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Compiling climate finance statistics from security-by-security data[1]

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[1] This contribution was prepared for the workshop. The views expressed are those of the authors and do not necessarily reflect the views of the Central Bank of the Republic of Türkiye, the BIS, the IFC or the other central banks and institutions represented at the event.

Compiling climate finance statistics from security-by-security data[1]

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Abstract

Over the past years, large-scale security-by-security (s-b-s) databases with multiple input data sources have become increasingly relevant for producing official statistics in the central banking world. Such databases also offer significant potential for compiling new reliable and comparable statistical indicators, including on climate finance. These climate finance statistics would improve policymakers' understanding of the volume, usage and sources of funds available for financing the green transition. This paper contributes towards closing this key data gap by providing a general framework for the compilation of climate finance statistics from s-b-s data on debt securities issuances and holdings in a consistent and automated manner. In addition, the paper explores a new approach for measuring the role of equity for climate finance using s-b-s data, an area that because of its complexity has so far been neglected by existing attempts to quantify the volume of climate finance via securities markets. To showcase the usefulness of the climate finance indicators for debt securities and the applicability of the newly proposed concepts for equity securities, the paper uses s-b-s data from the European System of Central Banks' Centralised Securities Database (CSDB) and Securities Holdings Statistics Database (SHSDB) for the euro area.

Keywords: Climate finance statistics, sustainable finance, environmental social and governance (ESG), official statistics, security-by-security databases, compilation, data quality management, multi-source data, debt securities, listed shares.

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1. Introduction

In the wake of the climate crisis and the growing need for funds to finance the green transition in economies around the world, climate finance securities have become one of the fastest growing market segments in the global securities market. These financial instruments, including green bonds, sustainability bonds, sustainability-linked bonds or green shares, today constitute a main source to finance climate and other sustainable projects and the transition to a sustainable economy in general. The issuance of climate finance debt securities in the global market has risen from negligible amounts to over USD 500 billion per year over the last decade (see International Monetary Fund 2024).[2] An increasing number of major stock exchanges has been introducing separate market segments for green listed shares (see, e.g., London Stock Exchange 2023; NASDAQ 2023). Investment funds with environmentally, socially and governance-oriented (ESG) investment strategies (i.e. that are investing in companies with ESG objectives) are mushrooming (Capotă et al. 2022).

Following the increasing relevance of climate finance in the global securities markets, also central banks, international institutions and other compilers of securities statistics have been trying to track the volume of climate finance globally or in different regions or countries (see, e.g., International Monetary Fund 2024; ESCB Statistics Committee Expert Group on Climate Change and Statistics and Working Group on Securities Statistics 2024). At the same time, there is so far no standardised methodology for the compilation of harmonised climate finance statistics from security-by-security (s-b-s) data. This paper aims at addressing this gap by presenting a general framework for compiling harmonised statistics on issuances and holdings of climate finance debt securities, and by exploring a new approach for measuring the volume of issuances and holdings of green equity securities.[3] The paper makes three contributions. First, it provides compilers of securities statistics with practical guidance on the key steps for producing harmonised statistics on climate finance debt securities based on s-b-s data. Second, the paper makes a first attempt of exploring a general and simple methodology for measuring the volume of green shares, an area that because of its complexity has so far been neglected by existing attempts to quantify the volume of climate finance via securities markets. In doing so, it identifies specific issues that require further consideration for developing a general harmonised compilation approach for statistics on green equity securities. Third, it directly contributes to the work of the Group of 20 Data Gaps Initiative (G20 DGI) on developing harmonised indicators for measuring climate finance in the G20 and Financial Stability Board (FSB) member economies in the context of G20 DGI Recommendation 4 on Climate Finance (Working Group on Securities Databases 2023). Thus, the paper ultimately supports the broader goal of improving policymakers' understanding of the volume, usage and sources of funds available for financing the green transition.

The remainder of the paper proceeds as follows. Section 2 describes a general compilation framework for securities statistics using s-b-s databases. Section 3 shows how this framework can be used for the compilation of climate finance statistics for debt securities, while section 4 showcases the usefulness of this compilation approach by presenting an overview of recent developments in climate finance via debt securities for the euro area economy. Section 5 explores the use of this framework for compiling statistics on green listed shares, suggesting a simple methodology for identifying green shares. Based on this, section 6 uses this methodology

[2] Debt securities consist of short-term and long-term debt instruments.

[3] While for debt securities the contribution of green, sustainability and sustainability-linked bonds to financing the green transition is immediate due to the use of proceeds for climate change adaptation and mitigation projects or their linkage to climate-related key performance indicators, for green equity this link is less clear. In the case of green equities, the related funds may have been raised long time in the past to finance non-green activities, while their issuers may have only transformed into green businesses at a later stage. This caveat should be considered when interpreting the experimental statistics on green listed shares presented in this paper.

to provide an overview of recent trends in green listed shares for the euro area economy. Section 7 concludes and identifies avenues for further work on establishing a general compilation methodology for statistics on green listed shares.

2. Compilation using security-by-security databases

Compiling climate finance statistics from s-b-s data first requires setting up a general compilation process. As prerequisites, compilers need to have in place an s-b-s data collection framework on securities issuances, securities holdings and related reference data (e.g., from reporting financial institutions, commercial data providers, government agencies, and other sources); an s-b-s database that stores and processes these data; and robust processes for the regular production, data quality management, revision and possible dissemination of such data (see Kleibl and Micheler 2022; 2023). For the remainder of this paper, we assume that aforesaid basic infrastructure has been put in place.

Setting up a process for compiling aggregates on securities statistics from s-b-s data requires following four basic steps and answering four related questions:

- *Availability of required s-b-s data attributes*: Which attributes are required for identification, calculation and aggregation?
- *Identification of relevant securities*: Which individual securities need to be part of the aggregates for a given reference date?
- *Calculation of statistics at individual security level*: How should the required statistical quantities (e.g., outstanding stocks, gross issuances, redemptions, revaluations, and other changes) be calculated at the level of the individual securities?
- *Aggregation by relevant breakdown categories*: For which breakdowns should aggregates be compiled based on the statistical quantities calculated at the level of the individual securities?

The following subsections briefly describe each of these steps for the example of compiling securities issues statistics on stocks of outstanding debt securities at nominal value.

Availability of required s-b-s data attributes

As a first step, compilers need to ensure that the required s-b-s data attributes are available in their database. These include the attributes needed for the identification of the securities that should be part of the aggregates, the calculation of the relevant statistical quantities at individual security level, and the aggregation of such quantities calculated at individual security level.

For example, to compile basic aggregates on stocks of outstanding debt securities at nominal value, the s-b-s data that would be required for the identification and calculation of statistical quantities at individual security level will comprise at least the following attributes: System of National Accounts (SNA) instrument classification, issue date and maturity date, security status (e.g. alive, redeemed, in default, etc.), relevant instrument flags (for excluding instruments out of scope or instruments creating duplications such as depository receipts), outstanding amount (stock face value), nominal currency, issue price, coupon rate, coupon frequency, and coupon dates. In addition, further attributes will be needed for assigning individual securities into different breakdowns when performing the aggregation of the statistical quantities at individual security level, such as the SNA issuer sector or the interest rate type of the securities. Finally, for compiling aggregates

on climate finance statistics for debt securities, additional attributes are needed to identify climate finance debt securities including green bonds, sustainability bonds, and sustainability linked bonds. As described in greater detail in section 3, these will include at least the classification of the type of climate finance debt security, the "assurance" level, and the standards with which each security is aligned.

The availability of all these attributes in the s-b-s database is usually achieved via a combination of direct reporting, input provision by commercial data providers, and reliance on additional data sources such as government agencies, stock exchanges, or internal sources.

Identification of relevant securities

In a second step, compilers need to define the filter conditions that are required for the identification of individual securities that should be part of the aggregates for a given reference date. This involves filtering for the relevant types of securities, for those securities that are in the relevant status (e.g., "alive" in the case of aggregates on outstanding stocks) or that experience the relevant event (e.g., an issuance or redemption in the case of aggregates on transactions), and for securities that are out of scope and should be excluded from the aggregates for specific reasons (e.g., to avoid duplications such as in the case of depository receipts).

For example, to identify the securities that should be included in the outstanding stocks of debt securities at a specific reference date the following attributes and filters are required:

- SNA instrument classification = F.3 (i.e., debt securities)
- Reference date >= issue date
- Reference date < maturity date
- Security status = alive (i.e., not early redeemed, converted, etc.)
- Instrument flags (for excluding instruments out of scope or instruments creating duplications) = blank

Compared with this simple example for outstanding stocks, the identification and filtering are much more challenging when identifying the securities that should be part of aggregates on transactions such as gross issuances (including full issuances, tap issuances, intra-month issuances, and accrual of interest) and redemptions (including full redemptions, partial redemptions, intra-month redemptions, and paid coupon), revaluations, or other changes in volume.

Calculation of statistics at individual security level

In a third step, compilers need to define the rules for calculating the outstanding stocks, gross issuances, redemptions, revaluations and other changes in volume at the level of individual securities. To ensure that the aggregates that result from these calculations are harmonised and comparable across economies, the calculation rules applied should follow to the extent possible the methodological principles defined in the SNA and the Handbook on Securities Statistics (HSS).[4]

For example, outstanding stocks of debt securities at nominal value can be calculated at individual security level by using the following simplified formula (based on HSS 5.51):

[4] The HSS provides a methodological framework for the compilation of securities statistics, but does not provide a detailed compilation guide.

Stocks at nominal value = *Stock face value x issue price +*

stock face value x next coupon rate x coupon accrual period +

stock face value x discount rate x discount accrual period

These calculation rules for stocks of debt securities would in many cases require further refinements, e.g., when calculating accruals in a continuous manner, for securities denominated in foreign currency, for securities issued in tranches, or for hybrid debt securities quoted in currency units, and would be more complex when calculating other quantities such as transactions or revaluations.

Aggregation by relevant breakdown categories

In a fourth step, compilers need to define the breakdowns used for the aggregation of outstanding stocks, gross issuances, redemptions, revaluations and other changes in volume calculated at individual security level. For example, breakdowns for the regular publication of aggregates on debt securities issues could involve slicing the aggregates down by SNA issuer sector, currency of denomination, original/residual maturity, and interest rate type.[5] For each of these categories, compilers can then aggregate up the statistical quantities calculated at individual security level to compile the final output aggregates.

As described in greater detail in section 3, the compilation of climate finance statistics will require further breakdowns, e.g., by type of climate finance debt security, by assurance level, or by standard.[6] Moreover, by combining the statistical quantities calculated at individual security level with additional breakdown attributes, compilers and users can flexibly create on-demand aggregations that are not part of the "standard" breakdown categories.

3. Compiling climate finance statistics from s-b-s data for debt securities

The four steps described in the previous section also apply to the compilation of climate finance aggregates on securities issuances and holdings using s-b-s information. For the compilation of further breakdowns for climate finance debt securities, additional requirements need to be applied for the first and fourth steps, i.e., "*availability of required s-b-s data attributes" and "aggregation by relevant breakdown categories"*.[7] Climate finance debt securities can be broken down into at least three dimensions. First, to distinguish the different types of climate finance debt securities, the classification by type of climate finance debt instruments is required as a minimum. The broader climate finance debt securities market consists of instruments which fully or partially aim at funding projects contributing to environmental objectives and thus support the transition to a sustainable, net-zero economy. It is thus composed of three main types of instruments: green, sustainability, and sustainability-linked bonds. Green bonds are negotiable debt instruments where the proceeds are used to finance green projects; sustainability bonds are negotiable debt instruments where the proceeds are used to finance a combination of both green and social projects; and sustainability-linked bonds are negotiable debt instruments where the issuers are committed to future improvements in sustainability outcome(s) within a

[5] These attributes would allow creating the breakdowns applied in the reporting templates of DGI-2 Recommendation 7 on Securities Statistics.
[6] These attributes would allow creating the breakdowns applied ink the reporting templates of DGI-3 Recommendation 4 on Climate Finance.
[7] No additional modifications are needed for steps 2 and 3.

predefined timeline, but with no restrictions on how the proceeds may be used. For this type of bonds, the financial and/or structural characteristics such as coupon rates may vary, depending on whether the issuers achieve the predefined sustainability objectives.[8] Second, in order to better understand the reliability of the classification of the different climate finance products and whether the issuer's bond framework is aligned to accepted market principles and the use of proceeds are aligned to market practises, information about the type of climate finance debt security can be complemented with its "assurance" level. Climate finance debt securities can be self-labelled as such by their issuer, or, in addition, they can be externally reviewed with a (pre-issuance) second party opinion (SPO) or can even be certified by an independent and recognised authority. Third, due to the lack of a common, internationally accepted, definition of the types of climate finance debt securities, it is equally important to know to which standard(s) the bonds are aligned with. These standards include, e.g., the CBI Climate Bonds Standards, ICMA Green, Social, Sustainability-linked Bond Principles, ICMA Sustainability Bond Guidelines, or European Union Green Bond Standard.

These additional attributes that describe the classification of the type of climate finance debt security (minimum requirement), the "assurance" level, and the standard(s) with which each climate finance debt security is aligned need to be available in the compilers' s-b-s databases. For climate finance statistics, aggregates by type of climate finance debt security (i.e., green, sustainability and sustainability-linked) are considered fundamental and as such are recommended to be part of the regular publications. Further, "of which" breakdowns by assurance level (e.g., self-labelled, with a second party opinion, or certified) and by standard can be compiled. This helps ensuring the reliability and transparency of the compiled data as well as serve users' needs for assessing the credibility of the claims of the issuers. The aggregates on climate finance debt securities issuances (as any other securities aggregates) can be further broken down for example by SNA issuer sector, currency of denomination, original/residual maturity, and interest rate type, while the aggregates on debt securities holdings can be broken down by similar dimensions as well as by holder sector and issuer residence. Applying these breakdowns for issuances and holdings of climate finance debt securities will allow the compilation of all breakdowns required in the reporting templates of G20 DGI-3 Recommendation 4 on Climate Finance. At the same time, limitations in the compilation of climate finance statistics for debt securities arise from a lack of internationally accepted and harmonised definitions of certain key concepts, such as what qualifies as "green", and the still relatively small size of the market that may not allow the publication of specific breakdowns (e.g., due to statistical confidentiality), particularly for the climate finance aggregates on holdings of debt securities.

4. Results for the euro area climate finance debt securities market

Building on the general compilation framework outlined in the previous two sections, this section illustrates the usefulness of this framework for compiling statistics on climate finance debt securities issuances and holdings for the euro area by using s-b-s data from the European System of Central Bank's (ESCB's) Centralised Securities Database (CSDB) and Securities Holdings Statistics Database (SHSDB) (see Cornejo Pérez and Huerga 2015; Amann et al. 2015). To do so, we will use the sustainable finance indicators developed by the ESCB in the context of the ECB Governing Council's action plan on climate change (ESCB Statistics

[8] The market of environmental, social and governance (ESG) securities also covers social debt securities, which are negotiable debt securities instruments where the proceeds are used to finance social projects. These securities are not in the scope of this paper due to its focus on climate finance statistics. However, the framework described in sections 2 and 3 of this paper is also fully applicable to compiling statistics on social debt securities (see, e.g., ESCB Statistics Committee Expert Group on Climate Change and Statistics and Working Group on Securities Statistics 2024).

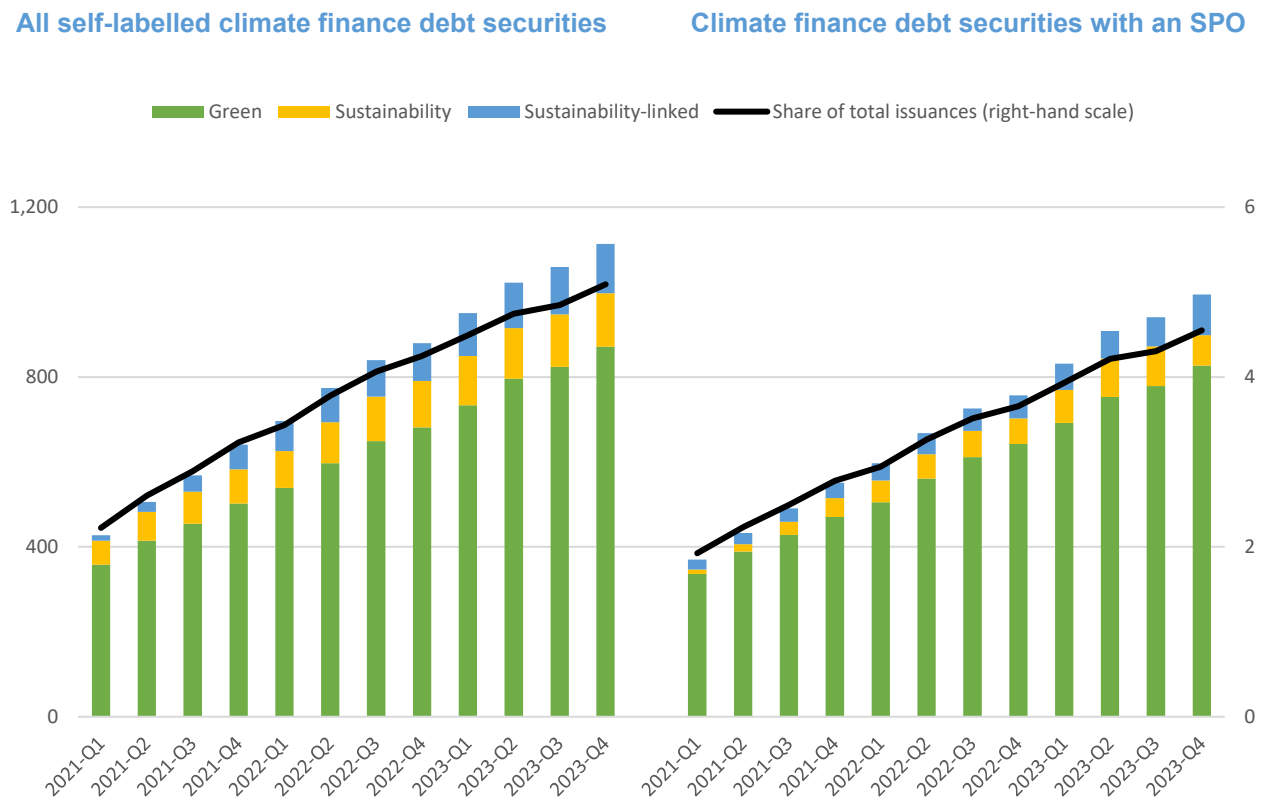
Committee Expert Group on Climate Change and Statistics and Working Group on Securities Statistics 2024). These indicators provide insights into the issuance and holding of climate finance debt instruments (green, sustainability, and sustainability-linked) by residents in the euro area. Aggregates are made available for two levels of assurance. For the "broader" assurance level, all climate finance debt securities, irrespective of the level of assurance, also including those that are only self-labelled, are considered. For the "stricter" level of assurance, the universe of climate finance debt securities is limited to those instruments that have been externally reviewed with a second party opinion or certified. No restriction is yet applied based on the underlying standard/framework against which the classification of the climate finance debt security is aligned with (although this information is available at s-b-s level).

Issuances of climate finance debt securities in the euro area

The outstanding amount of the climate finance debt securities issued in the euro area has almost tripled in the last three years, reaching more than EUR 1.1 trillion (Chart 1). Green debt securities account for the majority, representing close to 80% of the outstanding amount of all climate finance debt securities issued at the end of 2023.

Over the last three years, green bonds have recorded a particularly strong increase reaching outstanding amounts of almost EUR 900 billion in Q4 2023. Sustainability-linked bonds recorded the highest growth rate over the same period. Despite the constant increase, climate finance debt securities still account for a relatively small part of the wider debt securities market, representing 5% of total issuances in Q4 2023.

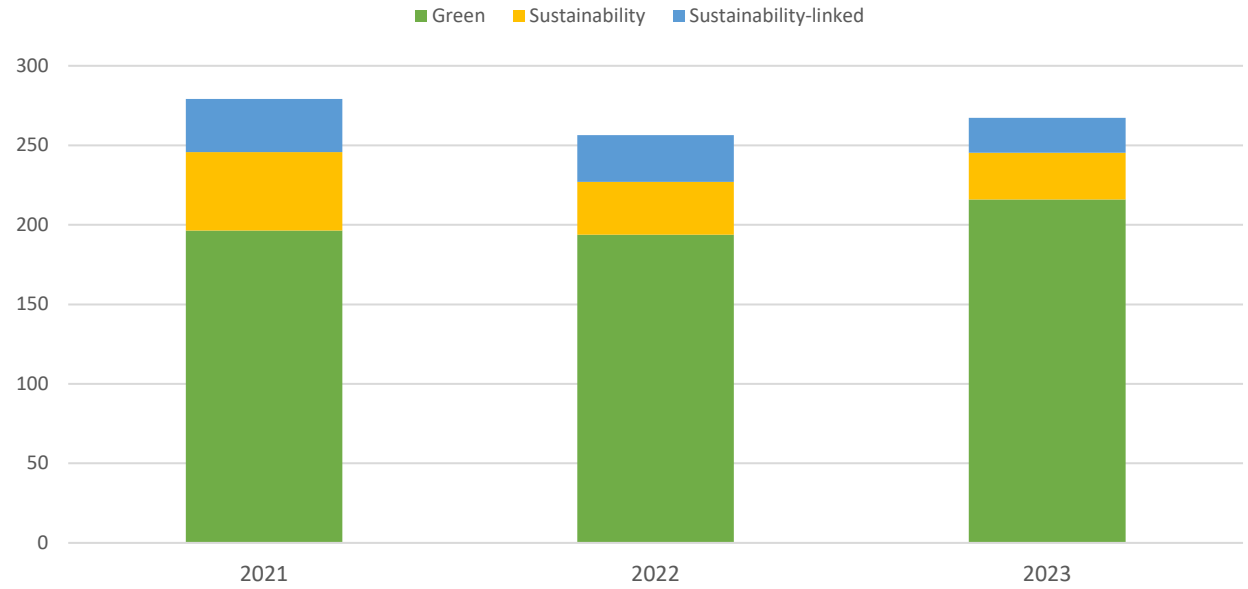
Chart 1
Euro area issuances of climate finance debt securities



Left-hand scale: EUR billions, outstanding amounts at face value; right-hand scale: percentages.
Notes: The share of total issuances refers to the amount of all climate finance debt securities as a share of all debt securities issued in the euro area (left graph) and to the amount of the climate finance debt securities with a second party opinion as a share of all debt securities issued in the euro area (right graph).

New issuance of climate finance debt securities in the euro area dropped on a year-on-year basis in 2022 (Chart 2), with green debt securities materialising only a marginal decrease (of 1%). Although the newly issued sustainability and sustainability-linked debt securities further declined in 2023, the total new issuances of all climate finance debt securities in the euro area increased, as a result of the high amount of newly issued green bonds that outperformed even the 2021 green bond issuances.

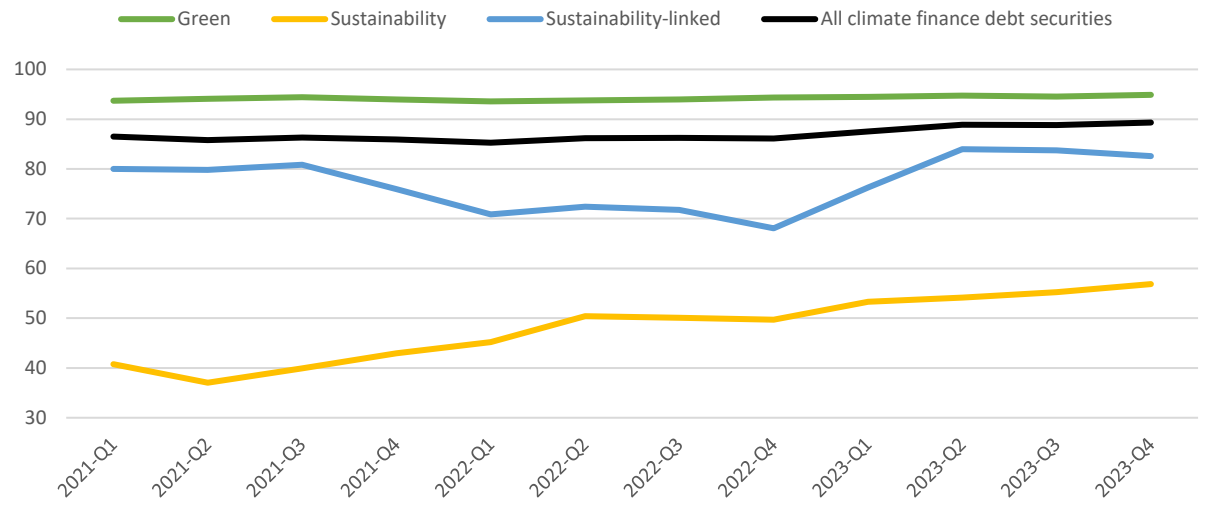
Chart 2
Issuances of climate finance debt securities



Left-hand scale: EUR billions, outstanding amounts at face value.

Overall, euro area issuers of climate finance debt securities deem to seek for external review of their issuances, with around 90% of them having obtained at least a SPO at the end of 2023 (Chart 3). This way issuers provide investors with further assurance of meeting certain international standards and alignment with accepted market principles. When focusing on each specific type of climate finance bonds, we observe that most green debt securities issued in the euro area have obtained a second party opinion (95%). Similarly, more than 80% of the sustainability-linked debt securities have been reviewed by an external provider (SPO), while sustainability bonds have significantly lower SPO assurance levels (only slightly above 55%).

Chart 3
Share of euro area issuances of climate finance debt securities with a second party opinion

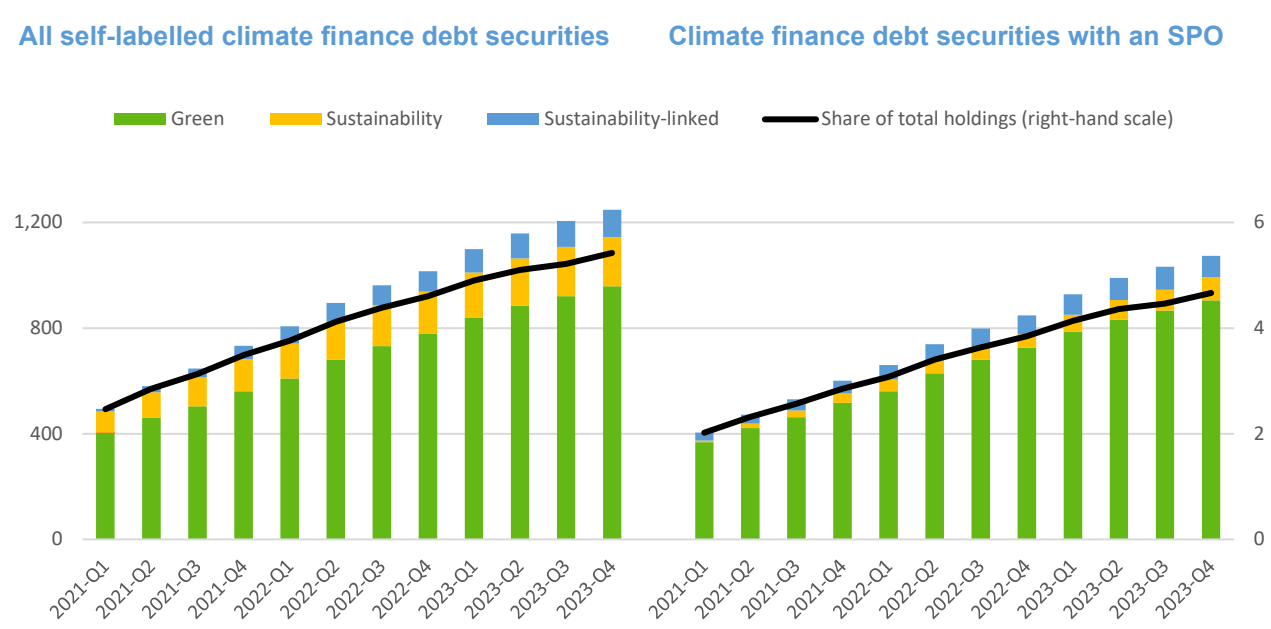


Left-hand scale: percentages.
Notes: The share of issuances with a second party opinion refers to the climate finance debt securities with a second party opinion as a share of all climate finance debt securities issued in the euro area.

Holdings of climate finance debt securities in the euro area

Euro area holdings of climate finance debt securities have grown continuously since the beginning of 2021, reaching almost EUR 1.3 trillion. Thus, euro area holdings of climate finance debt securities exceed the issuances, making the euro area a net buyer of these instruments. While these debt securities are becoming increasingly relevant investment alternatives (they more than doubled in the last three years), they are still a relatively minor portfolio item, accounting for 5.4% of total euro area debt securities holdings in Q4 2023 (Chart 4).

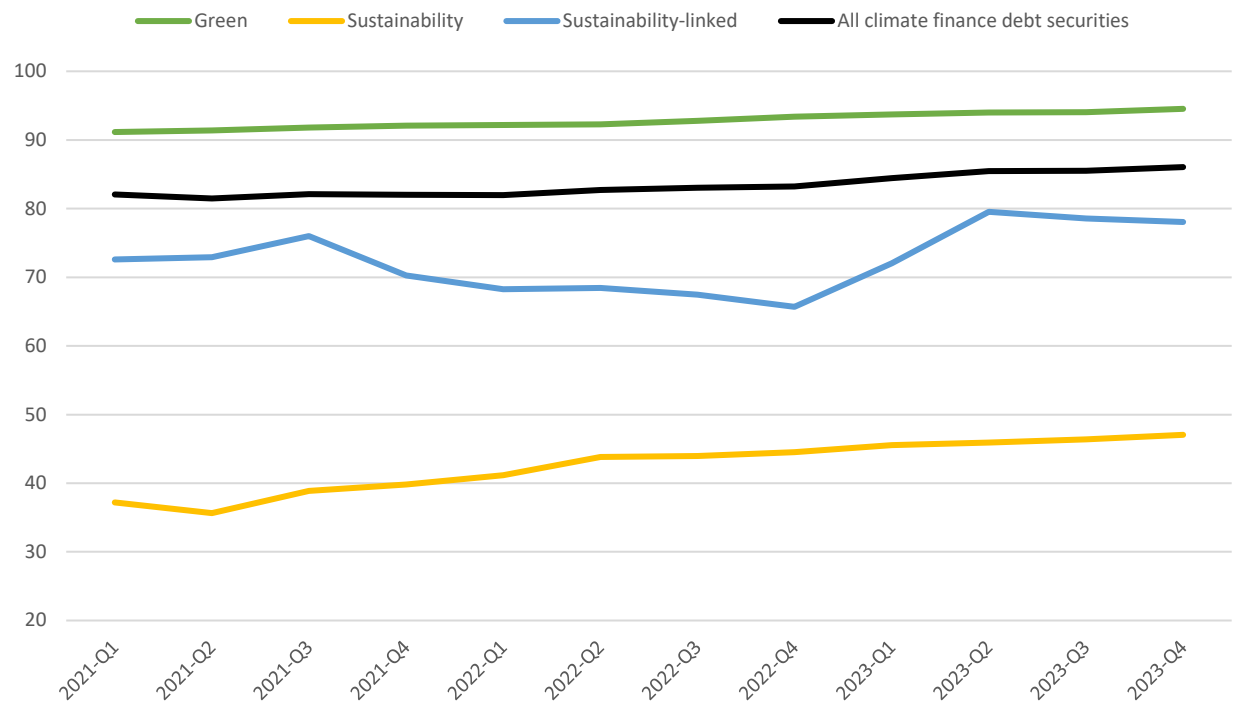
Chart 4
Euro area holdings of climate finance debt securities



Left-hand scale: EUR billions, outstanding amounts at face value; right-hand scale: percentages.
Notes: The share of total holdings refers to the amount of all climate finance debt securities as a share of all debt securities held in the euro area (left graph) and to the amount of the climate finance debt securities with a second party opinion as a share of all debt securities held in the euro area (right graph).

Most (86%) euro area holdings of climate finance debt securities have obtained a second party opinion (Chart 5). When focusing on the different types of securities, we can observe that holdings of sustainability bonds with a second party opinion are significantly lower (below 50%) than holdings of green and sustainability-linked bonds with a second-party opinion. This is because euro area investors buy a large proportion of sustainability bonds issued by non-EU residents, which have not obtained a second party opinion. On the contrary, euro area investors invest mainly in domestically issued green and sustainability-linked bonds that have been externally reviewed.

Chart 5
Share of euro area holdings of climate finance debt securities with a second party opinion



Left-hand scale: percentages. Notes: The share of holdings with a second party opinion refers to the climate finance debt securities with a second party opinion as a share of all climate finance debt securities held in the euro area.

5. Compiling climate finance statistics from s-b-s data for listed shares

As in the case of climate finance debt securities, the general framework described in section 2 can also be fruitfully applied to compiling aggregates for green listed shares based on s-b-s data. In this case, steps 2 and 4, i.e., "*availability of required s-b-s data attributes" and "aggregation by relevant breakdown categories"* require an additional attribute for the identification of green listed shares, which could then be used to break down listed shares into green and non-green shares.

Identifying green shares poses additional difficulties compared to debt securities. Most importantly, while for debt securities the financing of climate finance objectives is quite immediate when the "use of proceeds"

principle is used, for green equity securities this link is less clear if at all meaningful, as the shares that are considered green nowadays may have been non-green at the time the capital was raised. Thus, strictly speaking only new issuances of shares of already green corporations in the primary market can be considered as funds contributing to climate finance. This caveat should be considered when applying the approach described in the following paragraphs, which de facto measures the volume of investment opportunities on green shares available in the secondary market.

Moreover, in contrast to debt securities, where the criteria for identifying green, sustainability and sustainability-linked bonds are nowadays well established in the financial markets, there are currently no generally accepted criteria for identifying green shares. Recently however, some stock exchanges developed specific methodologies, largely based on the green equity principles developed by the World Federation of Exchanges (WFE) (see World Federation of Exchanges 2023). As a minimum, for issuers that generate revenue, the WFE proposes that "listed issuers will need to generate more than 50% of their total annual revenues from activities that contribute to the green economy". Additional criteria on governance, assessment, and disclosure are also brought forward. For example, the London Stock Exchange (LSE) and NASDAQ are respectively offering a "green mark" (London Stock Exchange 2023) or "green designation" (NASDAQ 2023) to issuers who satisfy certain criteria. Both stock exchanges require that 50% of the issuer's revenue is generated by activities considered green (according to an approved external reviewer). Additionally, NASDAQ requires that less than 50% of revenue is generated by fossil fuel activities, and that more than 50% of the issuer's investments is allocated to activities considered green.

The simple "50% of green revenues" criterion applied by the WEF and several of its member exchanges seems well suited for identifying green listed shares in the context of compiling statistical aggregates on green shares, as it provides a relatively easy-to-operationalise criterion for determining whether most economic activities of an issuer of listed shares can currently be considered as green.[9] Several other criteria for measuring the climate performance of issuers have been considered in other contexts such as monetary policy implementation (see, e.g., Aubrechtová et al. 2023), which however are not well suited for applying them in the statistical compilation context. For example, assessing the climate performance of companies based on improvements compared to past data (backward-looking metrics) might overestimate the greenness of a brown company just because it can reduce emissions very easily. On the other hand, relying on future emission targets (forward-looking metrics) could penalize companies in an already green sector. Similarly, relying on best-in-class approaches compared to other companies in the same sector might be biased by the fact that some sectors are naturally browner than others. Finally, criteria based on qualitative assessments cannot easily be applied to a large number of issuers as it is typically required for the automated compilation of aggregates based on s-b-s data. As a consequence, the simple "50% of green revenues" criterion seems conceptually to be the most suitable and at the same time easy-to-operationalise indicator for compiling statistics on green listed shares.[10]

Applying the breakdown into green and non-green listed shares, aggregates on listed shares issuances can be further broken down by SNA issuer sector and currency of denomination, while aggregates on listed shares holdings can be broken down by similar dimensions as well as by holder sector and issuer residence. Applying

[9] Due to the fungible nature of funds raised via equity financing, a use of proceeds approach as used for climate finance debt securities cannot be meaningfully applied for green shares.
[10] Future work should explore further refining this simple indicator by making it more robust to possible greenwashing, e.g., by complementing it with a threshold for the share of revenues from brown (i.e., fossil fuel) activities, as for example done for the Nasdaq Green Equity Designation.

these breakdowns for issuances and holdings will allow the compilation of all breakdowns required in the reporting templates of DGI-3 Recommendation 4 on Climate Finance.

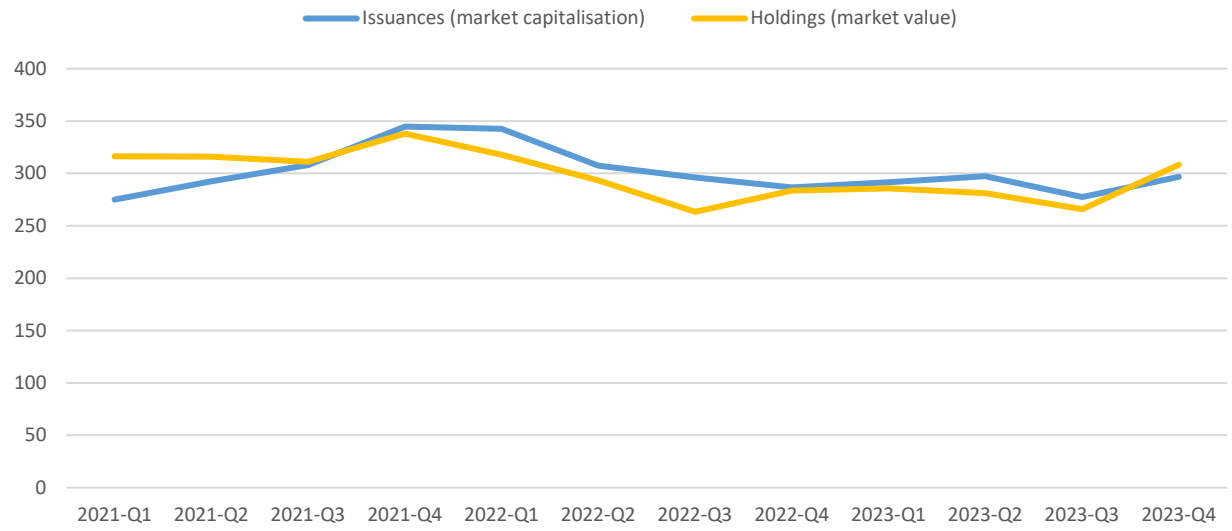
6. Results for the euro area green listed shares market

As an example of the general framework described in sections 2 and 5, we propose a simple approach for compiling experimental aggregates on issuances and holdings of green listed shares. Following the recommendations by the World Federation of Exchanges, we employ an identification method based on revenues, identifying as green shares those issued by issuers whose revenue share coming from activities aligned to the EU Taxonomy[11] is greater than 50%. To this aim, we use data sets from Institutional Shareholder Services (ISS) and Carbon4Finance (C4F)[12] and consider as green those shares that are green according to either ISS or C4F. To allow for the compilation of time series data, for each issuer, we select the latest data on green revenues from both data sets, and backpropagate the "green flag" to past periods. It should be noted that, given the natural delay with which climate data become available, the data should be considered provisional and is likely to be subject to revisions in the future. For the calculation step, for issuances, using the CSDB, we calculate the market capitalisation by multiplying the number of outstanding shares by the closing market price at the end of the reference period. For holdings, we calculate the holdings at market value using the SHSS database. Finally, we aggregate the indicators at euro area level.

At end-2023, we identify 62 green listed shares issued in the euro area, accounting for a market capitalisation of 308 EUR billion (Chart 6). This is about 3.1% of the total market capitalisation of euro area issuers for the same period (which is 9,967 EUR billion according to CSEC). As for holdings, the market value of green listed shares (as issued by the whole world) in the euro area investors' portfolio amounts to 297 EUR billion as of end Q4 2023, issued by 125 companies. This accounts for about 2.9% of the total market value of listed shares in their portfolio (which is 10,096 EUR billion according to SHSS).

[11] See the EU Taxonomy Regulation of 18 June 2020 available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32020R0852.
[12] ISS: https://www.issgovernance.com, C4F: https://www.carbon4finance.com. Other climate data sources available in the field include S&P Shades of Green: https://www.spglobal.com/ratings/en/products-benefits/products/second-party-opinions, and FTSE Russell Green Revenues Classification System: https://www.lseg.com/content/dam/ftse-russell/en_us/documents/policy-documents/ftse-green-revenues-classification-system.pdf.

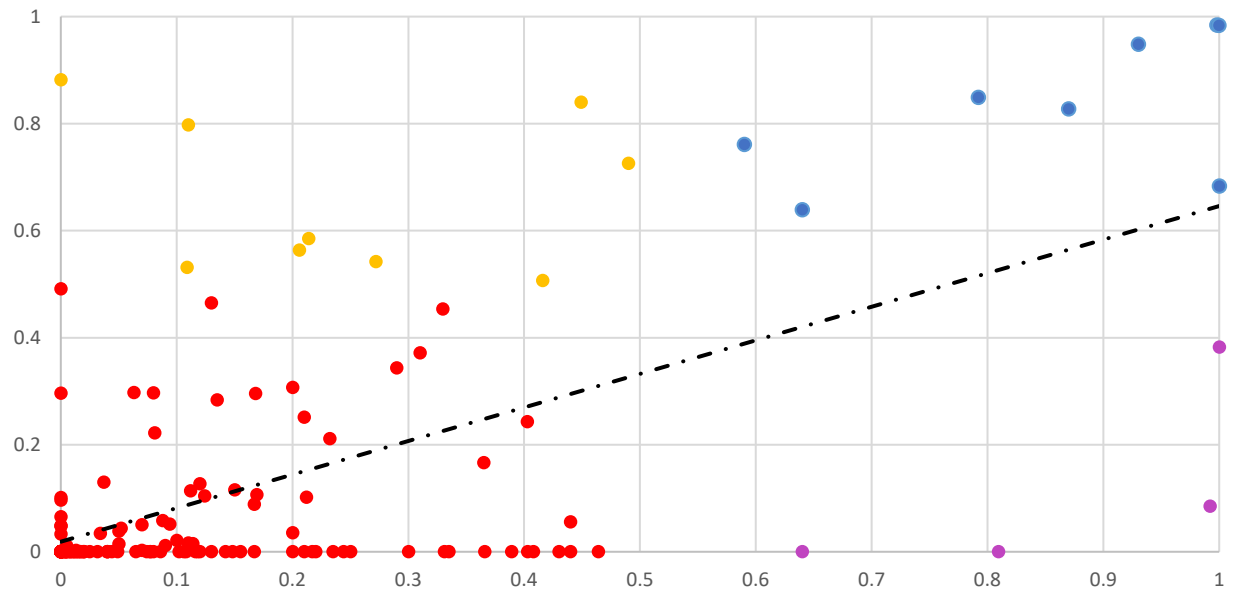
Chart 6
Issuances and holdings of green listed shares by euro area issuers and investors



Left-hand scale: EUR billion. For the holdings series, all green shares are considered, including those not issued in the euro area.

It should be noted that, in the above examples, we considered as green all listed shares which are green according to either ISS or C4F. However, the two datasets exhibit some relevant differences, as illustrated in Chart 7. For example, at end-2023, ISS identifies 52 green listed shares, accounting for a total market capitalisation of 143 EUR billion, while C4F identifies 18, with a total market capitalisation of 217 EUR billion. For holdings, considering only ISS, we obtain a total market value of 106 EUR billion, while C4F gives 238 EUR billion. The below scatterplot (Chart 7) shows a positive correlation between the share of green revenues according to the two datasets. These discrepancies caution against the use of only one single data source on green revenues and highlight the need for further analysis of the methodologies and data collection approaches applied by different commercial providers of green revenue information.

Chart 7
Comparison of the share of green revenues in ISS and C4F data sets



X axis: share of green revenues over total (ISS); Y axis: share of green revenues over total (C4F). The trendline is depicted in black.
The colours represent shares which are green according to both ISS and C4F (blue), ISS only (yellow), C4F only (pink), or neither (red). Only issuers which are present in both datasets are plotted. The Pearson correlation coefficient is 0.62.

7. Conclusions

This paper presents a general framework for compiling harmonised statistics on issuances and holdings of climate finance debt securities and explores a new approach for measuring the volume of issuances and holdings of green equity securities. In doing so, it directly contributes to the work of the G20 DGI on developing harmonised indicators for measuring climate finance in the G20/FSB member economies by providing a framework for compiling the statistics on climate finance debt securities and supporting the work on defining a framework for compiling the statistics on green listed shares that are disseminated in the context of G20 DGI Recommendation 4 on Climate Finance (Working Group on Securities Databases 2023).

In applying this compilation framework to the euro area, the paper shows that climate finance debt securities present a rapidly growing market segment in the euro area debt securities market, with outstanding amounts and holdings of climate finance debt securities having almost tripled to EUR 1.2 trillion over the last three years. At the same time, the results underscore the key importance of external assurance in the euro area climate finance debt securities market, as highlighted by the high share of close to 90% of climate finance debt securities issued and held in the euro area that have at least a second-party opinion from an external reviewer. In contrast to climate finance debt securities, the euro area market for green listed shares is still in a more infant stage with official designations of green shares still not in place in the major euro area stock exchanges. However, the results based on the general framework presented in this paper show that – applying a classification approach modelled on the one of the WFE principles and of major non-euro area exchanges – a small market for green listed shares already exists that is likely to grow in the future when official labels and designations of green shares become more widely available.

While the compilation framework for climate finance debt securities presented in this paper can be readily applied for the compilation of globally harmonised and comparable aggregates on climate finance debt securities, the compilation process for harmonised aggregates on listed shares would benefit from additional data sources and from a robust data quality framework, to deal with inconsistencies such as those evidenced by comparing the ISS and C4F data sets. Based on this, future research should further benchmark these different data sources and carefully assess the underlying differences in methodologies and data collection approaches that are causing relevant differences. In this regard, the future introduction of green share designation in other major stock exchanges as well as the application of the EU Corporate Sustainability Reporting Directive (CSRD) will hopefully strengthen the availability of data on green shares in the future, allowing for more consistent and reliable aggregates. In addition, future work on measuring the volume of climate via green shares should also shift its focus to specifically measuring the new funds raised via initial public offerings and capital increases of already green corporations to quantify the actual contribution of new green shares to overall climate finance, and explore further refining the indicator presented in this paper by making it more robust to possible greenwashing (e.g., by complementing it with a threshold for the share of revenues from brown activities). Finally, considering the framework suggested in this paper, future methodological work – e.g., in the in the context of DGI Recommendation 4 and currently ongoing updates of the System of National Accounts and Balance of Payments Manuals – should provide more specific guidance on the measurement and compilation rules for climate finance statistics on both debt securities and shares to promote a harmonised basis for further research on the volume, determinants and effects of climate finance.

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EUROPEAN CENTRAL BANK

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Compiling climate finance statistics from s-b-s data

CBRT-IFC Workshop on "Addressing Climate Change Data Needs: The Global Debate and Central Banks' Contribution"

Izmir, Türkiye
6-7 May 2024

Flavio Fusero, Johannes Kleibl, Dimitra Theleriti
European Central Bank

Overview

Introduction

Introduction

- Climate finance securities are one of the fastest-growing segments in global securities market
  - ► Compilers of securities statistics have started trying to track the volume of climate finance to support policymakers' understanding of funds available for financing the green transition ...
  - ► ... but so far no standardised methodology for compiling climate finance statistics from s-b-s data
- Our paper aims at addressing this gap and makes three contributions:
  1) Provides practical guidance on key steps for producing harmonised statistics on climate finance debt securities based on s-b-s data
  2) Explores possible methodology for measuring the volume of green shares
  3) Directly contributes to work on G20 DGI Rec. 4 on Climate Finance
- We use s-b-s data for the euro area to showcase the usefulness of the indicators for debt securities and the applicability of the proposed concepts for shares

Compilation using s-b-s databases

Compilation using s-b-s databases

- Compiling securities statistics based on s-b-s data generally requires four steps:
  1) Availability of required s-b-s data attributes → Ensure that attributes are required for identification, calculation and aggregation are available in the s-b-s database
  2) Identification of relevant securities → Filter for individual securities that need to be part of the aggregates for a given reference date

     Example: *Instrument classification == F.3 & reference date >= issue date & reference date < maturity date & security status == alive & instrument flags == “”*
  3) Calculation of statistics at individual security level → Calculate statistical quantities (e.g., outstanding stocks, gross issuances, redemptions, revaluations, and other changes) at the level of individual securities

     Example: *Stocks at nominal value = Stock face value x issue price + stock face value x next coupon rate x coupon accrual period + stock face value x discount rate x discount accrual period*
  4) Aggregation by relevant breakdown categories → Apply breakdowns for which aggregates should be compiled based on the statistical quantities calculated at the level of individual securities

► Generic approach can be easily applied to compilation of climate finance statistics from s-b-s data by integrating climate finance breakdowns in steps 1 and 4

Compiling climate finance statistics from s-b-s data: debt securities

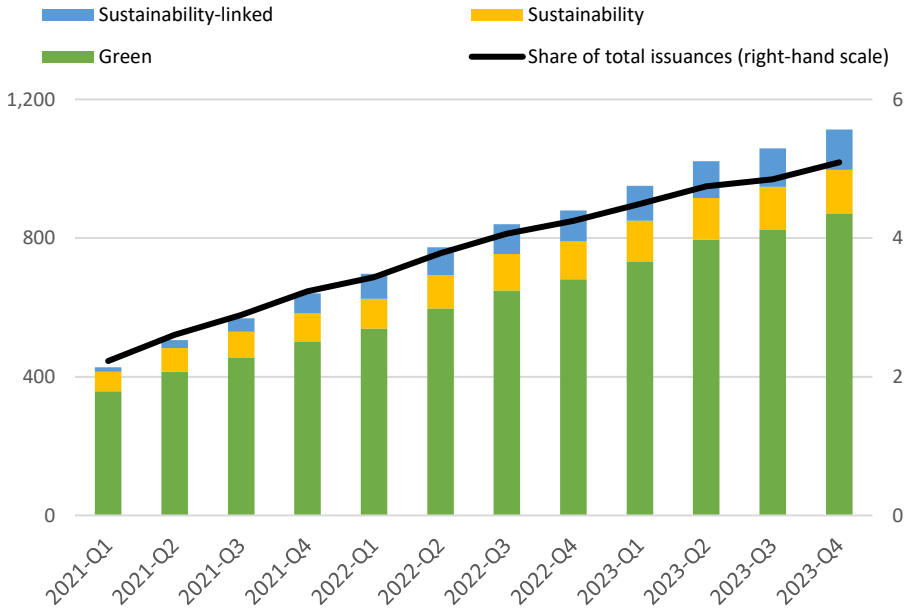
Compiling climate finance statistics from s-b-s: debt securities

- Compilation of climate finance statistics from s-b-s for debt securities:
  - Additional requirements for steps 1 and 4 of the generic compilation approach:
    - *1) Availability of required s-b-s data attributes*
      - Classification of climate finance debt securities: green, sustainability, and sustainability-linked — Minimum
      - "Assurance" level: self-labelled, with (pre-issuance) SPO, certified
      - Standards: e.g. CBI Climate Bonds Standards, ICMA Green / Sustainability-linked Bond Principles, European Union Green Bond Standard
    - *2) Aggregation by relevant breakdown categories*
      - Aggregates by type of climate finance debt securities — Basic
      - Further "of which" breakdowns by assurance level and by standard
      - Further breakdowns by e.g. issuer (or holder) sector, maturity, etc.

Suitable for G20 DGI-3 Rec. 4 on Climate Finance

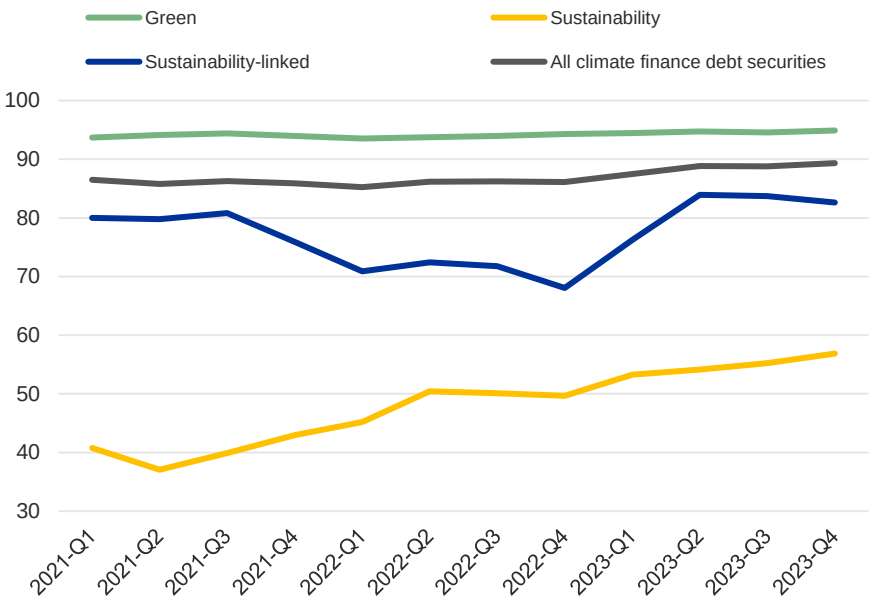
Results for EA climate finance debt securities market

EA issuances - all self-labelled climate finance debt securities



Left-hand scale: EUR billions, outstanding amounts at face value; right-hand scale: percentages.

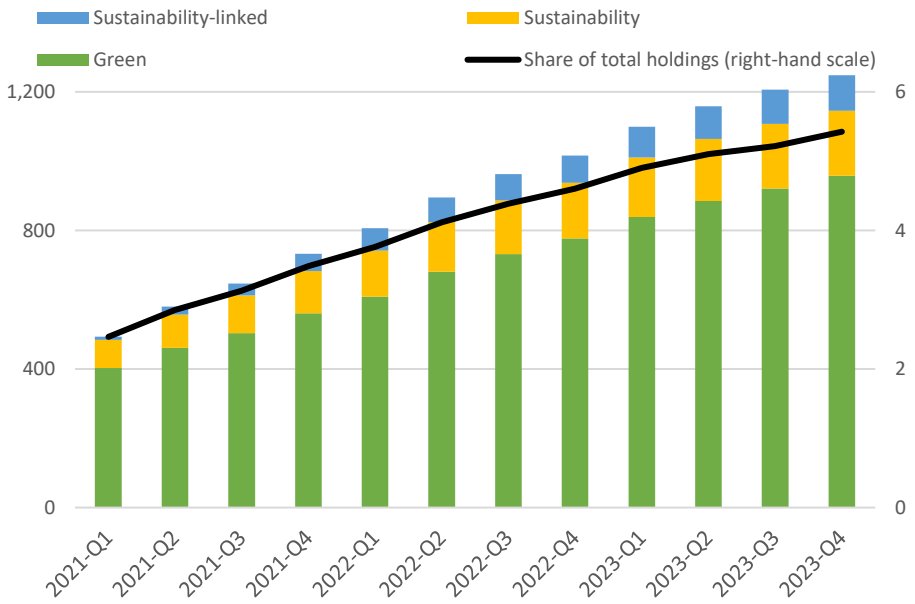
Share of EA issuances of climate finance debt securities with an SPO



Left-hand scale: percentages.

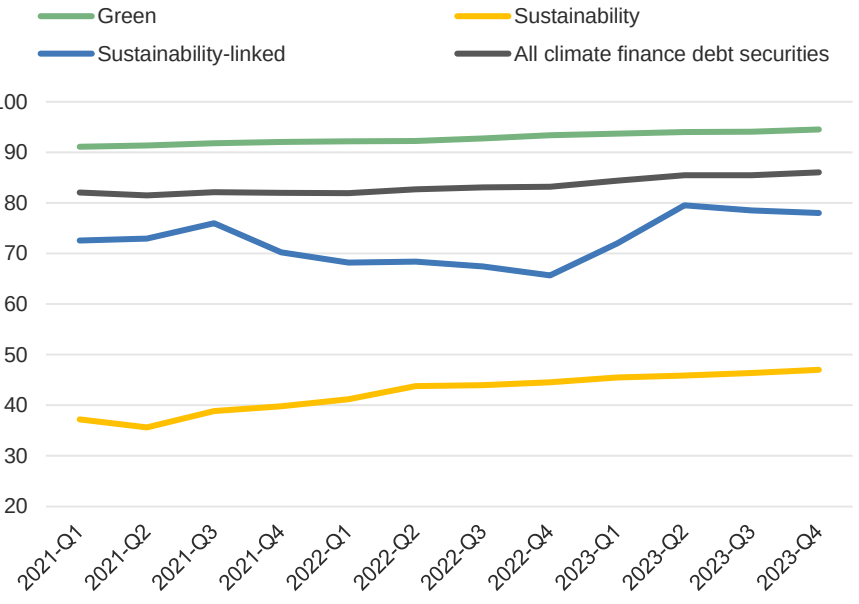
Results for EA climate finance debt securities market

EA holdings - all self-labelled climate finance debt securities



Left-hand scale: EUR billions, outstanding amounts at face value; right-hand scale: percentages.

Share of EA holdings of climate finance debt securities with an SPO



Left-hand scale: percentages.

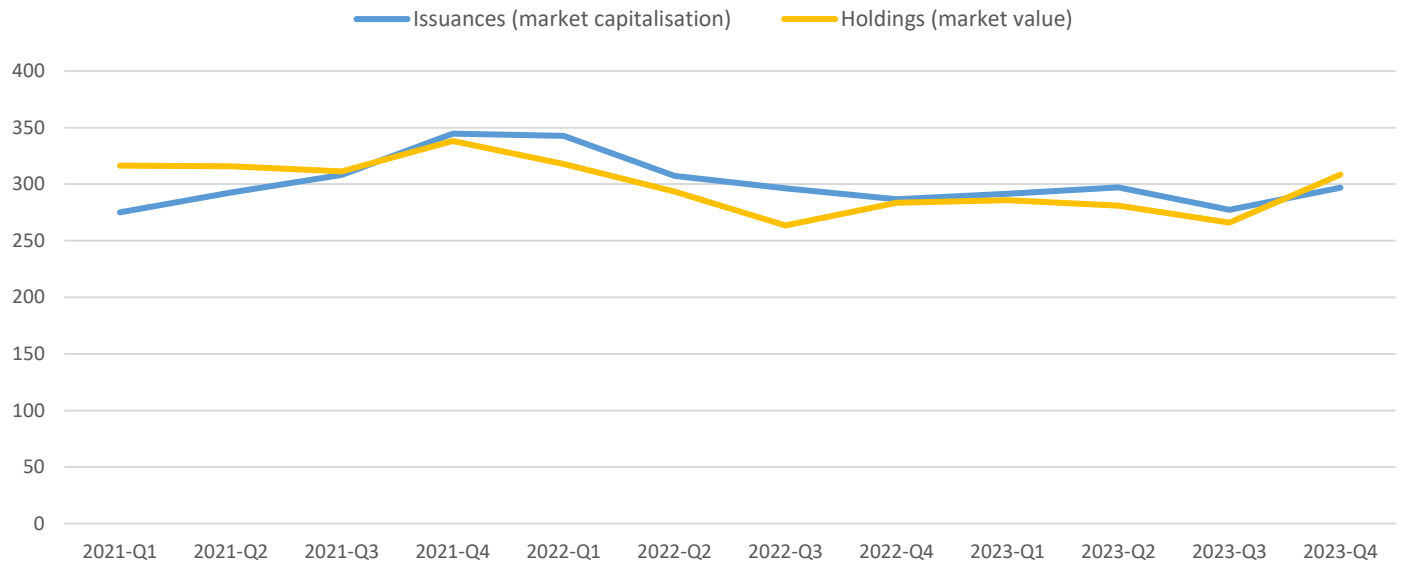
Compiling climate finance statistics from s-b-s data: listed shares

Compiling climate finance statistics from s-b-s: listed shares

- Identifying green listed shares poses additional problem compared to debt securities (no “use of proceed” approach possible)
- World Federation of Exchanges (WFE) developed “green equity principles”:
  - as a minimum: 50% of annual revenues should be from activities that contribute to the green economy
- Some stock exchanges (London Stock Exchange, NASDAQ) developed their own “green designations”, largely based on WFE principles
- The “50% of green revenues” criterion is simple and easy to operationalise, while other approaches have their own shortcomings (best-in-class approach, comparisons against back data or future emission targets, qualitative assessments)
- Generic compilation approach described above can be also easily applied to green shares
- Applying this approach, we propose results based on ISS and C4F datasets and backpropagate “green flags” to build historical time series

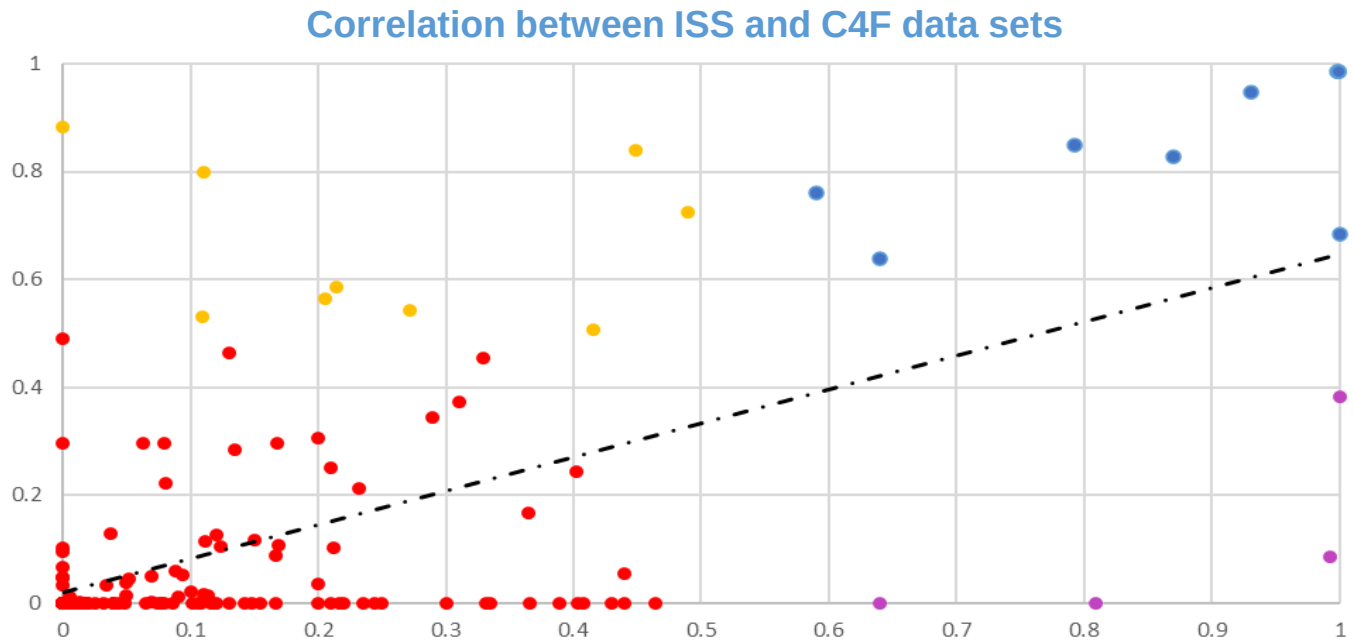
Results for EA green listed shares market

Issuances and holdings of green listed shares by EA issuers and investors



Left-hand scale: EUR billions. For the holdings series, all green shares are considered, including those not issued in the euro area.

Results for EA green listed shares market



X axis: share of green revenues over total (ISS); Y axis: share of green revenues over total (C4F). The trendline is depicted in black.

The colours represent shares which are green according to both ISS and C4F (blue), ISS only (yellow), C4F only (pink), or neither (red). Only issuers which are present in both datasets are plotted. The Pearson correlation coefficient is 0.62.

Conclusions

Conclusion

Summary

1) Paper provides general framework for compiling harmonised statistics on issuances and holdings of climate finance debt securities and ...
2) ... explores a new approach for measuring the volume of issuances and holdings of green equity securities

► Direct contribution to DGI Rec. 4 work on developing harmonised framework for compiling climate finance statistics

- Directions for future work/research on compiling climate finance statistics:
  - ► Use of additional data sources on green revenues to benchmark data quality and assessment of underlying differences in methodologies and data collection approaches
  - ► Measuring new funds raised via IPOs and capital increases to quantify actual contribution of new green shares to overall climate finance
  - ► Future methodological work (e.g., in context of Rec. 4 and SNA/BPM updates) needed to provide concrete measurement compilation guidance for climate finance statistics