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Abstract

Using a comprehensive dataset of Italian SMEs, we find that differences between private and public information on firm creditworthiness affect the decision to issue traded debt securities. Specifically, holding public information constant, firms with better *private* fundamentals are more likely to access bond markets. Additionally, credit conditions improve for issuers following the bond placement, compared with a matched sample of non-issuers. Thus, our evidence supports 'positive' (rather than adverse) selection in corporate bond markets. This is consistent with a model where banks offer more flexibility than markets during financial distress and firms use market lending to signal credit quality to outside stakeholders.

Keywords: Asymmetric Information; Bank Credit; Bond Markets; SME Finance
JEL Classification: D82; G21; G23

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1. Introduction

Small and medium-sized enterprises (SMEs) represent the overwhelming majority of businesses globally, employ more than half of the total workforce, and crucially contribute to product and technological innovation (Akcigit and Kerr, 2018). SMEs are also heavily dependent on bank lending as their main source of external funding (Petersen and Rajan, 1994; Black and Strahan, 2002; Cetorelli and Strahan, 2006; Robb and Robinson, 2014). This makes them particularly vulnerable to financial crises, magnifying the transmission of financial shocks to the real sector (Crouzet, 2017). In light of these potential risks for economic stability and growth, several regulators have recently enacted policies that allow for new "alternative" funding options, for example by relaxing securities regulations.[1] The 2012 JOBS Act in the US and the Capital Market Union project launched in Europe in 2014 are two such attempts.

Besides the clear benefits of diversification, however, the contribution of alternative funding sources to the overall working of entrepreneurial finance is still unclear.[2] In particular, the question remains open of how information collected by banks on small borrowers can be replicated by or transmitted to public markets, and at what costs. The objective of this paper is to shed light on these issues. Specifically, we investigate how information privately held by banks on small firms' creditworthiness differs from that held by public markets, and how such differences between private and public information affect firm's recourse to publicly traded debt.

Given the comparative advantage that distinguishes banks from other intermediaries in acquiring and processing information about borrowers (Leland and Pyle, 1977; Diamond, 1984; Fama, 1985), it has been argued that non-bank lending is prone to adverse selection and market breakdowns, suggesting a fairly limited scope for its use among young, small, and unlisted companies. For these relatively opaque firms, standard asymmetric information arguments predict that only borrowers of the worse *unobservable* credit quality self-select into market lending,

[1] For example, Report No.4 to the ESRB Scientific Committee (2014) suggests corporate bond markets for small firms and private placements of debt with asset managers as new 'policies to rebalance the EU's financial structure away from banks' (p.45). See https://www.econstor.eu/bitstream/10419/193614/1/Reports-ASC-4.pdf.

[2] For a recent analysis of the expansion of bond lending among public firms in Europe and its potential risks see Darmouni and Papoutsi (2020).

while better firms use bank lending to avoid undervaluation. On the other hand, precisely because of their informational advantage, banks can be more flexible than public markets when firms experience liquidity shocks, allowing for renegotiation of loan terms instead of (inefficient) liquidation (see for example Chemmanur and Fulghieri, 1994).[3] In this case, entrepreneurs who privately observe a high probability of probability of financial distress may find it optimal to use bank loans, while financially solid firms issue publicly traded debt. Thus, while departing from the same premise, i.e. asymmetric information, different theories offer opposite predictions regarding the unobservable credit quality of firms that access market lending.

We contribute to this discussion by examining SMEs' financing decisions. Our empirical analysis employs data on the universe of Italian firms and it is made possible thanks to a regulatory intervention aimed at shifting SME funding from a purely bank-based system to one that relies (partially) on capital markets through the introduction of tradable bond markets for small issuers. Specifically, in 2012, the Italian government implemented a reform of the civil code that removed the pre-existing limits on the issuance of corporate bonds by unlisted firms, under the condition that the securities can only be purchased and held by professional investors.[4]

Using data on both issuer and non-issuer firms, we estimate the firm level probability of issuing bonds in this new public market. The main explanatory variable is the difference between credit quality as perceived by outside investors, i.e. based solely on accounting data, and that observed by insiders, which combines information on both financial statements and credit history (including usage of credit lines and payments), as recorded in the national Credit Registry. We obtain these two measures, expressed in terms of estimated risk scores, from the Italian central bank. Importantly, while firm-level information from the Credit Registry is only known to banks and firm managers (plus the regulator), financial statements are easily accessible to non-bank lenders and investors, either directly or through third party data providers. Therefore, the difference

3 The question of whether this flexibility leads to efficient outcomes rather than "zombie-lending" is an open one. See Hu and Varas (2020), Bonfim et al. (2020), and Bruche and Llobet (2014) for recent discussions.

4 In Europe, France, Germany, the UK, and Spain have started similar programmes aimed at promoting economic growth and innovation leveraging for SMEs through the development of dedicated bond markets. Since their inception, Italian 'minibonds', as they are dubbed due to their small size, have proved to be an increasingly popular funding option, with over 500 issuers and 700 securities outstanding as of December 2018.

between the two risk scores represents the contribution of *private* information to total estimated credit risk. We label this difference as 'Risk Spread'. Intuitively, holding "public" risk score constant, larger (smaller) *Spread* values indicate that firm insiders observe lower (higher) credit risk than that perceived by firm outsiders. Similarly, positive (negative) *Spreads* indicate potential undervaluation (overvaluation) of debt securities.

We include various financial statement indicators as controls, together with the Herfindhal-Hirschman concentration index of bank-firm relations and find no evidence of adverse selection. On the contrary, as the coefficient for *Spread* is positive, significant, and robust to different specifications, our results suggest that access to capital markets is more common among firms that are more creditworthy than an analysis of their public balance sheet data would suggest. This stands in contrast with the common interpretation of previous evidence documented for listed companies. For example, Hadlock and James (2002) show that 'firms are relatively more likely to choose bank loans [over public securities] when variables that measure asymmetric information problems are elevated' (p. 1383), ascribing this empirical pattern to the idea that 'one of the benefits of bank debt is that it allows undervalued firms to avoid adverse selection problems in the public securities markets' (p. 1386). In addition, we find that firms that borrow from multiple banks are more likely to issue bonds, suggesting that diversification is not the predominant motivation for accessing capital markets.

To the best of our knowledge, this is the first study that employs the public-private rating gap to investigate the effects of asymmetric information on firms' funding choices. This novel approach has three main advantages. First, differently from previous studies, we quantify information asymmetries between banks and market investors without relying on empirical proxies (e.g. assets size), thus alleviating concerns over confounding omitted factors. Second, we observe directly whether individual firms issuing public debt are 'better' or 'worse', in terms of credit quality, compared with what outside investors can infer from public information, helping single out the relevant mechanisms among those suggested by competing theories. Third, differently from ex-post indicators of credit quality (e.g. default rates), our measure of public-private rating gap cleanly identifies *ex-ante* selection effects, and

it does not conflate them with ex-post incentive effects (e.g. on effort provision) which may be different with different types of lender (Karlan and Zinman, 2009). One inherent limitation of our approach, however, is that private information only includes hard data (i.e. credit scores) and it does not encompass "soft" information collected by banks (see Liberti and Petersen, 2019).

Importantly, we find that interest rates on bonds are significantly higher than the interest rates charged by banks to the same issuer-firms or to firms with a similar credit risk, but differences largely disappear when we consider seasoned issues. Moreover, contractual features such as maturity, the presence of covenants and guarantees, and put/call options are not correlated with our measure of unobservable credit risk. Therefore, when valuable private information collected by banks is revealed to the public, the costs of this transfer are ultimately borne by issuers. This is consistent with the hypothesis that firms with low credit risk value bank flexibility relatively less than riskier firms, and may use bond-based funding to signal their credit quality to firm outsiders. The effectiveness of the signal or, in other words, the existence of a signalling equilibrium, can be supported by offering debt securities at discounted prices.

The idea that firms may use public debt as a signalling tool is consistent with recent survey evidence which shows that firm managers consider issuing bonds in this market as a "marketing event" that can enhance the company's reputation and visibility. In particular, "there are many small firms that, *despite having access to bank credit*, are willing to experiment with the minibond market to improve knowledge of capital markets and obtain 'certification' and 'legitimation'" within the financial and business communities.[5] In order to quantify the benefits of this "certification effect", we estimate the effect of the initial bond issuance on the subsequent (i) average cost of bank loans; and (ii) number of banks that grant credit to the firm. We employ a difference-in-difference approach, using a control sample of non-issuer peer firms matched on the basis of their propensity scores computed with the bond-issuing probability model. We find that after four quarters from a bond initial offering, the average interest rate on bank credit drops by approximately 60 basis points. In the same period, the number of banks granting credit to the issuing firm increases by 0.5 units on average. Similar to Ongena et al. (2018), our results suggest that accessing public capital markets

5 "2021 Italian Minibond Industry Report" p.8, Osservatorio Minibond, Politecnico Milano (2020), available at www.minibond.tv/it/.

significantly improves conditions on bank loans. Importantly, however, this does not appear to be due only to changes in the bargaining position of the borrowers. The are concentrated among issuers with better private credit scores and more bank lending relationships, that is, firms that would benefit the least from adding an extra source of funding to an already large and competitive pool of creditors.

We interpret these results in light of the "certification effect" hypothesis, and we propose two complementary explanations. The first is that a signal on "private" creditworthiness may be informative not only for (non-bank) outsiders but also for individual banks, as it aggregates information across all bank lenders. This is because financial intermediaries report more information to the Credit Registry than they are allowed to receive when inquiring about a current or potential borrower. For example, through the Credit Registry, banks can learn the borrower's total exposure and the number of bad loans, but not whether part or all of the loans are classified as unlikely-to-pay or over-due by other institutions. Thus, although better informed than capital markets, banks do not have perfect and timely knowledge of firm's credit behaviour, leaving scope for informative signalling.

The second explanation is that banks may adjust their credit supply in anticipation of other stakeholders' reaction to incoming positive news about the firm.[6] For example, bond issues can signal the firm's financial soundness to current or prospective trade partners, who will be more likely to extend trade credit, thus reducing firm's net working capital requirements and increasing enterprise value. Consistently with this explanation, we find that, similar to Klapper et al. (2012), trade credit responds to new information about firm creditworthiness. In particular, the ratio of accounts payable over total assets increases significantly after bond issues.

The remainder of the paper is structured as follows. We briefly review the related literature in Section 2. Section 3 proposes a simple conceptual framework for SMEs' decision to access capital markets. In Section 4, we describe the regulatory framework and the data collection procedure. In Section 5, we present descriptive statistics for the main variables of interest. Section 6 illustrates our empirical results on selection into the bond market, while in Section 7, we analyse the effects of bond

[6] This mechanism is similar to Hertzberg et al. (2011).

issuance on the subsequent cost of credit and borrowing relations. Section 8 concludes.

2. Review of the Literature

Our results are related to numerous empirical studies on the relationship between bank and market lending (e.g. Petersen and Rajan, 1994; Faulkender and Petersen, 2006) and more specifically to papers that examine the role of information frictions. These studies present mixed evidence on whether adverse selection problems or flexibility in renegotiation drive the funding decision. In particular, consistent with the adverse selection mechanism, Hadlock and James (2002) and Gomes and Phillips (2012) show that (proxies of) large information asymmetries are associated with lesser use of information-sensitive market debt. On the other hand, Cantillo and Wright (2000), Denis and Mihov (2003), and Hale and Santos (2009) show that firms with higher (public) credit ratings are more likely to tap public credit markets, suggesting that flexibility in debt renegotiation plays an important role. We depart from this literature in two important ways. First, we focus exclusively on relatively small, unlisted firms, for which information asymmetries are presumably more severe. Second, rather than relying on proxies, we distinguish privately and publicly observed credit quality and separately measure the effects on funding choices.

As our analysis unveils positive instead of adverse selection, we offer a novel insight into the funding choices of entrepreneurial firms. Our evidence is consistent with existing theories of firm borrowing decisions based on the trade-off between lender flexibility in the event of default and contracting costs (Chemmanur and Fulghieri, 1994; Bolton and Scharfstein, 1996; Boot and Thakor, 1997; Bolton and Freixas, 2000; De Fiore and Uhlig, 2011), while our interpretation of the use of market debt as a signalling device is akin to existing theories of signalling in equity markets (Allen and Faulhaber, 1989; Grinblatt and Hwang, 1989; and Welch, 1989).

Additionally, our paper is related to the recent literature on new entrepreneurial public markets (Bernstein et al., 2020; Dambra et al., 2015; Gustafson and Iliev, 2017). In particular, Ongena et al. (2018) use the introduction of "minibonds" to study the effects of the diversification of funding sources on the financing conditions of Italian firms. While we obtain similar results in terms of ex-post outcomes of accessing bond markets, our focus differs from theirs in that we are mostly concerned with ex-ante

selection into market-based funding and its relationship with asymmetric information.

3. A Simple Conceptual Framework: Bank vs Market Lending

When information cannot be credibly transferred from firm insiders (such as managers or relationship banks) to outsiders, information-sensitive securities issued by firms with better fundamentals are priced below fair value by uninformed investors (Myers and Majluf, 1984). Thus, only firm of relatively low quality may find it beneficial to access capital markets, leaving investors exposed to adverse selection.

In what follows, we sketch a simple theoretical framework that reverses this prediction and yields "positive", rather than adverse, selection in corporate bond markets. Specifically, when faced with the choice between borrowing with an informed bank and issuing bonds on uninformed capital markets, firms with better unobservable credit quality strategically opt for capital markets funding. Crucial for this result is the assumption that bank lending is more flexible than market lending.[7] That is, in the event of a liquidity shock, the renegotiation process is less costly with a bank (or a small number of banks) rather than with multiple market lenders (e.g. investment funds). [8] Since this 'flexibility option' is more valuable for borrowers closer to financial distress, firms with poor credit quality may be reluctant to abandon bank lending. On the other hand, high credit quality firms are indifferent to the benefits of bank flexibility: this offers them the opportunity to signal their type by issuing bonds. The rationale for signalling is that, by credibly conveying information about their type, firms can improve the beliefs of suppliers, customers, employees and other prospective investors about their own creditworthiness. If these benefits are large, as is most likely the case for private and small firms, underpricing or embedded options may be used to sustain a separating equilibrium. To formalize this intuition, we propose a stylized model with the main goal of using its implications as a guide to interpret the main empirical results of the paper (presented

[7] This assumption is widely used in theoretical studies on financial intermediation (e.g. Chemmanur and Fulghieri (1994). Sufi (2009) and Berg et al. (2016) provide direct empirical evidence.

[8] In general, relationship banking, as opposed to arm's length finance, appears to alleviate financial constraints (Gobbi and Sette, 2014), especially during economic downturns (Beck et al., 2018).

in the subsequent sections).

Consider a cashless firm that has the following investment opportunity. By investing investing I today (t=0), it can generate two cash flows, each equal to $X > I$, in the next next two periods ($t = 1$ and $t = 2$). Investing in this project is necessary for the firm to to continue operating. The firm can be of two types, H and L. While both investment cash flows are certain for firm H, firm L may experience a liquidity shock at $t = 1$ with probability $p > 0$. To simplify the analysis, we assume that the liquidity shock is equal to -X, i.e. it fully absorbs the first cash flow from the investment project. Provided that the firm L remains an ongoing concern after experiencing a liquidity shock, it will to generate the second cash flow for sure.

The firm type is known to the firm's insiders, namely the firm's manager and its 'relationship' bank, i.e. the bank with which it conducts most of its financing transactions. The bank can finance the project with a one-year loan of face value F, and it is flexible, in the sense that it can renegotiate the terms of its loan in the event of a liquidity shock. Renegotiation takes the form of a maturity extension, allowing the firm to pay back the loan in the following period ($t = 2$). In the event of a maturity extension, a renegotiation fee r is paid by the firm to the bank at $t = 2$. We assume that $r \leq X - F$. We assume that, because of the high costs of establishing a new borrowing relationship, firm L cannot pay back the original loan by raising a fresh one. Thus the bank can expect a minimum profit of pr, which can be interpreted as the cost banks incur to be informed. The table below summarizes the shareholder's payoffs.

	Shareholder's Cash Flows	
Firm Type	*t=1*	*t=2*
H	*X-F*	*X*
L	No liquidity shock: *X-F* With liquidity shock: *X-X=0*	*X* *X-F-r*

Notice that the face value is the same for both types, but the expected costs of borrowing are higher for the *L* type due to the renegotiation fees.

Conditional on undertaking the project, and on top of the cash flows above, the firm can receive additional "reputational benefits" $x < I$ at $t = 1$. This cash flow materializes at $t = 1$ only if, at $t = 0$, outside stakeholders (e.g. employees, customers and suppliers) believe that the firm type is *H* with a certain probability, which, for simplicity, we set equal to one. To interpret this assumption, consider for example that firms may be able to attract the most productive employees if job candidates believe the employer will be able to pay their salaries on time every period. Suppliers may be willing to accept longer payment periods, which frees up resources for production and investment. Equity premium may drop as investors can rely on a steady flow of dividends. In other words, we assume that building a credible reputation of financial solidity is valuable to the firm as it generates monetary returns. Thus, conveying information on its type to firm outsiders is potentially beneficial to firm *H*. At the same time, firm *L* would also benefit from deceiving outsiders and convincing them that it has no foreseeable liquidity problems.

Now suppose that a new funding option becomes available, whereby firms can issue a one-year zero coupon bond to finance this project. Bond investors are competitive. They know the liquidity shock probability *p* and the proportion of firms of type *H* (α) and *L* ($1 - \alpha$) in the market but they do not know the exact firm type and assign the same probability of default, αp, to both firms. Differently from the bank, investors cannot offer maturity extensions, due to coordination problems.[9] Therefore, if a liquidity shock occurs, the issuer is liquidated and the assets in place are sold at a discount $\lambda \in (0,1)$, i.e. the liquidation value is $V = \lambda\, I < I$.[10]

Given our assumptions, it is clear that a pooling equilibrium where both *H* and *L* type firms issue bonds cannot exist. This is because if issuing bonds is not informative of firm type (as is the case with pooling) and the fairly priced bank loan

[9] See Gertner and Scharfstein (1991) and Bolton and Scharfstein (1996)

[10] For the sake of simplicity, we assume firms cannot roll over bonds at *t=1*

option is available, firm *H* has no incentive to sell undervalued securities.[11] Similarly, a separating equilibrium where firm *L* issues bonds and firm *H* only uses bank loans is not rational, since by revealing its type firm *L* receives no compensation for giving up the bank's flexibility option.

There is, however, a separating equilibrium where firm *H* issues bonds, thus signalling its type to outside stakeholders, and the *L* type only uses bank loans. In this equilibrium, with competitive capital markets and no discounting, the face value of the bond is equal to *I*, which is also the face value of the bank loan. The payoffs to firm *H* and firm *L* are

$$Payoff(H, Bond) = 2X - I + x$$
$$Payoff(L, Loan) = 2X - I - p(X + r)$$

The necessary condition for the equilibrium above to exist is that *L* must have no incentive to deviate and issue bonds. That implies

$$Payoff(L, Loan) = 2X - I - p\,(X + r) \geq (1 - p)(2X - I + x) = Payoff(L, Bond)$$

or, rearranging the terms,

$$\frac{p}{1 - p}\,(X - I - r) \geq x \qquad (4)$$

Condition 4) above suggests that the bond market is more likely to be active when *X* is sufficiently large, that is for more profitable firms. This prediction is in line with previous empirical evidence on large and listed firms (e.g. Denis and Mihov, 2003).

Condition 4) however may not hold when potential reputation gains (*x*) are large with respect to cash flows. This is most likely the case for small, young or relatively opaque companies. The most solid among these firms may use dissipative and conspicuous expenses, such as a bond issue, to establish their reputation. To see this result, assume that condition 4) does not hold. Now firm *H* can use a combination of bond funding and underpricing to signal its type. Specifically, it can offer to repay a face value equal to $\check{F} > I$ such that a) firm *L* still prefers borrowing with the bank and b) signalling its type

[11] With pooling, the bond market requires a face value equal to $I\frac{[1-\lambda p(1-\alpha)]}{[1-p(1-\alpha)]} > I$, and I is the face value of debt that a competitive bank requires for lending to firm H.

is profitable compared with the payoff in the bank-only equilibrium. Conditions a) and b) are satisfied for values of $\check{F}$ such that

$$I + x - \frac{p}{1-p}(X - I - r) \leq \check{F} \leq I + x \quad (5)$$

Notice that $\check{F} > I$, implying that the cost of bond funding is higher than that of bank credit. Moreover, it is easier to sustain this equilibrium for higher values of p, that is at low levels of 'public' credit quality.

Alternatively, firm *H* can signal its type by issuing callable cum-coupon bonds with $m > 1$ years maturity. The intuition is that at $t = 1$, in the absence of a liquidity shock, the firm can use its realized cash flows to buyback (call) the bond, thus saving on the payment of future interests. Firm *H* can therefore signal its type by promising a sufficiently high coupon rate. To see this result, suppose the firm offers a $m = 2$ years bond with face value I and an annual coupon $\frac{c}{m}$, payable in arrear at maturity. Moreover, the issuer can call the bond at the end of the first year at face value, extinguishing its obligations. With such contract in place, it is clear that firms find it optimal to call the bond at $t = 1$ if possible, in order to avoid paying interests in the second year. Thus, firm *H* can offer ta coupon of $\frac{c}{m}$ such that a) firm *L* prefers borrowing with the bank and b) signalling its type is profitable compared with the payoff in the bank-only equilibrium. Conditions a) and b) are satisfied for values of $I + c$ such that

$$I + \frac{x}{p} + r \leq I + c \leq I + mx \quad (6)$$

Notice that the condition above requires $p \geq \frac{1}{m}$, which, in a setting with infinite horizon, can be achieved by optimally choosing the bond maturity. Finally, since both the lower and upper bound of the cost of debt in (6) are higher than those in (5), we should expect callable bonds to display on average higher yields.

To summarize, this stylized model describes the funding choices of two firms that have identical ex ante public credit quality, i.e. markets assign the same default

probability to both firms. The firm with the best 'true' credit quality has incentives to signal its private information to outside stakeholders, and it can do so by issuing bonds. The credibility of the signal stems from the fact that the expected costs of raising funds from outside investors is higher for firms close to distress because, differently from banks, investors cannot offer debt restructuring. When reputation gains are large, signalling can be achieved through bond underpricing or by issuing callable bonds.

Finally notice that, in this context, underpricing only emerges because of the potential signalling role of bond issuance. Without this feature, bond and loan rates (or face values) converge. In other words, in the absence of additional frictions, underpricing is not compatible with rationales different from signalling, such as diversification of funding sources.

4. Regulatory Framework and Dataset Construction

The *minibond* market in Italy was created through the regulatory reform of June 2012, which aimed at improving access to capital markets for small and medium-sized enterprises.[12] The reform initially applied to non-financial firms that qualify as SMEs under the European Union Commission definition, namely firms with fewer than 250 employees, and either with total assets of less than €43 million or an annual turnover of up to €50 million, but it was later extended to all unlisted firms. The new regulation lifted the pre-existing restrictions on the issuance of corporate bonds by removing the limit on the tax deductibility of interest payments and the maximum notional threshold that apply to unlisted debt securities.[13] Additionally, in order to stimulate demand, *minibond* investors are exempted from the statutory 20 per cent tax withheld on coupon payments and capital gains. Importantly, investment in these securities is strictly limited to professional investors, such as asset managers, pension funds and financial intermediaries.[14]

[12] The Government issued Decree Law 83/2012, later converted by Parliament into Law 134/2012, the "Decreto Sviluppo".

[13] These restrictions could be waived by listing the security on a regulated market, effectively limiting access to capital markets for small firms due to high listing costs.

[14] Issuing firms must also be assisted by a 'sponsor', i.e. a registered financial intermediary, whose role is to facilitate the placement, and to have their latest financial statements audited.

With the goal of improving market liquidity, in March 2013, the Italian stock exchange set up a multilateral trading facility for negotiating *minibonds*, called ExtraMot Pro, available only to professional investors. Admission to trading on this platform follows a substantially different procedure vis-à-vis a common bond listing the regulated market (MOT), which is also open to retail investors. The former does not require approval by the Stock exchange commission (Consob), and is not subject to the EU Prospectus Directive.[15] Further innovations to the regulatory framework were introduced in 2014 to increase market participation.[16]

Like all fungible securities (regardless of their listing status), bonds issued under the new regulation are included in the security registry held by the Italian central bank. The registry contains information on bond identifier codes (ISIN), notional amounts, the coupon rate, maturity and seniority, the exchange where the security is listed (if any), and the name of the issuer. We collect data on bonds issued by all Italian companies between 2013 and 2018. We exclude companies that issued bonds before 2013, and we exclude bonds with a notional amount above €100 million and bonds listed on the regulated market (MOT). We then identify *minibond* issuers by merging this list with a dataset containing the universe of Italian SMEs.

The comprehensive SME dataset is built by selecting Italian companies that satisfy all of the following criteria:

a) the firm's total assets do not exceed €43 million;

b) the firm is not listed on the stock exchange;

c) the firm does not have a public issuer rating on its existing debt.

The first restriction matches the EU Commission definition of SMEs.[17] The other two are meant to make sure that only entrepreneurial firms with no pre-existing public external funding are included in the database. In each of the sample years (2013-2018), firms that qualify as SMEs as per the above requirements enter the dataset and we follow each cohort over time. Firms that match records from the bond

[15] The bond is admitted to trade within seven working days of the application to Borsa Italiana, and the issuer has to pay a fee of €2,500.

[16] The government approved Decree Law 145/2013 ('Destinazione Italia', converted into Law 9/2014) and Decree Law 91/2014 ('Decreto Competitivitá', converted into Law 116/2014). They establish the eligibility of minibonds as underlying assets for securitization and include minibonds in the set of financial instruments eligible for the technical reserves of insurance companies.

[17] We do not have information on employment and therefore we cannot match the EU Commission criterion based on that metric.

registry list are labelled as issuers, provided they satisfy criteria a) to c) in the year of their first bond placement. We refer to first-time issuers' characteristics as all firm-year year information (e.g. profitability, leverage, asset size and so on) that relates to issuers issuers in the year before their first bond offering. We retrieve data on firms' financial financial statements from the Cerved Database, which contains balance sheet data for the vast majority of Italian companies.

In order to obtain an estimate of firm credit quality, we employ data from the Bank of Italy's In-house Credit Assessment System (BI-ICAS, see Giovannelli et al., 2020).[18] BI-ICAS provides credit ratings for Italian non-financial firms with a monthly frequency. As part of its rating production process, the BI-ICAS statistical model includes two intermediate steps. In the first step, the system employs logistic regressions to compute firm-level scores based on financial statement data. Specifically, the assessment involves estimating coefficients on profitability, operating risk, liquidity and debt structure indicators in a statistical model for default probabilities based on historical data.[19] Estimated coefficients are then used to calculate current (partial) risk scores for individual firms, with smaller values indicating a lower default risk. In the second step, the estimation is further refined by adding information from the Credit Registry, such as payment histories and utilization of credit lines, and a final score is produced. We label the indicator obtained from the first step as *Partial Credit Risk* score and the final indicator as *Full Credit Risk* score. The difference between the two measures, *Risk Spread,* is our main variable of interest as it gauges the contribution of private information in terms of credit risk.

The information used to produce the firm's final score is provided to the Credit Registry by each lender. However, current and prospective lenders themselves do not

[18] ICAS systems are employed within the Eurosystem framework to screen bank loans to non-financial corporates for their potential use as collateral in refinancing operations. In accordance with the Eurosystem's general principles on credit assessment (ECAF or Eurosystem's Credit Assessment Framework), BI-ICAS consists of a statistical assessment (ICAS Stat) which is then completed by a qualitative assessment carried out by financial analysts (Expert System). The statistical model covers all non-financial companies recorded in the National Credit Registry with a total exposure of at least €30,000. In our analysis, we use the ICAS Stat estimates, because the expert assessment is only available for a subset of firms in our sample.

[19] For the purpose of the estimation, BI-ICAS classifies a borrower as being in default if, for at least three consecutive months, the total amount of exposures reported as bad debt, unlikely to pay and non performing exposure (past due) by each bank is greater than 5 per cent of the total exposure of the borrower to the whole banking system and greater than €500;

have access to the complete aggregate information in return. In particular, when inquiring about a potential borrower and in the periodic report from the Credit banks receive information that include the borrower's aggregate exposure, the of lending relationships, the number of lenders reporting bad loans, the number of inquiries on that borrower over the last month, but exclude aggregate amounts of unlikely-to-pay, non-performing, and bad loans.[20] Thus, our measure of credit risk scores are based on a different information set than that available to the banks lending to the firm, as it includes more accurate indicators of credit quality but "soft" information collected by relationship banks.

Finally, we collect data on lending relationships and lending rates from the Bank of Italy's interest rate database (Taxia), which includes information on all loans granted by over 200 banks in Italy. The database distinguishes the loan type (revolving credit lines, loans backed by accounts receivable, fixed-term loans). Interest rates refer to all the outstanding positions at a certain date; fixed-term loan data include interest rates on new loans granted in the previous quarter.

5. Descriptive Statistics

We start by offering a brief overview of the *minibond* (hereafter simply bond) market. We collect data on 294 issuers and 426 bonds; the total notional amount of first-time bonds is €2.1 billion and the median notional amount is €3 million. Figure 1 shows that bonds became an increasingly popular funding option in the period between January 2013 and December 2018. In particular, in 2016-2018, the volumes are significantly higher than in the first half of the sample period: yearly gross issues average €641 million, over three times as much as in 2013-15, and reach a maximum of €867 million in 2016. The number of firms accessing this market also rises over time: their yearly average is about 70 in 2016-18, compared with 30 between 2013 and 2015.

The maturity of first time issues ranges between less than one year and twelve years, and the cost of funding is between a few basis points (for secured bonds) and close to 14 per cent (Figure 2). As in mature corporate bond markets, the structure of these securities can be complex. The vast majority of bonds in our sample are senior

[20] See Bank of Italy Circolare n. 139, February 11th 1991

with a fixed interest rate, and only 15 per cent are secured or guaranteed, but more than half of the sample has an amortizing (rather than bullet) repayment schedule and around 70 per cent are either callable or putable. These figures are fairly similar across first and seasoned issues (Table 1). Seasoned issues are smaller in size (1.5 vs 3 million), but comparable to first issues in terms of maturity (median value 5 years) and yields (approximately 5 per cent median values).

The issuers are mostly relatively mature firms, between 10 and 30 years of age; most issuers operate in the manufacturing sector, and are mainly located in the North-West regions of Italy, reflecting the industrial and geographical distributions of the Italian economy (Table 2).

In Table 3, we compare selected financial statement ratios for non-issuers (346,387 firm-year observations) and first-time issuers (223 firm-year observations). First-time issuers are larger (€16 million vs €9 million in total assets) and more profitable firms, with a ratio of EBITDA over total assets equal on average to 8.3 per cent, against 5.1 per cent for non-issuers. First-time issuers also appear to be more leveraged and to have higher financing needs. The ratios of net financial positions, i.e. liquid assets minus financial debt, over EBITDA, sales and own funds are lower than those of non-issuers. Bank debt over total assets is 25.6 per cent on average for first-time issuers as opposed to 18.7 per cent for non-issuers. Average capital expenditures over total assets for the former (11.6 per cent) are considerably higher than for the latter (2.3 per cent).

Figure 3 shows the entire density distributions of Full and Partial (or Balance Sheet) Credit Risk scores for all firm-year observations. The distribution of Full Credit Risk scores, i.e. the ones including private information from the Credit Registry, is more dispersed and presents a heavier right tail. Thus, private information significantly affects overall credit risk assessments. Importantly, our main variable of interest, *Risk Spread*, appears evenly distributed between negative and positive values, where positive (negative) values indicate a positive (negative) contribution of private information to overall firm creditworthiness (Figure 4). Moreover, most variation in this variable seems to be idiosyncratic and firm-specific rather than systematic. Table 4 shows the results of a simple OLS regression of *Risk Spread* on industry, area, and time fixed effects (column 1) plus firm's asset size and age (column 2). These controls only explain a small portion of total variation (the R^2 is 10%), while adding firm fixed

effects roughly doubles the R^2 (column 3). Controlling for the lagged value of *Risk Spread*, instead, increases substantially the goodness of the fit (the R^2 is over 50%, see column 4). Thus, *Risk Spread* is a rather persistent firm-specific characteristic.[21]

On the loans side, we observe that, unsurprisingly, the cost of bank credit increases in risk scores. Figure 5 plots Full Risk Scores split into 20 percentiles (*x* axis) versus average (and median) interest rates on new fixed-term loans paid by firms in each risk percentile. Interest rates range between 2 per cent for the safest firms and 6 per cent for riskier ones.

Finally, we observe that borrowing relationships with banks are significantly less concentrated for first-time issuers, suggesting that issuers are well diversified in terms of funding sources. Figure 6 shows that the Herfindhal index of lending banks is consistently higher for non-issuers across different firm sizes.[22]

6. Private Information and Access to Capital Markets

The main objective of our analysis is to study the determinants of a firm's decision to access capital markets, and in particular the extent to which asymmetric information plays a role in such a decision.[23] As discussed earlier, the variable *Risk Spread* measures the difference between 'public' and 'private' credit risk. In other words, this variable indicates whether the firm is more or less creditworthy than markets may expect based on public information (i.e. financial statements). In the presence of adverse selection, one should expect larger values to be weakly negatively correlated with the probability of issuing bonds. To investigate the effects of asymmetric information, we estimate the following probability model

$$P(Y_{i,t,j,g} = 1) = f(\alpha RiskSpread_{i,t} + \beta PartialRisk_{i,t} + \gamma X_{i,t} + \theta_t + \delta_j + \lambda_g + \varepsilon_{i,t,j,g}) \quad (1)$$

where $P(Y_{i,t,j,g} = 1)$ is the probability that firm i in industry j and location g issues a bond at time t. Since industry and location are firm-time invariants, we

[21] Incidentally, we notice that young and smaller firms have larger Risk Spread values. This is due to the fact that, everything else equal, these firms have lower values of balance-sheet based credit scores.

[22] The Herfindhal index of lending banks is constructed as $HHI_{i,t} = \sum_{j=1}^{N} s_{i,t,j}^2$ where $s_{i,t,j}$ is bank j's share of firm i's total bank fixed-term loans outstanding at time t.

[23] For a related analysis, see Accornero et al. (2015).

suppress the subscripts *j* and *g* for firm-time controls. We use the firm-year *Partial Risk* score, i.e. the score based only on financial statements, as the control, together with other firm characteristics. We include time, industry and location fixed effects. Since $RiskSpread_{i,t} = PartialRisk_{i,t} - FullRisk_{i,t}$ an alternative version of the model above can be estimated where the two risk scores, *Partial* and *Full*, are employed separately.

The estimated coefficients for logistic regressions of the various specifications of model (1) are reported in Table 5. The proportion of issuers is around 0.1 per cent of the total observations; as a consequence, the estimates might be affected by a rare event bias, with a possible underestimation of the probability of the event. We therefore correct the estimates using the algorithm proposed by King and Zeng (2001).[24] In Panel A, columns 1) and 2), we show the results for our most parsimonious specification, where we only use the (log of) total assets and the Herfindahl Index of bank concentration as firm-level controls. In the first column, we use the two scores separately while in the second column we follow our main specification as in model (1). The *Risk Spread* coefficient α is positive and significant. Analogously, the coefficient on *FullRisk* is negative and significant. In other words, holding public information constant, firms with better *private* fundamentals are more likely to access bond markets. Thus, our result reveals positive, not adverse selection.

Our estimates also show that larger firms are more likely to issue bonds, which is in line with the previous literature (see for example Datta et al., 2000, and Diamond, 1991). Moreover, the coefficient on *Partial Risk* is positive, i.e. riskier firms are more likely to issue bonds. This is not surprising since this indicator tends to take higher values for firms with higher financing needs. Interestingly, we find that firms that are more diversified in terms of bank credit sources (i.e. with a lower HHI of bank concentration) are more likely to issue bonds, suggesting that diversification is not the predominant motivation for accessing capital markets. This is consistent with the notion that firms with highly concentrated bank relationships seek fresh credit from an additional bank before turning to the public capital market.

In Panel A column 3), we add controls for debt capacity utilization, leverage, financing needs and growth. In doing so, our firm-year observations drop from 249,267

[24] Our results are however unchanged when we use a simple logit model with no bias correction.

to 164,835, due to missing balance sheet and credit registry data. Our proxies for debt capacity utilization, i.e. (log of) credit line drawn amount and drawn over granted amount, have positive and significant coefficients, similar to that of our leverage measure (ratio of net financial position over own funds). Similarly, financing needs, as measured by capital expenditures over total assets, positively affect the probability of accessing capital markets. It is interesting to note that, with these controls, the sign of the coefficient on *Partial Risk* switches from positive to negative. This is due to the dependence of the partial risk score on leverage and on financing needs, as well as on profitability. This change in sign therefore implies that bonds are a more popular funding option among more profitable firms. Additionally, growth is positively correlated with bond issuance, as suggested by the coefficients on sales increases and the ratio of net financial position over sales. The coefficient of *Risk Spread* is larger and even more significant than in the previous regression.

We also examine the possible non-linearity of the *Risk Spread* effect, by means of interaction terms between *Risk Spread* and dummy variables that take the value 1 if the partial risk score belongs to the second and third tertile respectively. The resulting coefficients are significant (Table 5, Panel A, column 4) and consistent with the positive selection hypothesis. In particular, while the risk spread score is not significant for low-risk firms, it becomes statistically significant for medium-risk firms; in the high-risk score group, the effect of information asymmetry on the issuance probability becomes even larger.[25] Thus, consistent with our theoretical framework, private information matters more for firms with weaker 'public' fundamentals. We interpret this evidence in light of a possible signalling role, or 'certification effect', for market funding. If firms use bond markets to signal their good (privately known) credit quality and build a reputation, it follows that the benefits of issuing debt securities are higher when public information indicates worse firm fundamentals.

Finally, we examine the robustness of the information asymmetry effect by using a coarser measure, namely a dummy variable taking the value 1 when *Risk Spread* is positive and 0 otherwise. In this case too, the coefficient is positive as before and

[25] The same result, not reported for the sake of simplicity, holds true when using only two risk groups (below/above the median risk).

highly significant (Table 5, Panel A, column 5), suggesting that the correlation between the variable *Risk Spread* and the probability of a bond issuance is not due to the presence of outliers. Moreover, to ensure that the effects we document are not due to differences in creditworthiness between issuers and firms with either zero demand for or no access to credit, we perform our estimation exercise including only firms that raise new debt financing (whether with loans or bonds) in the specified time frame. In doing so, we drop approximately one hundred observations and ten thousands firms from the sample, but our main results remain essentially unchanged (Table 5, Panel B).

Overall, the ability of the model to discriminate between issuers and non-issuers is high, as the ROC index, which is a measure of the ability of the test to classify the single observations correctly, is about 90 per cent.

Our results are consistent with the view that firms with better 'private' fundamentals self-select into bond markets. Our theoretical framework in Section 3 suggests that this is related to firms desire to signal their good credit quality to outsiders and that the credibility of the signal can be enhanced with market debt underpricing. To verify this conjecture, we examine the relationship between interest rates on bonds and loans for bond issuers. Before reviewing the results, it is necessary to discuss some of the limitations of our analysis. We lack information on some loan characteristics, such as loan prepayment options, fees, and the presence and the value of loan collateral, which undoubtedly affect the pricing of bank credit. As a consequence, we cannot control for these important features. Additionally, we cannot evaluate how much of the difference in interest rates is due to the tradability of bonds, which should decrease the cost of market debt. A thorough comparison of the cost of bank versus market funding would require taking the issues above into consideration, and therefore the evidence we present next should be interpreted with this caveat in mind.

In Figure 7, we plot the yields on bond issues (*y* axis) against the average interest rate paid by the *same* issuers on new loans obtained during the quarter of the first or seasoned issue (*x* axis). The advantage of this comparison is that it eliminates concerns over unobservable firm-time factors that could affect the pricing of debt. The disadvantage, however, is that this approach is only possible for bond issuers that also raised fresh loans during the quarter of the issuance. Because of the limited sample size, we limit this analysis to descriptive evidence. The vast majority of the first issue

observations (77%) lie above the 45-degree line, and the average difference between bond yields and loan rates is 116 basis points, indicating that the cost of funding is substantially higher in the bond market compared with bank credit. Importantly, these differences drop substantially (to 30 basis points on average) when we consider seasoned bond issuances. This suggests that, while there may be time-invariant structural features of bonds and loans that make bank funding cheaper (e.g. the presence of collateral or higher recovery rates, see Schwert, 2020), the bond discount is larger for first-time issuances, which is consistent with the notion that firms bear additional costs when initially accessing public markets.

Additionally, we consider quarterly funding costs split by funding source, loans or bond placements, for both issuers and non-issuers, and we run the following regression

$$Cost_{s,i,t} = \beta Bond_s + \gamma X_{i,t} + \delta_t + \varepsilon_{s,i,t}$$

where $Cost_{s,i,t}$ is the average interest rate that applies to funding source s of borrower i, at time t. The variable $Bond_s$ takes the value 1 if the funding source is a bond placement and 0 otherwise. We control for firm-time *Full Risk* score and time (quarter) fixed effects. In Table 6, we show estimates for different specifications of the above model. In column 1, we only consider funding from banks (i.e. loans) and we use the variable *Issuer* as a regressor, which takes the value 1 if the borrower has ever issued a bond before t (and 0 otherwise). The coefficient for *Issuer* is not significantly different from zero. Therefore, bond issuers on average do not borrow from the banking system at a premium or discount. In column 2, we consider both funding sources, i.e. loans (of non-issuers) and bond placements. The coefficient for *Bond* is positive and significant, implying that bonds are on average 35 basis points more expensive than loans. In column 3, we repeat the same exercise only with bonds with embedded options. The coefficient for *Bond* is still significant and larger in magnitude (52 basis points). This evidence indicates that, consistently with our conceptual framework, the cost of borrowing is higher with bonds, and particularly so with callable bonds.

We conclude that if private information is transferred to outside investors, the cost of this transfer is borne by issuers via higher interest rates on bonds. What are the benefits of paying this price? We explore some possible explanations in the next section.

7. The Effects of Issuing Bonds

It is fairly intuitive to conjecture the presence of the material effects of issuing bonds on bank credit and lending relationships.[26] One view is that the diversification of funding sources may increase the bargaining power of firms in lending relationships, which in turn improves loan conditions for firms. The benefits of diversification, however, apply to all firms, regardless of private information, and even more so to firms with fewer bank relationships. Our empirical results instead show that firms with better (privately known) credit quality and that are well-diversified are more likely to issue bonds, suggesting that the benefits of doing so accrue disproportionately to this selection of firms. To rationalize this evidence, we contend that bond issues can be interpreted as costly signals, where firms use undervalued securities to convey information credibly on their 'true' good credit quality to outside stakeholders, such as prospective investors, suppliers, employees and so on. The reputation effect obtained through access to capital markets improves the firm value and leads to a compression of risk premia on fresh loans.[27] Along with this 'indirect' effect, risk premia on loans may drop because of the direct effect of the bond issue on banks assessment of the borrower's credit risk. This is because banks do not have full access to credit quality information as contained in the Credit Registry. Thus, the signal can be informative also for banks, and especially for those without a pre-existent relationship with the issuer. In what follows, we provide empirical evidence on the effects of the switching behaviour of firms from bank credit to market funding, and we specifically investigate whether bond issuers can obtain lower lending rates from banks *after* the issuance.

Using data on loan rates, we compute the weighted average interest rate on bank

[26] See Albareto and Marinelli (2018) on the effects of security issuance on bank credit in Italy.
[27] From another point of view, if the market rates required by investors are still higher than bank rates, banks could have less incentive to ease the lending conditions for firms. On these considerations, see Ongena et al. (2018).

loans for each firm *i* in quarter *t*.[28] In order to cleanly identify the effects of access to capital markets, we focus on the changes in the cost of bank funding around the time the first bond issuance. Therefore, for each bond issuer, we select observations in the time window $t \in [q-k; q+k]$, where q is the quarter in which the bond placement takes place and k takes value 2,3, or 4 depending on the specification. We match each issuer with a control group of non-issuers on the basis of firm-level characteristics at time q. In particular, we use the predicted probability from the specification of model (1) that includes the full set of firm-level controls (see Table 5, column 3). We include in our control groups all firms with a predicted probability exceeding the 50th percentile of the estimated probability distribution for issuer companies.

Since first bond issuances occur at different times, we compute the cost of bank lending, $Cost_{i,t}$, as the difference between the weighted average interest rate on firm *i*'s new fixed-term loans and the average fixed-term lending rate applied by all banks in Italy in the same quarter. We estimate the ex-post impact of bond issuance on borrowing costs by means of a difference-in-difference equation as follows:

$$\Delta Cost_{i,t,y} = \beta Issuer_i \times Post_t + \lambda Post_t + \theta X_{i,t} + \alpha_i + \gamma_y + \varepsilon_{i,t,y} \quad (7)$$

where $\Delta Cost_{i,t,y}$ is the quarterly change in the cost of lending for firm *i* in quarter *t* of year *y*. The variable $Issuer_i$ takes the value 1 if firm *i* has ever issued a bond and 0 otherwise. The variable $Post_t$ takes the value 1 if $t \geq q$ and 0 otherwise. The coefficient β provides an estimate of the average treatment effect of the first bond issuance on lending rates for any given time lag *k*. We include firm-yearly controls ($X_{i,t}$), firm fixed effects (α_i), and year fixed effects (γ_y).

We also propose the following alternative specification

$$\begin{aligned}\Delta Cost_{i,t,y} = {} & \beta IssuerPosSpread_{i,t} \times Post_t + \lambda Post_t + \pi IssuerPosSpread_{i,t} \\ & + \theta X_{i,y-1} + \alpha_i + \gamma_y \\ & + \varepsilon_{i,t,y} \end{aligned} \quad (8)$$

where we interact the variable $IssuerPosSpread_{i,t}$, which takes the value 1 if *Risk Spread* is positive and the firm is an issuer, with the dummy variable $Post_t$.

[28] Weights are based on loan volume.

Thus we verify that changes in the cost of funding are effectively triggered by the bond issue event, rather than being simply due to better private credit quality. Table 7 illustrates the results of the estimation of model (7) and its alternative specification (8), (8), with lags (*k*) equal to two quarters (columns 1 and 2), three quarters (columns 3 and 4) and four quarters (columns 5 and 6). In all the specifications, we use the *Full Risk* score obtained from BI-ICAS as the firm level control. Standard errors are clustered at firm level.

Our results show that, following the issuance, firms obtain a decrease in bank funding costs. This reduction is statistically significant after three and four quarters (columns 3 and 5 respectively), and it amounts to approximately 60 basis points. Moreover, savings in borrowing costs are more pronounced (approximately 75 basis points) for issuers with positive *Risk Spread* values, that is for firms with a private risk score better than the public risk score.

We obtain similar results when we repeat the analysis above, replacing the dependent variable with the change in the number of lending banks. After issuing bonds, firms receive loans from more banks on average (Table 8). The effects seem to decrease over time and range between 0.6 (additional banks) after two quarters (column 1) and 0.5 after four quarters (column 5). These effects appear to originate from firms with positive values of *Risk Spread* (see columns 2,4, and 6).

In Table 9, we interact the variable $Issuer_i$ with three dummy variables that take the value 1 if the Herfindhal index of bank concentration at time *t* is low (smaller than 0.2), medium (between 0.2 and 0.6) or high (larger than 0.6). The coefficient estimates for these interaction terms are shown in columns (1), (2), and (3) respectively. Our results show that the entire reduction in borrowing costs documented in Table 7 is driven by firms that rely on a larger number of lenders. Thus, the benefits of issuing bonds predominantly accrue to firms that have many credit relationships at the time of the issuance, suggesting, once again, that diversification may not be the main motivation for accessing public markets.

As discussed earlier, banks may increase their credit supply in anticipation of other stakeholders' reaction to the positive news about the firm. In particular, by credibly conveying information on their credit quality, firms can improve their reputation with suppliers, customers or other investors. This should have consequences on real

outcomes (such as net working capital, sales and investments), increasing firm value. We explore this possibility by estimating the effects of bond issuance on trade debt, sales and capital expenditures in both tangible and intangible assets. The coefficient estimates are reported in Table 10. We find that bond issuance has a positive and significant effect on trade debt, as the fraction of new accounts payable over total assets increases in the year after the issuance. This can occur because suppliers extend the terms of their payment arrangements, thus improving the firm's liquidity position and cash flows. We also find a positive effect on sales, a negative effect on tangible investments (e.g. machinery) and a positive effect on intangible investments (e.g. R&D, software, patents), although in this case coefficient are only marginally significant.

Finally, it is important to discuss our findings in the broader context of contemporaneous credit market dynamics. The reduction in borrowing costs that we observe for issuers after the bond offering may be amplified by the monetary policy interventions that were ongoing in Italy (and the euro area) during our sample years. In particular, the Targeted Longer-Term Refinancing Operation (TLTRO) programme provided significant liquidity support to most Italian banks starting from June 2014. This stimulus was transmitted to borrowing firms in terms of a reduction in the cost of loans, but the transmission was more effective in areas where competition in the banking sector was higher (Benetton and Fantino, 2018). Similarly, it might be argued that issuing bonds increases competition among lenders *at the firm level*, granting issuers a larger pass-through of the stimulus, i.e. lower interest rates, compared with non-issuers. We explore this possibility by adding relationship bank fixed effects to the previous model, with the fixed effects accounting for bank's participation in the TLTRO programme. We identify the relationship bank for firm *i* as the bank that in quarter *t* has the largest share of outstanding loans. The coefficient estimates from this regression are reported in Table 11. The results are substantially unchanged with respect to the previous specification, suggesting that the effects we document are not related to the identity of the main lending bank.

8. Conclusions

International data show that SMEs rely heavily on bank credit to support their financing needs. As a rationale for this evidence, economic theory often points at banks' ability to overcome informational frictions when dealing with smaller and more opaque firms. The recent global financial crises, however, have exposed the potential systemic risks associated with such dependence. SMEs were among the firms most affected by the credit crunch (Ongena, Peydró and Van Horen, 2015), hindering economic recovery, especially in economies with a low business concentration. In response to these concerns, regulators followed two main strategies. The first one was to stimulate bank lending to SMEs by easing financing conditions for financial intermediaries, for example through long-term refinancing operation programmes (see Benetton and Fantino, 2018). This solution leverages the consolidated comparative advantage that banks have in collecting and processing information on borrowers and therefore allocating funds efficiently. The second strategy pursues 'alternative' funding sources that can alleviate firms' financing constraints. The 2012 Italian reform that introduced bond markets for small, unlisted firms (analysed in this paper) belongs to the latter strategy.

While increasing competition among lenders is potentially beneficial for the real sector, the success of new funding methods crucially depends on whether and how markets can overcome asymmetric information problems and avoid adverse selection of borrowers.[29] In this paper, we contribute to this debate by investigating the role of information asymmetry in SMEs' choices between bank and 'alternative' funding. Using a comprehensive dataset of Italian SMEs, we find that asymmetric information, as measured by the difference between private and public information on firm creditworthiness, matters for the choice of funding method. In particular, our evidence supports positive (rather than adverse) selection. Holding public information constant, firms with better private fundamentals are more likely to access bond markets. Importantly, interest rates on bonds are significantly higher than those on bank loans, i.e. issuers appear to pay a premium for accessing debt capital markets. Credit conditions, however, improve for issuers following the bond placement: after four

[29] This consideration can be extended to other forms of alternative finance, such as invoice trading, crowdfunding, and peer-to-peer lending (Ziegler et al., 2018).

quarters from the bond offering, the cost of credit on fixed-term loans declines by 60 basis points, whereas the number of banks granting loans to the firm increases on average by 0.5 units.

To rationalize these findings, we propose a simple conceptual framework where firms with better unobservable credit quality strategically opt for capital market funding rather than bank lending. The assumption that bank lending is more flexible than market lending in case of liquidity shocks is crucial for this result. Since this 'flexibility option' is more valuable for borrowers closer to financial distress, firms with poor credit quality may be reluctant to abandon bank lending, while firms with better (privately known) credit quality use bond markets to signal their type and gain reputational benefits. If these benefits are large, underpricing may be used to sustain a separating equilibrium.

We conclude with three important remarks.

First, the importance of signalling good credit quality may be heightened by a lack of trust in the efficiency of the banking system. In this respect, cronyism or malpractice scandals in the financial sector may undermine public confidence in firms that are supported financially by the institutions involved, forcing them to seek costly 'certification' through access to capital markets and hastening the emergence of bond markets for SMEs.

Second, the institutional design of the Italian reform is important in understanding our results. Italian SME bond markets are only open to professional investors who, while having no access to private information, can process public information efficiently. The outcomes might be different if the regulation allowed retail investors to participate, leaving much of firm quality assessment to third parties (e.g. rating agencies) remunerated by the issuers themselves.

Third, we do not explore the effects of liquidity in the newly born SME bond markets. While the feature of tradability is certainly welcomed by investors, as it potentially contains firms' funding costs, issuers may feel uncomfortable with constant market scrutiny and the resulting pressure on short-term objectives.

We leave these topics for future research.

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Figure 1: SME Bond Issuers: First Placements Aggregate Data

This figure shows total amounts raised and number of issuers in the Italian *minibond* market between 2013 and 2018. We classify as *mininbonds* debt securities issued by unlisted firms with less than 43 million euros in assets.

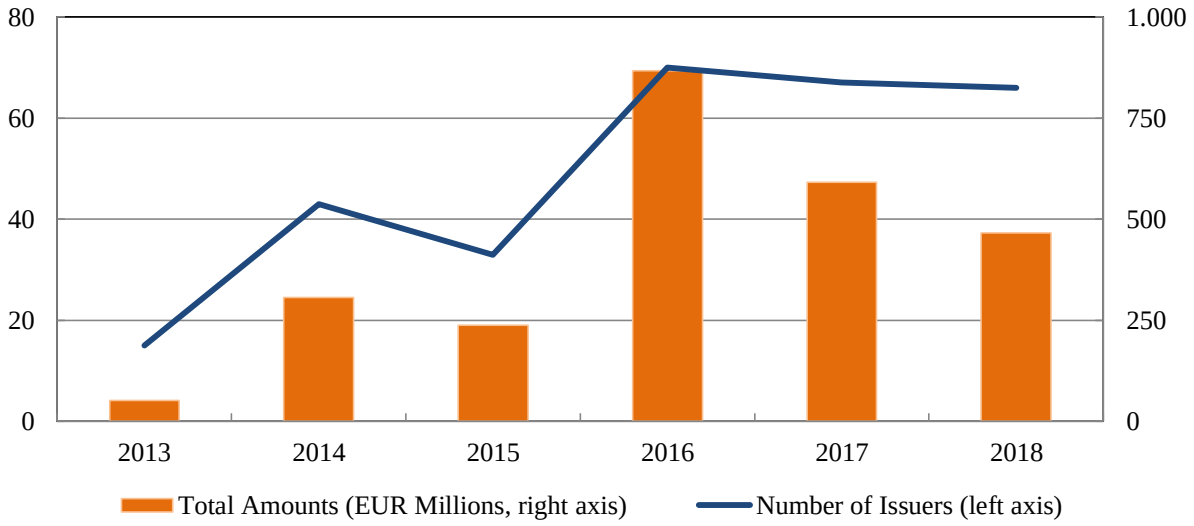
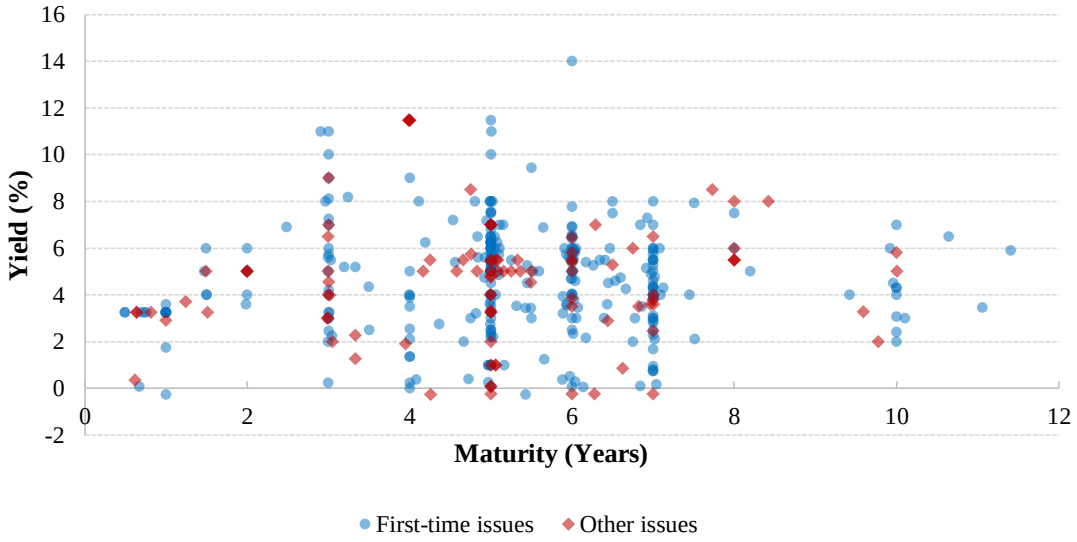


Figure 2: Cost of Bond Funding

This figure shows yields and maturity of bonds in the dataset, split by first-time issues and seasoned (Panel (a)), and guaranteed and unsecured (Panel (b)).

(a) First-time vs Seasoned



(b) Guaranteed vs Unsecured

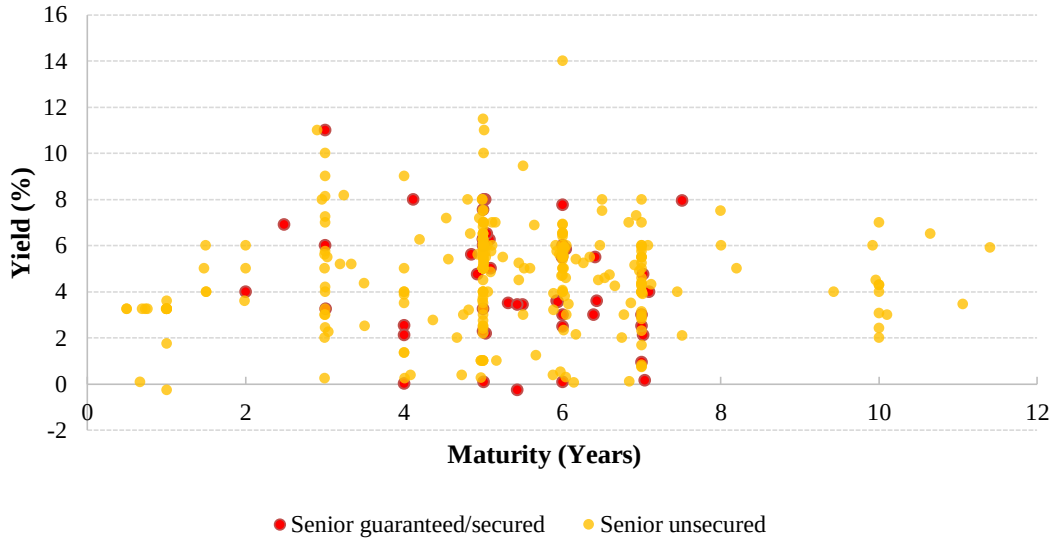


Figure 3: Risk Scores: Balance Sheet *vs* Full

This figure shows the distribution of Full Risk Score and Balance Sheet (or Partial) Risk Score of firm-year observations in the dataset. Full Risk Score is the credit risk measure assigned by the central bank to firms on the basis of information included both on financial statements and in the credit registry. Balance Sheet Risk Score is based on financial statements information only.

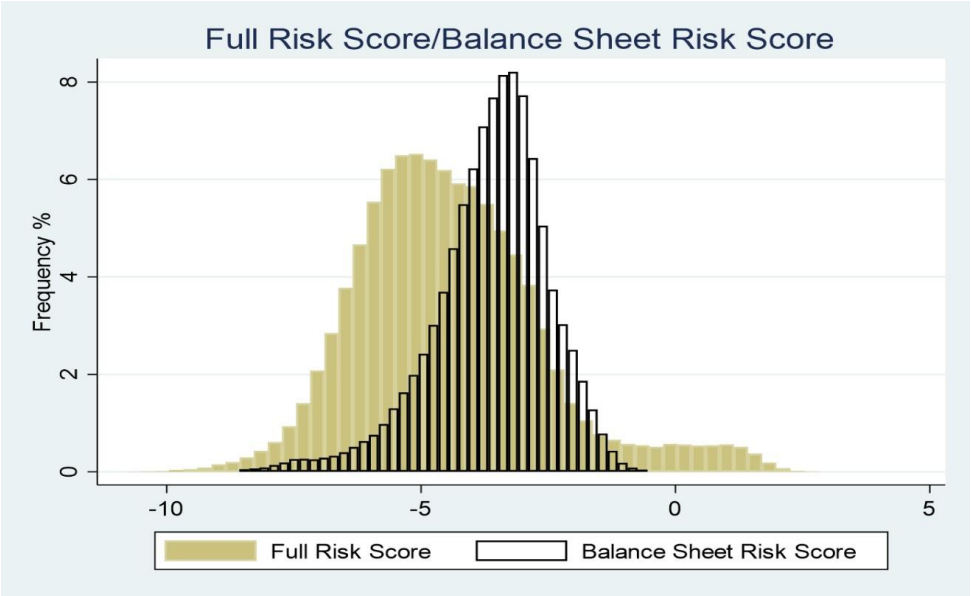


Figure 4: Risk Spread: Issuers vs Non Issuers

This figure shows the distribution of the Risk Spread variable for both issuers and non-issuers. Risk Spread is the difference between Partial Risk Score and Full Risk Score, and indicates the difference between credit risk computed using public information and that computed using both public and private information.

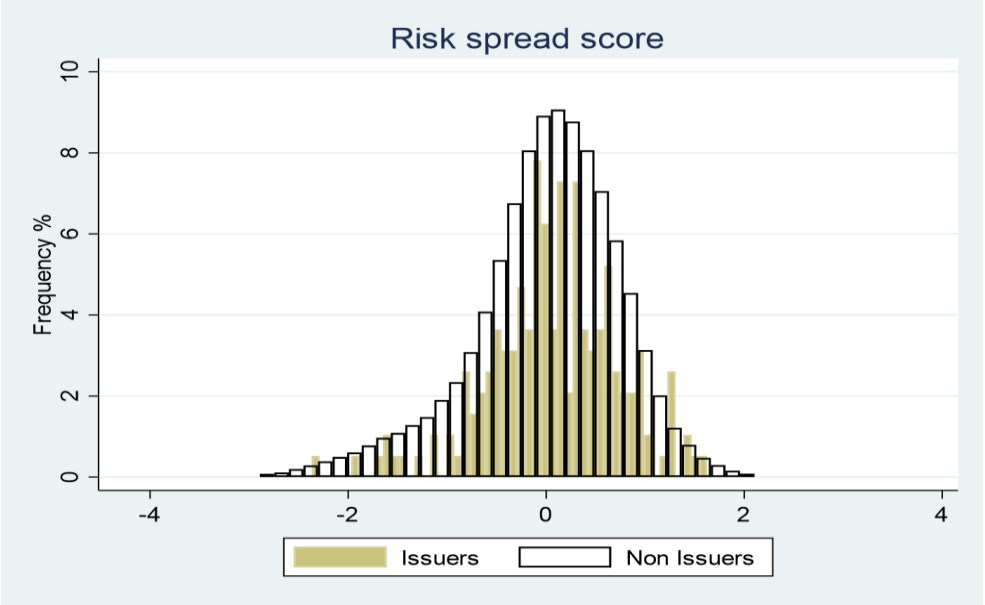


Figure 5: Cost of Bank Funding and Credit Risk

This figure shows average and median values of rates of bank loans per vigintile of Full Risk score for firms in our dataset. Observations are at quarterly frequency.

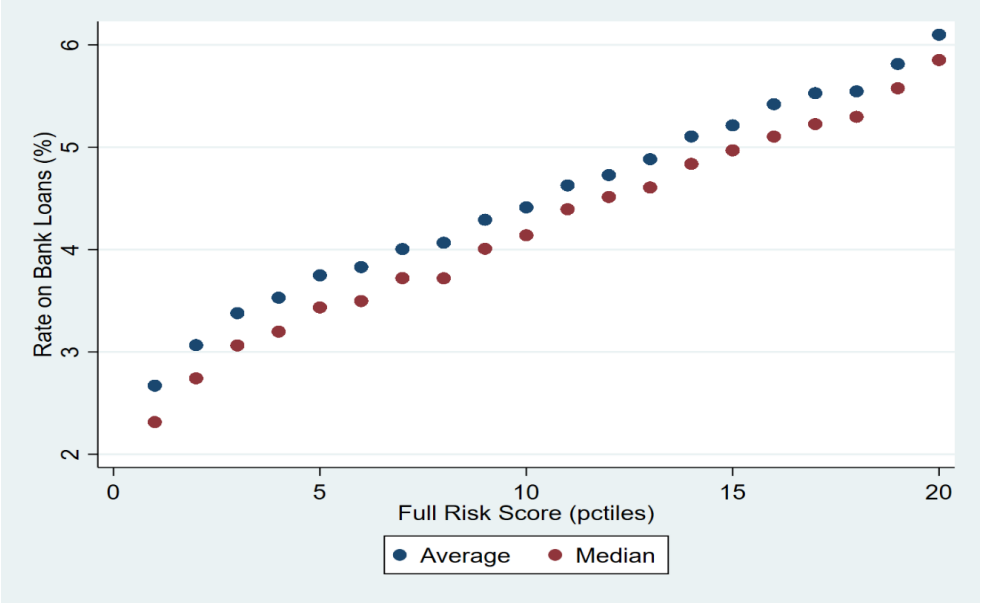


Figure 6: Herfindhal Index of Bank Concentration and Firm Size

This figure shows the Herfindhal Index (HHI) of bank concentration among issuers and non-issuers at different levels of total asset size.

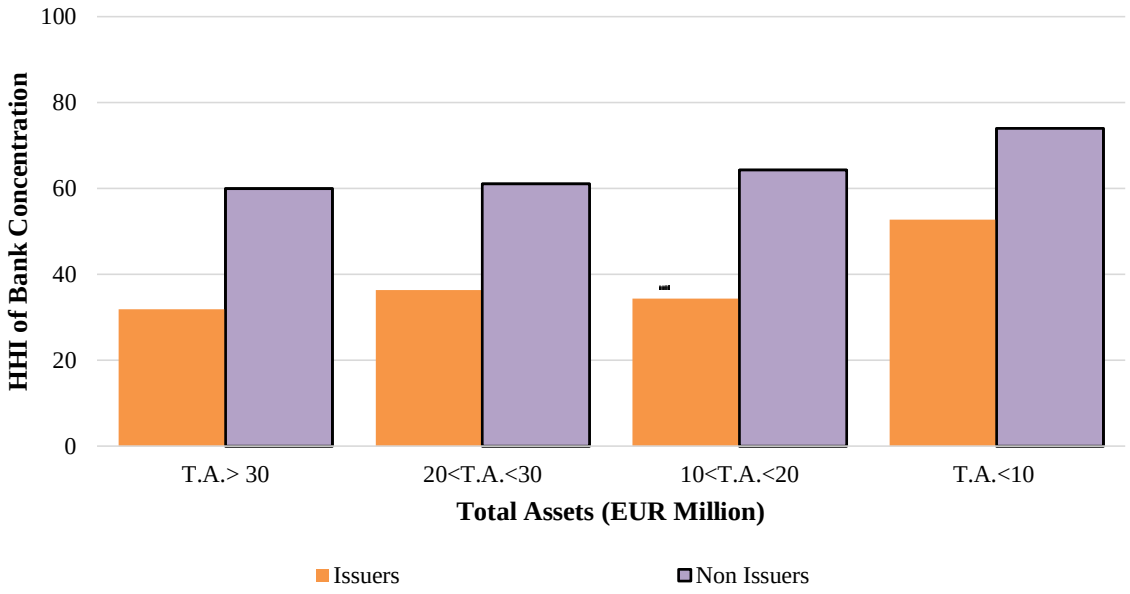


Figure 7: Cost of Funding: Bonds vs Bank Loans

This figure shows bond yield/loan rate pairs for new bonds and fresh loans raised by the same firm in a given quarter.

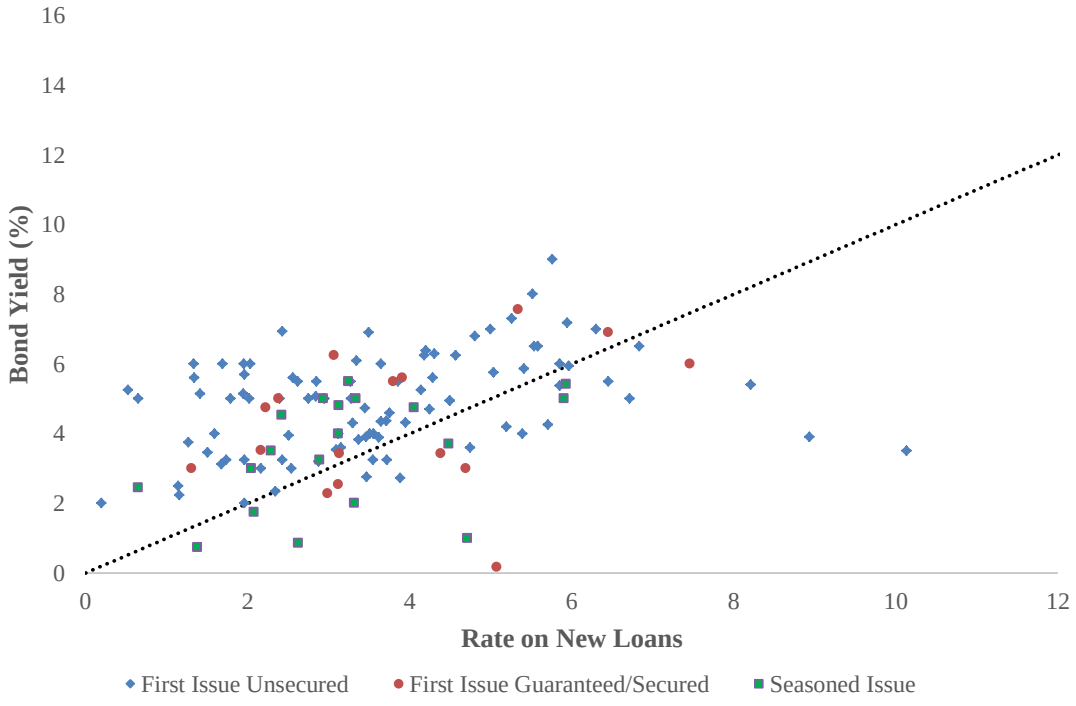


Table 1: Bond Characteristics: First and Seasoned Placements

Type	Yield (median, as a percentage)		Maturity (median, in years)		Size (median, in thousands of euros)		Number of issues	
	First time	Other	First time	Other	First time	Other	First time	Other
Subordinated	3.81	3.84	7.00	6.01	2,000	500	1	1
Senior unsecured	5.00	5.00	5.06	5.00	3,000	1,600	276	85
Senior secured/guaranteed	3.59	3.80	5.32	5.99	4,950	625	49	14
Bullet	5.00	4.80	5.00	5.00	3,000	1,000	155	59
Amortizing	4.69	5.00	6.00	5.50	4,000	2,000	171	41
Fixed/zero coupon rate	5.00	5.00	5.01	5.00	3,000	1,173	237	78
Floating rate	3.20	2.58	5.93	5.75	4,950	2,250	89	22
With embedded options	5.00	5.00	5.43	5.07	4,000	1,890	223	75
No options	4.30	3.25	5.00	5.00	2,000	550	103	25
Total	**4.79**	**5.00**	**5.10**	**5.00**	**3,000**	**1,465**	**326**	**100**

Table 2: Issuer Characteristics: Age, Sector, and Area

Panel A: Age

Issuers' Age	Aggregate Amt. (€ Mil.)	Median Amt. (€ Mil.)	Number of Issues
less than 3 years	329.4	5.00	35
from 3 to 10 years	543.8	2.53	75
from 10 to 30 years	783.2	3.00	127
over 30 years	475.9	4.00	89
Total	**2,132.2**	**3.00**	**326**

Panel B: Sector

Issuers' Sector	Aggregate Amt. (€ Mil.)	Median Amt. (€ Mil.)	Number of Issues
Construction and real estate	594.0	5.00	60
Manufacturing	415.6	3.00	114
Services	761.3	3.00	85
Other	361.3	3.00	67
Total	**2,132.2**	**3.00**	**326**

Panel C: Geographical Area

Issuer's Area	Aggregate Amt. (€ Mil.)	Median Amt. (€ Mil.)	Number of Issues
North East	495.0	4.00	84
North West	1032.5	2.58	151
Centre	380.4	3.00	56
South and Islands	224.3	4.00	35
Total	**2,132.2**	**3.00**	**326**

Table 3: Financial Ratios and Total Assets: Issuers *vs* Non-Issuers

	Aggregate Mean						
	All periods	**2013-2015**	**2016-2018**	**p25**	**p50**	**p75**	**s.d.**
			Non-Issuers				
Financial Ratios (%)							
EBIT/ Total assets	3.3	2.9	3.7	0.6	2.6	5.4	9
EBITDA/ Total assets	5.1	4.7	5.4	0.0	3.2	7.9	9
Total Debt/Total assets	60.6	61.5	59.8	49.5	68.5	83.3	28
Short-term debt/ Total assets	43.5	44.5	42.5	23.6	45.2	65.4	31
Fixed assets / Total assets	38.2	38.6	37.9	12.8	32.3	61.1	31
Net sales / Total assets	89.1	87.3	90.8	13.3	81.4	134.3	90
Net Financial Position/EBITDA	-7.2	-9.5	-5.3	-81.6	9.3	81.3	224
Net Financial Position/Sales	-0.4	-0.5	-0.3	-5.4	0.5	8.0	96
Net Financial Position/Own funds	-1.2	-1.5	-0.9	-17.4	1.0	18.2	137
EBITDA/Sales	5.7	5.4	5.9	0.3	3.6	8.7	40
Capital expenditures/ Total assets	2.3	2.2	2.4	0.8	1.9	5.6	8
Bank debt/ Total assets	18.7	19.5	17.9	16.8	29.1	42.3	19
Total Assets (€ Millions)	9.4	9.1	9.7	3.7	6.3	11.8	8
			First-time Issuers*				
Financial Ratios (%)							
EBIT/ Total assets	3.9	3.4	4.2	1.0	3.3	7.1	12
EBITDA/ Total assets	8.3	8.7	8.2	1.7	7.4	13.0	64
Total Debt/Total assets	60.9	58.8	62.1	58.4	71.2	81.1	19
Short-term debt/ Total assets	45.9	44.6	46.5	36.3	54.8	68.3	25
Fixed assets / Total assets	37.1	39.9	35.6	13.9	29.2	50.5	25
Net sales / Total assets	89.9	92.8	88.4	53.2	93.2	128.8	87
Net Financial Position/EBITDA	-20.3	-32.2	-14.1	-115.4	-19.7	36.7	220
Net Financial Position/Sales	-6.5	-10.3	-4.4	-22.3	-4.2	3.3	134
Net Financial Position/Own funds	-21.1	-31.6	-14.9	-68.6	-13.5	12.0	218
EBITDA/Sales	9.3	9.3	9.2	4.0	8.3	16.4	56
Capital expenditures/ Total assets	11.6	12.5	11.1	2.8	7.9	27.1	953
Bank debt/ Total assets	25.6	24.1	26.4	21.3	34.7	43.8	15
Total Assets (€ Millions)	16.3	16.9	16.1	5.7	14.1	26.0	12

**Ratios and amounts refer to financial statement figures as reported the year before the bond placement*

Table 4: Private Information and Access to Capital Markets

This table presents coefficient estimates of an OLS regression for the variable *Risk Spread*. The controls include Industry, Geographical Area, and Time fixed effects (column 1), firm's age and (log of) asset size (column 2), firm fixed effects (column 3, only), and the lagged value of *Risk Spread* (column 4). Standard errors are in brackets. ∗, ∗∗, and ∗∗∗ stand for statistical significance at the 10%, 5%, and 1% level.

Dep. Variable: Risk Spread	(1)	(2)	(3)	(4)
$Risk\ Spread_{t-1}$				0.7067***
				(0.0021)
Ln(Total Assets)		-0.0383***	-0.0126***	-0.0209***
		(0.0026)	(0.0021)	(0.0015)
Firm's age		-0.0031***	-0.0084***	-0.0004***
		(0.0001)	(0.0004)	(0.0001)
Industry, Area, Time FE	yes	yes	yes	yes
Firm FE	no	no	yes	no
Observations	299,584	299,584	299,584	203,269
R-squared	0.0991	0.1048	0.2065	0.5405

Table 5: Private Information and Access to Capital Markets

This table presents coefficient estimates of a logit model for the probability of issuing bonds for firm *i* in year *t*. *Full Risk* is firm *i*'s risk score at time *t* computed using both financial statement information and Credit Registry information. *Partial Risk* is *i*'s risk score at time *t* computed using financial statement information only. Risk Spread is the difference between *Partial Risk* and *Full Risk*. *Medium (High) P. Risk* is a dummy variable that takes value 1 if the *Partial Risk* of firm i belongs to the second (third) tertile of the distribution. *Risk Spread>0* is a dummy variable that takes value 1 if *Risk Spread* is positive. The estimates are corrected for the rare event bias using the King-Zhen algorithm. Heteroskedasticity-robust standard errors are in brackets, clustered at the firm level. ∗, ∗∗, and ∗∗∗ stand for statistical significance at the 10%, 5%, and 1% level.

Panel A: All firms

Dep. Variable: Prob(Bond Issue)	(1)	(2)	(3)	(4)	(5)
Full Risk	-0.2321**				
	(0.0956)				
Risk Spread		0.4326**	1.6555***	-0.0170	
		(0.1782)	(0.4435)	(0.3941)	
Partial Risk	0.5847***	0.2069*	-0.6622***		-0.2368
	(0.1982)	(0.1243)	(0.2386)		(0.1690)
Risk Spread × Medium P. Risk				1.0605**	
				(0.4727)	
Risk Spread × High P. Risk				1.6378***	
				(0.6125)	
Risk Spread>0					0.9656***
					(0.3181)
Ln(Total Assets)	1.2879***	1.2879***	0.5597**	0.6331***	0.5967***
	(0.1665)	(0.1665)	(0.2295)	(0.2345)	(0.2314)
HHI Index	-3.3041***	-3.3041***	-1.9154***	-1.9369***	-1.9965***
	(0.5645)	(0.5645)	(0.5817)	(0.5767)	(0.5836)
Log(Drawn Amt)			1.2946***	1.1488***	1.1613***
			(0.2172)	(0.2207)	(0.2159)
Drawn/Granted			2.1468***	1.1840**	0.9526**
			(0.5618)	(0.4690)	(0.4613)
Net Financial Position/Own funds			0.0055***	0.0057***	0.0063***
			(0.0004)	(0.0004)	(0.0004)
Net Financial Position/Sales			-0.0479***	-0.0450***	-0.0361***
			(0.0012)	(0.0011)	(0.0007)
Sales Growth			0.0001***	0.0001***	0.0001***
			(0.0000)	(0.0000)	(0.0000)
Capital Expenditures/ Total Assets			0.6206***	0.6778***	0.6932***
			(0.1001)	(0.1008)	(0.0939)
Medium P. Risk				0.5722*	
				(0.3102)	
High P. Risk				-0.2032	
				(0.4786)	
Time FE	yes	yes	yes	yes	yes
Sector FE	yes	yes	yes	yes	yes
Area FE	yes	yes	yes	yes	yes
Observations	249,267	249,267	164,835	164,835	164,835
Number of Firms	58,655	58,655	51,657	51,657	51,657

(continued)

Panel B: Only firms raising new debt financing

Dep. Variable: Prob(Bond Issue)	(1)	(2)	(3)	(4)	(5)
Full Risk	-0.2019*				
	(0.1119)				
Risk Spread		0.3763*	1.6220***	-0.1091	
		(0.2086)	(0.5212)	(0.4534)	
Partial Risk	0.6511***	0.3225**	-0.5710**		-0.1599
	(0.2210)	(0.1372)	(0.2722)		(0.1980)
Risk Spread × Medium P. Risk				1.3810**	
				(0.5473)	
Risk Spread × High P. Risk				1.6748**	
				(0.7606)	
Risk Spread>0					0.8773**
					(0.3574)
Ln(Total Assets)	1.2697***	1.2697***	0.5807**	0.6396**	0.6021**
	(0.1937)	(0.1937)	(0.2639)	(0.2694)	(0.2687)
HHI Index	-4.4020***	-4.4020***	-3.0338***	-3.0687***	-3.0960***
	(0.8843)	(0.8843)	(0.8446)	(0.8433)	(0.8441)
Log(Drawn Amt)			1.2526***	1.1335***	1.1311***
			(0.2588)	(0.2574)	(0.2587)
Drawn/Granted			2.2837***	1.4851***	1.1095**
			(0.6724)	(0.5534)	(0.5483)
Net Financial Position/Own funds			0.0049***	0.0051***	0.0053***
			(0.0004)	(0.0004)	(0.0004)
Net Financial Position/Sales			-0.0639***	-0.0639***	-0.0528***
			(0.0025)	(0.0025)	(0.0026)
Sales Growth			0.0001***	0.0001***	0.0001***
			(0.0000)	(0.0000)	(0.0000)
Capital Expenditures/ Total Assets			0.5887***	0.6425***	0.6545***
			(0.1075)	(0.1137)	(0.1076)
Medium P. Risk				0.6244*	
				(0.3445)	
High P. Risk				-0.0714	
				(0.5471)	
Time FE	yes	yes	yes	yes	yes
Sector FE	yes	yes	yes	yes	yes
Area FE	yes	yes	yes	yes	yes
Observations	148,865	148,865	109,412	109,412	109,412
Number of Firms	47,958	47,958	41,823	41,823	41,823

Table 6: Cost of Funding: Loans vs Bonds

This table presents coefficient estimates for an OLS regression of funding costs on firm characteristics and funding sources. In column 1, the dependent variable is the cost of bank funding. In columns 2 and 4, the dependent variable is the cost of funding from both sources, banks and bonds. In columns 3, the dependent variable is the cost of funding from both banks and bonds with embedded options. The variable *Issuer* that takes the value 1 if the borrower has ever issued a bond before t (and 0 otherwise). The variable *Bond* takes value 1 if the funding source is a bond placement and 0 otherwise. *Full Risk* is a firm's risk score computed using both financial statement information and Credit Registry information. Heteroskedasticity-robust standard errors are in brackets, clustered at the firm level. ∗, ∗∗, and ∗∗∗ stand for statistical significance at the 10%, 5%, and 1% level.

Dep. Variable: Cost of Funding	(1)	(2)	(3)	(4)
→Source:	Bank	Bank/ All Bonds	Bank/Bonds with Embedded Options	Bank/ All Bonds
Issuer	0.237			
	(0.146)			
Bond		0.351**	0.521**	0.3379*
		(0.179)	(0.234)	(0.1830)
Full Risk	0.763***	0.764***	0.763***	0.7708***
	(0.00978)	(0.00980)	(0.0098)	(0.0097)
Quarter-Year FE	Yes	Yes	Yes	Yes
Industry, Area, Age FE	No	No	No	Yes
N	228406	227536	228503	227536
adj. R^2	0.273	0.260	0.273	0.2890

Table 7: The Effects of Issuing Bonds: Cost of Bank Credit

This table presents DiD estimates of the effects of bond funding on changes in the cost of bank credit. The variable *Issuer* takes value 1 if the firm has ever issued a bond, and 0 otherwise. The variable *Post* takes value 1 in the focal quarter and in the following 2 (columns 1 and 2), 3 (columns 3 and 4), and 4 (columns 5 and 6) quarters. *Risk Spread*>0 is a dummy variable that takes value 1 if Risk Spread is positive. *Full Risk* is a firm's risk score computed using both financial statement information and Credit Registry information. Other controls include the variables *Post* and *Issuer Risk Spread>0*. Heteroskedasticity-robust standard errors are in brackets, clustered at the firm level. ∗, ∗∗, and ∗∗∗ stand for statistical significance at the 10%, 5%, and 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Variable: ΔCost	After the issuance: 2 quarters	After the issuance: 2 quarters	After the issuance: 3 quarters	After the issuance: 3 quarters	After the issuance: 4 quarters	After the issuance: 4 quarters
Issuer × Post	-0.0062		-0.0058*		-0.0056*	
	(0.0041)		(0.0034)		(0.0033)	
Issuer Risk Spread>0 ×Post		-0.0086*		-0.0079*		-0.0072*
		(0.0050)		(0.0075)		(0.0040)
Full Risk	0.0007*	0.0007*	0.0007***	0.0007***	0.0008***	0.0008***
	(0.0004)	(0.0004)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Other Controls	yes	yes	yes	yes	yes	yes
Firm and Year FE	yes	yes	yes	yes	yes	yes
Observations	32,897	32,897	44,959	44,959	57,016	57,016
R-squared	0.0088	0.0089	0.0075	0.0076	0.0064	0.0065
Number of Firms	9,552	9,552	9,761	9,761	9,942	9,942

Table 8: The Effects of Issuing Bonds: Number of Lending Banks

This table presents DiD estimates of the effects of bond funding on changes in the number of lending banks. The variable *Issuer* takes value 1 if the firm has ever issued a bond, and 0 otherwise. The variable *Post* takes value 1 in the focal quarter and in the following 2 (columns 1 and 2), 3 (columns 3 and 4), and 4 (columns 5 and 6) quarters. *Risk Spread>0* is a dummy variable that takes value 1 if *Risk Spread* is positive. *Full Risk* is a firm's risk score computed using both financial statement information and Credit Registry information. Other controls include the variables *Post* and *Issuer Risk Spread>0*. Heteroskedasticity-robust standard errors are in brackets, clustered at the firm level. ∗, ∗∗, and ∗∗∗ stand for statistical significance at the 10%, 5%, and 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Variable: ΔBanks	After the issuance: 2 quarters	After the issuance: 2 quarters	After the issuance: 3 quarters	After the issuance: 3 quarters	After the issuance: 4 quarters	After the issuance: 4 quarters
Issuer × Post	0.6257***		0.5665***		0.5368***	
	(0.1987)		(0.1774)		(0.1779)	
Issuer Risk Spread>0 × Post		0.6240***		0.5853***		0.5234***
		(0.2374)		(0.2085)		(0.2065)
Full Risk	-0.0373**	-0.0372**	-0.0423***	-0.0423***	-0.0486***	-0.0486***
	(0.0209)	(0.0209)	(0.0137)	(0.0137)	(0.0106)	(0.0106)
Other Controls	yes	yes	yes	yes	yes	yes
Firm and Year FE	yes	yes	yes	yes	yes	yes
Observations	32,882	32,882	44,937	44,937	56,986	56,986
R-squared	0.0331	0.0330	0.0280	0.0279	0.0237	0.0237
Number of Firms	9,551	9,551	9,760	9,760	9,941	9,941

Table 9: The Real Effects of Issuing Bonds

This table presents DiD estimates of the effects of bond funding on changes in trade debt (column (1)), sales (column (2)), and tangible and intangible capital expenditures (column (3) and (4)) over total assets. The variable *Issuer* takes value 1 if the firm has ever issued a bond, and 0 otherwise. The variable *Post* takes value 1 in the focal quarter and in the following 4 quarters. *Full Risk* is a firm's risk score computed using both financial statement information and Credit Registry information. Other controls include the variables *Post*. Heteroskedasticity-robust standard errors are in brackets, clustered at the firm level. ∗, ∗∗, and ∗∗∗ stand for statistical significance at the 10%, 5%, and 1% level.

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	(1)	(2)	(3)	(4)
Dep. Variable:	*Δ Trade debt / Total Assets*	*Δ Sales / Total Assets*	*Tangible CapEx / Total Assets*	*Intangible CapEx / Total Assets*
After the issuance:	*1 year*	*1 year*	*1 year*	*1 year*
Issuer × Post	0.0977**	0.3687	-0.0023	0.0520
	(0.0456)	(0.2523)	(0.0068)	(0.0344)
Full Risk	-0.0013	-0.0175	0.0006	0.0025*
	(0.0044)	(0.0231)	(0.0013)	(0.0013)
Other Controls	yes	yes	yes	yes
Firm and Year FE	yes	yes	yes	yes
Observations	3,718	3,834	3,763	3,047
R-squared	0.0281	0.0250	0.0003	0.0079
Number of Firms	2,563	2,616	2,708	2,265

Table 10: The Effects of Issuing Bonds: Cost of Bank Credit and Concentrated Borrowing

This table presents DiD estimates of the effects of bond funding on changes in the cost of bank credit. The variable Issuer takes value 1 if the firm has ever issued a bond, and 0 otherwise. The variable Post takes value 1 in the focal quarter and in the following 4 quarters. The variables HHI Low, HHI Medium, and HHI High are dummy variables that take value 1 if the Herfindahl concentration index of bank-firm relationships are, respectively, low (<0.2), medium (0.2<=x<0.60) or high (>0.60). Full Risk is a firm's risk score computed using both financial statement information and Credit Registry information. Other controls include the variables Post and Issuer_HHI Low, Issuer_HHI Medium, and Issuer_HHI High. Heteroskedasticity-robust standard errors are in brackets, clustered at the firm level. *, **, and *** stand for statistical significance at the 10%, 5%, and 1% level.

	(1)	(2)	(3)
Dep. Variable: ΔCost	After the issuance: 4 quarters	After the issuance: 4 quarters	After the issuance: 4 quarters
Issuer HHI Low × Post	-0.0070***		
	(0.0020)		
Issuer HHI Medium × Post		-0.0059	
		(0.0086)	
Issuer HHI High × Post			-0.0004
			(0.0052)
Full Risk	0.0008***	0.0008***	0.0008***
	(0.0002)	(0.0002)	(0.0002)
Other Controls	yes	yes	yes
Firm and Year FE	yes	yes	yes
Observations	57,005	57,005	57,005
R-squared	0.0064	0.0064	0.0065
Number of Firms	9,939	9,939	9,939

Table 11: The Effects of Issuing Bonds: Cost of Bank Credit

This table presents DiD estimates of the effects of bond funding on changes in the cost of bank credit. The variable *Issuer* takes value 1 if the firm has ever issued a bond, and 0 otherwise. The variable *Post* takes value 1 in the focal quarter and in the following 2 (columns 1 and 2) 3 (columns 3 and 4) and 4 (columns 5 and 6) quarters. *Risk Spread*>0 is a dummy variable that takes value 1 if Risk Spread is positive. *Full Risk* is a firm's risk score computed using both financial statement information and Credit Registry information. Other controls include the variables *Post* and *Issuer Risk Spread>0*. Bank fixed effects are defined as fixed effects of the firm's main lender, i.e. the bank with the largest borrowing share in quarter *t*. Heteroskedasticity-robust standard errors are in brackets, clustered at the firm level. ∗, ∗∗, and ∗∗∗ stand for statistical significance at the 10%, 5%, and 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Variable: ΔCost	After the issuance: 2 quarters	After the issuance: 2 quarters	After the issuance: 3 quarters	After the issuance: 3 quarters	After the issuance: 4 quarters	After the issuance: 4 quarters
Issuer × Post	-0.0061		-0.0058*		-0.0054	
	(0.0041)		(0.0035)		(0.0034)	
Issuer Risk Spread>0 ×Post		-0.0086*		-0.0081*		-0.0072*
		(0.0050)		(0.0043)		(0.0041)
Full Risk	0.0008*	0.0008*	0.0008***	0.0008***	0.0009***	0.0009***
	(0.0004)	(0.0004)	(0.0003)	(0.0003)	(0.0002)	(0.0002)
Other Controls	yes	yes	yes	yes	yes	yes
Relationship Bank FE	yes	yes	yes	yes	yes	yes
Firm and Year FE	yes	yes	yes	yes	yes	yes
Observations	32,094	32,094	43,841	43,841	55,571	55,571
R-squared	0.0129	0.0129	0.0107	0.0107	0.0091	0.0091
Number of Firms	9,412	9,412	9,645	9,645	9,848	9,848