BANCA D'ITALIA
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The series is available online at www.bancaditalia.it .

ISSN 1972-6627 (print)
ISSN 1972-6643 (online)

Printed by the Printing and Publishing Division of the Bank of Italy

EVERYTHING YOU ALWAYS WANTED TO KNOW ABOUT GREEN BONDS (BUT WERE AFRAID TO ASK)

by Danilo Liberati* and Giuseppe Marinelli*

Abstract

This paper presents a comprehensive study of the ESG (Environmental, Social and Governance) bond market which has experienced a dramatic expansion in the last few years and is about to gain an additional boost due to the forthcoming implementation of the Next Generation plan of the European Union. We use a security-by-security data set comprising a large sample of ESG bonds (15,500) exchanged on the main global security markets, integrated with microdata used in official statistics such as financial accounts and security holdings. First, we describe the most salient features of the global supply of ESG bonds by analyzing the characteristics of issuers and securities, the differences across countries and sectors, and their evolution over time. Second, we shed light on Italian residents' holdings of ESG bonds with a focus on sectoral holdings in the context of the financial accounts statistics.

JEL Classification: G12, G21, Q56.
Keywords: sustainable finance, ESG bonds, security holdings, financial accounts.
DOI: 10.32057/0.QEF.2021.0654

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*Bank of Italy, Economic Research and International Relations.

1 Introduction[1]

Climate change and its impact on financial markets and institutions have recently become a significant topic in the economic debate.[2] The development of a transitional economic model allowing a sustainable growth is one of the key-challenges for policy makers, economic agents and financial markets in the coming years. The pandemic crisis brought about a *wake-up call* on the correct assessment of the climate-related risks, as pointed out by Schumacher (2020) and Schnabel (2020):

> *The pandemic is therefore a stark reminder that preventing climate change from inflicting permanent harm on the global economy requires a fundamental structural change to our economy, inducing systematic changes in the way energy is generated and consumed.*

The *green finance gap*, i.e. the lack of the necessary financial resources to be addressed towards green investments, represents a relevant limitation for the green structural change of the economy. Apparently, green projects can be judged as not sufficiently attractive for investors due to the seemingly low rate of return[3] and the associated risks.[4] Nevertheless, the rapid growth of the environmental, social and governance (ESG) bond[5] market suggests that a vigorous interest of investors does exist. ESG bonds are debt securities whose proceeds are invested by the issuer so as to pursue environmental, sustainability and social purposes such as the reduction of CO_2 emissions, the increase of energy efficiency, enhancement of the health care and of workers' conditions in terms of safety, inclusion. The increasing importance of such instruments is proven by the fact that the main stock exchanges of the world have all launched sustainable/green market segments or have come to participate in the Sustainable Stock Exchanges initiative.[6]

The ESG bond market can be analyzed in several aspects. A first focus area is represented by the implications that the environmentally-sustainable finance has on the issuing firms value. Issuances of ESG bonds are generally more expensive than those of conventional securities due to the external and independent reviewer cost to certificate that the use of the proceeds of the green bonds is aligned to ESG criteria. On the other hand, issuing ESG debt securities represents a positive signal in terms of transparency and firms' value may increase in the long-run[7] benefiting of a reduced level of information asymmetry.

Second, green bonds may turn out to be a convenient source of funding. Many studies have tried to verify the existence of a *greenium puzzle*, i.e. a negative premium on ESG debt securities,[8]

[1]We would like to thank Paolo Angelini, Silvia Fabiani, Laura Graziani Palmieri, Luigi Infante, Giorgio Nuzzo, Alfonso Rosolia, Roberto Sabbatini, Luigi Federico Signorini and the participants who attended the Bank of Italy seminar (Rome, July 2021) and the International Conference on Statistics for Sustainable Finance (Paris, September 2021) for the useful comments. The opinions expressed and conclusions drawn are those of the authors and do not necessarily reflect the views of the Bank of Italy and of the Eurosystem.

[2]See the 2015 Paris Agreement and the 2030 Sustainable Development Agenda.

[3]See Yoshino et al. (2019).

[4]Hafner et al. (2020) claims that investors' reluctance regarding green investments depends on several factors as the lack of confidence given the technology risks, lack of information and experience, unstable energy policies, high transition and commercialization costs, etc..

[5]We will be using 'ESG bonds' and 'ESG debt securities' interchangeably throughout the paper when referring to the whole set of debt securities with the ESG label and belonging to the commonly-known sustainable market. Indeed, green bonds represent 85% percent of our ESG dataset; furthermore, in some few cases we find a misclassification among sources for the same security, in particular for green and sustainable securities.

[6]See https://sseinitiative.org and https://www.climatebonds.net.

[7]On the other hand, the "*greenwashing*" phenomena may arise when the communication strategy of firms addressed to enhance their environmental reputation is not supported by data and results, or it is voluntary used to distract investors from the true profile of the company.

[8]The expression "*greenium*" is usually specifically referred to green bonds but for the sake of brevity we will be using it for the entire set of ESG bonds.

thus implying that investors obtain lower returns from such instruments when compared to the conventional counterparts. At the same time this would result in lower borrowing costs for issuers offering ESG instruments to investors.

Third, the transition to a low-carbon economy can be favored by the role of policy makers as central banks and regulators. Hence, both macroprudential and non-standard monetary policies might affect investments in climate-friendly or sustainable assets mitigating CO_2 emissions and favoring green projects financing. This claim becomes even more relevant starting from 2020, with the Covid-19 shock hitting the global economy and slowing down green investments, as shown by Guérin and Suntheim (2021). A special role could be played by Governments leading and managing the ecological transition:[9] following the positive experiences of Germany and France, in March 2021, to finance public expenditures with positive environmental impact, Italy successfully issued its first green bond with an enthusiastic response of investors.[10]

The contribution of this paper is twofold. First, we comprehensively describe the global supply of ESG bonds over time, across countries and sectors with an analysis of the amount issued, the number of issuers, maturity, riskiness and liquidity. Second, we focus on Italian residents' holdings of ESG debt securities and we show the increasing weight of such instruments in financial portfolios of banks and institutional investors. The rest of the paper is structured as follows. The next section provides a review of the growing literature on ESG instruments; section 3 describes the construction of the data set whereas section 4 and section 5 focus on the characteristics of the global supply of ESG bonds and on Italian residents' holdings, respectively. Finally, section 6 concludes.

2 Literature Review

Green bond markets can play a pivotal role in financing the transition to a low carbon economy and a more sustainable growth (Sartzetakis, 2021). This process can be supported by financial intermediaries: despite, the increase in green bonds' issues banks do not seem to play a relevant role in the promotion of green projects. Xiao et al. (2021) show that the regulatory arbitrage mechanism is a more relevant motivation for Chinese commercial banks to issue green bonds rather than the climate goal. Barua and Chiesa (2019) focus on the factors affecting the amount of funds raised through the green bond supply: they find that the average funding size is significantly lower for high-grade bonds whereas no significant effects are found in the case of banking issuances. In this respect, based on the maturity mismatch between the asset and liability sides of banks' balance sheets and the comparable costs between green and conventional securities issues, Gianfrate and Lorenzato (2018) provide best practices to promote capital allocation towards green projects by non-bank financial institutions, such as mutual funds and insurance companies. Moreover, Riedl and Smeets (2017) find that social preferences and signaling play a more relevant role with respect to the financial motives for socially responsible investment (SRI) decisions. Hartzmark and Sussman (2019) point out that sustainability can be viewed as positively predicting future performance in US mutual funds market, even if no evidence supports that high-sustainability funds outperform low-sustainability ones.[11]

Nowadays, climate-related objectives can be read in the agenda of central banks both from a macroprudential and monetary policies point of view (Bernardini et al., 2021). On the macro-

[9] See also the recent remarks by Banca d'Italia Governor at the 'Financing Carbon Neutrality' Round Table of the annual conference of the Boao Forum for Asia and the presentation of the G20 TechSprint 2021 on sustainable finance.

[10] See the MEF Press Release.

[11] See also ECB (2020) (Box 7) for an overview of the performance and resilience of the euro-denominated ESG funds and green bonds.

prudential side, a special focus is devoted to the effects of the so-called *brown penalizing factor*, i.e. a setup where carbon-intensive assets are penalized with a relatively higher risk-weight in capital requirements' calculations, in contrast to the a "*green supporting factor*" that adjust capital requirements for green bonds (Thomä and Gibhardt, 2019). In this respect a critical review of the current prudential framework is provided by D'Orazio and Popoyan (2019) who find that a unique instrument for all scenarios does not exist even if buffers built during the carbon-intensive credit cycle could be favorable too. From a monetary policy perspective, by using a stock-flow-fund ecological macroeconomic model, Dafermos et al. (2018) provide evidence for a climate-induced financial instability characterized by a rise of defaults and an asset price deflation process that may be reduced by a green quantitative easing (QE) programme; similarly, strong effects in reducing detrimental emissions, are found by Ferrari and Nispi Landi (2020) by running a temporary green QE in a DSGE model based on the assumption that green and conventional bonds are not perfect substitutes. Returns of the two kind of securities may be affected by exogenous shocks such as the Covid-19 pandemic one. Yi et al. (2021) find that the pandemic shock increased the cumulative abnormal returns of the Chinese green bond markets due to the production stop – in particular for industries financed by green bonds – which determined both a decrease of the demand for green energies and the increase in the duration of the green bond projects. In this respect, a recent analysis by Ayaydin et al. (2021) argue that, following the COVID-19 pandemic, the performance of green securities may outperform that obtained by brown bonds. Moreover, based on the new definition of ESG risk scores – measuring firms' exposure to ESG-related risks – provided by Morningstar, Ferriani and Natoli (2020) show how, after the Covid-19 outbreak, investors preferred to invest in low-ESG-risk funds (that have performed better than their peers) in order to hedge against further market downturns.[12]

Empirical literature on the existence and the sign of a premium for investing in ESG bonds focuses on the green market and on the commonly denominated *greenium* showing mixed results.[13] By examining data on US-issued green bonds reported by Bloomberg at the end of 2017, Zerbib (2019), after running a matching procedure, estimate a negative yield differential between a small sample of green bonds and a counterfactual group of conventional securities. Similar conclusions are reached by Ehlers and Packer (2017) for the primary market even if no differences in the performance between green and conventional assets are found in the secondary market.[14] A negative premium is also estimated by Baker et al. (2018) for US municipal bonds after-taxes adjustments and by Gianfrate and Peri (2019) for the euro-denominated green bonds. Nonetheless, security and issuer characteristics can play a role in determining the existence of a *greenium*: Fatica et al. (2021) find a negative and statistical significant *greenium* when issuers are supranational institutions or corporates but no evidence arises if the issuer is a financial institute; similar results are found by Kapraun and Scheins (2019). Alessi et al. (2019) show that the risk premium related to the green financing investing is also negative when one considers the companies' greenhouse gas emissions and the quality of their environmental disclosures. Tang and Zhang (2020) find no statistically significant premium in favor of green bonds in a sample of securities drawn from Bloomberg and the Climate Bond Initiative (CBI). This result is confirmed by Larcker and Watts (2020) when only US municipal securities are considered; moreover Doronzo et al. (2021) find a substantial alignment between yield of green and conventional bonds both in the primary and secondary markets (also during the Covid-19 crisis) when only sovereign issuers are analyzed. Higher returns for green bonds are instead found by Bachelet et al. (2019)

[12]See Faiella and Malvolti (2020) for an assessment of the climate risk for the Italian finance.

[13]For surveys on this topic see Liaw (2020) and Cheong and Choi (2020).

[14]Ehlers and Packer (2017) point out as issuing green bonds is a costly transaction due to the third-party validations in order to reduce informational asymmetry and the risk of *greenwashing* (Baker et al., 2018). In this respect, Hyun et al. (2020) examine the green bond market investors' pricing, by finding that green bonds have lower yields than the conventional ones.

who also verify whether volatility and liquidity of green assets is affected by the presence of a third-party certification of *greenness* of the bonds. Higher returns for green bonds are also found by Karpf and Mandel (2017) by using the Oxaca-Blinder decomposition over a large sample of US municipal bonds.

3 Data

An official register of ESG bonds does not exist. According to International Capital Market Association (ICMA)[15] ESG data base providers do not usually disclose securities' standard identification codes, such as the ISIN ones, or do not allow for a massive filtering based on the green label flag. Furthermore, ESG bonds can be labeled or not: the green bond label is only assigned to instruments that meet specific criteria defined by international guidelines such as those published by ICMA and CBI. In this respect, data providers may publish both labeled and unlabeled ESG bonds and/or use different certification standards.[16] To overcome such practical issues, we construct a unique multi-source database by exploiting public information on ESG bonds with no distinction on the type of certification standard used to assign the ESG flag (subsection 3.1). Detailed information on the characteristics of securities and issuers are subsequently derived by using structured data bases as the Centralised Securities Database, the Securities Holdings Statistics and the intermediary supervision statistical reporting (subsection 3.2).

3.1 Identification of ESG Bonds

The first and crucial component of our comprehensive list is represented by ESG debt securities which are quoted on dedicated ESG bond market segments of the most prominent exchanges around the world up to the end of March 2021. The initial list of ESG debt securities comprises 15,529 ISIN codes. The main part of the list of ESG securities has been compiled thanks to a web-scraping procedure extracting the ISIN codes[17] of the debt securities listed on the ad-hoc segments of the on-line market platforms. Since the sustainable bonds represent a recent phenomena and given their average long maturity, our dataset contains almost all of the securities issued and/or exchanged on the market. Almost all securities contained in this component are labeled ones and received favorable pre-issuance external reviews.

A second block of our list has been hand-collected by exploiting publicly available information on ESG bonds published by providers such as CBI, Environmental Finance (EF) and ICMA.[18] By using information on the issuer (such as the residence country and the type) and on the issuance (face value, currency, issue and maturity dates) we scan issuers' official web sites and the main financial data market platforms to find the relevant ISIN codes.[19]

[15] For more details see the summary of Green/Social/Sustainable Bonds Databases.

[16] Evaluation steps and methodologies to flag a bond as "*green*" may slightly change based on different procedures. Generally, on voluntary basis, ESG issuers try to design their ESG framework/bonds to respect the most important criteria and guidelines as the *Green, Social and Sustainability-Linked Bonds Principles* (https://www.icmagroup.org/sustainable-finance/), the Climate Bonds Standard (https://www.climatebonds.net/market/best-practice-guidelines) or the recent release of the EU Green Bond Standard. Nonetheless, validation provided by independent external reviewers can be distinguished in different types of services (Second Party Opinion, Verification, Certification or Bond Scoring/Rating) based on the tightness, timing (before or after the issuance) and focus of the evaluation. For more details see Ehlers and Packer (2017) and the Guideline for the external reviewers published by the ICMA.

[17] In some cases the ISIN codes are not available. In particular, for US and Canadian' securities we detect their CUSIP codes – specific identifiers used by the North-American States – and convert them in ISIN codes by using the Luhn algorithm specified in ISO/IEC 7812-1.

[18] See subsection A.1.

[19] The platform Cbonds is a useful tool for a global bond market screening: it provides detailed information on

A third component of the list is derived from the published basket composition – if available at ISIN level – of some of the main green indexes, such as the Solactive Green Index or the China Green Bond Index, or the sample definitions of previous studies of investment banks' or research institutes. Finally, we exploit information from the web sites of the main national and supranational institutions reporting their ESG issuances and programs.

The relative importance of a source can be understood through the number and volumes of ESG securities being listed. The same security may be listed on different platforms or used by more reports (Table A.1). By focusing only on the green segments of exchanges we can observe the weight of the Luxembourg Stock Exchange whose green segment contains 961 ESG securities for a nominal value of euro 475 billion, of which the largest shares are referred to green and sustainable bonds. Other significant sources are the German and the Italian exchanges reporting ESG securities for a total volume of euro 260 billion each (Table A.2). Additionally, an important source of information is Euronext that lists ESG bonds from the Amsterdam, Brussels, Dublin, Lisbon, Oslo and Paris exchanges.

3.2 Securities' Information

After the identification of the ESG bonds we use other databases to obtain details on the instruments and on their issuers. To this end we draw information from the Bank of Italy Securities Data Base and the European Central Bank Centralised Securities Data Base (CSDB) from which we obtained security and issuer characteristics such as the country and the institutional sector of the latter and the price, maturity and currency of the former. Since CSDB data provides information on securities issued by EU residents and/or held and transacted by EU residents as well as securities denominated in euro, some ESG bonds, mainly those issued by US municipalities, are excluded once we merge the ESG list with the CSDB. Remarkably, many US ESG bonds are issued by municipalities or are asset-backed securities (ABS) issued by government-sponsored agencies such as Fannie Mae or Freddie Mac.

Once we have identified ESG bonds and found their characteristics, we investigate if and to what extent they are present in Italian residents' portfolios. The third component of our data set is based on data drawn from Bank of Italy supervisory statistics on individual banks' and mutual funds' balance-sheets. Data on banks have been aggregated at banking group level when applicable.[20] Such information are collected at security level which allows us to precisely identify the ISIN codes belonging to the above-mentioned list of ESG bonds. We complemented data on banks' and mutual funds' balance-sheets with those drawn from the Bank of Italy Securities Holdings Statistics (SHS) in order to exploit detailed information on the portfolios of other institutional sectors, i.e. insurance corporations and pensions funds, households and non-financial corporations. Finally we extensively use the official harmonized statistics on sectoral financial accounts compiled by the Bank of Italy on a quarterly basis (Banca d'Italia, 2018) as we need them to scale the sectoral issues and holdings of ESG bonds and to compare the dynamics of sectoral portfolios of financial assets.

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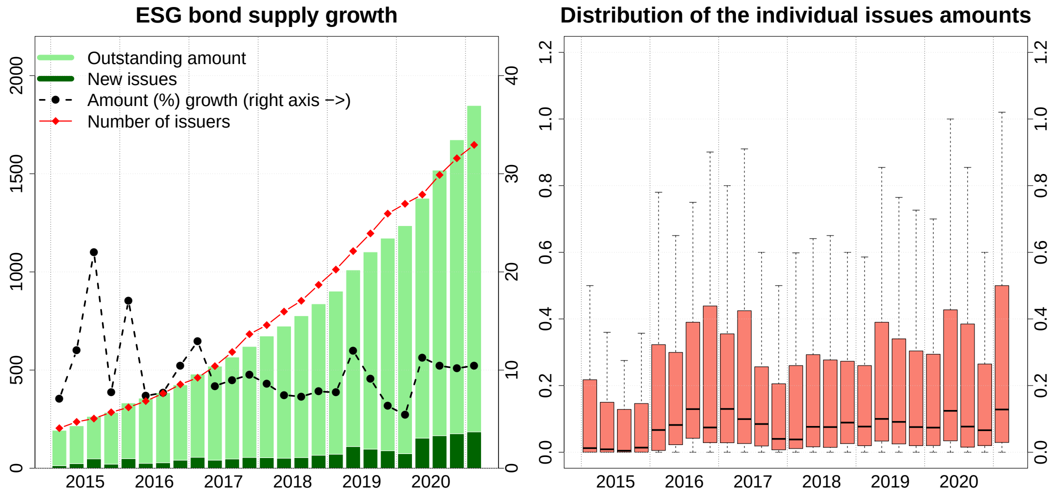
securities from 180 countries (100% coverage of Eurobonds worldwide) and attaches the 'green bond' label when applicable. Moreover, in presence of US municipalities a useful instrument to obtain the securities' identifiers and to control for the multi-tranche cases is the Electronic Municipal Market Access (EMMA) Dataport where it is possible to download all official statements of issues by US municipalities.

[20]The observational unit is the banking group or the stand-alone bank if not affiliated to any banking group. For the sake of brevity we will be using the term 'bank' to indicate the above-mentioned observational unit.

4 ESG Bond Supply

The supply of ESG bonds has experienced a dramatic rise in the last few years (Figure 1). At the beginning of 2015 the outstanding amount of ESG debt securities issued, including supranational entities, was equal to euro 193 billion whereas at the end of the first quarter of 2021 has reached almost euro 1,850 billion.[21] The annual net flows were euro 104 billion in 2015 and 567 billions in 2020 (185 in the first quarter of 2021) with a quarterly growth rate of 10% in the last few quarters after the slowdown due to the Covid-19 shock. Similarly, in the same time span the number of issuers has widened from 204 to more than 1,600 (Table A.3).[22] The distribution of the face value of the securities is rather dispersed (Figure 1, right panel) reflecting the wide variety of countries and sectors whose bonds are covered in our sample. The median volume of the bonds is always lower than euro 100 million whereas the 75^{th} percentile ranges between euro 150 and 480 million.

Figure 1: **ESG Bond Supply Expansion**
(euro billions and percentage values)



Source: elaborations on data drawn from the ECB Centralised Securities Data Base. The left panel of the figure depicts the outstanding amount reported in euro billions, the corresponding quarter-on-quarter growth rate and the number of issuers of ESG debt securities between 2015 and 2021. In rightmost panel the box and whiskers plot represent the distribution of individual amount ESG debt securities issues between 2015 and 2021. The three lines of the box represent, from bottom to top, the 25th, 50th and 75th percentiles of the distribution in a given quarter whereas the lower and the upper whiskers represent the 5th and 95th percentiles.

Leaving aside the role of the supranational issuers, a geographical overview of the ESG security issuers in our data set is illustrated in Figure A.1 and Figure A.2 showing that in our sample China is the most represented country having a share equal to 21 and 17% in terms of, respectively, amount issued and deals.[23] Other key-countries in the ESG bond supply are

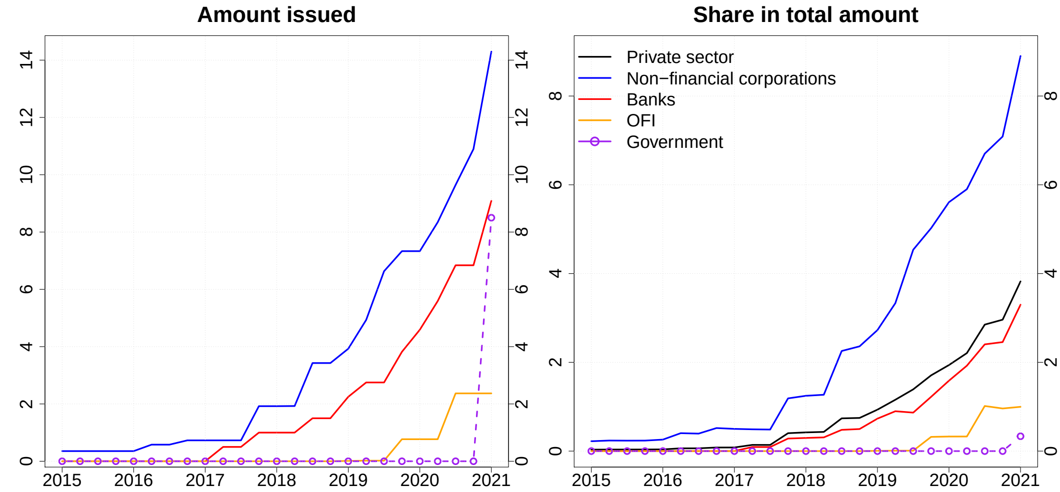
[21] If we consider the global outstanding amount of debt securities according to the BIS, the proportion of ESG bonds in total debt securities amounts to 1.6%. Such share is 2.5% for the private sector.

[22] The "climate awareness bond", issued by the European Investment Bank (EIB) in 2007, is generally considered the first green bond. On the other hand Tang and Zhang (2020) and Lebelle et al. (2020), among the others, document that the sustainable instruments market started to be relevant only after 2013 due to the increase of issues by commercial banks and corporation and the release of the Green Bond Principles by ICMA.

[23] The China Green Bond Index provided by the Luxembourg Stock Exchange includes bonds which are com-

the US, South Korea, Japan and Canada. As already mentioned, the relative importance of the countries represented in our sample reflects the fact that the initial comprehensive list of securities is merged with the CSDB, thus leading to a loss of non-euro-denominated instruments or other instruments which are not held by euro area residents. In Europe, whose securities represent almost half of the volumes of the ESG bonds in our sample, the most significant countries are Germany and France (Figure A.3). At the end of the first quarter of 2021 the largest amount of ESG securities is issued by China (euro 328 billion) followed by France and Germany with a bit more than euro 200 billion (Table A.4). The median volumes of security tranches is less than euro 100 million whereas the average maturity is rather long, coherently with the long duration of the projects financed by green bonds.[24] ESG securities issued by UK (20.3 years), US (13.3 years) and Canada (13.7 years) tend to have longer maturities whereas residents in Asian countries – namely China (7.6 years), Republic of Korea (5.2) and Honk Kong (7.2) – tend to issue shorter maturity instruments. When considering the median value of the ESG bonds, French, German and US issuances are characterized by lower face values – less than euro 50 million – whereas Dutch, Italian and Belgian ones are ten times bigger (euro 500 million). The number of issuers is in the order of hundreds in China, US and Japan, it is more limited in Italy (33) and Spain with France and Germany in the middle.

Figure 2: **ESG Bonds issued by Italian Residents**
(euro billions and percentage values)



Source: elaborations on Bank of Italy's Financial Accounts. The figure reports data on the amount of ESG bonds issued by Italian residents (right panel) and the share of this amount in total volumes of debt securities issued by issuer sector.

Most of the securities in our sample are denominated in euro and US dollars (Table A.3): in the first quarter of 2021 two-thirds of the ESG bonds were euro or US dollar denominated. Italian issuers represent 1.9 per cent of the total whereas German and French issuers are about 22

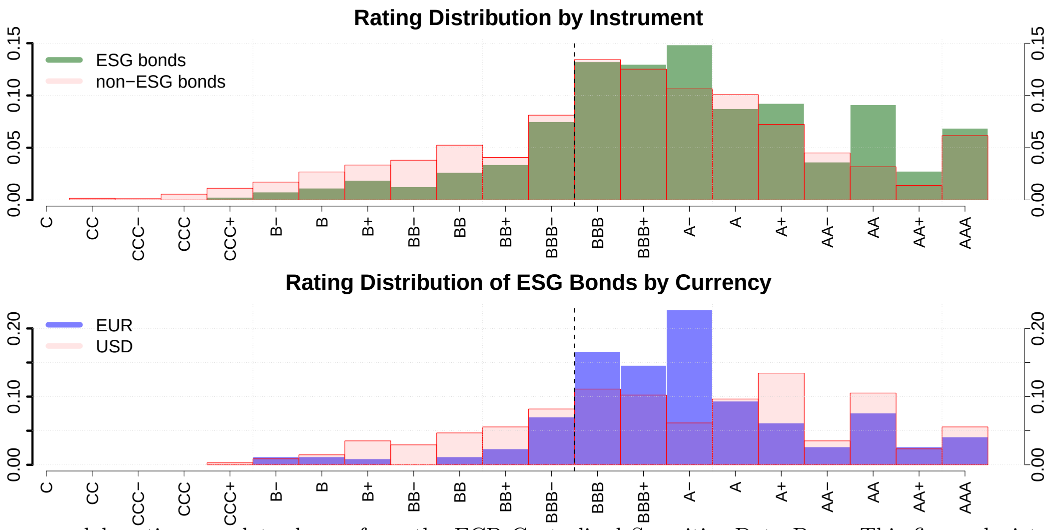
pliant with different green bond principles. In this respect, the minimum share of the proceeds should be used in green projects to mark a security as 'green' ranges between 50% (in the case of People's Bank of China – PBOC – Green Bond Endorsed Project Catalogue and the National Development and Reform Commission – NDRC – Green Bond Guidelines) and 95% (in the case of CBI Climate Bonds Standards). This explains our sample's higher coverage of Chinese bonds than those reported on the CBI platform. For more details on the key differences between international and domestic standards see also Clifford Chance (2020).

[24] In August 2019, a French State-owned company issued the world's first ever 100-year green bond.

per cent of the total. Interestingly, the Chinese sustainable market seems to have a very relevant role from the beginning of our sample period. In this respect, Table A.5 reports information about the ESG bonds' supply by country and sector of the issuer: overall, financial issuers have a prominent role in addressing resources by issuing ESG bonds. Nonetheless, this view slightly change at country level. Hence, on the one hand in Germany and France a pivotal role is played by the Government, consistently with a public strategy for the green financing; on the other hand, in China and US the non-government sectors prevail and over 50% of the volumes are issued by non-financial corporations. In Italy one can observe a certain balance between financial and non-financial private institutions whereas the government has launched its first green bond issuance (*BTPs Green*) only in March 2021.[25]

The ESG bond supply by Italian residents has expanded at the same pace as the global one. The total amount of ESG debt securities issued by Italian residents has jumped to euro 34 billion in the first quarter of 2021 thanks to the already-mentioned euro 8.5 billion issuance by the Italian government. Nonetheless the largest issuers are the non-financial corporations and the banking sectors with, respectively, euro 14 and 8 billions of bonds issued (Figure 2, left panel). Over the total amount of debt securities issued by the private sector, ESG bonds reached 3.8% in March 2021 (Figure 2, right panel). Such share is even higher for non-financial corporations (9%) and slightly smaller for banks.

Figure 3: **Debt Securities Ratings - March 2021**



Source: elaborations on data drawn from the ECB Centralised Securities Data Base. This figure depicts the distribution of ratings across categories of securities in the sample. The dotted vertical line at *BBB-* delimits the investment grade region from the non-investment grade one.

The risk profile of the ESG bonds supply is skewed towards the lower-risk area when compared to conventional ones. The top panel of Figure 3 shows that the rating distribution for ESG bonds is more concentrated in the investment grade area than their conventional counterparts with peaks in the *A-* and *AA* levels. The lower panel of Figure 3 shows the comparison between euro-denominated and USD-denominated securities within the ESG subsample. The rating distribution of euro-denominated bonds is more concentrated in the investment grade area especially around the *A-* level. The rating distribution of USD-denominated ESG bonds is characterized by less pronounced peaks in the investment grade area. Differences in the rating

[25]For more details see also Banca d'Italia (2021).

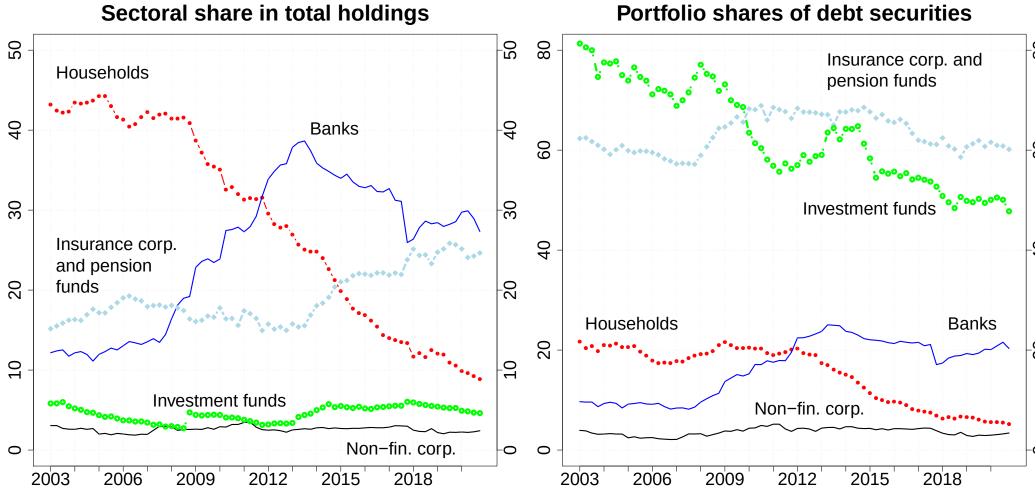
distribution may reflect differences in the characteristics of the issuers. Low-risk corporations or triple-A governments may be more willing to issue ESG bonds as they are considered more credible in their commitment to use the bond proceeds in green or sustainable projects. Hence we suspect that the lower-risk profile of ESG bonds merely reflects a self-selection bias.

5 Italian Residents' Holdings of ESG Bonds

Debt securities are a key component of Italian residents' portfolio with the share of total financial assets being equal to, on average, 19% in the last two decades even though their weight has been declining since the 2011 sovereign debt crisis and the Italian banking crises of the following years. The households sector held more than 40% of Italian residents' debt securities before the Lehman collapse at the end of 2008 and has progressively reduced its exposure down to less than 10% in 2020 (Figure 4, left panel). Banks, insurance corporations and pension funds have replaced households as leading sectors in bond holdings with a share of, respectively, 25% and 30% in 2020. The picture within sectors is mostly consistent with that across sectors. Banks have experienced an increasing weight of bonds in their portfolios from 10 to 20% (Figure 4, right panel) whereas the portfolio share of insurance corporations and pension funds has been stable around 60% and that of investment funds has been declining from 80% to 50%.

Figure 4: **Debt Securities held by Italian Residents**

(percentage values)



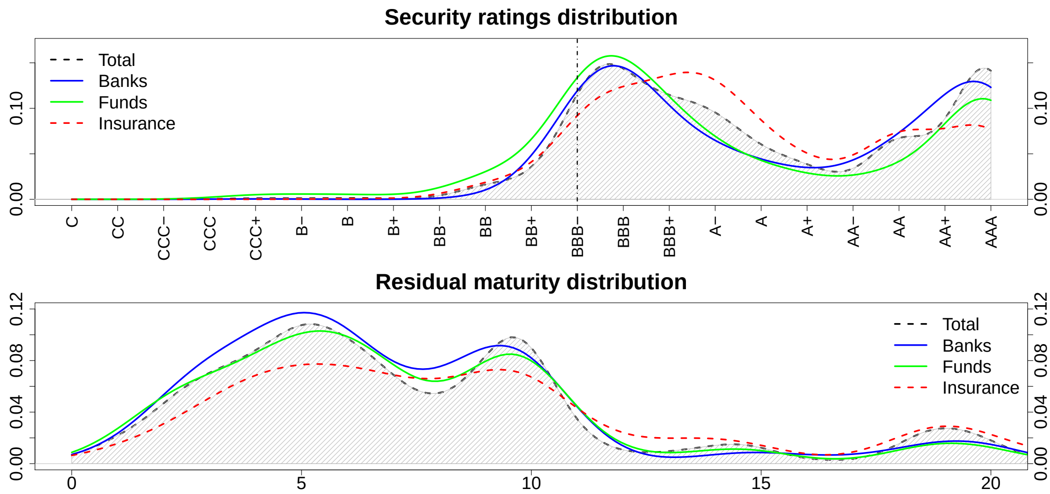
Source: Bank of Italy's Financial Accounts. The left panel of the figure depicts the sectoral share in total debt securities held by Italian residents between 2003 and 2020. The rightmost panel depicts the portfolio share of debt securities across Italian sectors between 2003 and 2020.

Against this background, the rise of the global supply of ESG bonds has been mirrored by a similar growth of their weight in Italian residents' portfolios. The amount of ESG instruments in Italian residents' portfolios, which was negligible 5 years ago, has steadily increased up to euro 16.6 billion in 2019 and has more than doubled in the last 5 quarters reaching euro 37.4 billion at the end of the first quarter of 2021 (Table A.6). The share of ESG bonds in total holdings of debt securities amounts to 1.4% at the end of 2020 and to 1.9% in the following quarter. The vast majority of the ESG instruments are denominated in euro (92%) and exchanged on regulated markets (88%). Portfolios are rather diversified when considering the number of issuers – almost

500 –, securities – more than 1,000 – and countries. Nevertheless ESG securities issued by Italian residents represent less than one third of the bond portfolios (Table A.7) whereas among the non-resident issuers France, Netherlands, Germany and Spain represent 40%. Other prominent ESG issuers, whose securities are held by Italian residents, are supranational entities, namely the European Union (EU), the International Bank for Reconstruction and Development (IBRD) and the European Investment Bank (EIB) together accounting for 15% of bond portfolios. The share of ESG instruments exchanged on regulated markets is almost 100% for securities issued by non-residents whereas it falls to two thirds for those issued by residents.

More than 70% of Italian residents' portfolios of ESG bonds are represented by securities issued by non-resident institutions (Table A.8). Instruments issued by supranational entities[26] and non-resident financial intermediaries represent more than one fourth of the ESG bond portfolio, followed by those issued by foreign non-financial corporations and general governments. Lower shares concern domestic banks and non-financial corporations and non-resident banks.

Figure 5: **Holdings characteristics by sector**
(rating class and years)



Source: elaborations on data drawn from the Bank of Italy Securities Data Base. The top panel depicts the distribution of the ratings and of the residual maturity of ESG debt securities held by Italian residents. The 21 categorial rating classes of the three main rating agencies – Moody's, Fitch and Standard & Poor's – have been mapped into a sequence of integers going from 1 (C rating) to 21 (AAA rating) on which the estimation has been performed. The curves have been estimated through weighted kernel density estimation with the portfolio share being the weight. The vertical line at *BBB-* in the top panel figure delimits the investment grade area from the non-investment grade one.

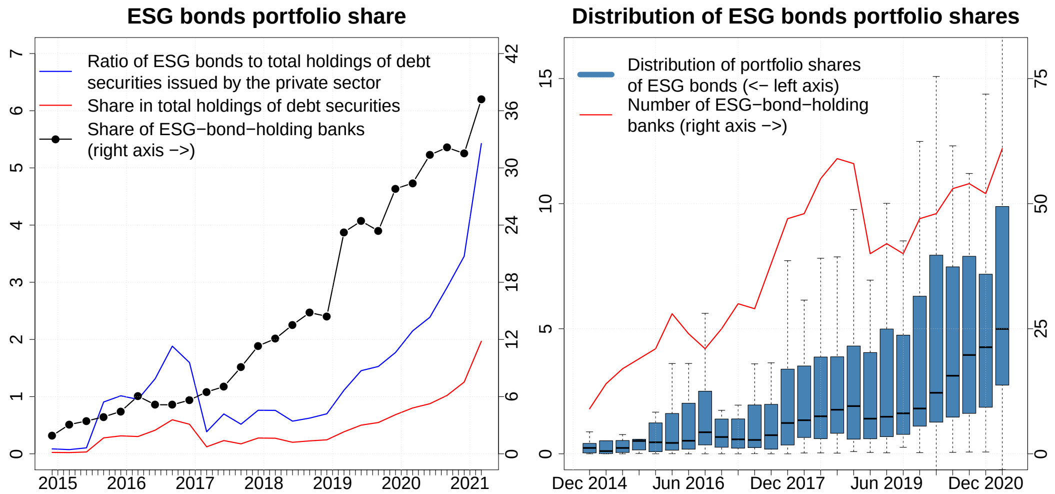
In March 2021 the most significant ESG bond holding sectors are the insurance corporations (37%) and the banking sector (35%) thus accounting for almost three quarters of all the ESG debt securities held by Italian residents (Table A.9). Other important ESG bond holding sectors are that of the investment funds whose share is 15% and, to a lesser extent, households and pension funds (5%). Yet, one has to consider that two thirds of resident investment funds' shares are held by households thus total holdings of ESG bonds are in principle higher due to the indirect holdings. This is the idea behind the methodology commonly known as the *look through* approach entailing the reclassification of asset management products from the institutional investors sector

[26]The European Union, the European Investment Bank (EIB) and the World Bank (WB)

to that of their subscribers, mostly households.

Figure 6: **Banks' holdings of ESG bonds**

(percentage values)



Source: elaborations on Bank of Italy Supervision Statistics. This figure depicts the share of ESG debt securities in banks' portfolios between 2015 and 2021 at aggregate level in left panel. In the rightmost panel the box and whiskers plot represent the distribution of ESG debt securities share in banks' portfolios. The three horizontal lines of the box represent, from bottom to top, the 25th, 50th and 75th percentile of the distribution in a given quarter whereas the lower and the upper whiskers represent the 5th and 95th percentiles.

The risk profile of Italian residents' portfolios invested in ESG bonds is moderate-low. Most of the securities held by Italian residents are classified into the investment grade category[27] (Figure 5). The risk profile is rather similar across sectors with insurance corporations holding a slightly higher share of investment grade securities but not on the highest end – *AA* or higher – of the rating range.

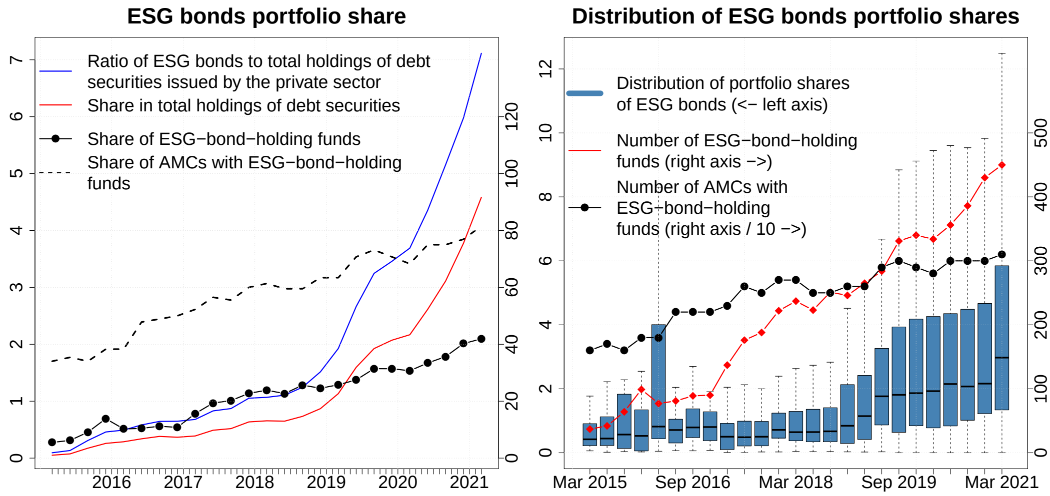
The weight of ESG bonds in Italian banks' portfolios has risen in the last few years. The share of ESG bonds in total holdings of debt securities has reached 1.2% at the end of 2020, whereas such share was less than 0.5% two years before (Figure 6, left panel). The expansion is even more notable when the holdings of ESG debt securities are scaled by the holdings of debt securities issued by the private sector with a proportion of 3.4% at the end of 2020 and a bit more than 1% two years before. Similarly, the number of banks holding ESG bonds in their portfolios has surged from less than 20 at the end of 2015 to more than 50 intermediaries out of 165 holding debt securities[28] five years later (Figure 6, right panel). Among such banks, the distribution of ESG portfolio shares has moved upwards with the median value reaching 4.5% and with at least one fourth of the ESG-bond-holding banks having a portfolio share of 7%.[29] The larger ESG bonds investors are bigger banks as suggested by the weighted mean being higher than the median portfolio share. Such trend has been reducing in the last two years with a wider number of medium banks investing in ESG securities.

[27] Securities with a *BBB*- or higher rating are considered as investment grade ones.

[28] The total number of banking groups and stand-alone banks in Italy at the end of March 2021 was 276.

[29] Considering that 50 banks were holding green debt securities at the end of 2020, this implies that 25 of them had at least a portfolio share of 4.5% and 12 held green bonds accounting for at least 7% of their non-Italian government portfolio.

Figure 7: **Investment funds' holdings of ESG bonds**
(percentage values)



Source: elaborations on Bank of Italy Supervision Statistics. This figure depicts the share of ESG debt securities in funds' portfolios between 2015 and 2021 at aggregate level in left panel. In the rightmost panel the box and whiskers plot represent the distribution of ESG debt securities share in funds' portfolios. The three horizontal lines of the box represent, from bottom to top, the 25th, 50th and 75th percentile of the distribution in a given quarter whereas the lower and the upper whiskers represent the 5th and 95th percentiles.

Mutual funds have experienced a similar pattern of growth of ESG debt securities in their portfolios. Their share in total holdings of debt securities was 3% at the end of 2020, whereas the proportion in total holdings of debt securities issued by the private sector has risen to more than 5% (Figure 7, left panel). The share of mutual funds that have invested in ESG bonds has increased to 40%, whereas 70% of asset management companies (AMC) manage a green-bond-holding mutual fund (Figure 7, left panel). Analogously, the number of ESG-bond-holding funds has surged to 400[30] at the end of 2020 with one fourth of the distribution lying above 4% in terms of ESG portfolio share and one fourth having a share ranging between 2 and 4% (Figure 7, right panel).

As already mentioned, insurance corporations represent the sector with the largest share of ESG debt securities among Italian residents. The portfolio share invested in ESG bonds amounts to nearly 2% and the ratio to holdings of debt securities issued by the private sector is more than 4% at the end of 2020 (Figure 8, left panel). Three quarters of Italian insurance corporations have invested in ESG bonds and for half of them the portfolio share is higher than 5% (Figure 8, right panel).

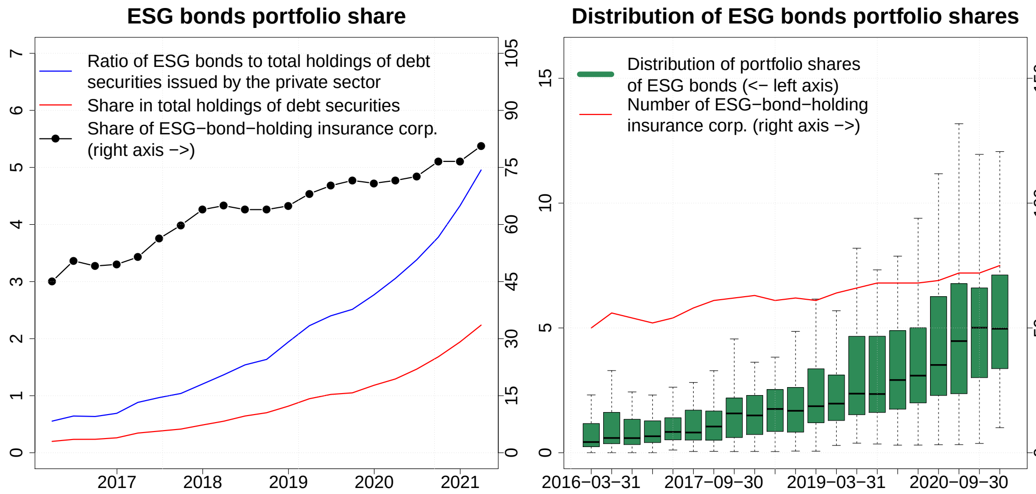
6 Conclusions

ESG bonds are bound to be a key financial instrument to channel financial resources into green, sustainable and social projects. The adoption of such instruments by the corporate and government sectors has rapidly increased in the last five years, with a dramatic expansion of the volumes issued and of the number of issuers. We compiled a comprehensive list of ESG securities, partly

[30]The universe of open-end mutual funds which are resident in Italy consists of 1,190 funds at the end of 2020.

Figure 8: **Insurance corporations' holdings of ESG bonds**

(percentage values)



Source: elaborations on Bank of Italy Supervision Statistics. This figure depicts the share of ESG debt securities in insurance corporations' portfolios between 2015 and 2021 at aggregate level in the left panel. In the rightmost panel the box and whiskers plot represent the distribution of ESG debt securities share in insurance corporations' portfolios. The three horizontal lines of the box represent, from bottom to top, the 25th, 50th and 75th percentile of the distribution in a given quarter whereas the lower and the upper whiskers represent the 5th and 95th percentiles.

web-scraped and partly hand-collected, by exploiting only publicly available information from a wide variety of online sources. Next we merged this list with microdata used for official statistics such as financial accounts, security holdings, banks' and investment funds' balance-sheets.

Based on the integrated data base we show that the euro area, China and the US are three major players in the global supply of ESG bonds. In Europe, Germany and France are by far the countries with the largest share of ESG bond supply especially due to the role of the government sector. The expansion of the ESG instruments supply is mirrored by the increase of their weight especially in financial intermediaries' assets, exceeding 4% in funds' portfolios and 2% for banks and insurance corporations.

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A Appendix

A.1 Information Sources

CBI reports a '**Bond Library**' where provides an overview of new green bond issuers entering the market; moreover, we check for repeated issues by using the '**Market Blogs Archive**' where CBI highlights a summary of the green bond market by reporting the list of the new and repeated issuers as well as the excluded and pending bonds starting from 2018; even if subsequent issues are not reported before 2018, we check for them. This information is strictly linked to the '**Labelled Green Bonds Database**' and the '**Certified Bond Database**' where CBI publishes the full list of latest 3 months new and repeated green bonds and the list of all bonds aligned to the certification scheme under the Climate Bonds Standards, respectively (to meet Climate Bonds Standards securities must be certified by third-party approved verifiers and aligned to more tight criteria ensuring consistency with the goals of the 2015 Paris Agreement to limit warming under 2 Celsius degrees). A similar exercise is carried out by using the daily updated '**EF bond database**' listing the 25 most recent ESG bond issuances (categorized in green, sustainable, sustainability-linked and social bonds) and augmented by using the list of issuer reported by the '**Sustainable bonds database**' provided and monthly updated by the ICMA.

Table A.1: **ESG Bonds - Sources**
(euro billions)

This table reports statistics on the number of ESG debt securities broken down by market or information provider. The following classification is applied: '**GRE**': green bonds included those that also are aligned to the social and/or sustainable principles as well as infrastructure green, transition, climate action, climate resilience, climate awareness, environment and blue bonds; '**SOC**': social bonds include infrastructure social, health and microfinance ones; ; '**SUS**': sustainable bonds include infrastructure sustainable, sustainable awareness, SDG-linked and COVID-19 ones; '**CSDB**': number of securities found in the ECB CSDB. **Volumes**: euro billions outstanding amounts.

Source	Total	GRE	SOC	SUS	CSDB	Volumes
CBI/ICMA/EF	9,221	7,720	794	707	3,871	1,341.6
US Nasdaq	5,556	5,254	270	32	510	130.1
Green indexes	1,963	1,963	0	0	1,718	852
Luxembourg Stock Exchange	961	522	74	365	919	475.1
Research institutes	798	481	10	307	727	352.5
Other	437	354	37	46	399	212.4
Euronext	392	362	15	15	378	244.2
Nasdaq Nordic	328	320	3	5	309	27.2
London Stock Exchange	284	210	2	72	274	78.8
Börse Frankfurt	259	259	0	0	255	261.5
Singapore Exchange	222	145	26	51	202	80.7
BIX Malaysia	201	187	0	14	200	1.3
Borsa Italiana	138	71	14	53	134	264.8
Asean Capital Market Forum	125	125	0	0	119	1.9
Oslo Børs	68	68	0	0	68	7.5
Taipei Exchange	53	49	0	4	52	4.6

Table A.2: **ESG Bonds Volumes by Purpose of the Proceeds**
(euro billions and percentage values)

This table reports statistics on the number of ESG debt securities broken down by market or information provider. The following classification is applied: '**GRE**': green bonds included those that also are aligned to the social and/or sustainable principles as well as infrastructure green, transition, climate action, climate resilience, climate awareness, environment and blue bonds; '**SOC**': social bonds include infrastructure social, health and microfinance ones; ; '**SUS**': sustainable bonds include infrastructure sustainable, sustainable awareness, SDG-linked and COVID-19 ones; '**CSDB**': number of securities found in the ECB CSDB. **Volumes**: euro billions outstanding amounts.

	Outstanding amount				Share		
Source	Total	GRE	SOC	SUS	GRE	SOC	SUS
CBI/ICMA/EF	1,341.6	975.5	222.6	143.5	72.7	16.6	10.7
US Nasdaq	130.1	109.5	16.8	3.8	84.1	12.9	2.9
Green indexes	852	852	0	0	100	0	0
Luxembourg Stock Exchange	475.1	201.2	111.9	162	42.4	23.6	34.1
Research institutes	352.5	304.9	5.9	41.7	86.5	1.7	11.8
Other	212.4	179.4	5.7	27.3	84.5	2.7	12.9
Euronext	244.2	194.4	42.4	7.4	79.6	17.4	3
Nasdaq Nordic	27.2	26.5	0.4	0.3	97.5	1.4	1.1
London Stock Exchange	78.8	61.5	2.8	14.4	78.1	3.6	18.3
Börse Frankfurt	261.5	261.5	0	0	100	0	0
Singapore Exchange	80.7	54	10.4	16.4	66.9	12.8	20.3
BIX Malaysia	1.3	1.1	0	0.2	82.2	0	17.8
Borsa Italiana	264.8	135.7	66.3	62.7	51.3	25	23.7
Asean Capital Market Forum	1.9	1.9	0	0	100	0	0
Oslo Børs	7.5	7.5	0	0	100	0	0
Taipei Exchange	4.6	4.4	0	0.2	95.6	0	4.4

Table A.3: **ESG Bond Supply Characteristics over Time**

This table reports summary statistics on ESG bond market supply between 2015 and 2021. Total outstanding amount and new issues are reported in euro billions.

Reference date	Total amount	New issues	Number of: securities	Number of: issuers	USD share	EUR share	Share of bonds issued by residents in: U.S.	China	Germany	France	Italy
2015 Q1	192.7	12.7	528	204	4.9	15.5	2.3	55.5	0.7	6.2	0.2
2015 Q2	215.9	23.2	658	236	5.0	18.2	2.2	54.5	1.3	6.0	0.2
2015 Q3	263.5	47.6	760	253	5.0	28.3	2.4	48.2	11.1	5.0	0.1
2015 Q4	283.9	20.4	892	285	6.8	27.7	2.4	48.2	10.8	6.1	0.1
2016 Q1	332.4	48.5	962	310	7.4	33.2	2.5	44.3	18.7	5.2	0.1
2016 Q2	356.9	24.5	1,069	342	8.4	33.4	2.9	43.0	17.9	5.2	0.2
2016 Q3	384.3	27.6	1,157	381	9.5	31.7	2.7	44.1	16.7	4.8	0.2
2016 Q4	424.5	40.7	1,274	427	10.2	30.8	2.8	45.0	15.6	5.2	0.2
2017 Q1	479.4	55.4	1,359	461	10.1	35.3	2.9	41.4	14.2	11.4	0.2
2017 Q2	519.6	40.7	1,488	520	10.5	34.9	3.1	42.0	13.7	10.7	0.2
2017 Q3	566.2	46.9	1,699	592	12.3	33.8	3.4	41.5	12.8	10.4	0.2
2017 Q4	620.2	54.6	1,979	683	13.5	33.8	3.8	40.9	12.2	10.0	0.5
2018 Q1	673.5	53.5	2,170	729	13.5	34.3	3.8	39.6	11.7	9.6	0.4
2018 Q2	723.7	50.6	2,374	798	14.2	34.0	4.3	38.9	11.0	9.1	0.4
2018 Q3	776.5	54.0	2,569	853	15.2	33.5	4.4	38.3	10.4	8.7	0.6
2018 Q4	837.3	65.8	2,790	934	15.3	34.1	4.5	38.0	10.0	8.4	0.6
2019 Q1	901.9	70.9	3,061	1,012	16.0	34.2	5.0	36.2	9.7	8.5	0.7
2019 Q2	1,009.9	110.1	3,401	1,106	17.1	35.3	5.2	33.9	9.4	8.3	0.8
2019 Q3	1,101.8	97.0	3,781	1,196	17.8	34.2	5.2	33.8	9.3	8.0	0.9
2019 Q4	1,171.8	88.8	4,103	1,297	18.9	35.3	5.9	31.0	9.1	8.2	1.0
2020 Q1	1,235.4	73.9	4,320	1,347	19.6	36.0	6.3	28.9	9.0	8.3	1.0
2020 Q2	1,374.8	153.0	4,576	1,394	20.7	38.4	6.6	25.8	10.8	8.5	1.1
2020 Q3	1,518.3	165.2	4,939	1,494	22.6	39.8	7.2	22.4	12.5	9.1	1.2
2020 Q4	1,672.8	175.4	5,364	1,579	23.0	41.9	7.3	19.7	11.6	10.2	1.2
2021 Q1	1,847.6	184.9	5,676	1,647	23.5	43.6	6.8	17.8	10.9	11.2	1.9

Table A.4: **ESG Bond Supply Characteristics by Issuer Country - March 2021**

This table reports summary statistics on ESG bond market supply by domicile country of the issuer at the end of the first quarter of 2021. Total, median and per-issuer amounts of the issues are reported in euro billions, original and residual maturity are expressed in terms of years. The sectors considered in the calculation of the number of sectors are the ESA 2010 institutional sectors, i.e. S.11, S.122-S.129, S.13, as reported in Table A.5.

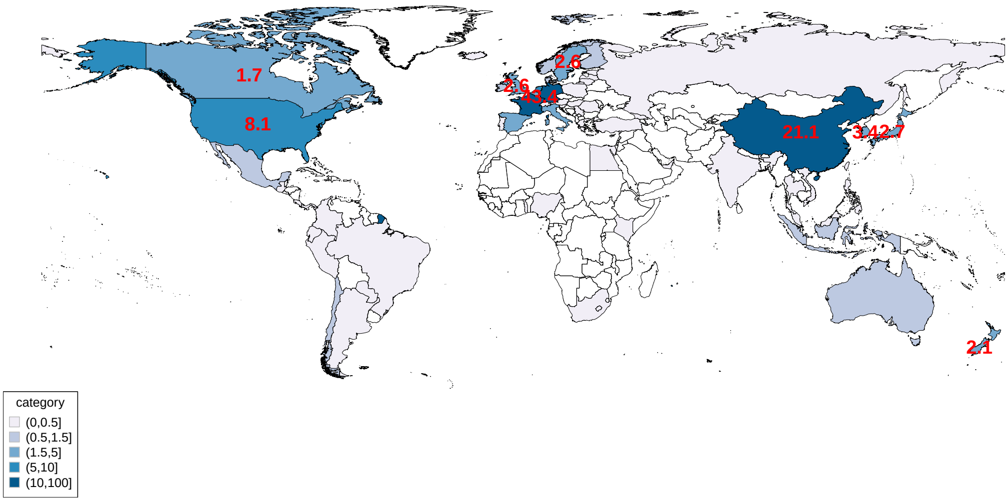
Country	Total amount	Median amount	Number of securities	Number of issuers	Amount per issuer	Number of sectors	Original maturity	Residual maturity
CN	328.2	0.2	843	372	0.9	11	7.6	4.1
FR	206.8	0.03	393	67	3.1	12	11.4	9.3
DE	202.2	0.03	281	41	4.9	11	8.5	6.9
US	126.4	0.04	654	202	0.6	20	13.3	10.5
NL	109.1	0.5	178	50	2.2	11	11.0	8.9
KR	53.4	0.1	248	49	1.1	10	5.2	4.1
JP	42.5	0.1	321	122	0.3	14	10.1	8.8
ES	42.1	0.2	113	32	1.3	9	8.1	6.3
SE	40.5	0.05	455	84	0.5	11	5.4	3.8
GB	39.7	0.1	188	60	0.7	11	20.3	14.8
IT	34.3	0.5	65	33	1.0	9	8.8	7.1
NZ	32.3	0.1	20	6	5.4	3	9.3	7.0
BE	32.0	0.5	24	13	2.5	8	11.0	9.8
CA	26.3	0.2	80	38	0.7	12	13.7	11.4
HK	19.8	0.4	52	25	0.8	7	7.2	5.7
NO	17.2	0.1	104	40	0.4	9	6.1	4.4
KY	16.1	0.3	48	25	0.6	8	8.0	6.6
LU	16.0	0.3	49	25	0.6	9	8.1	6.5
AU	14.9	0.2	45	26	0.6	11	8.0	6.1
DK	14.6	0.5	30	10	1.5	5	14.6	13.0
CL	13.9	0.4	25	10	1.4	7	19.2	17.5
FI	12.0	0.4	34	16	0.7	8	7.2	5.6
MX	9.9	0.2	24	11	0.9	8	11.2	8.3
IE	9.6	0.2	14	8	1.2	5	8.8	7.8
ID	8.5	0.4	18	8	1.1	5	6.6	4.8
IN	7.7	0.3	34	16	0.5	5	7.6	4.8
MU	6.1	0.4	18	8	0.8	4	5.3	3.0
AT	5.5	0.01	38	15	0.4	7	9.1	7.1
SG	4.8	0.1	26	14	0.3	5	6.9	4.9
VG	4.3	0.2	20	13	0.3	4	7.6	5.9

Table A.5: **ESG Bond Supply by Country and Sector of the Issuer - March 2021**
(euro billions)

This table reports data on the break-down of ESG debt securities by residence country and sector of the issuer excluding supranational institutions. Outstanding amounts are reported in euro billions. Sectors considered in the table are the ESA 2010 institutional sectors whose corresponding codes are reported in the headers.

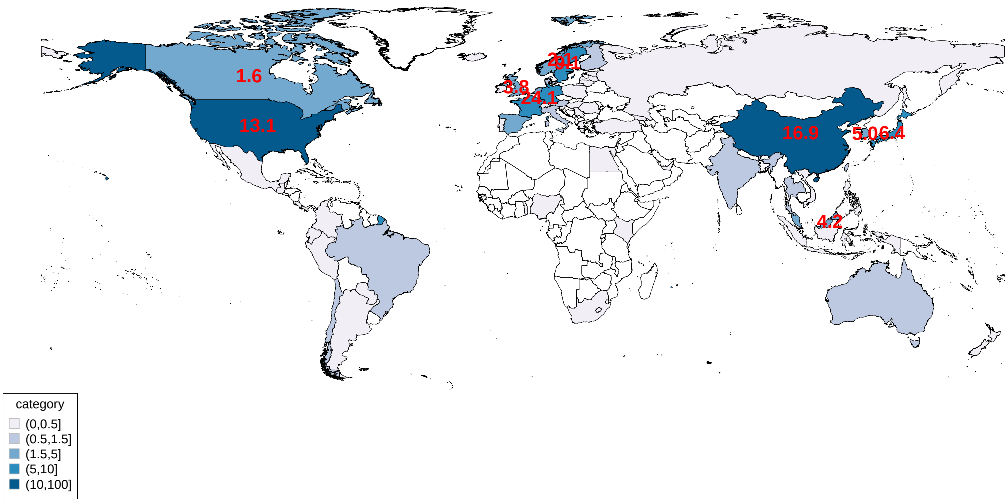
Country	Non-financial Corporations S.11	Deposit-taking Institutions S.122	OFI S.125	Financial Auxiliaries S.126	Captive Institutions S.127	Insurance Corporations S.128	General Government S.13
CN	238	43	17.4	10.1	0	0	19.6
FR	35.7	30.6	1	1	0	0.8	137.7
DE	16.5	56.6	0	0.1	0.6	1.2	127.2
US	68	8.4	35.4	6.9	1.2	0.8	5.3
NL	16	42.1	4.7	6.5	29.1	0	10.7
KR	17	17.6	16.7	0.5	0	1.2	0.4
JP	17.9	5.1	12.8	1.2	0.4	0	4.9
ES	15	17.6	0	0	0	0	9.4
SE	18.4	12.9	0	0	0.2	0	9
GB	9.4	8.5	16.3	0.1	4.5	0.3	0.6
IT	14.3	9.1	0	1	0	1.4	8.5
NZ	31.8	0	0	0	0	0	0.5
BE	0.9	0	0.7	1	0	0	16.4
CA	4.3	5.5	6.7	0.2	0	1.2	8.5
HK	1.5	8.9	3.3	0.1	0	0	4.3
NO	4.1	12.2	0.2	0.5	0	0	0.1
KY	7.3	1.8	6.5	0.1	0.5	0	0
LU	0.2	2.8	0.6	0	10.4	0	1.5
AU	0.6	6	1.6	0.5	0	0.2	6
DK	5.4	9.1	0	0	0	0	0
CL	3.8	0.2	0	0.1	0	0	9.9
FI	5.6	5.6	0.7	0	0	0	0.1
MX	0.7	0.6	7.4	0.1	0	0	0.8
IE	0	0	1.3	1	1.2	0	6.2
ID	2.1	0.4	5.9	0	0	0	0.1
IN	3.4	0.2	4	0	0	0	0
MU	0.8	0	4.8	0.6	0	0	0
AT	1.7	3	0	0	0.6	0.2	0
SG	0.8	2.8	0.1	1.1	0	0	0
VG	0	0	4.2	0	0.2	0	0
Total	557.6	325.2	157.2	34.1	51.2	7.9	402.5

Figure A.1: **Share of ESG Bonds Supply by Country - Amount issued**
(percentage values)



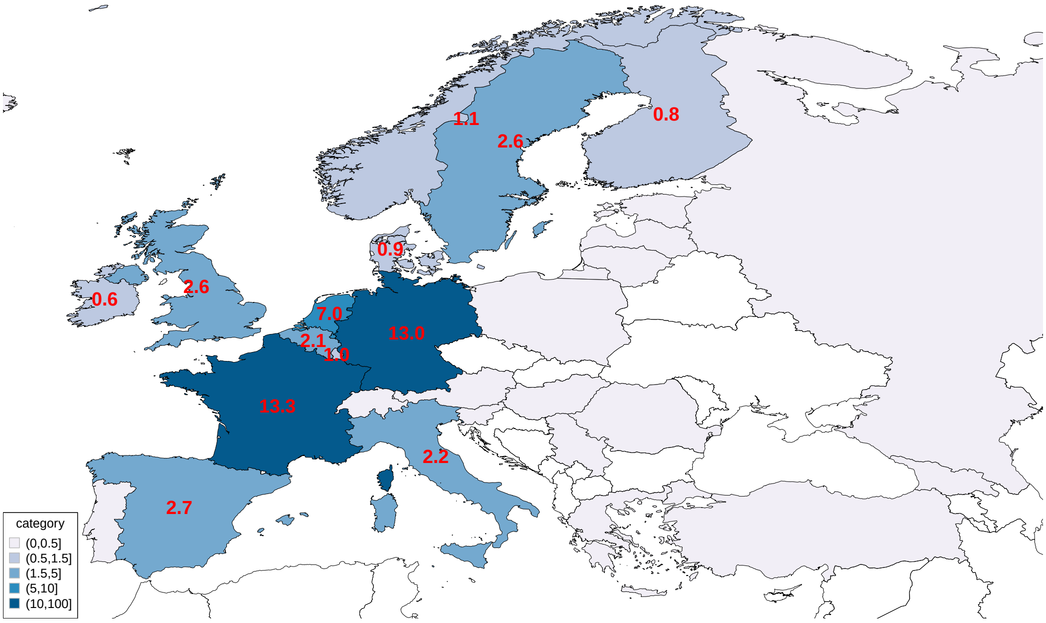
This figure depicts the world share of the outstanding amount of ESG debt securities by country at the end of March 2021. Data on the outstanding amount of the security and on the country of residence of the issuer are drawn from the ECB Centralised Securities Data Base (CSDB). Supranational entities are excluded from the calculation of the country shares.

Figure A.2: **Share of ESG Bonds Supply by Country - Number of securities**
(percentage values)



This figure depicts the world share of the total number of ESG debt securities issued by country at the end of March 2021. Data on the outstanding amount of the security and on the country of residence of the issuer are drawn from the ECB Centralised Securities Data Base (CSDB). Supranational entities are excluded from the calculation of the country shares.

Figure A.3: **Share of ESG Bonds Supply by Country in Europe - Amount issued**
(percentage values)



This figure depicts the world share of the outstanding amount of ESG debt securities by country at the end of March 2021. Data on the outstanding amount of the security and on the country of residence of the issuer are drawn from the ECB Centralised Securities Data Base (CSDB). Supranational entities are excluded from the calculation of the country shares.

Table A.6: **Italian Residents' Holdings of ESG Bonds - Summary Statistics**

This tables reports summary statistics on Italian residents' holdings of ESG debt securities between 2015 and March 2021. Data are drawn from the harmonized Securities Holdings Statistics (SHS). The outstanding amount, net of Bank of Italy's holdings, is reported in euro billions, original and residual maturities are expressed in terms of years. Listed share is the percentage proportion of ESG debt securities that are listed and traded on a financial exchange.

Reference	Outstanding	Number of			Maturity		Currency share		Listed
date	amount	securities	issuers	countries	original	residual	EUR	USD	share
2015 Q2	0.8	103	56	25	10.8	8.9	51.6	16.3	87.2
2015 Q3	2.3	116	61	26	11.2	9.3	83.7	6.3	98.8
2015 Q4	2.7	134	68	25	10.5	8.5	85.5	5.6	98.9
2016 Q1	4.0	144	74	27	10.4	8.3	89.6	3.9	99.4
2016 Q2	4.9	164	85	29	10.3	8.2	90.2	4.4	99.4
2016 Q3	6.0	181	89	30	10.3	8.1	91.1	4.1	99.5
2016 Q4	5.7	194	95	31	10.5	8.2	89.6	4.4	99.5
2017 Q1	4.1	211	105	34	10.5	8.4	83.9	6.6	99.4
2017 Q2	5.0	237	120	37	10.0	8.0	84.8	6.8	99.3
2017 Q3	5.1	277	138	42	10.2	8.3	82.9	9.1	98.7
2017 Q4	6.3	318	161	44	9.8	7.9	82.6	10.0	96.0
2018 Q1	6.8	342	173	48	9.3	7.4	83.5	9.4	96.7
2018 Q2	7.0	371	181	47	9.1	7.2	82.2	10.1	95.8
2018 Q3	7.6	389	189	46	9.0	6.9	82.6	10.0	92.9
2018 Q4	8.6	432	211	47	8.9	6.8	82.4	9.8	92.9
2019 Q1	10.9	482	222	48	9.0	6.9	85.2	8.6	90.1
2019 Q2	13.1	535	254	50	8.9	7.0	87.1	7.8	90.2
2019 Q3	14.6	575	269	50	9.3	7.3	87.6	7.5	90.2
2019 Q4	16.6	634	302	54	9.3	7.3	88.5	6.9	90.1
2020 Q1	17.8	700	322	52	9.5	7.5	89.2	6.3	89.6
2020 Q2	20.9	781	349	56	9.6	7.6	89.8	5.8	87.1
2020 Q3	24.5	871	391	58	9.6	7.5	91.2	5.1	87.3
2020 Q4	28.6	958	417	61	9.6	7.6	91.5	4.9	88.0
2021 Q1	37.4	1,090	471	66	12.1	10.1	92.5	4.5	88.4

Table A.7: **Italian Residents' Holdings of ESG Bonds by Issuer Country**

This tables reports summary statistics on Italian residents' holdings of ESG debt securities at the end March 2021. Data are drawn from the harmonized Securities Holdings Statistics (SHS). The outstanding amount, net of Bank of Italy's holdings, is reported in euro billions, original and residual maturities are expressed in terms of years. Listed share is the percentage proportion of ESG debt securities that are listed and traded on a financial exchange.

Country /	Outstanding	Amount	Number of			Maturity		Currency share		Listed
Institution	amount	share	securities	issuers	sectors	original	residual	EUR	USD	share
IT	11.2	30.1	50	24	8	7.9	6.4	100	0	65.4
FR	6.3	16.8	132	52	8	10.4	8.2	98.1	1.9	98.6
NL	3.5	9.3	120	43	8	8.6	6.7	97.7	1.8	99.5
EU	2.6	7.1	9	1	8	15.0	14.7	100	0	100
DE	2.5	6.7	83	33	8	12.3	10.5	98.0	1.6	96.5
ES	2.5	6.7	55	20	8	7.4	5.7	100	0	96.1
IBRD	1.8	4.7	125	1	8	7.1	4.6	24.3	32.5	94.7
EIB	1.0	2.7	39	1	8	11.6	7.6	51.5	36.5	100
BE	0.5	1.4	13	6	7	12.3	10.7	100	0	100
IE	0.5	1.4	6	5	8	10.4	8.9	98.9	1.0	100
CL	0.5	1.4	9	3	7	22.7	21.3	93.9	5.9	100
GB	0.5	1.3	44	30	8	9.0	6.2	82.9	0.4	99.9
PT	0.4	1.0	4	1	8	49.4	48.3	100	0	100
Other	3.5	9.4	401	251	8	17.5	15.7	83.3	13.4	97.5

Table A.8: **Italian Residents' Holdings of ESG Bonds by Issuer Sector**

(euro billions and percentage shares)

This table reports data on Italian residents' holdings of ESG debt securities, broken down by issuer sector. Outstanding amounts held by Italian residents are reported in euro billions whereas the following columns report the percentage share issued by resident and non-resident institutional sectors according to the ESA 2010 classifications. Bank of Italy's holdings of ESG debt securities are excluded from the total outstanding amount.

		Resident issuers			Non-resident issuers			
Reference date	Outstanding amount	Non-financial corporations S.11	Deposit-taking institutions S.122	General government S.13	Non-financial corporations S.11	Deposit-taking corporations S.122	General Government S.13	Other
2015 Q2	0.8	3.1	0	0	26.8	6.4	3.8	59.9
2015 Q3	2.3	1.1	0	0	8.7	2.1	71.7	16.5
2015 Q4	2.7	1	0	0	7.7	3.8	71.8	15.6
2016 Q1	4.0	2.4	0	0	19	6.8	55.6	16.1
2016 Q2	5.0	6.5	0	0	17.1	5.2	55.9	15.4
2016 Q3	6	5.3	0	0	15.1	4.7	61.4	13.5
2016 Q4	5.7	6.5	0	0	18.6	5	54.4	15.5
2017 Q1	4.1	7.8	0	0	30.3	9.3	25.5	27.2
2017 Q2	5.0	6.4	1	0	25.8	9.3	31.6	25.9
2017 Q3	5.1	7.3	1	0	29	9.9	23.8	29.1
2017 Q4	6.3	10.9	3.5	0	25.3	9.9	20.9	29.5
2018 Q1	6.8	9.9	3.1	0	24.7	8.4	23.3	30.5
2018 Q2	7	9.4	3	0	24.7	11.2	18.7	33
2018 Q3	7.6	11.4	5.8	0	22.9	11.5	16.8	31.7
2018 Q4	8.6	10.7	5.6	0	21.5	12.5	16	33.7
2019 Q1	10.9	12.7	8	0	21.3	10.6	16.3	31.1
2019 Q2	13.1	13.2	9.2	0	20.4	12.1	15.3	29.8
2019 Q3	14.7	15.1	8.7	0	20.3	11.6	15.7	28.3
2019 Q4	16.6	15.6	10.1	0	19.6	11.5	14.2	27.8
2020 Q1	17.8	13.3	11.1	0	19.2	10.8	16.7	28.1
2020 Q2	20.9	12	13.3	0	19.9	10.8	16.8	26.3
2020 Q3	24.5	10.6	13	0	19	11	20.2	24.3
2020 Q4	28.6	9.5	11.2	0	19.8	11.2	18.8	27.6
2021 Q1	37.4	10	10.3	8.3	16.2	9.6	19	25.1

Table A.9: **Italian Residents' Holdings of ESG Bonds by Holding Sector**

(euro billions and percentage shares)

This table reports data on Italian residents' holdings of ESG debt securities, broken down by holding sector. Outstanding amounts are reported in euro billions whereas the following columns report the percentage share held by Italian resident institutional sectors according to the ESA 2010 classifications. Bank of Italy's holdings of ESG debt securities are excluded from the total outstanding amount.

Reference date	Outstanding amount	Non-financial corporations S.11	Deposit-taking institutions S.122	Investment funds S.124	Insurance corporations S.128	Pension funds S.129	General Government S.13	Households and NPISH S.14+S.15	Other
2015 Q2	0.8	3.6	25	12.3	0	5.8	0.8	50.9	1.6
2015 Q3	2.3	1.1	69.4	9.5	0	2.3	0.3	16.7	0.6
2015 Q4	2.7	1.2	65.6	12.4	0	4	0.6	15.3	1
2016 Q1	4.0	0.9	45.2	9.1	26.6	5.6	0.5	11.6	0.4
2016 Q2	5.0	0.8	50.8	8.8	23.1	6	0.5	9.6	0.4
2016 Q3	6	0.7	57.7	8.4	19.5	4.7	0.5	8.1	0.3
2016 Q4	5.7	1.7	50	8.5	24.6	4.9	0.6	9.3	0.4
2017 Q1	4.1	2.6	16.5	12.9	44.7	7	0.7	15	0.6
2017 Q2	5.0	2.2	24.4	13.2	40	5.3	0.7	13.5	0.7
2017 Q3	5.1	2.2	20.5	13.8	42.9	4.9	1	13.8	0.8
2017 Q4	6.3	1.8	22.7	14	41.5	4.6	2.2	12.5	0.6
2018 Q1	6.8	1.7	21.3	13.1	43.6	5	2.2	12.4	0.7
2018 Q2	7	1.7	16.4	12.3	48.4	5.3	2.1	13.2	0.7
2018 Q3	7.6	1.7	17.4	12.4	48.2	5.1	1.9	12.5	0.9
2018 Q4	8.6	1.5	16.2	12.6	50.2	5	1.8	12.1	0.7
2019 Q1	10.9	1.3	21.1	13.2	47.2	4.8	1.5	10.2	0.6
2019 Q2	13.1	0.7	23.4	15.3	43.8	4.9	2.2	9.2	0.5
2019 Q3	14.7	0.6	23.8	16.9	42.7	5	2	8.6	0.5
2019 Q4	16.6	0.8	25.4	15.9	41.5	5.1	1.9	8.6	0.7
2020 Q1	17.8	0.8	28.3	14.2	41.2	5.2	1.7	7.9	0.7
2020 Q2	20.9	0.8	28.9	15.5	40.7	5	1.3	7.1	0.7
2020 Q3	24.5	0.7	29.2	15.6	41.3	5.2	1.2	6.1	0.6
2020 Q4	28.6	0.6	28.6	16.2	42.1	5.4	1.1	5.6	0.5
2021 Q1	37.4	1.8	35.1	15	36.7	4.6	1.1	5.2	0.5