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EUROSISTEMA

Questioni di Economia e Finanza

(Occasional Papers)

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THE FEATURES OF CAPITAL INCREASES BY ITALIAN CORPORATES

by Francesco Columba*, Tommaso Orlando*, Francesco Palazzo* and Fabio Parlapiano*

Abstract

The economic losses inflicted by the pandemic shock caused severe capital shortfalls for many corporates, which led to public measures being adopted to support firms' recapitalization and the rebalancing of their financial structure. However, evidence about the dynamics and features of these capital increases is scarce. Our work attempts to fill this gap by studying capital increases by Italian non-financial corporations between 2008 and 2020. Stylized facts and insights on the economics of capital increases are provided and the implications for the design of public support programs are discussed. We found that, first, small firms are less likely to raise new equity funds than larger firms; second, capital increases by large and financially vulnerable firms produce countercyclical behaviour, as the amount of these increases rises during downturns; and third, financially sound firms use new capital mostly to finance investments, which in turn expands their sales, while fragile firms tend to rebalance their financial structure with positive outcomes for their likelihood of survival.

JEL Classification: G1, G3, G32.

Keywords: capital increases, capital structure, corporate finance.

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* Bank of Italy, DG Economics, Statistics and Research.

1. Introduction and research questions¹

Equity capital is a fundamental financing source for corporates: given its unlimited maturity and residual right on firms' earnings, it allows for the financing of investments, the undertaking of riskier business projects, and innovation which, ultimately, contribute to economic growth. Within the euro area, Italian firms have been characterized by a systematically lower level of capital relative to debt; the gap was ample until the sovereign debt crisis and narrowed in recent years, along with the lowering of outstanding debt levels (De Socio and Finaldi Russo, 2016). With the outbreak of the pandemic crisis, and the increase of gross corporate debt in response to liquidity shortfalls, there has been renewed interest across policy fora in strengthening firms' capitalization to avoid the rise of debt overhang problems and solvency risks. Recent studies provide some evidence on the risk of capital shortages and the outcome of capital increases during the crisis (Hotchkiss et al., 2021; Orlando and Rodano, 2020).

After the outbreak of the Covid-19 pandemic, many countries adopted public support programs to foster the capitalization of corporations; but there is still little knowledge about the features and timing of voluntary capital increases, the characteristics of firms that raise capital and, importantly, about the use of the new funds and the performance of firms after a capital increase. This work aims to fill this gap by analyzing a novel and unique dataset on capital increases by non-financial companies (NFCs) over the 2008-20 period. The availability of granular data on firms' financial and credit indicators, their capital structure, and their loan repayment behavior allows us to address a number of questions and provides evidence that can be helpful in designing or amending equity support measures (including for the gradual phasing out of the current extraordinary measures) in this phase.

In particular, this work addresses the following questions:

1. What trends characterize NFCs' capital increases since the GFC and how do they associate with the business cycle?
2. What firm characteristics correlate with the probability of capital increases? What role do ownership structure and bank lending relationships play?
3. How do firms employ new equity funds? Specifically, to what extent equity financing helps sustain investments, increase liquidity buffers or rebalance firms' financial structure? Do firms' characteristics matter?
4. How are firms' performances, in terms of probability of survival, loan default and sales growth, affected by capital increases and to what extent are they dependent on firms'

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characteristics? What differences arise when new shareholders enter the ownership structure?

With regard to the aggregate dynamics of recapitalizations,² we document that during the 2008-20 period the average share of NFCs that increased their capital hovers around 1.1 per cent, but it accounts for a larger proportion of revenues (around 4.3 per cent). The amount of equity capital raised by large and fragile firms, in particular, displays a counter-cyclical pattern when compared to changes in GDP.

As for the characterization of firms that increase their capital, we show that firm size plays a significant role with smaller firms being, *ceteris paribus*, substantially less likely to engage in these operations with respect to their larger counterparts. After controlling for observable factors, time, sectors, and geographical areas, our estimates indicate that small and micro firms are over 80 per cent less likely to recapitalize than large and medium-sized companies. Firms' risk is positively correlated with the likelihood of recapitalizations, but the effect³ is limited in magnitude (with respect to firm size) and almost exclusively concentrated among larger companies.

Albeit one would expect a pivotal role of the ownership structure in determining the likelihood of capital increases, we find that, instead, the concentration of lending relationships is more important. Firms with a widely spread distribution of loans across banks are substantially more likely to increase their equity capital base. We argue that this effect is consistent with the literature on relationship lending (Petersen and Rajan, 1994; Berger and Udell, 1995) and the soft budget constraint (Bolton and Scharfstein, 1996). The concentration of shareholders instead is less important to explain the heterogeneity underlying firms' recapitalization decisions.

With reference to the purpose for which funds are raised, we show that both the financing of new investments and the rebalancing of the capital structure to decrease financial vulnerability are important. Drawing a firm line between the two usages is not straightforward as there may be complementary reasons amongst the two arguments: new investments can be used to strengthen a firm's operations and viability prospects. Nonetheless, we highlight differences in the use of funds between financially sound and fragile firms. The former use new equity funds and debt financing mostly to finance new investments, while keeping their capitalization (and, consequently, their financial leverage) unchanged. Fragile firms, instead,

² In this work, we use the terms "capital increase" and "recapitalization" as synonyms. Elsewhere, "recapitalization" is also used to indicate the injection of new equity aimed at covering losses in firms' net worth. Such operations are not included in our analysis, as explained in Section 2.

³ Our results, based on regression analyses, provide estimates of conditional correlations. We use the terms "correlation" and "effect" interchangeably without any claim of causality.

tend to invest less and to use part of the new equity to decrease their financial leverage and accumulate liquidity buffers.

Finally, we explore how recapitalizations affect firm performance over a two years horizon in terms of survival, loan default and sales growth.⁴ We find that when vulnerable firms increase their capital and, most likely, rebalance their financial structure, both their exit and loan default rates improve relative to otherwise similar firms. These correlations are sizeable for smaller firms, being substantial in the year of the recapitalization and lasting also in the two years after the recapitalization takes place. For sound firms, instead, we observe a slight increase in their loan default rates; a result which is consistent with the inherent risk of undertaking new investments without decreasing their financial leverage. Firms' business expansion - as captured by the sales growth indicator - seems to accelerate in years in which a recapitalization takes place, but the effect tends to fade in the subsequent years. Importantly, we find that investments and sales growth increase significantly when the recapitalization is accompanied by the entrance of new shareholders; the effect can be observed across the spectrum of firms' size and risk classes.

The empirical evidence presented in this paper, along with the discussion about the possible economic mechanisms underlying firms' recapitalizations, can be of key importance to inform the appropriate design of policy measures aimed at facilitating a rebalancing of firms' financial structure in the aftermath of the Covid-19 pandemic shock. We discuss the key policy implications in the concluding section.

The paper is structured as follows. Section 2 describes our data sources and the empirical setting. Section 3 provides descriptive statistics. Section 4 characterizes firms that are more likely to increase their capital. Section 5 documents the usage of equity funds accounting for size and risk classes. Section 6 analyzes the outcomes from recapitalizations in terms of survival likelihood, loan default and sales growth. Section 7 discusses the implications for the design of policies to strengthen the capitalization of firms and concludes.

2. Data and empirical setting

The key source of information used in our analysis consists of data on equity capital increases by Italian NFCs between 2008 and 2020. These are obtained from the Italian Business

⁴ We focus on the short-term outcomes of recapitalizations using a two-year time frame following capital increases. Such time frame was set accounting for the trade-off between having a sufficiently medium-term view of the outcomes of capital increases and the need to maintain enough observations in the sample (as longer horizons would imply losing recent observations).

Register, accessible through the InfoCamere database.⁵ Capital increases are identified as a positive difference between a firm's nominal capital at date t and the last nominal capital value recorded before date t . Such increases in the nominal value of capital can be attributed to either capital injections (*aumento di capitale a pagamento*) or to the conversion of reserves into equity capital (*aumento di capitale gratuito*). Even though we observe whether a transfer of resources occurs, we cannot distinguish between the two cases: an increase of nominal capital which is not accompanied by a corresponding cash injection could indicate either a conversion of reserves or a capital injection that becomes operational with a time delay (a circumstance which is allowed by the Italian legislation). Thus, we simply consider increases in nominal capital and take as our reference date their statutory approval – even when the actual cash injections are postponed to a later date. Importantly, equity injections that do not increase a firm's nominal capital, such as those that replenish equity to cover for economic losses, are not easily identifiable in our data and are therefore left outside the scope of our investigation.⁶

We also rely on an extensive set of firms' characteristics, financial ratios, size⁷ and risk indicators,⁸ sourced from the Cerved Group database. The InfoCamere database provides us with information on the ownership structure of firms, including changes in the number of shareholders, the entrance of new shareholders, and the degree of concentration of individual shares (measured using the standard Herfindahl–Hirschman index). Similarly, we retrieve information on the structure of financial debt, such as the number of credit relationships and measures of lenders concentration, from the Credit Register managed by the Bank of Italy.⁹ Moreover, firms' survival after a recapitalization is measured using both firm exit (through insolvency, dissolution or voluntary liquidation procedures) indicated in the Business Register, or the presence of a non-performing credit status in the Credit Register. Our final

⁵ The Business Register (Registro Imprese) is the Italian public register, maintained by the Chambers of commerce, where all companies and sole proprietorships must be recorded. A wide range of information on the events concerning these firms must be submitted to the Register, including the nominal value of equity capital and its changes over time. Note though that our work focuses on corporations (with limited liability), excluding partnerships and sole proprietorships.

⁶ The replenishment of equity capital is mandatory under Italian law when: i) the economic loss exceeds 1/3 of equity capital and ii) reduces its amount below legal thresholds specified for each legal form.

⁷ According to EU standards we distinguish: micro, small, medium, and large firms. Micro firms have less than 10 employees, and either revenues or total assets below € 2 million; small firms have less than 50 employees, and either revenues or total assets below € 10 million; medium firms have less than 250 employees, and either revenues below € 50 million or total assets below € 43 million; all other firms are large.

⁸ The Cerved Group credit risk score (CeBi Score 4) provides our proxy for firms' riskiness. Safe firms have a less than or equal to 2 credit risk score; solvent firms have a score between 3 and 4; vulnerable firms have a score between 5 and 6; risky firms have a score between 7 and 10. We also combine safe and solvent firms into a 'sound' group, and vulnerable and risky firms into a 'fragile' group.

⁹ Due to the reporting threshold required by the Credit Register, i.e. € 30,000 in financial debt, firms having below threshold financial liabilities (usually micro and small firms) are excluded from our analysis.

sample includes about 1.6 million NFCs active¹⁰ over the 2007-19 period, averaging around 740,000 yearly observations.

Our analytical setting revolves around conditional correlations between (i) firms' characteristics and the probability of a capital increase, and (ii) firms' economic and survival outcomes following a capital increase. Such correlations are estimated via linear probability models, which we choose over non-linear models for ease of interpretation and for estimation issues related to the rare-event nature of recapitalizations.¹¹

To investigate (i), we use specifications of the following form:

$$C_{i,t} = X_{i,t-1}\beta + \alpha_{s(i)} + \gamma_{g(i)} + \delta_t + \epsilon_{i,t} \quad (1)$$

where $C_{i,t}$ is a dummy variable indicating whether a firm i undergoes a capital increase in year t ; $X_{i,t-1}$ is a vector of firm i characteristics (and, possibly, interactions among those) in $t - 1$; $\alpha_{s(i)}$, $\gamma_{g(i)}$, and δ_t are indicators of the firm's sector of economic activity (2-digit Ateco classification) and province, and of the reference year, respectively.

With regard to the assessment of (ii), the relationship between capital increases and firm-level outcomes are modelled as follows:

$$Y_{i,t+s} = \beta C_{i,t} + X_{i,t-1}\zeta + CX_{i,t}\eta + \alpha_{s(i)} + \gamma_{g(i)} + \delta_t + \epsilon_{i,t} \quad (2)$$

where: $Y_{i,t+s}$ is the economic performance or survival outcome of interest measured s years after the reference year, with $s \in \{0,1,2\}$; $CX_{i,t}$ is a vector of interactions between the dummy for capital increases $C_{i,t}$ and firms' characteristics $X_{i,t-1}$.

3. Capital increases: firm characteristics and the business cycle

We first discuss some descriptive evidence on the frequency and amounts of firm recapitalizations over the period 2008-2020 to provide an overall picture of the extent of the phenomenon for the Italian corporate sector. Specifically, Table 1 reports for each year the share of firms (in terms of both the number of firms and the amount of revenues in the previous year) that increased their capital, the amount raised, and how such amount compares with firms' equity, financial debts and cash holdings.

Larger firms are relatively more likely to increase their equity capital. Over the sample period, on average around 8,000 firms increased their capital every year, slightly more than

¹⁰ A firm is classified as active in a given year when it reports positive net revenues and a valid value of either total assets or equity. For each year t , we require that firms have been active in the previous period for inclusion in our sample. This filtering criterion excludes from the analysis those firms that increase their capital in their first year of existence or after a period of inactivity.

¹¹ Even though capital increases are a rare event in this sample, since our exercises do not have predictive ambitions and due to the use of linear models, we do not perform balancing operations on the sample.

one per cent of all active NFCs, but they represented a larger share (4.3 per cent) in terms of total revenues. After the GFC both the number and the amount of capital increases gradually declined, then stayed constant in the aftermath of the sovereign debt crisis and have been increasing starting in 2019 and even more with the Covid-19 pandemic. On average, the amount of new capital raised constitutes roughly one-fifth of firms' equity or financial debt.

Table 1. Recapitalizations over the 2008-20 period

Year	N. Firms	% firms ⁽¹⁾	% firms by revenues ⁽²⁾	Capital increases	Capital increases over equity		Capital increase over cash holdings	
					Capital increase over fin debt	Capital increase over cash holdings		
	<i>units</i>	<i>per cent</i>	<i>per cent</i>	<i>billion</i>	<i>per cent</i>	<i>per cent</i>	<i>per cent</i>	
2008	10,730	1.57	5.06	10.2	30.38	19.98	153.99	
2009	9,710	1.39	6.09	13.4	36.84	26.82	201.56	
2010	9,706	1.34	4.19	9.8	33.31	24.28	198.45	
2011	8,267	1.12	6.23	8.2	14.81	12.72	75.81	
2012	8,194	1.09	4.51	7.9	26.47	22.20	172.54	
2013	7,287	0.98	4.95	7.1	15.17	11.70	95.03	
2014	7,285	0.98	4.85	8.1	16.02	14.73	89.01	
2015	7,267	0.98	3.61	8.7	21.24	19.56	132.29	
2016	7,423	0.98	3.52	8.0	22.64	29.93	139.48	
2017	7,345	0.96	3.50	4.9	11.46	11.87	53.85	
2018	7,411	0.96	3.05	5.6	9.67	21.97	85.96	
2019	7,684	0.98	3.15	5.9	22.91	27.52	88.46	
2020	8,051	1.00	3.63	6.3	17.60	29.05	103.08	
Average	8,182	1.10	4.33	8.00	21.43	20.95	122.27	

Source: InfoCamere and Cerved.

Note: NFCs' recapitalizations over the 2008-20 time period. The sample includes only firms with an active balance sheet (see footnote 10) in the year prior to reference, to which balance sheet information refers. (1) Share of firms that increase their capital over the total number of active NFCs. (2) Share of revenues of firms that increase their capital over the total amount of revenues of active NFCs.

The median firm that increases its equity capital is typically larger than the median Italian firm in terms of revenues, displays higher revenues growth and lower leverage (Table 2). This aggregate evidence may support the hypothesis that firms with better investment opportunities and a more resilient financial structure are more likely to raise equity. Interestingly, firms that recapitalize do not display substantial differences in their ownership structure with respect to the rest of the sample, while their debt structure tends to be distributed across a larger number of lenders.

Table 2. Recapitalizations and firm characteristics

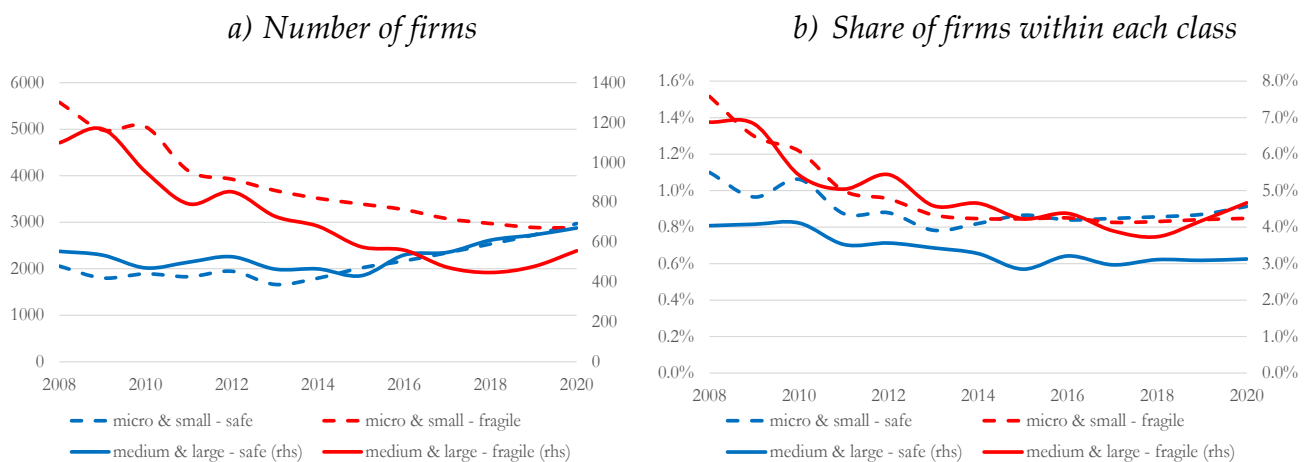
	Revenues		EBITDA margin		Leverage		Revenue growth		HHI Banks		HHI Shareholders	
	Recapitalization	Other firms	Recapitalization	Other firms	Recapitalization	Other firms	Recapitalization	Other firms	Recapitalization	Other firms	Recapitalization	Other firms
<i>10th perc.</i>	113.00	34.00	-56.00	-27.00	0.10	0.08	-0.16	-0.48	0.17	0.27	0.25	0.28
<i>Median</i>	1778.00	364.00	114.00	30.00	0.62	0.80	0.08	0.01	0.50	0.76	0.50	0.50
<i>75th perc.</i>	6318.00	1219.00	414.00	101.00	2.00	2.87	0.30	0.14	1.00	1.00	0.91	0.91

Source: InfoCamere and Cerved.

Note: Descriptive statistics over the entire sample period, comparing firms that recapitalize versus firms that do not recapitalize in each year. Balance sheet information refers to the year preceding the reference year.

When classifying recapitalizations depending on the size (micro and small versus medium and large firms – see footnote 7) and the riskiness of the firm (fragile versus sound firms – see footnote 8) some temporal trends become apparent: capital increases by risky firms have progressively become less frequent (fig. 1, panel a, red lines), while those by sound firms have remained constant and even increased since 2015 (blue lines), with limited differences across size classes. As firms’ financial conditions have generally improved in recent years, the overall trend of recapitalizations might also mirror a shift in the distribution of NFCs towards less risky classes over time.¹² Hence, we look at the frequency of recapitalizations in each size-risk subgroup (fig. 1, panel b). For smaller firms, the recapitalization rate is similar across risk classes: the gap between fragile and sound firms that can be observed at the beginning of the sample has disappeared since 2014. The recapitalization rate for larger firms is more volatile among the riskier ones; the share of fragile firms that increase their capital during downturns (2008, 2012-13 and 2020) seem to increase with respect to the upturns. As recapitalization rates among sound firms of any size have been essentially stable since 2015, the increase in the number of recapitalizations by sound firms shown in panel a might be attributed to the general decrease in firms’ riskiness.

Figure 1. Capital increases by firm size and risk



Source: InfoCamere and Cerved.

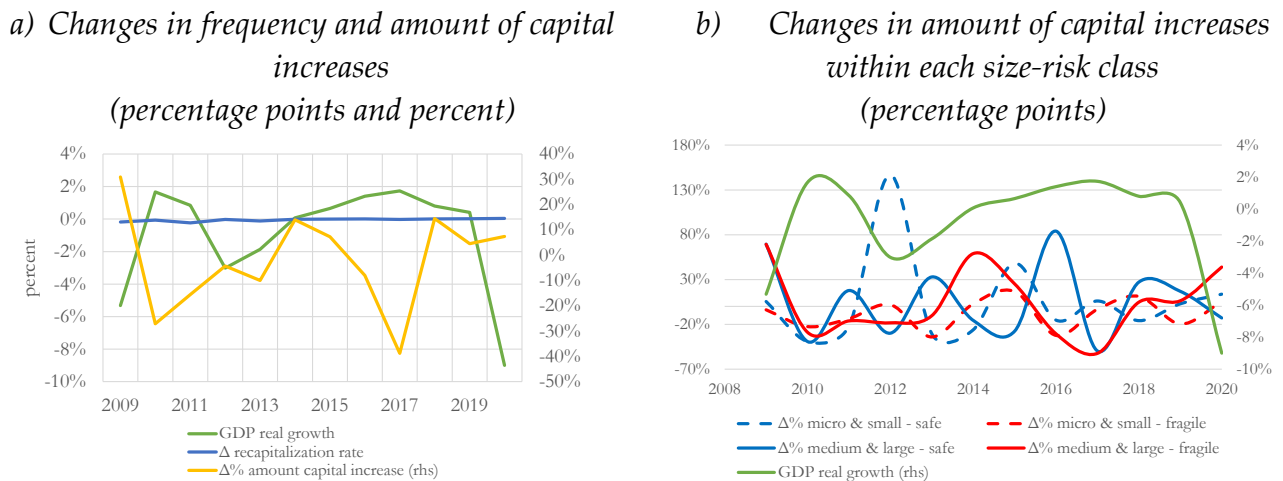
Note: a) number of firms that recapitalize by size and risk classes: information on size and risk (CEBI Score4) refers to the year preceding the capital increase; b) share of firms that recapitalize over the number of firms within each size-risk class.

To explore a potential association between recapitalizations and the business cycle, we plot the growth rate of GDP in relation to the aggregate growth rate of the amount of capital

¹² The distribution of Italian non-financial firms amongst risk classes has changed in the sample period: after a material deterioration of firms’ financial conditions during the sovereign debt crisis, the number of firms that recorded an improvement in their credit risk standing improved constantly since 2016 until the pandemic crisis. See Cerved Group Spa, “Up & Down - Come Cambia Il Rischio Delle Imprese Italiane”, June 2021.

increases and the year-on-year change in the recapitalization rate (fig. 2, panel a). The dynamics of the amount of capital increases displays a negative correlation with economic output (-0.5). The counter-cyclical pattern of the amounts is mostly driven by larger and fragile firms (fig. 2, panel b), that may tend to raise equity capital in response to economic difficulties. Panel b also shows that in 2012 smaller and safe firms more than doubled their annual capital increases, most likely in association with the introduction in the Italian tax system of the Allowance for Corporate Equity (ACE) aimed at promoting the recapitalization of limited liabilities companies via both cash injections and retained earnings. The change in the overall recapitalization rate appears, instead, less sensitive to the business cycle and displays a remarkably flat dynamics over the sample period.

Figure 2. Capital increases and the business cycle



Source: InfoCamere and Istat.

Note: a) year-on-year variations in GDP, recapitalization rate (share of firms that recapitalize) and amount of new capital; b) year-on-year variations in GDP and amount of new capital by size and risk classes.

4. Which firms are more likely to increase their capital?

In this section we analyze how the propensity to undertake capital increases correlates with (observable) firm characteristics. We focus on firm size and risk, two key dimensions of firms' heterogeneity that are commonly employed in the empirical literature to capture firms' efficiency, transparency and business prospects; all of which can influence firms' ability to raise additional funds.

The corporate finance literature has extensively analyzed the determinants of firms' financing decisions and in particular the optimal mix between equity and debt, linking this choice to underlying frictions, such as agency or asymmetric information problems. In this respect, the literature has derived direct implications for the optimal firm capital structure; results on the frequency and features of recapitalizations can only be indirectly inferred as the firm's response to deviations, observed or potential, from the optimal debt-to-equity ratio.

Notably, it is well understood that a firm's net worth determines its borrowing capacity (Diamond, 1991; Holmstrom and Tirole, 1997), as the firm's insiders need to hold an adequate stake of the outcomes in order to behave diligently and, in turn, be able to access external finance. The use of debt financing is however a source of trade-offs (Jensen and Meckling, 1976).¹³

When firms fall into a situation of excessive indebtedness or debt overhang (Myers, 1977) constraints to their ability to increase equity capital could arise. Risky firms with high leverage are less likely to raise additional funds to finance profitable projects through securities that are junior relative to existing debt, i.e. junior debt or equity, as most of the benefits would accrue to existing credit holders. Debt renegotiations can however foster the probability to raise equity capital also in such circumstances. In the same spirit, Moreno-Bromberg and Vo (2017) find that, in the context of a dynamic moral hazard model, recapitalizations are more likely when combined with debt concessions and, in turn, these would be favored when the firm's liquidation value is low and agency costs are mild.

Myers and Majluf's (1984) pecking order theory suggests that the asymmetric information problem leads equity issues to be more severely underpriced by investors (as they believe that better informed managers issue new equity when the firm is overvalued); in turn, these firms would prefer to issue securities that are less sensitive to firm insiders' information, such as debt financing. In other words, the issuance of debt securities would provide a positive signal about the quality of a certain business (as in Ross, 1977), while the use of equity would be accompanied by negative equity price reactions (as first documented by Masulis and Korwar, 1986), as it would reveal negative information on the firm value. Two useful implications for recapitalizations follow: i) firms with lower chances to issue information insensitive securities (e.g. due to less collateralizable assets or intangibles) are more likely to issue equity; ii) more transparent firms, which are less subject to asymmetric information problems (e.g. due to more accurate and financial reporting), are *ceteris paribus* more likely to issue equity.

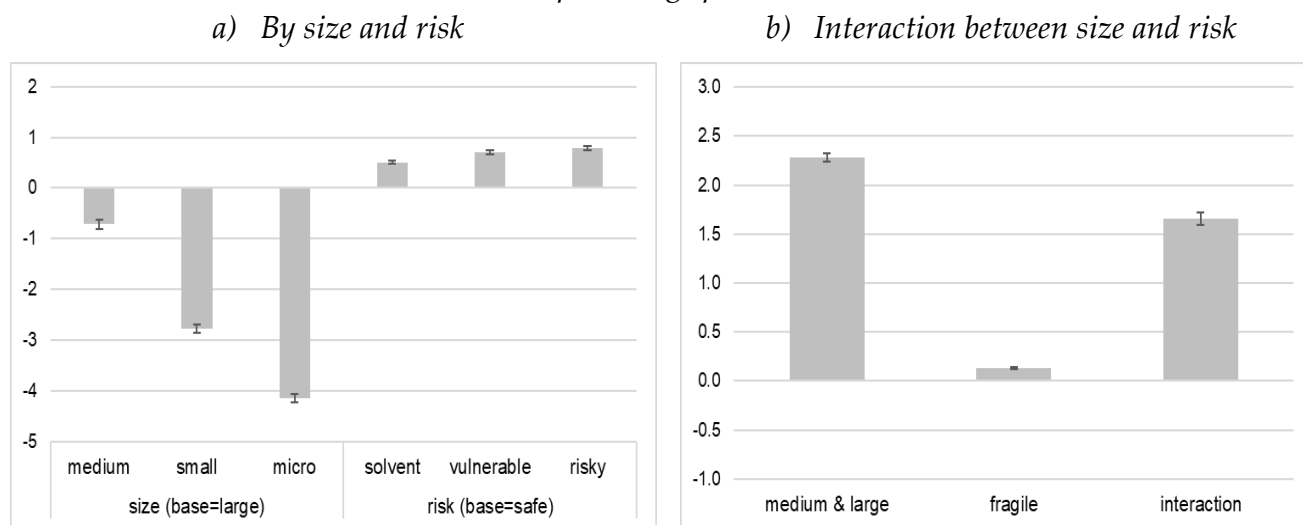
The above discussion allows extrapolating some hypotheses on the likelihood of firms' recapitalizations. First, asymmetric information problems (Myers and Majluf, 1984) can severely hinder the chances of capital increases: as smaller firms are usually regarded as being more opaque, we expect *ceteris paribus* smaller firms to recapitalize less frequently than other firm types. Second, the effect of firm risk on the likelihood to recapitalize is *a priori* ambiguous.

¹³ On the one hand, debt helps mitigate managerial incentives to dissipate free cash in unproductive uses; on the other hand debt financing and limited liability provide shareholders with incentives for so-called asset substitution, namely engaging in risky projects that provide high upside returns for shareholders in case of success, but that lead, relatively more often, to default in case of failure of the project. This trade-off theory by Jensen and Meckling (1976) predicts that large and mature firms with limited possibilities for asset substitution choose higher leverage levels.

As risky firms are more subject to debt overhang problems (Myers, 1977), we expect them to recapitalize relatively less despite the possible access to profitable investments. At the same time, if the debt overhang problem is less pronounced, riskier firms face greater constraints in expanding their borrowings and finance investment opportunities; injecting new equity is therefore key to access additional debt financing and finance investments (Holmstrom and Tirole, 1997).

In line with the descriptive evidence in fig. 1, results from regressions (1) point to a significant effect of firm size on the likelihood of raising equity funds (fig. 3, panel a). Indeed, micro firms are about 4 percentage points less likely to recapitalize than the larger ones (in absolute terms, their likelihood to increase capital is about 15 per cent of that of larger firms, *ceteris paribus*). The effect remains substantial (around 3 p.p.) also for small firms. Firm risk is positively correlated with the probability to recapitalize, consistent with the idea that new capital can be used to alleviate financial fragility. However, the differences across risk classes are less relevant than across firm sizes (less than 1 p.p.), and are mostly driven by fragile firms of larger size (fig. 3, panel b).

Figure 3. Firms' characteristics and likelihood of a capital increase
(percentage points)

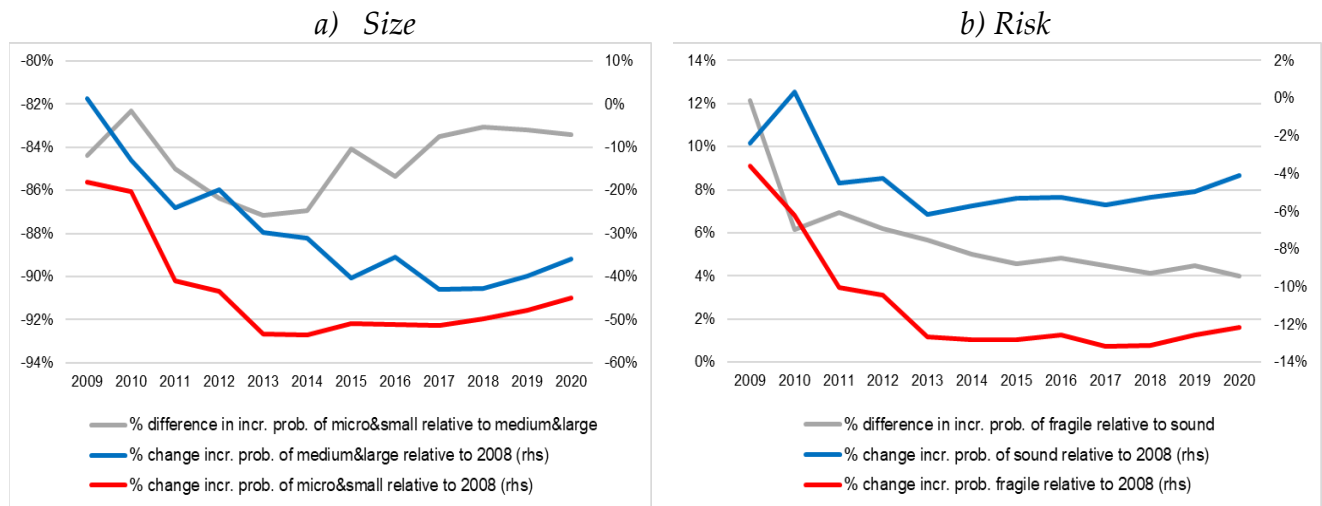


Note: estimates based on the linear probability model of capital increases in equation (1) considering (a) four categories of size (micro, small, medium, large) and risk (safe, sound, vulnerable, risky); (b) size (medium&large) and risk (fragile) indicators and their interaction. Year, sector and province fixed effects are included. See Table A1 in the Appendix.

The relation between size and probability of recapitalization has been rather stable over the sample period (fig. 4, panel a, grey line): smaller firms are about 85 per cent less likely to increase their capital relative to larger firms, consistently with fig. 3. However, both size groups recorded a decline in the probability to raise equity capital (fig. 4, panel a, red and blue lines) relative to the levels observed in the year 2008 (see also Table 1).

Similarly, the effect of risk on the probability of recapitalization has decreased over time (fig. 4, panel b, grey line): while riskier firms maintain a larger frequency of recapitalization, the likelihood of capital increases for fragile and for sound firms has gradually become more similar, and this is mostly due to a marked decline in the probability of recapitalization of fragile firms (fig. 4, panel b, red line) in the 2009-13 period (see also Figure 1).

Figure 4. Capital increases over time across size and risk classes
(percentage variations)



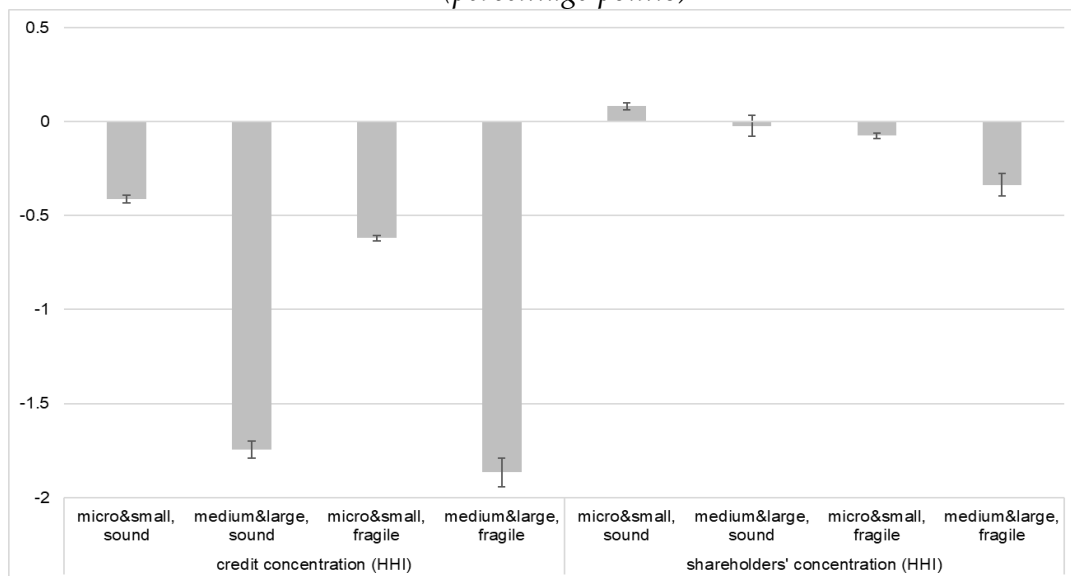
Note: estimates based on the linear probability model of capital increases in equation (1) which considers year fixed effects, size and risk indicators, and their interactions. Sector and province fixed effects are included. See Table A2 in the Appendix. *Incr. prob.* indicates the probability of a capital increase.

Abundant empirical evidence shows that debt and equity structures are endogenously affected by financial frictions. Two main complementary explanations have been put forward. The relationship lending literature (Petersen and Rajan, 1994; Berger and Udell, 1995) points out that concentrated long-term banking relationships, by alleviating the asymmetric information problem, allow borrowers to access a greater amount of financing at a lower cost. Indeed, while firms often resort to multiple lenders to reduce the liquidity risk arising from having a single banking relationship (Detragiache et al., 2000; Carmignani and Omiccioli, 2007), they often retain a tighter relationship with a main lender that provides the majority of credit. Because such concentrated relationships allow for easier finance, they may induce, *ceteris paribus*, a lower incentive to raise equity capital. An analogous conclusion is reached by the literature on soft budget constraints (Bolton and Scharfstein, 1996; Green and Liu, 2021) using a limited commitment problem argument. Fragile firms with many creditors face higher debt renegotiation costs, as the price at which creditors are willing to sell the firm's assets is increasing in their number. This in turn may *ex ante* alleviate the limited commitment problem, as it discourages strategic defaults (i.e. firms can repay creditors, but decide to divert funds). Hence, when lenders are dispersed, shareholders may be more willing to recapitalize to

accommodate the additional demand for financing. In summary, both theories suggest that concentrated credit relationships should reduce the likelihood to observe recapitalizations.

Figure 5 reports the estimated effects of concentration in creditors' and shareholders' structures on the probability of capital increases by firm size and risk classes. Concentration is measured using the Herfindahl-Hirschman index computed for credit and equity shares and standardized for the purposes of regression estimations. Each estimated coefficient therefore represents the impact of a standard deviation increase in the concentration index on the probability of a capital increase for each firm class.

Figure 5. Creditors' and shareholders' concentration and the likelihood of capital increases
(percentage points)



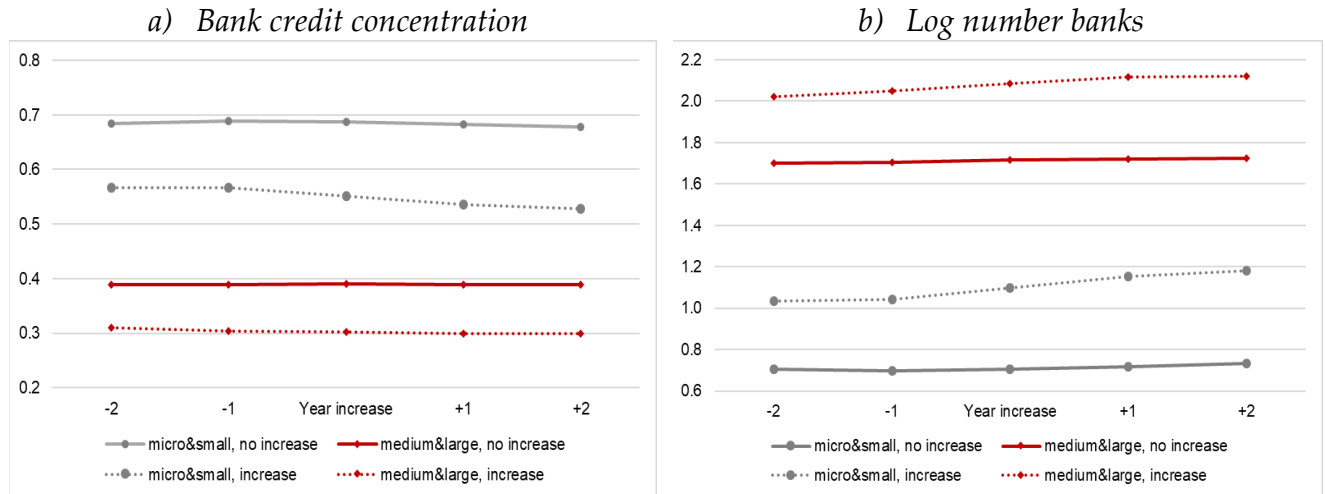
Note: marginal effects of creditors' and shareholders' concentration on capital increases by size and risk classes. Coefficients are obtained from the linear probability model of capital increases in equation (1) which considers size and risk indicators, the two standardized concentration indexes, and their interactions. See Table A3 in the Appendix.

Creditors' dispersion appears to be associated with a higher likelihood of recapitalization; the effect (in percentage points) is of a higher magnitude for larger firms, but – as seen before – these also have a larger unconditional probability to recapitalize. After scaling these marginal effects by their corresponding group average probability to recapitalize, credit concentration explains between 40 and 60 per cent of the variability around these averages. It is therefore an economically sizeable effect, in accordance with the theoretical predictions. The effect of shareholders' concentration is instead less relevant.

In what follows we describe how the concentration of bank creditors and shareholders changes after a recapitalization. Consistent with the evidence in fig. 5, firms that increase their capital have a less concentrated bank credit at the time of the recapitalization. Concentration further decreases after the recapitalization (fig. 6, panel a), due to an increase in the average

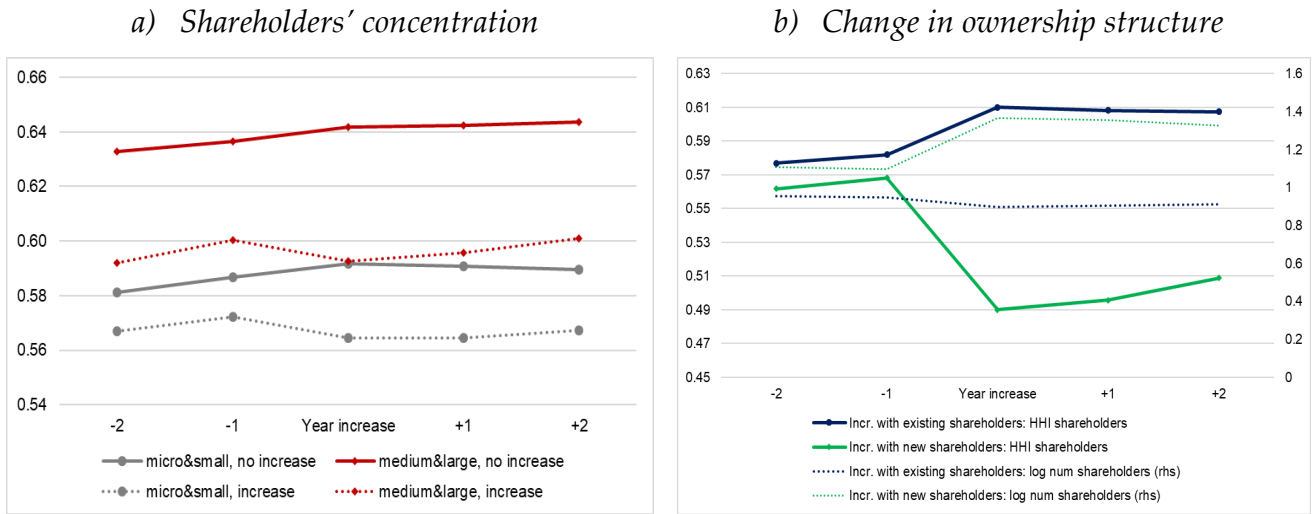
number of lenders (fig. 6, panel b). Such variations are of a greater magnitude among smaller firms, which display a significantly higher concentration of credit to begin with.

Figure 6. Outcomes of capital increases: bank credit concentration
(index values)



Following a recapitalization, firms' ownership structures become less concentrated, but the effect is small and it tends to disappear within two years (fig. 7, panel a; notice though that overall differences in average shareholder concentration across firm risk and size classes are less pronounced than those observed for the concentration of bank credit). This is likely due to the different dynamics between firms raising capital only from existing shareholders – roughly two-thirds of the total – and those for which the capital injection is financed by new shareholders. The former case (fig. 7, panel b, blue lines) features a slight increase in shareholders' concentration, since not every shareholder contributes *pro quota* to the capital increase; in the latter case (fig. 7, panel b, green lines) the extension of ownership structure to new shareholders drives the reduction in the concentration level of the equity base.

Figure 7. Outcomes of capital increases: shareholders' concentration
(index values)



5. How do firms use new equity funds?

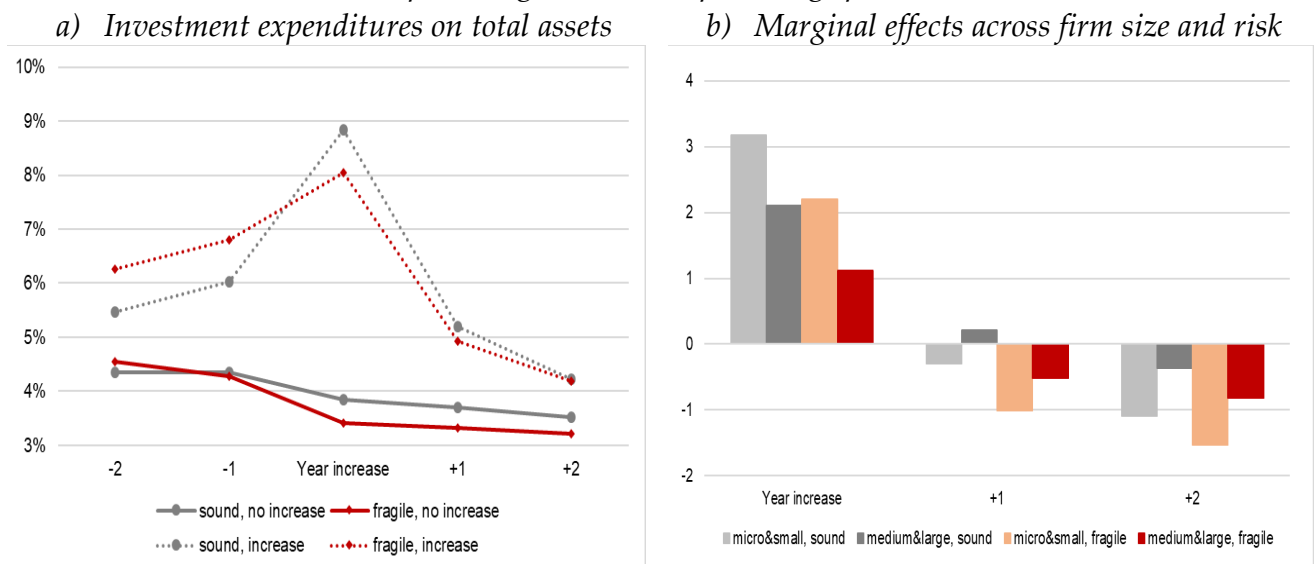
We explore how firms' investment and business activities are affected by recapitalizations. Kim and Weisbach (2008) point out three different, but possibly complementary, uses of new equity funds: i) to finance investments; ii) to transfer wealth from new to old shareholders; iii) to increase firm liquidity. More recently, Barclay et al. (2021) document that seasoned equity offerings (SEOs) are typically associated with investments and with new debt issuance. Dittmar et al. (2020) note that SEOs often exploit favorable conditions on the stock market, although they find such effect to be much less important for firms with investment opportunities or subject to financial constraints. Pagano et al. (1998) also stress the importance of market timing considerations for initial public offerings (IPOs) of Italian firms; moreover, they show that new funds are largely used to rebalance the liability structure of the firm after a period of high investment growth. More recently, Kim et al. (2019) show for a large sample of recapitalizations in Korea that increases in equity are often used as a last resource measure, and they are often associated with debt-to-equity swaps rather than new investments. In this respect, Brennan and Kraus (1987) provide a rationale for the use of equity funds to partially reimburse outstanding debt obligations, as this would signal to outsiders the high value of the firm.

In our sample, market timing considerations are less relevant as the shares of almost all firms in the sample are not publicly traded. Therefore, we focus on their potential use for investment financing, expansion of liquidity buffers and reduction of financial leverage. As previously noted in the literature, these different uses are not mutually exclusive, but often complementary. However, the extent to which equity finances new investments, increases liquidity or reduces indebtedness is an empirical issue and it is likely to depend on the initial

financial conditions of the firm. Specifically, we expect financially sound firms to undertake a recapitalization mainly to finance new investments, while more fragile firms should use a larger fraction of the new capital to rebalance the structure of their financial liabilities and/or raise their liquidity buffers.

We begin by exploring the investment behavior of firms that increase their capital (*increase*) *vis-à-vis* other firms (*no increase*). Investment levels are measured by the ratio of total investments in fixed assets to total assets. Firms that raise additional capital display higher investment levels relative to other firms already before the recapitalization (fig. 8, panel a). The investment ratio peaks in the year of the recapitalization and then it gradually decreases in the subsequent two years, remaining slightly above that of firms that do not recapitalize. The steep increase of investments in the year of the recapitalization is more noticeable among sound firms, consistently with the hypothesis that new equity is used to expand their investment capacity, whereas riskier firms devote a larger share of the new funds to mitigate existing financial fragility. Panel b of fig. 8 displays, for each size and risk group, the marginal effect of a capital increase on the *variation* of the investment ratio (the difference between the investment ratio at each horizon and that of the year before recapitalization). The immediate response of investment levels is especially driven by smaller firms, which however experience a stronger reduction in investment ratio variations in the two following years.

Figure 8. Outcomes of capital increases: investments
(percentage values and percentage points)

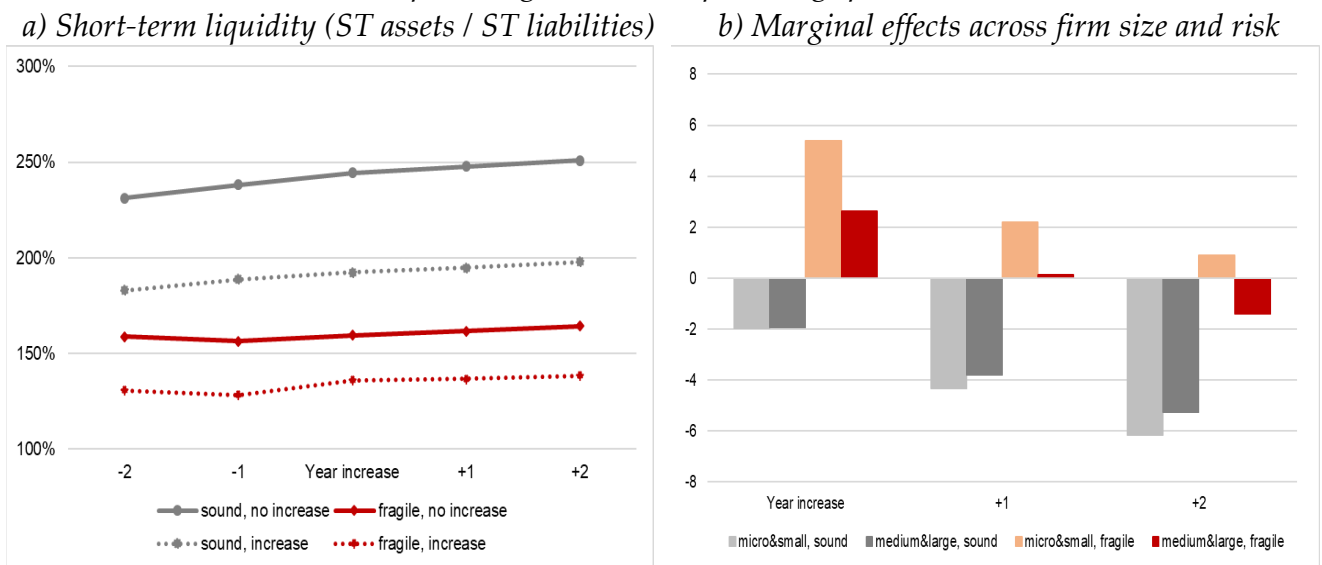


Note: Panel b reports the marginal effects, obtained from the linear probability model in equation (2) of capital increases on the variations – relative to the year preceding the reference year – in the investments-to-assets ratio, accounting for size and risk groups. Regression coefficients are reported in Table A4 in the Appendix.

Other than for investments, the increase in capital can be used to replenish liquidity buffers, which we measure as the short-term liquidity index, i.e. the ratio of current assets to short-

term liabilities. Accounting for size and risk groups, firms that recapitalize are characterized by significantly lower liquidity buffers with respect to other firms. Recapitalizations apparently lead to an increase in the liquidity ratio, especially among fragile firms (fig. 9, panel a). Indeed, the marginal effect of a capital increase on the variation of the liquidity ratio (fig. 9, panel b) is positive for fragile firms, while it turns negative for sound ones. This result is consistent with the possibility that the investments driven by recapitalizations gradually absorb their liquidity buffers, in relative terms.

Figure 9. Outcomes of capital increases: short-term liquidity
(percentage values and percentage points)



Note: Panel b reports the marginal effects, obtained from the linear probability model in equation (2) of a capital increase on the variations – relative to the year preceding the reference year – in short-term liquidity, accounting for size and risk groups. Regression coefficients are reported in Table A4 in the Appendix.

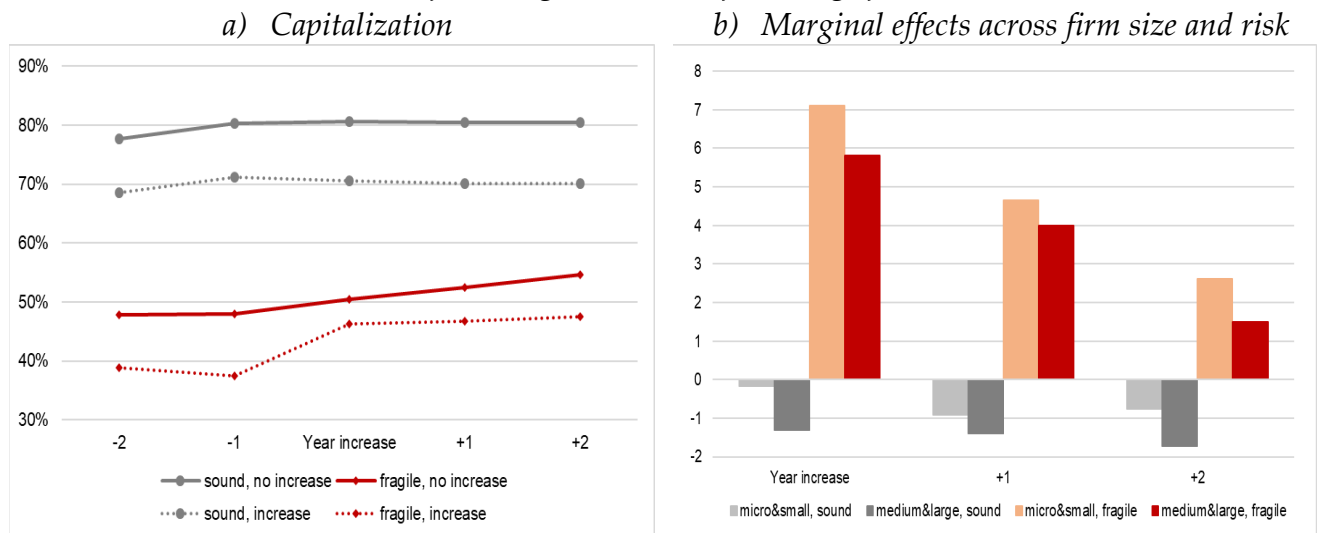
The different use of equity funds by sound and fragile firms also affects the dynamics of their degree of capitalization, measured by the ratio of equity to the sum of equity and financial debt. We find that sound firms that raise new capital also increase their borrowings in order to finance new investments; this financing behavior keeps their average capitalization roughly unchanged (fig. 10, panel a). Arguably, sound firms appear to finance their investments targeting an optimal debt-to-equity ratio.

In principle, fragile firms are more exposed to a debt overhang problem; as a result, they would need to first reduce their financial leverage before they can obtain debt financing for further investments. Indeed, we find that fragile firms that increase their capital have lower capitalization than other fragile firms, and partially close this gap after increasing their capital (fig. 10, panel b).

Fragile firms that recapitalize increase their capital ratio by over 7 and 5 percentage points –for smaller and larger fragile firms respectively– at the end of the year of the recapitalization,

relative to other fragile firms. The capitalization gap continues to narrow in the two subsequent years, albeit at a slower pace. For firms in weaker financial conditions, the effect on capitalization might be amplified if new equity funding is provided in the context of a debt restructuring operation, which typically implies the write-off of part of the existing debt obligations.

Figure 10. Outcomes of capital increases: capitalization
(percentage values and percentage points)



Note: Panel b reports the marginal effects, obtained from the linear probability model in equation (2) of a capital increase on the variations – relative to the year preceding the reference year – in capital ratio, accounting for size and risk groups. Regression coefficients are reported in Table A4 in the Appendix.

6. How do capital increases affect firm survival and sales growth?

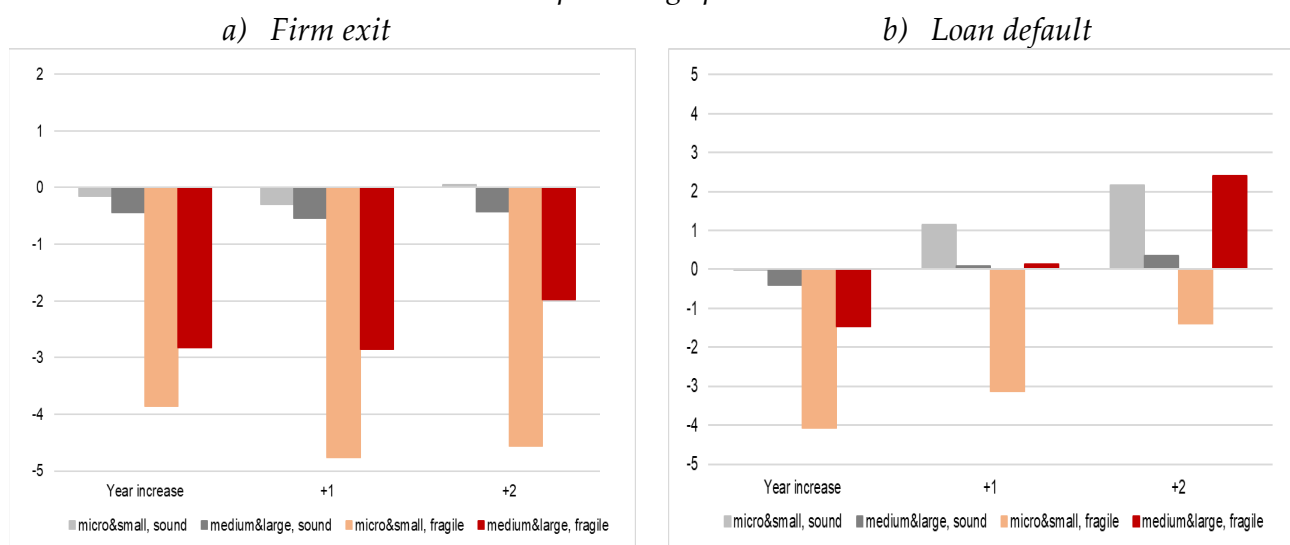
We documented how firms use new capital for different purposes, notably sound firms finance their investments and fragile firms improve their financial viability by increasing liquidity buffers and reducing indebtedness. This difference also leads to heterogeneous effects in terms of firm survival, loan default and firm performance relative to comparable firms in terms of size, risk, sector and geographical groups.

We find that fragile firms that recapitalize significantly reduce their likelihood to exit the market (fig. 11, panel a) and to default on their bank loans (fig. 11, panel b), compared to firms in the same size and risk group that do not recapitalize. The probability of going out of business in the year of the capital increase shrinks by almost 4 percentage points for small fragile firms and by 3 percentage points for large fragile firms (compared to an unconditional average exit rate of 7.4 per cent and 5.5 per cent, respectively for small and large fragile firms that do not recapitalize). For these categories, the effect persists in the following two years at least. The reduction in the probability of loan default for fragile firms is particularly pronounced in the

year of the recapitalization and for smaller firms, but it gradually disappears in the subsequent two years.¹⁴

In contrast, we observe a mild increase in sound firms' credit risk, largely driven by smaller firms, whose investments also increase more compared to those of larger firms. This, however, does not occur immediately after a recapitalization. Such evidence is consistent with the idea that investments are inherently risky as they affect firms' cash flows. Firms raising new equity to finance additional investments – without reducing their leverage – can be relatively more exposed to project failures and, relatedly, to loan default over a medium term horizon.

Figure 11. Outcomes of capital increases: firm exit and loan default
(percentage points)

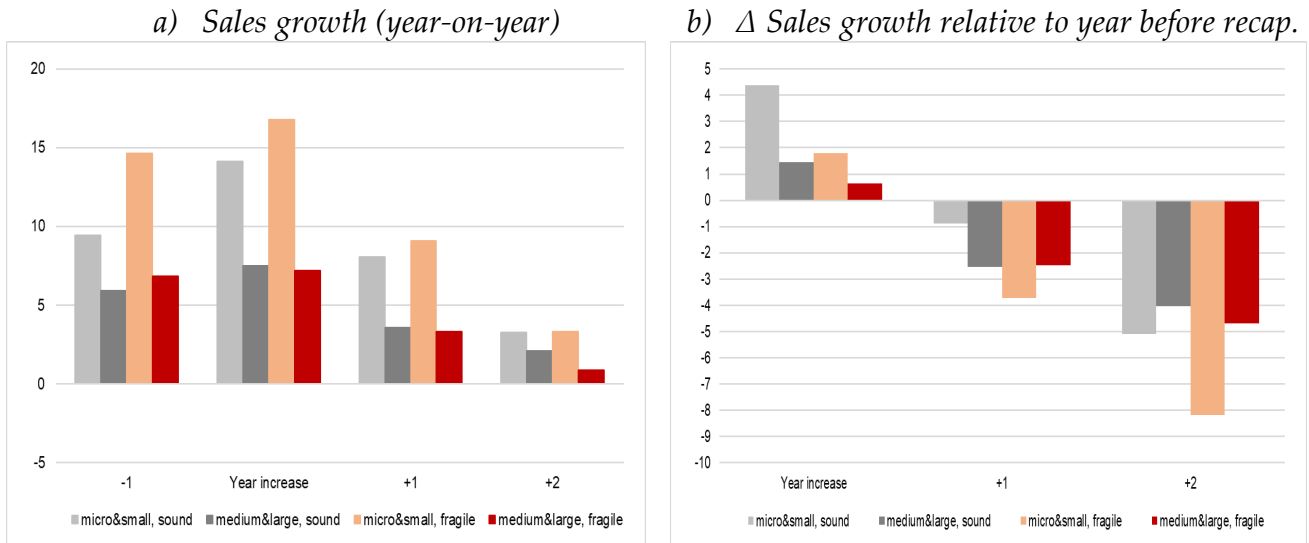


Note: The two panels report the marginal effects, obtained from the linear probability model in equation (2) of a capital increase on the likelihood of (a) the firm exiting the market and (b) the firm being classified as non-performing, accounting for size and risk groups. Regression coefficients are reported in Table A5 in the Appendix.

In turn, investments do not entail downside risks only. On average, raising new capital and investing is aimed to obtain beneficial effects in terms of sales growth and profitability. Firms raising new capital generally already display a stronger sales growth than other firms in the year before the recapitalization (fig. 12, panel a). This difference further expands immediately after the capital increase, especially for sound firms, which most often use new funds to finance new investments. In the subsequent two years, these firms continue to record more robust sales growth relative to others, but the difference fades over time (fig. 12, panel b). The latter effect could be also related to a decrease in the marginal rate of sales growth as the size of the firm increases.

¹⁴ A similar pattern arises when tracking the likelihood of the firm being liquidated through a bankruptcy procedure. Capital increases are associated with a reduction in the likelihood of fragile firms – but not of sound firms – being liquidated in the year of the increase and in the following one.

Figure 12. Outcomes of capital increases: sales growth
(percentage points)

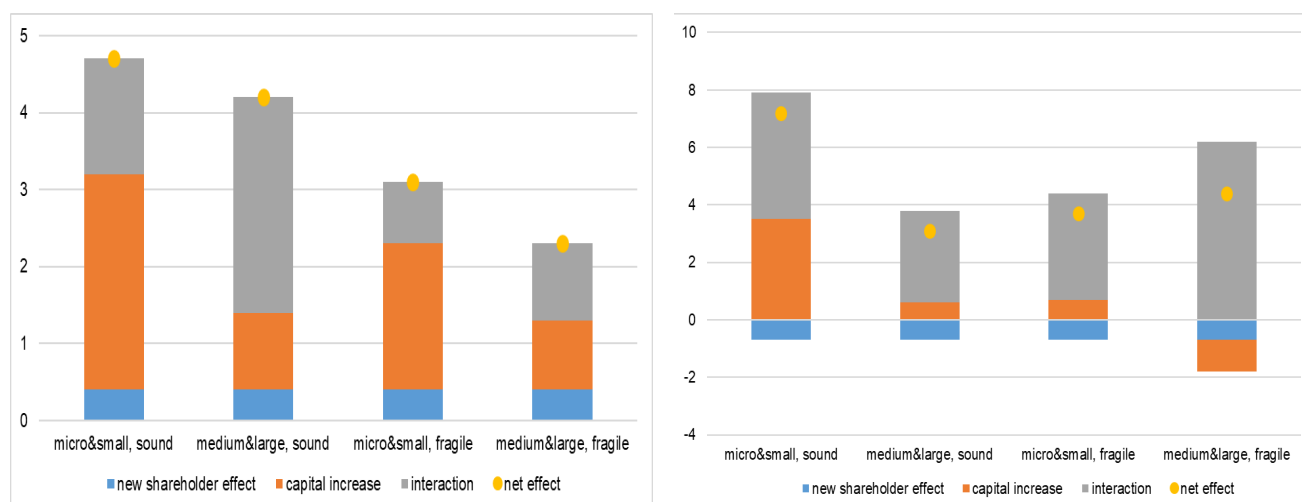


Note: Panel a reports the marginal effects, obtained from a linear probability model, of a capital increase on yearly sales growth, by size and risk. See Table A6 in the Appendix. Panel b reports the marginal effects, obtained from a linear probability model, of a capital increase on the variations – relative to the year preceding the reference year – in yearly sales growth, by size and risk. See Table A4 in the Appendix.

Finally, we consider whether and to what extent the effect of a recapitalization changes when the operation features a change in the composition of the firms' shareholders. Indeed, a change in the shareholders' base may also spur changes in the management and the business strategy that may reflect on firms' outcomes such as investments and sales growth. In fig. 13 we decompose the marginal effects of a capital increase by size and risk groups (limited to the year of the capital increase) according to whether a new shareholder enters the capital base. Indeed, the estimated effect of a recapitalization combined with the entry of new shareholders is associated with larger variations in the investment ratio and in sales growth for all groups.

Figure 13. New shareholders, investments and sales in the year of a capital increase

a) Δ Investment expenditures over total assets b) Δ Sales growth relative to year before recap.



Note: The two panels report the marginal effects, obtained from linear probability models, of a capital increase on the variations – reference vs. prior year – in the investments-to-assets ratio and in yearly sales growth, by size, risk, and presence of new shareholders. See Table A7 in the Appendix.

7. Conclusions and policy implications

As the pandemic crisis has evolved two major concerns about the health of NFCs have become central in the policy debate. First, a *debt overhang* condition of financially weaker firms would prejudice their economic and financial perspectives (Banerjee and Kharroubi, 2020; Aldasoro et al., 2021). Second, a materialization of a wave of bankruptcies, still lower than pre-pandemic levels (ESRB, 2021b; Orlando and Rodano, 2022),¹⁵ could follow the phasing out of the extraordinary support measures implemented in response to the pandemics (ESRB, 2021a), notwithstanding the fact that European companies entered the pandemic with stronger financial positions with respect to those prevailing at the start of the GFC (Ebeke et al., 2021).

To avert both risks a rebalancing of firms' financial structure is a crucial policy objective.¹⁶ Policy measures aimed at incentivizing equity and quasi-equity injections, although not announced and implemented on the same scale as credit and liquidity support measures, contributed to mitigate the debt increase (Giron and Rodriguez-Vives, 2021), but they have not been exploited at their full potential.¹⁷

¹⁵ Banerjee et al. (2021) note that since the start of the pandemic, a "bankruptcy gap" has emerged globally between measures of expected and realized bankruptcies.

¹⁶ As to the policies to stem bankruptcies, Diez et al. (2021) assess the impact of the pandemic on SMEs in a sample of European economies and, building on firm-level balance sheet projections, simulate selected policy interventions to assess their impact on insolvencies. They find that equity injections are effective in dampening insolvencies and make a case for targeted equity injections, as untargeted measures are less efficient.

¹⁷ European Central Bank, "Ensuring a smooth exit from support measures and securing the recovery", Macro prudential Report, 2022.

As, to date, the two most feared risks for corporates have not crystallized, it seems that the window of opportunity to rebalance the capital structure of firms and avoid a potential wave of foreclosures is still open in Italy, as in other advanced economies. As the policy focus has progressively shifted from liquidity to solvency issues, there is a quest for lessons learnt on how to maximize the recovery prospects of viable firms, especially the most vulnerable ones. In this respect, our work provides several insights on the economics of recapitalization, which can be useful to shape more effectively the policy response to both key concerns about non-financial firms, i.e. a protracted debt overhang and a potential and related spike in bankruptcies.

The first main result to be considered for policies is that micro and small firms are much less likely to recapitalize than larger firms across the whole period we examine.¹⁸ Such structural feature may reveal a market failure stemming, for instance, from information asymmetries between the owners of these firms and potential investors, who may effectively contribute to the development or turn-around of these smaller companies. This points out, *ceteris paribus*, a greater and structural need for public support to incentivize the expansion of the equity base of smaller firms, given also their more limited access to capital markets (Finaldi Russo et al., 2020). Public interventions may provide economic and (most importantly) regulatory incentives, such as effective financial reporting and governance standards aimed at reducing the asymmetric information problem, and a simplification of the access to capital markets and the development of private equity investments, including those undertaken via digital platforms, so as to increase the potential investors' base. The latter option would likely favor the creation of a wide and integrated equity market that could allow firms to expand their ownership base, a feature that we document as being related to more positive outcomes in terms of investments and sales growth.

A second piece of evidence is that larger and more financially fragile firms are often able to raise new capital in periods of economic downturn. This points to a stronger case, especially during the weaker phases of the cycle, for public support to equity injections by smaller firms, which are less able to raise additional equity, to foster the recovery. The expiration of some of the Covid-related support programs, i.e. the extraordinary cash transfer and the employment and business continuity fund programs, calls for a swift transition from liquidity to solvency support – for instance facilitated by incentives for capital increases to

18 Another evidence of this work, to be further explored, is that firms borrowing from a smaller number of lenders are less likely to recapitalize, pointing to the need to better take into account the consequences that the structure of the credit markets has on firms' incentives to rebalance their financial structure with private resources, including through the recourse to debt renegotiation.

firms in the recovery phase – to address the scars produced by the crisis, as downside risks remain large.

A third empirical result points out the heterogeneity between fragile and sound firms in the use of new equity funds, and as such it informs the discussion on the most appropriate target of firms eligible to access public programs for equity support. For fragile firms new equity funds reduce financial leverage, leading in turn to a sizeable effect on exit and loan default rates. Sound firms, instead, benefit from recapitalizations by substantially increasing their investments, which are crucial to foster the economic recovery after a sizeable negative shock. When programs are open to all firms, our evidence suggests that public incentives to equity injections may simultaneously cushion the effects of the crisis on firms' solvency and accelerate the recovery phase. If instead the amount of public funds available for equity support programs is more limited, and debt overhang issues constitute a significant financial stability concern, then policies ought to concentrate their efforts on fragile firms, evaluating the opportunity of support to restructuring for the weakest among them, possibly also through capital injections. Targeting policies to challenged firms for which raising equity is difficult because of market failures is in line with the principles indicated by the Group of Thirty (2020).

Among the possible designs for public interventions supporting the recapitalization of firms challenged by the pandemics, Gobbi et al. (2020) note that programs entailing a direct intervention of the State in the equity of the firms could be a daunting task, given the complexity of the selection and monitoring of a potentially very large number of firms as beneficiaries of the support, and that it is feasible only if the perimeter of the programs is restricted to a limited number of larger firms.¹⁹ This would already restrict the effectiveness of these direct interventions towards micro and small firms, which in Italy constitute a very relevant part of the firms' population. Public programs entailing automatic mechanisms of disbursing public funds or of accessing fiscal deductions avoid centralized selection and monitoring, but still require an appropriate design of the criteria to identify those firms that would actually benefit from a public subsidy to recapitalizations.

Public subsidy schemes that involve automatic fiscal incentives to firms' recapitalization may be further divided into two categories: "*public cash against future tax surcharges*" (Boot et al., 2020; Blanchard et al., 2020) and "*private cash against future tax credit*" (Gobbi et al., 2020). The first category of interventions consists in the possibility for companies affected by the crisis to access public transfers, accompanied by a subsequent temporary increase in taxes (VAT and/or taxation on profits). The second category instead requires the

¹⁹ Accordingly, within the architecture of public programs set up by the Italian Government to strengthen firms' capitalization, targeted equity investments are restricted to large or strategically important firms (a potentially very small sample of firms).

introduction of tax concessions for firms (and possibly also investors²⁰) that recapitalize with private funds. Both types of interventions have pros and cons.²¹ However, the latter type of intervention, by requiring a disbursement by private shareholders, may mitigate the concerns related to the allocation of resources to zombie firms. Indeed, it is unlikely that unprofitable firms with non-viable prospects can find the private funds required to activate this kind of public support.²²

Importantly, the evidence presented in this work, concerning private recapitalizations, better informs the discussion on the likely effect of "*private cash against future tax credit*" programs; on the contrary, programs in the "*public cash against future tax surcharges*" category might find a closer comparison in the results pointed out by the literature on the effectiveness of State promotional banks (Sapienza, 2004; Lazzarini et al., 2015; Ehrl, 2021).

²⁰ For example, the Italian "Decreto Rilancio" introduced tax incentives, in the form of tax credits, for equity injections in medium-sized corporations (with revenues between 10 and 50 million). The credit is recognized to natural or legal persons who make the contribution, to the extent of 20 per cent of the contribution (for contributions up to € 2 million).

²¹ The main advantage of "*public cash against future tax surcharges*" is the ease with which new resources can be found directly from the public sector; the main critical issues consist in strengthening the incentives to undertake tax avoidance practices in order to limit the amount of refunds and, finally, in quantifying the amount of public resources that each company can access. Moreover, some firms' shareholders might not be willing to have a public entity as a new shareholder. The "*private cash against future tax credit*" schemes would be better to self-select firms with good growth prospects as they would be more likely to benefit from the tax credit. Moreover, immediate spending on the public budget would be avoided, linking the implicit liabilities for the government to the actual survival of the company; the greater skin-in-the-game would also provide the entrepreneur with greater incentives to invest and improve business efficiency. However, for entrepreneurs with good growth prospects but with limited availability of capital, the scheme is less effective.

²² Besides, it was already shown that zombie firms in Italy in 2020 exited the market more and had a lower take-up even of the extraordinary support measures introduced with the pandemics (Pelosi et al., 2021).

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Appendix

Table A1 – Correlations between capital increases, size, and risk

<i>Dependent variable:</i>	Capital increase (0/1)		
	(1)	(2)	(3)
Size: medium	-0.007*** (0.000)		
Size: small	-0.028*** (0.000)		
Size: micro	-0.042*** (0.000)		
Risk: solvent	0.005*** (0.000)		
Risk: vulnerable	0.007*** (0.000)		
Risk: risky	0.008*** (0.000)		
Medium/Large		0.031*** (0.000)	0.023*** (0.000)
Fragile (vuln./risky)		0.002*** (0.000)	0.001*** (0.000)
Medium/Large * Fragile			0.017*** (0.000)
Observations	8,417,123	8,417,123	8,417,123
Adj. R ²	0.008	0.006	0.006

Note: OLS estimations at firm-year level, standard error in parentheses (***) 0.01, ** 0.05, * 0.10 significance level). For each year t of observation, the outcome indicates whether the firm has increased its nominal capital in t ; all features included in the regressions are measured at $t-1$. *Size* indicators are measured based on the European Commission classification (2003/361/CE). *Risk* indicators are based on CEBI Score4 by Cerved Group s.p.a. (1-2: safe; 3-4: solvent; 5-6: vulnerable; 7-10: risky). The excluded categories are *Size: large* and *Risk: safe* in column 1; *Micro/ Small* and *Sound (safe/solvent)* in columns 2 and 3. All specifications include indicators for the year of observation (2008-2020), geographical localization of the firm (province), and sector of economic activity (ATECO 2-dig).

Table A2 – Time-varying correlations between capital increases, size, and risk

<i>Dependent variable:</i>	Capital increase (0/1)	
<i>Interaction variable (X):</i>	Medium/Large (1)	Fragile (2)
Year: 2008	0.010*** (0.001)	0.047*** (0.001)
Year: 2009	0.008*** (0.001)	0.046*** (0.001)
Year: 2010	0.008*** (0.001)	0.047*** (0.001)
Year: 2011	0.006*** (0.001)	0.045*** (0.001)
Year: 2012	0.005*** (0.001)	0.045*** (0.001)
Year: 2013	0.005*** (0.001)	0.044*** (0.001)

Year: 2014	0.005*** (0.001)	0.044*** (0.001)
Year: 2015	0.005*** (0.001)	0.045*** (0.001)
Year: 2016	0.005*** (0.001)	0.045*** (0.001)
Year: 2017	0.005*** (0.001)	0.044*** (0.001)
Year: 2018	0.005*** (0.001)	0.045*** (0.001)
Year: 2019	0.005*** (0.001)	0.045*** (0.001)
Year: 2020	0.005*** (0.001)	0.045*** (0.001)
<hr/>		
Year: 2008 * X	0.041*** (0.001)	0.006*** (0.000)
Year: 2009 * X	0.043*** (0.001)	0.006*** (0.000)
Year: 2010 * X	0.036*** (0.001)	0.003*** (0.000)
Year: 2011 * X	0.033*** (0.001)	0.003*** (0.000)
Year: 2012 * X	0.035*** (0.001)	0.003*** (0.000)
Year: 2013 * X	0.031*** (0.001)	0.003*** (0.000)
Year: 2014 * X	0.030*** (0.001)	0.002*** (0.000)
Year: 2015 * X	0.025*** (0.001)	0.002*** (0.000)
Year: 2016 * X	0.028*** (0.001)	0.002*** (0.000)
Year: 2017 * X	0.024*** (0.001)	0.002*** (0.000)
Year: 2018 * X	0.024*** (0.001)	0.002*** (0.000)
Year: 2019 * X	0.025*** (0.001)	0.002*** (0.000)
Year: 2020 * X	0.027*** (0.001)	0.002*** (0.000)
<hr/>		
Observations	8,417,123	8,417,123
Adj. R ²	0.017	0.019

Note: OLS estimations at firm-year level, standard error in parentheses (*** 0.01, ** 0.05, * 0.10 significance level). Notes to Table A1 apply. Column 1 reports estimates of the coefficients relative to year indicators and the interactions between year indicators and *Medium/Large*. In addition, column 1 includes *Fragile* (coefficient not shown). Column 2 reports estimates of the coefficients relative to year indicators and the interactions between year indicators and *Fragile*. In addition, column 2 includes *Medium/Large* (coefficient not shown).

Table A3 – Correlations between capital increases, credit and shareholder concentration

<i>Dependent variable:</i>	Capital increase (0/1)	
	(1)	(2)
Credit concentration *		
Micro/Small * Sound	-0.004***	-0.004***
	(0.000)	(0.000)
Credit concentration *		
Medium/Large * Sound	-0.017***	-0.018***
	(0.000)	(0.000)
Credit concentration *		
Micro/Small * Fragile	-0.006***	-0.006***
	(0.000)	(0.000)
Credit concentration *		
Medium/Large * Fragile	-0.019***	-0.019***
	(0.000)	(0.000)
Shareholder concentration *		
Micro/Small * Sound	0.001***	0.001***
	(0.000)	(0.000)
Shareholder concentration *		
Medium/Large * Sound	-0.000	-0.000*
	(0.000)	(0.000)
Shareholder concentration *		
Micro/Small * Fragile	-0.001***	-0.001***
	(0.000)	(0.000)
Shareholder concentration *		
Medium/Large * Fragile	-0.003***	-0.004***
	(0.000)	(0.000)
Additional controls		X
Observations	4,510,302	4,146,935
Adj. R ²	0.025	0.025

Note: OLS estimations at firm-year level, standard error in parentheses (*** 0.01 ** 0.05 * 0.10). Notes to Table A1 apply. All specifications also include the interaction between *Medium/Large* and *Fragile* (coefficient not shown). Column 2 also includes the following variables: *Age*, *EBITDA-revenues margin*, *Current share of total assets*, *Capitalization (coverage of financial debt by equity)*, *Interest rate coverage by EBITDA* (coefficients not shown). Concentration indexes are standardized HHIs of, respectively, credit and equity shares.

Table A4 – Capital increases and variations in economic outcomes

<i>Dependent variable:</i> <i>Year:</i>	Δ Investment / Assets			Δ Short-term liquidity			Δ Capitalization			Δ Revenue growth		
	<i>t</i>	<i>t+1</i>	<i>t+2</i>	<i>t</i>	<i>t+1</i>	<i>t+2</i>	<i>t</i>	<i>t+1</i>	<i>t+2</i>	<i>t</i>	<i>t+1</i>	<i>t+2</i>
Capital increase (0/1)	0.032*** (0.002)	-0.001 (0.004)	-0.010** (0.004)	-0.020* (0.010)	-0.043*** (0.014)	-0.061*** (0.016)	-0.008*** (0.003)	-0.019*** (0.003)	-0.019*** (0.004)	0.044*** (0.005)	-0.009* (0.005)	-0.051*** (0.005)
Medium/Large	-0.001 (0.001)	0.001 (0.001)	0.001 (0.002)	0.010** (0.004)	-0.003 (0.005)	-0.024*** (0.006)	0.007*** (0.001)	0.008*** (0.001)	0.004*** (0.001)	0.024*** (0.002)	0.014*** (0.002)	0.016*** (0.002)
Fragile	-0.006*** (0.000)	-0.004*** (0.000)	-0.004*** (0.001)	-0.041*** (0.001)	-0.081*** (0.002)	-0.112*** (0.002)	0.000 (0.000)	0.014*** (0.000)	0.035*** (0.001)	0.088*** (0.001)	0.053*** (0.001)	0.044*** (0.001)
Medium/Large * Fragile	0.001 (0.001)	-0.002 (0.002)	-0.002 (0.002)	-0.024*** (0.006)	-0.014* (0.007)	0.009 (0.009)	-0.026*** (0.001)	-0.047*** (0.002)	-0.065*** (0.002)	-0.084*** (0.002)	-0.068*** (0.002)	-0.068*** (0.003)
Capital increase * Medium/Large	-0.013*** (0.005)	-0.002 (0.007)	0.003 (0.009)	0.000 (0.021)	0.005 (0.028)	0.009 (0.033)	0.008 (0.005)	0.019*** (0.007)	0.016** (0.008)	-0.029*** (0.009)	-0.016* (0.009)	0.011 (0.010)
Capital increase * Fragile	-0.011*** (0.003)	-0.009** (0.004)	-0.006 (0.005)	0.073*** (0.013)	0.065*** (0.016)	0.071*** (0.020)	0.082*** (0.003)	0.069*** (0.004)	0.050*** (0.005)	-0.026*** (0.006)	-0.028*** (0.006)	-0.031*** (0.006)
Capital increase * Medium/Large * Fragile	0.003 (0.006)	0.011 (0.009)	0.007 (0.011)	-0.028 (0.028)	-0.026 (0.035)	-0.032 (0.042)	-0.026*** (0.007)	-0.028*** (0.009)	-0.026*** (0.010)	0.018 (0.012)	0.029** (0.012)	0.024* (0.012)
Observations	4,606,701	4,041,715	3,504,852	4,603,588	4,036,182	3,497,759	4,467,928	3,902,542	3,371,375	4,182,035	3,554,805	3,039,480
Adj. R ²	0.003	0.001	0.001	0.001	0.001	0.002	0.010	0.016	0.025	0.014	0.018	0.010

Note: OLS estimations at firm-year level, standard error in parentheses (***) 0.01 ** 0.05 * 0.10). For each reference year *t*, the outcomes indicate the *difference* between the value of the variable at $\{t, t+1, t+2\}$ and the value of the variable at *t-1*. *Investment rate* is the ratio between investment in fixed assets and total assets. *Short-term liquidity* is the ratio between current assets and short-term liabilities. *Capitalization* is the ratio between equity and the sum of equity and financial debt, corrected for the possibility of negative equity. *Revenue growth* is the growth rate of net revenues with respect to the previous year. *Capital increase* indicates whether the firm has increased its nominal capital in *t*; all other features included in the regressions are measured at *t-1*. All specifications include indicators for the year of observation (2008-2020), geographical localization of the firm (province), and sector of economic activity (ATECO 2-dig), and creditor and shareholder concentrations as continuous variables.

Table A5 – Capital increases and survival outcomes

<i>Dependent variable:</i>	Liquidated (0/1)			Out of business (0/1)			Financial default (0/1)		
<i>Year:</i>	<i>t</i>	<i>t+1</i>	<i>t+2</i>	<i>t</i>	<i>t+1</i>	<i>t+2</i>	<i>t</i>	<i>t+1</i>	<i>t+2</i>
Capital increase (0/1)	-0.000 (0.000)	0.002** (0.001)	0.007*** (0.001)	-0.002 (0.001)	-0.003 (0.002)	0.001 (0.002)	-0.000 (0.002)	0.011*** (0.002)	0.022*** (0.003)
Medium/Large	-0.002*** (0.000)	-0.008*** (0.000)	-0.013*** (0.000)	0.004*** (0.001)	0.002** (0.001)	-0.001* (0.001)	-0.013*** (0.001)	-0.021*** (0.001)	-0.026*** (0.001)
Fragile	0.006*** (0.000)	0.017*** (0.000)	0.028*** (0.000)	0.044*** (0.000)	0.071*** (0.000)	0.095*** (0.000)	0.106*** (0.000)	0.143*** (0.000)	0.170*** (0.000)
Medium/Large * Fragile	0.016*** (0.000)	0.034*** (0.000)	0.051*** (0.001)	-0.002** (0.001)	0.009*** (0.001)	0.019*** (0.001)	0.011*** (0.001)	0.017*** (0.001)	0.022*** (0.001)
Capital increase * Medium/Large	-0.000 (0.001)	-0.001 (0.002)	-0.004* (0.002)	-0.003 (0.003)	-0.003 (0.004)	-0.005 (0.004)	-0.004 (0.005)	-0.011** (0.005)	-0.018*** (0.005)
Capital increase * Fragile	-0.005*** (0.001)	-0.007*** (0.001)	-0.004*** (0.001)	-0.037*** (0.002)	-0.045*** (0.002)	-0.046*** (0.003)	-0.041*** (0.003)	-0.043*** (0.003)	-0.036*** (0.003)
Capital increase * Medium/Large * Fragile	-0.008*** (0.001)	-0.004* (0.002)	0.004 (0.003)	0.013*** (0.004)	0.022*** (0.005)	0.031*** (0.006)	0.030*** (0.006)	0.043*** (0.006)	0.056*** (0.007)
Observations	4,867,375	4,867,375	4,863,828	4,867,375	4,867,375	4,863,828	3,754,475	4,176,620	4,176,620
Adj. R ²	0.007	0.016	0.026	0.019	0.029	0.039	0.060	0.078	0.096

Note: OLS estimations at firm-year level, standard error in parentheses (***) 0.01 ** 0.05 * 0.10). For each reference year t , the outcomes indicate the presence of each status at $\{t, t+1, t+2\}$. *Liquidated* indicates whether the firm has entered judicial liquidation. *Out of business* indicates whether the firm has left the market (including through liquidation). *Financial default* is an indicator of the presence of an (adjusted) non-performing loan status. Other notes to Table A4 apply.

Table A6 – Capital increases and revenue growth

<i>Dependent variable:</i>	Revenue growth			
<i>Year:</i>	<i>t-1</i>	<i>t</i>	<i>t+1</i>	<i>t+2</i>
Capital increase (0/1)	0.094*** (0.003)	0.141*** (0.003)	0.080*** (0.003)	0.033*** (0.003)
Medium/Large	-0.007*** (0.001)	0.020*** (0.001)	0.011*** (0.001)	0.013*** (0.001)
Fragile	-0.096*** (0.000)	0.024*** (0.000)	-0.010*** (0.000)	-0.015*** (0.000)
Medium/Large * Fragile	0.056*** (0.002)	-0.052*** (0.002)	-0.037*** (0.002)	-0.039*** (0.002)
Capital increase * Medium/Large	-0.035*** (0.007)	-0.066*** (0.006)	-0.044*** (0.006)	-0.012* (0.007)
Capital increase * Fragile	0.052*** (0.004)	0.026*** (0.004)	0.011*** (0.004)	0.001 (0.004)
Capital increase * Medium/Large * Fragile	-0.043*** (0.008)	-0.030*** (0.008)	-0.013 (0.008)	-0.013 (0.009)
Observations	4,510,302	4,487,008	3,799,322	3,245,963
Adj. R ²	0.024	0.015	0.014	0.010

Note: OLS estimations at firm-year level, standard error in parentheses (***) 0.01 ** 0.05 * 0.10). Notes to Table A4 apply.

Table A7 – Capital increases and variations in economic outcomes: new shareholders

<i>Dependent variable:</i>	Δ Investment/Assets	Δ Revenue growth
Capital increase (0/1)	0.028*** (0.003)	0.035*** (0.006)
Medium/Large	-0.002** (0.001)	0.025*** (0.002)
Fragile	-0.006*** (0.000)	0.089*** (0.001)
Medium/Large * Fragile	0.002 (0.001)	-0.085*** (0.003)
Capital increase * Medium/Large	-0.018*** (0.006)	-0.029** (0.012)
Capital increase * Fragile	-0.009*** (0.003)	-0.028*** (0.007)
Capital increase * Medium/Large * Fragile	0.008 (0.007)	0.011 (0.015)
New shareholders (0/1)	0.004*** (0.001)	-0.007*** (0.003)
New shareholders * Medium/Large	0.004 (0.003)	-0.004 (0.006)
New shareholders * Fragile	0.001 (0.002)	0.004 (0.003)
New shareholders * Medium/Large * Fragile	-0.002 (0.005)	-0.012 (0.009)
Capital increase * New shareholders	0.015*** (0.005)	0.044*** (0.011)
Capital increase * Medium/Large * New shareholders	0.013 (0.011)	-0.012 (0.023)
Capital increase * Fragile * New shareholders	-0.007 (0.006)	-0.007 (0.013)
Capital increase * Fragile * Medium/Large * New shareholders	-0.011 (0.014)	0.037 (0.029)
Observations	4,200,156	3,810,527
Adj. R ²	0.003	0.014

Note: OLS estimations at firm-year level, standard error in parentheses (***) 0.01 ** 0.05 * 0.10). For each reference year t , the outcomes indicate the *difference* between the value of the variable at t and the value of the variable at $t-1$. Other notes to Table A4 apply.