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Financial Fragility and Corporate Bond Funding of SMEs: An Analysis of the Italian Case

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Abstract

The chapter analyzes the financial policy of corporate bond issuers in the new Italian junior bond market specifically dedicated to unlisted firms and SMEs, using a proprietary firm-level dataset on 127 first-time mini-bond issuers across 2013–2017 years jointly with a control sample of around 5200 Italian private firms that have not issued corporate bonds across the same years. Since SME access to the debt capital market is largely considered a valuable source of debt funding diversification, especially for growth firms with a prominent exposure on bank debt, we test using OLS regressions whether bond issuers are able to reduce their financial vulnerability in comparison with similar nonissuers firms. The aim is to assess the extent to which the financial choices of SMEs regarding nonequity external funding can become a key factor in facing real and financial shocks like those triggered by the current pandemic Covid-19 outbreak. Our findings suggest that the access to the junior bond market is beneficial for the Italian unlisted companies in terms of a pronounced improvement in our financial fragility indicators.

Keywords: small business finance, bond financing, SMEs, financial fragility, mini-bonds

JEL classification: G12, G23, G24, G32

1. Introduction

The pandemic Covid-19 outbreak has severely disrupted the economic systems across European countries during the 2020 first semester. Widespread lockdowns have brought to a halt for a few months the firms' production and services delivering in many countries and major concerns have arisen on the capacity of many firms to survive the real and financial shocks induced by the current pandemic. Despite all governments and public authorities vast subsidizing programs deployed to help economy recovery, still small and medium sized enterprises (SMEs) remain particularly exposed to the negative consequences of the current Covid-19 outbreak due to their higher perceived financial vulnerability.

Among European countries, Italy has been the first country to be harshly hit by the coronavirus outbreak and one of the more exposed to negative economic consequences of the pandemic. Moreover, its economic system is very much reliant on SMEs on the economy supply side. Anecdotal evidence points out that many small

businesses are struggling to re-open and resume their activities after the slow easing up of the government lockdown measures.

Under these circumstances, the present study aims to test the financial policies that Italian SMEs have developed across the years starting from the aftermath of the 2008 financial crisis and the ensuing 2011 Greek sovereign debt crisis, up to recent years. There are many ways to deal with this issue and its many specifics. We opt to focus on how SMEs in Italy have chosen to diversify their debt funding away from bank lending through corporate bonds funding, since SME access to the debt capital market is largely considered a valuable source of debt funding diversification, especially for growth firms with a prominent exposure on bank debt [1–5]. Beyond that, one of the main goals of a firm's sound financial policy, particularly in the case of SMEs, should be to devise financial choices that may help reducing the financial vulnerability to potential unexpected financial shocks [6, 7].

There are several reasons for our research focus. First, it is well documented that SMEs tend to be over-reliant on bank debt, especially short-term lending [8]. Second, the last global financial crisis heightened in southern European countries by the spillover of Greek sovereign debt crisis in 2011 has produced a lasting credit crunch propelled by risk aversion from banks and their concerns on borrowers default risk, which it has been particularly severe for SMEs [9, 10]. Third, in order to counter the negative effect of this credit crunch on SMEs, the Italian government has promoted in June 2012 a raft of reforms in order to facilitate the SMEs and unlisted firms' access to bond financing¹ [3]. A new junior bond market for mini-bonds, named *ExtraMot-Pro*, within the domestic *Borsa Italiana* stock exchange, has been launched in February 2013, with a set of soft requisites for SMEs issuers. In brief, the new junior bond market is characterized by minimal regulations and simplified admission requirements in comparison with those set up for the senior corporate bond market.

More in particular, we analyze in this chapter whether mini-bond issuers have improved their financial resilience thanks to this market-based financial choice across the years between the two major recent crises (i.e., the 2011 Greek sovereign crisis and the 2020 pandemic-induced crisis). By focusing on this topic, our study may contribute to shed new light on the emerging debate on how small businesses can recover from the current crisis triggered by the Covid-19 pandemic.

Our empirical analysis is performed using regression models based on a proprietary hand-collected dataset of 127 mini-bonds issued by nonfinancial firms across 2013–2017 years jointly with a sample of nearly 5200 Italian private firms that have not issued corporate bonds across the same years. The dataset combines evidence on mini-bonds issuers, collected from *Borsa Italiana* website and admission prospectuses, with detailed financial statements data from Bureau Van Dijk' Amadeus/Aida dataset.

The chapter is organized as follows. Section 2 discusses our research question and the testable hypothesis. Section 3 describes our dataset and provides sample description. Section 4 illustrates the research design and the empirical methodology. Section 5 sets out the empirical results and discusses the main implications of the study. Section 5 concludes the paper.

¹ The regulatory framework for mini-bonds in Italy has been established by “Decreto Sviluppo” (D.L. n. 83, June 22, 2012), “Decreto Sviluppo Bis” (D.L. n. 179, October 18, 2012), “Piano Destinazione Italia” (D.L. n. 145, December 23, 2013), “Decreto competitività” (D.L. n. 91, June 24, 2014). For further detail, see the *Borsa Italiana* website: <https://www.borsaitaliana.it/prolink/extramotpro/ilcontestonormativo/ilcontestonormativo.en.htm>

2. The financial fragility of SMEs: does corporate bond financing make SMEs more resilient to potential crisis?

In our research setting, we are interested in testing one of the key ingredients that normally shapes the firms' financial policy [11, 12]: how firms' external funding choices could make them less financial fragile when facing potential unforeseen real or financial shocks like those induced by the current coronavirus pandemic. The basic idea, here, is the more the firm is less dependent from a unique or very few sources of external funding (for instance, bank lending), the better for the firm from a financial vulnerability point of view. We reckon that this topic is nowadays extremely important in particular for SMEs, which are the firm size-class clearly more at risk of survival in the current economic climate at least in those countries most affected by the pandemic.

In order to tackle this issue we ask ourselves whether the choice of debt diversification away from bank lending can improve or not the firms' financial fragility and, thus makes them, at least on paper, more resilient to potential external financial shocks or crises.

Prior literature on SME access to debt capital market have focused on the benefits that corporate bonds offers in terms of: positive management culture change linked to the firm financial life-cycle when approaching market-based finance [13]; enhanced market visibility on prospective investors [14–17]; acclimatization function and progressive step toward other more complex forms (even equity) of capital market funding [18]; and, even, reduced financial costs on subsequent bank lending thanks to heightened bargaining power in the firm-bank relationships [19]. On the contrary, there is still less evidence on the role that corporate bond financing may play on addressing the SMEs financial fragility issue. It is true that, at least on paper, any opportunity of debt diversification may help small businesses achieve a better and more balanced financial policy, but it is important also to verify whether this goal is somehow supported by the empirical data as we cannot take for granted that smaller firms are in practice able to improve their financial resilience through this channel of funding since there can be the suspicion that firms are replacing one form of debt (bank lending) with another one (debt securities). This is a quite relevant question in the current economic climate dominated by the pandemic crisis.

Ideally, to develop a comprehensive study on this research topic we should need a large dataset across years of firms' financial data around the crisis (in this case the pandemic) both before and after the event. Since we can only source data before the coronavirus outbreak, we are obliged to use firm-level data in the years before the 2020 pandemic crisis. We, thus, consider the firm's choice of corporate bond funding as the major external debt diversification solution molding the firm financial policy.

Under these circumstances, we formulate the following main research question. Does corporate bond financing make SMEs more resilient to potential crisis? To answer this research question we opt to create a firm-level financial fragility indicator using core financial reports data both before and after the time of mini-bonds funding for issuer firms and compute the variation reported by this indicator across the years. The basic idea is that the difference between ex-post (after the bond issuance) score and the ex-ante score (before the mini-bond funding) of our financial fragility indicator should give us a good proxy of the impact of the treatment (the corporate bond funding) on the firm financial fragility and, thus, on the ability of the firms' financial policy to reach its desired outcome in terms of improved (less) financial fragility.

Even if financial vulnerability can be measured along many dimensions, and there is not always a wide consensus on how measure it, we are confident that our

metric that include five different financial ratios commonly used by scholars and practitioners in assessing firms' financial health is reasonable robust. We then use this indicator as our dependent variable in our regressions as depicted later in our Section 4. Among the explanatory variables, together with other control variables, we employ a mini-bond financing dummy which is equal to one in case of SME funding through this channel and zero otherwise.

In this way, we can empirically test our main hypothesis on whether Italian SMEs mini-bond issuers are able to reduce ex-post their financial vulnerability as a consequence of this debt diversification choice in comparison with similar and comparable nonissuer firms. In sum our hypothesis is the following:

H.: Italian SME mini-bond issuers that diversify their debt funding through the access to the debt capital-market become ex-post less financial fragile.

If the above hypothesis is positively confirmed by our tests, we can claim that corporate bond funding may prove to be a key ingredient of a firm's sound financial policy aiming to improve its financial resilience to potential unexpected financial shocks, particularly in the case of SMEs.

3. Dataset and sample description

3.1 Dataset on Italian companies

Since we cannot test the counterfactual assumption of our hypothesis, i.e. what could happen to the financial vulnerability of those issuers firms if they have not chosen to access the debt capital market, we have to rely on a matched control group of private firms that have not issued corporate bonds across the same years under investigation. This control group is created from a large sample of around 6000 Italian firms extracted from Bureau Van Dijk' Amadeus/Aida dataset (hereafter Amadeus).

Therefore, in order to analyze the role of corporate bond funding in changing SMEs financial fragility, we have sourced data for two different samples. First, the listed mini-bonds sample (i.e. issuers firms) and, second, the matched control group sample formed by comparable private firms that have not issued mini-bonds (nonissuers firms).

For the first sample, we source data on mini-bonds listed on the junior bond market ExtraMot Pro, from its starting date in 2013 up to the end of December 2017. We obtained from the *Borsa Italiana* website the raw information on listed bonds and its issuers on the 15th January 2020. The total number of bonds net of delisting is 241, from 160 different firms. We consider only first time issuers, so we eliminate subsequent bond offerings from the same firm, since the decision to access the capital market could be persistent across time, following the standard approach used in the going public literature, dating back to the seminal work of Pagano et al. [20]. Then, we match the obtained dataset with accounting information about the issuers, collected from the Amadeus database. Due to a lack of complete accounting information for some issuers, the dataset comprises 127 mini-bonds issued by nonfinancial companies. We consider only nonfinancial firm issuers because financial statements information for financial and nonfinancial companies are not easily comparable.

As regards our control group, we source from the same Amadeus database a subset of nearly 40,000 private Italian nonfinancial firms with a number of employees between 1 and 2000 units, total asset between 0.3 and 1500 €/million, and with at least 5 years of available accounting data across the years where we have

corporate bonds offerings. From this large dataset, we randomly draw 1200 nonissuing firms' observation, with a comparable size of the issuers' firms, for each year of mini-bond issuance (from 2013 up to 2017). In this way, we are able to match issuers in a given year with a control group randomly drawn for the same year. Hence, the final raw control group is composed by 6000 firms. However, due to lack of some relevant accounting information, our final sample consists of 5319 firms (127 issuers and 5192 from the control group).

For what concerns firm-level accounting data for constructing our dependent and independent variables, we collect for the two firms' samples not only ex-ante data, (i.e. before the time of bond funding for issuers and the same year for the matched control group) but also data of 2 years after. For example, for mini-bond issuers that first-time entered the debt capital market during the 2017, we have collected financial statements data for the years 2016 and 2019. For a firm in the control group, the procedure is the same: if the firm is drawn in the 2017 sub-sample, we collected data for the years 2016 and 2019. In this way, we have homogeneous data between the issuers sample and the control group.

3.2 Sample descriptive characteristics

Our corporate bond issuers sample, which is composed by 127 offerings, is depicted in **Table 1** which illustrates the distribution of issuers by size (in terms of sales) using the firms' financial reports from the most recent year prior to the issuance date. In accordance with the standard EU Commission definition, we define a SME as a firm with fewer than 250 employees, total assets lower than €43 million, or sales lower than €50 million. A small firm is defined as a firm with fewer than 50 employees, total assets lower than €10 million, or sales lower than €10 million.

Table 1 distribution highlights that SMEs cover around 49% of our sample (i.e. first two size classes). **Table 2** shows the distributions of issuer firms by industry. The majority of these bonds were issued by manufacturing firms, followed by the retail sector. The positive correlation between issuers' size and mini-bond capital raised is confirmed in **Table 3**. As a matter of fact, larger bonds are issued by unlisted firms with more than 50 €/million sales. For SMEs with sales under the 50 €/million threshold, the average capital raised remains quite low. **Table 4** displays the issuance motivations as declared in the bonds prospectuses, and highlights that the main use of proceeds of the mini-bond funding is to exploit growth opportunities but still debt restructuring and diversification of funding are acknowledged by a high percentage (around 23%) of issuers, behind supporting firms' growth target. **Table 5** divides our sample into four groups according to the issuer-size in order to

Size class	# of observation	frequency
<10 million	12	9.45%
Between 10 and 50 million	50	39.37%
Between 50 and 100 million	18	14.17%
>100 million	47	37.01%
Total	127	100.00%

The sample is split accordingly to four different size classes based on sales in €/million. The table shows the number of the observations and the percentage with respect to the total for each category. Our elaboration on proprietary dataset.

Table 1.
Issuers distribution by size class.

Sector	# of observation	Frequency
Accommodation and catering	2	1.57%
Agriculture, silviculture and fishing	2	1.57%
Arts, sports and entertainment	2	1.57%
Buildings and constructions	7	5.51%
Energy	5	3.94%
Health and social care	2	1.57%
ICT	7	5.51%
Manufacturing	54	42.52%
Professional and scientific activities	8	6.30%
Real estate	2	1.57%
Rental and travels	6	4.72%
Retail activities	16	12.60%
Transports and storing	3	2.36%
Water, sewer and waste	11	8.66%
<i>Total</i>	<i>127</i>	<i>100.00%</i>

The number of firms and the frequencies are displayed. Our elaboration on proprietary dataset.

Table 2.

Issuer distribution across sectors, using the ATECO 2007 classifications.

Size class	Average issue	Total volume	Total volume (%)
<10 million	11.80	141.58	3.17%
Between 10 and 50 million	6.17	308.33	6.90%
Between 50 and 100 million	14.89	267.45	5.98%
>100 million	79.88	3754.16	83.96%
Total	35.21	4471.52	100%

Principal capital raised, by issuers size class. The table depicts the average capital raised and the total volume of principal capital for the four issuers size classes. Values are displayed in €/million. Our elaboration on proprietary dataset.

Table 3.

Issues' volume (€/millions), by issuers' size classes.

provide a more detailed examination of the issuers' characteristics through selected financial ratios. It is useful to highlight that smaller issuers are more leveraged, but, interestingly, have a higher interest coverage ratio (the ratio between EBITDA and interest expenses) and EBITDA over sales with respect to larger firms, while asset tangibility (as measured as tangible fixed asset over total assets) is, as expected, lower. Lastly, **Table 6** exhibits the differences in key financial ratios between the control group and minibond-issuers. The two samples present strong similarities in terms of size and profitability (i.e. ROI), which can guarantee us a good fit of our control group. On the other hand, issuers are overall more indebted, and in particular to banks. This evidence confirms that the use of mini-bond funding is aimed to exploit growth opportunities when bank lending is particularly costly and/or rationed, or to diversify the funding sources.

Motivation	# of observation	Frequency
Support working capital	20	10.10%
Growth	84	42.42%
Exploit merge/acquisition opportunity	13	6.57%
Internationalization	22	11.11%
Debt restructuring/diversification of funding	45	22.73%
Not declared/unavailable	14	7.07%
Total	198	100%

Motivations declared by issuers in the bond prospectuses. This table shows the motivations reported in the bond prospectus, divided into 5 main categories: Supporting the working capital, growth, exploit M&A opportunity, internationalization, debt restructuring or diversification of funding. The number of declared use of proceeds exceeds the number of issuers due to the fact that some issuers have declared more than one use of proceeds.

Table 4.
Use of proceeds.

Category	D/E Ratio	Bank debt exposure	Interest coverage	Short-term bank debt ratio	Current ratio	ROI	EBITDA/Sales	Tangible ratio
<10 million	2.61	34.82%	17.85	16.85%	1.15	6.6	23.03%	21.00%
	<i>4.73</i>	<i>29.28%</i>	<i>37.07</i>	<i>17.53%</i>	<i>0.42</i>	<i>10.16</i>	<i>34.92%</i>	<i>27.51%</i>
Between 10 and 50 million	2.53	50.39%	7.91	26.78%	1.22	8.13	14.56%	27.28%
	<i>2.52</i>	<i>18.30%</i>	<i>13.20</i>	<i>13.50%</i>	<i>0.51</i>	<i>6.78</i>	<i>10.13%</i>	<i>24.53%</i>
Between 50 and 100 million	2.18	45.16%	6.06	26.58%	1.06	10.19	12.79%	20.33%
	<i>1.4</i>	<i>15.06%</i>	<i>9.14</i>	<i>14.77%</i>	<i>0.17</i>	<i>8.81</i>	<i>9.40%</i>	<i>19.75%</i>
>100 million	1.58	43.49%	5.96	25.04%	1.17	8.77	12.36%	25.45%
	<i>2.21</i>	<i>18.25%</i>	<i>4.70</i>	<i>15.86%</i>	<i>0.44</i>	<i>7.53</i>	<i>8.45%</i>	<i>18.81%</i>
Total	2.14	45.62%	7.71	25.16%	1.17	8.55	14.30%	25.02%
	<i>2.58</i>	<i>19.47%</i>	<i>14.08</i>	<i>15.06%</i>	<i>0.44</i>	<i>7.64</i>	<i>13.90%</i>	<i>22.11%</i>

Issuers' descriptive statistics. The table reports selected financial ratios for issuers, divided into four size classes (in terms of sales). Means and standard deviations (in italics) are reported. D/E Ratio is the issuer's debt to equity ratio; Bank debt exposure is the ratio between the bank debt to total debt. The interest coverage ratio is the ratio between the issuer's EBITDA and its interest expenses. The short-term bank debt ratio is the ratio between bank short term debt and total debt. The current ratio is the ratio between issuer's current assets and current liabilities. Tangible asset ratio is the ratio between tangible fixed assets and total assets. Our elaboration on proprietary dataset.

Table 5.
Selected financial ratios by issuers' size class.

4. Research design and methodology

4.1 Empirical method

In order to study whether the access to the mini-bond market reduces firms' financial fragility, we perform a set of OLS regression models using the pooled sample of issuers and nonissuers of mini-bonds across the years analyzed

Variable	Issuers	Control sample
Sales (Natural logarithm)	17.69	18.05
	<i>1.68</i>	<i>1.06</i>
D/E Ratio	2.14	1.46
	<i>2.58</i>	<i>3.53</i>
Bank debt exposure	45.62%	29.72%
	<i>19.47%</i>	<i>23.81%</i>
Interest coverage	7.71	24.77
	<i>14.08</i>	<i>46.68</i>
Short-term bank debt ratio	25.17%	20.31%
	<i>15.06%</i>	<i>19.42%</i>
Current ratio	1.17	1.42
	<i>0.44</i>	<i>0.75</i>
ROI	8.55	8.65
	<i>7.64</i>	<i>7.81</i>
EBITDA/Sales	14.30%	7.37%
	<i>13.90%</i>	<i>8.45%</i>
Tangible ratio	25.02%	19.22%
	<i>22.11%</i>	<i>17.79%</i>
# of observation	127	5192

Difference between the issuers' sample and the control group. Standard deviations are reported in italics. Size is measured by the natural logarithm of sales. D/E Ratio is the issuer's debt to equity ratio; Bank debt exposure is the ratio between the bank debt to total debt. The interest coverage ratio is the ratio between the issuer's EBITDA and its interest expenses. The short-term bank debt ratio is the ratio between bank short term debt and total debt. The current ratio is the ratio between issuer's current assets and current liabilities. Tangible ratio is the ratio between tangible fixed assets and total assets.

Table 6.
Differences between the two samples (issuers and nonissuers).

(2013–2017). This methodology has often been employed in the prior going public literature, starting from the Pagano et al. study [20], on IPOs equity markets.

We choose as the dependent variable a measure of financial fragility (or vulnerability) using an equally weighted basket of financial ratios that aims to capture the exposure of the firm to the negative consequences of potential real and financial shocks.

In the OLS regressions, we estimate beta coefficients using a proxy of financial fragility as the dependent variable and combinations of the explanatory variables for different specifications, as depicted in the next section. More in detail, we compute the variation in the score of our financial fragility indicator for each firm between 2 years after the event (the corporate bond issuance) and the year before the same event. When the difference is positive, it means that our proposed financial fragility metric has worsened (becoming higher), the opposite if the difference is negative.

The basic structure of our regressions is as follows:

$$\Delta FinFragility = \alpha + \beta_1 (Minibond)_{i,t} + \sum_k \gamma_k FirmControls_{i,t-1} + \epsilon, \quad (1)$$

where $Minibond_{i,t}$ is a dummy variable equal to 1 in case of mini-bond funding of firm i at time t and zero otherwise, and $FirmControls_{i,t-1}$ is a vector of firm-specific

control variables about the issuers and nonissuers characteristics using the last available accounting information at the date of the bond offering. We control for sector and time fixed effects.

4.2 Dependent and explanatory variables

As indicated previously, our dependent variable is the change in firms' financial fragility, and it portrays the exposure of the firms to the negative consequences to potential financial shocks. We build a measure of financial fragility (or vulnerability) using an equally weighted scoring indicator of five financial ratios that capture the most significant dimensions of firms' financial health. They are the following: interest coverage financial ratio; current ratio; short-term bank debt over total debt; financial leverage (i.e. debt to equity ratio), bank debt exposure (bank debt over total debt). The procedure is the ensuing: for each year and for each five financial ratio we create a ranking system starting from a score of 1 (lowest financial fragility) up to 5 (highest financial fragility) based on a quintile classification of the financial ratio (we used also different ranking criteria, but our empirical results remain robust and are not affected significantly). For example, for year 2016 we have a starting sample of 28 mini-bond issuers and 1200 firms in the control group. Then, for each financial ratio we compute the score for all firms. Then, we compute the financial fragility indicator for all firms by computing the average of all 5 scores (with equal weights).

Next, we calculate the difference of the score of the financial fragility indicator between $t + 2$ and $t - 1$, relative to the reference year. We think that a two-year time span after the event is a good compromise in order to assess the effect of the firms' financial policy choices on the desired outcomes in terms of better financial resilience. Longer event windows (up to 3 year after the event or more) have undesired features such as: the loss of a significant number of observations in our issuers sample since for mini-bond issued during 2017 we do not have a 3 year ex-post track record of financial reports; and the longer the time horizon the more the effects on our financial fragility indicator can be influenced by other factors than merely the financial policy choice under scrutiny. **Table 7** shows the differences in the average financial fragility indicator score for the two sub-samples. As a matter of fact, mini-bond issuers have a higher average score because they are more leveraged, more indebted to banks and have a lower interest coverage with respect to the control group.

Variable	Issuers	Control sample	Total
Before t0	3.91	3.2	3.21
	<i>0.64</i>	<i>0.98</i>	<i>0.98</i>
After t0	3.73	3.12	3.14
	<i>0.62</i>	<i>0.93</i>	<i>0.93</i>
Difference	-0.18***	-0.07***	-0.07***
	<i>0.63</i>	<i>0.58</i>	<i>0.58</i>
# of observation	127	5192	5319

*Financial fragility scores for the two samples before and after the bond issuance date. Standard deviations are reported in italics. T0 is the event year of bond issuance for both samples. Values are average scores of the financial fragility indicator that spans from a score of 1 (lowest financial fragility) to a score of 5 (highest financial fragility). Stars denote the standard level of p-value significance: * = 10%, ** = 5%, *** = 1%. Our elaboration on proprietary dataset.*

Table 7.
 Differences in the financial fragility average score.

	Mean	Std. Dev.	Min	Max	obs
Δ FinFragility	-0.075	0.583	-3.4	2.6	5319
Minibond	0.024	0.152	0	1	5319
Tangible ratio	0.194	0.179	0.001	0.983	5319
EBITDA/Sales	7.55%	8.69%	-19.36%	99%	5319
Asset-liability mismatch	8.713	18.201	0.017	76	5319
Size	19.691	1.232	12.638	22.777	5319
SME	30.28%	49.86%	0	1	5319
Small	5.41%	22.61%	0	1	5319

Descriptive statistics of the pooled sample variables. Δ FinFragility is the difference in the financial fragility indicator between $t + 2$ and $t - 1$; Minibond is a dummy variable equal to 1 if the firm issued minibond at t_0 ; Tangible ratio is the ratio between the tangible fixed assets and the total assets. EBITDA/Sales is the ratio between EBITDA and Sales; the asset liability mismatch variable is the book value of equity over fixed assets ratio; size is the natural logarithm of total assets; SME (Small) is a dummy variable equal to 1 if the firm is a SME (Small) as defined in appendix A.

Table 8.
Variables' descriptive statistics.

As far as concerned the explanatory variables, we introduce a mini-bond financial dummy variable (*MiniBond*) which is equal to one in case of mini-bond funding of firm i at time t and zero otherwise. Beyond that, we consider a selection of firm-specific control variables: firm size (as log of total asset), profitability (measured as the EBITDA on sales), tangibility (measured as tangible fixed assets over total assets), and book value of equity over fixed assets ratio as a measure of firms' asset-liability mismatch. We introduce also two size dummies, a *SME* and a *Small* dummy variable, that controls for the issuers' classification according to EU Commission standard definition as a SME (Small) or not. SMEs are naturally opaque firms and obtain funds almost exclusively through private equity and bank debt [13]. In general, the informational asymmetry issue may cause shortage of finance and credit rationing and may lead to a disparity in access to bond financing between SMEs and large firms [21, 22]. The dummy size variables aim to test whether is actually more difficult for private SMEs or smaller firm to improve their financial resilience. Appendix A summarizes and describes our firm-specific variables that we have used in the regressions, while **Tables 8** and **9**, report the descriptive statistics and correlation coefficients for the empirical variables, respectively.

5. Empirical results

Table 10 shows the outcomes of our regressions, in which the beta coefficients and standard errors (in italics) are displayed. The effect of the mini-bond financing dummy on the change reported in the score of the financial fragility indicator 2 years after the event is negative and highly statistically significant (at the 5 percent level). Thus, the access to the debt capital market is conducive for the Italian companies to a decrease in the financial fragility after the event relative to the same indicator value displayed before this relevant change in their financial policy previously adopted. Consequently, our research hypothesis is confirmed.

As regards the other firm-specific control variables, we note that the tangibility variable displays a statistically significant (at 1 percent level) negative beta

	Δ FinFragility	Minibond	Tangible ratio	EBITDA/Sales	Asset-liability mismatch	Size	SME	Small
Δ FinFragility	1.00							
Minibond	-0.0284	1.00						
Tangible ratio	-0.0871	0.0493	1.00					
EBITDA/Sales	0.0029	0.1210	0.3055	1.00				
Asset-liability mismatch	0.0428	-0.0223	-0.4125	-0.0223	1.00			
Size	-0.0945	0.0622	0.3201	0.3528	-0.1249	1.00		
SME	0.0404	-0.0606	-0.2672	-0.2907	0.1182	-0.7613	1.00	
Small	0.0555	-0.0156	-0.1413	-0.0990	0.0811	-0.4259	0.2583	1.00

Correlation coefficients of the variables used in the OLS regressions. Δ FinFragility is the difference in the financial fragility indicator between $t + 2$ and $t - 1$; Minibond is a dummy variable equal to 1 if the firm issued minibond at t_0 ; Tangible ratio is the ratio between the tangible fixed assets and the total assets. EBITDA/Sales is the ratio between EBITDA and Sales; the asset liability mismatch variable is the book value of equity over fixed assets ratio; size is the natural logarithm of total assets; SME (Small) is a dummy variable equal to 1 if the firm is a SME (Small) as defined in appendix A.

Table 9.
Correlation coefficients.

Dependent variable: Δ FinFragility				
Specification:	1	2	3	4
Minibond	-0.115**	-0.117**	-0.118**	-0.118**
	<i>0.056</i>	<i>0.056</i>	<i>0.056</i>	<i>0.056</i>
Tangible ratio	-0.273***	-0.274***	-0.290***	-0.282***
	<i>0.054</i>	<i>0.054</i>	<i>0.054</i>	<i>0.054</i>
EBITDA/Sales	0.238	0.219	0.188	0.190
	<i>0.137</i>	<i>0.137</i>	<i>0.135</i>	<i>0.135</i>
Asset-liability mismatch	0.0003	0.0003	0.0003	0.0003
	<i>0.0004</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>
Size	-0.028*	-0.017		
	<i>0.013</i>	<i>0.013</i>		
SME	-0.074***	-0.066**	-0.036*	-0.043**
	<i>0.026</i>	<i>0.026</i>	<i>0.019</i>	<i>0.019</i>
Small		0.095*		0.117**
		<i>0.047</i>		<i>0.045</i>
Constant	0.554	0.335	0.029	0.030
	<i>0.367</i>	<i>0.372</i>	<i>0.281</i>	<i>0.280</i>
Industry dummies	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES
R squared	0.045	0.046	0.044	0.046
#obs	5319	5319	5319	5319

Outcome of the OLS Regressions with four different specification. The dependent variable is the difference of the financial fragility indicator between $t + 2$ and $t - 1$. Minibond is a dummy variable equal to 1 if the firm issued minibond at t_0 ; Tangible ratio is the ratio between the tangible fixed assets and the total assets. EBITDA/Sales is the ratio between EBITDA and Sales; the asset liability mismatch variable is the book value of equity over fixed assets ratio; size is the natural logarithm of total assets; SME (Small) is a dummy variable equal to 1 if the firm is a SME (Small) as defined in appendix A. In all specifications industries dummies and year dummies are included. Beta coefficients and robust standard errors (in italics) are displayed. Stars denote the standard level of p-value significance.

*=10%.

**=5%.

***=1%.

Table 10.
OLS regressions on financial fragility.

coefficient implying that the firms that presents higher tangible asset at the event date are more able to reduce their financial vulnerability. Here, our results suggest that SMEs with more intangible assets tends to develop, ceteris paribus, a more fragile financial structure and this it is happened even before the current pandemic crisis. We reckon that this is an interesting result as it shows that the presence of consistent tangible assets not only offers a wider scope for pledging collateral to potential investors playing a mitigating role regarding the borrower default risk [23, 24] but it can also be helpful to reduce the financial fragility.

Size variables presents a mixed picture. On one hand, in the specification 1 in which size is measured as log of total asset, we have a statistically negative coefficient showing that size as expected matters: the larger the firm the better its financial resilience. On the other hand, when we consider more in detail the two

size dummies (SME e Small), the former has a negative coefficient implying that, inside the small-medium size class, the larger firms are still less vulnerable from a financial point of view. On the contrary, the Small dummy in all regression specifications changes beta coefficient sign and becomes positive and statistically significant indicating that smaller firms (i.e. firms with sales lower than 10 million euro) tends to worsen across time their financial fragility score. This result is not totally unexpected as smaller firms are fundamentally less financial resilient as showed by substantial prior literature [5, 25] and by the anecdotal evidence. Other control variables such as, for instance, profitability are not statistically significant.

Even if our findings are quite robust, we must be aware that our study is limited to a firm-level dataset which is confined to the years up to the coronavirus outbreak and we cannot include in our tests the actual effects on firm financial data of the current global pandemic. Therefore, our results must be read with great caution as it is highly probable that the current crisis may display asymmetric effects across countries, geographical areas and industries that are not reflected in our dataset. Future researches based on new post-pandemic data can fully address this void.

6. Concluding remarks

The goal of our study is to contribute to shed new light on the emerging debate on how small businesses can recover from the current crisis triggered by the Covid-19 pandemic. Since SME access to the debt capital market is widely viewed as a valuable source of firm debt diversification, especially for growth firms with a prominent exposure on bank debt, we test whether SME bond issuers are able to reduce their financial vulnerability thanks to this financial policy. The aim is to assess the extent to which SMEs financial choices regarding nonequity external funding can become a key factor in facing real and financial shocks like those triggered by the current Covid-19 pandemic.

Our empirical analysis has been performed using OLS regression models based on a proprietary hand-collected dataset of 127 first-time mini-bonds issuers across 2013–2017 years jointly with a control sample of around 5200 Italian private firms that have not issued corporate bonds across the same years.

Based on our empirical analysis we find a robust evidence on the role that corporate bond financing can play on addressing the SMEs financial fragility issue. Debt diversification away from bank lending helps smaller firms to achieve a more balanced and sound financial policy and, thus in turn, firms are able to improve their financial resilience through this channel of funding. We think that this circumstance is becoming more and more relevant in the current economic climate dominated by the adverse effects on SMEs of the global pandemic crisis. Corporate bond funding offers benefits for SMEs that are not merely confined to what previous literature has already described such as: (a) hastening a more capital market-oriented management culture linked to the firm life-cycle; (b) enhanced market visibility on prospective investors; (c) providing an acclimatization function and a platform for progressive steps toward other more complex forms (even equity) of capital market funding; and (d) reduced costs on subsequent bank lending thanks to heightened bargaining power in the firm-bank relationships.

As a matter of fact, we offer empirical evidence that corporate bond financing has reduced the financial fragility of Italian SMEs. For these reasons, we can expect that even after the pandemic outbreak the mini-bond funding channel may still play a key, and maybe even enhanced, role in order to overcome the negative consequences of the current financial climate for SMEs where firms will be probably more and more indebted and more reliant on bank lending. Although our study is

limited to the Italian unlisted firm context, we reckon that our findings can provides useful insights to other countries particularly considering that the economic effects of the current pandemic have been so pervasive.

Appendix A: variables' definitions

Variable name	Definition	Source	Notes
Δ FinFragility	Difference between the financial fragility indicator at $t + 2$ and the financial fragility indicator at $t - 1$	Self-constructed from financial ratios from Amadeus—Bureau van Dijk database	See section 4.2
Minibond	Minibond dummy variable	Borsa Italiana website	Equal to 1 if the firm issued mini-bond, zero otherwise
Tangible ratio	Tangible ratio is the ratio between the tangible fixed assets and the total assets	Amadeus—Bureau van Dijk database	
EBITDA/Sales	The ratio between EBITDA and sales	Amadeus—Bureau van Dijk database	
Asset-liability mismatch	The book value of equity over fixed assets ratio	Amadeus—Bureau van Dijk database	A level below 1 of the ratio indicates a mismatch
Size	Natural log of Total Assets	Amadeus—Bureau van Dijk database	
SME	SME dummy variable	Self-constructed	Equal to 1 if the firm employees are less than 250 and total asset less than € 43 million and sales lower than € 50 million, zero otherwise
Small	Small dummy variable	Self-constructed	Equal to 1 if the firm employees are less than 50 and total asset and sales less than €10 million, zero otherwise

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