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The rise of bond financing in Europe: five facts about new and small issuers

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Abstract

Using newly available micro-data on public and private firms, this paper documents five facts about the rise of bond financing in the euro area through the lens of new and small issuers. (1) Recent new issuers are typically small, private, and unrated; (2) bond spreads of unrated issuers are around the investment-grade threshold; (3) holdings of traditional 'buy-and-hold' bond investors are small for unrated and smaller issuers, while financial intermediaries and households are large investors; (4) these investors were as flighty as mutual funds during the March 2020 turmoil; (5) the subsequent bond issuance wave was restricted to large rated firms, with other issuers returning to the loan market. These facts imply that these issuers are largely disconnected from the aggregate bond market and still significantly dependent on intermediaries.

Keywords: Corporate bond market, debt structure, disintermediation, financial fragility, ECB, monetary policy, quantitative easing, bond investors

JEL codes: G21, G32, E44

Non-technical summary

The global rise of bond financing is of particular interest in Europe, as its financial sector has always been heavily bank-based relative to the US. The transition towards more capital market funding in Europe was seen as a priority in the wake of the Global Financial Crisis, as diversifying firms' sources of funding is thought to increase financial stability and growth. However, progress towards that goal has been slow. Historically, the European bond market included only the very largest firms. But entry by smaller issuers is increasing. These new issuers are considered key to achieving a transition from a largely bank-based system towards more capital market funding. To fully understand these changes to the state of play in the bond market, we need to go beyond the aggregate data and dig into the characteristics of these new issuers. We need to understand how they compare to historical issuers, we need a clear view of who buys their bonds, and we need to know how they access credit across the cycle.

We construct the first comprehensive panel of euro area firms' capital structure, bond investors, banking relationships, and balance sheets including both public and private firms and present a comprehensive study of the rise of bond financing in the euro area. We document five facts about the rise of bond financing in the euro area through the lens of new and small issuers. First, the vast majority of recent new issuers are significantly smaller than historical issuers, are private firms, and lack a credit rating from a large rating agency. Second, bond spreads of unrated issuers are around the investment-grade threshold. Third, holdings of traditional 'buy-and-hold' bond investors are large in aggregate but small for unrated and smaller issuers. Households and financial intermediaries are large investors in that segment. The fourth fact is that, during the March 2020 turmoil, households and non-bank financial intermediaries were at least as flighty as mutual funds for unrated issuers. The fifth fact is that the subsequent April 2020 bond issuance wave was restricted to large firms, with other issuers returning to the loan market.

At a high level, the main implication of these five facts is that these new and small issuers are largely disconnected from the aggregate bond market and still significantly dependent on intermediaries. Our results connect to three key outstanding macro-finance issues. First, the fact that intermediaries are still important for small and new issuers blurs the conventional dichotomy between intermediated and market financing, suggesting that the capital markets transition has been imperfect so far. Second, it is important to build a broader framework for bond credit supply and its implications for firms' access to credit: traditional investors are significantly smaller for small and new issuers, while less-studied investors like financial intermediaries and households investors (which often access bond markets via banks' products) are larger. Finally, there are potential lessons for the design of credit policies: one implication of restrictions on central bank asset purchases is that they might have limited effects on new issuers, which tend to be small and unrated.

1 Introduction

With the global rise in bond financing, the landscape of corporate borrowing has changed significantly in recent years [Berg et al., 2020]. This shift is of particular interest in Europe as its financial sector has always been heavily bank-based, unlike the United States. The transition toward more capital market funding in Europe was seen as a priority in the wake of the Global Financial Crisis, as diversifying firms' sources of funding is thought to increase financial stability and growth.[1] However, progress toward that goal has been slow.[2] A key aspect of a successful transition is the entry of new bond issuers, and particularly of firms that might be particularly vulnerable to credit cycles. At a micro-level, bond market entry can have a positive impact on firms' balance sheets by improving their financing conditions and their ability to invest [Iannamorelli et al., 2021, Ongena et al., 2020, Becker and Josephson, 2016]. Yet, little is known in general about that segment of the bond market, with existing work typically focusing on large public firms, often in the United States.[3] How different is the "bottom" from the "top" of the European bond market in terms of issuer characteristics, investor composition, and credit access across the cycle? This is key to understand the nature of the transformation of the European financial system.

This paper documents five facts about the rise of bond financing in the euro area through the lens of new and small issuers. We use newly available micro-data on public and private firms to present the first comprehensive study of that aspect of the rise of bond financing in the euro area. Recent new issuers are typically small, private, and unrated, which makes them largely "invisible" when looking at aggregate or rating-based data, even though they are key to a successful capital markets transition. In addition to studying issuer characteristics, we also document differences in investor base as well as borrowing patterns during the 2020 crisis. Our evidence implies that new and small issuers are largely disconnected from the aggregate bond market and still significantly dependent on intermediaries.

[1]For instance, the Expert Group on European Corporate Bond Markets mandated by the European Commission in 2017 stated: "Corporate bonds reduce the over-reliance of the financial system on credit institutions and hence the susceptibility of the wider economy to bank deleveraging. The availability of an alternative source of funding for productive investment in the EU supports the wider economy, enables greater risk sharing and a more sustainable and smoother credit supply throughout the cycle."

[2]See the Special Report No 25/2020 by the European Court of Auditors "Capital Markets Union – Slow start towards an ambitious goal".

[3]Iannamorelli et al. [2021] and Ongena et al. [2020] are important exceptions: they study the introduction of "minibonds" for small firms in Italy.

The aggregate rise in bond financing in the euro area is well understood. The growth has been continuous since the turn of the century and accelerated after 2008 to reach €1.6T in outstanding bonds in 2021. Recent macroeconomic trends driving the rise of bond financing in Europe in the time series have been well documented, such as a fall in bank loan supply and tighter regulation, increased investor risk appetite and loose monetary policy, and bankruptcy reforms.[4] The goal of this paper is not to disentangle the different causes of this growth but instead to understand better the capital market transition through the lens of the cross-section of issuers.

To this end, we construct the first comprehensive panel of euro area firms' capital structure, bond investors, banking relationships, and balance sheets including both public and private firms. Many of the data come from new harmonized datasets created by the European Central Bank and the Eurosystem. We merge four different sources: (i) security-level data on bonds outstanding from the Centralized Securities Database (CSDB); (ii) security-level bond holdings by categories of euro area investors from the Securities Holdings Statistics data (SHS-S); (iii) loan contracts from AnaCredit, the harmonized credit registry of the euro area that contains confidential loan-by-loan information on bank credit to corporations; and (iv) firms' balance sheet data from Orbis (private firms) or Capital IQ-Compustat (public firms). We carefully account for firms' group structure and subsidiaries using the Register of Institutions and Affiliates Data (RIAD). This data effort yields new insights into the understudied segment of new and small bond issuers.

We document five facts. First, the vast majority of recent new issuers are significantly smaller than historical issuers, are private firms, and lack a credit rating from a large rating agency. For instance, bond issuers below the median of assets are about 300 times smaller than the top quartile, with over 80% being private firms and over 95% being unrated. On the one hand, this shows that the growth of European bond markets has benefited many firms. On the other hand, these new issuers are thus largely "invisible" when looking at aggregate, public firms, or ratings-based data alone, which are driven by the largest historical issuers. Moreover, the fact that new issuers have very different characteristics has drastic implications for how differently this segment of the bond market behaves. We leverage our newly available data to document this in detail.

The second fact is that bond spreads of unrated issuers are around the investment-grade

[4]For more micro-evidence on this trends, see Becker and Ivashina [2018], Altavilla et al. [2017], Grosse-Rueschkamp et al. [2019], De Santis and Zaghini [2021], Giambona et al. [2020], Todorov [2020], Pegoraro and Montagna [2021], Becker and Ivashina [2015], Bubeck et al. [2020], Becker and Josephson [2016].

threshold. Their bond spreads are consistently between that of high-yield and BBB-rated bonds (the riskiest investment grade category). This result persists in regressions that control for bond maturity and month fixed effects. If spreads can be interpreted as a signal of credit quality, this fact pushes against the idea that small unrated bonds represent an extremely risky segment, building up in the dark. Instead, there seems to be some screening even in this segment: only firms with good enough creditworthiness are able to enter the bond market.

The third fact is that these issuers also have a very different investor base. Bond investor composition plays an important role in financial stability: while traditional 'buy-and-hold' bond investors such as pension funds and insurance companies have a long-term horizon [Coppola, 2021, Becker and Benmelech, 2021], other bond investors, such as mutual funds, can be responsible for fire sales and price dislocation in bad times [Goldstein et al., 2017, Falato et al., 2020]. Using micro-data on domestic investor holdings at the bond level, we find that traditional buy-and-hold bond investors are large in aggregate, but small for unrated and smaller issuers. For instance, insurance companies, pensions funds, and the ECB hold only 15% of small, unrated, private issuers' bonds, compared to 50% of the aggregate in our sample. In fact, financial intermediaries (other than banks and mutual funds) and households (who tend to invest via intermediairies) hold over 50% of small and unrated issuers' bonds while owning only a trivial share of the aggregate. Banks also hold over 90% of unrated commercial paper issued by these firms. The importance of intermediaries (directly or indirectly via households) in this segment of the bond market is striking given that access to the bond market is commonly viewed as a way to make firms less reliant on intermediated financing. A complementary fact is that many of these non-traditional investors are local, i.e. located in the same country as the issuer, rather than in another EA country.

The first three facts are naturally connected. Small and infrequent issuers might see some benefits in issuing an unrated bond: they can save on the cost, work, and management time involved with obtaining a rating from a large agency.[5] Their credit quality being close to the BBB-threshold also means significant risk of not maintaining an IG rating. However, the drawback is a limited investor base. The investment mandates of many long-term investors limit

[5]See for example the article "Why Nordic companies don't worry about ratings": " "Nordic investors are very used to unrated corporate bonds." Acquiring an official rating is an investment. However, it may not be a beneficial process for all companies, at least for ones which are not regular issuers and whose issue sizes are relatively small. "We wanted to be agile and efficient. If we had gone through the rating process, securing financing would have taken much longer." " – Evli.com, October 9th 2017.

their risk exposure but can mechanically exclude new issuers because of their bond size or rating status [Baghai et al., 2022]. Local financial intermediaries may be large investors (directly and indirectly via households) because of their ability to conduct credit analysis for small unrated borrowers.

The last part of the paper studies the 2020 market turmoil (fact 4) and following recovery (fact 5). At the aggregate level, it is well known that bond issuance plummeted in March 2020 in the midst of rising yields, investor sell-off, and illiquidity in secondary markets. Central bank support, including corporate bond purchases, lead to a quick recovery and a wave of issuance starting in April. This episode is interesting to study through the lens of our micro-data because it can reveal how different issuers fared through this (quick) credit cycle.

The fourth fact is that, during the March 2020 turmoil, households and non-bank financial intermediaries were at least as flighty as mutual funds for unrated issuers. We use a methodology in a spirit similar to Coppola [2021] to study the effects of investor composition on bond spreads during the Spring 2020 market turmoil. For rated issuers, in line with prior work a larger share of insurer investors reduced a bond's spike in spread in 2020 relative to mutual fund investors, i.e. traditional buy and hold investors are "safe hands". However, this effect is absent for unrated issuers. Moreover, the two main non-traditional investors, households and non-bank financial intermediaries, do not make up for it. In this sample, households are no longer stabilizing, while other financial intermediaries are now destabilizing. This evidence raises concerns for the stability of bond credit supply for new issuers.[6]

The fifth fact is that the subsequent April 2020 bond issuance wave was restricted to large and rated firms, with other issuers returning to the loan market. Using event study regressions at the firm level, we find that rated firms increased their dependence on bonds during this time. BBB firms in particular had the strongest effect with a simultaneous decrease in bank credit lines and an increase in the total borrowing via bond issuance. The picture for unrated firms was reversed: they increased their borrowing by issuing more term loans from banks. This in consistent with the scope of the ECB intervention: corporate bond purchases were restricted to rated bonds, in line with the existing central bank mandate.

At a high level, the main implication of these five facts is that these new and small issuers

[6]Interestingly, commercial banks are generally stabilizing investors (at least during this episode in which the banking sector was healthy), but they represent a small share of bond holdings.

are largely disconnected from the aggregate bond market and still significantly dependent on intermediaries. Our descriptive evidence is nevertheless admittedly only a starting point that raises further research questions. We discuss connections to three key outstanding macro-finance issues in the last part of the paper. First, the fact that intermediaries are still important for small and new issuers blurs the conventional dichotomy between intermediated and market financing, suggesting that the capital markets transition has been imperfect so far. Second, it is important to build a broader framework for bond credit supply and its implications for firms' access to credit: traditional investors are significantly smaller for small and new issuers, while less-studied investors like financial intermediaries and households investors (which often access bond markets via banks' products) are larger. Finally, there are potential lessons for the design of credit policies: one implication of rating restrictions on bond purchases by central banks is that they might have limited effects on new issuers, which tend to be small and unrated.

1.1 Related Work

This paper first contributes to the literature on the rise of bond financing in Europe [Berg et al., 2020]. Studying this shift in this region is particularly interesting as the euro area financial sector has always been much more heavily bank-based than the United States. While the European bond market has grown, it is still significantly less mature than its U.S. counterpart. It is therefore unclear whether all lessons drawn from the U.S. equally apply to the European context.[7] Evidence from Europe might also be helpful to understanding the transition in emerging economies in which bond financing has also been growing.

We focus on the key topic of new issuers entering the bond market (the extensive margin of growth), which has received surprisingly little attention given how crucial it is to a successful capital markets transition. The closest papers to ours are Ongena et al. [2020] and Iannamorelli et al. [2021], who study the introduction of minibonds in Italy in 2012. They find that entering the bond market can improve financing conditions for small and private firms. The two approaches are complementary: detailed data from the Italian central bank helps to narrow some of the

[7] For instance, the European legal framework is substantially different from the United States: the absence of an equivalent of Chapter 11 hampers insolvency resolution in the presence of bond financing [Becker and Josephson, 2016, Ehmke, 2018]. We also show that rating agencies have much smaller coverage in Europe, while classical studies on the U.S. often emphasize credit rating as a comprehensive measure of bond market access and borrower risk [Denis and Mihov, 2003, Faulkender and Petersen, 2006, Hale and Santos, 2008, Rauh and Sufi, 2010].

mechanisms at play, while our broad sample increases external validity. Becker and Josephson [2016] also study the effects of entering the bond market, although their data stops in 2010 and includes only public firms, many outside the euro area. Relative to these works, we focus less on the (generally positive) effects of bond market entry on firms' balance sheets and instead provide complementary facts on this segment of the market, with an emphasis on investor composition and behavior across the credit cycle.

We also contribute to the link between financial fragility and non-bank lending, broadly defined. A growing strand of literature has emphasized the role of bond investor composition for financial stability. The fragility of fast-growing corporate bond funds contrasts with the fact that insurance companies and other long-term investors can insulate firms from market turmoil [Coppola, 2021, Becker and Benmelech, 2021, Goldstein et al., 2017].[8] We speak to this literature by providing novel evidence on how investor composition for small and unrated issuers is quite different from what aggregate data suggest, highlighting a large role for non-traditional bond investors.

At a high level, we build on recent works by taking as given four important (non-exclusive) macroeconomic factors that have been identified as drivers of bond issuance in Europe, often using variation around specific events: the creation of the euro [Pagano and Von Thadden, 2004], a fall in loan supply [Becker and Ivashina, 2018, Altavilla et al., 2017], bankruptcy reform [Becker and Josephson, 2016], and loose monetary policy and quantitative easing [Grosse-Rueschkamp et al., 2019, De Santis and Zaghini, 2021, Pegoraro and Montagna, 2021].[9] Relative to these works, this paper takes a more holistic view of bond issuance in the euro area. Moreover, contrary to most prior studies, we include private issuers, which have multiplied in recent years. This allows us to offer the first comprehensive analysis of new and small issuers in Europe.

[8]In fact, bond funds outflows were at the core of credit market disruptions in 2020 [Falato et al., 2020, Ma et al., 2020, Zaghini, 2020].

[9]Other works studying the link between bond markets and monetary policy include Arce et al. [2018], Ertan et al. [2019], Giambona et al. [2020], Todorov [2020], Becker and Ivashina [2014], Lhuissier and Szczerbowicz [2018], Elliott et al. [2019], Kashyap et al. [1996], and Bolton and Freixas [2006]. Becker and Ivashina [2015], Bubeck et al. [2020], and Di Maggio and Kacperczyk [2017] also highlight the role of reach for yield, while Pelizzon et al. [2019] shows the role of collateral eligibility on European corporate bond markets. Crouzet [2019], Holm-Hadulla and Thürwächter [2020], and Darmouni et al. [2019] study the impact of the bond market shift on monetary policy transmission.

2 Background and Data

2.1 Aggregate Growth in Bond Financing in the euro area

At an aggregate level, the amount of outstanding bonds issued by firms in the euro area has been rising steadily. At a micro-level, bond market entry can have a positive impact on firms' balance sheets by improving their financing conditions and their ability to invest [Iannamorelli et al., 2021, Ongena et al., 2020, Becker and Josephson, 2016]. The key macroeconomic factors driving this growth have been identified in prior work, including a fall in loan supply, bankruptcy reform, and loose monetary policy and quantitative easing (see, e.g. Becker and Ivashina [2018], Altavilla et al. [2017], Becker and Josephson [2016], Grosse-Rueschkamp et al. [2019], De Santis and Zaghini [2021]).

For background, we illustrate this growth using aggregate and public firm data commonly used in existing work. Figure 1 shows the growth of the Eurozone corporate bond market in the period 2002–2021.[10] Aggregate data on firms' outstanding bonds come from the quarterly sector financial accounts of the ECB Statistical Data Warehouse (SDW), while bond-level data come from the Corporate Securities Database of the Eurosystem (CSDB), which we describe in more detail in the next section. The growth of the bond market has been continuous since the early 2000s and has accelerated after the financial crisis. The data show that the corporate bond market has massively increased in size from €508B in 2002 to €1,642B in 2021. Both micro-level and aggregate data display similar magnitudes. Figures IA.1 and IA.2 in the Internet Appendix show that growth was not restricted to a particular country or sector.

To motivate the rest of our analysis, we also use Capital IQ data to display the growth in bond financing in the cross-section of euro area public firms. Figure 2 presents the time series of the average bond share across public firms of different sizes. The average bond share increased steadily and significantly from 10% to 24% between 2002 and 2021.[11] Importantly, this increase in the firms' dependence on the bond market is not concentrated at the very top. While the largest firms have a significantly higher level of bond share, the bond share has more than doubled for many firms.

[10] Berg et al. [2020] provide a more detailed overview of trends in corporate borrowing using data from public firms in the United States and Europe.

[11] Untabulated results also show that growth in the bond share is visible in virtually all sectors and not driven by a particular industry. The growth is visible in all countries.

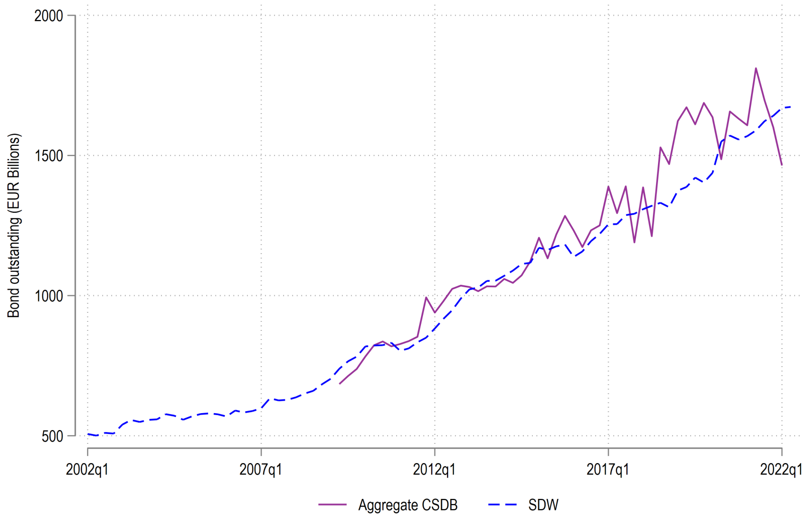


Figure 1 – Aggregate Growth of the euro area Corporate Bond Market

This figure shows the aggregate level of bonds in the euro area for non-financial corporations from 2002 to 2021, and from 2009 Q2 to 2021 Q4 for the CSDB aggregate. The sources are the ECB Statistical Data Warehouse (SDW) Macroeconomic and sectoral statistics and the Corporate Securities Database of the Eurosystem. In SDW, bonds correspond to the variable liabilities-debt. In CSDB, all debt securities issued by subsidiaries of non-financial corporates are summed. Data are at the quarterly level. Data are corrected for inflation, and reported in billions €.

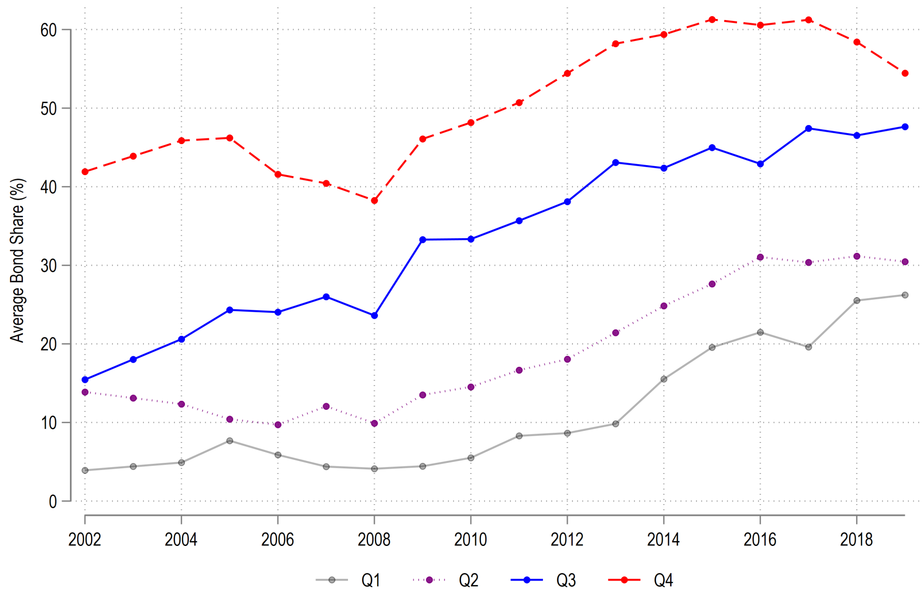


Figure 2 – Bond Share Across Firms' Size in Eurozone

The graph represents the evolution of bond share across quartiles of total assets of public firms in our sample for the period 2002–2021, by plotting within-quartile mean. Quartiles are dynamic over years, that is, they are computed in each year. The data are collected from Capital IQ. Bonds are defined as the sum of Senior Bonds and Subordinated Bonds. The average bond share is expressed in %.

To better understand the capital market transition, this paper focuses on new and smaller issuers, including private firms. Even if their total contribution to aggregate volume is smaller, these firms are key to a successful transition. Indeed, more capital market funding in Europe is seen as a priority in the wake of the last banking crisis: diversifying firms' sources of funding is thought to increase financial stability and growth. Entering the bond market can improve financing conditions for small and private firms. In line with the evidence in Becker and Josephson [2016], new issuers tend to use the funds to invest and grow. Internet appendix IA.2 uses a sample of European new issuers and finds that majority of funds raised is used for investment and to increase firms' long-term assets with only limited substitution away from bank loans. Iannamorelli et al. [2021] and Ongena et al. [2020] provide further evidence specifically for small firms in the context of the "minibonds" reform in Italy. Yet, very little is known in general about new European entrants to the bond market.

2.2 Data

We construct a panel of euro area firms' capital structure, bond investors, banking relationships, and balance sheets including both public and private firms. Many of the data come from new harmonized datasets created by the European Central Bank and the Eurosystem. In total, we combine five data sources.

The first dataset consists of security-level information on bonds outstanding from the Centralized Securities Database (CSDB) maintained by the ECB. For each bond outstanding in the euro area, we can observe its issuer, issuance and due date, size, price information, and bond characteristics. Amount outstanding and secondary market prices are recorded in a monthly panel starting in 2010. We add information on ratings from the three main rating agencies (Standard and Poor's, Fitch, Moody's). If applicable, we use the average issuer rating across agencies. Otherwise, we apply the average rating of the firm's instruments[12]. We then merge this bond-level information with firm-level information. Private issuers are matched to Orbis, while public firms are matched to Capital IQ. This gives us access to balance sheet information on the

[12] Although we use data on ratings from the three main rating agencies, we acknowledge that this does not cover the universe of rated bonds in the euro area as many bonds may be rated by specialized local agencies that operate at a national level. For example, Franke and Krahnen [2017] document that 52% of the German SME bonds were rated by the German rating agency Creditform in 2016. Nevertheless, most rating-based mandates for institutional investors are based on the three main rating agencies.

firms' assets and liabilities. We carefully account for the firms' group structure by identifying multiple subsidiaries of each company and ensuring that we restrict our sample to the parent company of each group[13].

To identify the parent company of each group and correctly allocate the subsidiaries of the group under the parent company we use the Register of Institutions and Affiliates Data (RIAD). RIAD is a dataset developed by the ESCB that allows us to successfully link different databases and aggregate data according to multiple group structures. For the purpose of this analysis, we start with all bond issuers in the euro area as reported in CSDB and link these with the respective RIAD codes and/or LEIs from Orbis. Next, we retrieve the group structure as available in RIAD and Orbis.[14] We hand-match firm identifiers that appear to have issued a large amount of bonds and should be matched to an Orbis entity. Last, we keep only non-financial corporations.[15]

Parts of our analysis study heterogeneity in investor composition across issuers. To this end, we match our core dataset at the bond ISIN level with the Securities Holdings Statistics data (SHS-S), which are collected by the Eurosystem, as well as with the Securities Holdings Statistics – Eurosystem (SHS-E) data, which are provided by the Eurosystem market operations departments. The SHS-S dataset provides information at the security level on the amount held by selected categories of euro area investors; similarly, the SHS-E dataset provides information at the security level on the amount held by the Eurosystem. For our analysis, we group the investor types into the following categories: insurance companies and pension funds, non-MMF investment funds, central bank, deposit-taking corporations, non-financial corporations, households, general government, and other financial institutions. The rest of the world is estimated as the residual amount from the total amount outstanding and the amounts held by selected investors in the euro area. The frequency of these data is quarterly.

Finally, we gather information on loan contracts and lending relationships from AnaCredit. AnaCredit is the harmonized credit registry of the euro area that contains confidential loan-by-loan information on bank credit to corporations.[16] The data are available at monthly frequency,

[13]For completeness, we include information on the financial subsidiaries of the non-financial corporations. We have verified that all our main results hold if we exclude financial subsidiaries.

[14]We first try to match all bond issuers to their corresponding ultimate parent in Orbis via the LEI. If this link is not available, we use the Orbis-RIAD mapping or the Group structure in RIAD by first retrieving the ultimate parent in RIAD and the associated ultimate parent in Orbis.

[15]That requires cleaning of the industry classification of the ultimate parent. For the industry classification, it was necessary to hand-collect information for some firms based on the name and reported industry of each firm.

[16]AnaCredit reports all loans granted by credit institutions residing in euro area member states, including

beginning in September 2018. Matching our sample of bond issuers to AnaCredit requires additional work on linking different subsidiaries with the parent company. We applied a procedure similar to the one described above to ensure that we link the information for each firm correctly.[17]

This data effort allows us to build a panel of euro area bond issuers to include both private and public firms, with information on bonds, loans, investor base, and balance sheets. One caveat is that not all datasets cover the same time periods. The bond- and firm-level data are available from 2010 onward, while the investor base and loan-level data start in 2018.

The final sample includes 467 public firms (groups) and 654 private firms. This is a significantly larger number than previous studies on bond issuance in Europe that include private issuers.[18]

3 The Cross-Section of Bond Issuers

3.1 Entry in the Euro Area Bond Market

The increase in firms' dependence on the bond market is not restricted to historical issuers (intensive margin) but is also driven by firms entering the bond market in recent years (extensive margin). We define as new issuers firms that issued a bond for the first time in the period on or after 2010.[19] Figure 3 shows there was a constant entry of firms issuing bonds for the first time during our sample period. Every year, new issuers entered the bond market for the first time, and entry has accelerated since 2016. In early years, new issuers represented a small fraction of all issuers, but in 2017, each new cohort made up over 10% of all issuers in our sample (see Figure IA.3 in the Internet Appendix) .

loans granted by their domestic/foreign branches. For that reason, any credit that is granted by a bank outside the euro area will not be included in our analysis. The data are maintained by the ECB and the Eurosystem National Central Banks and are harmonized across member states. A credit instrument is subject to reporting if the borrower is a legal entity and if the total commitment amount at the creditor-debtor level is greater or equal to €25.000 at any point within the reference period.

[17] Specifically, we start with all active borrowers that are listed with their unique LEI and RIAD codes and we apply the same group structure extraction as described above. Next, we proceed with ensuring there is only one unique link between the bond issuer and the AnaCredit borrower and their ultimate parent. This step allows us to have only one ultimate parent for each entity, and we restrict our analysis to the parent company of each group.

[18] For example, in the context of Italian minibonds, the final sample of Ongena et al. [2020] includes 92 firms, while Iannamorelli et al. [2021]'s includes 294 issuers. However, given our matching criteria, it is likely that our sample does not contain all Italian firms that issued a minibond.

[19] Although our data start earlier, we choose 2010 as a cutoff to prevent an excessive number of false positives.

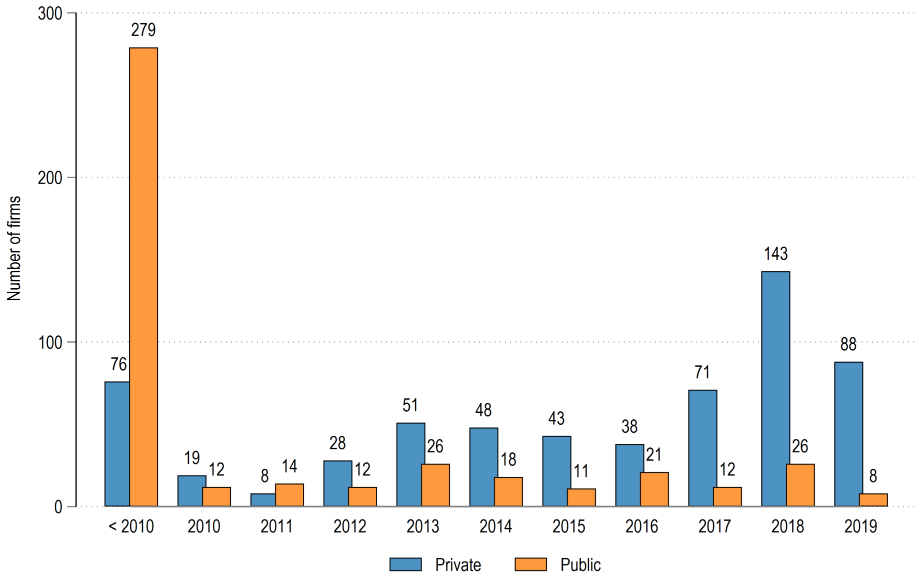


Figure 3 – Euro Area Bond Market Entry

This figure presents the total number of public and private issuers from 2010 to 2021. All firms represent the whole sample of firms included in the analysis, with positive outstanding bonds between the period of 2018 to 2021. In each year, new issuers are defined as firms that issue bonds for the first time in that year. The first year of issuance was obtained by combining Capital IQ and Centralised Securities Database (CSDB), which corresponds to the earliest issue year one could identify for any subsidiary or branch within the group structure of firms in the sample, that is, for any group, as well as the date of issuance - either identified directly using the variable *date of issuance* from CSDB or first year with non-zero bond volume outstanding in Capital IQ - which corresponds to the earliest issuance date across all entities within the group is kept. Bonds in Capital IQ correspond to the sum of Senior and Subordinated Bonds. Bonds in CSDB correspond to debt securities, where we exclude commercial papers.

Moreover, we see that there were more private new issuers than public new issuers, especially in recent years.[20] This underscores the need to go beyond traditional data on public firms to understand the capital markets transition in Europe.

3.2 Issuer Characteristics

Next, we investigate in more detail the characteristics of new and small bond issuers. Table 1 presents a comparison of firms of different sizes (quartiles of assets) in terms of: (i) credit rating status, (ii) new versus historical issuers, and (iii) private versus public firms. The table shows

[20]Note that the number of private issuers is likely even larger because our sample is restricted to firms that we could match to Orbis and that had a positive bond outstanding in the period of 2018 to 2021. Figure IA.4 in the Internet Appendix also shows the geographical distribution of new entrants, many of which come outside of "core" countries like France, Germany or the Benelux.

Table 1 – Share of Private, Rated, & New Issuers by Size

	Q1	Q2	Q3	Q4	All Firms
A (%)	0.4	0.4	1.7	11.1	4.4
BBB (%)	0.0	1.1	2.4	29.2	10.8
HY (%)	2.1	2.6	8.5	17.6	9.1
NR (%)	97.5	95.9	87.4	42.2	75.8
New Issuers (%)	91.6	90.3	70.0	30.8	65.3
Private Issuers (%)	85.4	81.6	56.7	14.9	53.5

This table shows the share of the following subcategories of issuers in our sample according to all categories used in our analysis: (i) size, (ii) rating, (iii) issuance history, and (iv) private/public status of the firm. The table first breaks our sample between quartiles of total assets. Quartiles are fixed and calculated only once with total assets values for the year 2019. Additionally, each quartile is further broken down between four rating categories: Unrated (NR) for the groups without a rating from S&P, Moody's, or Fitch; High Yield (HY) for all group ratings below 9; BBB for all groups rated between 9 and 11; and Investment Grade (IG), which includes all ratings of 12 and above. Ratings data are obtained from the Corporate Securities database (CSDB) collected by the Eurosystem and harmonized on a scale from 0 to 18 before defining rating subgroups. We identify the share of new issuers in our dataset by collecting information on the first year of issuance of bonds for each group on Capital IQ and/or CSDB. New issuers correspond to any groups that first issued a bond during and/or after 2010. Last, we differentiate between private and public issuers, where public firms are identified via the existence of the ISIN of a public stock in Orbis and/or Capital IQ. The data are expressed in %.

that a significant share of bond issuers are private and unrated firms that entered recently the bond market. Specifically, among the smaller issuers (Q1 and Q2 firms), more than 95% of are unrated by the top three rating agencies, more than 80% of are private firms, and 90% entered the bond market only in the last decade. The size differences are also large: Table 2 shows that issuers in the first or second quartile are 200 to 500 times smaller relative to the largest quartile (€60-150M versus €27B in assets). While small bond issuers are larger than the typical SME, they are nevertheless orders of magnitudes smaller than bond issuers typically studied in existing work.[21]

Perhaps the most striking aspect is the prevalence of issuers who lack a rating from a large credit agency. In line with common practice, we used the phrase "unrated" to denote the absence of a rating from one of the big three credit rating agencies (CRA): S&P, Moody's, and Fitch. This is because their market share exceeds 90% of European rated bonds and because many rating-based investment mandates specifically require a rating from one of these CRAs [Baghai et al., 2022].[22] Although we cannot rule out some small amount of measurement error, the

[21]For reference, Tables IA.1 and IA.2 in the Internet Appendix provides summary stats across countries.

[22]For more information on the penetration of small rating agencies, see this report by the European Securities and Markets Authority.

Table 2 – Summary Statistics across Type of Issuers - Size

	Q1	Q2	Q3	Q4	Total
Total Assets (Mlns EUR)	52.70	144.3	689.0	26655.8	20202.0
	(98.65)	(410.0)	(563.7)	(34634.3)	(32115.2)
Bond Share (in %)	33.80	39.41	42.11	73.78	65.56
	(29.16)	(28.68)	(30.49)	(26.53)	(30.94)
Total Credit / Assets (in %)	47.81	42.04	41.04	24.78	29.05
	(24.95)	(23.30)	(23.93)	(20.50)	(22.66)
Profitability (EBITDA / Assets) (in %)	7.493	4.188	5.478	7.981	7.331
	(5.776)	(11.25)	(6.031)	(5.241)	(6.109)
Cash / Assets (in %)	7.797	7.975	8.807	7.217	7.522
	(8.653)	(9.192)	(8.103)	(5.497)	(6.385)
Fixed Assets / Assets (in %)	45.68	41.51	50.39	42.27	43.52
	(29.65)	(28.36)	(30.24)	(30.53)	(30.44)
Bond Yield at Offering (in %)	4.473	3.795	3.459	1.369	1.936
	(1.678)	(1.881)	(1.855)	(1.422)	(1.835)
Interest Rate on All Loans (in %)	7.050	2.532	2.331	1.698	1.999
	(15.84)	(1.318)	(2.433)	(2.902)	(3.879)
Interest Rate on Term Loans (in %)	2.170	2.360	1.969	1.513	1.658
	(1.155)	(1.424)	(1.282)	(2.441)	(2.232)
Observations	2,914				
Nb of groups (2018/2019)	972				

The table reports means and standard deviations (in brackets) of the main variables of interest for issuers of our sample, broken down by quartiles of total assets. Quartiles are fixed and calculated only once with total assets values for the year 2019. Interest rates are volume weighted. The sample and summary statistics for this table are limited to EA non-financial bond issuers with positive bond outstanding in 2018–2019.

prevalence of unrated issuers in Europe is corroborated by anecdotal sources.[23] Note also that we observe very few firms that were unrated at their first issuance but obtained a rating later on during our sample period.[24] Section 3.5 discusses the potential incentives to be unrated in more detail. One implication is that credit ratings are far from being a comprehensive measure of risk in the euro area, while in the United States there is, according to Rauh and Sufi [2010], a close correspondence between the universe of firms with a credit rating from the top 3 CRA and the universe of firms with outstanding public debt.

Table 1 also makes clear that there is a high correlation between these issuers' characteristics. It is thus useful for exposition to emphasize the dichotomy between the "top" of the euro area bond market, consisting primarily of large rated public historical issuers, and the "bottom", consisting primarily of small unrated private new issuers. On the one hand, this evidence shows that the growth of European bond markets has benefited many firms. On the other hand, these new issuers are thus largely "invisible" when looking at aggregate, public firms, or rating-based data alone, which are driven by the largest historical issuers.

We summarize the first fact as follows:

Fact 1: *Most recent new issuers are significantly smaller than historical issuers, are private firms, and lack a credit rating from a large rating agency.*

3.3 Bond Spreads

To better understand unrated issuers in particular, we next compare their bond spreads to that of rated issuers. Figure 4 plots a time series of the weighted average bond spreads of four rating categories: unrated, high yield (HY), BBB-rated, and IG rated better than BBB. Unrated issuers' bond spreads are typically between that of high-yield and BBB-rated bonds (the riskiest investment grade category). Their spread is thus around the investment-grade threshold on

[23] Recall that our classification of rated firms includes both the existence of an issuer-level rating as well as a bond-level rating. Unrated firms have neither of these from any of the big three (S&P, Moody's, and Fitch). Although imperfect matching between datasets could lead us to underestimate this share, external sources confirm this low number of rated issuers. For instance, the ECB estimates that in 2004 only 11% of euro area firms with a turnover above €50M had an S&P rating, while 92% of corresponding U.S. firms were rated (Table 10 here). Moreover, in 2017 the European Commission estimated the share of unrated bonds to be similar to HY bonds, around 14% of the total (Figure 6 here).

[24] These firms amount to less than 7% of new (post 2010) unrated issuers. Among historical issuers (firms that entered the bond market before 2010) without a rating, about 30% had a rating by the end of our sample.

average. This result persists in regressions that control for bond maturity and month fixed effects, as shown in Table 3.

Fact 2: *The bond spreads of unrated issuers are around the investment-grade threshold.*

If bond spreads are interpreted as signal of credit quality, this fact pushes against the idea that small unrated bonds represent an extremely risky segment building up in the dark. Instead, there seems to be some screening even in this segment: only firms with good enough creditworthiness are able to enter the bond market. Note the caveat that bond spreads are an imperfect measure of credit quality. For instance, they can also be affected by bond liquidity[25]. However, given that unrated bonds tend to be less liquid than rated bonds, the presence of an illiquidity premium in their spreads would, if anything, lead to underestimating how safe they are.[26]

3.4 Bond Investor Composition

Next, we investigate how investor composition varies across different types of issuers. This is a central question because bond investor composition plays an important role in financial stability: while traditional 'buy-and-hold' bond investors such as pension funds and insurance companies have a long-term horizon [Coppola, 2021, Becker and Benmelech, 2021], other bond investors, such as open-ended mutual funds, can be responsible for fire sales and price dislocation in bad times [Goldstein et al., 2017, Falato et al., 2020].

We use detailed micro-data from the Securities Holdings Statistics by Sector (SHSS) that include the breakdown of holdings by investor type at the security-by-security level.[27] We merge these data with our other datasets on firms' balance sheets, bonds, and credit ratings. This allows us to compare the investor base for specific types of issuers relative to aggregate holdings. This section focuses on 2019,[28] while the next section studies the 2020 crisis. We only include investor sectors that are reported in SHS.[29]

[25] It is well known that corporate bonds tend to be more liquid than loans, but less liquid than stocks, partly because they trade over-the-counter rather than on centralized exchanges. See [Benos et al., 2022] for a recent description of the market micro-structure of corporate bond markets.

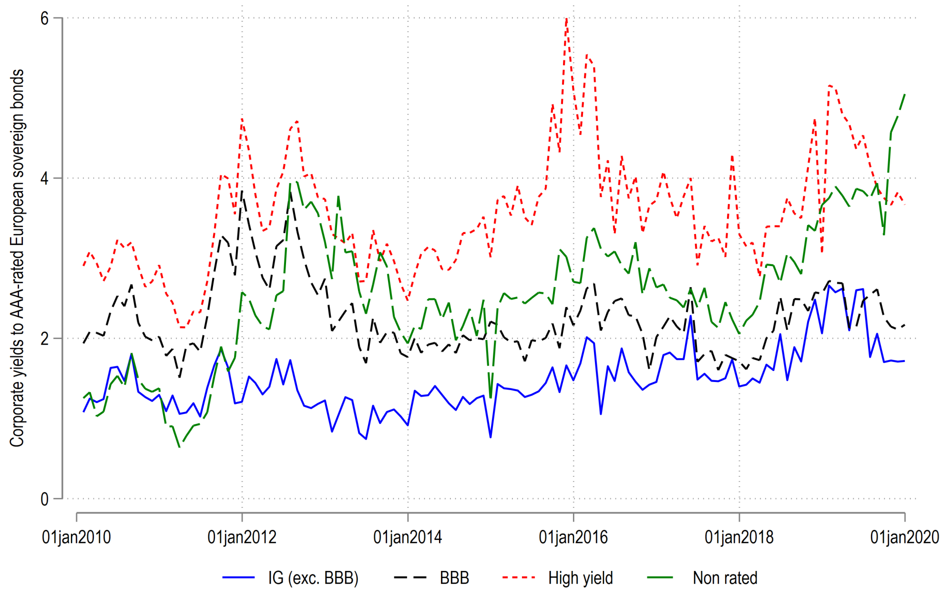
[26] Table IA.3 in the Internet Appendix shows that unrated issuers tend to have higher leverage and lower profitability relative to other issuers, although not by a vast amount.

[27] This includes data from the Securities Holdings Statistics of the Eurosystem (SHSE), which contain the holdings of the Eurosystem.

[28] Recall that the micro-data on securities holdings only cover recent years.

[29] That means that our analysis excludes some foreign investors and small investors below the reporting thresh-

Figure 4 – Corporate Yields to AAA-Euro Area Sovereign Bonds



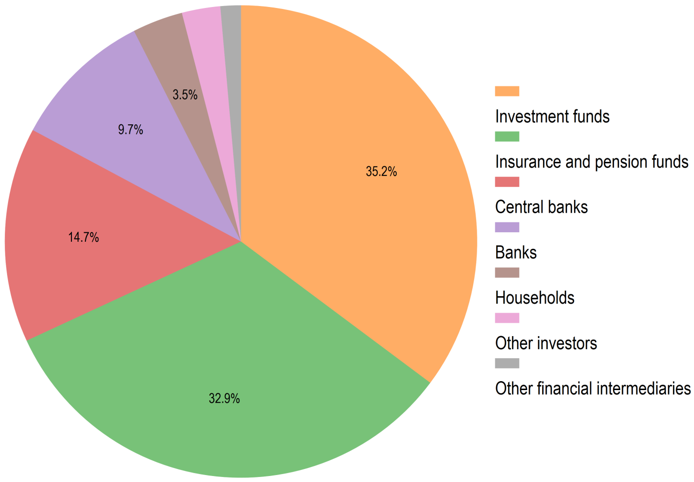
This figure shows time series of the spread between the average corporate bond yields of firms in our sample to the (maturity matched) AAA-rated sovereign bonds in the euro area, depending on their rating group. The spreads correspond to the weighted average spread by group. The time window comprises data between January 2010 and December 2019. The source of this data is the Corporate Securities Database collected by the Eurosystem, ratings data collected from S&P, Fitch, and Moody's, as well as the euro area AAA sovereign yield curve.

Table 3 – Corporate Yield to AAA-euro area Sovereign Bonds, WLS

	Spread (%)	Spread (%)	Spread (%)
HY	4.285***	4.107***	3.834***
	(0.123)	(0.124)	(0.125)
NR	1.316***	1.232***	1.270***
	(0.0594)	(0.0618)	(0.0646)
IG (exc. BBB)	-0.264***	-0.242***	-0.267***
	(0.0725)	(0.0737)	(0.0773)
Month	Yes	Yes	Yes
Original Bond Maturity	No	Yes	Yes
Residual Bond Maturity	No	No	Yes
Observations	29,364	29,364	29,364
R^2	0.067	0.087	0.116

This table displays the results from estimating a time series regression of the spread between the average corporate bond yields of firms in our sample to the (maturity-matched) AAA-rated sovereign bonds in the euro area. Rating categorical variables are included. BBB bonds are the omitted category. The dependent variables are constructed as the weighted average spread of each firm's bond yields. The time window comprises data between October 2019 and June 2020. The source of this data is the Corporate securities database collected by the Eurosystem, as well as the euro area AAA sovereign yield curve. Standard errors, in parentheses, are corrected for clustering of the observations at the firm level. $p < 0.10$, $p < 0.05$, $p < 0.01$

Figure 5 – Aggregate Bond Investor Composition, 2019Q4



The figure presents the investor composition of the debt securities issued by EA non-financial corporations in 2019Q4. The source of this data is ECB Securities Holding Statistics per Sector (SHSS).

As a benchmark, we first look at aggregate data on investor composition. Figure 5 presents the investor composition for all corporate bonds issued by euro area non-financial corporations. Traditional long-term investors hold a large share of the aggregate. In particular, insurance companies and pension funds hold a third of the total. The ECB (and the Eurosystem) also holds as much as almost 15% of the total in 2019. These investors tend to be classified as buy-and-hold and are a source of stability for corporate bond supply. On the other hand, bond funds also represent a large share of the investor base: their 35% share makes them comparable in importance to insurance and pension funds investors. Interestingly, traditional banks hold as much as 10% of the aggregate. Finally, direct holdings by households or other non-bank financial intermediaries are limited to less than 5%.

How does bond investor composition vary across issuing firms? Figure 6 shows investor composition for three groups: (i) all rated issuers, (ii) large unrated issuers (above the median of 2019Q4 assets); (iii) small unrated issuers (below the median).[30] The first fact is that for rated issuers the investor composition is remarkably similar to the aggregate: for instance, insurance and pension funds hold about a third, investment funds about a third, and the ECB 15%. This is unsurprising: rated firms tend to be large, so much larger in fact that they fully drive aggregate

old. These "residual" investors make up 28% of rated issuers' bonds outstanding, 18% for large unrated issuers, and 29% for small unrated issuers. Large/small issuers are defined as above/below the sample median of 2019Q4 assets.

[30] Figure IA.5 in the Internet Appendix shows the full data on a double sort of size by rating categories.

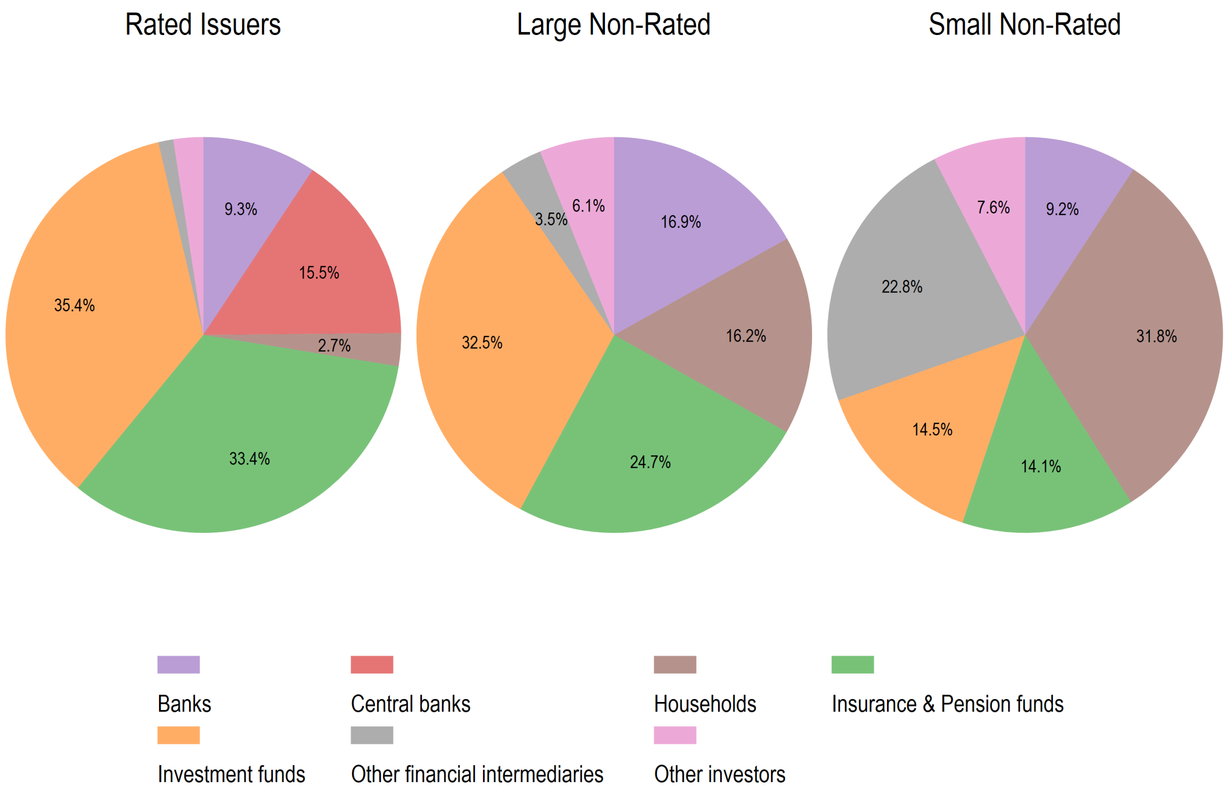


Figure 6 – Bond Investor Composition, Details by Size and Rating, 2019Q4

The figure presents the investor composition of the bonds issued by euro area non-financial corporations in 2019Q4, depending on whether the firms have a rating as of 2019Q4 and, for the unrated firms, if they have an asset size above (large) or below (small) the median of the sample at the end of 2019Q4. The source of this data is ECB Securities Holding Statistics per Sector (SHSS).

patterns.

However, investor composition for smaller unrated issuers is strikingly different from the aggregate. For instance, the share of buy-and-hold investors (ECB, insurance companies, pensions funds) is only 14%, or about 35 percentage points lower than in the aggregate. The ECB in particular holds none of their bonds as these are not eligible under the asset purchase programs. Even more surprisingly, households (which tend to invest via financial intermediaries' products) hold over 30% of the small unrated issuers' bonds in our sample. Financial intermediaries other than banks are also large for these issuers: they hold about 22% of the total.

This is remarkable in the sense that access to the bond market is often thought as a way to help firms reduce their dependence on financial intermediaries. The dependence of new and small bond issuers on financial intermediaries (directly or indirectly via households) might thus have been previously understated. Nevertheless, more work is needed to understand better that reliance on financial intermediaries: in our data, this sector of "Other financial intermediaries" excludes commercial banks and mutual funds but combines a heterogeneous group of financial firms involved in lending and securities markets.[31] The large role of households also contrasts with the case of Italian minibonds studied by Iannamorelli et al. [2021] and Ongena et al. [2020]: investment in these securities was strictly limited to professional investors, such as asset managers, pension funds and financial intermediaries.

Table 4 presents the results of cross-sectional multivariate regressions that jointly include size, rating, and private status indicators. It shows the effect of issuer characteristics on the holding share of different investor groups relative to the omitted category of the largest, IG, and public issuers. Overall, a similar picture emerges. Insurers and pension funds tilt their holdings away from smaller and non-IG issuers. On the other hand, unrated and small bonds are largely held by households and other financial intermediaries. These effects are large in magnitudes, in line with the pie charts above.[32]

[31] In the SHS classification, the sector "Other financial intermediaries" consists of: (i) financial vehicle corporations engaged in securitization transactions, (ii) security and derivative dealers, (iii) financial corporations engaged in lending via financial leasing, hire, purchase and the provision of personal or commercial finance or factoring, (4) specialized financial corporations, including venture and development capital companies, export/import financing companies, or financial intermediaries that acquire deposits and/or close substitutes for deposits or incur loans vis-a-vis monetary financial institutions only. These financial intermediaries also cover central counterparty clearing houses (CCPs) carrying out inter-MFI repurchase agreement transactions.

[32] Interestingly, being private does not per se reduce the chances of being held by insurers and pension funds.

Table 4 – Bonds Investors Composition in 2019Q4: Cross-Sectional Regressions

	IC & PF	Inv. funds	Other FI	Banks	Central Bank	Households	Other
Q1	-0.124***	-0.168***	0.0557***	0.0123	-0.00417	0.227***	0.0803***
	(0.0364)	(0.0371)	(0.0165)	(0.0247)	(0.00986)	(0.0197)	(0.0108)
Q2	-0.0892***	-0.156***	0.129***	0.0431**	-0.00382	0.221***	0.0284***
	(0.0317)	(0.0323)	(0.0144)	(0.0215)	(0.00859)	(0.0171)	(0.00938)
Q3	-0.00615	-0.119***	0.0799***	0.134***	-0.00553	0.0717***	0.0218***
	(0.0262)	(0.0267)	(0.0119)	(0.0178)	(0.00709)	(0.0142)	(0.00775)
Private	-0.00435	-0.0266	0.0371***	0.0130	-0.00856*	-0.00817	-0.00825
	(0.0192)	(0.0195)	(0.00870)	(0.0130)	(0.00519)	(0.0104)	(0.00567)
HY	-0.302***	0.133***	0.0229***	-0.0404***	-0.0223***	0.00134	-0.0108**
	(0.0182)	(0.0185)	(0.00824)	(0.0123)	(0.00492)	(0.00982)	(0.00537)
NR	-0.208***	0.0741***	0.00898	0.0204	-0.0123**	0.0652***	0.0103*
	(0.0204)	(0.0207)	(0.00923)	(0.0138)	(0.00551)	(0.0110)	(0.00602)
Observations	2,772	2,772	2,772	2,772	2,772	2,772	2,772
R^2	0.121	0.040	0.079	0.047	0.011	0.166	0.036

This table displays the results from estimating a cross-sectional regression of the investor holding shares of bonds on firms' characteristics. Specifically, size dummies, a variable equal to one if the firm is private, and rating categorical variables are included. The dependent variables are constructed as the share of each firm's total outstanding bonds held by each investor type. For this table data from only 2019Q4 are included. The source of this data is the Securities Holdings Statistics by Sector (SHSS) for debt securities issued by non-financial corporations. Standard errors, in parentheses, are corrected for clustering of the observations at the firm level. $p < 0.10$, $p < 0.05$, $p < 0.01$

We summarize the third fact as follows:

Fact 3: *Holdings of traditional buy-and-hold bond investors are large in aggregate but small for unrated and smaller issuers. Households and financial intermediaries are large investors in that segment.*

A complementary fact is that many of these non-traditional investors are local. Figure IA.6 in the Internet Appendix shows a more detailed breakdown of investor composition, distinguishing for each investor category between domestic (located in the same country as the issuer) and other-EA countries. We see for example that almost all holdings of households and other financial intermediaries are domestic. Table IA.4in the Internet Appendix confirms this pattern in a regression setting. The tilt towards small and unrated issuers of financial institutions and households is virtually entirely driven by domestic investors, while other-EA investors typically show opposite effects.

3.5 Connecting the First Three Facts

The first three facts are naturally connected. First, small and new issuers might see some benefits in choosing to forgo a rating from a large rating agency. For instance, they can save on the cost, work, and management time involved with obtaining a rating. This is particularly valuable for firms issuing smaller bonds infrequently. Anecdotally, many firms cite this reason for issuing an unrated bond:

Acquiring an official rating is an investment. However, it may not be a beneficial process for all companies, at least for ones that are not regular issuers and whose issue sizes are relatively small. "We wanted to be agile and efficient. If we had gone through the rating process, securing financing would have taken much longer."[33]

Having a credit quality close to the BBB threshold has two implications. First, their creditworthiness is good enough to be appealing to some investors.[34] However, there is also significant

[33] "Why Nordic companies don't worry about ratings", Evli.com, October 9 2017.

[34] "Many issuers have been able to take advantage of their well-known profiles among retail investors in successfully issuing unrated bonds. These include German Sixt and Adidas, Prada and Barilla from Italy, and Air

risk of not maintaining an IG rating if a rating is issued. This can be costly as being downgraded to "fallen angel" status has additional distress costs on firms' operations [Acharya et al., 2018, Fracassi and Weitzner, 2020, Almeida et al., 2017, Kisgen, 2006].

However, a clear drawback of being unrated is a limited investor base. The investment mandates of traditional buy-and-hold investors tend to require a rating from a large rating agency [Baghai et al., 2022]. These rating mandates can help to limit their risk exposure but can mechanically exclude new and small issuers. This can explain the small presence of insurers, pension funds, and central banks in that segment in spite of their large aggregate holdings.

This implies that the investor base is restricted to financial institutions that are willing and able to conduct their own credit analysis, or retail investors (which are typically sold such investment products by their financial institution). The investor base is also more likely to be local. Anecdotally, informed investors are thought to play an important role in supporting the unrated European bond market:

Getting an official rating has also held little appeal for [the Finnish company] Kemira, whose bond issuances have proved attractive to investors. The investors in regional markets know their companies well: "When we issue corporate bonds of EUR 100-200 million, a large part of investors are Finnish institutions, banks and brokers, which have good skills in credit analysis. In Nordic countries, companies are fewer and smaller than elsewhere, so it is possible for investors to gain a very good knowledge of them. The market knows how to price the risk."[35]

Nevertheless, this implies that the size of unrated bond issuance is capped by the restricted investor base. As a company grows and their funding needs increase, having a rating becomes more appealing. Indeed, in the data, large and seasoned issuers are significantly more likely to have a rating. Nevertheless, the fact that we observe very few firms that were unrated at their first issuance obtaining a rating later on during our sample period suggests that it can take many years before a firm decides to get a rating.

France-KLM, to name but a few. According to Fitch, a sizeable proportion of the larger issues of unrated bonds display credit profiles that could be classified as investment, or near-investment grade." Unicredit Credit Research "Unrated Corporate Bonds", February 2015.

[35] "Why Nordic companies don't worry about ratings", Evli.com, October 9 2017.

3.6 Commercial Paper Investor Composition

In the core analysis, we have focused on senior and subordinated corporate bonds and excluded commercial paper. Commercial paper is unsecured with a short-term maturity, which contrasts with typical corporate bonds. In our sample, it makes up 2 - 4% of firms' debt. Figure IA.7 in the Internet Appendix presents the investor composition of commercial paper issued by firms of different sizes and rating categories at the end of 2019. The main insight of this plot is that traditional banks' holdings are extremely high across almost all firms' groups. The only exception are high-yield firms. This is further evidence of the importance of financial intermediaries as investors in this segment of market financing.

4 The 2020 Downturn

The last part of the paper studies the 2020 market turmoil (fact 4) and following recovery (fact 5). At the aggregate level, it is well understood that bond issuance plummeted in March 2020 in the midst of rising spreads, investor sell-off, and illiquidity in secondary markets. This market turmoil raised concerns for the historically high number of firms relying on bond financing in Europe. Market functioning was severely disrupted until the European Central Bank stepped in with a massive intervention to support the bond market. Central bank support, including corporate bond purchases, led to a quick recovery and a wave of issuance starting in April 2020.

This episode is interesting to study through the lens of our micro-data because it can reveal how different issuers fared through this (quick) credit cycle. Were all issuers equally affected by the negative shock and subsequent recovery?

4.1 Investor Composition and Spikes in Spreads in Spring 2020

This section aims to better understand the role of investor composition in episodes of market turmoil. Prior work has emphasized that insurers and pension funds in particular are "safe hands" investors that can insulate firms from price dislocation, while mutual funds investors tend to be more flighty [Coppola, 2021]. We use a methodology similar in spirit to Coppola [2021] to study the effects of investor composition on bond spreads during the 2020 crisis.

We run the following cross-sectional regression in our sample of bonds:

$$\max \Delta Spread_b = \sum_{i \in I} \beta_i \phi_{i,b} + \text{Controls and FE} + \epsilon_b \tag{1}$$

The dependent variable is the maximum spread increase for a bond b during that episode relative to December 2019. The variables of interest are the holdings share $\phi_{i,b}$ of different investor sectors $i \in I$ for a bond b measured as of end of 2019. The set I of investors types includes insurers/pension funds, mutual funds being the omitted category. In addition, we include the less common investor types of financial intermediaries and households given the importance they play as documented earlier. The coefficients β_i reveal the impact of a particular investor type on spread dynamics in Spring 2020. A negative β_i on a particular investor type implies that it insulated the bond from price dislocation (relative to mutual funds), while a positive coefficient implies that it amplified the spike in spread.

The regression specifications include bond and issuer-level controls in order to isolate the price dislocation due to investor composition within similar bonds. For instance, we include Industry $\times$ Country fixed effects to compare issuers in similar sectors. The tightest specification includes firm (group) fixed effects. This is attractive for identification but only isolate variation in investor composition for firms issuing multiple bonds. We run these regressions separately for rated and unrated firms, as it is plausible that investor behavior differs across these groups, in addition to differences in investor base.[36]

Panel (a) of Table 5 shows that for rated firms the coefficients on insurers and pension funds are consistently negative. This indicates that these investors are safer hands than mutual funds. This is consistent with the evidence in Coppola [2021]. A 10p.p. increase in the ownership share of insurers reduces the spike in spread by 3bps. In terms for non-traditional investor types, households interestingly are also stabilizing investors for this sample of issuers, with coefficients of similar magnitudes as insurers. Interestingly, commercial banks also have negative coefficients, seemingly acting as stabilizers at least during this episode in which the banking sector was healthy. Other financial intermediaries, on the other hand, have positive but insignificant coefficients, indicating that they are at least as flighty as mutual funds. The signs, magnitudes and significance of all of these coefficients are preserved when we include firm fixed effects, assuaging

[36] For instance, Coppola [2021] focuses on IG bonds.

the concern that these correlations are driven by unobservable issuer characteristics, such as a deterioration of their fundamentals during this time.

The effects are significantly different for unrated issuers. Panel (b) of Table 5 shows that the stabilizing effect of insurers is absent in this sample, with coefficients close to a precise zero. Households are similarly not stabilizing for these issuers either. In addition, the destabilizing effect of other financial intermediaries is now statistically significant in the tightest specification.[37] Commercial banks are still stabilizing, but they represent a small share of bond holdings. Table IA.5 in the Internet Appendix shows the results when splitting the sample by size instead. The effects are generally consistent, albeit significantly less precisely estimated.

This evidence raises concerns for bond credit supply for new issuers given that non-bank financial intermediaries and households are large investors in that segment. Even if these bonds are less likely to be held by mutual funds, they are held by investors that do not appear to be more stable. We summarize the fourth fact as follows:

Fact 4: *Households and non-bank financial intermediaries were at least as flighty as mutual funds during the March 2020 turmoil for unrated issuers.*

4.2 Dynamics of Firm Borrowing

Finally, we consider the dynamics of firm borrowing around the 2020 shock. We look at data on bonds, but also on bank credit (credit lines and term loans) from the AnaCredit credit registry.

Figure 7 shows the dynamics of new issuance, separately for bonds and loans. It is apparent that the rated firms issued large amounts of bonds after the ECB intervention in April 2020. This is in line with aggregate data and consistent with the bond issuance wave documented in the United States following the Federal Reserve announcement to start purchasing corporate bonds [Halling et al., 2020, Darmouni and Siani, 2022]. On the other hand, there was no comparable bond issuance boom for unrated issuers. In fact, these issuers seemed to have relied more on credit lines during this episode. Panel (b) of Figure 7 confirms that smaller firms received higher

[37] In general, there is always a concern that bond spread dynamics can be influenced by illiquidity, that is, prices do not adjust absent trading. Note however this is partly what we are trying to capture: we infer from a smaller spike in spread that investors are relatively less eager to sell. Coppola [2021] dubs this effect "endogenous illiquidity".

Table 5 – Maximum Absolute Difference in Spread – By Rating

(a) Rated Issuers

	(1)	(2)	(3)
IC & PF	-0.389***	-0.390***	-0.311**
	(0.140)	(0.139)	(0.139)
Other FI	0.332	0.341	0.313
	(0.775)	(0.773)	(0.834)
Banks	-0.517**	-0.446**	-0.389*
	(0.203)	(0.203)	(0.202)
Households	-0.262	-0.304	-0.354*
	(0.215)	(0.214)	(0.214)
Log(Bond Size)	Yes	Yes	Yes
Log(Residual Maturity)	Yes	Yes	Yes
Rating	Yes	Yes	Yes
EUR Denominated	Yes	Yes	Yes
Industry*Country	Yes	Yes	Yes
Senior Bond	No	Yes	Yes
Call Option	No	Yes	Yes
Floating rate coupon	No	Yes	Yes
Group	No	No	Yes
R-squared	0.341	0.349	0.750
N	948	948	948

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(b) Unrated Issuers

	(1)	(2)	(3)
IC & PF	-0.104	-0.0848	-0.0200
	(0.107)	(0.109)	(0.112)
Other FI	0.140	0.154	0.295**
	(0.130)	(0.130)	(0.139)
Banks	-0.355***	-0.354***	-0.329***
	(0.0982)	(0.0994)	(0.103)
Households	-0.103	-0.0968	-0.0468
	(0.159)	(0.159)	(0.190)
Log(Bond Size)	Yes	Yes	Yes
Log(Residual Maturity)	Yes	Yes	Yes
EUR Denominated	Yes	Yes	Yes
Industry*Country	Yes	Yes	Yes
Senior Bond	No	Yes	Yes
Call Option	No	Yes	Yes
Floating rate coupon	No	Yes	Yes
Group	No	No	Yes
R-squared	0.194	0.197	0.616
N	1975	1975	1975

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

This table displays the results from estimating a cross-sectional regression on the maximum increase in spread at the bond level between 2019 Q4 (October-December) and June 2020 on investor sector shares of the same bond at the end of 2019 and a series of interacted fixed effects. Investment (mutual) funds is the excluded category. The dependent variable is constructed as the maximum absolute difference between the spread of bond yields - expressed in % - to the (maturity-matched) AAA-rated sovereign bonds in the euro area for the window of February to June 2020 compared to the value of the spread in 2019 Q4 (October-December). The maximum absolute difference is kept. Outliers with an absolute maximum difference larger than 10% are dropped from the analysis. The sources of this data are the Centralised Corporate Security Database (CSDB) for debt securities issued by non-financial corporations, the Securities Holdings Statistics per Sector (SHSS), the Orbis database for the industry classification of the firm, as well as the euro area AAA sovereign yield curve. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

levels of bank credit during that period.

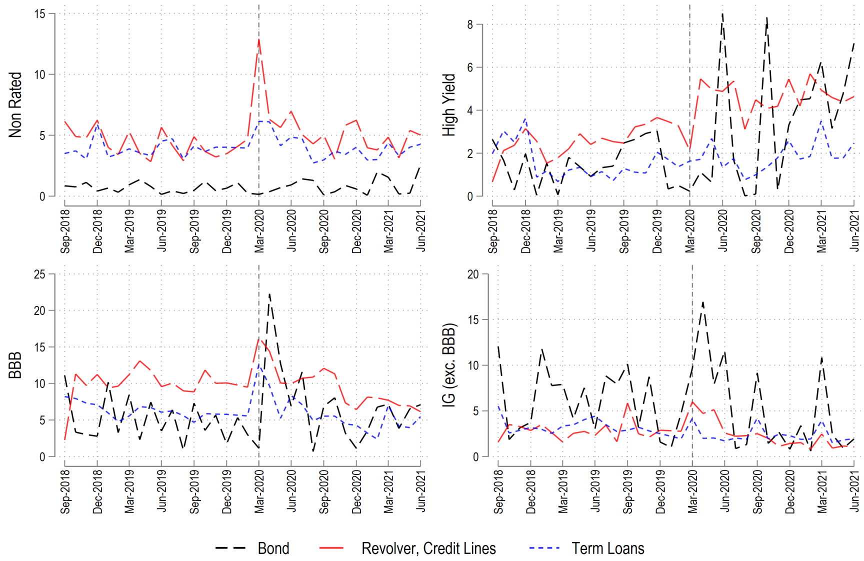
Tables 6 and 7 include the regression estimations of an event study analysis of the flow of credit around March 2020. We consider different types of firm credit and compare three quarters post March with the previous three quarters. All columns include issuer (GUO) fixed effects to isolate within-firm changes in debt outstanding around the shock. In Table 6 we examine firms in different rating categories by interacting the post March 2020 dummy with firm's rating status as of end 2019, while in Table 7 we examine firms in different sizes by interacting the post March 2020 dummy with asset quartiles constructed in 2019.

Consistent with the evidence presented in Figure 7, the regression estimations allow us to quantify more accurately the dynamics of credit flows. There is a significant heterogeneity in the sources of financing that firms of different types depended on around March 2020. The increase in bonds was driven by firms with a BBB rating: these firms also experienced a decrease in their credit line borrowing but nevertheless expanded their total credit. On the other hand, the picture for unrated firms is the opposite: unrated firms issued more term loans and increased their total credit, indicating that banks provided the financing that was needed at this distress period. Similarly, the comparison across firms' size groups presented in Table 7 confirms that smaller firms did not participate in the bond issuance wave. In fact, the smallest firms experienced an insignificant increase in total credit during this episode.

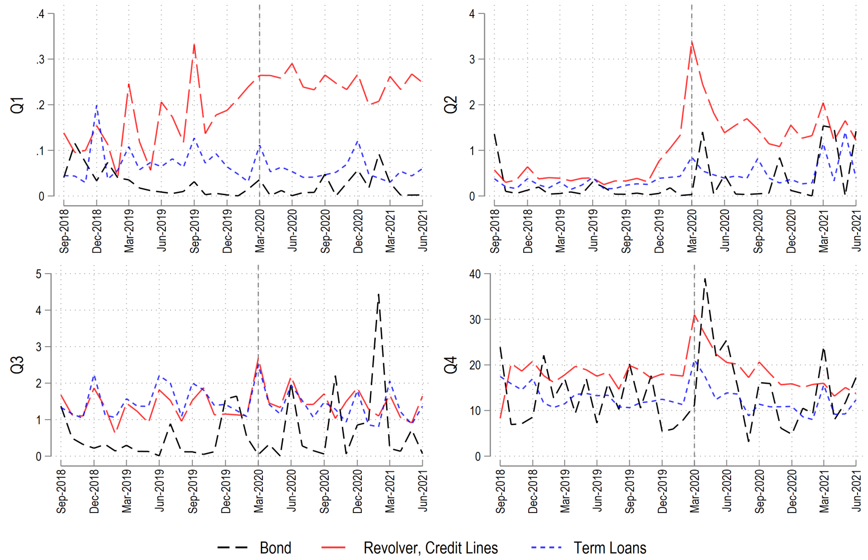
Fact 5: *The April 2020 bond issuance wave was restricted to large and rated firms, with other issuers returning to the loan market.*

These dynamics are at least in part consistent with the nature of credit policies put in place during this time. For instance, the scope of the ECB intervention was limited: corporate bond purchases were restricted to rated bonds (with BBB bonds being the largest group being purchased), in line with the existing central bank mandate. At the same time, many firms received guaranteed loans in Europe which aimed to stimulate loan markets for smaller firms [Altavilla et al., 2021]. In fact, we can see that within our sample of bond issuers: Table IA.6 in the Internet Appendix shows that 50 to 60% received a guaranteed loan. Strikingly though, this seemed to have been the case across all groups: even rated issuers have a high take up rate, even if slightly lower than unrated firms. It thus seemed that both rated unrated firms benefited

Figure 7 – New Credit Origination



(a) New Credit Origination by Rating of Issuers



(b) New Credit Origination by Size of Issuers

This figure shows the aggregate level of volume outstanding for new origination of bond, revolver and credit lines and term loans for euro area bond issuers in our sample, from January 2019 to June 2021. The sources are the Central Securities Database (CSDB) for bonds and AnaCredit data for loans. In CSDB, bonds correspond to debt instruments; in AnaCredit, revolver and credit lines are computed as the sum of revolving credit, credit lines other than revolving credit, overdrafts and credit card debt; while term loans are computed as the sum of loans, trade receivables and finance leases. The breakdown of size of issuers is obtained after collecting data on the asset size of all firms in the sample, from Orbis, Capital IQ, and RIAD. Quartiles are fixed, that is, they are computed for asset values for end of the year 2019. The breakdown of rating of issuers is obtained after collecting data on the rating of the firms and bonds issued by each firm from either Standard & Poor's, Moody's, or Fitch, from the CSDB Rating database. Ratings are dynamic over time, that is, they are computed in each month. Volumes outstanding are expressed in billions €.

Table 6 – Covid Shock: Credit Effects, by Rating of Issuers

	Total Credit/ Lag. Assets	Bond/ Lag. Asset	Term Loans/ Lag. Assets	Rev., Cr. Lines/ Lag. Assets
Post*NR	2.287***	0.172	1.997***	0.118
	(0.503)	(0.230)	(0.417)	(0.171)
Post*HY	1.113	0.782	0.297	0.0346
	(0.885)	(0.780)	(0.264)	(0.0912)
Post*BBB	2.743**	3.053**	-0.120	-0.191**
	(1.220)	(1.368)	(0.209)	(0.0904)
Post*A	-0.138	-0.121	-0.0176	0.000435
	(0.335)	(0.320)	(0.0145)	(0.000670)
Observations	1733	1733	1733	1733
R^2	0.041	0.006	0.079	0.002
Fixed Effects	GUO	GUO	GUO	GUO

This table displays the results from estimating the following specification: $y_{ijt} = \beta_j \times Post_t \times R_j + \alpha_i + \epsilon_{ijt}$ for each firm i of rating j and month t, for different credit measures. The dependent variables y_{ijt} are constructed as: (i) the aggregate credit of the firm, corresponding to the sum of all outstanding bonds and loans amount; (ii) the total outstanding bond amount of each firm; (ii) the aggregated term loans outstanding amount of each firm; and (iv) the sum of all revolver credit and credit lines of each firm. Each dependent variable from (i) to (iv) is divided by the total assets of the firm in 2019. The *Post* dummy is interacted with a categorical variable that indicates the firm's rating status at the end of 2019. The frequency of the credit data is monthly. Lagged assets are held constant, corresponding to the total assets of the firm in 2019. The *Post* dummy is equal to one for the period 2020 Q1 until 2020 Q3 and zero for the period 2019 Q2 until 2019 Q4. The sources of this data are the Centralised Corporate Security Database (CSDB) for debt securities issued by non-financial corporations, the euro area credit registry AnaCredit for loans borrowed by non-financial corporations, and Orbis and Capital IQ for the firm's total assets information. Standard errors, in parentheses, are corrected for clustering of the observations at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7 – Covid Shock: Credit Effects, by Size of Issuers

	Total Credit/ Lag. Assets	Bond/ Lag. Asset	Term Loans/ Lag. Assets	Rev., Cr. Lines/ Lag. Assets
Post*Q1	1.233	-0.251	1.294	0.190
	(1.145)	(0.433)	(1.016)	(0.395)
Post*Q2	3.822***	0.260	3.636***	-0.0743
	(0.981)	(0.466)	(0.793)	(0.319)
Post*Q3	1.626***	0.531*	0.971**	0.124
	(0.568)	(0.321)	(0.420)	(0.227)
Post*Q4	1.901***	0.802	0.824*	0.275
	(0.676)	(0.569)	(0.419)	(0.243)
Observations	1733	1733	1733	1733
R^2	0.049	0.003	0.104	0.003
Fixed Effects	GUO	GUO	GUO	GUO

This table displays the results from estimating the following specification: $y_{ijt} = \beta_j \times Post_t \times R_j + \alpha_i + \epsilon_{ijt}$ for each firm i of rating j and month t, for different credit measures. The dependent variables y_{ijt} are constructed as: (i) the aggregate credit of the firm, corresponding to the sum of all outstanding bonds and loans amount; (ii) the total outstanding bond amount of each firm; (iii) the aggregated outstanding term loans amount of each firm; and (iv) the sum of all revolver credit and credit lines of each firm. Each dependent variables from (i) to (iv) is divided by the total assets of the firm in 2019. The *Post* dummy is interacted with an asset quartile categorical variable as an approximation of firm's size based on the end of 2019 values. The frequency of the credit data is monthly. Lagged assets are held constant, corresponding to the total assets of the firm in 2019. The *Post* dummy is equal to one for the period 2020 Q1 until 2020 Q3 and zero for the period 2019 Q2 until 2019 Q4. The sources of this data are the Centralised Corporate Security Database (CSDB) for debt securities issued by non-financial corporations, the euro area credit registry AnaCredit for loans borrowed by non-financial corporations, and Orbis and Capital IQ for the firm's total assets information. Standard errors, in parentheses, are corrected for clustering of the observations at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

from loan market stimulus, but only rated firms benefited from bond market stimulus.

5 Discussion and Implications

At a high level, the main implication of these five facts is that new and small issuers are largely disconnected from the aggregate bond market and still significantly reliant on financial intermediaries. Our descriptive evidence is nevertheless admittedly only a starting point that raises further research questions. We discuss connections to three key outstanding macro-finance issues in this section.

First, the fact that financial intermediaries are still important for small and new issuers blurs the conventional dichotomy between intermediated and capital market funding. This is key to understanding the effects of financial crises and to what extent capital markets represent a "spare tire" to dampen the credit cycle. The fact that the 2020 crisis was not centered on intermediaries was fortunate in that respect, with banks for example being well capitalized when the shock hit. Our evidence nevertheless questions how successful the capital markets transition has been for these issuers. They are still significantly dependent on intermediaries and potentially vulnerable to deleveraging in that sector. Entering the bond market does diversify firms' sources of funds, but may be less than policy makers might have hoped. Concretely, classifying bond issuers as not being dependent on intermediaries is likely an oversimplification. More work is necessary to accurately assess the dependence of new bond issuers on intermediated financing.

Second, our evidence can help us better understand the fragility of credit supply. The 2020 crisis made clear the importance of non-banks and corporate bond markets for financial stability. Most existing work tends to focus on two investor classes: mutual funds and insurers/pension funds. This is justified by the fact that these two types of investors hold a large share of the aggregate bond market, both in Europe and in the United States. Insurers and pension funds in particular are thought to be "safe hands" that can insulate firms from market turmoil. Our evidence that traditional investors are significantly smaller for small and new issuers highlights the importance of building a broader framework of bond credit supply and its implications for firms' access to credit. In particular, financial intermediaries and household investors (which often access bond markets via financial intermediaries' products) are large but the cyclicality of their bond demand is much less well understood.

Finally, there are potential lessons for the design of credit policies. All major central banks now routinely use asset purchases as a tool. As bond financing has risen globally, central banks have more readily implemented new measures targeting corporate bond markets specifically. At the same time, policy-makers might have hoped that bond market stimulus would be sufficient to reach all firms with bond market access, leaving programs supporting loan markets to smaller bank-dependent firms. However, the effects of bond market stimulus on the most vulnerable issuers, which tend to be small and unrated, seemed to have been limited with many turning to loan markets instead. A potential important driver is the (near universal) restrictions put on bonds allowed to be purchases, specifically rating requirements. More generally, there is a risk that new and small issuers might be "invisible" to policy makers, even if they track bond market indicators very closely. The fact that so many new European bond issuers are unrated has important implications for the discussion around investment restrictions on central bank purchases.

6 Conclusion

This paper documents five facts on the capital markets transition in the euro area through the lens of new and small issuers. We use newly available micro-data on public and private firms to present the first comprehensive study of the rise of bond financing in the euro area. Our evidence implies that these issuers are largely disconnected from the aggregate bond market and still significantly dependent on intermediaries. Better understanding the welfare and policy implications of this evidence is an important avenue for future research.

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Internet Appendix

IA.1 Additional Figures and Tables

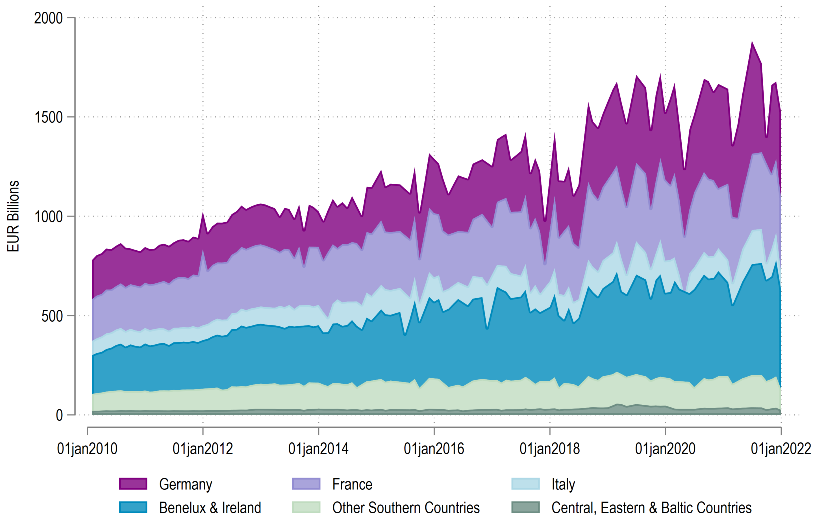

Figure IA.1 – Aggregate Growth of the euro area Corporate Bond Market: Across Countries

This figure shows the aggregate level of bonds in the euro area for non-financial corporations from 2010 to 2021 Q4 from the the Corporate Securities Database of the Eurosystem. All debt securities issued by subsidiaries of non-financial corporates are summed. Data are at the quarterly level. Data are corrected for inflation, and reported in billions €. “Other Southern Countries” include: CY, ES, GR, MT, PT. “Central, Eastern and Baltic Countries” include: AT, EE, FI, LT, LV, SI, SK.

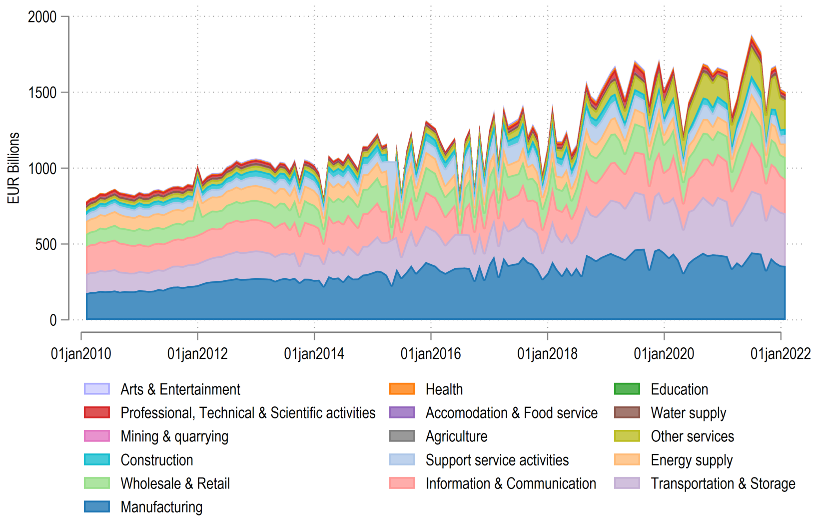

Figure IA.2 – Aggregate Growth of the euro area Corporate Bond Market: Across Sectors

This figure shows the aggregate level of bonds in the euro area for non-financial corporations from 2010 to 2021 Q4 from the the Corporate Securities Database of the Eurosystem. All debt securities issued by subsidiaries of non-financial corporates are summed. Data are at the quarterly level. Data are corrected for inflation, and reported in billions €.

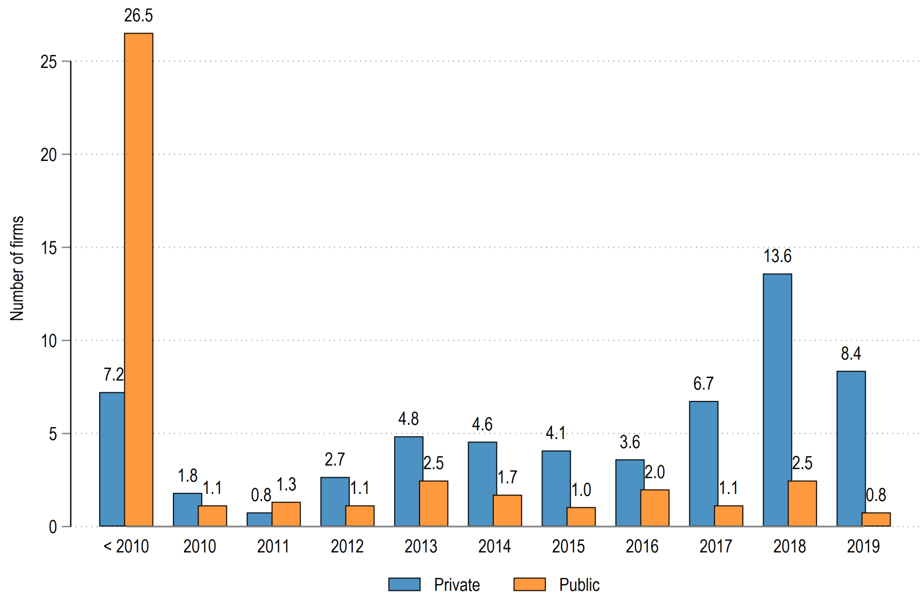

Figure IA.3 – Euro Area Bond Market Entry, % of Total Issuers

This figure presents the share of number of public and private issuers per year from 2010 to 2021 over the total number of bond issuers in the Eurozone for the entire period. All firms represent the whole sample of firms included in the analysis, with positive bond outstanding between the period 2018 to 2021. In each year, new issuers are defined as firms that issue bonds for the first time in that year. The first year of issuance was obtained by combining Capital IQ and Centralised Securities Database (CSDB): it corresponds to the earliest issue year one could identify for any subsidiary or branch within the group structure of firms in the sample, i.e. for any group, the date of issuance - either identified directly using the variable *date of issuance* from CSDB or first year with non-zero bond volume outstanding in Capital IQ - which corresponds to the earliest issuance date across all entities within the group is kept. Bonds in Capital IQ correspond to the sum of Senior and Subordinated Bonds. Bonds in CSDB correspond to debt securities, where we exclude commercial paper.

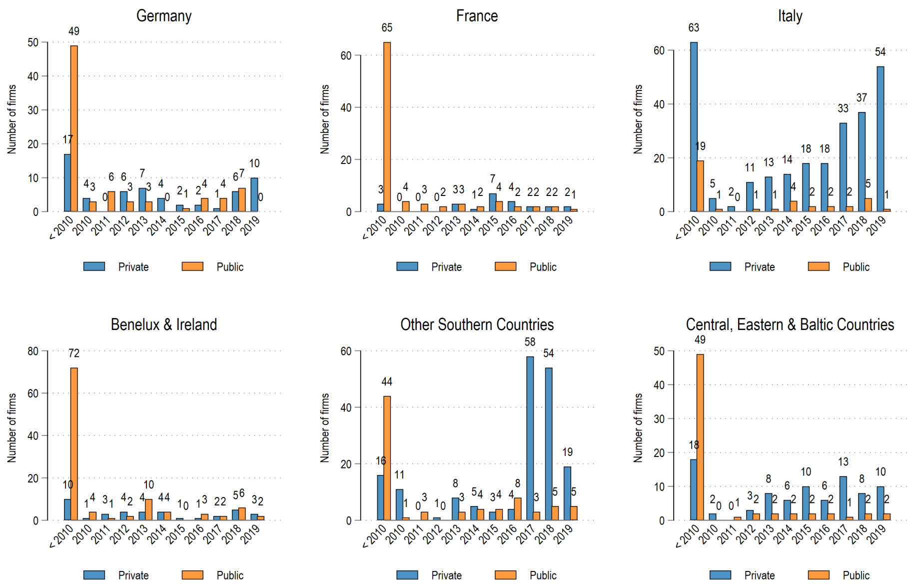

Figure IA.4 – Euro Area Bond Market Entry: Across Countries

This figure presents the total number of public and private issuers from 2010 to 2021, broken down by countries and regions. All firms represent the whole sample of firms included in the analysis, with positive outstanding bonds between the period of 2018 to 2021. In each year, new issuers are defined as firms that issue bonds for the first time in that year. The first year of issuance was obtained by combining Capital IQ and Centralised Securities Database (CSDB), which corresponds to the earliest issue year one could identify for any subsidiary or branch within the group structure of firms in the sample, that is, for any group, as well as the date of issuance - either identified directly using the variable *date of issuance* from CSDB or first year with non-zero bond volume outstanding in Capital IQ - which corresponds to the earliest issuance date across all entities within the group is kept. Bonds in Capital IQ correspond to the sum of Senior and Subordinated Bonds. Bonds in CSDB correspond to debt securities, where we exclude commercial paper. “Other Southern Countries” include: CY, ES, GR, MT, PT. “Central, Eastern and Baltic Countries” include: AT, EE, FI, LT, LV, SI, SK.

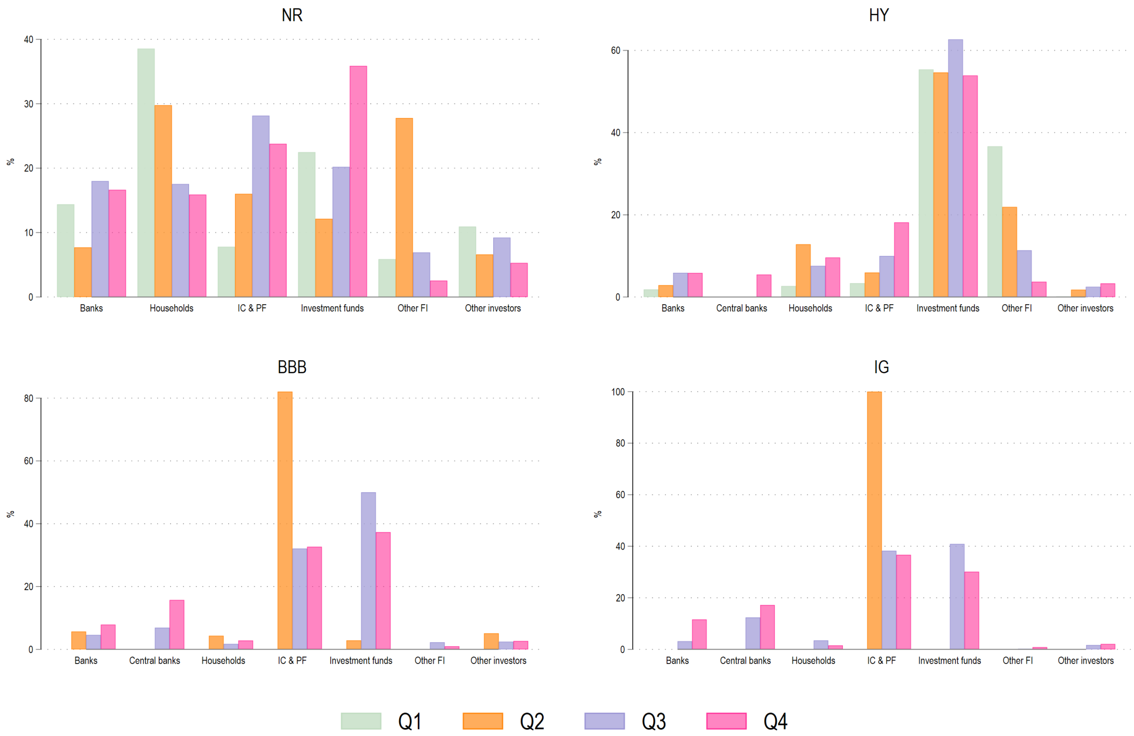

Figure IA.5 – Investor Composition by Rating and Size

This figure presents the investor composition of the bonds issued by firms in the final sample at the end of 2019, broken down by size. The source of this data is the ECB Securities Holdings Statistics per Sector (SHSS). The breakdown of size of issuers is obtained after collecting data on the asset size of all firms in the sample, from Orbis, Capital IQ and RIAD. Quartiles are fixed, i.e. they are computed for asset values of the year 2019. Investors' shares are expressed in %.

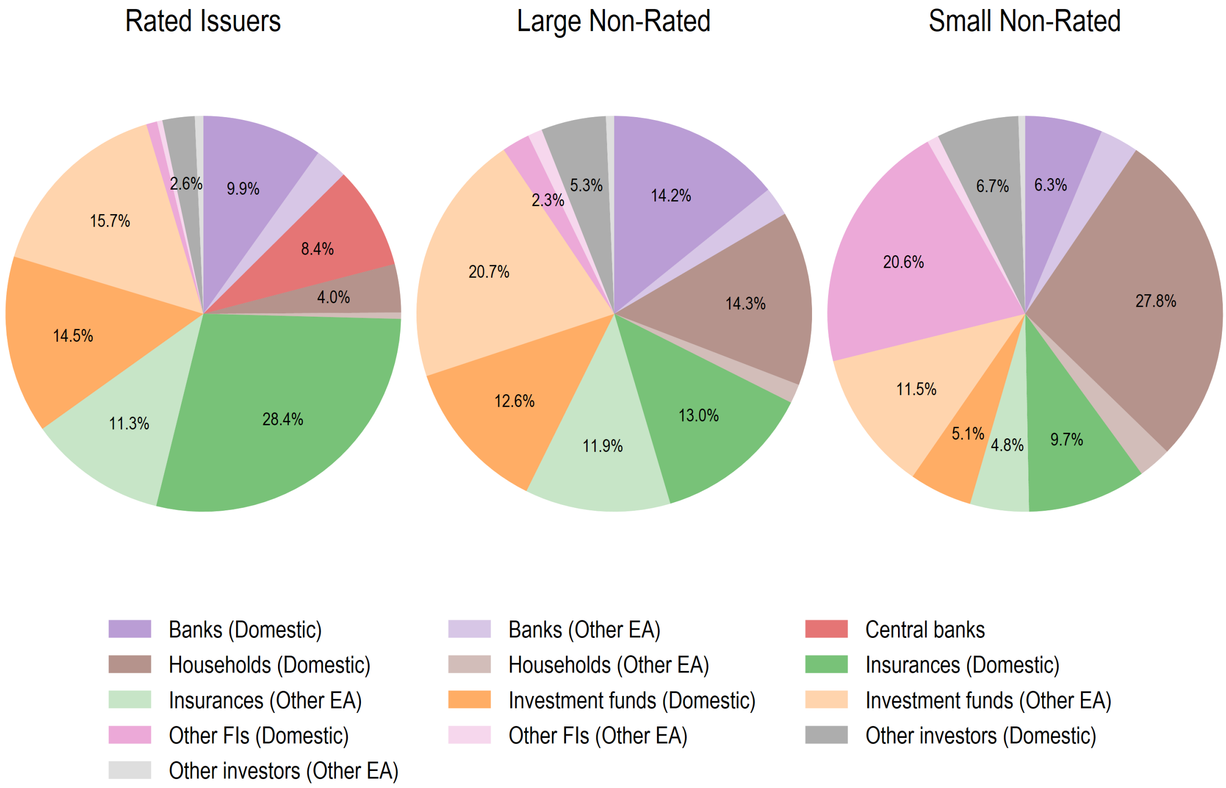

Figure IA.6 – Bond Investor Composition, Details by Size and Rating, 2019Q4: Domestic vs Other EA Investors

The figure presents the investor composition of the bonds issued by euro area non-financial corporations in 2019Q4, depending on whether the firms have a rating as of 2019Q4 and, for the unrated firms, if they have an asset size above (large) or below (small) the median of the sample at the end of 2019Q4. The source of this data is ECB Securities Holding Statistics per Sector (SHSS). Investor holdings are labeled as Domestic if located in the same country as the issuer. Otherwise they are labeled as Other EA.

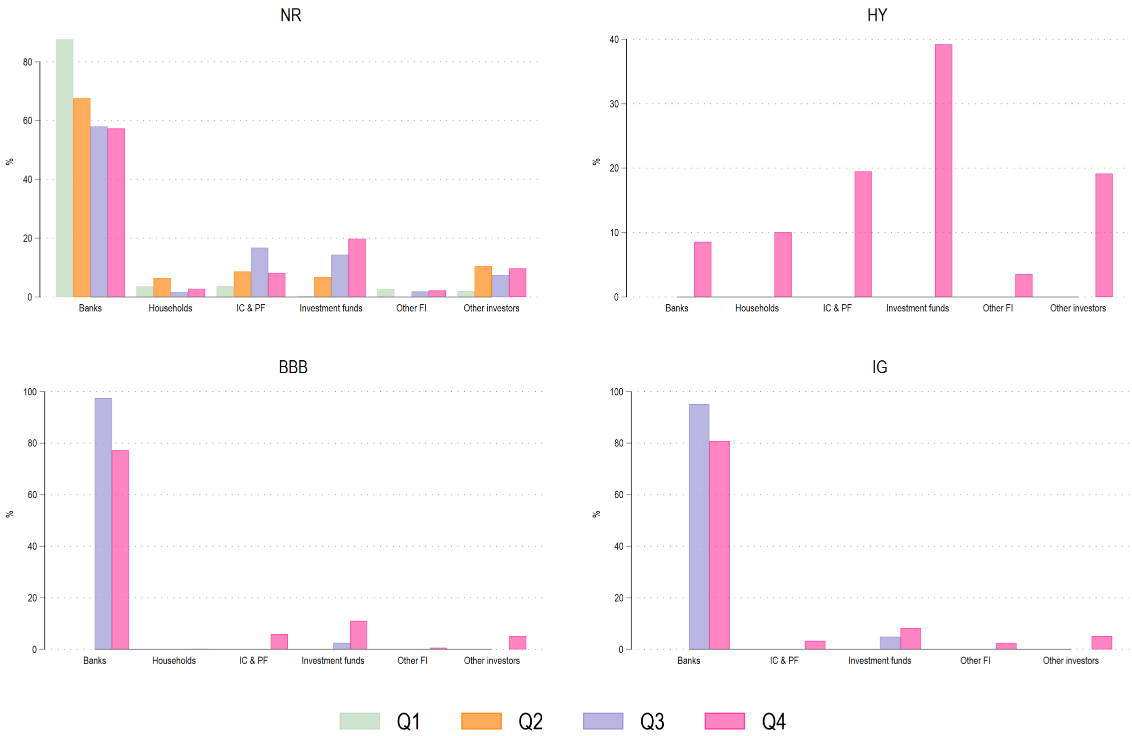

Figure IA.7 – Investor Composition by Rating and Size: Commercial Paper

This figure presents the investor composition of the commercial papers issued by firms in the final sample at the end of 2019, broken down by size. The source of this data is the ECB Securities Holdings Statistics per Sector (SHSS). The breakdown of size of issuers is obtained after collecting data on the asset size of all firms in the sample, from Orbis, Capital IQ and RIAD. Quartiles are fixed, i.e. they are computed for asset values of the year 2019. Investors' shares are expressed in %.

Table IA.1 – Share of Private, Rated and New Issuers by Size, Across Country

	(1) Germany					(2) France					(3) Italy				
	Q1	Q2	Q3	Q4	All	Q1	Q2	Q3	Q4	All	Q1	Q2	Q3	Q4	All
A (%)	.	.	2.78	14.46	7.47	.	.	3.03	17.44	12.50	.	.	.	5.56	0.57
BBB (%)	.	.	2.78	28.92	14.37	.	.	6.06	26.74	19.53	.	.	.	30.56	3.13
HY (%)	.	.	11.11	19.28	11.49	.	20.00	3.03	18.60	14.06	0.93	0.91	6.06	16.67	3.98
NR (%)	100.00	100.00	83.33	37.35	66.67	100.00	80.00	87.88	37.21	53.91	99.07	99.09	93.94	47.22	92.33
New Issuers (%)	100.00	86.36	54.84	29.09	60.28	75.00	100.00	70.00	21.21	40.38	92.45	90.83	84.95	46.15	86.23
Private Issuers (%)	75.76	63.64	41.94	16.36	43.26	.	50.00	40.00	10.61	20.19	94.34	93.58	81.72	42.31	86.53

	(4) Benelux and Ireland					(5) Other Southern Countries					(6) Central, Eastern, and Baltic Countries				
	Q1	Q2	Q3	Q4	All	Q1	Q2	Q3	Q4	All	Q1	Q2	Q3	Q4	All
A (%)	.	.	6.25	13.04	9.71	1.85	1.33	2.08	1.89	1.74	.	.	.	2.38	0.65
BBB (%)	.	9.52	3.13	32.17	22.86	.	.	2.08	33.96	8.26	.	2.94	4.44	19.05	7.10
HY (%)	14.29	14.29	18.75	17.39	17.14	5.56	2.67	16.67	18.87	10.00	.	.	.	11.90	3.23
NR (%)	85.71	76.19	71.88	37.39	50.29	92.59	96.00	79.17	45.28	80.00	100.00	97.06	95.56	66.67	89.03
New Issuers (%)	71.43	70.59	50.00	28.05	40.15	92.00	95.83	70.73	38.46	78.71	91.18	90.91	56.82	23.53	64.83
Private Issuers (%)	57.14	64.71	26.92	10.98	23.48	86.00	87.50	56.10	12.82	66.34	85.29	72.73	40.91	17.65	53.10

This table shows, by country, the share of the following subcategories of issuers in our sample according to all categories used in our analysis: (i) size, (ii) rating, (iii) issuance history, and (iv) private/public status of the firm. The table first breaks our sample between quartiles of total assets. Quartiles are fixed and calculated only once with total assets values for the year 2019. Additionally, each quartile is further broken down between four rating categories: Unrated (NR) for the groups without a rating from S&P, Moody's, or Fitch; High Yield (HY) for all group ratings below 9; BBB for all groups rated between 9 and 11; and Investment Grade (IG), which includes all ratings of 12 and above. Ratings data are obtained from the Corporate Securities database (CSDB) collected by the Eurosystem and harmonized on a scale from 0 to 18 before defining rating subgroups. We identify the share of new issuers in our dataset by collecting information on the first year of issuance of bonds for each group on Capital IQ and/or CSDB. New issuers correspond to any groups that first issued a bond during and/or after 2010. Last, we differentiate between private and public issuers, where public firms are identified via the existence of the ISIN of a public stock in Orbis and/or Capital IQ. The data are expressed in %. "Other Southern Countries" include: CY, ES, GR, MT, PT. "Central, Eastern and Baltic Countries" include: AT, EE, FI, LT, LV, SI, SK.

Table IA.2 – Summary Statistics across Type of Issuers - Size, Across Country

	(1) Germany					(2) France				(3) Italy				
	Q1	Q2	Q3	Q4	Total	Q1	Q3	Q4	Total	Q1	Q2	Q3	Q4	Total
Total Assets (Mlns EUR)	25.53	89.86	406.8	41639.8	32355.7	15.65	1054.2	28459.1	26276.6	31.60	64.21	249.5	29293.8	7144.2
	(6.788)	(21.14)	(417.4)	(50288.0)	(47520.8)	(23.11)	(914.7)	(29523.3)	(29295.3)	(47.72)	(22.10)	(209.8)	(46502.0)	(25910.5)
Bond Share (in %)	38.08	68.84	34.00	73.32	66.80	60.06	45.49	75.32	73.18	27.13	25.76	19.38	70.51	34.91
	(31.86)	(25.83)	(27.10)	(23.09)	(27.84)	(5.179)	(26.04)	(24.30)	(25.36)	(24.93)	(19.24)	(14.06)	(21.55)	(27.99)
Total Credit / Assets (in %)	51.20	30.86	48.86	23.81	28.31	38.12	33.73	25.10	25.85	47.55	41.47	43.07	38.91	42.08
	(19.38)	(25.67)	(16.03)	(22.26)	(23.50)	(20.12)	(30.46)	(20.45)	(21.34)	(27.58)	(21.20)	(20.48)	(27.67)	(23.62)
Profitability (EBITDA / Assets) (in %)	6.497	2.795	3.129	6.554	5.812	0.695	7.862	7.215	7.159	8.066	4.386	3.558	8.209	5.542
	(4.805)	(22.86)	(8.095)	(3.713)	(7.425)	(2.121)	(7.142)	(3.737)	(4.096)	(3.045)	(4.744)	(3.783)	(5.441)	(4.916)
Cash / Assets (in %)	1.929	9.353	10.31	5.847	6.665	12.95	4.038	8.438	8.222	9.586	9.425	6.949	3.058	7.218
	(1.686)	(10.24)	(7.223)	(4.181)	(5.558)	(5.031)	(4.694)	(5.722)	(5.776)	(10.43)	(10.02)	(5.230)	(2.635)	(8.032)
Fixed Assets / Assets (in %)	38.08	47.95	41.09	48.37	47.14	7.142	56.37	38.61	39.28	52.84	34.95	46.63	41.54	42.10
	(16.71)	(26.07)	(34.67)	(29.12)	(29.73)	(12.76)	(38.36)	(30.49)	(31.39)	(28.61)	(24.80)	(22.95)	(26.56)	(25.89)
Bond Yield at Offering (in %)	4.728	4.119	3.622	1.451	1.986	2.950	2.486	1.128	1.243	4.149	3.695	4.065	1.238	3.266
	(2.294)	(1.161)	(1.393)	(1.765)	(1.965)	(0.000000159)	(1.643)	(1.131)	(1.225)	(1.170)	(2.083)	(1.623)	(0.970)	(1.995)
Interest Rate on All Loans (in %)	3.341	3.218	2.156	1.471	1.710	44.57	4.730	2.638	3.394	2.306	2.231	1.966	1.040	1.880
	(0.350)	(1.223)	(0.603)	(0.931)	(1.038)	(26.88)	(6.904)	(5.084)	(7.883)	(0.829)	(1.044)	(1.094)	(0.687)	(1.073)
Interest Rate on Term Loans (in %)	2.200	3.500	2.053	1.531	1.743	0.867	2.256	1.757	1.776	2.304	2.257	1.931	1.028	1.875
	(0.601)	(1.312)	(0.619)	(1.082)	(1.151)	(0.279)	(2.637)	(3.844)	(3.751)	(0.914)	(1.254)	(1.019)	(0.711)	(1.145)
Observations	481					607				345				

	(4) Benelux and Ireland					(5) Other Southern Countries					(6) Central, Eastern and Baltic Countries				
	Q1	Q2	Q3	Q4	Total	Q1	Q2	Q3	Q4	Total	Q1	Q2	Q3	Q4	Total
Total Assets (Mlns EUR)	372.9	674.3	976.6	22042.2	19344.4	13.71	83.02	795.4	23327.6	18360.3	24.20	454.4	934.8	12700.2	8507.2
	(25.20)	(1199.2)	(361.9)	(27384.3)	(26534.9)	(0)	(28.28)	(519.4)	(31853.1)	(29676.2)	(23.71)	(600.8)	(483.2)	(16490.3)	(14439.0)
Bond Share (in %)	55.87	61.57	48.20	86.80	82.26	25.95	54.45	57.66	60.00	59.07	27.07	42.05	54.45	56.72	54.44
	(43.96)	(33.58)	(30.60)	(21.88)	(26.25)	(21.30)	(21.24)	(30.19)	(28.19)	(28.33)	(34.68)	(32.12)	(32.39)	(28.46)	(30.42)
Total Credit / Assets (in %)	28.16	58.71	39.37	25.12	27.31	70.67	49.35	44.02	25.19	29.78	57.01	39.78	34.19	17.94	24.71
	(6.914)	(20.20)	(28.69)	(20.01)	(21.85)	(19.91)	(23.96)	(27.28)	(19.00)	(22.63)	(19.73)	(26.17)	(19.71)	(13.77)	(19.19)
Profitability (EBITDA / Assets) (in %)	-2.519	13.12	7.519	9.441	9.246	21.22	-3.235	6.447	8.856	8.003	11.87	6.736	6.029	6.565	6.615
	(3.577)	(11.36)	(6.045)	(7.000)	(7.144)	(0)	(10.61)	(5.571)	(4.445)	(5.817)	(1.706)	(2.238)	(4.659)	(4.775)	(4.698)
Cash / Assets (in %)	5.725	4.689	11.35	6.782	7.156	1.059	3.107	11.16	8.454	8.583	3.740	3.365	7.734	7.144	7.034
	(1.349)	(3.026)	(11.13)	(5.193)	(6.107)	(0)	(4.248)	(6.404)	(6.333)	(6.461)	(2.799)	(2.696)	(9.659)	(5.543)	(6.858)
Fixed Assets / Assets (in %)	33.70	35.29	51.81	39.20	40.25	25.84	62.42	65.37	44.33	48.46	67.18	61.54	44.85	47.16	47.81
	(33.26)	(26.10)	(36.12)	(28.32)	(29.32)	(0)	(38.24)	(20.79)	(34.24)	(33.53)	(17.46)	(21.60)	(26.63)	(31.63)	(29.87)
Bond Yield at Offering (in %)	4.556	3.061	2.852	1.205	1.434	4.700	4.829	3.306	1.356	1.865	6.727	3.107	3.698	2.492	3.003
	(0.720)	(1.839)	(2.340)	(1.207)	(1.499)	(1.397)	(1.418)	(1.751)	(1.321)	(1.728)	(2.102)	(1.157)	(1.902)	(1.827)	(2.038)
Interest Rate on All Loans (in %)	2.469	2.525	1.656	1.164	1.254	2.248	3.628	2.497	1.762	1.974	1.935	1.792	2.170	1.291	1.577
	(0.539)	(1.620)	(1.376)	(1.136)	(1.200)	(0.102)	(1.728)	(1.288)	(2.378)	(2.242)	(0.458)	(1.056)	(1.021)	(0.596)	(0.849)
Interest Rate on Term Loans (in %)	2.245	1.786	1.486	1.337	1.370	2.286	2.080	2.050	1.597	1.700	2.601	1.785	2.122	1.382	1.647
	(2.420)	(1.845)	(1.234)	(1.900)	(1.851)	(0.143)	(1.539)	(1.191)	(2.327)	(2.145)	(1.433)	(1.040)	(1.047)	(0.586)	(0.878)
Observations	706					471					304				

The table reports means and standard deviations (in brackets) of the main variables of interest for issuers of our sample, broken down by quartiles of total assets. Quartiles are fixed and calculated only once with total assets values for the year 2019. Interest rates are volume weighted. The sample and summary statistics for this table are limited to EA non-financial bond issuers with positive bond outstanding in 2018–2019. "Other Southern Countries" include: CY, ES, GR, MT, PT. "Central, Eastern and Baltic Countries" include: AT, EE, FI, LT, LV, SI, SK.

Table IA.3 – 2018-2019 Summary Statistics: Rating Categories

	A and above	BBB	HY	NR	Total
Total Assets (Mlns EUR)	55653.2	32123.4	7990.1	3258.8	20202.0
	(43762.5)	(35133.4)	(9072.9)	(6479.0)	(32115.2)
Bond Share (in %)	88.76	81.40	73.13	42.76	65.56
	(13.75)	(20.14)	(25.17)	(29.06)	(30.94)
Total Credit / Assets (in %)	26.71	23.72	29.18	34.00	29.05
	(26.17)	(18.52)	(22.12)	(23.51)	(22.66)
Profitability (EBITDA / Assets) (in %)	7.709	9.260	6.709	5.888	7.331
	(4.749)	(5.884)	(4.530)	(6.702)	(6.109)
Cash / Assets (in %)	5.979	6.508	8.404	8.533	7.522
	(4.395)	(5.451)	(6.036)	(7.436)	(6.385)
Fixed Assets / Assets (in %)	44.92	41.35	51.21	42.15	43.52
	(27.70)	(30.46)	(30.50)	(30.87)	(30.44)
Bond Yield at Offering (in %)	0.493	0.853	2.683	3.013	1.936
	(0.484)	(0.784)	(1.847)	(1.898)	(1.835)
Interest Rate on All Loans (in %)	1.265	1.921	1.671	2.415	1.999
	(1.824)	(3.830)	(1.201)	(4.848)	(3.879)
Interest Rate on Term Loans (in %)	1.191	1.671	1.673	1.797	1.658
	(2.590)	(3.157)	(1.391)	(1.194)	(2.232)
Observations	2,914				
Nb of groups (2018/2019)	972				

The table reports mean and standard deviation (in brackets) of the main variables of interests for issuers of our sample, broken down by ratings. Ratings are dynamic overtime and computed for each monthly periods. Interest rates are volume weighted. Sources for Ratings are Moody's, Fitch and SP. The sample and summary statistics for this table are limited to EA non-financial bond issuers with positive bond outstanding in 2018-2019.

Table IA.4 – Bonds Investors Composition in 2019Q4: Cross-Sectional Regressions, Domestic vs other EA investors

	IC & PF		Inv. funds		Other FI		Banks		Central Bank	Households		Other	
	Domestic	Other EA	Domestic	Other EA	Domestic	Other EA	Domestic	Other EA		Domestic	Other EA	Domestic	Other EA
Q1	-0.0220*	-0.0918***	-0.0543***	-0.0844***	0.0273***	-0.0147	0.0711***	-0.00447	-0.0204	0.142***	0.0210	0.0457***	-0.0383**
	(0.0127)	(0.0210)	(0.0126)	(0.0239)	(0.00538)	(0.0131)	(0.00838)	(0.0173)	(0.0143)	(0.00863)	(0.0166)	(0.00402)	(0.0181)
Q2	-0.0130	-0.0449***	-0.0556***	-0.0990***	0.0532***	-0.0215**	0.0422***	-0.0583***	-0.0210*	0.118***	0.0837***	0.0200***	-0.0286*
	(0.0105)	(0.0174)	(0.0104)	(0.0197)	(0.00445)	(0.0108)	(0.00693)	(0.0143)	(0.0118)	(0.00714)	(0.0137)	(0.00333)	(0.0149)
Q3	0.0126*	-0.0106	-0.0256***	-0.0675***	0.0125***	-0.00211	0.0462***	-0.0213**	-0.0135*	0.0493***	0.0315***	0.0154***	-0.0120
	(0.00722)	(0.0120)	(0.00716)	(0.0136)	(0.00307)	(0.00746)	(0.00477)	(0.00983)	(0.00812)	(0.00492)	(0.00945)	(0.00229)	(0.0103)
Private	-0.00183	-0.00165	0.00993**	0.00993	0.0228***	-0.0154***	0.0135***	-0.0233***	0.000521	0.00593*	-0.0362***	-0.00598***	-0.0350***
	(0.00488)	(0.00808)	(0.00483)	(0.00919)	(0.00207)	(0.00504)	(0.00322)	(0.00664)	(0.00549)	(0.00332)	(0.00638)	(0.00155)	(0.00695)
HY	-0.0333***	-0.0482***	0.00327	0.0956***	0.00203	0.0238***	-0.0128***	-0.0188***	-0.0473***	-0.00573*	-0.0382***	-0.00594***	-0.0493***
	(0.00436)	(0.00722)	(0.00432)	(0.00820)	(0.00185)	(0.00450)	(0.00288)	(0.00593)	(0.00490)	(0.00296)	(0.00570)	(0.00138)	(0.00621)
NR	-0.0223***	-0.0274***	0.0264***	0.0295***	0.0118***	0.000686	0.00192	-0.0119*	-0.0529***	0.00732**	-0.00995*	0.00477***	-0.0339***
	(0.00455)	(0.00755)	(0.00451)	(0.00858)	(0.00193)	(0.00470)	(0.00301)	(0.00620)	(0.00512)	(0.00310)	(0.00596)	(0.00144)	(0.00649)
Observations	15,895	15,895	15,895	15,895	15,895	15,895	15,895	15,895	15,895	15,895	15,895	15,895	15,895
R^2	0.006	0.006	0.004	0.011	0.042	0.004	0.021	0.005	0.015	0.049	0.006	0.017	0.011

This table displays the results from estimating a cross-sectional regression of the investor holding shares of bonds on firms' characteristics, after classifying the investors between 2 groups: domestic investors, where the investors are domiciled in the same country as the bond issuer, and other EA investors, where the investors are domiciled in a different country than the bond issuer's. Specifically, size dummies, a variable equal to one if the firm is private, and rating categorical variables are included. The dependent variables are constructed as the share of each firm's total outstanding bonds held by each investor type. For this table data from only 2019Q4 are included. The source of this data is the Securities Holdings Statistics by Sector (SHSS) for debt securities issued by non-financial corporations. Standard errors, in parentheses, are corrected for clustering of the observations at the firm level. $p < 0.10$, $p < 0.05$, $p < 0.01$

Table IA.5 – Maximum Absolute Difference in Spread – By Size

(a) Q1 and Q2

	(1)	(2)	(3)
IC & PF	0.00840	0.113	-0.0944
	(0.596)	(0.617)	(0.964)
Other FI	-0.0832	-0.0836	0.422
	(0.601)	(0.609)	(1.244)
Banks	-0.383	-0.282	-1.287
	(0.561)	(0.566)	(1.236)
Households	0.197	0.259	1.681
	(0.511)	(0.512)	(1.176)
Log(Bond Size)	Yes	Yes	Yes
Log(Residual Maturity)	Yes	Yes	Yes
Rating	Yes	Yes	Yes
EUR Denominated	Yes	Yes	Yes
Industry*Country	Yes	Yes	Yes
Senior Bond	No	Yes	Yes
Call Option	No	Yes	Yes
Floating rate coupon	No	Yes	Yes
Group	No	No	Yes
R-squared	0.457	0.468	0.869
N	192	192	192

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(b) Q3 and Q4

	(1)	(2)	(3)
IC & PF	-0.179**	-0.189**	-0.136
	(0.0858)	(0.0873)	(0.0878)
Other FI	0.146	0.149	0.212
	(0.130)	(0.130)	(0.133)
Banks	-0.387***	-0.388***	-0.356***
	(0.0894)	(0.0905)	(0.0913)
Households	-0.115	-0.135	-0.175
	(0.138)	(0.138)	(0.145)
Log(Bond Size)	Yes	Yes	Yes
Log(Residual Maturity)	Yes	Yes	Yes
Rating	Yes	Yes	Yes
EUR Denominated	Yes	Yes	Yes
Industry*Country	Yes	Yes	Yes
Senior Bond	No	Yes	Yes
Call Option	No	Yes	Yes
Floating rate coupon	No	Yes	Yes
Group	No	No	Yes
R-squared	0.153	0.159	0.618
N	2731	2731	2731

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

This table displays the results from estimating a cross-sectional regression on the maximum increase in spread at the bond level between 2019 Q4 (October-December) and June 2020 on investor sector shares of the same bond at the end of 2019 and a series of interacted fixed effects. Investment (mutual) funds is the excluded category. The dependent variable is constructed as the maximum absolute difference between the spread of bond yields - expressed in % - to the (maturity-matched) AAA-rated sovereign bonds in the euro area for the window of February to June 2020 compared to the value of the spread in 2019 Q4 (October-December). The maximum absolute difference is kept. Outliers with an absolute maximum difference larger than 10% are dropped from the analysis. The sources of this data are the Centralised Corporate Security Database (CSDB) for debt securities issued by non-financial corporations, the Securities Holdings Statistics per Sector (SHSS), the Orbis database for the industry classification of the firm, as well as the euro area AAA sovereign yield curve. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Q1	Q2	Q3	Q4	All Firms
A	0	0	3	20	23
A (%)	*0*	*0*	*50*	*55.56*	*53.49*
BBB	0	1	0	44	45
BBB (%)	*0.00*	*100.00*	*0.00*	*45.83*	*44.12*
HY	0	3	10	20	33
HY (%)	*0.00*	*100.00*	*58.82*	*50.00*	*54.10*
NR	129	138	128	60	455
NR (%)	*56.33*	*60.00*	*58.99*	*58.25*	*58.41*
New issuers	121	132	107	43	403
New issuers (%)	*55.25*	*62.26*	*59.78*	*51.81*	*58.15*
Private issuers	118	127	93	24	362
Private issuers (%)	*58.42*	*63.50*	*65.49*	*63.16*	*62.20*

Table IA.6 – Number of Firms and Share of Private, Rated, & New Issuers by Size which Received a Public Guarantee during Covid

This table shows the number of firms of the following subcategories of issuers which also received a public loan guarantee during Covid: (i) size, (ii) rating, (iii) issuance history, and (iv) private/public status of the firm. The table first breaks our sample between quartiles of total assets. Quartiles are fixed and calculated only once with total assets values for the year 2019. Additionally, each quartile is further broken down between four rating categories: Unrated (NR) for the groups without a rating from S&P, Moody's, or Fitch; High Yield (HY) for all group ratings below 9; BBB for all groups rated between 9 and 11; and Investment Grade (IG), which includes all ratings of 12 and above. Ratings data are obtained from the Corporate Securities database (CSDB) collected by the Eurosystem and harmonized on a scale from 0 to 18 before defining rating subgroups. We identify the share of new issuers in our dataset by collecting information on the first year of issuance of bonds for each group on Capital IQ and/or CSDB. New issuers correspond to any groups that first issued a bond during and/or after 2010. Last, we differentiate between private and public issuers, where public firms are identified via the existence of the ISIN of a public stock in Orbis and/or Capital IQ. The share of firms which received a public loan guarantee is expressed in % and calculated as the total number of firms within a given category (size * rating/new issuers/private firms) that received a public loan guarantee between March 2020 and December 2020, over the total number of firms in that specific category. Public loan guarantees are identified in AnaCredit as loan guarantees granted by Government institutions, as well as any institutions which implemented the public guarantee programs of Euro area governments during Covid (e.g. KfW for Germany)

IA.2 New Bond Issuance and Firms' Balance Sheet

How do new issuers use the funds? An important question is whether bonds simply replace loans in a pattern of pure debt substitution, and we thus investigate changes in new issuers' balance sheets. We construct a firm-level panel of companies in the Eurozone that covers information on firm's balance sheet and debt structure. The main time period spans 2002 to 2018. We gather information about both public and private firms, and restrict attention to non-financial corporations. The public firms panel is constructed by merging two main data sources: Capital IQ and Compustat Global. We also construct a private bond issuers panel by merging balance sheet data from Orbis with bond issuance from Centralized Securities Database (CSDB) maintained by the ECB.

To understand the evolution of the debt and assets more precisely, we run a dynamic regression analysis. For this analysis, we use only the new issuers and the time window of [-3, +5] years from the first issuance. We use D_t time dummies and run the following specification:

$$y_{i,t} = \sum_{t=-3}^{5} \beta_t \left(D_t\right) + \alpha_i + \alpha_t \tag{2}$$

We chose the year before issuance as reference date. The specification includes firm and year fixed effects to capture any firm- or year-specific characteristics. The dynamic evolution of debt for new issuers is presented in Figure IA.8.

Panel (A) shows that for public new issuers total debt increases up to 50% after issuance compared to its pre-issuance level and remains significantly higher for the years after issuance. Bank loans decreases by approximately 10% compared to pre-issuance level, suggesting that new issuers substitute only partially bank loans with bonds. The level of bonds remains high and stable for the five years after the issuance, consistent with the fact that firms do not dramatically adjust their bonds in a short time period. Panel (B) shows very similar dynamics for private issuers, with an even larger drop in non-bond debt.

Figure IA.9 presents the dynamic evolution of firms' assets that follows a bond issuance. Panel (A) shows that public new issuers grow in size by expanding their assets by 15% on average, consistent with limited loan substitution. We also observe that cash rises significantly the year after the issuance but drops in the later years. On the other hand, investment in long-term

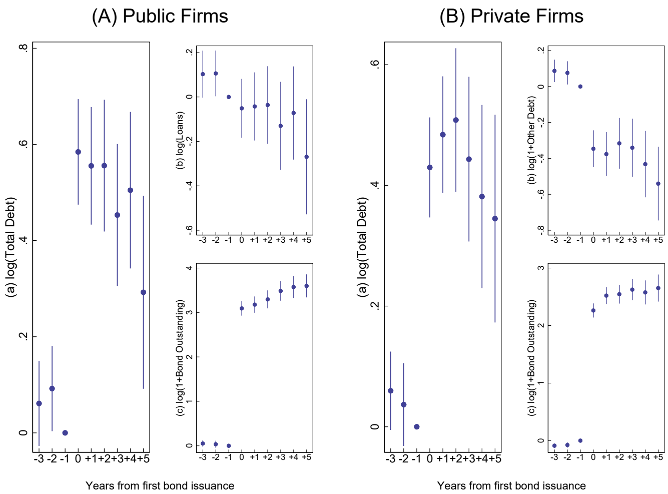

Figure IA.8 – Debts' Dynamics

The figures show the coefficients and the 95% confidence intervals obtained through fixed-effects regressions. Panel (A) and (B) include only public new issuers and private new issuers, respectively. The points are the coefficients resulting from regressing the (A-a, B-a) logarithm of total debt, (A-b) logarithm of loans, (B-b) logarithm of 1 plus other debt, calculated as difference between total debt and bonds, and (A-c, B-c) logarithm of 1 plus bond outstanding, on time dummies for a window of [-3, +5] years from the first issuance. Year and firm fixed effects are included. Standard errors are clustered at the firm level. Each line crossing a point represents the confidence interval for that coefficient.

assets appears to be consistent over the years as firms grow. Panel (B) shows a similar pattern for private firms, with two differences. First, investment is significantly larger: long-term assets grow by about 30%. Second, cash levels grow relatively more and do not revert nearly as fast.

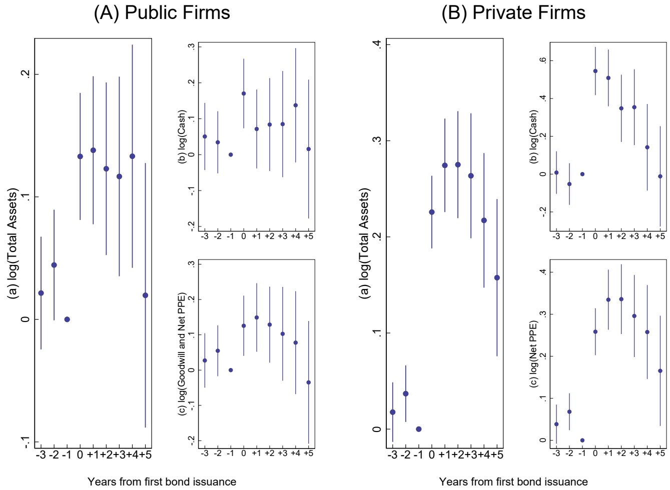

Figure IA.9 – Assets' Dynamics

The figures show the coefficients and the 95% confidence intervals obtained through the fixed-effects regressions. Panel (A) and (B) include only public new issuers and private new issuers, respectively. The points are the coefficients resulting from regressing the (A-a, B-a) logarithm of total assets, (A-b, B-b) logarithm of cash, (A-c) logarithm of the sum of goodwill and net ppe, and (B-c) logarithm of net ppe, on time dummies for a window of [-3, +5] years from the first issuance. Year and firm fixed effects are included. Standard errors are clustered at the firm level. Each line crossing a point represents the confidence interval for that coefficient.

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