foreign banks or financial intermediaries whose main activity was markedly different with respect to that of standard commercial banks).

in large geographical areas and one bank listed in the stock exchange. Among the difficulties most frequently encountered in cases of special administration there are insufficient capital base, poor corporate governance, irregularities in the organizational and monitoring structure (especially with regard to the credit approval process), violation of anti-money laundering and conflicts of interest.

As far as the timing of the events is concerned, we assume that the treatment starts from the first quarter following the date in which the bank is placed under special administration. Additional results refine this assumption showing that leading and lagged effects are at work too.

3.2 Data and variables

For the subsample of banks described above, we build a matched bank-firm panel data, drawing information from four different sources: the OR.SO. database is managed by the Bank of Italy and contains exhaustive current and historical information on members of governing bodies of banks and financial intermediaries (e.g. president, executive director, members of the board of directors, members of supervisory boards, etc.); the National Business Register (NBR) database contains exhaustive, current and historical, vital statistics on Italian firms and on members of their governing bodies; the Credit Register (CR) is managed again by the Bank of Italy and contains information on the universe (above 30,000 euros) of loans to firms; finally the Company Accounts Data System (CADS), managed by Cerved Group, includes balance sheet data and indicators covering almost all the Italian limited companies.

Our data include all non-financial limited companies that had borrowed at least once from one of the banks under special administration. The data is at bank-firm level and covers more than 30 quarters; it traces the history of lending including information on the amount of the outstanding loan by different types of contracts (credit lines, credit receivable, fixed-term loans) and the corresponding credit conditions, including the interest rates (for credit lines only).[9]

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[9] Interest rates are measured for credit lines only for three main reasons. First, these loans are highly standardized among banks and, therefore, the cost of credit across different firms is not affected by unobservable loan-contract-specific covenants. Second, credit lines are loans granted neither for some specific purpose, as it is for the case of mortgages, nor on the basis of a specific transaction, as it is for the case of short-term advances against trade credit receivables; as a consequence, the pricing of these loans is highly associated with the borrower-lender relationship. Third, credit lines conditions (both quantities and prices) can be unilaterally changed by the lender in the short term.

Unfortunately, data on interest rates are available only for 8 banks (instead of 40). All these variables, drawn from CR, have been enriched by those drawn from CADS, such as firms' turnover (used as proxy for size), Z-score (a measure of credit risk), age, sector of activity and geographical area. Finally, using OR.SO. and NBR archives we are able to add to our dataset a binary variable that maps the banks' involvement in the firms' governance before the removal of the governing bodies (that occurs as the special commissioners are appointed).[10]

3.3 Descriptive evidence

Table 1 reports the mean and the standard deviation for each variable mentioned above. Italian firms strongly rely on bank debt as a source of external finance; unsurprisingly, this dependence is reflected in close ties between banks and firms, also taking shape of interlocking directorships.[11] Considering for each bank the quarter preceding the start of the special administration, we have information on nearly 30,000 firms; among them 2,3 percent (nearly 700 units) were connected to the lender. The credit granted to a connected firm represents, on average, the 0.2 percent of the loans granted by the same bank to all its borrowers; the distribution is highly skewed (Figure 2, left panel): for the overwhelming majority of firms, the percentage is below 1 percent, for a handful of firms is above 2 percent. If we consider all the connected firms as a whole, they weight on average the 3 percent of total loans granted by each bank; for seven banks the overall exposure to connected firms is relevant, i.e. above 5 percent (Figure 2, right panel).

Table 2 provides summary statistics for the main variables used to represent the firm's characteristics we control for, providing the comparison and the means tests between connected and unconnected firms. Connected firms are larger and are less risky; these differences are statistically significant at the 1 percent level. Marked differences arise also in terms of sector of activity and geographical area of residence of the firm. The propensity score matching should balance the pre-

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[10] Specifically, from OR.SO and NBR we retrieve the fiscal code, that unequivocally identifies a person, for each past member of the governing bodies of both banks and non-financial firms. Therefore, we are able to identify the firms connected to their lenders by means of at least one person who has been member of both the governing bodies.

[11] Close ties between banks and industries were kept out by the Italian legislation in the past: bank holding in equity stakes of industrial firms were prohibited by the 1936 Banking Law. This was also due to the negative consequences of the large diffusion of the so-called mixed banks (characterized by widespread interlocking directorates) in the previous two decades. Since the approval of the Banking Code in the first part of the 1990s, this prohibition has been progressively slackened.

treatment variables between the connected firms and the control group. In order to verify that the balancing properties are satisfied in the data, we perform two balancing tests suggested in the related empirical literature. First, we measure the standardized bias suggested by Rosenbaum and Rubin (1985). For each covariate it is defined as the difference of sample means in the treated and matched control subsamples as a percentage of the square root of the average of sample variances in both groups. Even though there is not a clear threshold to establish the success of the matching procedure, a standardized bias around 5 percent or less is seen as sufficient (Caliendo and Kopeinig, 2008). Second, we perform a two-sample t-test to check if there are significant differences in covariate means for both groups: before matching differences are expected, but after matching the covariates should be balanced in both groups and hence no significant differences should be found. As expected, firms' differences are substantially narrowed and there are no more statistically significant differences.

4. Results

4.1 Main results: the impact of loss of connection

In this subsection we examine whether the loss of connection with the bank has an impact on firm's access to credit. We focus on granted credit lines (i.e. overdraft facilities) as main outcome variable, though we also provide a broader set of results.[12]

To help visualize the value of connections, Figure 3 plots average credit lines for two groups of firms. The first group includes firms losing their bank connection with the start of special administration (at time 0); the second group includes a selected group (through propensity score matching) of control units. Firm-bank specific averages and common shocks have been preliminarily differenced out of the credit lines series so that values greater (lower) than zero indicates firms having credit above (below) average. Taken together the two lines suggest that change in connection status is associated with significant and lasting shift in access to credit, which worsens for firms losing their connections. Figure 4 replicate the

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[12] According to Berger and Udell (1995), credit lines are the most attractive vehicle for studying the impact of the lender-borrower relationship. On the lender side, it is a flexible instrument whose terms of contracts may be changed unilaterally and with a very short notice. This allows us to fully capture in our quarterly data the effects of the shocks due to special administration.

analysis for each of the main 12 banks. We find again a significant drop in credit lines, though it is not generalizable to all banks.

Table 3 statistically substantiates the visual evidence reported in Figures 3 and 4. Our estimate for the parameter β in equation (1) indicates that the loss of connection implies a 26 per cent drop in credit availability (column 1). This estimate is highly significant and very stable when we include in the specification the firms' time-varying controls (column 2).

We now corroborate our core result by dealing with the only potential source of endogeneity we detected in our analysis. Suppose that a bank is significantly exposed towards a connected firm that is going through a difficult economic phase. As a consequence the supervisory authority might decide the special administration regime (and cut the firm's credit lines) to avoid that the poor firm's trend impact on the bank's financial equilibria. In this case the treatment would be endogenous as the unsafe amount of a firm's credit line would determine the treatment at the bank level. In Table 4 we present two empirical tests aimed at addressing this threat to the identification. In the first column, we exclude the top percentile in the distribution of the share of firms' credit over its lender total credit for both treated and control group. In the second column, we exclude the two banks that are more exposed to the treated group. In both cases the estimate is identical to the baseline, thus suggesting that this potential source of endogeneity is not an issue in this case.

Thus far we have assumed that the treatment starts in the first quarter following the special administration date. This assumption might be questioned in both directions. On the one hand, the new board might need time to examine each outstanding credit and, eventually, cut the credit granted to unworthy borrowers: hence effects might be delayed. On the other hand, the special administration is the final step of a bank crisis, that usually occurs after a long investigation during which the old board might review lending policies under the moral suasion of the supervisor aimed at resolving the bank crisis in a cooperative manner: in this case the effects might be anticipated.[13] Table 5 documents the existence of possible leading and lagged effects: the connection premium strongly persists in a 4-quarter window around the special administration date.

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[13] The Bank of Italy is empowered to adopt a broad range of measures against banks, graduated to the gravity of the situation. Even though it lacks early intervention powers to suspend and replace management, the Bank of Italy can give to the bank detailed recommendations for the credit management or can require the bank to convene, or directly convene, a general meeting to decide on the dismissal of Board members (whose outcome is, however, still subject to the vote of the general meeting).

However, the existence of leads documented above may cast some doubts on our identification strategy, suggesting that treated and control units may have divergent pre-treatment trends. Therefore, in Table 6, we provide two tests on the validity of our DID estimations. The first exercise is a placebo regression in which we focus on the period that goes, for each bank, from the beginning of the sample to one year before the special administration. We know for sure that in this interval no treatment effect took place. We then split this interval in two equal sub-periods and assume that the loss of connection takes place at that fake time threshold. The first column shows that no significant effect emerges. In the second column we test the parallel trend assumption more directly: we consider again the period preceding the treatment and we augment the baseline specification with by a trend variable interacted with the treatment dummy and estimate the model on the same sample on column 1. If the evolution of loans was different for treated and untreated firms before the loss of connection, thus invalidating our strategy, this additional variable would turn out to be significant. As shown in column 2, this is not the case.

Thus far we focused on credit lines because they can be contractually modified in the very short-term. However our evidence on the more favorable credit stance towards connected firms would be invalidated if, for example, the drop in the credit lines after the loss of connection was accompanied by an increase in terms of long-term debt. To address this issue, in Table 7, we examine the impact of loss of connection on various definitions of loans. In the first column we redefine the dependent variable as including both credit lines and credit receivables to have an overall picture of short-term loans. The parameter estimate is even larger (in absolute value) with respect to the baseline. In the second column we focus on long-term loans (fixed term contracts) as dependent variable and we don't find a significant impact; therefore, there are no substitution effects. In the last column all the types of loans are pooled together, to have overall outstanding credit. Again there exists a large connection premium that is driven by the short-term component of loans.

Table 8 contains the analysis of the effects on interest rates. Unfortunately they are available for a subset of bank, and this lead to a significant drop in the number of observations and of treated firms. According to our findings, the loss of connection has no effect (both from an economic and a statistical point of view) on

the cost of credit either without or with firm controls. All in all, the connection premium concerns market quantities but not prices.[14]

4.2 Value of connection: conflict of interest vs. information view

The connection premium can in principle be traced to alternative mechanisms, with relevant differences in terms of welfare implications. On the one hand, there are many benefits stemming from a strict link between banks and firms, mostly related to access to privileged information flows. Indeed, if a banker holds a seat on the board of directors of a company, she may act as "delegated monitors", thereby mitigating asymmetric information problems since borrowers reveal information to the banks that is not otherwise available (Kroszner and Strahan, 2001; Byrd and Mizruchi, 2005). In addition, the banker could provide valuable financial expertise to the firm (Güner et al., 2008). On the other hand, lending bankers on firms' boards may generate conflicts of interest. As member of firm's board, the banker should try to get the best financing terms for the firm. As member of bank's board, she has the fiduciary duty to serve the interest of creditors, thus getting the best terms for the bank and avoiding its risk. Conflicts arise as the pay-offs of these two classes of agents are not aligned. As a consequence, loan conditions may be not justified on the economic grounds (La Porta et al., 2003).

We adopt a battery of tests to discriminate between the two alternative views. First, we examine how the firms' default rates react after the loss of connection (Table 9). If the favorable lending conditions were due to conflict of interest we may expect an increase in the default rate after the loss of connection: the poor quality of the borrower would not be masked any more by favorable lending conditions. Indeed, bankers in the firm's board may have an incentive to apply evergreening practices: they may provide additional credit to the troubled firm in order to avoid or delay bankruptcy; or they may delay the recognition of losses on the bank's portfolio by rolling over existing loans. We find that bad loans increase by 7 per cent for former connected borrowers with respect to the control group.

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[14] As stated before, information on interest rates is available for a small subset of banks. However, the absence of any significant effect seems not attributable to specificities of this subset of banks. Indeed, in unreported evidence (available upon request) we re-estimated the baseline equation for credit lines on this subsamples and results are qualitatively similar to those reported in Table 3.

Second, we examine whether the impact of loss of connection is heterogeneous across firms along some crucial firms' or banks' characteristics (Table 10). We start with firm's opaqueness, measured as the first principal component of the following variables: firm's size, firm's physical assets over total assets, firm's age and length of bank-firm relationship lending.[15] If the credit drop due to loss of connection passed through the loss of access to privileged information, then the impact should be stronger among more opaque firms. As shown in the first column, we find the opposite, in contrast with that predicted by the information view.

The second characteristics is firms' riskiness, exploiting the fact that the divergence of interest between the bank and the borrower is most severe when a firm faces a financial distress (Kroszner and Strahan, 2001). Indeed, as member of the firm's board, one should try to get debt conditions that are more favorable than would be economically justified. On the contrary, as member of the bank's board, he should limit credit extension in order to maximize the expected value of debt repayment. Therefore, if the conflict of interest hypothesis is at work, we should observe a larger (negative) impact of loss of connection for more troubled firms. The second column supports this statement: the connection premium is larger for more risky firms, defined as those whose Z-score is above the median.

The third variable that may drive differential effects is bank's market power. The idea of the test is based on two assumptions: favoritism in lending is not compatible with the bank's profit-maximization; pressure for profit-maximization is lower in markets where the bank has some market power. Hence we test whether the connection premium is higher the larger is the bank market share in the province where the connected firm is located. In the third column we show that this is the case: the impact of losing connection is by far larger for connections with banks whose market share is above the median.

Finally, we consider the differential impact between "bad" and "good" connection. According to the Italian law, imposing the special administration to a bank is an administrative measure that does not imply per se any crime according to the penal code. On the other hand, in some cases the administrative measure

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[15] Opaqueness is expected to be negatively correlated with size, since smaller firms have less informative financial statements and lower public profiles. Bonaccorsi di Patti and Dell'Ariccia (2004) assume that firm opaqueness is also negatively correlated to the relative use of fixed and tangible assets in the production process. This assumption is based on the idea that a bank can evaluate more easily the quality of a project (and later monitor the actions of the borrower) when the technology is simple, and the relationship between observable inputs and output is predictable. Finally, age and length of bank-firms relationships are also commonly thought as being negatively correlated with opaqueness.

goes hand in hand with penal prosecution of some of the members of the board (e.g. fraudulent accounting, criminal conspiracy, etc.). We define "bad" connection as those whose in which the banker has been involved in penal crimes that are related to his role in the governing body of the bank. The idea of the test is that larger connection premium for bad connections are more consistent with the conflict of interest view. The fourth column show that the loss of both good and bad connection implies a drop in extended loans but that in the latter case the impact is nearly doubled. Figure 5 offers a nice visual representation of this result.

All in all, none of the tests reported in Tables 9 and 10 is, individually considered, conclusive.[16] However, all the tests together essentially point to the conflict of interest view and the internal consistency of these signals make us been inclined to interpret our results as a tale of bad credit allocation.

5.   Conclusions

The paper contributes to the literature on interlocking directorates between banks and firms by showing the causal impact connections on firm's access to credit. To this end we exploit a matched bank-firm panel data containing information on firms' loans and on governing bodies of both banks and firms. To identify the value of interlocking directorates, we adopt a difference in difference matching estimator and we exploit the exogenous loss of connection at the firm level that occurs when the bank is placed under special administration. We find that loss of connection is associated to a significant drop in firms' credit, particularly in the components that can be freely changed by the lender in the short term. We also provide several empirical tests that are consistent with the fact that the advantages of connection are mainly due to favoritism behaviors rather than to privileged information flows. In terms of policy implications, these results point out that minimization of credit misallocation may be achieved by explicit regulation and early interventions powers and closer supervision on interlocking directorates.

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[16] For example, in the test of the Z-score one may also argue that access to privileged information is particularly important for financially distressed firms so that the results in Table 10, second column, would not necessarily suggest the greater plausibility of the conflict of interest view.

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Tables

Table 1. Data and variables

Name of the variable:	Description of the variable [data source]:	Mean	St. dev.
Credit lines	Log of credit lines [CR]	2.823	2.173
Short-term loans	Log of short-term loans (i.e. credit lines plus credit receivable) [CR]	3.781	2.504
Long-term loans	Log of long-term loans [CR]	2.000	2.701
Total loans	Log of total loans (i.e. short-term plus long-term loans) [CR]	4.563	2.417
Interest rate	Interest rate on credit lines [CR]	7.575	2.995
Loss of connection	Dummy equal to 1 for treated firms (i.e. those connected to the bank) after the special administration and 0 otherwise [CR & NBR]	0.008	0.087
Size	Log of turnover [CADS]	6.942	1.932
Z-score	Z-score is a measure of credit risk obtained by linear discriminant analysis; values are in the interval [1,10], with lower values indicating safer firms and higher values risky firms [CADS]	5.624	1.587
Agriculture	Dummy equal to 1 if the firm belongs to the agriculture sector and 0 otherwise [CADS]	0.016	0.124
Construction	Dummy equal to 1 if the firm belongs to the construction sector and 0 otherwise [CADS]	0.180	0.384
Manufacturing	Dummy equal to 1 if the firm belongs to the manufacturing sector and 0 otherwise [CADS]	0.264	0.441
Wholesale and retail trade	Dummy equal to 1 if the firm belongs to the wholesale and retail trade sector and 0 otherwise [CADS]	0.220	0.415
Real estate	Dummy equal to 1 if the firm belongs to the real estate sector and 0 otherwise [CADS]	0.107	0.309
Business services	Dummy equal to 1 if the firm belongs to the business services sector and 0 otherwise [CADS]	0.093	0.290
South	Dummy equal to 1 if the firm is localized in the South of Italy and 0 otherwise [CADS]	0.165	0.371
Opaqueness	First principal component of the following variables: size, physical assets over total assets, age and length of bank-firm relationship lending [CADS and CR]	0.327	1.101
Bank's market power	Bank's loan share in the province where the firm is located [CR]	0.089	0.108
"Bad" connection	For connected firms, dummy equal to 1 if the prosecutor required to proceed with criminal investigation the person sitting in the boards of the bank and firm; "good" connections are the complement of "bad" connections [hand-collected data from newspapers].	0.475	0.499

Table 2. Comparison between treated and control group

Variables:	Full sample			Propensity score matching sample			
	Mean		Difference			%	Difference
	Treated	Control	in means	Treated	Control	bias	in means
Size	7.82	6.87	0.95 ***	7.84	7.75	3.9	0.09
Z-score	5.45	5.76	-0.30 ***	5.45	5.40	2.9	0.05
Agriculture	0.03	0.02	0.01 **	0.03	0.02	2.6	0.01
Construction	0.13	0.18	-0.04 ***	0.14	0.13	1.8	0.01
Manufacturing	0.28	0.26	0.02	0.28	0.29	-1.4	-0.01
Wholesale and retail trade	0.16	0.22	-0.07 ***	0.16	0.17	-3.2	-0.01
Real estate	0.13	0.10	0.03 **	0.13	0.13	-0.5	0.00
Business services	0.13	0.09	0.04 ***	0.13	0.13	0.3	0.00
South	0.24	0.17	0.07 ***	0.24	0.24	0.4	0.00
Number of observations	660	26,986		650	4,641		

Firms are observed in the quarter preceding the special administration. Differences in means are accompanied by a t-test to document significant differences between the treated and the control subsample; the standardized bias is defined as the difference of sample means in the treated and matched control subsample as a percentage of the square root of the average of sample variances in both groups.

Table 3. Credit lines: baseline results

Dependent variable:	Log of credit lines	
Loss of connection	-0.262	-0.260
	(0.075)***	(0.072)***
	(0.060)***	(0.055)***
Firm-bank FE	YES	YES
Bank-trimester FE	YES	YES
Firm controls	NO	YES
Observations	110,435	110,435
R-squared	0.715	0.723

Firms in the treated group are the connected; firms in the control group are those matched through propensity score; firm controls include log of size, Z-score and sector and area trends; standard errors clustered at the bank-firm level (first row) and bank-group level (second row) are in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 4. Credit lines: robustness

Dependent variable:	Log of credit lines	
	Excluding firms' outliers	Excluding banks' outliers
Loss of connection	-0.258	-0.262
	(0.072)***	(0.074)***
	(0.054)***	(0.059)***
Firm-bank FE	YES	YES
Bank-trimester FE	YES	YES
Firm controls	YES	YES
Observations	106,105	102,006
R-squared	0.722	0.730

Firms in the treated group are the connected; firms in the control group are those matched through propensity score; firms' outliers are firms whose outstanding loans relative to overall bank loans is above the 99th percentile; banks' outliers are the two banks with a larger exposition to treated firms; firm controls include log of size, Z-score and sector and area trends; standard errors clustered at the bank-firm level (first row) and bank-group level (second row) are in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 5. Credit lines: leads and lags

Dependent variable:	Log of credit lines			
Leads and lags	Leads (-4 quarter)	Leads (-2 quarter)	Lags (+2 quarter)	Lags (+4 quarter)
Loss of connection	-0.252	-0.246	-0.261	-0.227
	(0.078)***	(0.084)***	(0.070)***	(0.068)***
	(0.061)***	(0.064)***	(0.059)***	(0.054)***
Firm-bank FE	YES	YES	YES	YES
Bank-trimester FE	YES	YES	YES	YES
Firm controls	YES	YES	YES	YES
Observations	110,435	110,435	110,435	110,435
R-squared	0.725	0.731	0.734	0.746

Firms in the treated group are the connected; firms in the control group are those matched through propensity score; firm controls include log of size, Z-score and sector and area trends; standard errors clustered at the bank-firm level (first row) and bank-group level (second row) are in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 6. Placebo regression and parallel trend

Dependent variable:	Log of credit lines	
	Placebo regression	Parallel trend hypothesis
Loss of connection	-0.052	
	(0.061)	
	(0.039)	
Trend × treated		-0.007
		(0.008)
		(0.006)
Firm-bank FE	YES	YES
Bank-trimester FE	YES	YES
Firm controls	YES	YES
Observations	67,732	67,732
R-squared	0.830	0.830

Firms in the treated group are the connected; firms in the control group are those matched through propensity score; in the first column we consider the temporal window up to one year before the special administration, we split it in two sub-periods and we simulate a loss of connection in the second sub-period (placebo regression); in the second column we consider the temporal window up to one year before the special administration and we test whether treated and control units have a parallel trend; firm controls include log of size, Z-score and sector and area trends; standard errors clustered at the bank-firm level (first row) and bank-group level (second row) are in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 7. Different types of loans

Dependent variable:	Short-term loans	Long-term loans	Total loans
Loss of connection	-0.288	0.091	-0.213
	(0.082)***	(0.093)	(0.084)**
	(0.075)***	(0.091)	(0.099)**
Firm-bank FE	YES	YES	YES
Bank-trimester FE	YES	YES	YES
Firm controls	YES	YES	YES
Observations	110,435	110,435	110,435
R-squared	0.699	0.734	0.611

Firms in the treated group are the connected; firms in the control group are those matched through propensity score; firm controls include log of size, Z-score and sector and area trends; standard errors clustered at the bank-firm level (first row) and bank-group level (second row) are in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 8. Interest rate

Dependent variable:	Interest rate on credit lines	
Loss of connection	-0.001	-0.006
	(0.115)	(0.115)
	(0.051)	(0.057)
Firm-bank FE	YES	YES
Bank-trimester FE	YES	YES
Firm controls	NO	YES
Observations	41,082	41,082
R-squared	0.728	0.731

Firms in the treated group are the connected; firms in the control group are those matched through propensity score; firm controls include log of size, Z-score and sector and area trends; standard errors clustered at the bank-firm level (first row) and bank-group level (second row) are in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 9. Default rate

Dependent variable:	Log of bad loans	
Loss of connection	0.070	0.069
	(0.035)**	(0.033)**
	(0.047)	(0.043)
Firm-bank FE	YES	YES
Bank-trimester FE	YES	YES
Firm controls	YES	YES
Observations	110,443	110,443
R-squared	0.301	0.318

Firms in the treated group are the connected; firms in the control group are those matched through propensity score; firm controls include log of size, Z-score and sector and area trends; standard errors clustered at the bank-firm level (first row) and bank-group level (second row) are in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 10. Credit lines: heterogeneous effects

Dependent variable:	Log of credit lines			
Loss × low opaqueness	-0.340 (0.082)*** (0.071)***			
Loss × high opaqueness	-0.097 (0.124) (0.078)			
Loss × low Z-score		0.043 (0.115) (0.110)		
Loss × high Z-score		-0.383 (0.085)*** (0.094)***		
Loss × low bank's market power			-0.090 (0.123) (0.107)	
Loss × high bank's market power			-0.329 (0.088)*** (0.060)***	
Loss × "good" connection				-0.197 (0.097)** (0.075)**
Loss × "bad" connection				-0.323 (0.104)*** (0.080)***
Firm-bank FE	YES	YES	YES	YES
Bank-trimester FE	YES	YES	YES	YES
Firm controls	YES	YES	YES	YES
Observations	110,435	110,435	110,435	110,435
R-squared	0.723	0.724	0.723	0.723

Firms in the treated group are the connected; firms in the control group are those matched through propensity score; firm controls include log of size, Z-score and sector and area trends; standard errors clustered at the bank-firm level (first row) and bank-group level (second row) are in parentheses; *** p<0.01, ** p<0.05, * p<0.1.
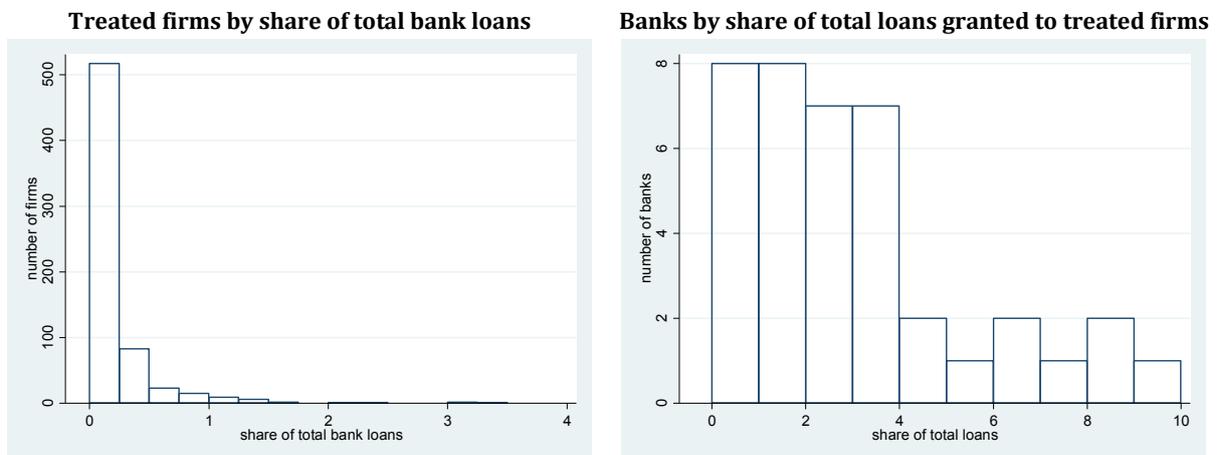
Figures

## Figure 1. Number of banks under special administration
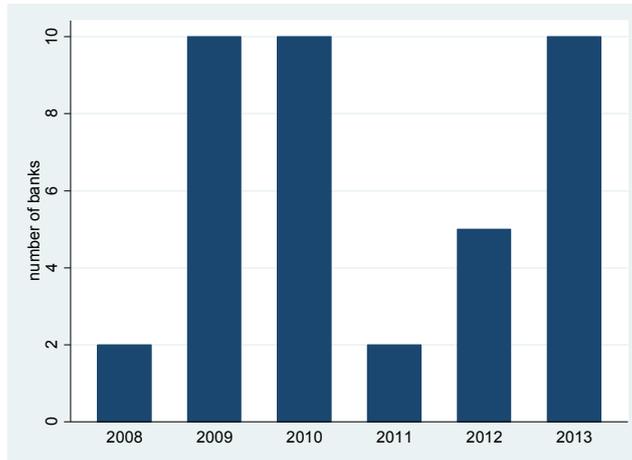
The histograms represent, for each year, the number of banks placed under special administration.

Figure 2. Share of loans to connected firms

Treated firms by share of total bank loans   **Banks by share of total loans granted to treated firms**


The left panel reports the number of treated firms by the share of loans granted to them relative to the total loans of the bank they borrow from. The right panel reports the number of banks by the share of loans granted to the connected firms. Figures refer to the quarter preceding the special administration.

Figure 3. Credit lines before and after special administration
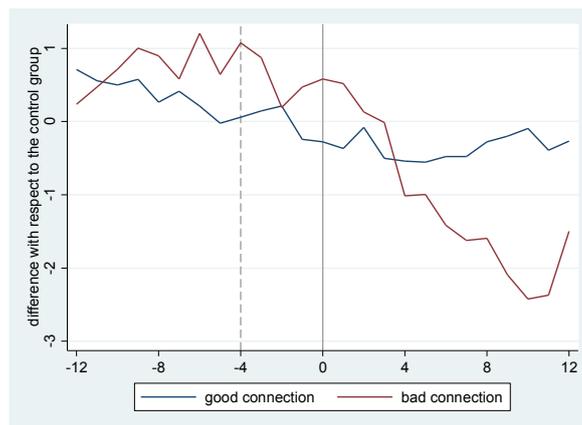
Propensity score matching
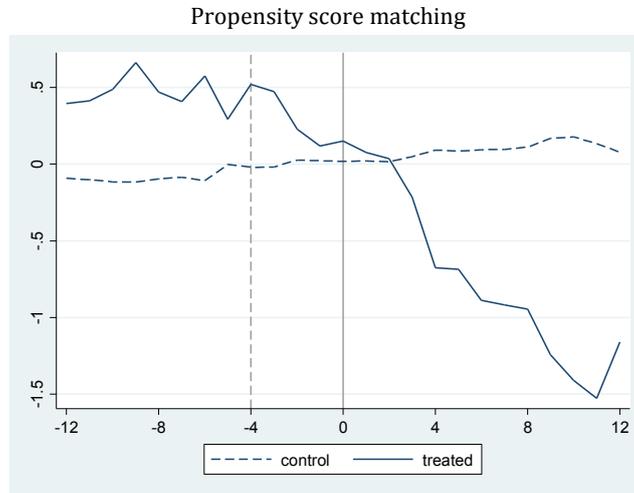
The lines represent the residuals of a regression of credit lines on firm-bank and bank-quarter fixed effects and other firms' controls (log of size, Z-score and sector and area trends); quarterly averages of the residuals are distinguished between treated firms (i.e., those losing the connection with the start of the special administration) and control group; firms in the control group are firms matched through propensity score.

Figure 4. Credit lines before and after special administration by bank
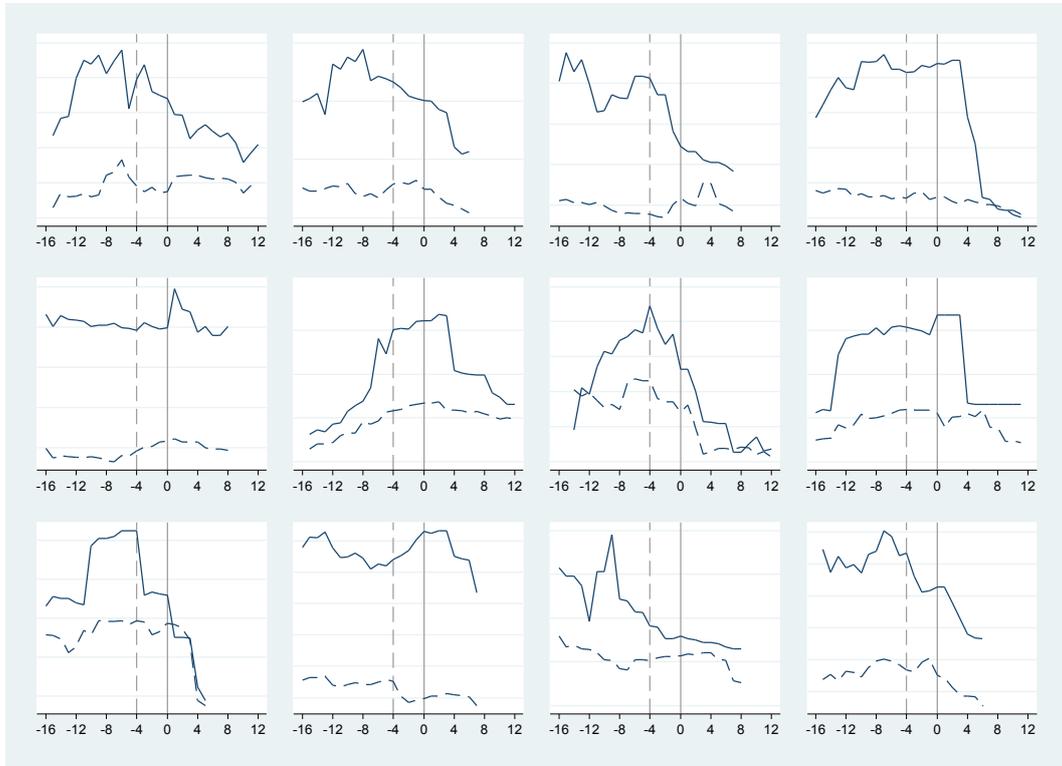
The lines represent the quarterly average of the credit lines; treated (solid line) and control (dashed line) firms are matched through propensity score; each plot refers to a different bank.

Figure 5. Credit lines: bad vs. good connections differentials

The lines represent the difference in the residuals between treated and control units; residuals are obtained through a regression of credit lines on firm-bank and bank-quarter fixed effects and other firms' controls (log of size, Z-score and sector and area trends); treated firms are distinguished between "good" and "bad" connections, with the latter being those being (plausibly) involved in criminal behaviors.