Navigating crises. Organizational innovation and managerial restructuring in bad times

Minetti, Raoul and Murro, Pierluigi and Peruzzi, Valentina and Schaffer, Matthew

Michigan State University, LUISS University, Sapienza University of Rome, Eastern Michigan University

April 2025

Navigating Crises. Organizational Innovation and Managerial Restructuring in Bad Times

Raoul Minetti*
Michigan State University

Pierluigi Murro
LUISS University

Valentina Peruzzi
Sapienza University of Rome

Matthew Schaffer
Eastern Michigan University

Abstract

This paper investigates the interplay between financial frictions, organizational innovation and managerial restructuring among Italian small and medium-sized enterprises during the Great Financial Crisis. Using firm-level data from the VIII UniCredit survey, we find that financial constraints spurred managerial and organizational innovation, suggesting a Schumpeterian-like response to the downturn. The analysis reveals that this effect was stronger for relatively young and small firms operating in services industries. Limited entrenchment with financial institutions and propensity to engage in financial innovation facilitated firms' organizational transformations. While we find no evidence of an across-the-board effect of public support on firms' organizational and managerial innovations, the results indicate that public policies eased the reorganization efforts of financially constrained firms.

Keywords: Organizational Innovation; Managerial Restructuring; Crises; Financial Innovation.
JEL codes: O30; L20; G32.

1 Introduction

Financial crises constitute major challenges for firms, but they also offer opportunities for rethinking business goals and organizational structures. The financial tensions experienced during crises hinder firms' ability to conduct business as usual. These same disruptions, however, may motivate firms to rationalize the organization of their activities in order to more efficiently use human and financial resources. This perspective, originally inspired by

*Corresponding author. Email: minetti@msu.edu. Address: Department of Economics, 486 W. Circle Drive, 110 Marshall-Adams Hall, Michigan State University, East Lansing, MI 48824-1038, USA. We wish to thank several seminar and conference participants for helpful comments and conversations. All remaining errors are ours.

Schumpeter (1911; 1942), suggests that firms could ultimately emerge stronger from crises. Despite a general consensus on the possible coexistence of these opposite forces, empirical evidence on these issues remains scarce. Further, the limited evidence is generally confined to firms' propensity to improve products or production processes. Managerial and organizational structures are however increasingly found to significantly affect firms' performance and productivity (see, e.g., Bloom and Van Reenen, 2007).

In this paper, we study how the occurrence of the Great Financial Crisis (GFC) of 2009 influenced the managerial and organizational structure of small and medium-sized Italian businesses. Our data refer to a large set of small Italian firms, which are clients of the major Italian banking group UniCredit, drawn from the VIII UniCredit survey. This survey targets about 7,500 firms operating in manufacturing and services industries, featuring predominantly small size (15 employees on average). This survey is ideal for our purposes as it provides unusually rich details on firms' managerial and organizational decisions. In particular, it provides information on managerial practices, such as the allocation of managers to different tasks and locations of the firm as well as methods of interaction, communication and exchange of competencies among managers and between managers and other firm employees. The survey also provides information on workforce organization methods (e.g., divisional and operational units, hierarchical levels, and decentralization of business decisions), and on external relationships with public institutions and distribution and marketing intermediaries. These dimensions of firms' internal and external organization are considered to be crucial for firms' core production and investment activities (Bloom and Van Reenen, 2007). Several of these activities are naturally intensive in external financing needs. Thus, firms under the pressure of a financial crisis could be induced to restructure their organizational and managerial structure in order to more efficiently use scarce resources and maximize the chance of surviving the crisis. The survey also contains information on financial tensions faced by firms, as captured by measures of credit rationing.

The experience of Italian small and medium-sized enterprises offers compelling anecdotal evidence that crises can promote organizational innovation. For example, in 2009, the

firm Grafica Veneta evolved from a small family business to a major player in the publishing industry, demonstrating the importance of continuous organizational change for business success. Similarly, the development of the Acqua & Sapone retail chain and the innovative waste management strategies in the Bacino Padova consortium exemplify how strategic vision, innovation, and teamwork can spur business growth during challenging times. The experience of the manufacturers Brembo and Technogym further illustrates how Italian firms have leveraged organizational innovation during crises. Brembo has become a leader in braking system design and production, focusing on strategic innovation. Similarly, Technogym has succeeded in the fitness and wellness equipment sector by focusing on continuous organizational change during the great financial crisis. Figure 1 summarizes information on the intensity of organizational changes during the financial crisis for the firms covered by the UniCredit survey, aggregated at the industry level. The figure reveals, for example, that during the crisis no less than 30% of manufacturers engaged in some form of managerial reorganization and about 40% carried out reorganizations of their workforce. There is also clear heterogeneity across industries. The unconditional frequency of managerial and workforce reorganizations was higher in manufacturing than in services, construction or retail. On the other hand, firms in retail featured a disproportionate propensity to reorganize their external relationships with marketing and distribution intermediaries.

After controlling for a large set of firm characteristics and fixed effects, the estimation results reveal a generally positive association between credit rationing and salient forms of managerial and organizational innovation. During the crisis, firms constrained in their access to credit were more likely to undertake managerial improvements, reorganize their workforce, and revisit their external relationships with public institutions and distribution intermediaries. This suggests a potential "Schumpeterian" response to financial frictions during the crisis, where constraints serve not simply as barriers but as drivers of organizational innovation. The empirical findings remain significant when we account for endogeneity issues by employing a propensity score matching (PSM) and an instrumental variables approach. For PSM, we split the sample based on credit rationing status and match firms of the two subgroups (credit

rationed and not) to ensure comparability across the variables that may be correlated with reorganization activities. Then, once the treatment and control groups are formed, we rerun our baseline regressions on this selected subset of firms, obtaining results in line with our baseline findings. For the instrumental variables approach, we exploit information on the major merger occurred in 2007 between the UniCredit banking group, of which our sample firms are clients, and another major Italian banking group, Capitalia. More specifically, we consider as instruments the share of branches of the merging banks, relative to the total number of branches in the province, and the difference between the provincial share of branches of the merging banks. Bank mergers can represent important shocks to firms' exposure to credit rationing (Peek and Rosengren, 1998; Sapienza, 2002). On the one hand, they can result in informational and efficiency gains. On the other hand, they may dilute existing credit relationships and increase banks' market power, particularly in cases where the merging banks have significant market overlap.

The richness of our database allows us to investigate possible heterogeneity in the effects along various dimensions. We find that the influence of credit rationing on organizational and managerial innovation varies significantly across firm characteristics, industries, and types of relationships with banks. In particular, younger and smaller firms (micro enterprises) appear to be more inclined to engage in organizational changes, including modifying their relationships with public institutions and carrying out managerial improvements. Such propensity to restructure activities is also found to be more pronounced for firms with relatively shorter banking relationships. Together, these findings suggest that firms that are more informationally opaque in financial markets could have stronger incentives to adapt their organization in response to financial tensions. Further, when we distinguish firms based on their core activity, we obtain that service firms are more likely to engage in reorganizations relative to manufacturers. This could reflect the fact that in services industries, intangible managerial resources may play a more significant role in firms' activities, and therefore firms could have stronger incentives to reorganize such resources.

We then study to what extent financial innovation and organizational innovation could be

complements or substitutes during a financial crisis. Although the firms in our sample are small and hence do not use sophisticated financial products, the survey asks firms whether they switched to new forms of debt during the crisis or they changed the primary sources of funding and if so, whether this was aimed at improving their access to financial and consulting services, and at supporting transformations inside the firm. The results point to a form of complementarity between financial innovation and organizational innovation. For instance, a firm that declares to use a new form of debt is 4.3% more likely to introduce managerial improvements. Moreover, a firm changing banks for more sophisticated services is 10.4% more likely to innovate its workforce organization, and a business changing banks for supporting its transformations is 13% more likely to engage in managerial reorganizations. This suggests that the adoption of new financial instruments could be functional to the reorganization efforts of a firm and also call for a renewal of its managerial resources in order to facilitate the usage of the new financial instruments.

Finally, in the last part of the paper we carry out a preliminary exploration of the influence of public policies (e.g., collaborations with the public administration) on firms' restructuring activities. Our findings indicate that, although in general firms' dependency on public support dilutes the incentives to engage in organizational changes, in the presence of financial frictions such reorganizations can be facilitated by the support of the public sector.

The paper contributes to two main strands of literature. First, we add to the research on the relationship between financial frictions and firm innovation. Most of the current studies investigate the impact of credit constraints on technological innovation, especially product and process innovation (Herrera and Minetti, 2007; Minetti, 2011; Canepa and Stoneman, 2008; Savignac, 2008; Brancati, 2015; Mancusi and Vezzulli, 2014; Araujo et al., 2019). To the best of our knowledge, previous literature has not investigated the effect of the Great Financial Crisis on firms' organizational and managerial innovation, which constitutes the core focus of this analysis. Second, the paper relates to the studies analyzing the impact of crises on firm innovation and long-term investments (Archibugi et al., 2013a; 2013b; 2017). In this sense, we provide support for the Schumpeterian view that crises spur on new innovation, in

the form of new organization models and managerial improvements. Finally, we contribute to the very scant literature on how financial innovation influences organizational changes, complementing the studies investigating the correlation between financial markets innovativeness and the adoption of new technologies within firms (Chang et al., 2019). In developing testable hypotheses in the next section, we further elaborate on the linkages with the literature.

The remainder of the paper is organized as follows. Section 2 presents the hypotheses to be tested empirically. Section 3 describes the institutional background, setting the context of our study. Section 4 presents the dataset and outlines the empirical methodology employed in the analysis. Sections 5 and 6 discuss the main findings and perform additional tests. Section 7 concludes.

2 Testable hypotheses

2.1 Crises and firms' organizational innovation

A number of studies have documented an increase in credit rationing around the Great Financial Crisis. Ivashina and Scharfstein (2010), Santos (2010), and Contessi and Francis (2013) report greater credit rationing by the US banking sector. Albertazzi and Marchetti (2010) and Iyer et al. (2014) show that the supply of credit to small and medium-sized enterprises in Italy and Portugal, respectively, decreased. Carbo-Valverde et al. (2011), Puri et al. (2011), and Jiménez et al. (2012) present similar evidence of rationing in European credit markets. It is therefore natural to expect that the small and medium-sized enterprises in our sample experienced a similar intensification of financial frictions during the crisis.

The literature has documented mixed evidence on the relationship between financial frictions and firm innovation. Savignac (2008) and Canepa and Stoneman (2008) find that financial constraints faced by firms reduce the probability of engaging in innovative activities. Mancusi and Vezzulli (2014) find that credit rationing negatively impacts R&D investment. While documenting that other factors such as market structure can influence firm innovation, Pellegrino and Savona (2017) similarly report a negative relationship between financial

constraints and innovative activities. A number of additional studies find that greater access to external finance is associated with higher rates of innovation (Ayyagari et al, 2011; Gorodnichenko and Schnitzer, 2013; Hall and Sena, 2017).

A related literature analyzes the impact of crises on firm innovation and long-term investments, although there is relatively little direct evidence on the relationship with managerial and organizational innovation. In general, financial constraints may inhibit firms from implementing key organizational and managerial innovations. For instance, lack of funding can hinder the adoption of advanced IT systems that facilitate improved data management and communication within a company. Similarly, insufficient resources might prevent a business from retaining or expanding its workforce, crucial steps for enhancing productivity and managerial efficiency. Additionally, financial constraints could hinder the firm's ability to restructure its operations to better align with strategic objectives, such as shifting to different business models or integrating sustainable practices that require initial capital outlays but promise long-term gains.

Hypothesis 1a. *Credit rationing associated with financial crises and economic downturns can undermine organizational innovation by limiting the financial resources available for restructuring activities.*

While the above studies indicate that financial frictions may depress organizational innovation, other works point to a positive channel, whereby financial constraints can stimulate organizational innovations aimed at enhancing efficiency with the goal of reducing waste of resources or costs that need to be covered buy external financing and reducing the time lag between cost payment and the arrival of revenues (Musso and Schiavo, 2008; Almeida et al., 2013; Jin et al., 2019). Such studies support the Schumpeterian view that crises can spur firms' restructuring. Belenzon et al. (2013) show that underdeveloped financial markets encourage organizational innovation aimed at creating more efficient internal capital markets. Archibugi et al. (2013b) find evidence of a countercyclical increase in innovation for small enterprises and new entrants in Europe after the GFC.

These results suggest a possible positive relationship between credit rationing and orga-

nizational innovation around a financial crisis. There is also reason to expect that organizational innovation may be less sensitive to the negative effects of economic downturns and credit crunches. Alarcon et al. (2019) show that, while product innovation tends to be sensitive to the state of the business cycle, organizational innovation is relatively stable. Using German data, Giebel and Kraft (2020) find that product innovation is more strongly affected by negative credit supply shocks than other types of innovation. Additionally, Nemlioglu and Mallick (2021) show that Turkish firms with better managerial practices tend to perform better in post-crisis periods, suggesting that firms have an incentive to take up managerial and organizational innovations in a crisis environment. These studies cumulatively point to an alternative hypothesis, that during a crisis firms may be encouraged to engage in organizational innovations in order to make a more efficient use of scarce resources.

Hypothesis 1b. *Credit rationing associated with financial crises and economic downturns can stimulate organizational innovation.*

The fact that the related literature can generate opposing hypotheses suggests there may be substantial heterogeneity in the effects of credit rationing on organizational innovation across firms, depending, for example, on firms' size, human capital and age. We also envisage a possible influence of firms' financial sophistication in driving reorganization activities during crises, as we now elaborate.

2.2 Financial and organizational innovation

There is little direct evidence on the relationship between firm financial innovations (e.g., switching banks or seeking new sources of finance) and organizational innovations. For instance, there is essentially no mention of financial factors as a determinant of organizational innovations in a highly cited review of the organizational innovation literature (Crossan and Apaydin, 2010). However, studies such as Freel (2007) and Lee et al. (2015) document that innovative small and medium-sized enterprises (SMEs) have a higher probability of applying for finance and a lower probability of a successful application compared to other firms. Lee et al. (2015), in particular, find that, following the 2009 crisis, SMEs in the United Kingdom

had a higher demand for finance while simultaneously facing a restricted supply. This suggests that innovative firms are more likely than their less innovative counterparts to seek new sources of financing. One may therefore expect a positive relationship between entering into new financial arrangements and engaging in innovative activities.

More broadly, the literature has identified a positive relationship between innovations in the financial system and technological innovation. Chang et al. (2019) report a positive relationship between financial and technological innovation at the firm level, as the initiation of credit default swap (CDS) trading on a firm's debt increases the firm's technological innovation output. Lechman and Marszk (2015) document a complementarity between technological innovation and financial innovation at the country level, as greater information and communications technology (ICT) penetration is associated with the development of exchange traded fund (ETF) markets. Yuan et al. (2021) find that financial innovation at the country level promotes green innovation in high-tech industries. These results are consistent with the argument that financial innovation can facilitate technological innovation by improving lenders' ability to screen information, thereby reducing the information asymmetries associated with lending to innovative firms (Petersen and Rajan, 2002). This leads to our next testable hypothesis.

Hypothesis 2. *Firms that engage in financial innovations are more likely to implement organizational innovations during crises.*

We will further elaborate on these linkages in Section 5.3.

3 Institutional background

Italy's economic landscape is dominated by small and medium-sized enterprises. SMEs constitute the backbone of the Italian economy, contributing significantly to both employment and output. In 2010, firms with fewer than 20 employees accounted for 40% of the employment and 41% of the value added of all Italian businesses; firms with fewer than 50 employees contributed to 54% of employment and 52% of value added (ISTAT, 2010). The adaptability

of Italian SMEs has been crucial in ensuring their survival, particularly in the face of the Great Financial Crisis that started in 2009. During this period, as suggested by evidence gathered through direct interviews with entrepreneurs and managers, a high portion of Italian businesses undertook comprehensive restructuring processes (Bank of Italy, 2009). Many Italian firms invested in the reorganization of their managerial and labor practices and in transformations of their marketing and product commercialization, and after-sales support (De Nardis, 2010). Additional restructuring efforts focused on market and customer diversification strategies (Bugamelli et al., 2010).

Regarding the characteristics of the Italian financial system, the banking sector holds a pivotal role in funding Italian firms. As indicated by World Bank data, stock market capitalization in Italy remains relatively low when compared to other advanced countries. In 2010, the stock market capitalization as a percentage of the gross domestic product was 15.4%, in contrast to the significantly higher 117.5% recorded in the United States (World Bank, 2010). Specialized financial intermediaries, such as private equity, have a limited presence in the country, so that the availability of bank credit is essential for SMEs' ability to invest and survive (Minetti et al., 2019). This issue became especially prominent during the Great Financial Crisis when Italian banks significantly reduced their lending.

4 Data and methods

4.1 Data sources

To perform our empirical investigation, we use data from the VIII UniCredit Survey on small and medium-sized enterprises (SMEs), conducted by the major Italian banking group UniCredit in 2011 on the year 2010, which was around the peak of the credit crunch induced by the GFC in Italy. This survey gathers information from a sample of Italian firms that are clients of UniCredit. The sample is carefully chosen to be representative of the bank's portfolio, which is well diversified due to the bank's extensive scale in loans, deposits, and

branches.[1] In 2011, the survey focused on 7,433 small and medium-sized enterprises, selected using a stratified sampling procedure to ensure the representativeness of the findings at the level of firm size, sectors, and provinces. The survey's primary strength lies in its comprehensive information about (a) the financial structure of firms and their relationships with the banking system; (b) investments, including organizational and managerial innovations; (c) the extent of internationalization and export; and (d) organizational structure. Hence, our dataset's uniqueness stems from the direct measurement of firms' access to credit and activities of reorganization through firms' responses to survey questions, rather than indirect inferences from balance sheet statements.[2]

Table A1 presents a detailed description of all the variables used in the empirical analysis, while Table 1 provides summary statistics (for all firms and by credit rationing status). On average, the surveyed firms have been operating for 18 years and have 15 employees. Only 33% of the firms are registered as corporations, and 16.9% as a partnership. Regarding the sector composition of the sample, 28% and 30% of the surveyed firms operate in the trade and services sectors, respectively. Manufacturing firms account for 26.2% of the total, whereas construction, tourism and agriculture businesses represent, respectively, 9.9%, 2.6% and 1.8% of the firms. Firms' geographic distribution reveals a prominence of the North of Italy (57.6% of the total), whereas other firms are located in the Center (18.6%) and in the South (23.7%). These figures align with similar findings from other surveys on Italian firms. For instance, the average age is consistent with the value (approximately 18 years) reported by Balduzzi et al. (2018) for around 25,000 firms in the manufacturing and service sectors covered by the MET survey in 2013.

[1] Considering UniCredit's significant standing as the second largest bank in Italy and its universal, traditional banking model that spans all sectors and regions, we can reasonably assume that the sample used in this survey accurately represents the segment of small and medium-sized enterprises within the Italian economy.

[2] Using data from self-reporting firms could raise concerns about potential misreporting regarding their inclination towards innovation activities. We believe this is unlikely for several reasons. Firstly, the survey was conducted by highly qualified personnel from a major Italian statistics institute (Doxa, the Italian branch of the Gallup International association) on behalf of UniCredit, and rigorous checks were performed on firms' responses. Secondly, respondents were provided with clear instructions for interpreting the questionnaire, and great care was taken to ensure the questions were understandable and to minimize measurement errors. Thirdly, any potential measurement error in the dependent variable would only impact the results if it were systematically related to one or more of the explanatory variables.

4.2 Measurement

Organizational innovations The information provided by the UniCredit survey allows us to directly measure organizational innovation. We construct our dependent variables by relying on a specific survey question that asks: "In the last three years, has the firm introduced any of the following organizational innovations? (i) adoption of new (or significantly improved) managerial techniques to enhance the use and exchange of information, knowledge, and technical and work skills within the company (including training and reallocation of managers across units); (ii) introduction of new labor force organization methods (definition of new divisional or operational units, reduction of hierarchical levels, decentralization of business decisions); (iii) adoption of new (or significantly improved) practices for marketing or distributing products or services, such as franchising, direct sales, distribution licensing, and packaging methods; (iv) changes in relationships (e.g., partnerships) with public institutions." Based on firms' responses, we create the following dummy variables, which take the values of one or zero, depending on whether the firm has introduced such innovations or not: *Managerial reorganization*; *Workforce reorganization*; *Changes in external relationships with marketing and distribution intermediaries*; *Changes in external relationships with public institutions*.

As shown in Table 1, organizational innovations have been introduced by a relatively large proportion of firms in our sample, with changes in external relationships with distribution intermediaries (37%), workforce organization innovations (33.7%), and managerial improvements (26.0%) being the most relevant. Figure 2(b) shows the distribution across Italian provinces of firms that have introduced at least one of the organizational innovations described above. Table 2, in turn, shows the correlation among the different indicators of organizational innovation, suggesting that the proxies capture related but distinct phenomena within business organizations.

Credit rationing Our primary indicator of credit rationing relies on firms' responses to a specific question in the UniCredit survey that asks to the firm whether it have liked to

obtain more credit at the prevailing interest rate? (i) yes; (ii) no. In line with the approach followed by Angelini and Generale (2008), Minetti and Zhu (2011), and Minetti et al. (2019), we categorize firms responding affirmatively to this question as credit-constrained firms. As illustrated in Table 1, 37.7% of the firms in our sample were credit rationed. This percentage is higher than those documented in some earlier studies (see, e.g., Minetti and Zhu, 2011). The higher percentage of credit rationed firms in the UniCredit survey can be attributed to the credit crunch that occurred in Italy during the GFC. One other reason for our higher figure could be that our sample firms are relatively small compared to those in other studies (e.g., the average firm size is approximately 80 employees in the Capitalia survey). Albareto and Finaldi Russo (2012) estimate that the proportion of credit-constrained firms in Italy is significantly higher for businesses with fewer than 50 employees. Figure 2(a) illustrates the distribution of credit constrained firms across Italian provinces. The data suggests that credit constrained firms are not concentrated in a few provinces. In fact, while businesses in Southern and Central Italy exhibit a higher likelihood of experiencing credit constraints, we also observe a notable proportion of credit rationed firms in some Northern provinces. Table 2 shows that there is a positive correlation between our proxy for credit rationing and the indicators of organizational innovation.

Control variables To accurately estimate the impact of credit restrictions on organizational innovations and to mitigate the omitted variables concern associated with the cross-sectional structure of our dataset, we control for a set of potential confounding effects. First, to account for the possibility that older and larger firms could have a different propensity to engage in organizational activities, we control for firm age (*Age*) and size (*Employees*), measured by the logarithm of the total number of employees. Second, we include dummy variables indicating whether a firm is a corporation (*Corporation*), and whether it belongs to a partnership (*Partnership*), such as a consortium. In robustness tests, we further include measures of firm profitability (*ROE*), firm liquidity (*Current assets*), capital intensity (*Capital*

intensity), asset tangibility (*Intangible assets*), and a measure of competition.[3]

In the regressions we also insert industry fixed effects to account for sectoral differences in the propensity to invest in organizational innovations. In particular, the survey asks each firm to indicate its activity sector based on the following categorization: Agriculture, Manufacturing, Services, Trade, Tourism, and Construction. Finally, we saturate the model with province (NUTS-3) fixed effects.

4.3 Empirical model

We study how firms' access to credit may influence firms' organizational changes. The probability that firm i engages in organizational innovations can be written as

$$P(OrganInno_i = 1|R_i, Z_i) = \Phi(\alpha_1 + R_i\beta_1 + Z_i\gamma_1) \tag{1}$$

where $\Phi(\cdot)$ is the standard normal cdf; R_i represents the binary bank credit rationing indicator; and Z_i is the vector of firm-level controls, as well as fixed effects at the province and industry levels. Since our dependent variable is a binary variable taking values zero and one, we estimate Equation (1) by maximum likelihood probit regressions.

The reader may have concerns regarding the endogeneity of a firm's access to credit. First, there is a possibility of reverse causality: engaging in organizational innovation might serve as a signal for banks, thereby influencing the likelihood of a firm facing credit restrictions. Second, some omitted variables could be correlated with a firm's access to bank credit and simultaneously impact its decision to engage in organizational innovation activities. Our model specification controls for a comprehensive set of factors linked to firms' organizational innovation, including firm-level characteristics, and industry and province fixed effects. This should minimize the risk of omitting factors that are correlated with both the dependent and independent variables. To address endogeneity concerns, as outlined in section 5.1.1, we test the robustness of our probit estimates by employing a matched sample and adopting an

[3]To measure the competition faced by a firm, we construct a dummy (*High competition*) that takes the value of one if the firm declares to have a number of competitors higher than the median number in the sample. Notice that, when inserting these additional controls, we experience a loss of observations.

instrumental variable approach.

5 Results

5.1 Baseline results

The baseline results on the relationship between credit rationing and organizational changes are reported in Table 3, Panel A.[4] The marginal effects indicate a positive association between credit rationing and all four types of organizational innovation, both those related to internal managerial and workforce organization and those capturing firms' external relationships. The largest effects are on managerial improvements (0.111) and new workforce organization (0.103), both statistically significant at the 1% level (see columns 1 and 2, respectively). Thus, credit rationed firms are notably more likely to engage in organizational innovations related to managerial and human capital structures in comparison to non-rationed businesses. The weakest effect is on relationships with public institutions (column 4): the marginal effect is 0.053, suggesting that credit rationed firms are 5.3 percentage points more likely to engage in this type of organizational innovation than their non-credit restricted counterparts. Among the control variables, larger firms (in terms of employment) are more likely to engage in organizational innovations. We also observe that the propensity to innovate in areas like new workforce organization and new marketing practices tends to decrease with firm age. Moreover, belonging to a partnership appears to be negatively associated with some type of organizational innovations like managerial improvements and relationships with public institutions. There does not appear to be a systematic relationship between the other control variables, such as the sector of activity, and organizational innovations. As shown in Table 3, Panel B, the results are fully robust to inserting additional controls for firm profitability, asset liquidity and tangibility, and competition.

Overall, the results in this table suggest that there exists a positive relationship between the exposure to credit constraints and firms' incentives to introduce organizational innovations, as outlined in Hypothesis 1b. This association not only highlights the adaptability of

[4] Standard errors are clustered at the province level.

firms under financial frictions, but also signals the potential of credit constraints as a catalyst for organizational restructuring.

5.1.1 Addressing endogeneity concerns

The reader could be concerned that the estimated effects of bank credit rationing on firms' engagement in organizational changes suffer from endogeneity problems. First, some omitted variables could be correlated with a firm's access to bank credit and simultaneously impact its decision to engage in reorganizations. Second, there is a possibility of reverse causality as investing in organizational innovation might serve as a signal for banks, thereby influencing the likelihood of a firm facing credit restrictions. In Table 4, we address these concerns in two different ways: in Panel A, we reestimate our baseline regressions on a sample of matched firms identified through a propensity score matching (PSM) approach; in Panel B, we employ an instrumental variables model.

Propensity score matching To implement the PSM approach, we first split our sample into credit rationed and non-credit rationed firms based on the dummy variable Rationing. Then, we match firms of the two groups aiming to make the two subsamples as similar as possible in terms of the variables that may be correlated with reorganization initiatives. More specifically, we estimate a probit model where the dependent variable is Rationing. This probit regression includes all the firm-specific controls used in our baseline estimations and requires a tolerance level for the maximum propensity score distance (caliper) between the treatment and the control groups equal to 0.0001 (see, e.g., Fang et al., 2014; Murro and Peruzzi, 2022).[5] Figure 3 displays the kernel density of the estimated propensity score for both the treated and control groups before and after the matching process. The graphs indicate that matching strongly improves the degree of similarity between the two subsamples in terms of the

[5]The control variables included in the estimation are: Age, Employees, Corporation, Partnership, Agriculture, Constructions, Retail, Tourism, Services, Manufacturing, and province (NUTS-3) dummies. These controls are crucial for creating a matched sample of firms, and to ensure that these firms are comparable across growth trajectories, management practice, and investment opportunities, differing primarily in their credit rationing status. This approach helps to isolate the impact of credit rationing on organizational innovation by minimizing confounding effects arising from other differences between firms.

covariates employed in the matching strategy. This confirms that the PSM procedure reduces the likelihood that omitted differences, rather than credit rationing, drive our results. Once the treatment and control groups are formed, we rerun our baseline regression in Equation (1). The results are reported in Panel A of Table 4 and are nearly identical to those in Table 3: credit rationing is significantly and positively associated with the probability of engaging in organizational innovations.

Instrumental variables Turning to the instrumental variables approach, our goal in constructing the instruments is to capture exogenous shocks to the structure of the Italian provincial credit markets that might have influenced firms' access to bank credit in the year under consideration. Existing research has consistently highlighted that bank mergers can represent important shocks to firms' exposure to credit rationing (Peek and Rosengren, 1998; Sapienza, 2002). On the one hand, bank mergers can result in informational and efficiency gains. On the other hand, they may dilute existing credit relationships and increase banks' market power, particularly in cases where the merging banks have significant market overlap. Building on this literature and following Minetti et al. (2019), we construct the instruments by exploiting the merger occurred in 2007 between the banking group, UniCredit, of which the firms in our sample are clients, and another major Italian banking group, Capitalia. In particular, we consider the share of branches of the merging banks, relative to the total number of branches in the province (*Share UniCredit Group*), and the difference between the provincial share of branches of the merging banks (*UniCredit - Capitalia*). The first variable serves to capture the intensity of the merger's impact on local credit markets. The second instrument may mirror advantages or challenges arising from the implementation of the merger within a province, as a result of asymmetries in the local relevance of the involved banks.[6]

To be valid, our instruments must be correlated with our proxy for credit rationing,

[6]Although the merging banks had a nationwide presence, their branch distribution varied significantly among provinces at the time of the merger. Hence, we expect that the influence of the merger on firms' access to credit depended on the relevance of the merged banks in comparison to other banks in the provincial credit market during the merger. For instance, in a province with a substantial proportion of branches from the merging banks, firms should have experienced greater economies of scale and improved information sharing than in a province where the merging banks had limited branch presence.

whereas they should not correlate with unobservable variables (economic and institutional characteristics of the provinces) that might also be associated with firms' decision to pursue organizational innovations. Regarding the first aspect, it is worth mentioning that Italian firms, particularly those in our sample, heavily depend on banking institutions, with the provincial credit market being the relevant one. This stems from the historical development of Italian local credit markets, which remained segmented for several decades due to the banking regulation introduced in 1936. In addition, considering the informational opacity characterizing the small and medium-sized enterprises in our sample, any informational gains for the banks involved in the merger could have had a profound impact on the firms within our dataset. Concerning the second issue, we have reasons to believe that the relative branch presence of the UniCredit and Capitalia banking groups in the provinces during the merger was not correlated with the economic characteristics of the provinces. This presence primarily stemmed from the historical development of the Italian banking sector during the decades when the 1936 banking law was in effect.

Panel B of Table 4 presents instrumental variables estimates (the bottom of the panel also displays the estimated coefficients on the instruments in the first stage.) As both (our indicators of) organizational innovation and credit rationing are binary variables, we estimate a bivariate probit model that comprises Equation (1) and a probit equation for firms' access to credit, instrumented by the two variables discussed above. The results are consistent with the baseline estimates, as credit rationing increases the probability of engaging in three of the organizational innovation outcomes. The impact on managerial improvements is no longer statistically significant, but the coefficient remains positive. Overall, both robustness exercises support the conclusion that credit rationing is positively associated with organizational innovation, consistent with Hypothesis 1b.

5.2 Heterogeneous effects

Figures 1 and 4 display the frequency of organizational innovations in subsamples sorted by salient firm characteristics, including size, age and industry. Medium-sized and old firms

appear to be more inclined to engage in reorganizations than smaller and younger firms; as noted, reorganizations are also more frequent among manufactures than among service firms. Our primary interest in this section is examining whether during the crisis the relationship between the exposure to credit rationing and the propensity to engage in organizational changes may have been influenced by firm characteristics. To this end, we re-estimate the baseline specifications after classifying firms according to selected firm-specific characteristics (Table 6), activity sector (Table 7), and bank-specific features (Table 8). Table 5 provides an overview of the results.

5.2.1 Firm characteristics

Given the link we detected between credit rationing and the probability of a firm engaging in organizational innovations, we now turn our focus to the heterogeneity across firms. Table 6 explores how firm-specific attributes affect the propensity to engage in reorganizations in response to financial constraints. More specifically, in Panels A and B, firms are classified based on their age (*Age under 15 years*, a dummy variable equal to one for firms operating for less than 15 years, and zero otherwise) and size (*Less than 10 employees*, a dummy variable equal to one for firms with fewer than 10 employees, and zero otherwise). These characteristics are commonly viewed as proxies for the vulnerability to financial constraints, given that younger and smaller firms facing bank credit rationing are less able to resort to alternative sources of external funding (e.g., corporate bond markets). In Panel C, firms are sorted based on the length of their banking relationships (*Rel. length under 10 years*, a dummy variable equal to one for firms with a banking relationship of less than 10 years, and zero otherwise), highlighting the potential impact of relationship lending on innovation. In Panel D, we distinguish corporations from other types of firms (*Corporation*, a dummy variable equal to one for corporations, and zero otherwise), to examine how corporate structure might influence innovation behavior.

The estimates reveal that, when subject to credit rationing, younger firms are slightly more inclined to engage in reorganizations (Panel A). This includes improving relationships

with public institutions and with marketing and distributional intermediaries. Regarding firm size, the marginal effects in Panel B indicate that very small firms are more likely to engage in managerial reorganizations when facing financial constraints. Analogous results are observed for firms that do not rely on relationship lending, specifically those with short-term relationships with banks (Panel C). More specifically, these firms, when faced with credit rationing, are more inclined to adopt organizational innovations, particularly in the areas of marketing techniques. Finally, the marginal effects presented in Panel D show that corporations are less likely to engage in organizational innovations when credit rationed. In particular, they are characterized by a lower likelihood of developing new relationships, or enhancing existing relationships, with public institutions and marketing intermediaries, and of introducing managerial improvements.

Overall, Table 6 underscores a complex interplay between firm characteristics and the propensity for organizational innovations in the face of a credit crisis. In particular, firms with higher informational opacity - those that are relatively young, smaller in size, have weaker banking relationships and non-corporate structures - appear to exert significant effort to overcome the limitations imposed by their financial environment. Put differently, under financial constraints, these firms could leverage reorganizations as a pathway to achieve resilience.

5.2.2 Does the industry matter?

Table 7 provides a detailed investigation of the heterogeneous impact of credit rationing on organizational innovation across industries. In Panel A, the analysis focuses on manufacturing firms, revealing a tendency towards "conservatism" in times of financial constraints. In particular, these firms are characterized by a lower propensity to introduce changes in their external relationships with marketing and distribution intermediaries. This suggests that, possibly due to the capital-intensive nature of their activities, credit rationed manufacturers might give priority to operational stability over the pursuit of certain types of organizational innovations. Panel B, on the other hand, suggests that service sector firms are more flexible, embracing opportunities to reorganize their workforce in response to credit constraints. This

result can reflect the reliance of service sector firms on intangible assets, such as human capital and customer relationships, which can be more easily reconfigured to navigate financial restrictions. Finally, Panels C and D extend the analysis to firms operating in the construction and retail industries, respectively. The marginal effects reported in the table indicate a uniform response to credit rationing across these sectors, with no significant differential impacts across the measures of organizational innovation.

In summary, the heterogeneous responses across sectors uncovered in Table 7 underscore the importance of accounting for the industry context when evaluating the implications of financial constraints on business reorganization efforts.

5.2.3 Bank types

Table 8 explores the heterogeneity across different types of banks that firms do business with and its implications for organizational innovation. Drawing on the detailed information from the UniCredit survey, we categorize firms based on their banking affiliations, distinguishing those doing business with national or foreign banks from businesses that maintain relationships with smaller, local banking institutions. The marginal effects presented in the table reveal that firms dealing with national or foreign banks demonstrate a reduced likelihood of implementing workforce reorganizations when credit rationed. This finding suggests that the type of banking institution the firm is client of plays a significant role in shaping the organizational response to financial frictions.

Understanding firms' financing structures thus appears to be crucial for informing policies aimed at fostering firms' organizational innovation. We now turn to investigate this point more in detail.

5.3 Financial innovation and organizational changes

During financial crises, even firms not directly experiencing credit restrictions often face significant challenges that can disrupt their traditional operations and financial structures. In such unstable times, the need to adapt can push companies to re-evaluate aspects related to

their financing. As a consequence, some firms may find themselves forced to introduce financial innovations as a response to the changing economic landscape. The adoption of financial innovations, however, may not be an end in itself. It can facilitate a transformation within the organization, preparing the ground for organizational innovations that can redefine the company's internal and external relationships. Moreover, the introduction of financial innovation can call for the hiring of new managers or the training of incumbent ones, and the internal reorganization of human capital resources. For example, as highlighted by the main association of Italian firms (Confindustria), small and medium-sized enterprises have increasingly introduced new managerial positions that can lead firms' reorganizations and facilitate access to new financial instruments (Confindustria, 2022). In this section, we investigate the co-evolution of financial and organizational innovations and empirically test Hypothesis 2. The results should be interpreted as investigating an association between financial and organizational innovations, rather than establishing a direction of causality.

As the firms in our study are predominantly small and medium-sized, the measures of financial innovation we employ have been crafted to reflect the nature of these firms. In particular, we use four variables to proxy for financial innovation. The first, *New form of debt*, is a dummy equal to one if the firm obtained a new form of debt (non-bank funding and issuance of new types of securities), and zero otherwise. The second, *Change of bank for new financial needs*, is a dummy variable equal to one if the firm changed banks due to evolving financial needs, and zero otherwise. The third, *Change of bank for more sophisticated services*, is a dummy equal to one if the firm changed banks for the purpose of obtaining access to more sophisticated services (i.e., consultancy on financial and business activities), and zero otherwise. Finally, *Change of bank for support in pivotal moments (e.g., reorganizations)*, is a dummy equal to one if the firm changed banks for the purpose of obtaining support during pivotal moments of its activities such as reorganizations, and zero otherwise.[7]

The results, displayed in Table 9, reveal a generally positive relationship between the measures of financial innovation and the organizational innovation outcomes. In Panel A, ob-

[7]While the reliance on new forms of debt occurs for about 27% of firms in the sample, not surprisingly the frequency of bank switching is very low (around 3%). This is fully in line with the general observation that in Italy bank-firm relationships are very stable over time (Ongena and Smith, 2000).

taining a new form of debt is associated with a significantly higher probability of reorganizing managerial and human capital structures, as well as external relationships with marketing and distribution intermediaries. For example, a medium-sized firm's decision to issue corporate bonds may require managerial competencies not previously available in the company. By contrast, obtaining a new form of debt does not show a significant association with organizational innovations related to external relationships with public institutions. This is not surprising, as external relationships with public entities may be less directly related to the firm's use of external funding. In Panel B, changing banks for new financial needs positively correlates with the same three outcomes observed in Panel A. Similarly, Panel C shows that switching to a bank offering more sophisticated services is positively associated with the same variables observed in Panel B. Perhaps more remarkably, Panel D suggests that switching to a new bank especially correlates with organizational changes when banks are perceived to be relevant in supporting firms' transformations, including reorganization activities.

Overall, the results in Table 9 suggest that as firms adjust to the new financial tools at their disposal, they simultaneously implement organizational innovations, especially opening the door to changes related to managerial and human capital structures.

6 Further tests

6.1 The role of public policies

The role of public policies and subsidies in fostering innovation within firms has recently attracted growing interest. Public policies can be particularly relevant for firms during periods of economic uncertainty. In Italy, an example of such policies is the initiative launched by the Veneto Region, in the North of Italy, as part of the European Regional Development Fund 2014-2020. This program aimed to support small and medium-sized enterprises in acquiring services for strategic, organizational and commercial innovation. Similarly, under the EU programming for 2007-2013 and the Cohesion Development Fund, the Lombardy Region introduced the "Support for the growth of the competitive capacity of Lombardy

enterprises" initiative. This aimed at enhancing the activities of small and medium-sized enterprises in that region by encouraging organizational innovation. The "Innoaid" program implemented by the Apulia Region, in the South of Italy, represents another strategic initiative in support of firms' acquisition of services for organizational innovation. This initiative focused on innovation projects within three specific innovation areas identified in the region's "Smart Specialization Strategy" for the 2014-2020 programming cycle: sustainable manufacturing, human and environmental health, and digital, creative, and inclusive communities.[8]

In this section, we inquire into the role played by the public sector in influencing firms' adoption of organizational and managerial innovation in the presence of financial frictions. The survey asks firms whether they faced any issues related to scarcity of public funding and support that negatively impacted their innovation goals. The survey also asks firms to specify the percentage of their revenue derived from collaborations with the public administration. Using this information, we define a dummy variable *Public support*, which is equal to one for firms that either (i) encountered no issues with public funding adversely affecting their innovation activities, or (ii) derive more than 10% of their revenue from collaborations with the public administration. The results reported in Table 10, Panel A, indicate that when included as an additional control, our proxy for public support is negatively and significantly associated with the measures of organizational and managerial innovation, suggesting that firms receiving the support of the public sector have less incentives to reorganize their structure than other firms. Notably, the coefficients of *Rationing* remain positive and statistically significant across all measures of organizational and managerial innovation.

Next, in Panel B of Table 10, we interact the dummies *Public support* and *Rationing* to understand whether the interaction with the public administration influences the relationship between firms' financial frictions and organizational innovations. While the *Public support* dummy remains negative and statistically significant in almost all the specifications, the interaction terms turn out to be positive and statistically significant for managerial and workforce reorganizations, and for changes in external relationships with public institutions. This

[8]Innoaid aimed to enhance the innovative capabilities of micro, small, and medium-sized enterprises operating in a wide range of sectors.

suggests that, although in general firms' dependency on public support dilutes the incentives to engage in organizational changes, in the presence of financial tensions such reorganizations can be facilitated by the support of the public sector.

6.2 Long-term effects

We conclude the analysis by providing preliminary evidence on the long-term effects of organizational innovations on firms' long-run outcomes. Understanding the broader implications of organizational innovation strategies is useful, as it offers insights on how these strategic changes translate into measurable economic benefits over time, especially when firms are navigating through crises. In fact, some studies highlight the role of organizational innovation in promoting firms' competitive positioning, enhancing their growth, and equipping them to withstand downturns (Cefis and Marsili, 2005; Bourke and Roper, 2017; Ortiz-Villajos and Sotoca, 2018; Cucculelli and Peruzzi, 2020).

To explore this point, we matched our dataset with detailed information on firms' balance sheets provided by the Centrale dei Bilanci database maintained by the Cerved research center.[9] We consider two main measures of firm long-term outcomes: a measure of firms' productivity, the value added per worker, and a proxy for firms' employment capacity, the number of employees. We use data on these proxies for the period 2011-2015, averaging annual values across this five year window. In Table 11 we treat these proxies as dependent variables and study the influence of organizational innovation. The results suggest that firms' reorganization activities in 2010 had an impact on firms' long-run outcomes. We especially detect an influence of reorganization of external relationships with marketing intermediaries on both productivity and employment, while other effects are estimated imprecisely. In particular, the estimates suggest that a firm engaging in reorganizing its relationships with marketing intermediaries experienced an increase in its value added per worker by 22 thousands euro (9.4% of the standard deviation) and a rise in labour force by 7 employees (the average of the sample of matched firms is 28).

[9] We could match a subset of our data, due to the coverage of the Centrale dei Bilanci database.

7 Conclusions

This paper has explored the relationship between financial frictions and organizational innovation in the context of small and medium-sized enterprises in Italy during the great financial crisis. Drawing from a rich dataset provided by the UniCredit survey, our analysis has offered novel insights into how SMEs respond to financial challenges through organizational changes. The results have revealed a positive association between the exposure to credit constraints and various forms of organizational innovation. Firms restricted in their access to bank credit were more likely to introduce managerial improvements and reorganize their workforce. However, the influence of credit rationing on organizational innovation varies significantly across firm characteristics, industries, and types of banking relationships. More specifically, younger and smaller firms, as well as those with less established banking relationships, were more likely to engage in organizational innovation under credit constraints. The study has also found a significant role of banking relationships in shaping firms' propensity to engage in organizational and managerial innovations in response to credit restrictions. Firms dealing with national or foreign banks had a reduced probability of introducing some types of organizational innovation compared to those doing business with local, smaller banks.

Next, we have turned to investigate to what extent financial innovation and organizational innovation could be complements or substitutes during periods of crisis. As the firms in our sample are predominantly small and medium-sized and did not engage in using sophisticated financial products, the measures of financial innovation used in the analysis have been crafted to capture the financial opportunities faced by these firms. In particular, the survey asked firms whether they switched to new forms of debt during the crisis, or they changed the primary sources of funding and if so, whether this was aimed at improving the access to sophisticated services and to support for major transformations. The results highlight a form of complementarity between financial innovation and organizational innovation.

The paper leaves relevant questions open. In the analysis we have taken a first step towards investigating the long-run outcomes associated with firms' reorganization activities during crises. Further work is however needed to establish the long-run implications for firm

productivity and growth. We leave this and other issues to future research.

References

[1] Alarcón, J. C., Aguilar, R., & Galán, J. L. (2019). Determinants of innovation output in Spanish knowledge-intensive service firms: Stability analysis throughout the economic crisis of 2008. *Structural Change and Economic Dynamic*s, 49, 228-244.

[2] Albareto, G., & Finaldi Russo, P. (2012). Financial fragility and growth prospects: credit rationing during the crisis. Bank of Italy Occasional Paper, N. 127.

[3] Albertazzi, U., & Marchetti, D. J. (2010). Credit supply, flight to quality and evergreening: an analysis of bank-firm relationships after Lehman. *Bank of Italy Temi di Discussione (Working Paper)* No, 756.

[4] Almeida, H., Hsu, P. H., & Li, D. (2013). Less is more: Financial constraints and innovative efficiency. Available at SSRN 1831786.

[5] Angelini, P., & Generale, A. (2008). On the Evolution of Firm Size Distributions. *American Economic Review*, 98(1), 426-38.

[6] Araujo, L., Cao, Q., Minetti, R., & Murro, P. (2019). Credit crunches, asset prices and technological change. *Review of Economic Dynamics*, 32, 153-179.

[7] Archibugi, D. (2017). Blade Runner economics: Will innovation lead the economic recovery?. *Research Policy*, 46(3), 535-543.

[8] Archibugi, D., Filippetti, A., & Frenz, M. (2013a). Economic crisis and innovation: is destruction prevailing over accumulation?. *Research Policy*, 42(2), 303-314.

[9] Archibugi, D., Filippetti, A., & Frenz, M. (2013b). The impact of the economic crisis on innovation: Evidence from Europe. *Technological Forecasting and Social Change*, 80(7), 1247-1260.

[10] Ayyagari, M., Demirgüç-Kunt, A., & Maksimovic, V. (2011). Firm innovation in emerging markets: The role of finance, governance, and competition. *Journal of Financial and Quantitative Analysis*, 46(6), 1545-1580.

[11] Balduzzi, P., Brancati, E., & Schiantarelli, F. (2018). Financial markets, banks' cost of funding, and firms' decisions: Lessons from two crises. *Journal of Financial Intermediation*, 36, 1-15.

[12] Bank of Italy (2009). Rapporto sulle tendenze nel sistema produttivo italiano. Questioni di economia e finanza, n. 45, Banca d'Italia.

[13] Belenzon, S., Berkovitz, T., & Rios, L. A. (2013). Capital markets and firm organization: How financial development shapes European corporate groups. *Management Science*, 59(6), 1326-1343.

[14] Bloom, N., & Van Reenen, J. (2007). Measuring and explaining management practices across firms and countries. *The Quarterly Journal of Economics*, 122(4), 1351-1408.

[15] Bourke, J., & Roper, S. (2017). Innovation, quality management and learning: Short-term and longer-term effects. *Research Policy*, 46(8), 1505-1518.

[16] Brancati, E. (2015). Innovation financing and the role of relationship lending for SMEs. *Small Business Economics*, 44(2), 449-473.

[17] Bugamelli, M., R. Cristadoro & G. Zevi (2010), International Crisis and the Italian Productive System: an Analysis of Firm-Level Data. *Giornale degli Economisti e Annali di Economia*, 69(2), 155-88.

[18] Canepa, A., & Stoneman, P. (2008). Financial constraints to innovation in the UK: evidence from CIS2 and CIS3. *Oxford Economic Papers*, 60(4), 711-730.

[19] Carbó-Valverde, S., Degryse, H., & Fernandez, F. R. (2012). Lending relationships and credit rationing: the impact of securitization. Available at SSRN 2164218.

[20] Cefis, E., & Marsili, O. (2005). A matter of life and death: innovation and firm survival. *Industrial and Corporate Change*, 14(6), 1167-1192.

[21] Chang, X., Chen, Y., Wang, S. Q., Zhang, K., & Zhang, W. (2019). Credit default swaps and corporate innovation. *Journal of Financial Economics*, 134(2), 474-500.

[22] Confindustria (2022). Ascolto, coraggio, impresa. Assise Piccola Industria, Confindustria, Rome.

[23] Contessi, S., & Francis, J. L. (2013). US commercial bank lending through 2008: Q4: new evidence from gross credit flows. *Economic Inquiry*, 51(1), 428-444.

[24] Crossan, M. M., & Apaydin, M. (2010). A multi-dimensional framework of organizational innovation: A systematic review of the literature. *Journal of Management Studies*, 47(6), 1154-1191.

[25] Cucculelli, M., & Peruzzi, V. (2020). Post-crisis firm survival, business model changes, and learning: evidence from the Italian manufacturing industry. *Small Business Economics*, 54, 459-474.

[26] De Nardis, S. (2010). Imprese Italiane nella Competizione Internazionale. Franco Angeli edizioni, Milano.

[27] Fang, V. W., Tian, X., & Tice, S. (2014). Does stock liquidity enhance or impede firm innovation?. *The Journal of Finance*, 69(5), 2085-2125.

[28] Freel, M. S. (2007). Are small innovators credit rationed?. *Small Business Economics*, 28(1), 23-35.

[29] Giebel, M., & Kraft, K. (2020). Bank credit supply and firm innovation behavior in the financial crisis. *Journal of Banking & Finance*, 121, 105961.

[30] Gorodnichenko, Y., & Schnitzer, M. (2013). Financial constraints and innovation: Why poor countries don't catch up. *Journal of the European Economic Association*, 11(5), 1115-1152.

[31] Hall, B. H., & Sena, V. (2017). Appropriability mechanisms, innovation, and productivity: evidence from the UK. *Economics of Innovation and New Technology*, 26(1-2), 42-62.

[32] Herrera, A. M., & Minetti, R. (2007). Informed finance and technological change: Evidence from credit relationships. *Journal of Financial Economics*, 83(1), 223-269.

[33] ISTAT (2010). Struttura e competitività del sistema delle imprese industriali e dei servizi. ISTAT, Rome.

[34] Ivashina, V., & Scharfstein, D. (2010). Bank lending during the financial crisis of 2008. *Journal of Financial Economics*, 97(3), 319-338.

[35] Iyer, R., Peydró, J. L., da-Rocha-Lopes, S., & Schoar, A. (2014). Interbank liquidity crunch and the firm credit crunch: Evidence from the 2007–2009 crisis. *The Review of Financial Studies*, 27(1), 347-372.

[36] Jiménez, G., Ongena, S., Peydró, J. L., & Saurina, J. (2012). Credit supply and monetary policy: Identifying the bank balance-sheet channel with loan applications. *American Economic Review*, 102(5), 2301-2326.

[37] Jin, M., Zhao, S., & Kumbhakar, S. C. (2019). Financial constraints and firm productivity: Evidence from Chinese manufacturing. *European Journal of Operational Research*, 275(3), 1139-1156.

[38] Lechman, E., & Marszk, A. (2015). ICT technologies and financial innovations: The case of exchange traded funds in Brazil, Japan, Mexico, South Korea and the United States. *Technological Forecasting and Social Change*, 99, 355-376.

[39] Lee, N., Sameen, H., & Cowling, M. (2015). Access to finance for innovative SMEs since the financial crisis. *Research Policy*, 44(2), 370-380.

[40] Mancusi, M. L., & Vezzulli, A. (2014). R&D and credit rationing in SMEs. *Economic Inquiry*, 52(3), 1153-1172.

[41] Minetti, R. (2011). Informed finance and technological conservatism. *Review of Finance*, 15(3), 633-692.

[42] Minetti, R., Murro, P., Rotondi, Z., & Zhu, S. C. (2019). Financial constraints, firms' supply chains, and internationalization. *Journal of the European Economic Association*, 17(2), 327-375.

[43] Minetti, R., & Zhu, S. C. (2011). Credit constraints and firm export: Microeconomic evidence from Italy. *Journal of International Economics*, 83(2), 109-125.

[44] Murro, P., & Peruzzi, V. (2022). Relationship lending and the use of trade credit: The role of relational capital and private information. *Small Business Economics*, 59(1), 327-360.

[45] Musso, P., & Schiavo, S. (2008). The impact of financial constraints on firm survival and growth. *Journal of Evolutionary Economics*, 18, 135-149.

[46] Nemlioglu, I., & Mallick, S. (2021). Effective innovation via better management of firms: The role of leverage in times of crisis. *Research Policy*, 50(7), 104259.

[47] Ongena, S., & Smith, D. C. (2000). What determines the number of bank relationships? Cross-country evidence. *Journal of Financial Intermediation*, 9(1), 26-56.

[48] Ortiz-Villajos, J. M., & Sotoca, S. (2018). Innovation and business survival: A long-term approach. *Research Policy*, 47(8), 1418-1436.

[49] Peek, J., & Rosengren, E. S. (1998). Bank consolidation and small business lending: It's not just bank size that matters. *Journal of Banking & Finance*, 22(6-8), 799-819.

[50] Pellegrino, G., & Savona, M. (2017). No money, no honey? Financial versus knowledge and demand constraints on innovation. *Research Policy*, 46(2), 510-521.

[51] Petersen, M. A., & Rajan, R. G. (2002). Does distance still matter? The information revolution in small business lending. *The Journal of Finance*, 57(6), 2533-2570.

[52] Puri, M., Rocholl, J., & Steffen, S. (2011). Global retail lending in the aftermath of the US financial crisis: Distinguishing between supply and demand effects. *Journal of Financial Economics*, 100(3), 556-578.

[53] Santos, J. A. (2011). Bank corporate loan pricing following the subprime crisis. *The Review of Financial Studies*, 24(6), 1916-1943.

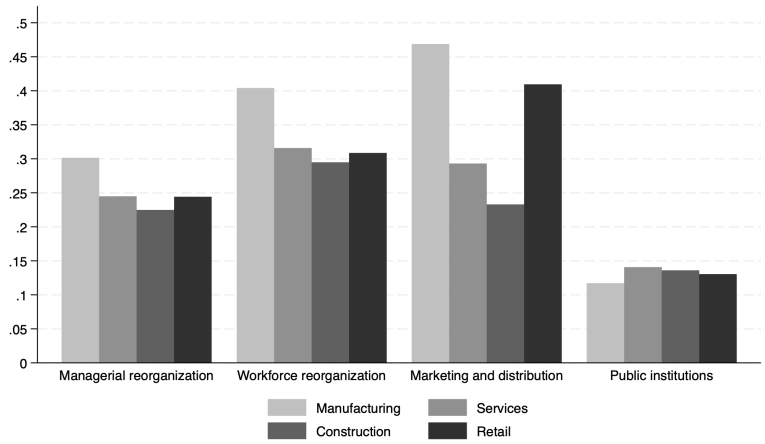
[54] Sapienza, P. (2002). The effects of banking mergers on loan contracts. *The Journal of Finance*, 57(1), 329-367.

[55] Savignac, F. (2008). Impact of financial constraints on innovation: What can be learned from a direct measure?. *Economics of Innovation and New Technology.*, 17(6), 553-569.

[56] Yuan, G., Ye, Q., & Sun, Y. (2021). Financial innovation, information screening and industries' green innovation—Industry-level evidence from the OECD. *Technological Forecasting and Social Change*, 171, 120998.

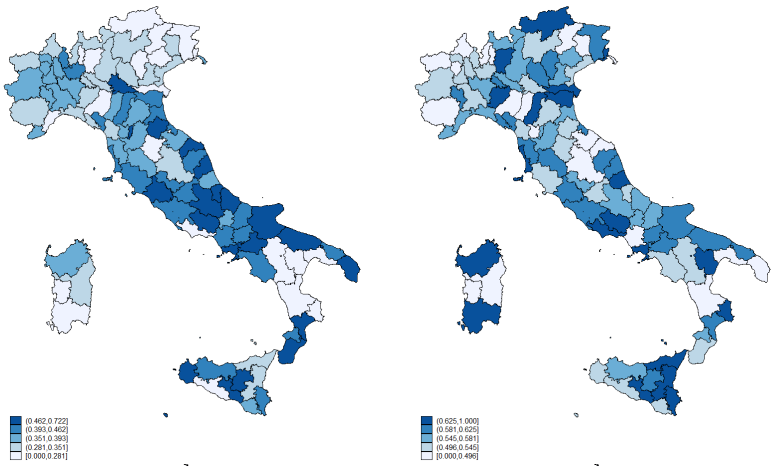
Tables and Figures

Figure 1
Organizational changes across sectors



Notes: For the firms in our database, the figure shows the percentage of firms implementing organizational changes in the various industries during the financial crisis.

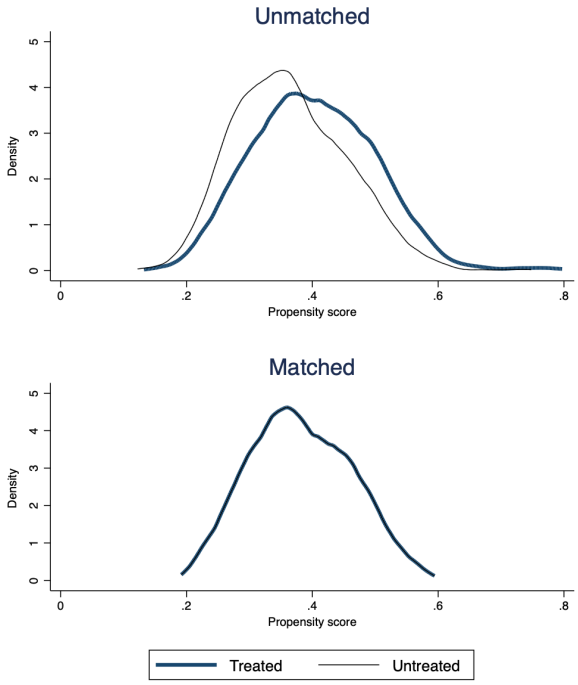
Figure 2
Credit rationing and organizational changes across Italian provinces



(a) Rationing (b) Organizational innovation

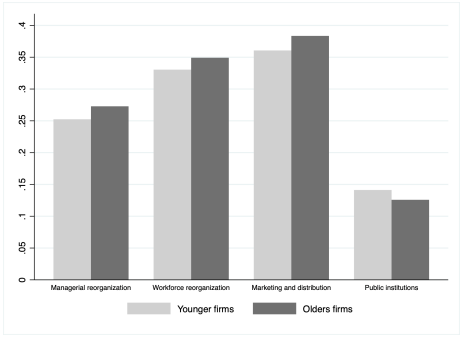
Notes: The figure shows the percentage of firms in Italian provinces (NUTS-3) that were credit rationed, and engaged in at least one organizational innovation activity in our sample.

Figure 3
Balancing test for the propensity score matching (PSM)

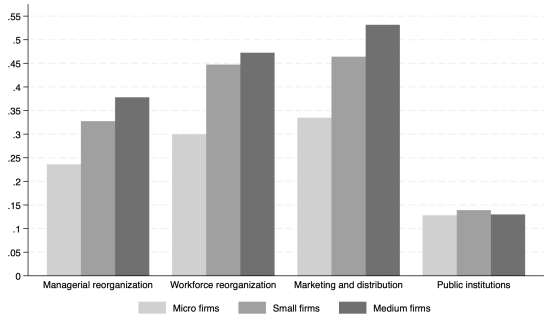


Notes: The figure reports the performance of the balancing test between rationed (treated group) and non-rationed (control group) firms for the sample before and after matching.

Figure 4
Organizational changes by age and size



(a) Organizational changes by age



(b) Organizational changes by size

Notes: The figure shows the frequency (in percentage) of organizational changes during the financial crisis for the firms in our database, aggregated by age (a) and by size (b).

Table 1
Summary statistics and univariate tests

	All firms					Rationing=1		Rationing=0		
	Obs.	Mean	Std. Dev.	Min	Max	Obs	Mean	Obs	Mean	*t-test*
Dependent variables:										
Managerial reorganization	7433	0.260	0.439	0	1	2731	0.324	4516	0.221	*-9.505*
Workforce reorganization	7433	0.337	0.473	0	1	2731	0.400	4516	0.300	*-8.609*
Changes in ext. relationships with marketing and distribution intermediaries	7434	0.370	0.483	0	1	2731	0.434	4516	0.332	*-8.608*
Changes in ext. relationships with public institutions	7433	0.132	0.339	0	1	2731	0.170	4516	0.110	*-7.082*
Independent variable:										
Rationing	7247	0.377	0.485	0	1					
Control variables:										
Age	7121	18.959	17.818	0	211	2638	17.492	4340	19.763	*5.413*
Employees	7153	15.380	42.401	1	900	2641	12.374	4373	16.922	*4.651*
Corporation	7433	0.330	0.470	0	1	2731	0.283	4516	0.353	*6.295*
Partnership	7433	0.169	0.375	0	1	2731	0.174	4516	0.168	*-0.665*
Agriculture	7433	0.019	0.135	0	1	2731	0.021	4516	0.018	*-0.870*
Constructions	7433	0.100	0.300	0	1	2731	0.122	4516	0.086	*-4.711*
Retail	7433	0.284	0.451	0	1	2731	0.311	4516	0.270	*-3.705*
Tourism	7433	0.027	0.161	0	1	2731	0.030	4516	0.024	*-1.420*
Services	7433	0.301	0.459	0	1	2731	0.302	4516	0.304	*0.155*
Manufacturing	7433	0.262	0.440	0	1	2731	0.205	4516	0.291	*8.350*
High competition	7433	0.205	0.404	0	1	2731	0.193	4516	0.214	*2.117*
ROE	3314	0.105	0.843	-3.7	3.8	1159	0.072	2062	0.121	*1.491*
Intangible assets	3302	0.036	0.087	0	1	1154	0.040	2055	0.034	*-1.610*
Capital intensity	3129	0.580	2.942	0	111.4	1098	0.565	1943	0.598	*0.339*
Current assets	3124	0.692	0.237	0	1	1094	0.688	1942	0.694	*0.641*
Other variables:										
New form of debt	7433	0.271	0.445	0	1	2731	0.322	4516	0.243	*-7.218*
Change of bank for new financial needs	7433	0.040	0.196	0	1	2731	0.056	4516	0.031	*-4.918*
Change of bank for more sophisticated services	7433	0.032	0.176	0	1	2731	0.043	4516	0.027	*-3.519*
Change of bank for support in pivotal moments	7433	0.029	0.142	0	1	2731	0.029	4516	0.016	*-3.517*

Notes: The table reports summary statistics and univariate tests for the main variables used in the regressions. All of the variables are defined in Table A1.

Table 2
Correlation matrix

		(1)	(2)	(3)	(4)	(5)
(1)	Credit rationing	1.000				
(2)	Managerial reorganization	0.114	1.000			
(3)	Workforce reorganization	0.102	0.458	1.000		
(4)	Changes in ext. rel. marketing & distribution	0.102	0.404	0.433	1.000	
(5)	Changes in ext. rel. public institutions	0.087	0.327	0.307	0.269	1.000

Notes: The table reports the correlation matrix for the dependent and the main independent variables used in the regressions. All of the variables are defined in Table A1.

Table 3
Baseline results

	Panel A: Baseline estimations			
	Managerial and human capital reorganizations		Changes in external relationships	
Dependent variable:	Managerial reorganization	Workforce reorganization	With marketing and distribution interm.	With public institutions
	(1)	(2)	(3)	(4)
Rationing	0.111***	0.103***	0.112***	0.053***
	(0.010)	(0.011)	(0.012)	(0.009)
Age	-0.000	-0.001***	-0.001***	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Employees (log)	0.053***	0.075***	0.053***	0.026***
	(0.006)	(0.007)	(0.007)	(0.005)
Corporation	-0.001	-0.001	0.052**	-0.015
	(0.021)	(0.025)	(0.023)	(0.014)
Partnership	-0.033**	-0.024	0.034**	-0.021**
	(0.014)	(0.018)	(0.016)	(0.011)
Agriculture	0.001	0.079	0.088	0.107
	(0.077)	(0.076)	(0.098)	(0.095)
Constructions	-0.075	-0.004	-0.029	0.042
	(0.058)	(0.065)	(0.083)	(0.070)
Retail	-0.039	0.031	0.183**	0.047
	(0.062)	(0.067)	(0.084)	(0.065)
Tourism	-0.004	0.074	0.183*	0.102
	(0.076)	(0.073)	(0.096)	(0.091)
Services	-0.038	0.038	0.061	0.065
	(0.064)	(0.066)	(0.082)	(0.066)
Manufacturing	-0.079	-0.024	0.120	-0.005
	(0.063)	(0.069)	(0.085)	(0.060)
+ Province dummies	Yes	Yes	Yes	Yes
Observations	6,855	6,898	6,892	6,814
	Panel B: Robustness checks			
Rationing	0.099***	0.108***	0.084***	0.034**
	(0.019)	(0.021)	(0.022)	(0.016)
Age	0.000	-0.001**	-0.001*	-0.001*
	(0.000)	(0.001)	(0.001)	(0.000)
Employees (log)	0.054***	0.066***	0.047***	0.018**
	(0.010)	(0.012)	(0.012)	(0.008)
Corporation	-0.057	0.009	0.072*	-0.015
	(0.039)	(0.040)	(0.038)	(0.028)
Partnership	-0.099***	-0.024	0.011	-0.022
	(0.033)	(0.038)	(0.035)	(0.024)
High competition	-0.055**	-0.034	-0.099***	-0.033**
	(0.024)	(0.023)	(0.023)	(0.015)
ROE	0.022**	0.008	0.007	-0.003
	(0.011)	(0.013)	(0.014)	(0.007)
Intangible assets	0.199**	0.032	0.213**	-0.003
	(0.087)	(0.098)	(0.105)	(0.074)
Capital intensity	0.016***	-0.000	0.002	0.004
	(0.005)	(0.005)	(0.004)	(0.003)
Current assets	-0.012	0.000	0.029	-0.027
	(0.045)	(0.048)	(0.046)	(0.027)
+ Province dummies	Yes	Yes	Yes	Yes
+ Industry dummies	Yes	Yes	Yes	Yes
Observations	2,779	2,817	2,826	2,679

Notes: The table reports marginal effects for the probit regressions. Three, two and one star (*) mean, respectively, a 99, 95 and 90 percent level of significance. Standard errors clustered at the provincial level and heteroskedasticity robust are in parentheses. All of the variables are defined in Table A1.

Table 4
Addressing endogeneity issues

	Panel A: Matched sample			
	Managerial and human capital reorganizations		Changes in external relationships	
Dependent variable:	Managerial reorganization	Workforce reorganization	With marketing and distribution interm.	With public institutions
	(1)	(2)	(3)	(4)
Rationing	0.101***	0.098***	0.091***	0.063***
	(0.012)	(0.014)	(0.017)	(0.012)
+ Control variables	Yes	Yes	Yes	Yes
+ Province dummies	Yes	Yes	Yes	Yes
+ Industry dummies	Yes	Yes	Yes	Yes
Observations	3,574	3,591	3,603	3,510
	Panel B: Instrumental variables approach			
	(1)	(2)	(3)	(4)
Rationing	0.666	0.964**	1.170***	1.338***
	(0.418)	(0.442)	(0.214)	(0.302)
+ Control variables	Yes	Yes	Yes	Yes
+ Province dummies	No	No	No	No
+ Industry dummies	Yes	Yes	Yes	Yes
Observations	6,781	6,781	6,781	6,781
First stage: Instrumental variables				
Share UniCredit Group	-0.323	-0.332	-0.439**	-0.303*
	(0.204)	(0.209)	(0.189)	(0.183)
UniCredit - Capitalia	-0.229	-0.183	-0.168	-0.228
	(0.159)	(0.149)	(0.138)	(0.145)

Notes: Panel A reports marginal effects for the baseline probit regressions run on a matched sample of firms. Panel B reports bivariate probit regression coefficients. The measure for access to credit is instrumented using the share of provincial bank branches of the merged banks (Share UniCredit Group) and the difference between the shares of provincial bank branches of the two banking groups involved in the merger (UniCredit - Capitalia). The regressions in Panel A include province and industry dummies; the regressions in Panel B include area and industry dummies. Three, two and one star (*) mean, respectively, a 99, 95 and 90 percent level of significance. Standard errors clustered at the provincial level and heteroskedasticity robust are in parentheses. All of the variables are defined in Table A1.

Table 5
Overview of salient mechanisms

Panel A: Main implications of cross-sectional heterogeneity			
Proxies:	Firm characteristics	Industry	Banks
Main effects on:	External relationships	Managerial and workforce reorganization	Managerial and workforce reorganization
Implications:	Opacity stimulates reorganization	Services more flexible in reorganization	Local banks facilitate firms' reorganization
Panel B: Influence of financial innovation			
Proxies:	New form of debt	Change of bank for new financial needs	Change of bank for more sophisticated products and support in pivotal changes
Main effects on:	Managerial, workforce & ext. relationships	Managerial, workforce & ext. relationships	Managerial, workforce & ext. relationships
Implications:	Financial innovation facilitates firms' reorganization		
Panel C: Role of public policies			
Proxies:	Reliance on public support	Interaction with credit rationing	
Main effects on:	Managerial, workforce & ext. relationships	Managerial and workforce reorganization	
Implications:	Public support discourages reorganization	Public support stimulates reorganization	

Notes: For salient proxies used in our analysis, this Table reports the main estimated effect on organizational innovations and the leading interpretation for this effect.

Table 6
Heterogeneous effects by firm characteristics

	Panel A: Age			
	Managerial and human capital reorganizations		Changes in external relationships	
Dependent variable:	Managerial reorganization	Workforce reorganization	With marketing and distribution interm.	With public institutions
	(1)	(2)	(3)	(4)
Rationing	0.111***	0.116***	0.085***	0.036***
	(0.013)	(0.017)	(0.019)	(0.011)
Rationing * Age below median (15 yrs)	0.001	-0.022	0.050*	0.030*
	(0.019)	(0.025)	(0.028)	(0.016)
Age below median (15 yrs)	0.005	0.022	-0.011	0.002
	(0.014)	(0.019)	(0.020)	(0.013)
+ Control variables	Yes	Yes	Yes	Yes
+ Province & Industry dummies	Yes	Yes	Yes	Yes
Observations	6,855	6,898	6,892	6,814
	Panel B: Size			
Rationing	0.052**	0.093***	0.035	0.067***
	(0.025)	(0.030)	(0.030)	(0.017)
Rationing * Less than 10 employees	0.070**	0.011	0.095***	-0.016
	(0.029)	(0.033)	(0.035)	(0.019)
Rationing * Over than 50 employees	0.090	0.020	0.054	-0.017
	(0.066)	(0.057)	(0.066)	(0.026)
Less than 10 employees	-0.024	-0.019	-0.000	0.002
	(0.029)	(0.032)	(0.031)	(0.020)
Over than 50 employees	-0.046*	-0.088***	-0.057*	-0.036**
	(0.024)	(0.029)	(0.031)	(0.017)
+ Control variables	Yes	Yes	Yes	Yes
+ Province & Industry dummies	Yes	Yes	Yes	Yes
Observations	6,855	6,898	6,892	6,814
	Panel C: Relationship with the main bank			
Rationing	0.115***	0.110***	0.093***	0.045***
	(0.013)	(0.017)	(0.016)	(0.010)
Rationing * Rel. length under 10 years	-0.011	-0.015	0.049*	0.018
	(0.020)	(0.030)	(0.025)	(0.014)
Rel. length under 10 years	-0.003	0.014	-0.011	-0.017
	(0.016)	(0.016)	(0.015)	(0.011)
+ Control variables	Yes	Yes	Yes	Yes
+ Province & Industry dummies	Yes	Yes	Yes	Yes
Observations	6,855	6,898	6,892	6,814
	Panel D: Corporation			
Rationing	0.128***	0.112***	0.136***	0.063***
	(0.013)	(0.013)	(0.014)	(0.011)
Rationing * Corporation	-0.048**	-0.026	-0.072***	-0.028*
	(0.020)	(0.023)	(0.024)	(0.015)
Corporation	0.021	0.010	0.084***	-0.002
	(0.023)	(0.026)	(0.024)	(0.016)
+ Control variables	Yes	Yes	Yes	Yes
+ Province & Industry dummies	Yes	Yes	Yes	Yes
Observations	6,855	6,898	6,892	6,814

Notes: This table reports marginal effects for the probit regressions. In Panel A, *Age under 15 years* is a dummy variable equal to one if the firm has operated for less than 10 years, and zero otherwise. In Panel B, *Less than 10 employees* is a dummy variable equal to one if the firm has less than 10 employees, and zero otherwise; *Over than 50 employees* is a dummy variable equal to one if the firm has more than 50 employees, and zero otherwise. In Panel C, *Rel. length under 10 years* is a dummy variable equal to one if the firm's main banking relationship has a length under 10 years, and zero otherwise. In Panel D, *Corporation* is a dummy variable equal to one if the firm is a corporation, and zero otherwise. Three, two and one star (*) mean, respectively, a 99, 95 and 90 percent level of significance. Standard errors clustered at the provincial level and heteroskedasticity robust are in parentheses. All of the variables are defined in Table A1.

Table 7
Heterogeneous effects by industries

	Panel A: Manufacturing			
	Managerial and human capital reorganizations		Changes in external relationships	
Dependent variable:	Managerial reorganization	Workforce reorganization	With marketing and distribution interm.	With public institutions
	(1)	(2)	(3)	(4)
Rationing	0.116***	0.113***	0.135***	0.055***
	(0.012)	(0.012)	(0.014)	(0.011)
Rationing * Manufacturing	-0.019	-0.037	-0.090***	-0.009
	(0.023)	(0.023)	(0.023)	(0.018)
Manufacturing	-0.072	-0.009	0.157*	-0.001
	(0.065)	(0.070)	(0.084)	(0.061)
+ Control variables	Yes	Yes	Yes	Yes
+ Province & Industry dummies	Yes	Yes	Yes	Yes
Observations	6,855	6,898	6,892	6,814
	Panel B: Services			
Rationing	0.101***	0.086***	0.101***	0.054***
	(0.010)	(0.013)	(0.016)	(0.012)
Rationing * Services	0.030	0.057**	0.035	-0.002
	(0.019)	(0.025)	(0.026)	(0.018)
Services	-0.038	0.039	0.064	0.065
	(0.064)	(0.066)	(0.083)	(0.066)
+ Control variables	Yes	Yes	Yes	Yes
+ Province & Industry dummies	Yes	Yes	Yes	Yes
Observations	6,855	6,898	6,892	6,814
	Panel C: Construction			
Rationing	0.111***	0.098***	0.109***	0.051***
	(0.011)	(0.012)	(0.013)	(0.009)
Rationing * Construction	0.003	0.050	0.031	0.015
	(0.038)	(0.036)	(0.040)	(0.030)
Construction	-0.075	-0.004	-0.029	0.042
	(0.058)	(0.065)	(0.083)	(0.070)
+ Control variables	Yes	Yes	Yes	Yes
+ Province & Industry dummies	Yes	Yes	Yes	Yes
Observations	6,855	6,898	6,892	6,814
	Panel D: Retail			
Rationing	0.110***	0.113***	0.100***	0.048***
	(0.012)	(0.013)	(0.015)	(0.010)
Rationing * Retail	0.003	-0.030	0.037	0.015
	(0.023)	(0.023)	(0.031)	(0.022)
Retail	-0.040	0.044	0.167*	0.039
	(0.064)	(0.071)	(0.088)	(0.066)
+ Control variables	Yes	Yes	Yes	Yes
+ Province & Industry dummies	Yes	Yes	Yes	Yes
Observations	6,855	6,898	6,892	6,814

Notes: This table reports marginal effects for the probit regressions. In Panel A, *Manufacturing* is a dummy variable equal to one if the firm operates in the manufacturing sector, and zero otherwise. In Panel B, *Services* is a dummy variable equal to one if the firm operates in the services sector, and zero otherwise. In Panel C, *Construction* is a dummy variable equal to one if the firm operates in the construction sector, and zero otherwise. In Panel D, *Retail* is a dummy variable equal to one if the firm operates in the retail sector, and zero otherwise. Three, two and one star (*) mean, respectively, a 99, 95 and 90 percent level of significance. Standard errors clustered at the provincial level and heteroskedasticity robust are in parentheses. All of the variables are defined in Table A1.

Table 8
Heterogeneous effects by types of banks

	Managerial and human capital reorganizations		Changes in external relationships	
Dependent variable:	Managerial reorganization	Workforce reorganization	With marketing and distribution interm.	With public institutions
	(1)	(2)	(3)	(4)
Rationing	0.118***	0.150***	0.100***	0.060***
	(0.025)	(0.028)	(0.031)	(0.018)
Rationing * National or foreign bank	-0.008	-0.055*	0.015	-0.009
	(0.027)	(0.030)	(0.036)	(0.019)
National or foreign bank	0.014	0.036*	0.018	-0.004
	(0.018)	(0.019)	(0.021)	(0.015)
+ Control variables	Yes	Yes	Yes	Yes
+ Province dummies	Yes	Yes	Yes	Yes
+ Industry dummies	Yes	Yes	Yes	Yes
Observations	6,855	6,898	6,892	6,814

Notes: This table reports marginal effects for the probit regressions. *National or foreign bank* is a dummy variable equal to one if the firm's main bank is a national or foreign bank, and zero otherwise. Three, two and one star (*) mean, respectively, a 99, 95 and 90 percent level of significance. Standard errors clustered at the provincial level and heteroskedasticity robust are in parentheses. All of the variables are defined in Table A1.

Table 9
Financial innovation and organizational change

	Managerial and human capital reorganizations		Changes in external relationships	
Dependent variable:	Managerial reorganization	Workforce reorganization	With marketing and distribution interm.	With public institutions
	(1)	(2)	(3)	(4)
Panel A: New form of debt				
New form of debt	0.043***	0.043***	0.063***	0.015
	(0.011)	(0.014)	(0.012)	(0.010)
+ Control variables	Yes	Yes	Yes	Yes
+ Province dummies	Yes	Yes	Yes	Yes
+ Industry dummies	Yes	Yes	Yes	Yes
Observations	6,990	7,033	7,027	6,948
Panel B: Change of bank for new financial needs				
Change of bank for new financial needs	0.122***	0.119***	0.078**	0.004
	(0.027)	(0.031)	(0.035)	(0.019)
+ Control variables	Yes	Yes	Yes	Yes
+ Province dummies	Yes	Yes	Yes	Yes
+ Industry dummies	Yes	Yes	Yes	Yes
Observations	6,990	7,033	7,027	6,948
Panel C: Change of bank for more sophisticated services				
Change of bank for more sophisticated services	0.104***	0.104***	0.091**	0.002
	(0.035)	(0.037)	(0.038)	(0.023)
+ Control variables	Yes	Yes	Yes	Yes
+ Province dummies	Yes	Yes	Yes	Yes
+ Industry dummies	Yes	Yes	Yes	Yes
Observations	6,990	7,033	7,027	6,948
Panel D: Change of bank for support in pivotal moments (e.g., reorganization)				
Change of bank for support in pivotal moments	0.130***	0.132***	0.136***	-0.020
	(0.041)	(0.040)	(0.047)	(0.025)
+ Control variables	Yes	Yes	Yes	Yes
+ Province dummies	Yes	Yes	Yes	Yes
+ Industry dummies	Yes	Yes	Yes	Yes
Observations	6,990	7,033	7,027	6,948

Notes: This table reports marginal effects for the probit regressions. Three, two and one star (*) mean, respectively, a 99, 95 and 90 percent level of significance. Standard errors clustered at the provincial level and heteroskedasticity robust are in parentheses. All of the variables are defined in Table A1.

Table 10
The role of public policies

	Panel A: Reliance on public support			
	Managerial and human capital reorganizations		Changes in external relationships	
Dependent variable:	Managerial reorganization	Workforce reorganization	With marketing and distribution interm.	With public institutions
	(1)	(2)	(3)	(4)
Rationing	0.108***	0.100***	0.108***	0.053***
	(0.010)	(0.011)	(0.013)	(0.009)
Public support	-0.032**	-0.048***	-0.066***	-0.003
	(0.013)	(0.013)	(0.014)	(0.007)
+ Control variables	Yes	Yes	Yes	Yes
+ Province dummies	Yes	Yes	Yes	Yes
+ Industry dummies	Yes	Yes	Yes	Yes
Observations	6,855	6,898	6,892	6,814
	Panel B: Interaction with credit rationing			
Rationing	0.058***	0.061***	0.086***	-0.001
	(0.015)	(0.018)	(0.018)	(0.013)
Rationing * Public support	0.073***	0.057**	0.031	0.082***
	(0.020)	(0.023)	(0.021)	(0.018)
Public support	-0.013	-0.033**	-0.057***	0.017**
	(0.015)	(0.014)	(0.016)	(0.008)
+ Control variables	Yes	Yes	Yes	Yes
+ Province dummies	Yes	Yes	Yes	Yes
+ Industry dummies	Yes	Yes	Yes	Yes
Observations	6,855	6,898	6,892	6,814

Notes: This table reports marginal effects for the probit regressions. In Panel A, *Public support* is a dummy variable equal to one for firms that either (i) encountered no issues with public funding adversely affecting their innovation activities, or (ii) derived more than 10% of their revenue from collaborations with the public administration. Three, two and one star (*) mean, respectively, a 99, 95 and 90 percent level of significance. Standard errors clustered at the provincial level and heteroskedasticity robust are in parentheses. All of the variables are defined in Table A1.

Table 11
Long-term effects of organizational changes

Dependent variable	**Panel A: Firm productivity**			
	Value added per worker			
	(1)	(2)	(3)	(4)
Managerial reorganization	1.370			
	(10.637)			
Workforce reorganization		-4.407		
		(9.199)		
Changes in external relationships with marketing and distribution intermediaries			22.024**	
			(9.705)	
Changes in external relationships with public institutions				3.339
				(12.271)
+ Control variables	Yes	Yes	Yes	Yes
+ Province dummies	Yes	Yes	Yes	Yes
+ Industry dummies	Yes	Yes	Yes	Yes
Observations	3,004	3,004	3,004	3,004
	Panel B: Firm size			
Dependent variable	Number of employees			
Managerial reorganization	-0.435			
	(4.967)			
Workforce reorganization		-5.417		
		(4.271)		
Changes in external relationships with marketing and distribution intermediaries			7.229*	
			(4.281)	
Changes in external relationships with public institutions				-1.317
				(4.910)
+ Control variables	Yes	Yes	Yes	Yes
+ Province dummies	Yes	Yes	Yes	Yes
+ Industry dummies	Yes	Yes	Yes	Yes
Observations	3,013	3,013	3,013	3,013

Notes: This table reports OLS regression coefficients. In Panel A, the dependent variable is *Value added per worker*, computed as the ratio between value added and the number of employees. In Panel B, the dependent variable is *Number of employees*. Three, two and one star (*) mean, respectively, a 99, 95 and 90 percent level of significance. Standard errors clustered at the provincial level and heteroskedasticity robust are in parentheses. All of the variables are defined in Table A1.

Appendix

"Navigating Crises. Organizational Innovation and Managerial Restructuring in Bad Times"

This Appendix provides more details on the main data sources and on the definitions of the variables used in the analysis.

A. More details on data sources

To perform our empirical analysis, we exploit data from the VIII UniCredit Survey on small and medium-sized enterprises (SMEs), conducted by the major Italian banking group UniCredit in 2011 on the year 2010. Since 2006 to 2013, the UniCredit Report on small businesses has annually offered an insight into the Italian production environment, backed by an annual survey involving over 6,000 small business clients. In 2011, the analysis was enriched by an additional element, a specific survey that was conducted on about 1,400 medium-sized manufacturing enterprises.

The survey on small firms is based on 6,025 CATI (Computer Assisted Telephone Interview) interviews, distributed throughout the national territory to UniCredit clients selected according to a scheme that aligns the sample with the population of businesses it represents. The survey on medium-sized manufacturing enterprises, on the other hand, is based on 1,408 CATI interviews with both client and non-client businesses, also stratified at the territorial level. Businesses are classified based on their turnover: from 0 to 5 million euros for small enterprises, and from 5 to 50 million euros for medium-sized enterprises.

In both cases, the interviews were administered by Doxa, the Italian branch of the Gallup International association, between June and September 2011. Respondents were provided with clear instructions for interpreting the questionnaire, and great care was taken to ensure the questions were understandable and to minimize measurement errors. Moreover, rigorous checks were performed on firms' responses. The interviews, conducted through a questionnaire, cover: the structural characteristics of the firms; the entrepreneurial strategies on innovation and internationalization; production characteristics; aspects of credit and financial structure, with a focus on bank-firm relationship.

Table A1
Variable definitions

Variable	Description
Dependent variables:	
Managerial reorganization	Dummy variable equal to one if, in the last three years, the firm has adopted new (or significantly improved) managerial techniques to enhance the use and exchange of information, knowledge, and technical and work skills within the company, and zero otherwise.
Workforce reorganization	Dummy variable equal to one if, in the last three years, the firm has introduced new work organization methods, and zero otherwise.
Changes in external relationships with marketing and distribution intermediaries	Dummy variable equal to one if, in the last three years, the firm has introduced changes in packaging or adoption of new (or significantly improved) practices for marketing or distributing products or services, such as e-commerce, franchising, direct sales, distribution licensing, and zero otherwise.
Changes in external relationships with public institutions	Dummy variable equal to one if, in the last three years, the firm has introduced changes in relationships with public institutions, and zero otherwise.
Independent variable:	
Rationing	Dummy variable equal to one if the firm would have liked to obtain more credit at the prevailing interest rate, and zero otherwise.
Control variables:	
Age	Number of years since inception.
Size	Total number of employees.
Corporation	Dummy variable equal to one for firms that are private limited companies (LTD) or public limited companies (PLCs), and zero otherwise.
Partnership	Dummy variable equal to one for firms that are part of a partnership, and zero otherwise.
Agriculture	Dummy variable equal to one for firms operating in the agriculture sector, and zero otherwise.
Constructions	Dummy variable equal to one for firms operating in the constructions sector, and zero otherwise.
Retail	Dummy variable equal to one for firms operating in the retail sector, and zero otherwise.
Tourism	Dummy variable equal to one for firms operating in the tourism sector, and zero otherwise.
Services	Dummy variable equal to one for firms operating in the services sector, and zero otherwise.
Manufacturing	Dummy variable equal to one for firms operating in the manufacturing sector, and zero otherwise.
High competition	Dummy variable equal to one if the firm declares to have a number of competitors higher than the median number in the sample.
ROE	Ratio of net income over total equity.
Intangible assets	Ratio of intangible assets over total assets.
Capital intensity	Ratio of tangible assets over total number of employees.
Current assets	Ratio of current assets over total assets.
Instrumental variables:	
Share UniCredit Group	Share of branches of the merging banks, relative to the total number of branches in the province.
UniCredit - Capitalia	Difference between the provincial share of branches of the merging banks.
Other variables:	
New form of debt	Dummy variable equal to one if the firm obtained a new form of debt, and zero otherwise.
Change of bank for new financial needs	Dummy variable equal to one if the firm obtained a new form of debt, and zero otherwise.
Change of bank for more sophisticated services	Dummy variable equal to one if the firm changed banks in search of more sophisticated services, and zero otherwise.
Change of bank for support in pivotal moments	Dummy variable equal to one if the firm changed banks for the purpose of obtaining support during pivotal moments of its activities (e.g., reorganizations), and zero otherwise.