INTERNAL CAPITAL MARKETS IN TIMES OF CRISIS: THE BENEFIT OF GROUP AFFILIATION

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Abstract

Firms affiliated with business groups survive the stress of the global financial and euro crises better than unaffiliated firms. Using granular data from Italy, we show that better performance stems partly from access to an internal capital market, as the survival value of group-affiliated firms increases with group-wide cash flow. Internal cash transfers increase when banks' health deteriorates, with funds moving from cash-rich to cash-poor firms and, some evidence suggests, to firms with favorable investment opportunities. Internal capital markets' role thus increases when external markets (banks) are distressed.

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1. Introduction[1]

This paper provides the first direct evidence of substitution towards internal capital markets in response to deterioration of the balance sheet condition of a firm's bank. This substitution allows group-affiliated firms to use internal capital market transfers to better survive the global financial and sovereign debt crises.

Earlier research demonstrates that internal capital markets become more important during periods of financial-market crisis (Matvos and Seru, 2014; Kuppuswamy and Villalonga, 2015; Almeida, Kim and Kim, 2015), and that diversifying mergers become more common during these periods (Matvos, Seru and Silva, 2018).

Our paper shows how firms use the internal capital market when external capital markets are distressed, using precise information on both firm affiliation with a business group, transfers across affiliated firms, and the specific health of each firm's bank(s). These data allow us to go beyond the effects of a general financial-market downturn, as explored in Almeida, Kim and Kim (2015) following the 1997 Asian Crisis. We show that firms in business groups share cash resources from affiliated firms and this activity increases when their bank(s) becomes distressed. This behavior is beneficial to firm survival. Diversification strengthens this mechanism by allowing some parts of the group to have excess cash when other parts of the group are cash constrained. Group affiliation may also allow firms to share collateral and/or debt capacity that could help alleviate financial constraints. As we show, firms with high borrowing capacity transfer funds to their group-affiliated cousins.

Italy provides our setting, which is unique because: 1) the financial and banking systems in Italy experienced a large negative shock; 2) business groups, our laboratory to explore internal capital markets, are prevalent; 3) firm-bank connections are observable (from the Italian Credit Register); and, 4) intra-group financial flows are also observable. No other study combines all of these features. Relying on them, we show that when an

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individual firm's banking relationships become impaired, its internal capital market becomes more important.

The Italian banking system began experiencing large credit losses starting at the beginning of the 2008 global financial crisis and increasing further with the onset and deepening of the euro area sovereign debt crisis in 2011. By December of 2015, aggregate bad loans had reached about €200 billion, or approximately 12% of loans outstanding to the non-bank private sector (Figure 1). Losses are higher when other troubled loans not yet written off are included. Unlike other recent banking problems, where losses were concentrated in mortgage related assets or sovereign debt, most of these losses – close to 80% – come from bad debts in lending to non-financial businesses.

As a result of these banking system-wide losses, the availability of credit overall in Italy has been constrained. A number of recent studies find that credit supply by distressed banks was reduced in Italy during both the 2007–2008 global financial crisis as well as the more recent euro area sovereign debt crisis (e.g., Albertazzi and Marchetti, 2010; Cingano, Manaresi and Sette, 2016; Bolton et al., 2016; Bofondi, Carpinelli and Sette, 2017; Balduzzi, Brancati and Schiantarelli, 2017). Losses at banks, combined with a weak legal system, have made the situation worse because Italian firms sometimes delay payments to banks weakened by past losses and facing large time and legal expenses associated with enforcing loan defaults in court (Schiantarelli, Stacchini and Strahan, 2016). In addition, bank distress from exposure to risky sovereign debt has reduced credit supply and helped propagate the euro crisis from distressed to non-distressed countries (e.g. Popov and van Horen, 2015; De Marco, 2019; Acharya et al., 2018). As we show, bank loan losses are strongly predictive of declines in credit growth in subsequent quarters, and this effect cannot be explained by credit demand. Thus, we use loan losses for each firm's banks as our primary measure of credit constraints.

In our first set of results, we show that affiliation with business groups helps firms survive the downturn.[2] Using the non-parametric Kaplan-Meier estimate of survival probabilities, we show that firms in business groups are approximately 6 percentage points more likely to survive from 2006 to 2013, compared with unaffiliated firms. To understand

[2] See p. 19 and footnote 20 on how we use the balance sheet information in our data set to define "failure".

the role of internal capital markets, we report results that condition on firm fundamentals (sales growth, cash flow and industry-time, region-time, and firm size-time effects) in a discrete-time linear probability model.[3] These models imply that firms affiliated with groups have a better chance of survival than unaffiliated firms even after controlling for fundamentals.

Consistent with internal capital markets helping drive these differences, we show that survival increases not only when a firm's own fundamentals are stronger, but also when fundamentals of other group-affiliated firms are stronger.[4] We then test how the health of a firm's bank(s) affects its survival, conditional on fundamentals. We show that the effect of bank health is smaller for group-affiliated firms than for unaffiliated firms. For the mean unaffiliated firm, for example, a one standard deviation increase in its bank's loan loss rate increases the one-year probability of failure rate by 0.44 percentage points. In contrast to unaffiliated firms, the same shock to bank health raises the probability of failure for group-affiliated firms – those with access to an internal capital market – by just 0.23 percentage points (the difference is highly significant in the more general specifications).[5] Putting these two results together, survival for group-affiliated firms hinges less on their bank(s) and more on the health of other firms in the group.

Because we can observe intra-group transfers, our second and key set of results verifies directly that group-affiliated firms substitute toward the internal capital market when external markets become distressed. Figure 2 shows this pattern at an aggregate level: intra-group capital transfers increase sharply as the euro area sovereign debt crisis explodes in 2011, and this increase is mirrored by a drop in outside borrowing (mainly from banks). Analysis of firm-level data supports this substitution. First, intra-group capital flows from firms with high cash flow to those with low cash flow and also toward firms with high investment opportunities (proxied by sales growth). Consistent with efficient use of internal capital market, the effect on transfers of negative shocks to firm

[3] We report the linear model to ease the interpretation of the results, but estimating the discrete-time logit yields similar results. See Appendix Table 1.

[4] Factors beyond the fundamentals that we control for, such as managerial quality, may also affect firm survival. But this factor is unlikely to account for the importance of fundamentals of *other* affiliated firms.

[5] This result, it should be added, is incremental to the overall effect of poor economic and financial conditions which are captured by time, region and industry fixed effects.

cash flow is greater for high sales firms. Second, after combining the firm-level data with data drawn from the Italian Credit Register, we link the use of internal capital markets to the relative distress of a firm's own bank(s). In particular, we show that the internal capital flows are more pronounced among firms with more distressed banks. This is strong evidence that the internal capital substitutes in for the external markets when those markets are distressed.

Two conditions are required for internal capital markets to matter for firm real outcomes. First, external capital markets must be more costly than internal ones. Second, there must be some variation in the availability of cash resources relative to investment opportunities across firms within the internal capital market. If all firms have excess cash, for example, then all would be able to finance their own projects internally; that is, without the need for internal (or external) capital. Similarly, if all firms within the internal capital market face cash shortages relative to investment options, then there would be little scope for reallocation across affiliated firms.

We develop our regressions with these two conditions in mind. We need to measure the degree of constraints from both the external and the internal capital markets. For the former, identification comes from the shocks to the banking system starting in 2008 and worsening over the subsequent years; these shocks made bank credit less available and more expensive.[6] We measure each firm's exposure to external financing constraints by conditioning on the health of its own set of bank lenders. We use sales growth as a proxy for each firm's investment opportunities and free cash flow as a measure of each firm's capacity (or need) for internal transfers within the internal capital market. And, we use other firms' cash flow to capture the availability of funding from other group members. Our data allow us to control for potentially confounding effects (such as variation in unobserved aspects of investment opportunities) with granular fixed effects. We control for firm fixed effects, industry-time, and province-time effects in all models. We also introduce group-time effects in some specifications.

The existing literature has not achieved consensus about the value of internal capital markets. The theoretical literature has identified tradeoffs associated with internal capital

[6] Interest rates on loans start decreasing from 2014 onward, but credit supply remains tight until the end of 2015.

market use, relative to the external markets. On one hand, Stein (1997) emphasizes that with external financial constraints, firms use internal capital transfers to move funds away from low-return projects and toward high-return ones. Consistent with our results, that paper suggests that internal capital markets are more valuable during times when external capital is especially expensive or hard to access. Others, however, focus on offsetting agency costs (e.g. divisional rent seeking) of internal capital markets in large, diversified conglomerates (e.g., Lang and Stulz, 1994; Scharfstein and Stein, 2000). Subsequent empirical studies raise doubts about whether a large and well-diversified internal capital market creates or destroys value (e.g., Whited, 2001; Schoar, 2002; Villalonga, 2004).[7] Whether or not the intra-group transfers are delaying the failure of otherwise bad firms in our setting is hard to fully assess. That said, we do report evidence that transfers are higher for firms with above-median sales, which suggests that the transfers are efficiency enhancing on average.

Our paper suggests when external capital markets are constrained, the internal capital market likely increases firm value, as its use increases and firms with access to large internal capital markets are more likely to survive the crisis.[8] This interpretation is consistent with Kuppuswamy and Villalonga (2015), who find that U.S. diversified conglomerates became more valuable than otherwise-similar single segment firms during the 2008 financial crisis. In addition, Matvos and Seru (2014) report simulations based on the 2008 financial crisis which suggest diversified conglomerates are more likely to share resources across the internal capital market when external finance is costly. And, in a related study, Matvos, Seru and Silva (2018) offer evidence that diversifying mergers are more likely during periods in which external market constraints are more likely to bind.[9] With our large and unique data set on groups and firm-bank links, we provide direct evidence that access to the internal capital market is a key mechanism behind the increase in the survival value of group association, and that this is particularly true when access to external finance worsens due to the deterioration of a firm's bank health.

[7] Consistent with internal capital markets reducing firm value, Lamont (1997) provides evidence that oil company investment in non-oil segments represented over-investing in low profit projects.

[8] We do not explore valuation effects because almost all of our firms do not have publicly traded equity.

[9] Although they do not analyze business groups, Babina, Garcia and Tate (2017) show that firms more connected to others through common board members are more likely to survive the Great Depression.

Our study also supports the general conclusions of earlier papers finding that investment rates are insulated from cash-flow shocks for firms with access to a wide internal capital market. Schiantarelli and Sembenelli (2000), also studying Italian business groups, find that investment is less sensitive to cash flow for firms in large business groups. Similarly, Shin and Stulz (1998) find lower investment-cash flow sensitivities for U.S. segments held by diversified conglomerates. Both of these studies are consistent with our findings that an active internal capital market can affect real outcomes (in our case firm's survival), but they suffer from the well-known ambiguities that emerge in interpreting investment links to cash flow (e.g., Alti, 2003).[10] Because we study the actual movements of capital, rather than investment itself, our approach does not suffer from these criticisms.

Our paper extends a small number of studies that test how business groups circulate internal cash flow across affiliated firms. Gopalan, Nanda and Seru (2007) exploit business groups in India and, like us, find that intra-group capital transfers help affiliated firms facing low cash flow. Their study, however, does not consider how the value of the internal capital market responds to shocks to the external providers of capital, as we do. Almeida, Kim and Kim (2015) study how Korean Chaebol-related firms used cross-firm equity investment to transfer funds to firms with better investment opportunities and show that this helped to mitigate the fall in investment of affiliated firms in the aftermath of the 1997 Asian financial crisis. Our paper is unique because we can link the health of a firm's own bank(s) to its use of internal transfers, thus providing direct evidence that the internal capital market substitutes for external (bank) finance when credit conditions become more difficult. Moreover, we can show that the sharing of resources increases the probability of survival of group-affiliated firms and that the survival of unaffiliated firms is more sensitive to their own bank's health than firms with access to an internal capital market.

The next section provides a brief overview of the role of business groups in Italy. Section 3 then describes our data, while Section 4 discusses our empirical methodology and results. Section 5 concludes.

[10] Shin and Stulz (1998) also show that the sensitivity to cash flow does not depend upon investment opportunities, measured by 'q' of the segment a firm in a conglomerate belongs to. This result leads them to question whether funds are efficiently allocated within a conglomerate.

2. Business Groups in Italy

Business groups remain a prevalent organizational form around the world, across both developed and developing economies (e.g., La Porta, Lopez-de-Silanes and Shleifer, 1999; Khanna, 2000). Business group affiliation appears to be a persistent feature within the domestic corporate landscape (e.g., Cannari and Gola, 1996; Bianchi et al., 2005; Bianchi et al., 2008). According to the Italian Civil Code, a business group exists when a dominant influence on a firm is exerted through centralized coordination. Such coordination may occur when control is performed on either a de jure or a de facto basis, or when a firm's capital is equally distributed among different owners, or when corporate decisions are subject to any shareholders agreements.

Business groups play a prominent role in Italy. In 2014, with 5.6 million employees, they represent about one-third of total employment in the industrial and service sectors, and they produce about 55 percent of total value added. Most groups have a fairly simple structure, with just a few active firms based in Italy. Other large groups have a more complex ownership structure, often with more than ten domestic firms.

The historical memory of bank failures in the 1920s and 30s, along with bank reforms of 1936, generated a system in Italy with separation between banking and industry, and between short-term and long-term lending institutions. While the latter distinction disappeared in the 1990s, the separation between ownership of industry and ownership of financial institutions still characterizes the Italian economy. For instance, the 1993 Italian banking law stipulates that entities with relevant industrial interests cannot control more than 15% of voting shares of a banking institution. Moreover, banks are restricted in their shareholding of non-financial firms to a maximum of 15% of bank capital overall, and just 3% for shares in a single firm. Although some of these limits were relaxed in 2008, there are no significant cross-ownership relationships between banks and firms.[11] Thus, business groups do not have special access to bank credit, as in structures like the Japanese Keiretsu.

[11] The separation between banking and commerce in Italy is similar to the one that characterizes the US.

Yet being a group member is likely to confer an advantage in accessing external finance (Schiantarelli and Sembenelli, 2000).[12]

The typical Italian business group consists of a parent holding company that owns and controls affiliates (subsidiary operating companies). Figure 3 illustrates the structure of Gruppo PAM Spa, which operates as a subsidiary of Gecos Generale Di Commercio e Servizi Spa. PAM owns subsidiaries operating in a number of retail sectors, such as hardware, airport convenience stores, restaurants, and so on. In some of the more complicated structures, a business group will own operating companies in several industry segments (i.e., not just retail) and introduce sub-holding companies that lie between the ultimate parent holding company and the subsidiaries. In addition, affiliates themselves sometimes own other affiliated operating companies. Capital typically moves up and down the hierarchy, rather than horizontally. For example, consider a simple structure in which one parent holding companies owns two operating subsidiaries, one of which has excess cash flow relative to its investment demand and one of which has a deficit of cash flow relative to its investment needs. The cash-rich subsidiary would tend to lend its excess funds to the parent, who would, in turn, lend those funds to the cash-poor subsidiary to fill its financing needs. Parent companies also sometimes borrow from external sources such as banks and use those funds to support investment in the operating subsidiaries.

To illustrate the general patterns, consider the average behavior of firms in our main sample. We classify firms as 'parent' or 'affiliate', where parent refers to holding companies and sub-holding companies and affiliate refer to operating subsidiaries (some of whom may own other operating companies). On average, parent firm lends 8.7% of their assets to a subsidiary one level down (i.e., to a firm they directly control), but they only lend 4.7% of their assets up (i.e., to a firm that controls them). In contrast, subsidiaries do the opposite. On average, subsidiaries lend 9.2% of their assets to a parent firm, but only 5.4% to another affiliate which they control. These patterns suggest that the control of capital flowing through the group resides in the ultimate owner of the firm's businesses.

Figure 4 (Panel A) reports the net flow of credit between group-affiliated firms over time, again stratified into parents v. affiliates. In other words, we report the difference

[12] On the real consequences of credit supply shocks in Italy see Cingano, Manaresi and Sette (2016) and Balduzzi, Brancati and Schiantarelli (2017).

between funds borrowed minus funds lent within the group, scaled by each firm's assets. On average, parent firms supply credit (the net flows are negative), whereas affiliate firms demand credit (the net flows are positive). Beyond the internal capital flows, business groups also use external capital to finance their investments. Panel B of Figure 4 reports average bank debt over time by parent and affiliated subsidiaries. Bank debt at subsidiaries exceeds that of parent companies because that is where the ultimate invest occurs. But parent firms also borrow and then recycle the funds down to their operating subsidiaries. Figure 4 shows that the use of both bank debt and intra-group flows peaked in 2007, which coincides with the peak in GDP growth (recall Figure 1). Bank debt then declines as the crisis began to unfold in 2008 and on; intra-group financial debt increases start in 2010. This means that intra-group redistribution of resources (captured by the difference between the two lines) becomes more important.

3. Data and Descriptive Statistics

We build a novel dataset that combines the structure of Italian groups with data on both firm performance and measures of the health of their bank (or banks). In this section we describe the data sources and present some basic descriptive statistics.

3.1 Data

To build our data, we combine several sources. We rely on the *Gruppi Italiani* data (produced by *Cerved)* for information on the entire universe of Italian groups (both financial and non-financial, but we focus on the non-financial groups). Firms are associated with groups if there is a dominant influence on a firm exerted through a centralized control.[13] We obtain the firm-level balance sheet, income statement and

[13] Control relationships between companies are identified based on the ultimate owner (i.e. the largest shareholder located at the upper echelons of the ownership chain who holds directly or indirectly controlling stakes in other firms). A dominant influence is exerted through centralized coordination when control is performed on a de jure or de facto basis (i.e. when a firm has a control determined by the ownership of shares higher than 50 per cent of the capital issued or in any case sufficient to exercise a dominant influence over another company; this judgement is made by Cerved upon careful consideration of additional information

statement of cash flows information from the *Centrale dei Bilanci* data set *(*also from *Cerved)*. We match these with firm-level individual loan data from the Italian *Credit Register* and bank-level data from the Bank of Italy *Supervisory Reports* to construct a firm-specific measure of the quality the bank (or banks') portfolio from which each firm borrows.

We focus our analysis of intra-group capital transfers between firms affiliated with domestic business groups, as transfer to firms outside of Italy – relevant for Italian firms associated with foreign groups or holding companies – are not observable in our data. Although ours is the first study able to combine the comprehensive financial statement data to time-varying measure of ownership structure, we are restricted in our access to just three points in time: 2006, 2010 and 2014.[14] In other words, we can only merge the ownership connections to the year-by-year financial statements during these three points in time. In our regression analysis, which we describe in more detail below, we focus on annual panel data from 2004 to 2014. Hence, we need to assume that ownership connections remain constant over periods longer than a single year. To minimize classification error, we assign ownership as follows: we use the 2006 ownership data for all firms during the years 2004–2007; the 2010 ownership information we assign to the years 2008–2011; and the 2014 ownership data we assign to the years 2012–2014. Our strategy works well because business group affiliation in Italy is persistent over time.

After combining *Cerved* with the structural data from *Gruppi Italiani,* we apply several filters to remove data that may be unreliable. First, we drop observations with zero total assets or zero sales. Second, we include firms with financial statements reported in abbreviated form, under the condition that financial or trade aggregates in the balance sheet are recognized and fully disclosed. Third, we require the disclosure of the full statement of cash flow. And fourth, we drop financial companies.

According to national rules, firms are required to indicate their lending or borrowing positions within the group on their balance sheets (article 2424 of the Italian

available on the company), or when a firm's share capital is (i) equally distributed among different owners (such as in joint ventures) or (ii) subject to any shareholder agreements.

[14] Santioni and Supino (2018) take a first step in this direction using ownership data for 2006 and 2014. This paper contains a descriptive analysis of Italian groups and of the working of their internal capital markets when credit becomes tight.

Civil Code). We use this information to construct *Intra-Group Net Financial Position/Assets*, which equals the total amount of financial debt owed by a given firm to all other firms affiliated with the same group, net of loans provided, as a percentage of the firm's total assets. The variable represents non-arm's length, net debt that, we argue, provides the main tool used by groups to effect intra-group transfers of capital. Positive values of *Intra-Group Net Financial Position/Assets* indicate that a firm is borrowing (that is, demanding funds) from the internal capital market; negative values indicate that the firm is lending (i.e., supplying funds) to the internal capital market. Hence, across all firms in a given group, the variable averages to zero (appropriately weighted). We also construct a second measure of intra-group transfers – the *Intra-Group Net Position (total)/Assets* – that includes net trade debt as well as financial debt. Trade debt (Gross) is less important quantitatively than financial debt, representing around 35% of gross intra-group financial debt – the latter of which equals about 30% of total financial debt. We do not include equity transfers because in the Italian context they are not a significant method to transferring resources between group members. Disclosure on the details on intra-group transactions, however, are not compulsory for those firms that prepare abridged financial statements, so we drop those firms that do not report this item.

3.2 Summary Statistics

Table 1 reports summary statistics for group-affiliated firms and unaffiliated firms, with these data broken into pre-crisis (2004–2008) and crisis (and post crisis) years (2009–2014). For group-affiliated firms, the median one has €1,317,000 in assets, compared to €417,000 for unaffiliated firms (pre-crisis years). Both types of firms experienced large declines in operating performance from the pre-crisis to the period including the crisis years, with sales growth (cash flow) falling across the whole (most of the) distribution.[15]

For the group-affiliated firms, Table 1 also shows how *Intra-Group Net Financial Position/Assets* varies across firms and over time. As expected, the median value is near

[15] Because of the difference in characteristics such as firm size, we have estimated the survival model below using propensity-score matched data. These results are similar to those reported here.

zero, which follows from the fact that the measure nets up to zero within each group. As shown in Figure 2, the aggregate growth in *gross* intra-group financial borrowing shows a sharp increase in internal capital transfers in 2011, the year that the euro area sovereign debt crisis reached its nadir. As the figure also shows, lending from external source shrinks sharply in 2011 as well and the contraction continues into 2014.[16] These aggregate patterns suggest substitution from the external to internal sources of financing, although these overall growth rates are also affected by the overall economic conditions (i.e., by demand for capital). But the patterns clearly show an overall rise in the importance of the internal capital market relative to the external financial markets during the crisis years.

Table 2 reports transition probabilities for our firms over two, non-overlapping periods: 2006 to 2010 and 2010 to 2014. Recall that these two periods (or, three points in time) represent the only ones in which we have exact data allowing observation of firm ownership. The transition matrix shows, first, that firms normally either remain in the same category or they exit the sample. This general pattern holds in both periods. Second, the rate of exit increases across all categories in the second period, which contains the crisis years.

3.3 Measuring the Availability of External (Bank) Finance

In this section we explain the measure of bank health we use in our empirical work, which we show offers a good proxy for funding availability from external financial markets. Note that banks are the main source of external finance in Italy, as almost all of the firms in our sample do not have access to national or global bond and equity markets.

The *Credit Register* contains loan data, which we combine with bank balance sheet information from the Bank of Italy *Supervisory Reports* to construct our firm-specific measure of the health of each firm's bank(s). Italy's *Credit Register* provides lender-borrower level data on characteristics of loans extended by banks operating in Italy. The data include information on loan type (credit lines, term loans), amount, maturity, the pledging of real collateral, personal guarantees, accounts receivable, and ex post

[16] The figure is constructed from continuing firms. Hence it does not reflect entry or exit of firms.

performance. From the first quarter of 2009 on, loans are reported for firms borrowing at least €30,000 from the entire population of credit institutions, having been lowered from €75,000 before then. With these data, we can observe how much each firm borrowers from each bank. We focus on bad loans as a measure of bank health. As we show below, bank loan losses are strongly predictive of declines in credit growth in subsequent quarters, after controlling for credit demand. For each firm we construct the variable *Bad Loans,* equal to the weighted average of that firm's banks' ratio of bad loans to total assets (from the *Supervisory Reports*), where the weights equal the fraction of credit received by the given firm from each of its banks in the prior quarter (from the *Credit Register*). As shown in Figure 5, *Bad Loans* has substantial variation both over time, rising on average in the post-crisis years, and also displaying an increased dispersion across firms.

The *Bad Loans* ratio captures variation in credit supply at the firm-time level because more distressed banks cut credit supply in general, and because firms can only switch lenders at substantial cost. This strategy builds on a long sequence of prior research demonstrating that banks cut credit supply in response to negative shocks to their balance sheets. This literature began with the seminal research of Peek and Rosengren (1997 and 2000), who demonstrate that lending by Japanese banks to borrowers in California was constrained due to large losses stemming from the collapse in Japanese real estate prices and the associated losses experienced by Japanese banks. A large academic literature on bank "capital crunches" followed, documenting that negative shocks from many different sources have large contractionary effects on the supply of lending. Such shocks can stem from exposure to losses in real estate lending, trading (Chava and Purnanandam, 2011), sovereign debt (Popov and Van Horen, 2015; De Marco, 2019), or changes in regulation (Aiyar et al., 2014; Gropp et al., 2019), among others. In our setting, exposure to loan losses has been the main driver of banking problems in Italy during the years following the Global Financial and Euro Crises, hence we focus on that as the most relevant shock for our setting.

To validate the idea that exposure to *Bad Loans* really has reduced credit supply, Table 3 reports regressions of the growth in new credit origination at the bank-firm-quarter level, based on loan growth from the *Credit Register.* With the disaggregated data, we can build loan growth at the level of the bank-firm-quarter, thereby allowing us to test how the

same firm's growth in credit varies with the characteristics of its lenders, while holding fixed the firm's overall demand for credit. Focusing on loans to firms that borrow from multiple banks (a common occurrence in Italy), we explain credit growth as a function of bank characteristic, and fully absorb firm characteristics (both fixed and time varying) with firm-time fixed effects. These effects absorb all firm-level fundamentals that might reflect credit demand such as investment opportunities, an identification strategy pioneered by Khwaja and Mian (2008) and subsequently adopted in many papers, although we do not find their inclusion affects the regressions coefficients much. We also incorporate a bank fixed effect to remove time-invariant characteristics of lenders. In addition to the *Bad Loans* ratio, we include the following time-varying bank balance sheet measures: the capital to assets ratio, the log of assets, the asset liquidity ratio (*Liquidity*, defined as cash plus securities over assets), and the funding stability ratio (*Funding*, defined as deposits plus bonds sold to households over assets). The regression specification follows:

$$\Delta LnLoans_{i,b,t} = \beta_1 Bad\ Loans_{b,t-1} + \beta_2 Liquidity_{b,t-1} + \beta_3 Capital\ Ratio_{b,t-1} + \beta_4 Funding_{b,t-1} + \beta_5 LnAssets_{b,t-1} + \alpha_{i,t} + \mu_b + \varepsilon_{i,b,t}, \quad (1)$$

where i refers to firm, b refers to bank and t refers to time (measured at quarterly frequency).

We report Equation (1) with two specifications: one with just *Bad Loans* and bank size, and the other with the additional bank characteristics. In addition, we report the model with the full set of fixed effects and those with just bank and time effects. Finally, we report the model with all of the data, and again after removing outliers by censoring the top and bottom 1% (based on the dependent variable). The results are reported in Table 3. As shown, lenders saddled with high levels of loan losses cut credit growth. The magnitude of the effect of *Bad Loans* changes somewhat across specifications (smaller when we drop the outliers), but the sign is always negative with very strong statistical significance.[17]

[17] We have even dropped data more aggressively, trimming loan growth below the 5th or above the 95th percentiles. These results also indicate a statistically significant and negative relationship between loan growth and *Bad Loans*. Our conclusion on the importance of bad loans on bank balance sheet for credit supply differs from the result in Accornero et al. (2017) who find that the proportion of the stock of non-performing loans (that includes but is not limited to formally written off loans) out of total loan is not significant in a Khwaja and Mian (2008) credit growth regression that also uses matched firm-bank loan data

With the firm-time fixed effects, the relationship plausibly represents variation in credit supply, rather than credit demand. That said, the results are very similar, whether or not we include these effects. Given our results, as well as the literature linking bank loan losses to credit supply across many different settings, we focus on *Bad Loans* (aggregated across each firm's banks) as our main measure of each firm's access to bank credit (and thus to external finance more generally). However we will also show some robustness exercises based on a broader index of bank health containing bad loans, liquidity, the capital ratio, funding stability and bank size, each weighted by the coefficients of column 2 in Table 3.

4. Empirical Methods and Results

We now provide evidence on the importance of group membership before the financial crisis and in the years that followed. These years include the sovereign debt crisis and a steady deterioration of the health of Italian banks due to the accumulation of bad loans on bank portfolios. The latter, in turn, reflected the poor overall performance of the Italian economy. We first present an analysis of firm survival, comparing group-affiliated and non-affiliated firms. We also analyze the effect of bank health on the survival of different types of firms. Finally we investigate the determinants of intra-group capital flows, focusing specifically on how these flows differ based on the health of each firm's bank(s).

from the Italian Credit Register. In addition to the different definition of the impaired loans variable (we use the stock of written off loans as a proportion of total asset), a major difference between the two studies is the size of the sample. We use observations for the universe of loan contracts at a quarterly frequency, whereas Accornero et al. (2017) use only a subsample of the loans for firms with a total exposure exceeding €75,000 and adopt an annual frequency. As a result, our sample size is approximately 30 million observations, while Accornero et al.'s sample size is around 900 thousand. Our results continue to hold when we limit ourselves to the universe of exposures exceeding €75,000, or include all the exposures above €30.000, but exclude the observations before the change in the threshold.

4.1 Discrete-time Hazard Analysis

Is group affiliation beneficial to firms? If so, is it particularly important when bank health deteriorates and credit availability declines? To answer these questions, we test whether group affiliation raises firm survival probabilities, using a discrete-time hazard model with time-varying covariates (Allison, 1982; Singer and Willett, 1993). The model defines the hazard probability for a given firm *i* over discrete time intervals (one year in our context), as follows:

$$P_{i,t} = \text{Prob}\ (T_i=t \mid T_i>=t, X_{i,t}, \text{fixed effects})$$

where $P_{i,t}$ represents the probability that firm *i* fails in period *t*, conditional on having survived until the beginning of the interval.[18] We will allow this probability to depend on a set of time-varying, firm-specific variables ($X_{i,t}$) and a set of year specific fixed effects described below. So, for example, the hazard rate for 2011 would be equal to the probability that the firm fails during the year 2011, conditional on its having survived to the beginning of that year and conditional on its covariates at the beginning of that year, as well as year fixed effects. Because time is measured in discrete intervals (years), these hazard rates are proper probabilities. We model them using a linear probability model for simplicity of interpretation, but as we show in the appendix the results are similar using the logistic function for $P_{i,t}$.

One major advantage of our approach is that time-varying covariates can be introduced and their coefficients estimated easily. Since we want to draw inferences about the utility of the internal capital market (i.e., the role of capital transfers), we need to control for the economic environment, the set of cost conditions and the state of demand conditions facing firms, as these will all have a large effect on survival but might be correlated with group affiliation. In addition, we need to account for firm size, as larger firms likely can

[18] Given that the data are observed at yearly frequency, discrete time methods are the natural choice in this context. The use of Cox continuous time proportional hazard model would be computationally very problematic due to the fact that multiple firms would be experiencing an event (failure) in the same time interval (see Allison, 1982).

absorb larger negative shocks without failing compared to smaller firms. Similarly, older firms may be less informationally opaque than younger firms, more able to access external finance, and, therefore, may have a higher probability of survival.[19] Given these controls, we then argue that any residual effect of group status on survival reflects advantages of the internal capital market. Since all firms in Italy experience a challenging economic downturn, this test should be quite powerful. As a preliminary exercise that avoids making parametric assumptions, we report below the raw survival rates by plotting the Kaplan-Meier estimate of the survival function and hazard rates over time by group status.

We then parameterize the survival model, as follows:

$$P_{i,t} = \beta_1 Group_i + \beta_2 Bad\ Loans_{i,t-1} + \beta_3 Group_i \times Bad\ Loans_{i,t-1} + \quad (2)$$
$$+ \beta_4 Sales\ Growth_{i,t-1} + \beta_5 Cash\ Flow_{i,t-1}/Assets_{i,t-2} \quad +$$
$$\beta_6 Log\ asset\ ratio_{i,t-1} + \beta_7 Log\ age_i + Fixed\ Effects$$

where *i* represents the firm and *t* the year. In Equation (2), the coefficients β_1 and β_3 capture the impact of *Group* on the probability failure, and β_2 and β_3 capture *Bad Loans*. To capture the effect of specific shocks faced by firms, we include lagged values of both *Sales Growth* and *Cash Flow/Assets* (*Cash Flow* for short). We interact *Bad Loans* with *Group* to test whether the importance of bank health declines for firms with access to an internal capital market. As additional controls, we also include firm age (in log form), as well as the log of the ratio of a given firm's asset relative to the sum of assets across all group-affiliated firms. This variable captures the relative size for group-affiliated firms. Because all unaffiliated firms have an asset ratio of 1.0 by definition, they have no impact on the estimation of β_7 (since Log (1.0) = 0). The fixed effects capture interactions of time with industry, region, firm size-bins (which may be specific to group versus non-group members).

Our sample includes only those firms that were present in the sample in 2006. Because later entrants are not considered, the model is a proper survival analysis. Given

[19] Firm age may also proxy for hard-to-observe variables such as managerial risk aversion, which likely affect failure rates. Note that our results linking failure rates to group status are not sensitive to whether or not we control for age.

the linear specification for $P_{i,t}$, we estimate the model by OLS applied to the pooled sample, with a dummy dependent variable equal to one in the year of failure and zero otherwise (Allison, 1982). We classify a firm as 'failed' when it disappears permanently from the sample. In some (few) cases, we miss the firm balance sheet for one year, or even more, but then the firm reappears in the sample. In these cases we delete the entire string of information for that firm. In the same spirit, we end our survival analysis in 2013 and classify as failed in that year only firms that do not have a balance sheet both in 2013 and 2014. In spite of these adjustments, some measurement error may remain in using exit as a proxy for failure.[20]

The results for the Kaplan-Meier estimate of the survival function are reported in Figure 6, while Table 4 reports the estimates of the discrete-time hazard estimate of Eq. 2. The simple results from the Kaplan-Meier analysis – which are no more than the raw survival and hazard rates themselves – suggest that the survival of a group-affiliated firm is greater than that of unaffiliated firms. For instance, the probability that a firm belonging to a group survives from 2006 until 2013 is about 56 percent, compared to about 50 percent for unaffiliated firms. These estimates, of course, do not control for firm level differences in growth opportunities or internal cash flow or for the industrial regional or size characteristics (time invariant or time varying). As a result one cannot attribute the differences in survival to a pure group effect, operating, for instance, through intra-group transfers.

To address fundamentals, Table 4A presents estimates of Equation 2. In column 1, we control (in addition to log age) for a common year effect and for industry, region and size effects. We allow for 25 industries, 20 regions and two firm-size categories (small firms have fewer than 50 employees and sales or asset less than €10 million, with others classified as large). In column 2, we introduce a firm's *Cash Flow* and *Sales Growth* as

[20] We follow mostly the methodology applied by the National Statistical Institute. Inactive firms are represented by the subset of the population of companies active in year t that are not active either in t + 1 and t + 2, as suggested by lack of balance sheet information or zero sales or employment. Although we do not adjust for mergers and acquisition, most of these firms have failed. While a small fraction may exit through M&A, such activity slowed down substantially during the years which we focus on, likely because of distress in the financial sector. For example, there were only about 350 M&A events per year in Italy during our sample (KPMG, 2017); this represents only about 1.4% of the firms that exit the sample during that period.

additional regressors, as well as the *Bad Loans* ratio. In column 3, we allow the set of fixed effects to vary depending on whether or not a firm is group affiliated. In these models, the direct effect of *Group* in Equation 2 is absorbed.

Recalling that a negative coefficient on a variable means that it lowers the probability of failing, we see that unaffiliated firms fail at greater rates than group members. In column (1), the coefficient suggests the annual failure probability is about 1.7 percentage points lower for group-affiliated firms. This cumulates over our 7 year period to about 11 percentage points, which is greater than what we see from the Kaplan-Meier analysis. In column (2), the effect of group affiliation becomes stronger. Moreover, we see that both bank health (*Bad Loans*) and a firm's own fundamentals enter the model as one would expect. More bank distress is associated with greater failure. Conversely, higher sales and higher cash flow are associated with lower failure. Increasing *Bad Loans* by one standard deviation (=0.021) increases failure rates by about 0.43 percentage points. In the models with the simpler set of fixed effect, *Bad Loans* does not interact with *Group*. However, once we introduce the more complete set of fixed effects that vary also by group affiliation (column 3), the interaction becomes negative and statistically significant. This suggests that the effect of a firm's bank health on its failure is about half as important for group-affiliated firms, consistent with their ability to substitute to the internal capital market when lending becomes constrained.

In Table 1 of the Appendix we present the results obtained when we assume that the probability has the logistic form. We report the average marginal effects that translate the coefficients into the marginal effect of a variable on the probability of failure averaged across observations, which are more comparable with the coefficients of the linear probability model. The effects are similar in most cases in terms of size and significance.

To unpack the relative importance of access to both the internal and external capital market, we make two changes to the survival model: first, we split the sample based on group affiliation; second, we control for the fundamentals – both *Sales growth* and *Cash Flow* – at other group-affiliated firms. The former change allows all slope coefficients to differ between group affiliated and non-affiliated firms. The latter change allows us to test whether firms owned by groups whose 'brother and sister' firms have stronger fundamentals, all else equal, have greater rates of survival. We also develop a placebo test

by constructing pseudo-groups from unaffiliated firms, with one pseudo-group built to mirror each actual group. To do so, we sample (with replacement) from the set of unaffiliated firms in 2006 to match the number of firms and their industry and regional distribution for each actual group in that year. With this sample, we can test whether the *Other Sales Growth* and *Other Cash Flow* variables only matter for firm survival for firms that are parts of real (opposed to pseudo) business groups. For the pseudo-groups, these two variable come from the hypothetical 'brother and sister' firms that we have constructed in the pseudo-groups. Since they represent sales and cash for firms that are not really associated with the firm to which they have been assigned, their effect on survival ought to be zero.

Table 4B reports these results. Column 1 contains coefficients for unaffiliated firms, column 2 reports the coefficients using the pseudo-group results (i.e., the placebo test), columns 3 and 4 for firms in groups. The sample size is substantially smaller for the pseudo-groups because the unaffiliated firms drop out of the sample at higher rates than the group-affiliated firms (recall Table 4A).

As expected, *Sales Growth* and *Cash flow* continue to affect failure rates very strongly. The effect of *Bad Loans* is larger (nearly double) for the unaffiliated firms compared to group affiliated firms; this difference, as can be seen in Table 4A, is statistically significant. This occurs because these unaffiliated firms have no internal capital market; hence, they rely more on external suppliers of capital. Increasing *Bad Loans* by one standard deviation raises annual failure risk by 0.48% (=0.021 x 0.2307) for unaffiliated firms but only by about 0.27% for group-affiliated firms. Firms in groups have access to a wider pool of internal capital. This makes them less vulnerable to shocks to their banks.

The potential to share resources across the group's internal capital market is associated with lower failure, as can be seen in column 4 of Table 4B. When 'brother and sister' firms have high sales and/or substantial cash flow, this firm is less likely to fail. In other words, comparing two group-affiliated firms with similar fundamentals, the one with access to a stronger internal capital market is more likely to survive. The magnitude is sizeable: a standard deviation increase in *Other Cash flow* (=0.306) leads to a decline in annual failure rates of 0.12%. Moreover, we find very small effects which are not

statistically significant of both *Other Sales Growth* and *Other Cash Flow* in the placebo test. Note that the impact of *Other Cash Flow* and *Other Sales Growth* can only be estimated for groups that have sufficient diversification, since correlated shocks would not add explanatory power to the failure model.[21]

Table 4C introduces interactive effects between *Bad Loans* and firm fundamentals. To ease the interpretation of the direct coefficients, we center the variables around zero (by demeaning them) before building the interaction terms. Hence, the direct effects in Table 4C can be compared easily with those in 4B. The results suggest strong interactive effects. To be precise, the effect of a firm's own fundamentals becomes substantially stronger when its banks are distressed. That is, both own *Sales Growth* and own *Cash Flow* interact negatively with *Bad Loans*. Said differently, firms are most likely to fail when their own fundamentals are weak and access to external capital is constrained. Yet the results also continue to show that unaffiliated firm survival depends more on its bank health than that of group-affiliated firms.

4.2 Intra-group Capital Transfers

Together, the results of Table 4 suggest that group affiliation helps firms survive by increasing their potential to share funds between firms owned by the same group. And, crucially, that group-affiliated firm survival depends less on the health of their banks, consistent with internal capital markets providing a substitute source of funds. But, do firms actually share financial resources using the internal capital market? And, do they use the internal capital market more when banks are distressed? If internal capital markets explain group survival value, then financial resource sharing ought to be more pronounced when external markets become distressed.

[21] All else equal, more diversification across group-affiliated firms may enhance survival, but much of this effect is captured by controlling for *Other Cash Flow* and *Other Sales Growth*. In an earlier draft, for example, we compared survival of larger (and thus more diversified) v. smaller groups. For the sake of simplicity and to get our main message across in a simple way we do not pursue this angle in this version of the paper. Moreover, we do not find a statistically significant effect of adding an indicator for large group affiliation to the survival of Table 4A, column (1). Hence, we do not report the results split based on group size.

To test this notion, we regress capital transfers between group affiliated firms on investment opportunities (proxied by *Sales Growth)*, on *Cash flow* (to capture the potential ability to share finance within the internal capital market), and *Bad Loans* (to capture credit available from the external finance). Investment opportunities measure a firm's *demand* for financial resources, while cash flow measures a firm's *supply* of internal financial resources. If the firm's relative demand exceeds its internal supply of cash, then it would need to fill a financing gap either through a within-group transfer or by accessing the external market.

Given this conceptual framework, we report regressions with the following structure:

$$\begin{aligned} &Net\ Transfer_{i,t} = \beta_1 Sales\ Growth_{i,t} + \beta_2 Other\ Sales\ Growth_{i,t} \qquad (3) \\ &+ \beta_3 Cash\ Flow_{i,t}/Assets_{i,t-1} + \beta_4 Other\ Cash\ Flow_{i,t}/Assets_{i,t-1} \\ &+ \beta_5 Bad\ Loans_{i,t-1} \times Sales\ Growth_{i,t} + \beta_6 Bad\ Loans_{i,t-1} \times Other\ Sales\ Growth_{i,t} \\ &+ \beta_7 Bad\ Loans_{i,t-1} \times Cash\ Flow_{i,t}/Assets_{i,t-1} \\ &+ \beta_8 Bad\ Loans_{i,t-1} \times Other\ Cash\ Flow_{i,t}/Assets_{i,t-1} + \beta_9 Bad\ Loans_{i,t-1} \\ &+ Fixed\ effects + \varepsilon_{i,t}. \end{aligned}$$

In Equation (3), *i* represents the firm and *t* the year. As in the survival analysis, we demean variables before building the various interaction effects, so the coefficients on direct-effect variables represent marginal effect of the variable at the mean of the distribution.

We report the two measures for *Net Transfer* described in Section 3.1: the first includes intra-group net financial borrowing scaled by the end of previous period assets (we call this the *Intra-Group Net Financial Position*); the second adds the intra-group net trade position (accounts payable minus accounts receivable) to the intra-group net financial position in the numerator (we call this the *Intra-Group Net Financial and Trade Position*).

The sample includes only group-affiliated firms, as only such firms have access to an internal capital market. To capture unobserved heterogeneity, we include a series of granular fixed effects: industry-year, province-year, and firm.[22] We allow for 286

[22] We have used the Stata command *reghdfe.* See Correia (2016).

industrial sectors and 105 provinces, which generates much more detailed year effects in our linear regression for intra-group transfers than in the survival models. In some specifications, we also add a group-specific year effects. By including so many fixed effects, we are able to remove potential sources of bias related to economic conditions at the industry and geographical levels. Since we allow these effects to vary with time, they will account for the rapid deterioration in the Italian economy during our sample period (recall Figure 1). To construct standard errors, we double cluster by firm and by group-year.

Equation (3) explicitly models the idea that relative demand for and supply of funds is what motivates capital transfers. *Other Sales Growth* captures the demand for funds elsewhere in the group (i.e., other firms in the same internal capital market), defined as in the survival analysis. *Other Cash flow/Assets (Other Cash Flow* for short*)* captures the availability of funds elsewhere in the group, and is also defined as in the survival analysis. Conversely, *Sales Growth* captures the effects of this firm's demand for funds and *Cash Flow* captures this firm's supply of investable funds. We normalize each of the cash flow measures by the firm's assets at the end of the previous period; since the outcome is normalized with the same denominator, the coefficients have a natural interpretation as the marginal effect of an additional unit of cash flow on intra-firm transfers. As we did before, variables in the interaction terms are demeaned, so that the coefficient of the non-interacted variables captures their effect at the mean of the distribution. In the most general specification, we incorporate group x year fixed effects. This empirical strategy, by differencing out the group-time means, is equivalent to re-defining the effects of investment opportunities and cash resources in a *relative* sense within a given group in a given year.

Table 5 reports the estimates for Equation (3). We report each regression first for *Intra-Group Net Financial Position*$_t$*/Assets*$_{t-1}$ (columns 1–2), and then for *Intra-Group Net Financial and Trade Position*$_t$*/Assets*$_{t-1}$ (columns 3–4). Positive coefficients indicate that an increase in the explanatory variable leads a firm to use more funds from the internal capital market (that is, to borrow), whereas negative coefficients mean that an increase in the explanatory variable leads the firm to supply more funds to the internal capital market (to lend).

Both *Cash Flow* and *Other Cash Flow* affect capital transfers strongly: firms with high cash flow lend to the internal capital market and those with low cash flow borrow; in contrast, firms in groups with other high-cash firms are able to borrow more (i.e., the coefficient on *Other Cash Flow* is positive and statistically significant).[23] All four specifications suggest that group-affiliated firms make greater use of capital transfers when their banks are weak, particularly with regard to the effects of *Cash Flow* on transfers. Own *Cash Flow* interacts strongly with *Bad Loans*, implying much larger magnitudes during the crisis years, when *Bad Loans* are highest (recall Figure 4).[24]

Figure 7 helps interpret the implications of these interactive models by plotting the marginal effect of *Cash Flow* across the distribution of *Bad Loans* (using coefficients from Table 5, column 2, with group specific year effects). We report the marginal effects across the distribution of lagged *Bad Loans,* varying from 0.01 to 0.07. The effect is consistently negative and statistically significant, meaning that firms with low cash flow borrow from the internal capital market (and vice versa for those with high cash flow). Moreover, the magnitude increases as bank health worsens. These coefficients have a natural interpretation because they represent funds available for investment (unlike sales growth, which acts as a proxy that helps capture future investment opportunities). At the overall mean for *Bad Loans*, the marginal effect of cash flow is about –0.13. This effect implies that a 1€ increase in cash lowers (net) borrowing from the affiliated firms by 0.13€. For firms whose banks are one standard deviation above the median of *Bad Loans*, the marginal effect increases. For these firms, each 1€ decline in internal cash brings about 0.20€ transfer from other group members.

To understand the effect of bank health on internal transfers, Figure 8 reports the reverse experiment, plotting the marginal effect of *Bad Loans* for varying levels of *Cash Flow*. This exercise suggests that *Bad Loans* positively affect internal capital transfers to

[23] This result on *Other Cash Flow* is not significant when we add in trade credit. Our focus, however, is on the financial transfers. Adding trade credit reduces the sample substantially, so the results are not directly comparable.

[24] In Appendix Table 2, we report the results for the subsample of firms that do not switch their ownership type (say from group-affiliated to unaffiliated or vice versa). They constitute the overwhelming majority of the sample. The results obtained are similar to those discussed in the text. In Table 3 of the Appendix, we present the results obtained when we use our broader index of bank health (see end of Section 3.3, p. 16). Note that an increase in the index denotes improvements in bank health. Although there are some differences, most of the fundamental conclusions do not change.

firms when cash flow is low. For firms with higher cash flow, the effect signs negatively, although it is not statistically significant. Firms with low cash borrow more from the internal capital market as their bank(s) becomes more distressed. Thus, firms with both very low internal cash resources and with weak banks are most reliant on the internal capital market transfers, as we would expect.

Robustness across various permutations of fixed effects helps allay the concern that omitted variables can explain our results. But, fixed effects do not address endogeneity questions that might come from reverse causality. For example, perhaps firms receiving more capital transfers are able to use the capital to generate higher sales growth. However, if transfers indeed help promote sales, this would be an indication that funds were not wasted in not sales enhancing expenditures. Nevertheless, we have also estimated the regressions after allowing sales growth to be endogenous and using its own lagged values (once and twice) as additional instruments. These results are similar in terms of sign, size and significance and are not reported here.[25] There is also a potential endogeneity issue for cash flow, based on a parallel argument. The problem is less worrisome because it would generate a positive coefficient on *Cash Flow*, not a negative one as we find. Reverse causality also cannot explain why *Cash Flow*'s effect would become so much greater in magnitude when banks become distressed.

We have also estimated models like those in Equation (3) that allow the effects of *Cash Flow* (along with the other variables) to vary over time, rather than using *Bad Loans* as the main interaction. This model thereby measures the sensitivity of capital transfers to both investment opportunities (sales growth) and cash flows on a year by year basis. Rather than report all of these coefficients, Figure 9 summarizes the main finding by graphing the coefficient on *Cash Flow* over time. The results suggest that the cash flow coefficient is not statistically significant before 2009, is consistently negative thereafter, and increases in absolute value as the banking problems in Italy grow worse over these years. Hence, firms seem to use the internal capital markets more aggressively as the banking system ceases to function well.

[25] Results are not reported here, but are available from the authors'.

Is the Internal Capital Market Efficient?

We have seen that group membership increases firm survival, and that groups move capital across firms during the crisis years when the banking system is under stress. Are these actions efficiency enhancing? Or, are groups propping up weak firms (perhaps for reasons related to agency problems)? Our results tend to point toward efficiency. For example, sales growth is a predictor of firm survival and also, in some cases, of intra-group capital transfers. In the model of column 1 of Table 5, the effect of sales growth is positive and significant at the mean value of *Bad Loans* (but this ceases to be the case as *Bad Loans* increase), but not for the remaining specifications.

To investigate the issue of efficiency further, Table 6 reports the financial transfer models of Table 5, after adding an indicator variable equal to one for firms with above-median sales growth for that year and its interaction with the two cash flow variables (own and other). While the above-median indicator is an imperfect measure of investment opportunities, it is the best that we have. Efficiency in the internal capital market would imply that low cash flow firms with high sales ought to receive more intra-group transfers than low cash flow firms with low sales. In other words, *Above-Median Sales*Cash Flow* ought to enter negatively. The opposite would be true for other cash flow, meaning that *Above-Median Sales*Other Cash Flow* ought to enter positively.

We find precisely these effects, and they are significant in the model with group-year effects for both dimensions of cash flow shocks (own and other). The economic effect is large. For example, the incremental effect of *Cash Flow* on internal transfers rises in (absolute) magnitude by about 0.02 to 0.07 for high-sales firms, which represents a large increase above the effect of *Cash Flow* for low sales growth firms. In addition, having sales growth above the median is associated with larger transfers to the firm (although now the categorical sales growth variable absorbs the effect of the continuous sale growth variable). Taken together, our results provide some evidence that groups make efficient use of their internal capital markets.[26]

[26] We have also tested whether capital transfers respond more to cash flow for the largest firm within groups. The evidence, which might point toward agency-based explanations for transfers, does not suggest that transfers are more sensitive to cash flow in the case of 'dominant' firms. We do not report these results here, but they are available from the authors.

Sharing Bank Debt Capacity

Firms use internal transfers to share cash flow, and they do so most when their bank(s) is distressed. Do they also use internal transfers to share debt capacity? To test this mechanism, for each firm we construct *Other Bank Debt*, equal to the sum of bank borrowing across all other affiliated firms within the group. We include only the bank borrowing from other firms because a firm's own borrowing will be endogenously related to its use of internal funds. This augmented model captures an additional benefit to group-affiliation, which is the potential to share collateral and/or reputational capital through internal transfers, both of which increase its borrowing capacity.

The results in Table 7 confirm, as expected, that *Other Bank Debt* enters significantly with a positive effect, meaning firms borrow from the internal capital market when their 'brother and sister' firms have greater access to external capital. We do not find, however, that this effect interacts with the health of the firm's banks (i.e., *Bad Loans* does not interact with *Other Bank Debt*).[27]

5. Conclusions

We have shown that group affiliation becomes very important for firm survival during the economic and financial distress that has plagued the Italian economy in recent years. This effect does not reflect differences in fundamentals or cash flow to firms. Group affiliation is not strongly correlated with changes in firm's fundamentals during the crisis years, as both affiliated and unaffiliated firms' fortunes deteriorated sharply. But group-affiliated firms have access to internal capital markets, which allows them to survive despite declining credit supplied by banks. Indeed, their survival increases not only when own fundamentals are stronger, but also when fundamentals of other group-affiliated firms

[27] Appendix Tables 4 and 5 introduce the *Main-Bank Share* to the core models for survival (Table 4A) and intra-group flows (Table 5), to test whether our main result changes when we control for the strength of the firm's main bank relationship (see, for example, Gobbi and Sette, 2015). In both of these cases, we also introduce a fixed effect to capture the number of banks from which a firm borrows, since firms borrowing from many banks will mechanically have lower *Main-Bank Share*. Firms borrowing more from their main lender are more likely to survive (negative coefficient), but our core result remains almost unchanged (Appendix Table 4). In the intra-group flows regressions, our core result again remains largely unchanged (Appendix Table 5).

are stronger. Moreover, we show that bank health, conditional on fundamentals, matters for survival, but its effect is smaller for group-affiliated firms than for unaffiliated firms.

As direct evidence of the substitution towards internal capital markets, we show that firm use internal capital transfers more when the health their own bank(s) deteriorates. Those transfers move funds from relatively cash-rich to relatively cash-poor firms within the internal capital market. There is also some evidence that transfers also respond positively to better investment opportunities and that the marginal effect of a drop in cash flow on transfers is greater for high sale growth firms belonging to groups. These findings highlight the importance of internal sources of funds combined with an active internal capital market as a substitute for banking and external finance.

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Appendix

Bank level variables – Source: Supervisory Reports, Bank of Italy

(Bank level) *Bad Loans*: exposures to insolvent counterparties (even if not legally ascertained or formally written off).

Total Assets: bank's total assets.

Bad Loans ratio: bad loans over total assets.

Capital Ratio: bank capital over total assets

Liquidity: asset liquidity ratio, defined as cash plus securities over assets

Funding: funding stability ratio, defined as deposits plus bonds sold to households over assets.

Loan quality and lending relationship – Source: Credit Register, Bank of Italy

(Firm-bank level) *Bad Loans* (as explanatory variable) end of year weighted average of the lending banks' ratio of bad loans to total assets (*bad loans ratio*), where the weights equal the fraction of credit received by a given firm *i* from each of its banks *b*.

$$Bad\ Loans_{i,t} = \sum_{b=1}^{n} \frac{loans_{i,b,t}}{\sum_{b=1}^{n} loans_{i,b,t}} * \frac{bad\ loans_{b,t}}{total\ assets_{b,t}}$$

Firm level variables – Source: Balance sheet register (Cerved)

Sales Growth: the annual percentage change in real sales; industry GDP deflator used to deflate nominal sales.

Cash Flow: net income minus extraordinary items plus depreciation and amortization divided by end of previous year total assets; firm, year-level.

Other Sales Growth: the annual percentage change in real sales of all other firms affiliated with the same group; industry GDP deflator used to deflate nominal sales.

Other Cash Flow: the average of *cash flow* for all other firms affiliated with the same group divided by end of previous year total assets.

Total Assets: firm's total assets.

Asset ratio: total assets of the firm/total assets of all firms affiliated with the same group.

Bank Debt: total amount of financial debt owed by a given firm towards all banks.

Total Borrowing: total amount of financial debt owed by a given firm.

Gross Intra-Group Financial Debt: total amount of financial debt owed by a given firm to all other firms affiliated with the same group.

Intra-Group Net Financial Position: total amount of financial debt owed by a given firm to all other firms affiliated with the same group, net of credit given, divided by end of previous year total assets.

Intra-Group Net Trade Position: total amount of trade debt owed by a given firm to all other firms affiliated with the same group, net of credit given, divided by end of previous year total assets.

Intra-Group Net Position (total): intra-group net financial position plus intra-group net trade position divided by end of previous year total assets.

Employees: number of employees.

Age: the number of years from date of incorporation of the company.

Table 1: Summary statistics

This table reports summary statistics for the universe of firms based in Italy. The description of variables and their data sources are provided in the Appendix.

	Group-affiliated firms					Unaffiliated firms				
	Mean	Std. Dev.	Percentiles 25th	50th	75th	Mean	Std. Dev.	Percentiles 25th	50th	75th
Panel A: 2004–2008										
Sales growth	0.117	0.569	–0.134	0.011	0.203	0.100	0.494	–0.144	0.013	0.214
Total assets	11,844	380,596	424	1,317	4,199	1,923	57,676	149	417	1,165
Cash flow/Assets	0.037	0.075	0.002	0.030	0.073	0.046	0.099	0.001	0.036	0.091
Total borrowing/Assets	0.339	0.317	0.022	0.275	0.558	0.294	0.305	0.000	0.207	0.499
Intra-group net fin. position/Assets	0.028	0.210	–0.056	0.001	0.081					
Intra-group net positions (total)/Assets	–0.019	0.239	–0.128	–0.019	0.070					
Other Sales growth	0.071	0.407	–0.111	0.018	0.171					
Other Cash flow/Assets	0.178	0.374	0.002	0.029	0.155					
Log(Asset ratio)	–1.656	1.626	–2.372	–1.158	–0.429					
Bad Loans/Assets	0.022	0.012	0.014	0.020	0.028	0.022	0.012	0.013	0.019	0.028
Log(Age)	2.269	0.973	1.609	2.398	3.045	2.070	0.970	1.386	2.079	2.833
Number of firms			160,519					362,665		
Panel B: 2009–2014										
Sales growth	0.031	0.498	–0.206	–0.022	0.137	0.015	0.419	–0.202	–0.024	0.139
Total assets	11,281	363,385	422	1,296	4,058	1,801	61,077	151	415	1,141
Cash flow/Assets	0.030	0.078	–0.001	0.026	0.067	0.038	0.098	–0.001	0.031	0.082
Total borrowing/Assets	0.322	0.299	0.027	0.261	0.535	0.277	0.284	0.000	0.196	0.470
Intra-group net fin. position/Assets	0.021	0.215	–0.065	0.002	0.083					
Intra-group net position (total)/Assets	–0.021	0.243	–0.136	–0.019	0.072					
Other Sales growth	–0.001	0.374	–0.185	–0.021	0.118					
Other Cash flow/Assets	0.136	0.306	0.001	0.023	0.124					
Log(Asset ratio)	–1.549	1.499	–2.212	–1.091	–0.432					
Bad Loans/Assets	0.039	0.021	0.023	0.034	0.050	0.038	0.022	0.023	0.034	0.049
Log(Age)	2.213	1.047	1.609	2.398	3.045	2.066	1.047	1.386	2.197	2.890
Number of firms			200,562					444,021		

Notes: (1) All figures obtained after winsorizing at the 5th and 95th percentiles. (2) Total borrowing includes all forms of external and internal (gross) financial debt. (3) Intra-group net financial position includes intra-group financial borrowing minus intra-group financial lending. (4) Intra-group net position (total) includes intra-group financial borrowing minus lending plus intra-group net trade debt (accounts payable minus accounts receivable). (5) Total assets in thousands of euros.

Table 2: Transition matrix for the universe of Italian firms

This table reports transition probabilities for the universe of firms based in Italy over two, non-overlapping periods: 2006 to 2010 and 2010 to 2014. The description of variables and their data sources are provided in the Appendix.

		Unaffiliated firms	Small and large domestic groups	Foreign groups	Exit (No balance sheet)
		2010			
2006	Unaffiliated firms	59.49%	8.05%	0.12%	32.34%
	Small and large domestic groups	13.02%	56.97%	0.37%	29.64%
	Foreign groups	8.03%	10.86%	50.99%	30.12%
	New firms	72.24%	27.33%	0.43%	0.00%
		2014			
2010	Unaffiliated firms	54.55%	5.61%	0.06%	39.77%
	Small and large domestic groups	9.42%	54.47%	0.22%	35.89%
	Foreign groups	6.19%	9.37%	55.34%	29.10%
	New firms	72.07%	27.49%	0.44%	0.00%

Table 3: Bank loan supply growth

This table reports regressions of the change in the log of bank loans at the firm-bank-quarter level, as a function of lender characteristics and fixed effects. Standard errors appear in parenthesis. ***, **, * indicate significance at the 99%, 95% and 90% level, respectively. Columns 1, 2, 4 and 5 include all of the data, while columns 3 and 6 drop observations below the 1st and above the 99th percentile of the distribution, based on the dependent variable.

Dependent Variable	ΔLog Loans$_{i,b,t}$					
	(1)	(2)	(3)	(4)	(5)	(6)
Bad Loans$_{b,t-1}$	–0.1069***	–0.2063***	–0.0767***	–0.0893***	–0.1954***	–0.0715***
	(0.0107)	(0.0118)	(0.0060)	(0.0154)	(0.0168)	(0.0085)
Liquidity$_{b,t-1}$	-	0.0312***	0.0152***	-	0.0395***	0.0162***
		(0.0043)	(0.0023)		(0.0061)	(0.0031)
Capital Ratio$_{b,t-1}$	-	0.2088***	0.0687***	-	0.2325***	0.0624***
		(0.0082)	(0.0039)		(0.0113)	(0.0054)
Funding$_{b,t-1}$	-	0.0039	0.0118***	-	-0.0028	0.0053**
		(0.0036)	(0.0018)		(0.0051)	(0.0025)
Log Assets$_{b,t-1}$	–0.0131***	–0.0154***	–0.0067***	–0.0163***	–0.0197***	–0.0098***
	(0.0005)	(0.0008)	(0.0004)	(0.0007)	(0.0011)	(0.0005)
Firm*Quarter FE	No	No	No	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm Clustered St. Errors	Yes	Yes	Yes	Yes	Yes	Yes
Observations	39,978,328	39,978,328	39,178,762	30,341,104	30,341,104	29,567,021

Table 4A: Firm failure by group affiliation

This table reports a linear probability model for firms existing in 2006, from that year until 2013. Firms that exit the sample during this period are modelled as failures, while those that survive are right-censored. Sample includes both group-affiliated and unaffiliated firms. Firms that enter the sample after 2006 are excluded. Standard errors in parenthesis. ***, **, * indicate significance at the 99%, 95% and 90% level, respectively.

Dependent Variable	Firm Failure		
	(1)	(2)	(3)
Group	–0.0170***	–0.0314***	-
	(0.0004)	(0.0012)	
Bad Loans $_{t-1}$	-	0.2037***	0.2304***
		(0.0272)	(0.0289)
Group*Bad Loans $_{t-1}$	-	–0.0121	–0.1081**
		(0.0393)	(0.0481)
Cash Flow$_{t-1}$/Asset$_{t-2}$	-	–0.6769***	–0.6768***
		(0.0051)	(0.0051)
Sales Growth$_{t-1}$	-	–0.0393***	–0.0392***
		(0.0008)	(0.0008)
Log (asset ratio)$_{t-1}$	-	–0.0173***	–0.0174***
		(0.0005)	(0.0005)
Log age	–0.0235***	–0.0230***	–0.0229***
	(0.0002)	(0.0003)	(0.0003)
Industry*Year FE	Yes	Yes	No
Region*Year FE	Yes	Yes	No
Firm size*Year FE	Yes	Yes	No
Group*Industry*Year FE	No	No	Yes
Group*Region*Year FE	No	No	Yes
Group*Firm size*Year	No	No	Yes
Firm Clustered St. Errors	Yes	Yes	Yes
Observations	1,827,975	900,487	900,487

Table 4B: Firm failure and access to group-level cash flow and sales growth and bank health

This table reports a linear probability model for firms existing in 2006, from that year until 2013. Firms that exit the sample during this period are modeled as failures, while those that survive are right-censored. Firms that enter the sample after 2006 are excluded. In column 2, we construct pseudo-groups by combining unaffiliated firms into groups that mirror the structure of actual groups based on industry and region. In these tests, the *Other Sales Growth* and *Other Cash Flow* variables reflect the average outcomes for pseudo-group affiliated firms. Standard errors appear in parenthesis. ***, **, * indicate significance at the 99%, 95% and 90% level, respectively.

Dependent Variable	Firm Failure			
	Unaffiliated	Unaffiliated Placebo Test	Group-Affiliated	
	(1)	(2)	(3)	(4)
Bad Loans$_{t-1}$	0.2307***	0.3785***	0.1277***	0.0995**
	(0.0290)	(0.0752)	(0.0383)	(0.0400)
Own Fundamentals:				
Sales Growth$_{t-1}$	–0.0457***	–0.0283***	–0.0280***	–0.0263***
	(0.0011)	(0.0024)	(0.0013)	(0.0013)
Cash Flow$_{t-1}$/Asset$_{t-2}$	–0.7000***	–0.6480***	–0.6010***	–0.5704***
	(0.0061)	(0.0139)	(0.0092)	(0.0098)
Other Fundamentals:				
Other Sales Growth$_{t-1}$	-	–0.0019	-	–0.0031**
		(0.0026)		(0.0013)
Other Cash Flow$_{t-1}$/Asset$_{t-2}$	-	–0.0002	-	–0.0397***
		(0.0002)		(0.0032)
Other Controls				
Log (asset ratio)$_{t-1}$	-	–0.0106***	–0.0180***	–0.0219***
		(0.0007)	(0.0005)	(0.0006)
Log age	–0.0250***	–0.0228***	–0.0184***	–0.0172***
	(0.0004)	(0.0009)	(0.0005)	(0.0005)
Industry*Year FE	Yes	Yes	Yes	Yes
Region*Year FE	Yes	Yes	Yes	Yes
Firm size*Year FE	Yes	Yes	Yes	Yes
Firm Clustered St. Errors	Yes	Yes	Yes	Yes
Observations	613,069	134,888	287,418	253,597

Table 4C: Firm failure and access to group-level cash flow and sales growth and bank health

This table reports a linear probability model for firms existing in 2006, from that year until 2013. Firms that exit the sample during this period are modeled as failures, while those that survive are right-censored. Firms that enter the sample after 2006 are excluded. Standard errors appear in parenthesis. ***, **, * indicate significance at the 99%, 95% and 90% level, respectively.

Dependent Variable	Firm Failure		
	Unaffiliated	Group-Affiliated	
	(1)	(2)	(3)
Bad Loans$_{t-1}$	0.2343***	0.1424***	0.1147***
	(0.2343)	(0.1424)	(0.1147)
Own Fundamentals:			
Sales Growth$_{t-1}$	–0.046***	–0.0284***	–0.0267***
	(–0.046)	(–0.0284)	(–0.0267)
Sales Growth$_{t-1}$*Bad Loans$_{t-1}$	–0.3427***	–0.3657***	–0.3573***
	(0.0766)	(0.0935)	(0.0983)
Cash Flow$_{t-1}$/Asset$_{t-2}$	–0.6999***	–0.602***	–0.5712***
	(–0.6999)	(–0.602)	(–0.5712)
Cash Flow$_{t-1}$/Asset$_{t-2}$*Bad Loans$_{t-1}$	–1.8940***	–5.4095***	–4.9832***
	(0.4285)	(0.6457)	(0.6884)
Other Fundamentals:			
Other Sales Growth$_{t-1}$	-	-	–0.0029**
			(–0.0029)
Other Sales Growth$_{t-1}$*Bad Loans$_{t-1}$	-	-	–0.1364
			(0.0979)
Other Cash Flow$_{t-1}$/Asset$_{t-2}$	-	-	–0.0401***
			(–0.0401)
Other Cash Flow$_{t-1}$ /Asset$_{t-2}$*Badloans$_{t-1}$	-	-	–0.2039
			(0.1896)
Other Controls			
Log (asset ratio)$_{t-1}$	-	–0.0180***	–0.0219***
		(–0.018)	(–0.0219)
Log age	–0.025***	–0.0184***	–0.0172***
	(–0.025)	(–0.0184)	(–0.0172)
Industry*Year FE	Yes	Yes	Yes
Region*Year FE	Yes	Yes	Yes
Firm size*Year FE	Yes	Yes	Yes
Firm Clustered St. Errors	Yes	Yes	Yes
Observations	613,069	287,418	253,597

Table 5: Intra-group capital transfers and bank health

This table reports regressions of intra-group transfers as a function of sales growth, cash flow and bad loans at the firm-level and cash flow and sales growth for other firms affiliated with the same group. Increases in the dependent variable reflect increased borrowing from group-affiliated sources. Standard errors in parenthesis. ***, **, * indicate significance at the 99%, 95% and 90% level, respectively.

Dependent Variable	Intra-Group Net Financial Position$_t$/Assets$_{t-1}$		Intra-Group Net Financial and Trade Position$_t$/Assets$_{t-1}$	
	(1)	(2)	(3)	(4)
Own Fundamentals:				
Sales Growth$_t$	0.0023**	0.0029	0.0000	0.0012
	(0.0009)	(0.0024)	(0.0017)	(0.0036)
Sales Growth$_t$*Bad Loans$_{t-1}$	–0.1206**	–0.1916*	–0.0898	–0.1791
	(0.0568)	(0.1085)	(0.0996)	(0.1716)
Cash Flow$_t$/Asset$_{t-1}$	–0.0869***	–0.1259***	–0.1608***	–0.2023***
	(0.0115)	(0.0219)	(0.0174)	(0.0314)
Cash Flow$_t$/Asset$_{t-1}$*Bad Loans$_{t-1}$	–2.6131***	–2.2147**	–3.2849***	–4.2202***
	(0.5096)	(0.8919)	(0.7418)	(1.2338)
Bad Loans$_{t-1}$	0.0237	0.0978	0.1153	0.0408
	(0.0527)	(0.0953)	(0.0772)	(0.1311)
Other Fundamentals:				
Other Sales Growth$_t$	–0.0000	0.0014	0.0008	0.0091
	(0.0009)	(0.0040)	(0.0016)	(0.0067)
Other Sales Growth$_t$*Bad Loans$_{t-1}$	–0.0007	–0.1275	0.0916	–0.4141
	(0.0590)	(0.1692)	(0.0993)	(0.2673)
Other Cash Flow$_t$ /Asset$_{t-1}$	0.0272***	0.0238***	0.0072	–0.0038
	(0.0052)	(0.0078)	(0.0076)	(0.0110)
Other Cash Flow$_t$ /Asset$_{t-1}$*Bad Loans$_{t-1}$	0.1168	–0.0661	–0.1403	0.1553
	(0.1855)	(0.2443)	(0.2464)	(0.3148)
Industry*Year FE	Yes	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes	Yes
Group*Year FE	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Group*Year & Firm Clustered St. Errors	Yes	Yes	Yes	Yes
Observations	127,450	70,524	75,280	43,042
R-squared	0.780	0.865	0.791	0.881

Table 6: Intra-group capital transfers and bank health with above-median sales indicator, by group size

This table reports regressions of intra-group transfers as a function of sales growth, cash flow and bad loans at the firm-level and cash flow and sales growth for other firms affiliated with the same group. A dummy for above median sales growth and its interactions with the cash flow variables are also introduced. Increases in the dependent variable reflect increased borrowing from group-affiliated sources. Standard errors in parenthesis. ***, **, * indicate significance at the 99%, 95% and 90% level, respectively.

Dependent Variable	Intra-Group Net Financial Position$_t$/Assets$_{t-1}$	
	(1)	(2)
Own Fundamentals:		
Sales Growth$_t$	-0.0040	-0.0004
	(0.0012)	(0.0028)
Sales Growth$_t$*Bad Loans$_{t-1}$	-0.1199**	-0.2055*
	(0.0576)	(0.1139)
Cash Flow$_t$/Asset$_{t-1}$	-0.0830***	-0.1119***
	(0.0131)	(0.0265)
Cash Flow$_t$/Asset$_{t-1}$*Bad Loans$_{t-1}$	-2.6803***	-2.1115**
	(0.5156)	(0.9339)
Bad Loans$_{t-1}$	0.0413	0.1239
	(0.0533)	(0.0990)
Other Fundamentals:		
Other Sales Growth$_t$	-0.0002	0.0005
	(0.0009)	(0.0042)
Other Sales Growth$_t$*Bad Loans$_{t-1}$	0.0128	-0.1691
	(0.0592)	(0.1790)
Other Cash Flow$_t$ /Asset$_{t-1}$	0.0198***	0.0147*
	(0.0057)	(0.0088)
Other Cash Flow$_t$ /Asset$_{t-1}$*Bad Loans$_{t-1}$	0.1567	-0.0188
	(0.1868)	(0.2496)
Cash Flow Interactions:		
Above-Median Sales Growth	0.0036***	0.0050***
	(0.0009)	(0.0018)
Above-Median Sales*Cash Flow$_t$/Assets$_{t-1}$	-0.0168	-0.0688***
	(0.0141)	(0.0255)
Above-Median Sales*Other Cash Flow$_t$/Assets$_{t-1}$	0.0121***	0.0141**
	(0.0043)	(0.0057)
Industry*Year FE	Yes	Yes
Province*Year FE	Yes	Yes
Group*Year FE	No	Yes
Firm FE	Yes	Yes
Group*Year & Firm Clustered St. Errors	Yes	Yes
Observations	127,094	69,572
R-squared	0.787	0.872

Table 7: Intra-group capital transfers and debt capacity

This table reports regressions of intra-group transfers as a function of sales growth, cash flow and bad loans at the firm-level and cash flow, sales growth and bank debt for other firms affiliated with the same group. Increases in the dependent variable reflect increased borrowing from group-affiliated sources. Standard errors in parenthesis. ***, **, * indicate significance at the 99%, 95% and 90% level, respectively.

Dependent Variable	Intra-Group Net Financial Position$_t$/Assets$_{t-1}$	
	(1)	(2)
Own Fundamentals:		
Sales Growth$_t$	0.0020**	0.0029
	(0.0010)	(0.0024)
Sales Growth$_t$*Bad Loans$_{t-1}$	–0.1037*	–0.1676
	(0.0620)	(0.1096)
Cash Flow$_t$/Asset$_{t-1}$	–0.0893***	–0.1393***
	(0.0125)	(0.0227)
Cash Flow$_t$/Asset$_{t-1}$*Bad Loans$_{t-1}$	–2.5762***	–2.1706**
	(0.5601)	(0.9124)
Bad Loans$_{t-1}$	0.0379	0.0847
	(0.0578)	(0.0985)
Other Fundamentals:		
Other Sales Growth$_t$	0.0007	0.0032
	(0.0010)	(0.0040)
Other Sales Growth$_t$*Bad Loans$_{t-1}$	–0.0078	–0.1388
	(0.0676)	(0.1728)
Other Cash Flow$_t$ /Asset$_{t-1}$	0.0193***	0.0084
	(0.0055)	(0.0081)
Other Cash Flow$_t$ /Asset$_{t-1}$*Bad Loans$_{t-1}$	0.0739	–0.2203
	(0.2170)	(0.2796)
Other Debt Capacity:		
Other Bank Debt$_{t-1}$/Assets$_{t-1}$	0.0077***	0.0108***
	(0.0011)	(0.0014)
Other Bank Debt$_{t-1}$/Assets$_{t-1}$*Bad Loans$_{t-1}$	0.0305	0.0405
	(0.0327)	(0.0421)
Industry*Year FE	Yes	Yes
Province*Year FE	Yes	Yes
Group*Year FE	No	Yes
Firm FE	Yes	Yes
Group*Year & Firm Clustered St. Errors	Yes	Yes
Observations	111,643	67,982
R-squared	0.780	0.865

Figure 1: Italian GDP growth rate and aggregate bad loans ratio

This figure reports Italian GDP growth rate and the ratio of aggregate bad loans to total loans to the (non-bank) private sector for the Italian banking system from 2003 to 2015. The description of variables and their data sources are provided in the Appendix.

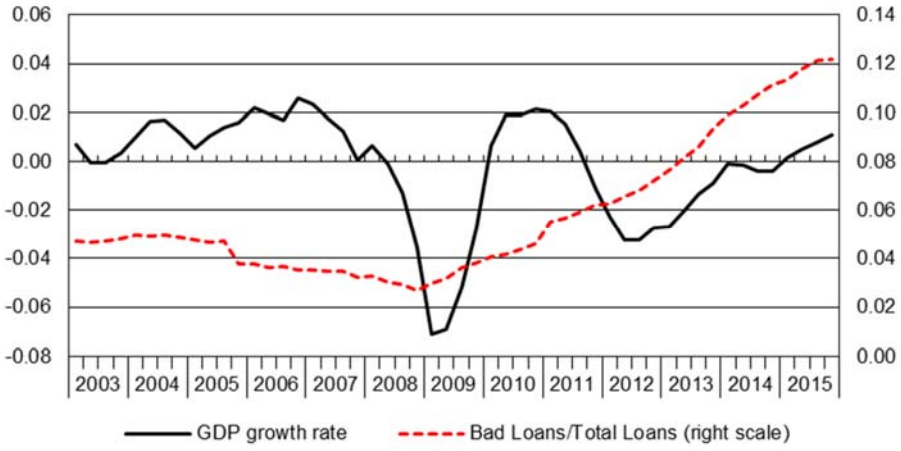


Figure 2: Gross intra-group financial debt and bank debt

This figure reports the growth in aggregate gross intra-group financial debt, bank debt for continuing firms. Values in 2004 normalized to 100. The description of variables and their data sources are provided in the Appendix.

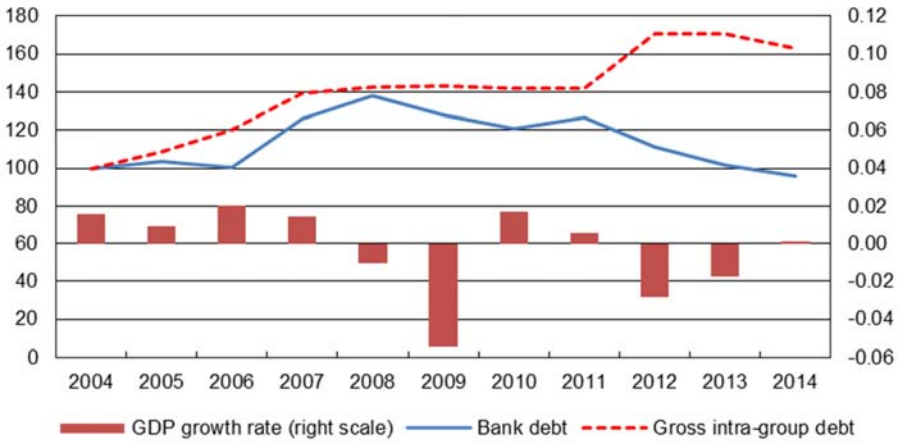


Figure 3: Gruppo PAM SpA

The figure represents the structure of one Italian business groups in our sample, with a holding company, sub-holding company, and its operating subsidiaries.

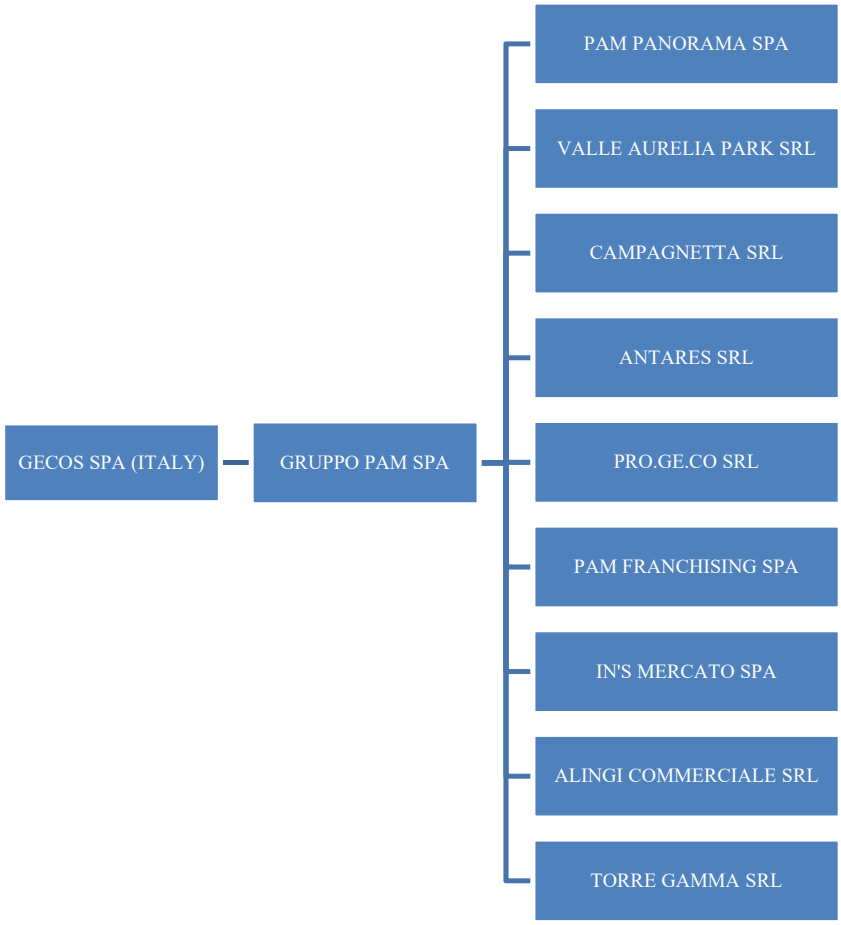
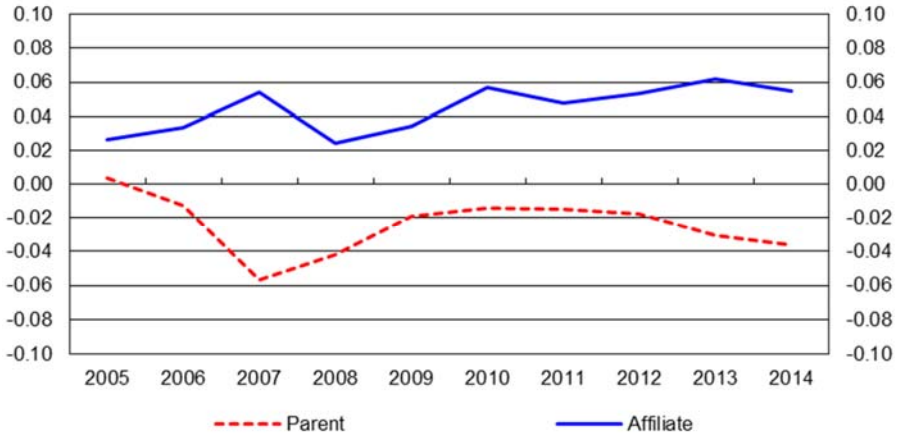


Figure 4: Intra-group credit and debt flow by firm layer and direction

These figures report intra-group net financial position (i.e. gross debt minus gross credit over total asset) and bank debt ratio (over total asset) by parent and affiliated firms.

(a) Intra-group net financial position



(b) Bank debt

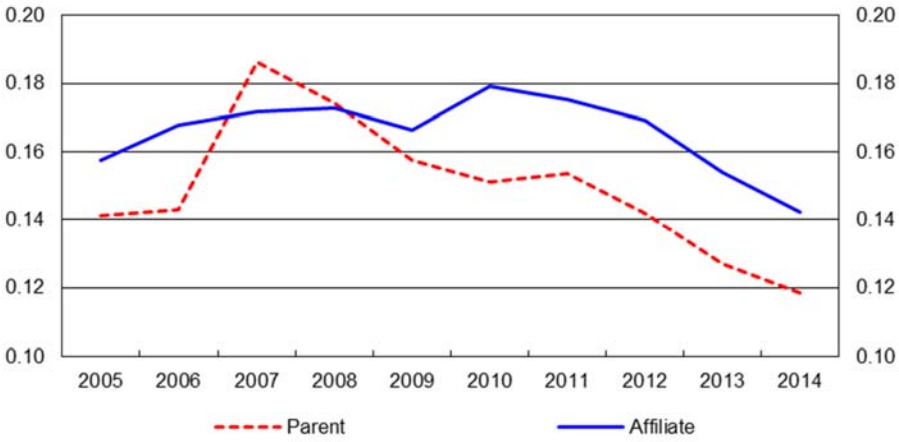


Figure 5: Bad loans

This figure reports the time-series and cross-sectional variation of the median and 5th and 95th percentile range for the firm-bank's bad loans-to-assets ratio, from 2004 to 2014. The description of variables and their data sources are provided in the Appendix.

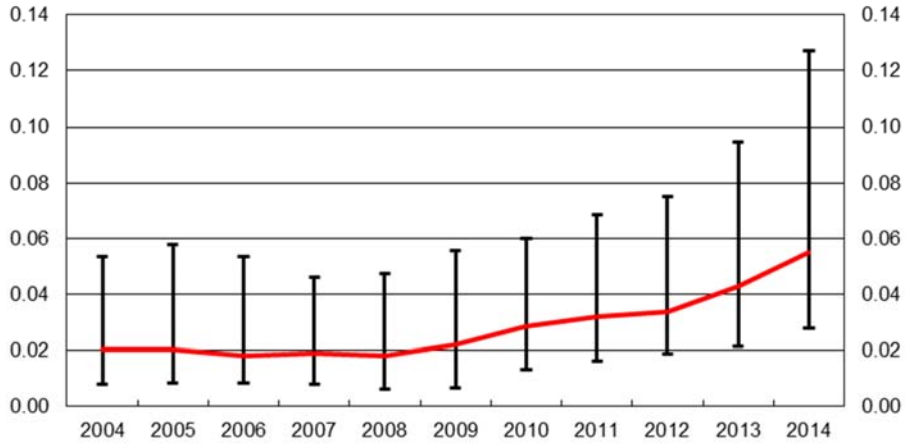


Figure 6: Kaplan-Meier survival estimates

This figure plots the Kaplan-Meier survival estimates for firms that exist in 2006 over the subsequent seven years (until 2013). The vertical axis equals the fraction of firms that remain in the sample in that year.

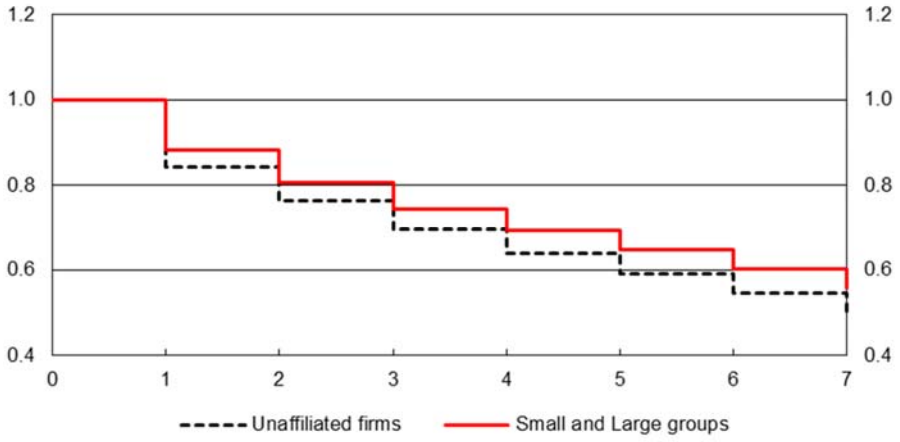


Figure 7: Marginal effect of cash flow

This figure plots the marginal effect of *Cash Flow* on intra-group net financial transfers (vertical axis) as a function of *Bad Loans* (horizontal axis), based on the model in column 2 of Table 5.

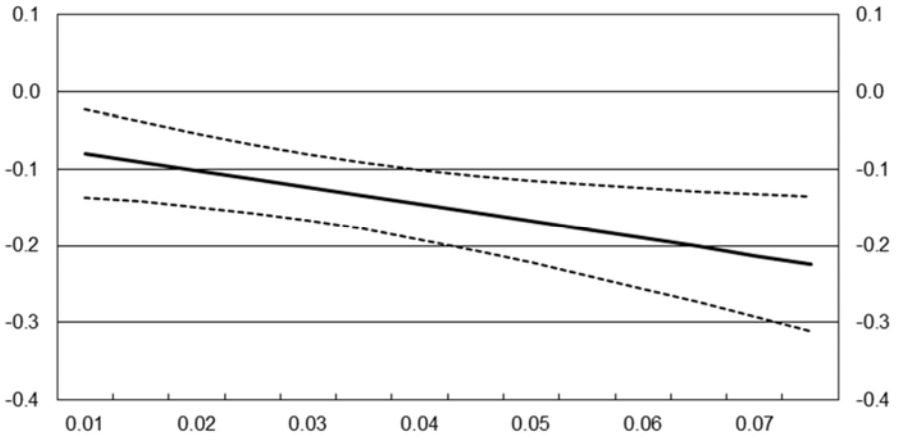


Figure 8: Marginal effect of bad loans

This figure plots the marginal effect of *Bad Loans* on intra-group net financial transfers (vertical axis) as a function of *Cash Flow* (horizontal axis), based on the model in column 2 of Table 5.

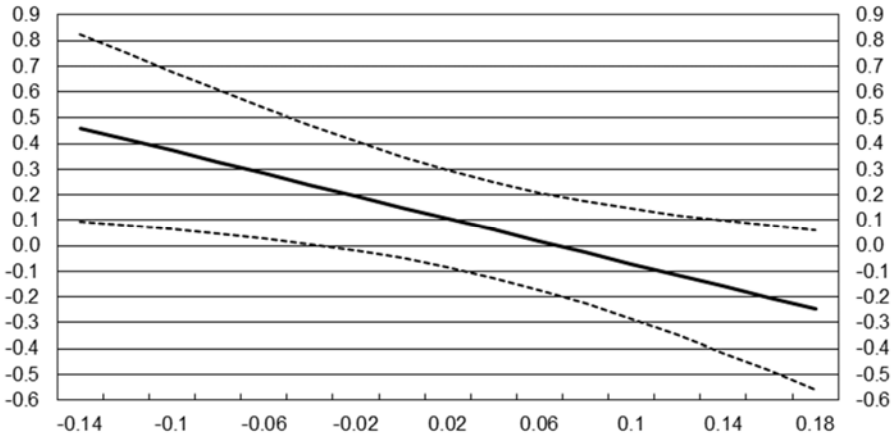
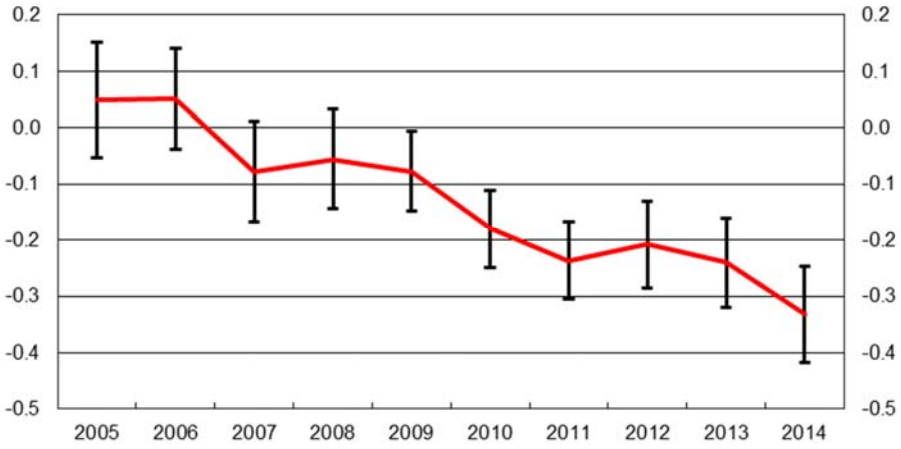


Figure 9: Cash flow coefficients by year

This figure reports the coefficient on firm *Cash Flow* in regressions of intra-group net financial transfers like those of Table 5, allowing the marginal effect to vary in each year in the sample.



APPENDIX

Appendix Table 1: Firm failure by group affiliation, logit

This table reports average marginal effects from a logit model for firms existing in 2006, from that year until 2013. Firms that exit the sample during this period are modelled as failures, while those that survive are right-censored. Sample includes both group-affiliated and unaffiliated firms. Firms that enter the sample after 2006 are excluded. Standard errors in parenthesis. ***, **, * indicate significance at the 99%, 95% and 90% level, respectively.

Dependent Variable	Firm failure		
	(1)	(2)	(3)
Group	–0.0174***	–0.0277***	-
	(0.0004)	(0.0007)	
No Group x Bad Loans $_{t-1}$	-	0.2009***	0.2270***
		(0.0268)	(0.028)
Group*Bad Loans $_{t-1}$	-	0.1815***	0.1294***
		(0.0291)	(0.0344)
Cash Flow$_{t-1}$/Asset$_{t-2}$	-	–0.5765***	–0.5745***
		(0.004)	(0.004)
Sales Growth$_{t-1}$	-	–0.0352***	–0.0351***
		(0.0009)	(0.0009)
Log (asset ratio)$_{t-1}$	-	–0.0136***	–0.0135***
		(0.0003)	(0.0004)
Log age	–0.0223***	–0.0197***	–0.0197***
	(0.0002)	(0.0003)	(0.0003)
Industry*Year FE	Yes	Yes	No
Region*Year FE	Yes	Yes	No
Firm size*Year FE	Yes	Yes	No
Group*Industry*Year FE	No	No	Yes
Group*Region*Year FE	No	No	Yes
Group*Firm size*Year FE	No	No	Yes
Firm Clustered St. Errors	Yes	Yes	Yes
Observations	1,827,975	900,487	900,487

Appendix Table 2: Intra-group capital transfers and bank health for firms that never switch ownership

This table reports regressions of intra-group transfers as in Table 5 (columns 1 & 2), but drops any firm that switches its ownership type (say, from group-affiliated to unaffiliated). Increases in the dependent variable reflect increased borrowing from group-affiliated sources. Standard errors in parenthesis. ***, **, * indicate significance at the 99%, 95% and 90% level, respectively.

Dependent Variable	Intra-Group Net Financial Position$_t$/Assets$_{t-1}$	
	(1)	(2)
Own Fundamentals:		
Sales Growth$_t$	0.0031***	0.0040
	(0.0010)	(0.0027)
Sales Growth$_t$*Bad Loans$_{t-1}$	–0.0964	–0.1616
	(0.0643)	(0.1247)
Cash Flow$_t$/Asset$_{t-1}$	–0.1183***	–0.1744***
	(0.0126)	(0.0241)
Cash Flow$_t$/Asset$_{t-1}$*Bad Loans$_{t-1}$	–2.3835***	–2.2419**
	(0.5732)	(0.9758)
Bad Loans$_{t-1}$	0.0271	0.1394
	(0.0581)	(0.1041)
Other Fundamentals:		
Other Sales Growth$_t$	0.0002	0.0042
	(0.0010)	(0.0048)
Other Sales Growth$_t$*Bad Loans$_{t-1}$	–0.0099	0.0145
	(0.0657)	(0.1942)
Other Cash Flow$_t$ /Asset$_{t-1}$	0.0280***	0.0268***
	(0.0056)	(0.0085)
Other Cash Flow$_t$ /Asset$_{t-1}$*Bad Loans$_{t-1}$	0.2044	0.3002
	(0.2110)	(0.2709)
Industry*Year FE	Yes	Yes
Province*Year FE	Yes	Yes
Group*Year FE	No	Yes
Firm FE	Yes	Yes
Group*Year & Firm Clustered St. Errors	Yes	Yes
Observations	113,734	61,524
R-squared	0.768	0.859

Appendix Table 3: Intra-group capital transfers and bank health using different index of bank health

This table reports regressions of intra-group transfers as in Table 5 (columns 1 & 2), using a broader index of bank health containing bad loans, liquidity, the capital ratio, funding stability and bank size, each weighted by the coefficients of column 2 in Table 3. Increases in the dependent variable reflect increased borrowing from group-affiliated sources. Standard errors in parenthesis. ***, **, * indicate significance at the 99%, 95% and 90% level, respectively.

Dependent Variable	Intra-Group Net Financial Position$_t$/Assets$_{t-1}$	
	(1)	(2)
Own Fundamentals:		
Sales Growth$_t$	0.0035***	0.0049**
	(0.0009)	(0.0024)
Sales Growth$_t$*Bank Health$_{t-1}$	0.0305	0.0321
	(0.0278)	(0.0525)
Cash Flow$_t$/Asset$_{t-1}$	–0.0984***	–0.1381***
	(0.0112)	(0.0207)
Cash Flow$_t$/Asset$_{t-1}$*Bank Health$_{t-1}$	0.5862*	1.2348**
	(0.3116)	(0.5070)
Bank Health$_{t-1}$	0.0367	0.0643
	(0.0307)	(0.0515)
Other Fundamentals:		
Other Sales Growth$_t$	0.0001	0.0030
	(0.0009)	(0.0040)
Other Sales Growth$_t$*Bank Health$_{t-1}$	–0.0301	0.0634
	(0.0323)	(0.0844)
Other Cash Flow$_t$ /Asset$_{t-1}$	0.0205***	0.0160**
	(0.0050)	(0.0073)
Other Cash Flow$_t$ /Asset$_{t-1}$*Bank Health$_{t-1}$	0.2146**	0.1402
	(0.1020)	(0.1436)
Industry*Year FE	Yes	Yes
Province*Year FE	Yes	Yes
Group*Year FE	No	Yes
Firm FE	Yes	Yes
Group*Year & Firm Clustered St. Errors	Yes	Yes
Observations	135,648	76,609
R-squared	0.773	0.862

Appendix Table 4: Firm failure, with Main Bank Share

This table reports a linear probability model for firms existing in 2006, from that year until 2013. Column 1 reproduces the result from Table 4A (col. 3), and column 2 adds *Main Bank Share* and its interaction with *Group*. Firms that exit the sample during this period are modelled as failures, while those that survive are right-censored. Sample includes both group-affiliated and unaffiliated firms. Firms that enter the sample after 2006 are excluded. Standard errors in parenthesis. ***, **, * indicate significance at the 99%, 95% and 90% level, respectively.

	Original Model	Model with Bank Share
	(1)	(2)
Main Bank Share$_{t-1}$		−0.0226***
		(0.0019)
Group*Main Bank Share$_{t-1}$		0.0004
		(0.0023)
Bad Loans $_{t-1}$	0.2304***	0.2665***
	(0.0289)	(0.0290)
Group*Bad Loans $_{t-1}$	−0.1081**	−0.1034**
	(0.0481)	(0.0482)
Cash Flow$_{t-1}$/Asset$_{t-2}$	−0.6768***	−0.6803***
	(0.0051)	(0.0052)
Sales Growth$_{t-1}$	−0.0392***	−0.0394***
	(0.0008)	(0.0008)
Log (asset ratio)$_{t-1}$	−0.0174***	−0.0162***
	(0.0005)	(0.0005)
Log age	−0.0229***	−0.0206***
	(0.0003)	(0.0003)
Group*Industry*Year FE	Yes	Yes
Group*Region*Year FE	Yes	Yes
Group*Firm size*Year FE	Yes	Yes
Number of Banks FE	No	Yes
Firm Clustered St. Errors	Yes	Yes
Observations	900,487	785,196

Appendix Table 5: Intra-group capital transfers and bank health, with Main Bank Share

This table reports regressions of intra-group transfers as a function of sales growth, cash flow and bad loans at the firm-level and cash flow and sales growth for other firms affiliated with the same group. Increases in the dependent variable reflect increased borrowing from group-affiliated sources. Columns (1) and (2) reproduce the results of Column (1) and (2) of Table 5, while columns (3) and (4) add *Main Bank Share* and its interactions with the other regressors. Standard errors in parenthesis. ***, **, * indicate significance at the 99%, 95% and 90% level, respectively.

	Original Models (no Bank Relationship)		Models with Bank Relationship	
	(1)	(2)	(3)	(4)
Own Fundamentals:				
Sales Growth$_t$	0.0023**	0.0029	0.0018**	0.0017
	(0.0009)	(0.0024)	(0.0009)	(0.0024)
Sales Growth$_t$*Bad Loans$_{t-1}$	–0.1206**	–0.1916*	–0.1141**	–0.1812*
	(0.0568)	(0.1085)	(0.0567)	(0.1085)
Cash Flow$_t$/Asset$_{t-1}$	–0.0869***	–0.1259***	–0.0843***	–0.1108***
	(0.0115)	(0.0219)	(0.0113)	(0.0215)
Cash Flow$_t$/Asset$_{t-1}$*Bad Loans$_{t-1}$	–2.6131***	–2.2147**	–2.6572***	–2.2855**
	(0.5096)	(0.8919)	(0.5099)	(0.8889)
Bad Loans$_{t-1}$	0.0237	0.0978	0.0447	0.1382
	(0.0527)	(0.0953)	(0.0529)	(0.0969)
Other Fundamentals:				
Other Sales Growth$_t$	–0.0000	0.0014	–0.0001	0.0010
	(0.0009)	(0.0040)	(0.0009)	(0.0041)
Other Sales Growth$_t$*Bad Loans$_{t-1}$	–0.0007	–0.1275	–0.0018	–0.1314
	(0.0590)	(0.1692)	(0.0591)	(0.1704)
Other Cash Flow$_t$ /Asset$_{t-1}$	0.0272***	0.0238***	0.0220***	0.0214***
	(0.0052)	(0.0078)	(0.0054)	(0.0081)
Other Cash Flow$_t$ /Asset$_{t-1}$*Bad Loans$_{t-1}$	0.1168	–0.0661	0.1335	–0.0289
	(0.1855)	(0.2443)	(0.1878)	(0.2484)

(Continued)

Bank Relationships:				
Main-Bank Share$_{t-1}$			0.0161***	0.0129**
			(0.0034)	(0.0062)
Sales Growth*Main-Bank Share$_{t-1}$			0.0046	0.0113*
			(0.0035)	(0.0064)
Cash Flow*Main-Bank Share$_{t-1}$			–0.1287***	–0.2701***
			(0.0351)	(0.0618)
Bad Loans*Main-Bank Share$_{t-1}$			–0.1470	-0.3157
			(0.1270)	(0.2320)
Other Sales*Main-Bank Share$_{t-1}$			–0.0016	0.0022
			(0.0035)	(0.0088)
Other Cash Flow*Main-Bank Share$_{t-1}$			0.0309**	0.0335*
			(0.0149)	(0.0188)
Industry*Year FE	Yes	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes	Yes
Group*Year FE	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Group*Year & Firm Clustered St.	Yes	Yes	Yes	Yes
Number of Banks FE	No	No	Yes	Yes
Observations	127,450	70,524	127,450	70,524
R-squared	0.780	0.865	0.780	0.865