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ASYMMETRIC INFORMATION IN CORPORATE LENDING: EVIDENCE FROM SME BOND MARKETS

by Alessandra Iannamorelli[†], Stefano Nobili[†], Antonio Scalia[†] and Luana Zaccaria[‡]

Abstract

Using a comprehensive dataset of Italian SMEs, we find that differences between private and public information on creditworthiness affect firms' decisions to issue debt securities. Surprisingly, our evidence supports positive (rather than adverse) selection. 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. These results are consistent with a model where banks offer more flexibility than markets during financial distress and firms may use market lending to signal credit quality to outside stakeholders.

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1. Introduction

Small businesses are heavily dependent on bank lending as their main source of external funding (Petersen and Rajan, 1994; Cole, 2013; Robb and Robinson, 2014). This makes entrepreneurial firms particularly vulnerable to financial crises that reduce the availability of bank credit. Credit shortages can constrain business investments, thus further propagating the initial shock to the real sector (Crouzet, 2017). Additionally, the scarcity of funding options reduces competition among lenders and increases borrowing costs for small and medium-sized enterprises (SMEs), potentially inhibiting entrepreneurial initiatives and innovation (Black and Strahan, 2002; Chava et al., 2013). These arguments recently motivated regulators to actively support the creation of new funding markets for small firms in order to ease their dependence on banks.[1]

Whether such reforms can improve the overall working of entrepreneurial finance, however, is yet unclear. 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 (Faulkender and Petersen, 2006).

We contribute to this debate by investigating the role of information asymmetry in SMEs' choice between bank and 'alternative' funding. In particular, we examine how the difference between private and public information on a firm's creditworthiness affects recourse to non-bank (market) lending. We measure this informational gap by comparing 'public' credit ratings, i.e. measures of creditworthiness based on the information available to the markets, with 'private' credit ratings, i.e. ratings produced by bank lenders for internal use only, and we relate this gap to the firm's propensity to raise debt via bond markets. This novel approach allows us to quantify the potential extent of information asymmetries without relying on proxies (such as the variance in analysts' forecasts or stock price volatility), and to observe directly whether individual firms are 'better' or 'worse', in terms of credit quality, compared with what outside investors can infer from

[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 .

using public information such as that contained in financial statements.

Our empirical analysis employs data on financing decisions from the universe of Italian SMEs 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.[2] 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 (about 300 issuers and over 420 securities considering only SMEs).

From a finance theory perspective, the success of such novel financing instruments is somewhat unexpected. Since the information generated by banks is not easily transferable to outsiders, investors should require high returns for holding debt instruments issued by small, unlisted firms, thereby inducing adverse selection among issuers. Thus, arguments based on asymmetric information theories predict that only firms of the worse *unobservable* credit quality self-select into bond markets, while better firms remain with bank lending to avoid undervaluation (Myers and Majluf, 1984). This prediction casts doubts on the desirability or effectiveness of reforms aimed at expanding SMEs' funding options beyond the banking system. Does 'alternative' lending attract borrowers of poor quality?

Using data on both issuer and non-issuer firms, together with public and *private* information on their creditworthiness, we shed light on this question by investigating the drivers of bond offerings at the firm level. Key to the empirical strategy is our novel measure of the gap between credit quality as perceived by outside investors and that observed by insiders. We quantify this gap by using firm-year indicators of credit quality based solely on accounting data, and compare them with indicators that combine information on both financial statements and credit history, as recorded in the national

[2] 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.

Central Credit Register. We obtain these two measures, expressed in terms of estimated risk scores, from the Bank of Italy's In-house Credit Assessment System (BI-ICAS). Importantly, while firm-level information from the Central Credit Register 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 between the two measures represents the contribution of *private* information to total estimated credit risk. We label this difference as 'Risk Spread'. Intuitively, 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 use this measure as the main explanatory variable to estimate the firm level probability of issuing bonds. We include various financial statement indicators as controls, together with the Herfindhal-Hirschman concentration index of bank-firm relations. We find no evidence of adverse selection in any model specification. 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 evidence stands in contrast with the previous results 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), which is consistent with the notion 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 resolving hold-up problems (Rajan, 1992) is not the predominant motivation for accessing capital markets.

Using a simple theoretical framework, we propose an explanation for these findings that rests on borrowers' choice of bond versus loan funding, as driven by the convenience of exploiting the relative advantage of one market or the other. Specifically, bank lending is typically more flexible than market lending in situations of financial distress.[3] In other

[3] Sufi (2009) and Berg et al. (2016) provide direct empirical evidence.

words, following a credit event, banks are more likely than non-bank lenders to renegotiate and restructure existing loans rather than to initiate liquidation (Bolton and Scharfstein, 1996; Bolton and Freixas, 2000).[4] Therefore, firms with a higher probability of financial distress have stronger incentives to seek bank funding. This also protects them from the public scrutiny arising from defaulting on traded securities. On the other hand, firms with a lower credit risk value banks' flexibility relatively less, and may use bond-based funding to signal their credit quality to other external stakeholders. This 'certification effect' helps firms gain a reputation with stakeholders and visibility with capital providers (including non-relationship lenders), and it supports issuers in preparing for future funding operations on capital markets (e.g. Private Equity funding, IPOs), thus increasing firm value. 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 view proposed by our theoretical framework is consistent with a *causal* effect, rather than a pure selection effect, of bond issuance on firm outcomes, such as the availability of bank credit. 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 60 basis points; this effect is much larger than in previous studies (see Ongena et al., 2018). In the same period, the number of banks granting credit to the issuing firm increases by 0.5 units on average. Our results support the view that accessing capital markets significantly improves credit conditions on bank loans for issuers. This can be due to both direct and indirect mechanisms consistent with our signalling model. Bond issues can signal the firm's financial soundness to prospective lenders, thus directly affecting subsequent borrowing costs, especially outside of relationship lending. This can occur if the firm's 'true' credit quality is only known to the managers, while being strongly correlated with its past credit history (and thus with our *Risk Spread* measure), which is observable to banks. Additionally, signalling high credit quality to other outsiders (e.g. suppliers) may improve firm value, for example by

[4] 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).

reducing net working capital requirements, thus indirectly lowering the cost of funding. We find empirical evidence in support of both mechanisms.

Alternative explanations for our findings rely on the fact that the buy-side of the Italian *minibond* market comprises institutional rather than retail investors. While this feature is common to global corporate bond markets where retail investors hold a very small fraction of the total securities outstanding, one can argue that professional investors may be able to infer banks' private information through their due diligence, thus efficiently screening borrowers and selecting the most creditworthy among them.[5] This reading of our empirical results would suggest the irrelevance of informational barriers between banks and public securities markets. It would therefore imply that, *all things being equal*, there should be no substantial difference in the cost of funding between bonds and loans. Our evidence does not support this view. 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. 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. If private information is revealed to the public, the costs of this transfer are ultimately borne by issuers, which is consistent with the costly signalling hypothesis.

Our results are most closely related to empirical studies on debt structure (Cantillo and Wright, 2000; Hadlock and James, 2002; Denis and Mihov, 2003; Rauh and Sufi, 2010; Gomes and Phillips, 2012). In these studies, firms display different degrees of transparency. For example, small, unlisted firms are typically considered more opaque than large listed firms. These differences affect the relative cost of bank versus market lending, so that loans are relatively cheaper than bonds for opaque firms. We depart from this literature in three important ways. First, we focus exclusively on small, unlisted firms, for which information asymmetries are presumably more severe. Second, because of our focus on this specific set of firms, we do not rely on a variation in proxies for the intensity of potential asymmetric information problems, such as asset size or stock price volatility. Rather, we measure the extent to which private information is better or worse than public

[5] For example, as of March 2017, European households held approximately 5 per cent of the total euro-area corporate bonds outstanding (https://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=35768&no=1).

information. This allows us to directly investigate the very mechanism that underpins most theoretical results on bank versus market funding, i.e. adverse selection. Third, as our analysis unveils positive instead of adverse selection, we offer a novel insight into the funding choices of entrepreneurial firms. Under the (reasonable) assumption that insiders are better informed about the actual firm default probability than outsiders, 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; 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).

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

2. 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.[6] 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.[7] Additionally, in order to stimulate demand, *minibond*

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

[7] 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.

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.[8]

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 on the regulated market (MOT), which is also open to retail investors. The former process does not require approval by the Stock exchange commission (Consob), and is not subject to the EU Prospectus Directive.[9] Further innovations to the regulatory framework were introduced in 2014 to increase market participation.[10]

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, listing the exchange (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;

[8] 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.

[9] 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.

[10] 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.

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

The first restriction matches the EU Commission definition of SMEs.[11] 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 register 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 information (e.g. profitability, leverage, asset size and so on) that relates to issuers in the year before their first bond offering. We retrieve data on firms' 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).[12] 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.[13] 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 Central Credit Register, such as payment histories and

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

[12] 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 Central Credit Register 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.

[13] 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;

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.

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.

3. 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 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 Central Credit Register, 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). 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.[14]

4. 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. [15] 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 in its financial statements and therefore, 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 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 4. 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). In columns 1) and 2), and we show the results for our most parsimonious specification, where we only use the

[14] 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.

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

(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). Surprisingly, 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. Contrary to extant models of information asymmetry and access to the bond market, 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 resolving hold-up problems (Rajan, 1992) 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 capital market.

In 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 to 164,835, due to missing balance sheet and Central Credit Register 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). Growth is positively correlated with bond issuance, as suggested by the coefficients on sales increases and the ratio of net financial position over sales. As expected, 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. 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 4, 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.[16] Thus, 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 highly significant (Table 4, column 5).

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. It is also possible, however, that information from the Central Credit Register, which is in principle only known to insiders, i.e. banks and individual firms, can easily be transferred to outside investors who are then able to screen borrowers based on its content. Under this assumption, banks would not enjoy significant information advantages, and bonds and loans would be perfect substitutes. Therefore, the cost of funding in the two markets should approximately converge. To verify this conjecture, we examine the relationship between interest rates on bonds and loans for

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

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 maturity, 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 positively affects the supply 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 issuers on new loans obtained during the quarter of the issue (*x* axis). The vast majority of the observations lie above the 45-degree line, indicating that the cost of funding is substantially higher in the bond market compared with bank credit.

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 characteristics and time (quarter) fixed effects. In Table 5, 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), controlling for a firm's *Full Risk* score. The coefficient for *Issuer* is not significantly different from zero. Therefore, bond issuers 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 64 basis points more expensive than loans. In column 3, we repeat the same exercise as before, adding the control for credit risk. The coefficient for *Bond* drops to 35 basis points but it is still significant. These results do not substantially change when we add the bank loans of issuers to the pool of funding events, as shown in column 4.

We conclude that if private information is transferred to outside investors, either explicitly through negotiation, or implicitly, through signalling, the cost of this transfer seems to be 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.

5. 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.[17] 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 reconcile the intuition on diversification with our 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 non-bank investors or lenders, 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.[18] It is also possible that the information content associated with the choice of issuing bonds exceeds firm-specific information in the hands of the banking system and therefore issuing bonds conveys additional information to banks. This can occur if a firm's 'true' credit quality is only known to the managers, while being strongly correlated with its past credit history, which can be observed by banks.

We elaborate further on how the signalling equilibrium can be sustained in our conceptual framework (see the next section). 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

[17] See Albareto and Marinelli (2018) on the effects of security issuance on bank credit in Italy.
[18] 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).

after the issuance.

Using our bank interest rate dataset, we compute the weighted average interest rate on bank loans for each firm *i* in quarter *t*.[19] 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 of 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 4, 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:

$$\Delta Cost_{i,t,y} = \beta Issuer_i \times Post_t + \lambda Post_t + \theta X_{i,t} + \alpha_i + \gamma_y + \varepsilon_{i,t,y} \quad (2)$$

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

$$\begin{aligned}\Delta Cost_{i,t,y} = {} & \beta IssuerPosSpread_{i,t} \times Post_t + \lambda Post_t + \pi IssuerPosSpread_{i,t} \\ & + \theta X_{i,y-1} + \alpha_i + \gamma_y \\ & + \varepsilon_{i,t,y} \qquad (3)\end{aligned}$$

[19] Weights are based on loan volume.

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 $Post_t$. 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 6 illustrates the results of the estimation of model (2) and its alternative specification (3), 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 7). 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 are almost unchanged for firms with positive values of *Risk Spread*.

To summarize, taken all together, our evidence documents that firms with better (privately known) credit quality are more likely to access debt capital markets, and that bond funding, although more expensive than bank credit, improves bank funding conditions *after* the first bond placement. How are these two results related? There are at least two mechanisms, a direct one and an indirect one. In the first (direct) mechanism, bond issues can signal a firm's financial soundness to prospective lenders, thus directly affecting subsequent borrowing costs, especially outside of relationship lending. This can occur if a firm's 'true' credit quality is only known to the managers, while being strongly correlated with its past credit history (and to our *Risk Spread* measure), which is observable to all banks. According to this interpretation, we should observe that most of

the benefits from accessing bond markets accrue to firms that have less concentrated borrowing. This is because the breadth and size of lending relationships help banks gather both soft and hard information on borrowers (see Gobbi and Sette, 2014). In other words, less concentrated borrowing makes firms more opaque to the banking system as a whole. In Table 8, we verify this conjecture by interacting 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 6 is driven by firms that rely on transaction rather than relationship banks.

The second mechanism that connects private information on the credit quality of issuers with the post-issuance cost of credit is indirect, and hinges on the effects of signalling to third party stakeholders. In particular, by conveying information on their credit quality credibly, firms can improve their reputation with suppliers, customers or other investors. This should have a bearing on real outcomes (such as net working capital, sales and investments), increase firm value, and consequently lower the cost of debt. We explore this possibility by estimating the effects of bond issuance on trade debt, sales and capital expenditures. The coefficient estimates are reported in Table 9. 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 do not find significant effects on sales and capital expenditures.

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. Since not all Italian banks participated in the TLTRO programme, we explore this possibility by adding relationship bank fixed effects to the previous model. 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 10. 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.

6. A Simple Conceptual Framework

Finance theory suggests that, in the presence of asymmetric information between firm insiders and outside capital markets, firms with better unobservable fundamentals tend to rely on funding sources alternative to external capital, such as internally generated cash flows or risk-free loans. This occurs because, when information cannot be credibly transferred from insiders (such as existing shareholders or relationship banks) to outsiders, information-sensitive securities issued by firms with better fundamentals are priced below fair value by outside (uninformed) investors. Thus, capital markets, including corporate bond markets, are subject 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 from an informed bank and issuing bonds on uninformed capital markets, firms with better unobservable credit quality strategically opt for capital markets funding. The assumption that bank lending is more flexible than market lending is crucial for this result. That is, in the event of liquidity problems, 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). 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 may be used to sustain a separating equilibrium.

To formalize this intuition, consider a cashless firm that has the following investment opportunity. By investing I today (t=0), it can generate two cash flows, each equal to $X > I$, in the next two periods ($t = 1$ and $t = 2$). Investing in this project is necessary for the firm 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 definitely be able to generate the second cash flow.

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 $r \leq X - F$. 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 credit 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 $x < I$ 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 probability of one. To interpret this assumption, consider for example that firms may be able to attract the most productive employees if job candidates believe their employer will have no liquidity issues in the near future. Suppliers may be willing to accept longer payment periods, which frees up resources for production and investment. In other words, we assume that building a credible reputation of financial solidity can generate 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.[20] 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 $V = \lambda\, I < I$.[21]

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 as to firm type (as is the case with pooling) and the fairly priced bank loan option is available, firm *H* has no incentive to sell undervalued securities.[22] Similarly, a separating equilibrium where firm *L* issues bonds and firm *H* only uses bank loans is not rational, since firm *L* receives no compensation for giving up the bank's flexibility.

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

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

[22] 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.

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. Thus, we have

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

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).
Profitability alone, however, is not sufficient when potential reputation gains (*x*) are large. This is most likely the case for small, young or relatively unknown companies. The most solid among these opaque 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 is profitable compared with the payoff in the bank-only equilibrium. Conditions a) and b) are satisfied for values of $\check{F}$ such that

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

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

of ‘public’ credit quality.

To summarize, the 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.

7. Conclusions

International data show that small and medium-sized enterprises (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.[23]

[23] 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).

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 in the choice of funding method. In particular, we compare credit risk scores based only on financial statements (public information) with risk scores based on information that includes Central Credit Register data (private information). Surprisingly, 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 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. 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.

References

Accornero, M., G. Guazzarotti, P. Finaldi Russo and V. Nigro. “First-time corporate bond issuers in Italy”, Banca d’Italia, Occasional Paper 269 (2015).

Albareto, Giorgio, and Giuseppe Marinelli. "Italian Banks and Market-Based Corporate Financing." Banca d’Italia, Occasional Paper 432 (2018).

Allen, Franklin, and Gerald R. Faulhaber. "Signalling by underpricing in the IPO market." Journal of Financial Economics 23, no. 2 (1989): 303-323.

Beck, Thorsten, Hans Degryse, Ralph De Haas, and Neeltje Van Horen. "When arm's length is too far: Relationship banking over the credit cycle." Journal of Financial Economics 127, no. 1 (2018): 174-196.

Benetton, Matteo, and Davide Fantino. "Competition and the pass-through of unconventional monetary policy: evidence from TLTROs." Banca d’Italia Temi di Discussione (Working Papers) 1187 (2018).

Berg, Tobias, Anthony Saunders, and Sascha Steffen. "The total cost of corporate borrowing in the loan market: Don't ignore the fees." The Journal of Finance 71, no. 3 (2016): 1357-1392.

Black, Sandra E., and Philip E. Strahan. "Entrepreneurship and bank credit availability." The Journal of Finance 57, no. 6 (2002): 2807-2833.

Bolton, Patrick, and Xavier Freixas. "Equity, bonds, and bank debt: Capital structure and financial market equilibrium under asymmetric information." Journal of Political Economy 108, no. 2 (2000): 324-351.

Bolton, Patrick, and David S. Scharfstein. "Optimal debt structure and the number of creditors." Journal of Political Economy 104, no. 1 (1996): 1-25.

Cantillo, Miguel, and Julian Wright. "How do firms choose their lenders? An empirical investigation." The Review of Financial Studies 13, no. 1 (2000): 155-189.

Chava, Sudheer, Alexander Oettl, Ajay Subramanian, and Krishnamurthy V. Subramanian. "Banking deregulation and innovation." Journal of Financial Economics 109, no. 3 (2013): 759-774.

Chemmanur, Thomas J., and Paolo Fulghieri. "Reputation, renegotiation, and the choice between bank loans and publicly traded debt." Review of Financial Studies 7, no. 3

(1994): 475-506.

Cole, R. A. “What do we know about the capital structure of privately held US firms? Evidence from the surveys of small business finance.” Financial Management, (2013), 42(4), 777-813.

Crouzet, Nicolas. "Aggregate implications of corporate debt choices." The Review of Economic Studies 85, no. 3 (2017): 1635-1682.

Datta, Sudip, Mai Iskandar-Datta, and Ajay Patel. "Some evidence on the uniqueness of initial public debt offerings." The Journal of Finance 55, no. 2 (2000): 715-743.

De Fiore, Fiorella, and Harald Uhlig. "Bank finance versus bond finance." Journal of Money, Credit and Banking 43, no. 7 (2011): 1399-1421.

Denis, David J., and Vassil T. Mihov. "The choice among bank debt, non-bank private debt, and public debt: evidence from new corporate borrowings." Journal of financial Economics 70, no. 1 (2003): 3-28.

Diamond, Douglas W. "Financial intermediation and delegated monitoring." The Review of Economic Studies 51, no. 3 (1984): 393-414.

Diamond, Douglas W. "Monitoring and reputation: The choice between bank loans and directly placed debt." Journal of Political Economy 99, no. 4 (1991): 689-721.

Fama, Eugene F. "What's different about banks?" Journal of Monetary Economics 15, no. 1 (1985): 29-39.

Faulkender, Michael, and Mitchell A. Petersen. "Does the source of capital affect capital structure?" The Review of Financial Studies 19, no. 1 (2006): 45-79.

Gertner, Robert, and David Scharfstein. "A theory of workouts and the effects of reorganization law." The Journal of Finance 46, no. 4 (1991): 1189-1222.

Gobbi, Giorgio, and Enrico Sette. "Do firms benefit from concentrating their borrowing? Evidence from the great recession." Review of Finance 18, no. 2 (2014): 527-560.

Gomes, Armando, and Gordon Phillips. "Why do public firms issue private and public securities?" Journal of Financial Intermediation 21, no. 4 (2012): 619-658.

Grinblatt, Mark, and Chuan Yang Hwang. "Signalling and the pricing of new issues." The Journal of Finance 44, no. 2 (1989): 393-420.

Hadlock, Charles J., and Christopher M. James. "Do banks provide financial slack?." The

Journal of Finance 57, no. 3 (2002): 1383-1419.

King, Gary, and Langche Zeng, “Logistic Regression in Rare Events Data.” Policy Analysis 9, no. 2 (2001): 137-163.

Leland, Hayne E., and David H. Pyle. "Informational asymmetries, financial structure, and financial intermediation." The Journal of Finance 32, no. 2 (1977): 371-387.

Myers, Stewart C., and Nicholas S. Majluf. "Corporate financing and investment decisions when firms have information that investors do not have." Journal of Financial Economics 13, no. 2 (1984): 187-221.

Ongena, Steven, José-Luis Peydró, and Neeltje Van Horen. "Shocks abroad, pain at home? Bank-firm level evidence on the international transmission of financial shocks." IMF Economic Review 63(4), November (2015).

Ongena, Steven, Sara Pinoli, Paola Rossi, and Alessandro D. Scopelliti. “Bank Credit and Market-based Finance for Corporations: The Effects of Minibond Issuances in Italy” Working Paper (2018).

Petersen, Mitchell A., and Raghuram G. Rajan. "The benefits of lending relationships: Evidence from small business data." The Journal of Finance 49, no. 1 (1994): 3-37.

Rajan, Raghuram G. "Insiders and outsiders: The choice between informed and arm's-length debt." The Journal of Finance 47, no. 4 (1992): 1367-1400.

Rauh, Joshua D., and Amir Sufi. "Capital structure and debt structure." The Review of Financial Studies 23, no. 12 (2010): 4242-4280.

Robb, Alicia M., and David T. Robinson. "The capital structure decisions of new firms." The Review of Financial Studies 27.1 (2014): 153-179.

Welch, Ivo. "Seasoned offerings, imitation costs, and the underpricing of initial public offerings." The Journal of Finance 44, no. 2 (1989): 421-449.

Ziegler, Tania, Rotem Shneor, Kieran Garvey, Karsten Wenzlaff, Nikos Yerolemou, Hao Rui, and Bryan Zhang. "Expanding horizons: The 3rd European alternative finance industry report." Available at SSRN 3106911 (2018).

Figures and Tables

Figure 1: SME Bond Issuers: First Placements Aggregate Data

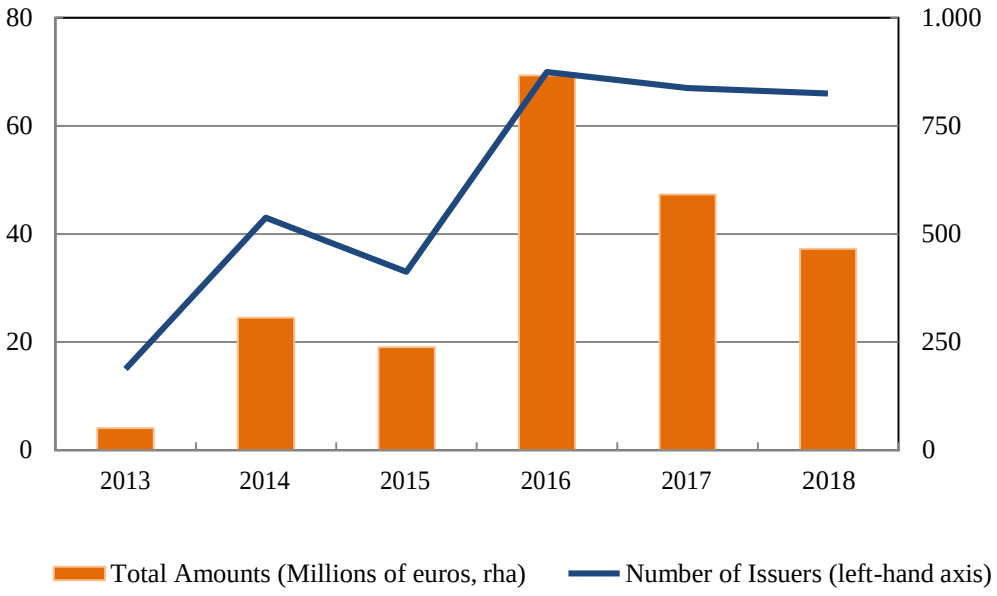
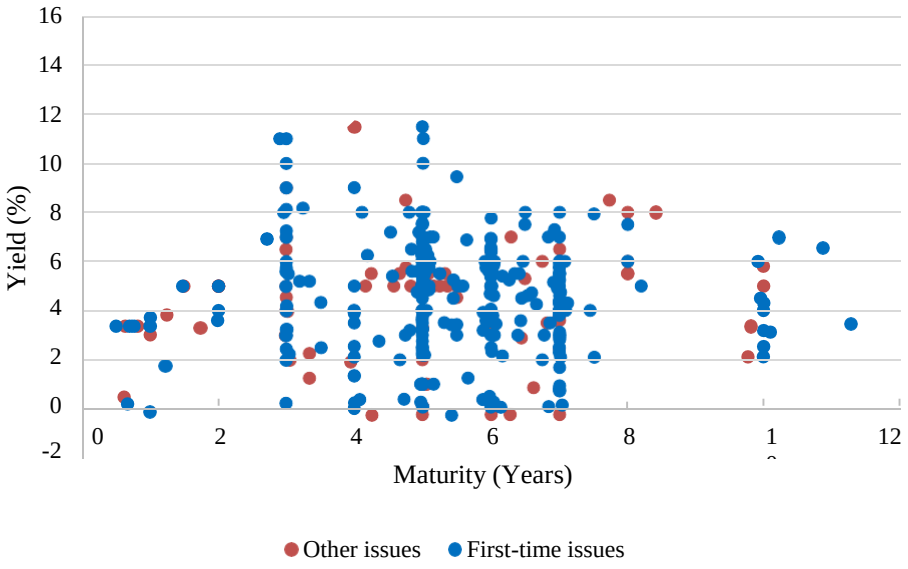
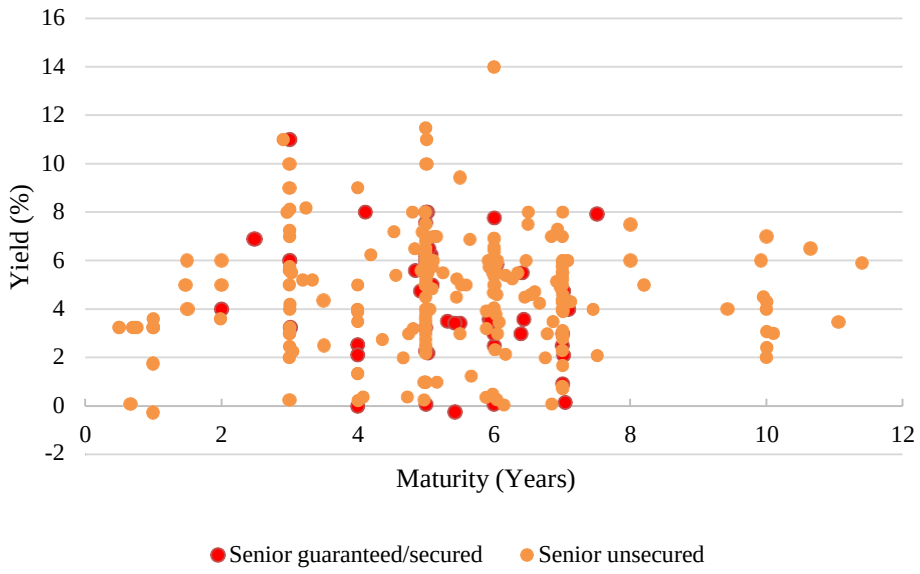


Figure 2: Cost of Bond Funding



(a) First-time vs Seasoned



(b) Guaranteed/Secured vs Unsecured

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

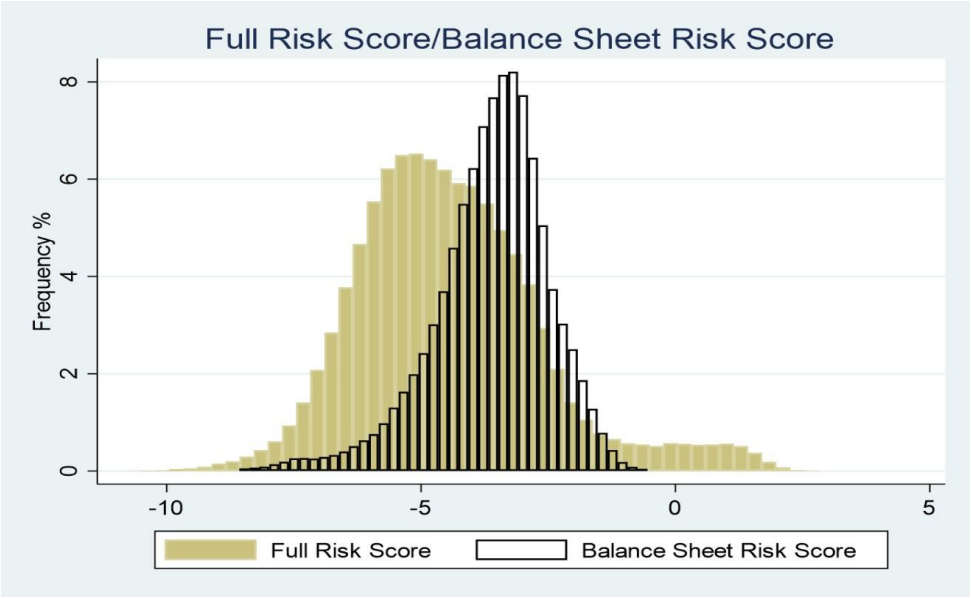


Figure 4: Risk Spread: Issuers vs Non Issuers

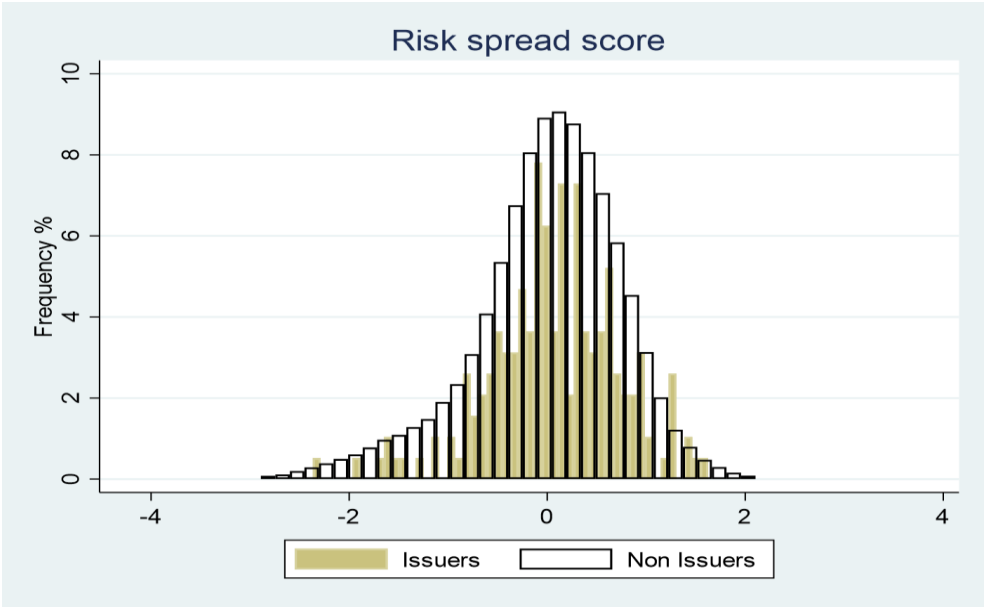


Figure 5: Cost of Bank Funding and Credit Risk

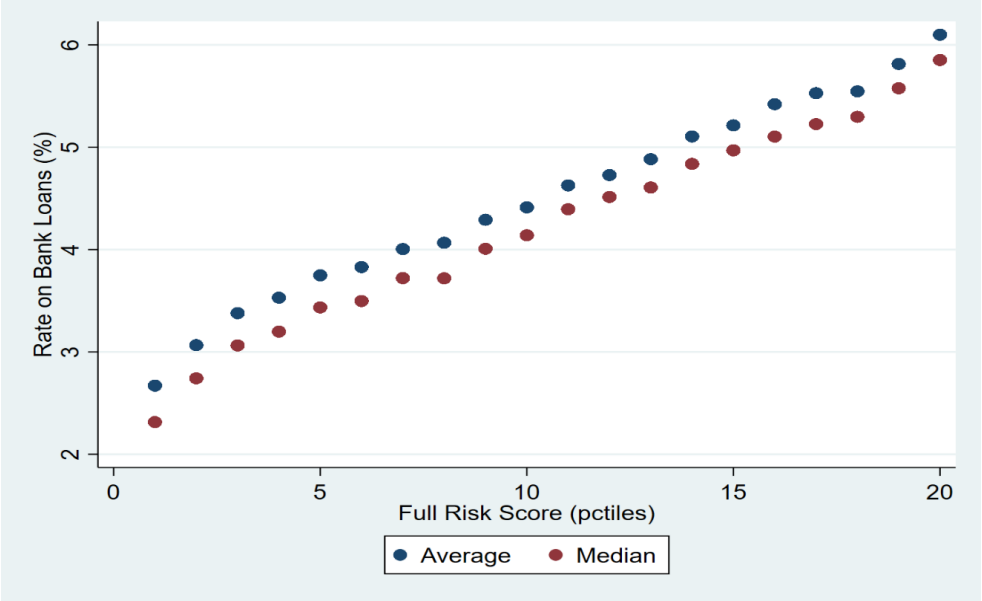


Figure 6: Herfindhal Index of Bank Concentration and Firm Size

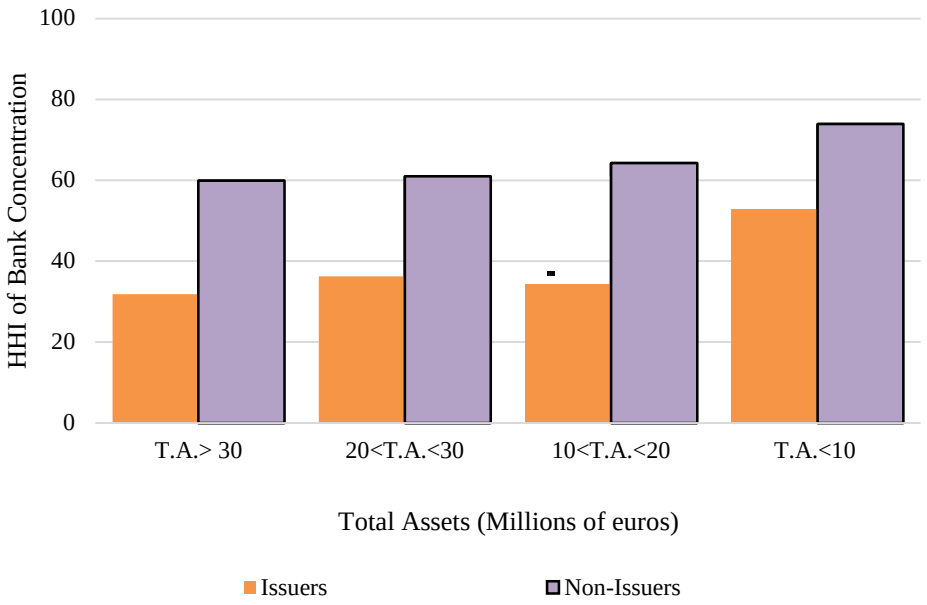


Figure 7: Cost of Funding: Bonds vs Bank Loans

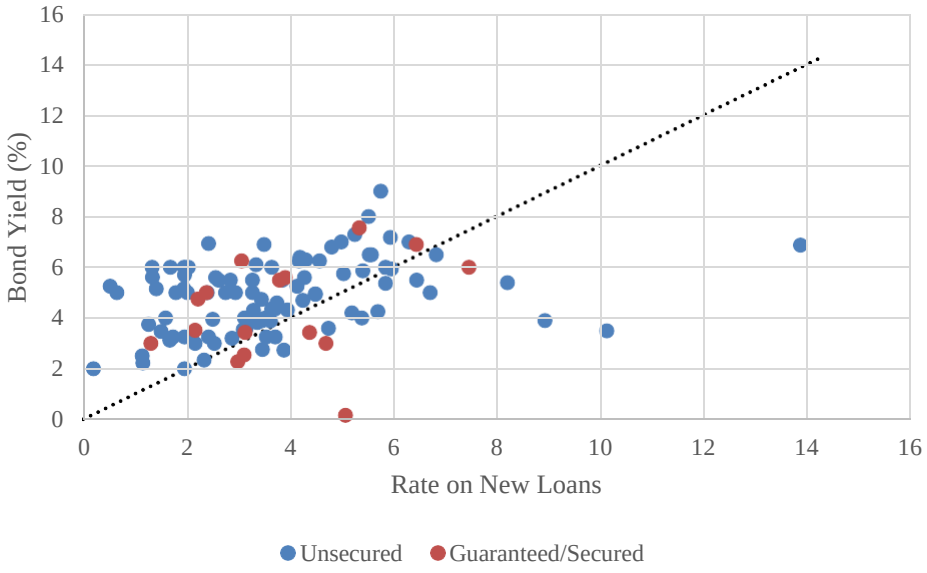


Table 1: Bond Characteristics: First and Seasoned Placements

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 a logit model for the probability of issuing bonds for firm *i* in quarter *t*. *Full Risk* is firm *i*'s risk score at time *t* computed using both financial statement information and Central Credit Register 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.

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

Table 5: 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 to 4, the dependent variable is the cost of funding from both sources, banks and bonds. 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 Central Credit Register 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/Bonds	Bank/Bonds	Bank/Bonds
Issuer	0.237			
	(0.146)			
Bond		0.642***	0.351**	0.350*
		(0.136)	(0.179)	(0.179)
Full Risk	0.763***		0.764***	0.763***
	(0.00978)		(0.00980)	(0.00977)
Quarter-Year FE	Yes	Yes	Yes	Yes
N	228406	296432	227536	228553
adj. R^2	0.273	0.157	0.260	0.271

Table 6: 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 Central Credit Register 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 7: 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 Central Credit Register 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 8: 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 Central Credit Register 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 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 capital expenditures (column (3)) 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 2 (columns 1 and 2) 3 (columns 3 and 4) and 4 (columns 5 and 6) quarters. *Full Risk* is a firm's risk score computed using both financial statement information and Central Credit Register 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.
.

	(1)	(2)	(3)
Dep. Variable:	*Δ Trade debt / Total Assets*	*Δ Sales / Total Assets*	*Δ CapEx / Total Assets*
After the issuance:	*1 year*	*1 year*	*1 year*
Issuer × Post	0.0977**	0.3687	-0.0406
	(0.0456)	(0.2523)	(0.0630)
Full Risk	-0.0013	-0.0175	-0.0062
	(0.0044)	(0.0231)	(0.0068)
Other Controls	yes	yes	yes
Firm and Year FE	yes	yes	yes
Observations	3,718	3,834	2,170
R-squared	0.0281	0.0250	0.0528
Number of Firms	2,563	2,616	1,607

Table 10: 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 Central Credit Register 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

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ANDINI M., E. CIANI, G. DE BLASIO, A. D'IGNAZIO and V. SILVESTRINI, *Targeting with machine learning: an application to a tax rebate program in Italy,* Journal of Economic Behavior & Organization, v. 156, pp. 86-102, **WP 1158 (December 2017).**

BARONE G., G. DE BLASIO and S. MOCETTI, *The real effects of credit crunch in the great recession: evidence from Italian provinces,* Regional Science and Urban Economics, v. 70, pp. 352-59, **WP 1057 (March 2016).**

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BERTON F., S. MOCETTI, A. PRESBITERO and M. RICHIARDI, *Banks, firms, and jobs,* Review of Financial Studies, v.31, 6, pp. 2113-2156, **WP 1097 (February 2017).**

BOFONDI M., L. CARPINELLI and E. SETTE, *Credit supply during a sovereign debt crisis,* Journal of the European Economic Association, v.16, 3, pp. 696-729, **WP 909 (April 2013).**

BOKAN N., A. GERALI, S. GOMES, P. JACQUINOT and M. PISANI, *EAGLE-FLI: a macroeconomic model of banking and financial interdependence in the euro area,* Economic Modelling, v. 69, C, pp. 249-280, **WP 1064 (April 2016).**

BRILLI Y. and M. TONELLO, *Does increasing compulsory education reduce or displace adolescent crime? New evidence from administrative and victimization data,* CESifo Economic Studies, v. 64, 1, pp. 15–4, **WP 1008 (April 2015).**

BUONO I. and S. FORMAI *The heterogeneous response of domestic sales and exports to bank credit shocks,* Journal of International Economics, v. 113, pp. 55-73, **WP 1066 (March 2018).**

BURLON L., A. GERALI, A. NOTARPIETRO and M. PISANI, *Non-standard monetary policy, asset prices and macroprudential policy in a monetary union,* Journal of International Money and Finance, v. 88, pp. 25-53, **WP 1089 (October 2016).**

CARTA F. and M. DE PHLIPPIS, *You've Come a long way, baby. Husbands' commuting time and family labour supply,* Regional Science and Urban Economics, v. 69, pp. 25-37, **WP 1003 (March 2015).**

CARTA F. and L. RIZZICA, *Early kindergarten, maternal labor supply and children's outcomes: evidence from Italy,* Journal of Public Economics, v. 158, pp. 79-102, **WP 1030 (October 2015).**

CASIRAGHI M., E. GAIOTTI, L. RODANO and A. SECCHI, *A "Reverse Robin Hood"? The distributional implications of non-standard monetary policy for Italian households,* Journal of International Money and Finance, v. 85, pp. 215-235, **WP 1077 (July 2016).**

CIANI E. and C. DEIANA, *No Free lunch, buddy: housing transfers and informal care later in life,* Review of Economics of the Household, v.16, 4, pp. 971-1001, **WP 1117 (June 2017).**

CIPRIANI M., A. GUARINO, G. GUAZZAROTTI, F. TAGLIATI and S. FISHER, *Informational contagion in the laboratory,* Review of Finance, v. 22, 3, pp. 877-904, **WP 1063 (April 2016).**

DE BLASIO G, S. DE MITRI, S. D'IGNAZIO, P. FINALDI RUSSO and L. STOPPANI, *Public guarantees to SME borrowing. A RDD evaluation,* Journal of Banking & Finance, v. 96, pp. 73-86, **WP 1111 (April 2017).**

GERALI A., A. LOCARNO, A. NOTARPIETRO and M. PISANI, *The sovereign crisis and Italy's potential output,* Journal of Policy Modeling, v. 40, 2, pp. 418-433, **WP 1010 (June 2015).**

LIBERATI D., *An estimated DSGE model with search and matching frictions in the credit market,* International Journal of Monetary Economics and Finance (IJMEF), v. 11, 6, pp. 567-617, **WP 986 (November 2014).**

LINARELLO A., *Direct and indirect effects of trade liberalization: evidence from Chile,* Journal of Development Economics, v. 134, pp. 160-175, **WP 994 (December 2014).**

NATOLI F. and L. SIGALOTTI, *Tail co-movement in inflation expectations as an indicator of anchoring,* International Journal of Central Banking, v. 14, 1, pp. 35-71, **WP 1025 (July 2015).**

NUCCI F. and M. RIGGI, *Labor force participation, wage rigidities, and inflation,* Journal of Macroeconomics, v. 55, 3 pp. 274-292, **WP 1054 (March 2016).**

RIGON M. and F. ZANETTI, *Optimal monetary policy and fiscal policy interaction in a non_ricardian economy,* International Journal of Central Banking, v. 14 3, pp. 389-436, **WP 1155 (December 2017).**

SEGURA A., *Why did sponsor banks rescue their SIVs?,* Review of Finance, v. 22, 2, pp. 661-697, **WP 1100 (February 2017).**

2019

ALBANESE G., M. CIOFFI and P. TOMMASINO, *Legislators' behaviour and electoral rules: evidence from an Italian reform,* European Journal of Political Economy, v. 59, pp. 423-444, **WP 1135 (September 2017).**

APRIGLIANO V., G. ARDIZZI and L. MONTEFORTE, *Using the payment system data to forecast the economic activity,* International Journal of Central Banking, v. 15, 4, pp. 55-80, **WP 1098 (February 2017).**

ARNAUDO D., G. MICUCCI, M. RIGON and P. ROSSI, *Should I stay or should I go? Firms' mobility across banks in the aftermath of the financial crisis,* Italian Economic Journal / Rivista italiana degli economisti, v. 5, 1, pp. 17-37, **WP 1086 (October 2016).**

BASSO G., F. D'AMURI and G. PERI, *Immigrants, labor market dynamics and adjustment to shocks in the euro area,* IMF Economic Review, v. 67, 3, pp. 528-572, **WP 1195 (November 2018).**

BATINI N., G. MELINA and S. VILLA, *Fiscal buffers, private debt, and recession: the good, the bad and the ugly,* Journal of Macroeconomics, v. 62, **WP 1186 (July 2018).**

BURLON L., A. NOTARPIETRO and M. PISANI, *Macroeconomic effects of an open-ended asset purchase programme,* Journal of Policy Modeling, v. 41, 6, pp. 1144-1159, **WP 1185 (July 2018).**

BUSETTI F. and M. CAIVANO, *Low frequency drivers of the real interest rate: empirical evidence for advanced economies,* International Finance, v. 22, 2, pp. 171-185, **WP 1132 (September 2017).**

CAPPELLETTI G., G. GUAZZAROTTI and P. TOMMASINO, *Tax deferral and mutual fund inflows: evidence from a quasi-natural experiment,* Fiscal Studies, v. 40, 2, pp. 211-237, **WP 938 (November 2013).**

CARDANI R., A. PACCAGNINI and S. VILLA, *Forecasting with instabilities: an application to DSGE models with financial frictions,* Journal of Macroeconomics, v. 61, **WP 1234 (September 2019).**

CHIADES P., L. GRECO, V. MENGOTTO, L. MORETTI and P. VALBONESI, *Fiscal consolidation by intergovernmental transfers cuts? The unpleasant effect on expenditure arrears,* Economic Modelling, v. 77, pp. 266-275, **WP 985 (July 2016).**

CIANI E., F. DAVID and G. DE BLASIO, *Local responses to labor demand shocks: a re-assessment of the case of Italy,* Regional Science and Urban Economics, v. 75, pp. 1-21, **WP 1112 (April 2017).**

CIANI E. and P. FISHER, *Dif-in-dif estimators of multiplicative treatment effects,* Journal of Econometric Methods, v. 8. 1, pp. 1-10, **WP 985 (November 2014).**

CIAPANNA E. and M. TABOGA, *Bayesian analysis of coefficient instability in dynamic regressions,* Econometrics, MDPI, Open Access Journal, v. 7, 3, pp.1-32, **WP 836 (November 2011).**

COLETTA M., R. DE BONIS and S. PIERMATTEI, *Household debt in OECD countries: the role of supply-side and demand-side factors,* Social Indicators Research, v. 143, 3, pp. 1185–1217, **WP 989 (November 2014).**

COVA P., P. PAGANO and M. PISANI, *Domestic and international effects of the Eurosystem Expanded Asset Purchase Programme,* IMF Economic Review, v. 67, 2, pp. 315-348, **WP 1036 (October 2015).**

ERCOLANI V. and J. VALLE E AZEVEDO, *How can the government spending multiplier be small at the zero lower bound?,* Macroeconomic Dynamics, v. 23, 8. pp. 3457-2482, **WP 1174 (April 2018).**

FERRERO G., M. GROSS and S. NERI, *On secular stagnation and low interest rates: demography matters,* International Finance, v. 22, 3, pp. 262-278, **WP 1137 (September 2017).**

FOA G., L. GAMBACORTA, L. GUISO and P. E. MISTRULLI, *The supply side of household finance,* Review of Financial Studies, v.32, 10, pp. 3762-3798, **WP 1044 (November 2015).**

GIORDANO C., M. MARINUCCI and A. SILVESTRINI, *The macro determinants of firms' and households' investment: evidence from Italy,* Economic Modelling, v. 78, pp. 118-133, **WP 1167 (March 2018).**

GOMELLINI M., D. PELLEGRINO and F. GIFFONI, *Human capital and urban growth in Italy,1981-2001,* Review of Urban & Regional Development Studies, v. 31, 2, pp. 77-101, **WP 1127 (July 2017).**

MAGRI S., *Are lenders using risk-based pricing in the Italian consumer loan market? The effect of the 2008 crisis,* Journal of Credit Risk, v. 15, 1, pp. 27-65, **WP 1164 (January 2018).**

MAKINEN T., A. MERCATANTI and A. SILVESTRINI, *The role of financial factors for european corporate investment,* Journal of International Money and Finance, v. 96, pp. 246-258, **WP 1148 (October 2017).**

MIGLIETTA A., C. PICILLO and M. PIETRUNTI, *The impact of margin policies on the Italian repo market,* The North American Journal of Economics and Finance, v. 50, **WP 1028 (October 2015).**

MONTEFORTE L. and V. RAPONI, *Short-term forecasts of economic activity: are fortnightly factors useful?,* Journal of Forecasting, v. 38, 3, pp. 207-221, **WP 1177 (June 2018).**

NERI S. and A. NOTARPIETRO, *Collateral constraints, the zero lower bound, and the debt–deflation mechanism,* Economics Letters, v. 174, pp. 144-148, **WP 1040 (November 2015).**

PEREDA FERNANDEZ S., *Teachers and cheaters. Just an anagram?*, Journal of Human Capital, v. 13, 4, pp. 635-669, **WP 1047 (January 2016).**

RIGGI M., *Capital destruction, jobless recoveries, and the discipline device role of unemployment,* Macroeconomic Dynamics, v. 23, 2, pp. 590-624, **WP 871 (July 2012).**

2020

BRIPI F., D. LOSCHIAVO and D. REVELLI, *Services trade and credit frictions: evidence with matched bank – firm data,* The World Economy, v. 43, 5, pp. 1216-1252, **WP 1110 (April 2017).**

COIBION O., Y. GORODNICHENKO and T. ROPELE, *Inflation expectations and firms' decisions: new causal evidence,* Quarterly Journal of Economics, v. 135, 1, pp. 165-219, **WP 1219 (April 2019).**

CORSELLO F. and V. NISPI LANDI, *Labor market and financial shocks: a time-varying analysis,* Journal of Money, Credit and Banking, v. 52, 4, pp. 777-801, **WP 1179 (June 2018).**

D'IGNAZIO A. and C. MENON, *The causal effect of credit Guarantees for SMEs: evidence from Italy,* The Scandinavian Journal of Economics, v. 122, 1, pp. 191-218, **WP 900 (February 2013).**

RAINONE E. and F. VACIRCA, *Estimating the money market microstructure with negative and zero interest rates,* Quantitative Finance, v. 20, 2, pp. 207-234, **WP 1059 (March 2016).**

RIZZICA L., *Raising aspirations and higher education. Evidence from the UK's widening participation policy,* Journal of Labor Economics, v. 38, 1, pp. 183-214, **WP 1188 (September 2018).**

FORTHCOMING

ARDUINI T., E. PATACCHINI and E. RAINONE, *Treatment effects with heterogeneous externalities,* Journal of Business & Economic Statistics, **WP 974 (October 2014).**

BALTRUNAITE A., C. GIORGIANTONIO, S. MOCETTI and T. ORLANDO, *Discretion and supplier selection in public procurement*, Journal of Law, Economics, and Organization, **WP 1178 (June 2018).**

BOLOGNA P., A. MIGLIETTA and A. SEGURA, *Contagion in the CoCos market? A case study of two stress events,* International Journal of Central Banking, **WP 1201 (November 2018).**

BOTTERO M., F. MEZZANOTTI and S. LENZU, *Sovereign debt exposure and the Bank Lending Channel: impact on credit supply and the real economy,* Journal of International Economics, **WP 1032 (October 2015).**

BRONZINI R., G. CARAMELLINO and S. MAGRI, *Venture capitalists at work: a Diff-in-Diff approach at late-stages of the screening process,* Journal of Business Venturing, **WP 1131 (September 2017).**

BRONZINI R., S. MOCETTI and M. MONGARDINI, *The economic effects of big events: evidence from the Great Jubilee 2000 in Rome,* Journal of Regional Science, **WP 1208 (February 2019).**

COVA P. and F. NATOLI, *The risk-taking channel of international financial flows,* Journal of International Money and Finance, **WP 1152 (December 2017).**

COVA P., P. PAGANO, A. NOTARPIETRO and M. PISANI, *Secular stagnation, R&D, public investment and monetary policy: a global-model perspective,* Macroeconomic Dynamics, **WP 1156 (December 2017).**

DEL PRETE S. and S. FEDERICO, *Do links between banks matter for bilateral trade? Evidence from financial crises,* Review of World Economics, **WP 1217 (April 2019).**

GERALI A. and S. NERI, *Natural rates across the Atlantic,* Journal of Macroeconomics, **WP 1140 (September 2017).**

LIBERATI D. and M. LOBERTO, *Taxation and housing markets with search frictions,* Journal of Housing Economics, **WP 1105 (March 2017).**

LOSCHIAVO D., *Household debt and income inequality: evidence from Italian survey data,* Review of Income and Wealth, **WP 1095 (January 2017).**

MOCETTI S., G. ROMA and E. RUBOLINO, *Knocking on parents' doors: regulation and intergenerational mobility,* Journal of Human Resources, **WP 1182 (July 2018).**

NISPI LANDI V. and A. SCHIAVONE, *The effectiveness of capital controls,* Open Economies Review, **WP 1200 (November 2018).**

PANCRAZI R. and M. PIETRUNTI, *Natural expectations and home equity extraction,* Journal of Housing Economics, **WP 984 (November 2014).**

PEREDA FERNANDEZ S., *Copula-based random effects models for clustered data,* Journal of Business & Economic Statistics, **WP 1092 (January 2017).**

RAINONE E., *The network nature of otc interest rates,* Journal of Financial Markets, **WP 1022 (July 2015).**

SANTIONI, R., F. SCHIANTARELLI and P. STRAHAN, *Internal capital markets in times of crisis: the benefit of group affiliation*, Review of Finance, **WP 1146 (October 2017).**

SCHIANTARELLI F., M. STACCHINI and P. STRAHAN, *Bank Quality, judicial efficiency and loan repayment delays in Italy,* Journal of Finance, **WP 1072 (July 2016).**