BANCA D'ITALIA
EUROSISTEMA

Report on sustainable investments and climate-related risks

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OVERVIEW

The risks deriving from climate change, the loss of biodiversity, the deterioration of social conditions and the quality of corporate governance, i.e. the environmental, social and corporate governance (ESG) risks, affect the actual and potential growth rate of the economy.

Globally, investors are paying increasing attention to ESG factors. According to the World Economic Forum's 2022 Global Risks Report,[1] environmental and sustainability profiles are among the most important risk categories, in terms of both the probability and the perceived severity of potential damage. In 2020, according to a Global Sustainable Investment Alliance report,[2] sustainable financial investments, which made up about 36 per cent of global assets under management, reached $35.3 trillion, more than doubling its 2016 value.

It is up to governments to play the primary role in tackling climate change and ESG risks. However, these risks are also important for central banks and supervisory authorities, as they can affect their ability to pursue institutional objectives relating to the monetary and financial stability, as well as the soundness of individual intermediaries.[3]

For central banks, these risks are also relevant to their role as institutional investors. Since 2019, the Bank of Italy has begun to integrate ESG criteria into the management of its non-monetary policy portfolios. In its Responsible Investment Charter, published in 2021, the Bank identified three strategic lines of action: (a) promoting the disclosure of information on sustainability by issuers and other financial system operators; (b) integrating the ESG criteria into the management of its own investments, thus helping to disseminate good practices in this field; and (c) publishing data and analyses on sustainable finance, regularly communicating the achievements, thereby contributing to the spreading of an ESG culture both in the financial system and among citizens.

This Report addresses the commitment, undertaken with the publication of the Charter, to disclose the methodologies adopted for considering ESG risks in the investment policy for the Bank's non-monetary policy portfolios, and the results obtained.

The Report is inspired by the recommendations prepared by the Task Force on Climate-Related Financial Disclosures (the TCFD) and the 'Guide on climate-related disclosure for central banks', published by the Network for Greening the Financial System (the NGFS), which the Bank joined in 2019.[4]

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1 World Economic Forum, *The Global Risks Report 2022*. 17th edition, 2022.

2 Global Sustainable Investment Alliance, *Global sustainable investment review 2020*, 2021.

3 E. Bernardini, I. Faiella, L. Lavecchia, A. Mistretta and F. Natoli, '*Central banks, climate risks and sustainable finance*', Banca d'Italia, Questioni di Economia e Finanza (Occasional Papers), 608, 2021.

4 NGFS, *Guide on climate-related disclosure for central banks*, December 2021.

The Report has a section for each of the four areas identified by the TCFD: (a) governance; (b) strategy; (c) risk management; and (d) metrics and targets.

Governance. – The introduction of sustainability criteria into the investment decision-making process did not require any significant changes to be made to the Bank's governance for making its investment choices: the various Committees and Directorates were tasked with adding sustainability considerations to the pre-existing financial criteria, based on traditional financial considerations. To ensure a consistent approach to sustainability across all the Bank's functions, a Climate Change and Sustainability Committee was set up, chaired by a member of the Governing Board and a Hub was created to support the Committee in coordinating and directing the Bank's activities relating to all ESG issues (portfolio investments, banking and financial supervision, economic research, and business operations).

Strategy. – Since 2019, the sustainable investment strategy has been extended in terms of both asset classes and targets, steadily paying greater attention to ESG factors and in particular to climate-related ones. Moreover, this choice aims to contribute to the achievement of the sustainability objectives identified both at European level, with the approval of Regulation (EU) 2021/1119, outlining the framework for achieving climate neutrality, and at national level, with the amendment of Articles 9 and 41 of the Constitution, which introduced a reference to the protection of the environment, biodiversity and ecosystems, also in the interest of future generations.

At the end of 2021, the value of the portfolios where a sustainable investment policy could potentially be applied, was around €210 billion. For euro-area government bonds, which account for a large share of the total, the sustainability metrics are currently monitored but do not contribute to investment decisions, for various reasons; an exception is made for the green bonds of euro-area sovereign issuers and of supranational institutions, currently valued at €1.7 billion, whose share of the Bank's investments is foreseen to grow over time.

Risk management. – The Bank's policy for investing in private sector instruments (in particular equity) used to follow the market neutrality principle (the composition of the portfolio replicated that of the market, although some sectors were excluded). Since 2019, the Bank has gradually introduced climate-related and sustainability factors into the existing risk management models. At first, they were included after the asset portfolio allocation step, in the security selection phase, first for the equity portfolios, and then for the bond portfolios. Subsequently, sustainability considerations were also applied at the asset allocation step, but only for private sector issuers. In this way, the ESG factors are now taken into account during the whole investment process, from allocation to the selection of individual securities.

The sustainable investment strategy is implemented by means of a combination of different portfolio management policies: for private sector securities: (a) 'negative screening', excluding certain companies from the investment universe; (b) 'positive screening', giving preference to companies that are 'best in class' in terms of ESG practices; and (c) 'ESG integration', introducing ESG factors into the financial models;

in addition, there are 'thematic investments' with policies in place for both public and private sector investments (e.g. for the purchase of green bonds).[5]

The ESG metrics applied so far in the portfolio investment decisions of private sector issuers are backward-looking (measurements of certain indicators at an earlier date). The use of forward-looking data is in fact complicated by the uncertainties about time horizons, the type of metrics, and the probability and severity of the related events. Nevertheless, information on companies' transition plans is a good starting point, since it has fewer scenario assumptions. Starting this year, therefore, investment decisions also take companies' decarbonization commitments and transition plans into consideration. The Bank will start a dialogue with companies to gather information on sustainability strategies and on the results achieved so far. An equity portfolio for thematic investment will also be set up, to include those companies that are contributing most to the ecological transition, in order to seize the opportunities linked to technological innovations and to foster structural change in the economic system.

Metrics and targets. – The analysis of metrics and targets shows the progress made by the Bank in recent years. For the internally managed equity portfolio (worth €16 billion and accounting for over 90 per cent of the Bank's private sector investments), the carbon footprint declined by 60 per cent compared with 2018 – the year prior to the launch of the sustainable investment strategy – and is 37 per cent lower than the market benchmark. Weighted average carbon intensity (-24 per cent), use of electricity (-21 per cent), use of water (-14 per cent) and production of waste (-28 per cent) are also better than the benchmark. With regard to social metrics, the share of women employed is 7 percentage points higher than the benchmark and the injury rate is 9 per cent lower.

The approaches and methodologies described in this Report are based on the current state of the debate, the available data and the relevant legislation; they are therefore subject to continuous scrutiny and may evolve in line with any new developments.

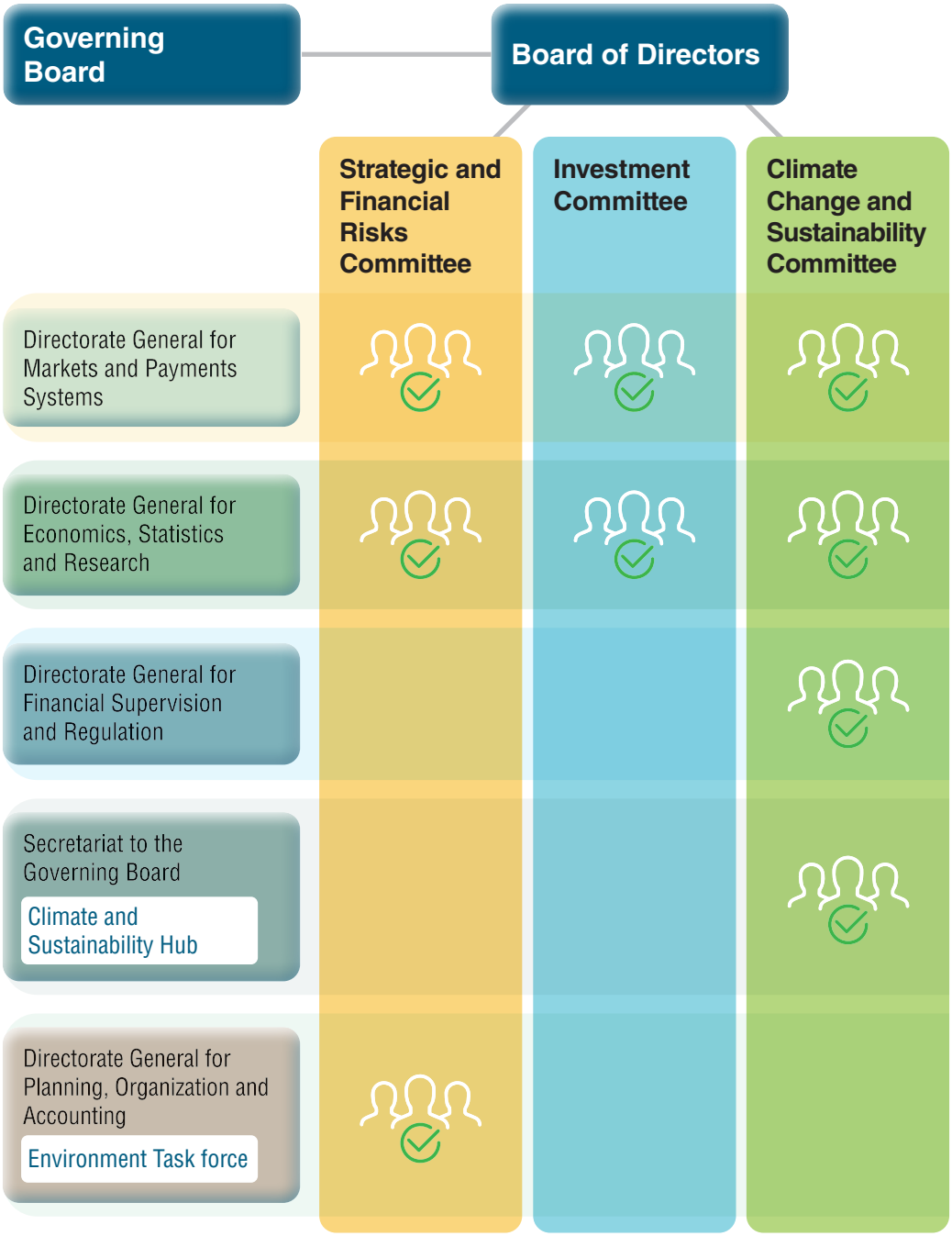
5 NGFS, *A sustainable and responsible investment guide for central banks' portfolio management*, October 2019; NGFS, *Progress report on the implementation of sustainable and responsible investment practices in central banks' portfolio management*, December 2020.

1. GOVERNANCE

The investment decisions of the Bank of Italy are adopted within a comprehensive governance framework (Figure 1.1).

Figure 1.1

Sustainable investments and sustainability topics: governance bodies



Proposals for the strategic asset allocation (SAA) for investments, prepared by the risk management function, are submitted to the Strategies and Financial Risks Committee, chaired by a member of the Governing Board, which meets at least once a year. The composition of this Committee is broad-based, in order to involve other functions: members from the Directorate General for Economics, Statistics and Research and the Directorate General for Planning, Organization and Accounting attend the Committee meetings, because of the possible implications of financial investments on the Bank's balance sheet. The Committee evaluates the proposals regarding the risk budget, the size and strategic allocation of the portfolio, that implies a challenging and screening role. Final approval of the proposals rests with the Governing Board.

The Investments Committee, which coordinates the analyses, the drafting of proposals and the day-to-day management of the investments,[6] reports to the Directorate General for Markets and Payment Systems and is chaired by its Director General, meeting every two months.[7] The Committee plays different roles according to the different types of financial assets involved. For foreign exchange reserves, the Committee takes decisions on tactical deviations from the strategic benchmarks over a two-month horizon (see Section 3, 'Risk Management'). With reference to the remaining financial assets, it monitors convergence towards strategic asset allocation on a bimonthly basis.

The Bank of Italy's Board of Directors intervenes when the investment decisions involve a change in the accounting classification of financial assets, for example for decisions on held-to-maturity securities portfolios; it is also periodically informed of the results of portfolio management.

Since 2019, with the introduction of sustainable investment criteria, this governance framework has remained essentially unchanged. The pre-existing governance bodies were mandated to add sustainability profiles to the previous criteria, which had been based on traditional financial considerations.

To give further impetus to the Bank's action on sustainability, in 2022, the Climate Change and Sustainability Committee[8] was set up and it is chaired by the same member

6 In particular, the Financial Risk Management Directorate prepares proposals regarding the strategic and tactical allocation of portfolios and takes care of risk control and portfolio yield measurement, reporting directly to the Governing Board and the Committees. The Market Operations Directorate is concerned with the active management of currency reserves, executes investment operations on the other portfolios and carries out market analyses. The Operations and Payments Settlement Directorate carries out settlement operations and related controls as well as IT support activities.

7 The other members of the Committee are: the Head of the Financial Risk Management Directorate, the Head of the Market Operations Directorate, two managers from the Directorate General for Economics, Statistics and Research, respectively representing the Economic Outlook and Monetary Policy Directorate and the International Relations and Economics Directorate.

8 The Committee is composed of the Heads of the Directorates General for Economics, Statistics and Research, for Markets and Payment Systems and for Financial Supervision and Regulation, the Head of the Secretariat to the Governing Board, and there is also a representative of the Insurance Supervisory Authority (IVASS). The meetings are also attended by representatives of the Directorate General for Property and Tenders and the Organization Directorate, which carry out tasks relevant to the sustainability of the Bank of Italy. The Committee ensures a unified vision of climate and sustainability issues; it integrates its work across all the various areas of activity; it ensures that all the relevant information on climate change and sustainability is circulated around the various functions; and it facilitates the coordination of the Bank's representatives in the various national and international offices.

of the Governing Board who chairs the Strategies and Financial Risks Committee. The Committee does not hold specific tasks relating directly to investments; however, it does promote analyses on the risks and opportunities relating to ESG profiles, which can contribute to enhancing methodologies for the Bank's sustainable investments.

The Committee makes use of a Climate Change and Sustainability Hub, which coordinates the workstreams in the various departments of the Bank on a daily basis and interacts with similar units created by other central banks and national and international institutions. The Hub, which reports directly to the Governing Board, benefits from the collaboration of experts on the subject working in the areas of economic research, financial stability, markets and supervision, gathered in a permanent contact group on climate change and sustainability. The Hub also cooperates with the Directorate General for Planning, Organization and Accounting and with the Environmental Task Force, which coordinates the initiatives to reduce the Bank's environmental and carbon footprint.

2. STRATEGY

This section describes the functions and composition of the Bank's financial investments. It also illustrates the investment strategy and the changes introduced to take sustainability criteria into account.

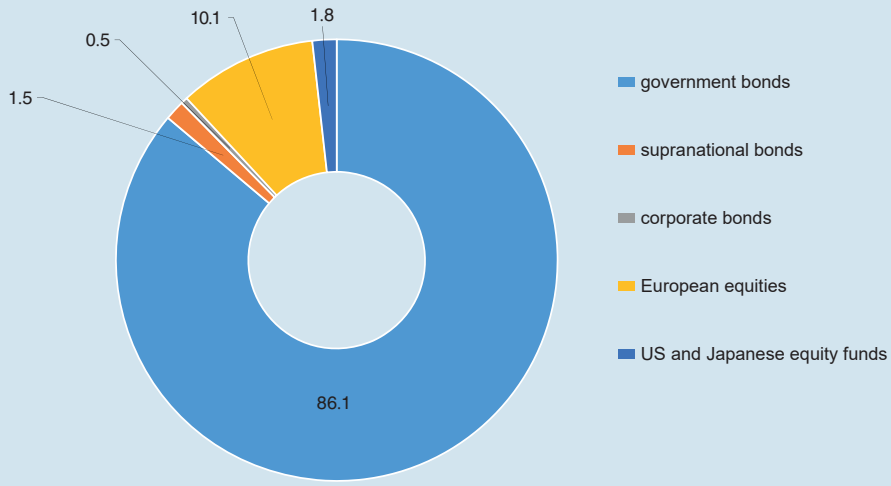
2.1 *The characteristics of the Bank's financial investments*

The Bank's financial investments amounted to almost €210 billion at the end of 2021, distributed between the euro-denominated financial portfolio (which represents over 80 per cent of the total) and the portfolio holding foreign exchange reserves. Both portfolios consist mainly of government bonds denominated in euro and in other major currencies, due to their safety and liquidity characteristics, as well as the institutional needs of the central bank.

The financial portfolio. – At the end of 2021, the financial portfolio had a market value of €160 billion, 86 per cent of which was in government bonds, mainly of the Republic of Italy (Figure 2.1); there were also government bonds from other euro-area countries and from supranational issuers.

Figure 2.1

Financial portfolio: composition by asset class
(percentage points; December 2021)



A stake of close to 12 per cent was invested in listed shares of euro-area companies and in equity mutual funds denominated in foreign currencies, which track equity indices for the United States and Japanese markets.[9] Due to the institutional role played by the Bank

[9] The Bank of Italy has historically held shares among its own investments and has expanded its equity portfolio over time for diversification purposes. This goal has become more important in recent years because of both the very low interest rates on government securities and above all the marked fiscal expansion caused by extraordinary monetary policy interventions.

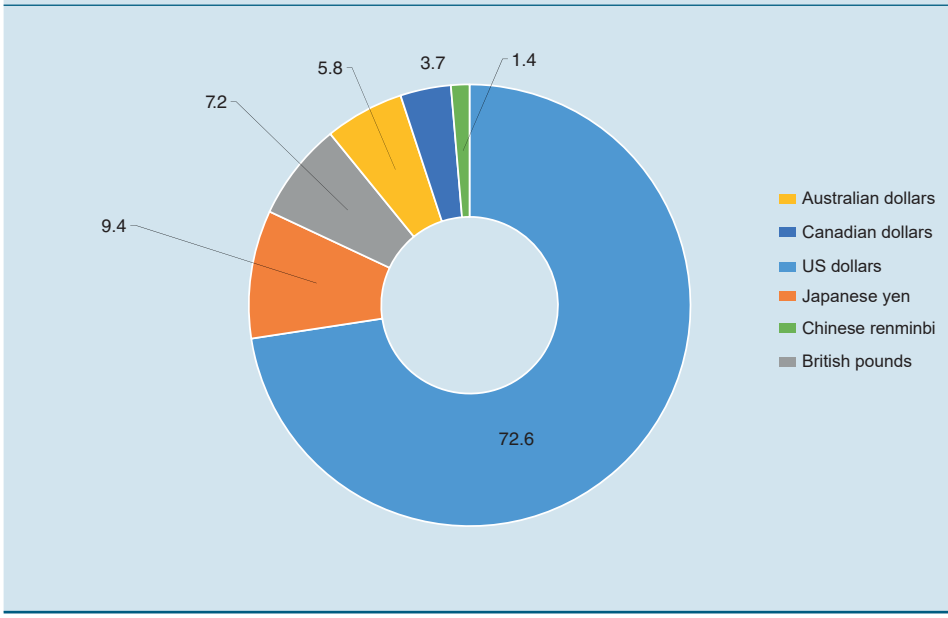
of Italy, equities of banking, insurance and financial services companies are excluded from the investment universe. A smaller part is invested in euro-denominated corporate bonds.

Foreign exchange reserves. – The foreign exchange reserves held by the Bank of Italy are an integral part of those of the Eurosystem; they help bolster its credibility and can be used for foreign exchange market interventions to support currency stability.[10]

At the end of 2021, the foreign exchange reserves were worth €49.1 billion and included the main currencies: USD (whose share was over 70 per cent; Figure 2.2), JPY, GBP, CAD, AUD, CNY, as well as net claims on the IMF, denominated in Special Drawing Rights. The financial investments in the foreign exchange reserves examined in this Report are mainly government bonds and, to a lesser extent, supranational and corporate bonds, of which a part was issued to fund projects with environmental objectives (green bonds).

Figure 2.2

Investments in foreign exchange reserves: currency composition (1)
(percentage points; December 2021)



(1) Excluding the IMF's net position.

Gold reserves, which together with foreign exchange reserves constitute the official reserves of the Bank of Italy, are exempted from the sustainable investment policy and not included in this Report, mainly due to the difficulty of measuring the carbon footprint of gold reserves.

[10] The Bank also uses foreign exchange reserves in order to settle payments on public debt payments in foreign currency on behalf of the Treasury and to fulfil commitments to international organizations (such as the International Monetary Fund).

2.2 *The strategic objectives of the investments*

Traditionally, the Bank's investment policy pursues strategic objectives for limiting its exposure to financial risks (to preserve the capital invested including at times of market tensions) and for prudently seeking a return, to help cover the Bank's operational costs. For foreign exchange reserves, the Bank also aims to ensure a high degree of liquidity.

Since 2019, these objectives have been integrated with the assessment of ESG factors (Figure 2.3). The change in strategy aims to:

a) contribute to the protection of the environment;

b) improve the risk-return profile of investments;

c) encourage dialogue with the financial sector.

Contribute to the protection of the environment. – The effort to protect the environment is actively pursued by lawmakers to ensure sustainable and lasting growth.[11] Although the Bank is not subject to some of the sustainability regulations,[12] in its role as investor, it faces issues and makes choices which have many points in common with the decisions of private investors (e.g. asset managers, insurance companies and banks).

Improve the risk-return profile of the investments. – The risk profile of investments is influenced by climate change, as well as by the environmental, social and governance conditions in which companies operate. By giving preference to companies that are mindful of ESG factors, investors can improve their own risk-return profiles.[13] Attention to environmental and sustainability issues reduces transition risk in particular, which could occur even over short horizons.

Encourage dialogue with the financial industry. – Awareness of the challenges of integrating sustainability profiles into financial decisions helps to shape the dialogue with market operators, promote the transparency of information and spread the adoption of good practices. Ultimately, the dialogue increases the effectiveness of the Bank's role, which aims to make the financial system more resilient to the risks relating to sustainability profiles. Looking forward, this dialogue will also increasingly involve banks and other financial intermediaries.

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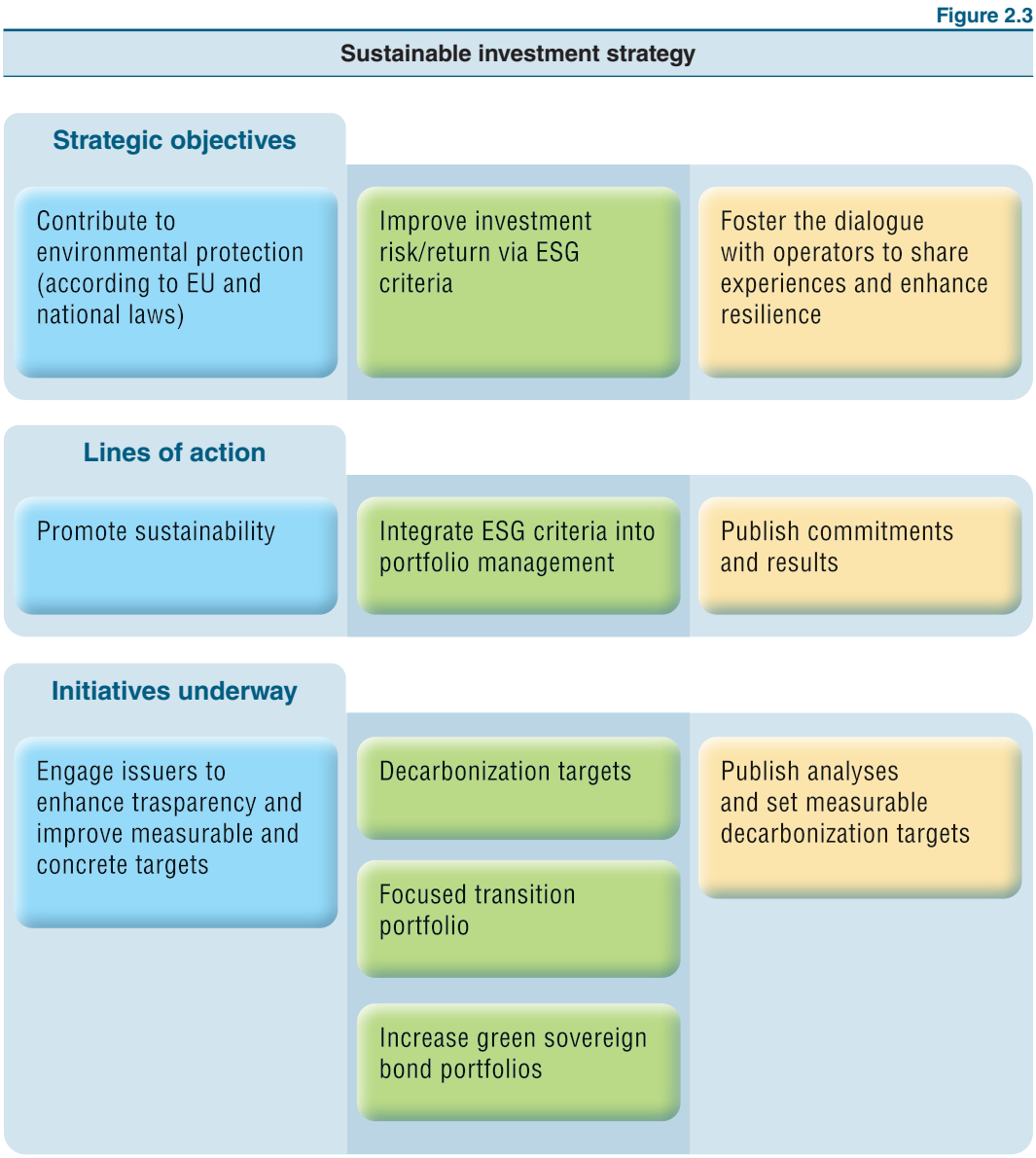
11 In particular, see the measures already mentioned in the overview: at European level, the regulation for the achievement of climate neutrality; and at national level, the constitutional amendment introducing an explicit reference to the protection of the environment, biodiversity and ecosystems.

12 For example, the Bank is not subject to the implementation rules of the European directives on non-financial information and reporting on sustainable finance.

13 G. Friede, T. Busch and A. Bassen, 'ESG and financial performance: aggregated evidence from more than 2000 empirical studies', *Journal of Sustainable Finance & Investment*, 5, 4, 2015, pp. 210-33; G. L. Clark, A. Feiner and M. Viehs, 'From the stockholder to the stakeholder: how sustainability can drive financial outperformance', 2015.

Figure 2.3



2.3 *Lines of action and ongoing initiatives*

With the publication of the Responsible Investment Charter, the Bank has defined the three lines of strategic action it intends to pursue:

a) promoting sustainability with initiatives aimed at encouraging the disclosure of information on ESG profiles by issuers, intermediaries and other financial system operators;

b) integrating ESG criteria into the management of its investments and related financial risks and promoting the dissemination throughout the financial system of good practices for sustainable investment and risk management;

c) publishing commitments and results for sustainable finance, regularly communicating the achievements in terms of sustainability and thus contributing to the dissemination of a sustainable finance culture both in the financial system and among citizens.

Promoting sustainability. – In 2021, the Bank of Italy illustrated its strategy in numerous dialogues with representatives of the Italian and international financial systems.[14] It has published analyses on: the characteristics of and prospects for the green government bond market;[15] ESG bonds;[16] the measurement of exposure to climate risks for the Bank's investments;[17] and the strategic asset allocation and the integration of sustainability criteria in the Bank's investment policy.[18]

Looking ahead, the Bank aims to increase its contacts with financial system operators and issuers of securities to encourage the dissemination of sustainability information and the adoption of concrete and measurable commitments to decarbonizing their activities.

Integrating ESG criteria into portfolio management. – The ESG objectives are pursued by the Bank mainly by investing in companies that: adopt production processes respectful of the environment; ensure inclusive working conditions, mindful of employees' rights; and apply the best corporate governance standards.

The inclusion of ESG profiles initially involved investments in equity and then in corporate bonds. With regard to investments in government and supranational securities, the assessment of sustainability metrics still has significant conceptual and implementation limitations (see Section 3.2, 'The introduction of ESG considerations'). Moreover, public securities have a particular role in institutional transactions, with safety and liquidity characteristics that would be difficult to replicate. For these reasons, the sustainability strategy has so far mainly concentrated on buying green bonds.

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14 The interventions of the Bank's representatives at conferences and events include: several speeches by the Governor and the Senior Deputy Governor during the Italian Presidency of the G20 in which they described the Bank's experience in introducing sustainability criteria into its investments; the Week of Sustainable and Responsible Investment; the Sustainable Development Festival; the conference on 'New aspects of financial culture: climate change and the green transition' as part of the annual 'Liquidity 2021' event run by Assiom Forex - The Financial Market Operators Association; the workshop on 'Climate change, credit risk and COVID-19' organized by the Fondazione Collegio Carlo Alberto of Turin; the ABI Lab conference 'Data, analytics and AI for sustainability'; and the event reserved for central banks on 'ESG integration in practice' organized by the Network for Greening the Financial System (NGFS).

15 R. Doronzo, V. Siracusa and S. Antonelli, 'Green bonds: the sovereign issuers' perspective', Banca d'Italia, Mercati, infrastrutture, sistemi di pagamento, 3, 2021.

16 D. Liberati and G. Marinelli, 'La crescita del mercato globale delle obbligazioni ESG e la loro diffusione in Italia', in A. Scalia (ed.), *La gestione dei rischi finanziari e climatici: l'esperienza di una banca centrale*, Roma, Bancaria Editrice, 2022, also published in Banca d'Italia, Questioni di Economia e Finanza (Occasional Papers), 654, 2021.

17 E. Bernardini, J. Di Giampaolo, I. Faiella, M. Fruzzetti, S. Letta, R. Loffredo and D. Nasti, 'Climate and environmental risks: measuring the exposure of investments', in A. Scalia (ed.), 2022, op. cit., also published in Banca d'Italia, Mercati, infrastrutture, sistemi di pagamento (Markets, Infrastructures, Payment Systems), 15, 2021.

18 D. Di Zio, M. Fanari, S. Letta, T. Perez and G. Secondin, 'The strategic allocation and sustainability of central banks'investment' in A. Scalia A. (ed.), 2022, op. cit., also published in Banca d'Italia, *Mercati, infrastrutture, sistemi di pagamento (Markets, Infrastructures, Payment Systems)*, 14, 2021.

Last year, in-depth studies were continued to enhance the management of the climate-related risks of investments through the use of forward-looking data on companies' decarbonization commitments. As regards ESG data, the analysis on the availability of information was carried out starting from various types of sources (public, private, company disclosures). Depending on the nature of the data (environmental, social and governance), gaps and differences were found between the information providers. In general, it is found helpful to combine data from different sources, which has led to improved coverage and accuracy.

The Bank is outlining a pathway to decarbonize equity and bond portfolios by identifying predefined and measurable intermediate goals. For the current year, the Bank is reviewing the criteria for how portfolios of shares and corporate bonds should be composed, in the light of indicators relating to companies' decarbonization commitments, the related long-term transition plans and the results achieved in this field. In addition to considering the past trends of companies in terms of greenhouse gas emissions, particular attention will be paid to decarbonization commitments in the short and medium-term (up to 10 years) as well as in the long term (10-30 years); both commitments, although included in the plans of a still limited number of companies, are very useful for assessing the transition prospects for companies and the related risks. The actual emissions trend will then be compared with the declared commitments in order to assess the consistency with the transition plans; any deviations could be investigated directly with the companies. In addition, initiatives will be launched to raise awareness and to hold dialogues with companies on the disclosure of sustainability data.

To contribute to the reduction of emissions, a thematic equity portfolio will be created, made of companies operating in the sectors of renewables, energy efficiency systems, electric mobility and green construction. These investments can contribute to the ecological transition by fostering the necessary technological innovations. For government and supranational bonds in euros and in foreign currencies, the portfolio of green bonds will be enlarged according to their availability on the market.

The Bank currently defines its strategic asset allocation choices by applying models that consider a ten-year forecasting horizon. The outcome of forthcoming climate scenario analyses may suggest adopting longer horizons.

Publishing commitments and results. – On the publication of its Responsible Investment Charter, the Bank disclosed some metrics relating to the results achieved in the reduction of the environmental footprint of equity investments.[19] February 2021 saw the publication of a common stance among the Bank of Italy and the other Eurosystem central banks to defining common climate-related sustainable investment principles for euro-denominated non-monetary policy portfolios.[20]

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19 For further information, see also Chapter 13: *L'impegno per la cultura, la società e l'ambiente e i servizi al pubblico* (The commitment to culture, society and the environment and services for citizens) in the *Report on Operations and Activities of the Bank of Italy for* 2020, 2021 (only in Italian) and Chapter 15, 'Central banks, climate-related risks and sustainable finance' in the *Annual Report for 2020*, 2021.

20 ECB, 'Eurosystem agrees on common stance for climate change-related sustainable investments in non-monetary policy portfolios', press release, 4 February 2021.

Going forward, the Eurosystem aims to publish information on climate-related risks by the first quarter of 2023, along with the recommendations of the TCFD.

In the future, both the publication of analyses on sustainable investments and the sharing of methodological research conducted by Bank experts will continue, including with the collaboration of research institutes and universities. Updates will also be provided on the results achieved and some of the goals of the Bank's decarbonization process will be announced in the next few years. The sustainability data disseminated by the Bank will encourage companies and financial institutions to increase their disclosure of non-financial information and their transition plans.

3. RISK MANAGEMENT

This section illustrates the conceptual and methodological framework for managing the financial and sustainability risks of the Bank of Italy's investments.

3.1 *The methodology for managing portfolio risks*

The portfolio investment process begins with the strategic allocation of capital between various asset classes; we then proceed with the selection of issuers and types of securities in order to define the composition of the investments in equity and corporate bonds.

In the strategic allocation step, a quantitative asset and liability management (ALM) model has been applied since 2010.[21] The model aims to identify the share of the portfolio to be invested in the various asset classes to optimize the distribution of economic capital,[22] which is key for maintaining the independence and credibility of a central bank. The results of the model incorporate institutional considerations, which are particularly relevant in the case of central bank investments, introducing a degree of discretionality to the process.

The optimization exercise has some specific characteristics: it adopts a long-term horizon (10 years) and minimizes the potential capital loss that could occur in the worst economic-financial scenarios for the central bank's balance sheet. The constraints include the risk budget (defined according to the risk aversion of the central bank) and an accounting constraint to avoid short-term losses that could entail reputational consequences.[23] The optimization exercise provides a hypothetical optimal allocation for the value of the portfolio across various asset classes – government and supranational bonds and equity and corporate bonds – which is broken down by currency.

The strategic asset allocation also produces other useful information. For foreign currency reserves, it defines the allocation weights by currency and by maturity band. For euro-area government bonds, allocation weights for duration targets are also identified. For the securities of private issuers (equity and corporate bonds), the selection is based on the principle of market neutrality with regard to broad-based indices (e.g. euro-area equity indices). For the euro area, securities of the banking, insurance and financial services sectors are excluded from the indices and portfolios, in light of the supervisory function carried out by the Bank. For Italian equities only, corporate securities in the media sector are also excluded, in order to avoid reputational risks linked to a

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21 The model takes into account the entire balance sheet of the Bank and other implicit exposures that affect the Bank's solvency in the medium and long term, for example the current value of operating costs and monetary income (see the box 'Monetary income' in *Annual Accounts - Year 2020*, 2021).

22 The economic capital of a company expresses the value attributable to the capital of a company taking into account the income that it will be able to generate in the future.

23 For more details on the model, see M. Fanari and G. Palazzo, '*The strategic asset allocation of the investment portfolio in a central bank*', in Bank of International Settlements, The World Bank, Bank of Canada and Banca d'Italia, *Evolving practices in public investment management*. *Proceedings of the seventh public investors conference*, BIS, 2019, pp. 2-22 and D. Di Zio, M. Fanari, S. Letta, T. Perez and G. Secondin, 2022, op. cit.

hypothetical influence of the Bank on the press and other media. The directly managed equity and corporate bond portfolios consist of fewer securities than the benchmarks; the replication of the indices is carried out with margins of tolerance for deviations from the index in terms of both economic sectors and individual securities.

Tactical management with a short-term horizon also contributes to the investment of foreign currency reserves, which is updated every two months and pursues the objective of improving the profitability of the portfolio by taking into account the market trends; tactical management is only performed for currencies whose financial markets are very large and liquid (US dollars, yen and pounds).

The Bank constantly measures the exposure to financial risks at all stages of the investment process, to ensure that the strategy is implemented in line with the approved guidelines. Monitoring is based on a framework of subsequent checks with specific limits based on predefined and objective criteria, which aim to avoid excessive exposure to individual counterparties, geographical areas and types of financial instrument.

3.2 *The introduction of ESG considerations*

As an investor, the Bank of Italy is exposed to financial and operational risks, which are also affected by climate-related and sustainability factors. A sustainability risk derives from an environmental, social or corporate governance event or condition, which, if it occurs, could have a negative impact on the value of the investment. Associated with these risks, however, are new opportunities stemming from the actions of the issuers, which can improve efficiency in the use of resources (primarily energy and environmental resources); increase the use of renewables; develop innovative products and services; and improve the operational resilience of the organization. Making the best of these opportunities can result in lower costs or higher revenues for companies, or in benefits to their financial structure and their ability to raise funds on the capital markets.

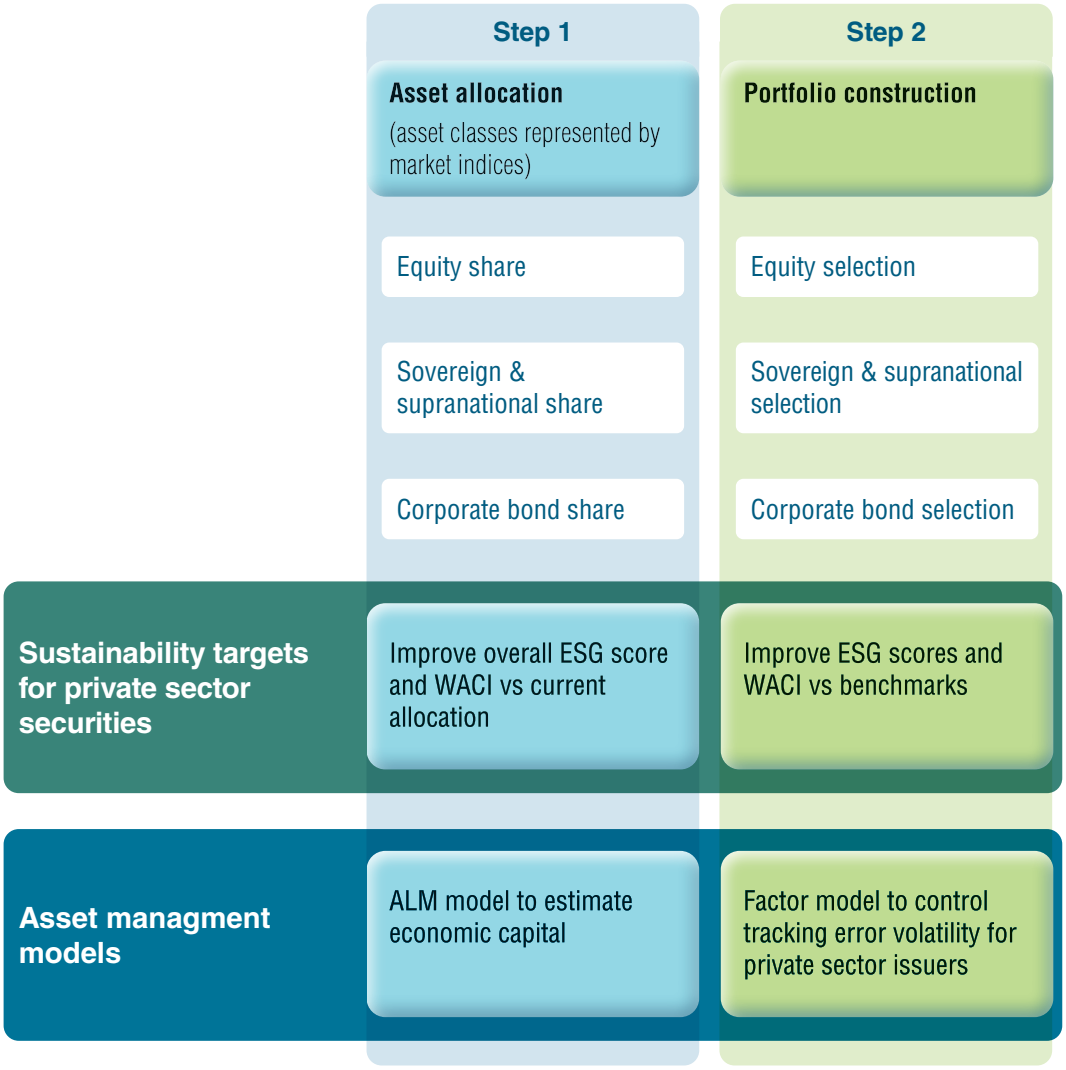
The integration of the sustainability criteria takes place in the two steps of strategic asset allocation and securities selection (Figure 3.1). In the first step, the optimization exercise described above takes two metrics into account: the ESG score and the carbon intensity of private sector issuers.[24] The goal is to improve or at least maintain the ESG score year by year and progressively reduce the carbon intensity of investments. In the second step, securities are selected to improve the ESG score and lower the carbon intensity compared with the benchmark, by checking the expected tracking error volatility of the related portfolio return by using a factorial model. In addition, the portfolio excludes equities and bonds of companies that do not comply with fundamental labour conventions and international treaties on weapons; it also bars tobacco producers, as specified in the Responsible Investment Charter.

Since 2022, forward-looking indicators have been also taken into account in the selection step, such as decarbonization commitments and private companies' transition plans (see Section 2.3, 'Lines of action and ongoing initiatives').

[24] For more details, see D. Di Zio, M. Fanari, S. Letta, T. Perez and G. Secondin, 2022, op. cit.

Figure 3.1

Sustainable investment management



The integration of ESG criteria into the selection of equity from euro-area issuers,[25] which began in 2019, was subsequently extended to the foreign currency component and included US and Japanese equities. With regard to the latter component, it was decided to invest in exchange-traded funds (ETFs) and in investment funds which replicate ESG equity indices. In selecting equity funds, the assessments consider both the sustainability profiles and the financial characteristics of the instruments, including diversification, liquidity, the volume of assets under management, fees and a comparison of returns and volatility. The selection of equity funds is based on the general principle of diversifying both managers and ESG strategies. Therefore, the integration of ESG factors meant that the Bank's equity portfolio had to deviate from the principle of neutrality.

[25] For more details, see Banca d'Italia, 'Investment criteria for equity portfolios', May 2020, on the Bank's website: 'The Bank of Italy values sustainability in its financial investments'.

With regard to corporate bonds, the Bank holds two portfolios (investments denominated in euros and in US dollars respectively). The inclusion of environmental, social and corporate governance criteria in the management of these portfolios took place through the switch to sustainability benchmarks developed by external providers.[26]

For government securities, different considerations are made compared with those for corporate securities. Firstly, the link between the public policies of sovereign issuers and the sustainability of their securities is more tenuous than the one that characterizes corporate issuers. There is no doubt that ESG profiles can play an important role in a country's long-term growth and financial soundness.[27] However, the ESG metrics for government bonds reflect the economic and productive structure of a country, which is influenced by the actions of the various economic agents, both public and private, operating in that country, while the environmental policies adopted by governments have an indirect, and generally delayed, effect on the relevant metrics. Secondly, the government bonds of the various countries, including those that are part of foreign exchange reserves, have very high liquidity and safety characteristics, which make them difficult to replace with alternative securities.

Italian government bonds are the main financial asset in the Bank's portfolio for institutional and historical reasons, as is generally the case in the other national central banks.

Given these considerations, in the process of strategic asset allocation and security selection, the sustainability metrics are only taken into account for the securities (equities and bonds) of corporate issuers. As for government bonds, the sustainability metrics are assessed and monitored (see Section 4, 'Indicators and results'), but they do not influence investment choices, except for the green bond portfolios of euro-area sovereign issuers and supranational institutions, whose share of the Bank's investments is destined to grow over time, depending on the issuance policies.

As for supranational bonds, the Bank has purchased a US dollar green bond fund that is managed by the Bank for International Settlements. Portfolios of green bonds denominated in euros and US dollars issued by supranational issuers and agencies have also been set up. The growing availability of these types of instrument enables us to widen the scope of application of the Responsible Investment Charter. The internal management of the green bond portfolios offers greater flexibility in the selection of securities and makes it possible to adapt to the Bank's evolving sustainability strategies.

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26 The sustainability indices consider only issuers with an ESG rating above BBB . The indices also include green bonds. In the portfolio management, which performs a sample replication of the indices, marginal deviations from the index are allowed under various profiles (sector, issuer, duration and maturity band).

27 W. D. Nordhaus, 'Economic growth and climate: the carbon dioxide problem', *The American Economic Review*, 67, 1, 1977, pp. 341-46; U. Volz, J. Beirne, N. Ambrosio Preudhomme, A. Fenton, E. Mazzacurati, N. Renzhi and J. Stampe, *Climate change and sovereign risk*, 2020; S. Stern, A. Wares and S. Orzell, *Social progress index 2015: methodological report*, 2015; M.A. Diaye, S. H. Ho and R. Oueghlissi, 'ESG performance and economic growth: a panel co-integration analysis', *Empirica*, 49, 2022, pp. 99-102; OECD, 'Biodiversity, natural capital and the economy: a policy guide for finance, economic and environment ministers', OECD *Environment Policy Paper*, 26, 2021.

Finally, information on climate and sustainability risks is being integrated into the internal processes of analysis and reporting. Backward-looking indicators, such as carbon footprint and carbon intensity, as well as forward-looking indicators, such as the 'Climate Value-at-Risk' and the implicit temperature rise are being developed (see Section 4.2, 'Climate metrics').

4. METRICS AND RESULTS

This chapter describes the metrics adopted by the Bank for measuring the environmental, social and governance profile of its investments, considering separately both public and private sector securities, as well as the different geographical areas and currencies in which the investments are denominated.

4.1 *The metrics for ESG profiles*

In order to integrate sustainability into their portfolio choices, investors need information on the ESG profiles of financial instrument issuers. It is therefore important to understand their characteristics, limitations and potential in order to be able to measure and manage investment sustainability profiles and to monitor results. At the moment, this information is provided by several specialized providers. The methodologies applied by ESG scoring providers have a certain degree of heterogeneity in terms of both the number of key parameters considered and the importance assigned to the different ESG profiles, which also varies depending on the sector, the main activity and the country. This explains why the scores for the same issuer, calculated by different providers, can sometimes be very different.[28]

A comparison with accounting and financial information shows that there is ample room for improvement for ESG indicators; international standards for disclosure and uniform validation rules to be applied by external auditors have been in place for a long time with regard to accounting information. The regulatory developments underway aim to bridge this gap.[29]

Aware of the limitations of the indicators currently available, the Bank of Italy is committed to identifying the most reliable ones, including through dialogue with the providers of sustainability information. At the moment, the Bank considers it appropriate to diversify techniques and maintain a flexible approach.

When using sustainability metrics, other considerations should also be taken into account. First, the ESG scores do not represent a precise measure of companies' sustainability strategies, but rather a brief assessment of their ability to manage risks and to seize the opportunities associated with sustainability factors as a whole.

Second, the importance of the three pillars included in the ESG profiles varies significantly from sector to sector. Climate-related and environmental factors play a decisive role for companies producing electricity, oil and gas or basic materials (e.g. cement and steel), while social and governance factors tend to be more important in

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28 The correlation between scores is relatively low and on average between 40 and 50 per cent (see A. Lanza, E. Bernardini and I. Faiella, 'Mind the Gap! Machine learning, ESG metrics and sustainable investments', in A. Scalia (edited by), 2022, *op.cit.*, and also published in Banca d'Italia, Questioni di Economia e Finanza (Occasional Papers), 561, 2020).

29 For further details, see ISSB, *General requirements for disclosure of sustainability-related financial information prototype*, *2021*; EFRAG, *Sustainability reporting standards interim draft*, 2022, and the proposal to amend Directive EU/2014/95 on non-financial reporting by companies.

the financial and technology sectors. Government bonds require specific considerations (see Section 3.2, 'The introduction of ESG considerations').

Third, the mainly backward-looking nature of the ESG scores makes them only partially useful in evaluating firms' future strategies. To draw up plans for the decarbonization of investment portfolios, it is instead necessary to consider possible developments in technology, public policies, and in consumer and investor preferences. However, above all, it is necessary to have detailed and reliable information on corporate transition plans, especially regarding investment programmes for decarbonization.

Forward-looking climate risk indicators make up for these shortcomings in that they generally employ scenarios that assume different future combinations of the climate policies adopted and the developments in socio-economic behaviour. The use of climate scenarios (e.g. those developed by the NGFS)[30] is of great importance in understanding the physical and transition risks of a financial portfolio.

The values of these indicators are very sensitive to the underlying assumptions and methodologies and are therefore generally subject to even greater levels of uncertainty than the backward-looking indicators. For this reason, they have so far only been used by the Bank of Italy to assess the exposure to climate risk subsequently and not to make portfolio choices, although the integration of some of these indicators into portfolio decision-making is currently underway.

GHG emissions upstream and downstream of the corporate value chain ('Scope 3 emissions') are currently not taken into account in the measurement for the Bank's portfolios due to the sizeable information limitations both conceptually and regarding their application. In fact, for the companies represented in a portfolio, the same emissions are counted several times, in particular for those companies manufacturing basic and intermediate goods used by other companies included in the investments; therefore, the portfolio composition significantly affects the overall Scope 3 calculation of the portfolio. Furthermore, the disclosure of Scope 3 emissions by companies is still very limited and the methods for estimating them are not very standardized and highly dependent on the assumptions applied by providers. For these reasons, although Scope 3 scores provide some information about an individual company, they can lead to misleading results at portfolio level.

To measure the climate-related and sustainability profiles of its investments, the Bank relies on both public data and information from specialized providers.[31] The use of multiple sources allows data to be compared for spotting possible anomalies and improving coverage. The Bank selected private data providers on the basis of a thorough comparison of methodologies, the degree of diffusion among market operators, the use for academic research and simulations of the application of data in its investment management models.

30 NGFS, '*Scenarios in action: a progress report on global supervisory and central bank climate scenario exercises*', 2021.

31 A. Lanza, E. Bernardini and I. Faiella, 2022, op. cit.

The Appendix contains a description, the category of the ESG metrics used in this Report (environmental, social or governance) and the data sources.

The ESG indicators relating to investments in private sector securities were calculated separately for the following asset classes: (a) equities in the euro area, the United States and Japan; and (b) corporate bonds denominated in euros and in US dollars (see Section 4.3, 'Investments in private securities'). The results achieved for each financial asset class are compared with a suitable benchmark that takes into account the Bank of Italy's investment criteria. The same sustainability analysis was carried out for government bonds (see Section 4.4, 'Investments in government bonds').

4.2 *Climate metrics*

As described in Section 3, in selecting securities, the Bank considers companies' ESG score and carbon intensity, in order to improve the sustainability profile compared with that of the benchmarks. To assess the impact of ESG criteria on portfolio management, these indicators are accompanied by other metrics. One of the financial industry's most used metrics is the weighted average carbon intensity of the portfolio (WACI).[32] It is calculated for each company by dividing the emissions by the turnover, and this ratio is aggregated using the weight of each company in the portfolio at market value. A second metric is the carbon footprint, calculated as the ratio between the emissions associated with the securities in the portfolio and the market value of the portfolio itself; the indicator represents the grams of CO_2 attributable to each euro invested.[33]

Compared with absolute emissions, these metrics can be used to compare different portfolios in terms of composition and size, and to select the most effective management strategies for decarbonization purposes.

As for the forward-looking indicators, four metrics are used, the first three of which are sourced from MSCI ESG Research.

The first metric gauges the risks that could emerge, for different classes of companies, due to the transition to a low-emission economy. For example, the highest risk class includes companies whose activities are incompatible with a low-emission economy, while the lowest risk class includes ones that offer products that enable the transition, such as electric cars or the production of energy from renewable sources. The metric (included among those reported in Tables 4.1 and 4.2) represents the share of investments in companies belonging to the category with the lowest transition risk (see the indicator 'Companies with products and services favoured by the transition' in Tables 4.1 and 4.2).[34]

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32 The WACI is the metric recommended by the TCFD for comparing the exposure of the portfolios of various entities (see TCFD, *Implementing the recommendations of the Task Force on Climate-related Financial Disclosures*, October 2021).

33 In this case, the share of emissions attributable to each firm in the portfolio is calculated using the ratio between the value of the investment and the overall value of the firm (enterprise value including cash, EVIC): in this way, total emissions are divided based on the various instruments the firm uses for funding itself (risk and/or debt capital), to stop them being counted twice.

34 MSCI, 'MSCI Climate change indexes methodology', May 2021.

The second metric, Climate Value-at-Risk (Climate VaR), measures the percentage change in a company's market value resulting from the potential effects of climate risks, both physical and transitional.[35] The estimation model takes into account three factors: (a) the risks for the company stemming from changes in climate policies. Data provided by Integrated Assessment Models (IAMs)[36] are used to estimate the effects for companies relating to compliance with emission reduction targets determined by public policies; (b) the technological opportunities relating to the transition to a low-carbon economy; and (c) the physical risk, i.e. the cost of the disruption of production due to either acute climate events (such as cyclones and floods) or chronic events (such as higher temperatures and greater rainfall) or the opportunities deriving from lower exposure to these risks. The model provides estimates of Climate VaR from both transition and physical risks, according to different climate scenarios and selected IAM models.

The third metric is the implied temperature rise: for each firm, it expresses the increase in global temperature in degrees Celsius (°C) that would occur at the beginning of the next century if the whole economy performed in a similar way to that firm in terms of overshooting or undershooting the carbon budget necessary to keep the global temperature below 2°C.

Lastly, the fourth metric considers companies with commitments or targets defined according to the methodology developed by the Science Based Target initiative (SBTi).[37] It measures the percentage value weight of companies in the portfolio and in the index that have made a commitment to the SBTi to draw up a decarbonization plan, or that already have decarbonization targets validated by the SBTi itself.

4.3 *Investments in private-sector securities*

Investments in equities. – The ESG metrics are described in Table 4.1, separately for euro-area equities (euro portfolio), which amounted to €16.1 billion at the end of 2021 (approximately 85 per cent of the total equity asset class),[38] and for the collective investment units in equity mutual funds in the United States and Japanese markets, which had an equivalent value of €2.8 billion, making up the remaining 15 per cent. The indices used to compare the results are: (a) for euro-area equity, the indices that are customized and used for management purposes (FTSE Italia All Share, excluding banking, insurance and media companies and companies with a market capitalization below €500 million; MSCI EMU, excluding banking and

35 B. Rauis and Z. Nagy, 'Managing climate risk in investment portfolios', MSCI, June 2020.

36 These are econometric models used to make an integrated assessment: they represent the relationships between the environmental and socio-economic factors that determine future climate scenarios.

37 The SBTi is a non-profit organization born emerging from the collaboration between the Carbon Disclosure Project, the United Nations Global Compact, the World Resources Institute (WRI) and the World Wildlife Fund (WWF). The SBTi prepares the methodologies that firms and financial institutions can use to set goals for reducing carbon emissions in line with climate science and the Paris Agreement, and certifies the commitments undertaken.

38 European securities consist of two distinct portfolios, one containing Italian companies and the other containing those of other euro-area countries but which are managed according to a common ESG strategy.

insurance companies); and (b) for collective investment funds, the MSCI indices of the United States and Japanese markets. These indices do not take ESG profiles into account.

With regard to environmental indicators, Table 4.1 shows that equity investments achieved significantly better results than market indices, with reference to both the ESG scores and the weighted average carbon intensity (see Section 3,'Risk Management'). Better results are also achieved for most of the other backward-looking environmental metrics (weighted average intensity of electricity and water use in production processes, waste production, and the recycling rate) and forward-looking indicators (such as Climate VaR).

Table 4.1

ESG metrics for equity portfolios (1)
(absolute values, unless otherwise specified; December 2021)

	Euro-area equity				US and Japanese equity funds			
	Coverage (%) (2)	Portfolio (3)	Index	Difference (%)	Coverage (%) (2)	Portfolio (3)	Index	Difference (%)
ESG score (4)	99.6	7.6	7.0	8.9	99.9	7.0	6.2	13.1
Enviromental metrics								
Weighted Average Carbon Intensity (gCO_2e / € revenue) (4)	99.2	198.5	260.9	-23.9	99.8	90.6	151.2	-40.1
Carbon Footprint (gCO_2e / € invested)	99.2	91.8	145.8	-37.1	99.8	24.3	39.3	-38.3
Weighted Average Energy Intensity (GJ / €M revenue)	91.3	1.4	1.8	-20.9	82.4	0.9	1.1	-13.5
Weighted Average Water Intensity (m^3 / €M revenue)	90.4	27.4	31.8	-13.7	76.0	9.0	16.0	-43.8
Weighted Average Waste Intensity (tonnes / €M revenue)	85.6	23.6	32.6	-27.8	70.3	154.1	173.7	-11.3
Waste Recycling Ratio (%)	82.7	81.7	73.3	11.6	58.6	70.3	68.9	2.1
Estimated revenue aligned with the EU Taxonomy (%)	99.7	6.7	5.9	13.3	99.9	8.2	6.2	33.3
Social metrics								
Women employees (%)	95.7	39.5	32.8	6.6	89.3	36.7	37.5	-0.8
Women managers (%)	94.8	34.8	28.9	5.9	80.9	31.2	31.8	-0.6
Average training hours (hours per year)	84.1	28.5	23.6	20.4	29.7	29.7	29.8	-0.3
Companies with flexible working hours (%)	99.4	77.4	77.7	-0.3	99.7	73.7	69.9	3.8
Trade union representation (%)	71.0	73.9	70.2	3.8	36.7	21.2	20.0	1.2
Injury rate	62.5	0.029	0.031	-8.7	36.8	0.046	0.045	2.8
Governance metrics								
UN Global Compact Signatory (%)	93.7	72.7	71.5	1.2	99.6	37.4	30.3	7.1
Companies with bribery and anti-corruption policy (%)	93.7	98.0	97.1	1.0	99.7	67.9	68.7	-0.7
Combined CEO/Chair (%)	99.7	17.4	17.3	0.0	99.9	45.8	43.7	2.1
Board members independence (%)	99.6	82.0	81.0	1.0	99.8	80.7	80.0	0.7
Female directors (%)	99.6	39.5	38.6	0.9	99.8	31.8	31.5	0.3
Pay linked to sustainability performance (%)	99.7	45.7	44.0	1.8	99.9	67.9	68.7	-0.7
Forward-looking climate metrics								
Implied temperature rise (°C)	99.1	3.1	3.2	-5.4	100.0	2.4	2.6	-8.3
Low Carbon Transition Category "Solutions" (%)	98.5	9.0	7.4	1.7	99.0	16.9	11.5	5.4
Climate VaR - NGFS Orderly scenario (%)	99.6	8.6	12.4	-3.8	99.6	2.3	3.1	-0.8
Climate VaR - NGFS Disorderly scenario (%)	99.6	16.3	21.1	-4.8	99.6	12.5	13.7	-1.2
Companies with commitment or target SBTi (%)	100.0	54.0	44.0	10.0	100.0	50.0	46.0	4.0
Physical risk climate metrics								
Physical Climate VaR (%)	99.6	10.4	11.1	-0.7	99.6	5.1	5.8	-0.7
Estimated revenues from areas highly vulnerable to physical climate risk (%)	99.7	58.6	58.5	0.0	99.9	90.2	90.2	0.0

(1) For a description of the metrics, see the Appendix. – (2) Coverage reports the percentage of the market value of the portfolio securities for which the metric is available. – (3) Portfolio metrics equal to or better than those of the index are highlighted in green; in red those that are worse. – (4) Metrics used for sustainably managing the euro-denominated equity portfolio.

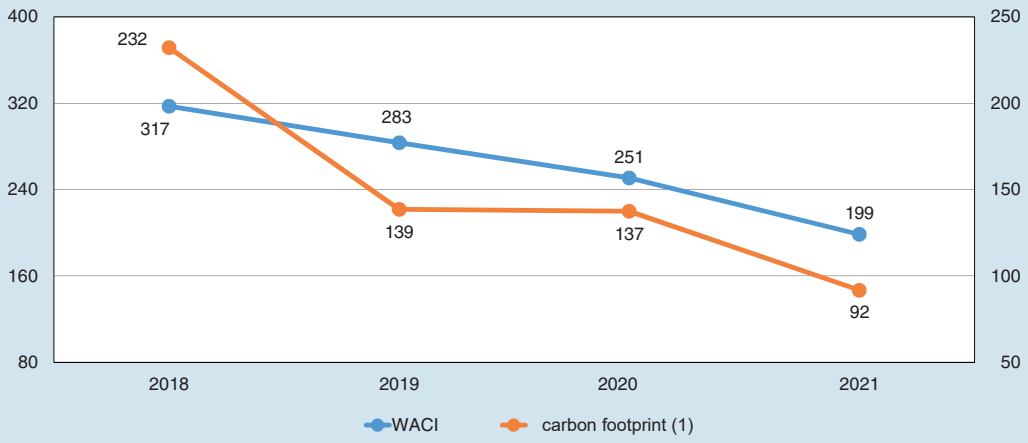
With regard to the social metrics, the euro-area portfolio shows better results than the benchmark index for almost all profiles. The collective investment fund portfolio, on the other hand, shows better indicators only for flexibility in working hours and the rate of unionization; it shows slightly worse results for gender equality and for the injury rate.

The corporate governance metrics of both the euro-area portfolio and collective investment funds are substantially aligned with the benchmarks, since the regulation of the countries of residence of the investee companies involves stringent governance criteria (e.g. in terms of independent directors and gender diversity).

Figure 4.1 shows the progress made by the Bank thanks to the integration of sustainability criteria into the management of the euro-area equity portfolio, which has led to a reduction in the carbon footprint and weighted average carbon intensity of 60 and 37 per cent respectively since 2018, the year before the adoption of the sustainable investment strategy.

Figure 4.1

Carbon footprint and carbon intensity (WACI) of the euro portfolio
(CO_2 grams equivalent per invested euro and CO_2 grams equivalent per euro of sales)

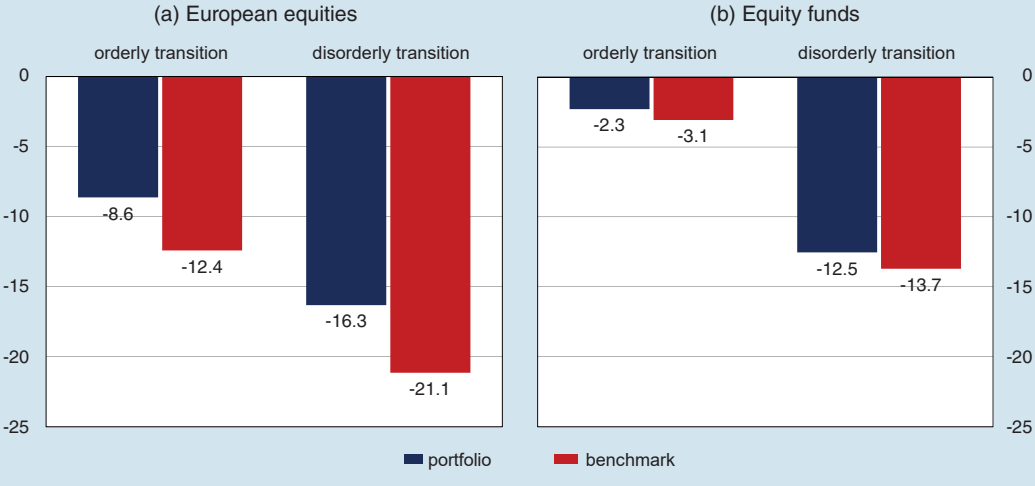


Source: Own calculations on MSCI ESG Research data.
(1) Right-hand scale.

The Climate VaR on transition risk in both scenarios defined by the NGFS under consideration (orderly and disorderly transition) is better for both portfolios than the relative indices (Figure 4.2).

Figure 4.2

Transition risk climate VaR (1)
(per cent)



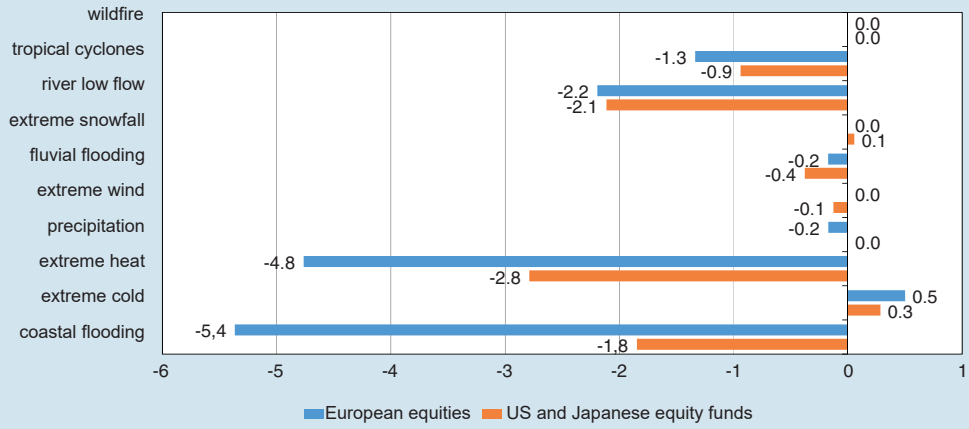
Source: Own calculations on MSCI ESG Research data.
(1) Potential loss of value on portfolios and related indices. For a description of applied scenarios, see NGFS, *NGFS climate scenarios for central banks and supervisors*, June 2021.

The metric on the implied temperature rise shows better values for the portfolios than the respective indices. In particular, the implicit temperature rise is equal to 3.1°C for the euro-area portfolio and 2.4°C for the equity mutual funds, compared with 3.2°C and 2.6°C for the respective benchmarks. The difference between the portfolios is mainly due to the greater share of the technology sector in the equity funds portfolio, whose securities are characterized by lower implicit temperature rise levels on average.

The measurement of physical risk considers two metrics: the Climate VaR relating to physical risk and the percentage of turnover achieved in geographic areas vulnerable to the impact of climate change. The two portfolios present Climate VaR values in an extreme scenario, respectively equal to -10.4 and -5.1 per cent, lower than the relative indices (-11.1 and -5.8 per cent). The main climate-related risk phenomena with potential losses are coastal floods, heat waves, hydrogeological risk and cyclones (Figure 4.3). Taking into account where the companies' production plants are located, the physical risk for the euro-area portfolio is greater than that for the United States and Japanese equity funds.

Figure 4.3

Physical risk events and potential loss on the internally managed equity portfolio
(percentage loss on the market value)



Source: Own calculations on MSCI ESG Research data

Investments in corporate bonds. - To highlight the differences between traditional portfolio management and that considering ESG profiles, in the analysis of the sustainability profiles of the corporate bond portfolios,[39] a comparison was made with market indices[40] and not with the ESG benchmarks used for management purposes.

39 Corporate bonds amounted to €1.2 billion at the end of 2021, of which €0.8 billion are denominated in euros, held against the financial portfolio and managed internally; the remaining US dollar-denominated bonds were held against the foreign exchange reserves and managed by means of external management mandates (see Section 2, 'The strategy'). The portfolios are managed according to market neutrality criteria and follow ESG benchmarks which are customized to exclude, as for the equity portfolios, financial sector and Italian media securities (see Section 3, 'Risk Management').

40 For the euro-denominated portfolio, the index is the ICE BofA AAA-A euro non-financial index; for the portfolio denominated in US dollars, the index is the ICE BofA 1-10 year AAA-A US corporate non-financial index.

The analysis was also conducted jointly for the two portfolios denominated in euros and in US dollars, given that they pursue similar strategies.[41]

In general, the ESG score and the relevant sub-indicators for the environmental and social profiles show better results for the portfolio than against the benchmark, while there is substantial alignment as regards the corporate governance profile (Table 4.2).

Table 4.2

ESG metrics of the corporate bond portfolio (1)
(absolute values unless otherwise specified; December 2021)

	Coverage (%) (2)	Portfolio (3)	Index	Difference (%)
ESG score	99.5	7.0	6.8	4.2
Enviromental metrics				
Weighted Average Carbon Intensity (gCO2e / € revenue)	92.4	220.8	202.3	9.1
Carbon Footprint (gCO_2e / € invested)	92.4	73.1	75.5	-3.2
Weighted Average Energy Intensity (GJ / €M revenue)	90.3	1.5	1.5	-1.4
Weighted Average Water Intensity (m^3 / €M revenue)	89.6	18.9	24.2	-22.0
Weighted Average Waste Intensity (tonnes / €M revenue)	83.8	22.5	41.3	-45.6
Waste Recycling Ratio (%)	71.0	69.0	70.6	-2.3
Estimated revenue aligned with the EU Taxonomy (%)	99.5	5.9	5.5	6.8
Social metrics				
Women employees (%)	90.0	33.4	34.2	-0.8
Women managers (%)	92.9	30.2	31.3	-1.1
Average training hours (hours per year)	52.9	32.3	27.6	17.3
Companies with flexible working hours (%)	98.3	81.8	81.3	0.5
Trade union representation (%)	40.1	49.8	51.4	-1.6
Injury rate	47.4	0.025	0.029	-15.0
Governance metrics				
UN Global Compact Signatory (%)	97.9	59.7	63.1	-3.4
Companies with bribery and anti-corruption policy (%)	97.9	97.5	96.8	0.7
Combined CEO/Chair (%)	99.5	33.1	32.9	0.3
Board members independence (%)	99.5	34.8	35.6	-0.9
Female directors (%)	99.5	34.8	35.6	-0.9
Pay linked to sustainability performance (%)	99.5	43.1	41.6	1.5
Forward-looking climate metrics				
Implied temperature rise (°C)	92.4	3.3	3.2	4.7
Low Carbon Transition Category "Solutions" (%)	98.3	11.3	10.6	0.7
Climate VaR - NGFS Orderly scenario (%)	93.9	0.7	0.8	-0.1
Climate VaR - NGFS Disorderly scenario (%)	93.9	11.9	12.4	-0.5
Companies with commitment or target SBTi (%)	100.0	50.0	52.0	-2.0
Physical risk climate metrics				
Physical Climate VaR (%)	93.9	5.2	8.2	-3.0
Estimated revenues from areas highly vulnerable to physical climate risk (%)	64.9	78.6	72.4	6.2

(1) For a description of metrics, see the Appendix. – (2) The percentage of the market value of the portfolio securities for which the metric is available. – (3) The portfolio metrics equal to or better than those of the index are highlighted in green; in red those that are worse

Forward-looking indicators confirm the portfolio's better results, although the implicit temperature rise is slightly higher and still far from the objective of the Paris Agreement.

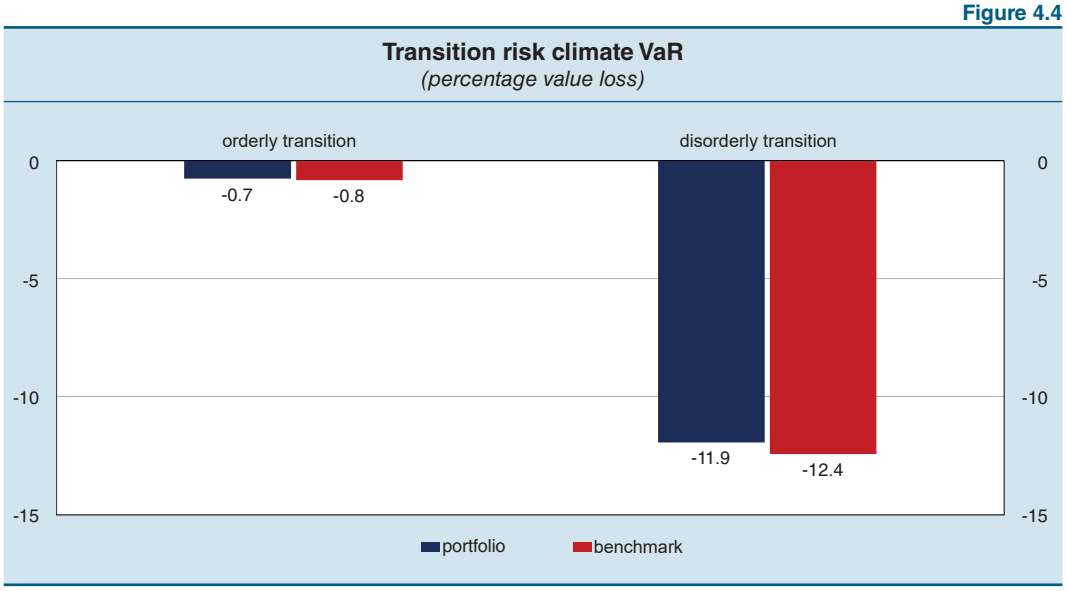
The estimated Climate VaR for physical risk indicates a potential loss for the portfolio aligned with the benchmark (respectively of 5 and 8 basis points in the

41 In addition, many companies included in both portfolios have issued securities in both currencies. When aggregating the two portfolios, each one is weighted by its relative share with respect to the overall market value of investments in corporate bonds.

extreme scenario), while the indicator of turnover from geographic areas vulnerable to the impacts of climate change shows portfolio results worse than the benchmark; however, the coverage of the indicator is limited (65 per cent).

The corporate bond portfolio shows a slightly better Climate VaR for transition risk than the relative benchmark (Figure 4.4). The disorderly transition scenario implies significant losses (of around 12 per cent), despite the fact that the corporate bond asset class is characterized by much lower volatility than that for equities.

Figure 4.4



Source: Own calculations on MSCI ESG Research data.

4.4 *Investments in government bonds*

The methodologies for analysing the sustainability of government bonds are still under development. Since 2021, the Bank has been following the evolution of the ESG profiles of government bonds, although at the moment they do not affect the Bank's sustainable investment strategy (see Section 3.2, 'The introduction of ESG considerations').

The analysis of the ESG profile was performed separately for government bonds denominated in euros and for those denominated in foreign currencies.[42] The former are included in the financial portfolio and are mainly Italian government bonds; the remainder is made up of government bonds of other euro-area countries. Foreign exchange government bonds account for the majority of foreign exchange reserves and include government bonds from the United States, Japan, the United Kingdom, Australia, Canada and China.

42 Inflation-linked government bonds are excluded from the analysis as they are not included in benchmarks used for comparison purposes.

The ESG indicators of the portfolios are compared with those of indices provided by ICE covering all maturities,[43] suitably adjusted to take into account the Bank's investment criteria, including a minimum average rating threshold equal to BBB.

Table 4.3 shows the comparison between the portfolios and the indices for the ESG indicators taken into consideration.

Table 4.3

ESG metrics of the government bond portfolios (1)
(absolute values unless otherwise indicated; December 2021)

	Financial portfolio				Foreign exchange reserves			
	Coverage (%) (2)	Portfolio (3)	Index	Difference (%)	Coverage (%) (2)	Portfolio (3)	Index	Difference (%)
ESG score	100	5.9	6.6	-9.7	100	6.7	6.5	3.3
Enviromental metrics								
WACI (tCO_2e per a million dollars of 2017 PPP GDP) (4)	100	174.2	185.3	-6.0	100	327.0	321.2	1.8
Energy intensity (EJ per one dollar of 2011 PPP GDP)	100	2.6	2.9	-12.4	100	4.4	4.2	3.6
Forest cover (%)	100	32.0	32.3	-0.3	100	36.2	40.7	-4.5
Share of renewable sources in total energy supply (%)	100	20.0	16.4	3.5	100	8.9	9.0	-0.1
Forward-looking climate metrics								
Sovereign warming potential: BAU scenario (°C) (5)	100	4.0	4.1	-3.2	100	5.4	5.0	7.6
Sovereign warming potential: NDC scenario (°C) (6)	100	2.7	2.8	-5.5	100	4.6	4.3	7.0
Physical risk climate metrics								
Physical risk indicator Moody's Four Twenty Seven	100	88.7	63.0	40.8	100	91.6	91.3	0.3
Social metrics								
Gini index	100	32.7	30.5	7.2	100	37.5	37.1	1.0
Investments in R&D (%)	100	1.6	2.1	-0.6	100	2.9	2.9	0.0
Female participation in the labour market (%)	100	70.6	80.4	-9.8	100	82.3	80.7	1.6
Governance metrics								
Democracy index	100	7.8	8.1	-4.3	100	8.1	7.6	6.8
Corruption perceptions index	100	54.7	67.7	-19.2	100	69.6	67.9	2.4
Trade vulnerability index	100	0.4	0.4	-9.4	100	0.4	0.4	-1.1

(1) For a description of metrics, see the Appendix. – (2) The percentage of the market value of the portfolio securities for which the metric is available. – (3) The portfolio metrics equal to or better than those of the index are highlighted in green; in red those that are worse. – (4) PPP stands for purchasing power parity. – (5) BAU stands for business as usual. – (6) NDC stands for nationally determined contributions.

The financial portfolio has an overall ESG score lower than the reference index of 0.7 points. The environmental risk indicators are mostly better than the index, while those for physical risk and forest cover are lower, as are those for the social and governance profiles.

The reserves have a slightly higher ESG score and better governance indicators, while they have environmental and social indicators below those of the reference index, with the exception of female participation in the labour market.

The lower weighted average carbon intensity of the financial portfolio compared with that of the index is mainly attributable to the considerable share of Italian government bonds. For energy production, our country mainly uses gas, which is more efficient than other fossil fuel sources; this also explains the lower level of energy intensity of the portfolio compared with that of the index. The financial portfolio also shows a share of renewables that is greater than the index; this result is also attributable

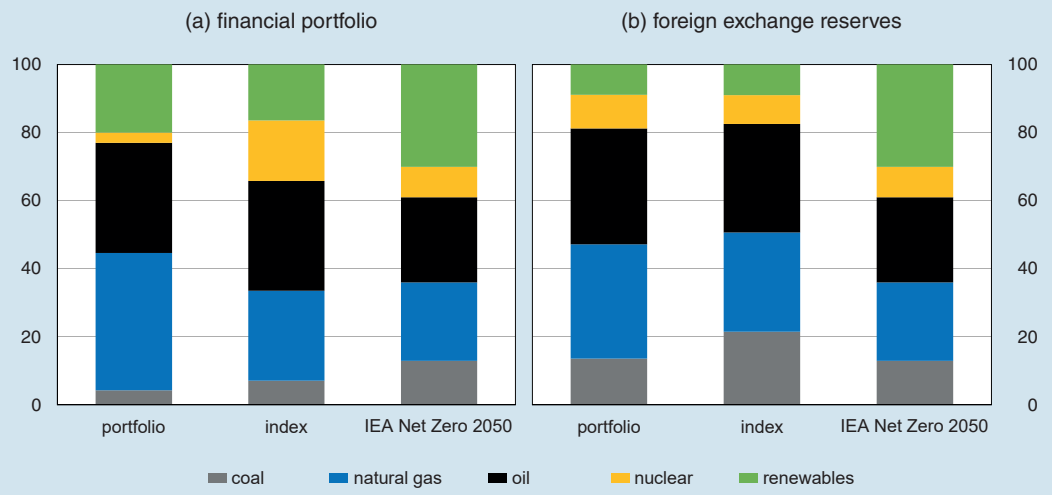
43 These indices only include nominal government bonds with at least one month remaining to final maturity and a minimum amount outstanding of at least 1 billion euros, US, Australian and Canadian dollars, 200 billion yen, 500 million pounds sterling and 10 billion renmimbi. The average rating provided by ICE is a simple average of the ratings assigned by the three major rating agencies (Moody's, Standard & Poor's and Fitch). The countries included in the euro index, taking into account the investment criteria, are: Austria, Belgium, Estonia, Finland, France, Germany, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Portugal, Slovakia, Slovenia and Spain.

to the inclusion of Italian government bonds, where the energy mix has a relatively high share of renewables.

Figure 4.5 shows the average energy mix of the countries whose securities are included in the portfolios and indices, as well as the mix to aim for by 2030 that is compatible with net zero greenhouse gas emissions in 2050 according to the International Energy Agency (IEA).[44] To converge with the mix suggested by the IEA, there needs to be a reduction in the share of natural gas and oil in favour of renewables; as regards the other energy sources, the portfolio is substantially aligned with the energy composition indicated by the IEA (for coal, the 2030 reduction targets have already been exceeded). Foreign exchange reserves show an energy mix substantially in line with that of the index. Compared with the mix suggested by the IEA, this portfolio also has a lower share of renewables which, going forward, should be increased at the expense of natural gas and oil.

Figure 4.5

Energy mix of the government bond portfolios
(per cent)



Sources: Own calculations and IEA 2020.

44 IEA, 'Net Zero by 2050. A roadmap for the global energy sector', May 2021.

APPENDIX

Table A.1

ESG metrics for private sector issuers

Category	Metrics	Description	Source (1)
ESG	ESG score	Quantifies the assessment of a company's adherence to the principles of environmental, social and corporate governance responsibility	MSCI ESG Research, 2021
E	Physical Climate VaR (% market value)	Market value loss from physical risk	MSCI ESG Research, 2021
	Climate VaR - NGFS Orderly scenario (% market value)	Market value loss from transition risk (orderly transition)	MSCI ESG Research, 2021
	Climate VaR - NGFS Disorderly scenario (% market value)	Market value loss from transition risk (disorderly transition)	MSCI ESG Research, 2021
	Weighted Average Carbon Intensity (gCO2e / € revenue)	Measures the weighted average of the portfolio companies' carbon intensity. The weighted average is based on the weights of the companies in the portfolio at market value. Companies' carbon intensity are categorized as Scope 1 and Scope 2 greenhouse gas emissions normalized by sales in EUR	MSCI ESG Research, 2020
	Carbon Footprint (gCO2e / € invested)	Measures the portfolio companies' total Scope 1 and Scope 2 greenhouse gas emissions normalized by the portfolio value. A company's total Scope 1 and Scope 2 greenhouse gas emissions are allocated to the portfolio based on the investor's stake in the company's EVIC (Enterprise Value Including Cash)	MSCI ESG Research, 2020
	Weighted Average Energy Intensity (GJ / €M revenue)	Measures the weighted average of the portfolio companies' energy intensity. The weighted average is based on the weights of the companies in the portfolio at market value. Companies' energy intensity is the energy consumption normalized by sales in EUR	Refinitiv, 2020
	Estimated revenue aligned with the EU Taxonomy (%)	Weighted average of the esitimated revenue that the companies in the portfolio generate from activities aligned with the EU Taxonomy of sustainable activities. The weighted average is based on the weights of the companies in the portfolio.	MSCI ESG Research, 2021
	Weighted Average Water Intensity (m3 / €M revenue)	Measures the weighted average of the portfolio companies' water intensity. The weighted average is based on the weights of the companies in the portfolio at market value. Companies' water intensity is the water withdrawn from any source, either directly by the company or acquired from public utilities, normalized by sales in EUR	Refinitiv, 2020
	Weighted Average Waste Intensity (tonnes / €M revenue)	Measures the weighted average of the portfolio companies' waste intensity. The weighted average is based on the weights of the companies in the portfolio at market value. Companies' waste intensity is expressed in terms of the tonnes of solid waste produced by the company, normalized by sales in EUR. The waste considered is both hazardous and non-hazardous. Liquid waste is included only if expressed in tonnes. For utilities and for the energy and mining sectors, waste materials, such as waste rocks and ashes, are also considered waste.	Refinitiv, 2020
	Waste Recycling Ratio (%)	Percentage ratio between the amount of recycled waste and the amount of total waste. The counting of recycled waste also includes waste destined for waste-to-energy and waste used for composting.	Refinitiv, 2020
	Low Carbon Transition Category "Solutions" (%)	Share of investments in companies with products/services that will benefit from the transition to a low-carbon economy.	MSCI ESG Research, 2021
	Estimated revenues from geographies highly vulnerable to physical climate risk (%)	Percentage of turnover achieved in geographic areas vulnerable to the impact of climate change.	MSCI ESG Research, 2021
	Companies a with commitment to or a target with SBTi (%)	Percentage weight of companies in the portfolio that have made a commitment with SBTi to define a decarbonization plan or that have decarbonization targets already approved by SBTi.	SBTi, 2021

cont.

Table A.1 *cont.*

ESG metrics for private sector issuers			
Category	**Metrics**	**Description**	**Source** (1)
S	Women employees (%)	Percentage of women employed out of total company employees	Refinitiv, 2020
	Women managers (%)	Percentage of female managers out of the total number of company managers. If the company provides the data broken down by managerial category, only the category of middle managers is considered	Refinitiv, 2020
	Average training hours (hours per year)	Average annual training hours per employee	Refinitiv, 2020
	Companies with flexible working hours (%)	Percentage of companies that offer flexible working hours, including formulas such as telecommuting, job-sharing and a compressed work week	Refinitiv, 2020
	Trade union representation (%)	Percentage of workers represented by independent trade unions or covered by collective bargaining agreements. When both union representation and collective bargaining data are available, the latter is used to calculate the indicator	Refinitiv, 2020
	Injury rate	Number of injuries and deaths, including injuries that do not lead to absences from work, compared with the total number of hours worked per year. The ratio is multiplied by the scale factor of one million. If the company does not communicate the hours worked, the figure is approximated as the number of workers multiplied by 2000.	Refinitiv, 2020
G	UN Global Compact Signatory (%)	Share of companies that have signed the United Nations Global Compact	MSCI ESG Research, 2021
	Board members independence (%)	Percentage of independent directors on the Board. For companies with a two-tier system, the figure refers to Supervisory Board members only.	MSCI ESG Research 2021
	Combined CEO/ Chair (%)	Percentage of companies in which the roles of Chief Executive Officer and Chairman of the Board of Directors are assigned to the same person.	MSCI ESG Research, 2021
	Female directors (%)	Percentage of women on the Board of Directors. In the two-tier system, the calculation is based solely on the members of the Supervisory Board.	MSCI ESG Research, 2021
	Pay linked to sustainability performance (%)	Share of companies that have introduced reference to sustainability performance in determining the variable components of the Board's remuneration.	MSCI ESG Research, 2021
	Companies with bribery and anti-corruption policies (%)	Share of companies that have bribery and anti-corruption policies	MSCI ESG Research, 2021

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Table A.2

ESG indicators of the government issuers

Category	Metric	Description	Source (1)
ESG	ESG score	Quantifies the assessement of a country's adherence to principles of environmental, social and corporate governance responsibility. It can vary between 0 and 10; the higher the score, the better the ESG profile.	MSCI ESG Research, 2021
E	Physical risk	Measures a country's exposure to the risks of climate change. It is based on 19 metrics that consider 6 sources of risk (floods, droughts, hurricanes and typhoons, sea level rise, water stress and forest fires) and 3 socio-economic measures (expected population in 2040, expected GDP in 2040 in dollars at 2005 purchasing power parity (PPP) and current agricultural area). It can range between 0 (minimum risk) and 100 (maximum risk).	Moody's Four Twenty Seven, 2020
	WACI (tCO_2e)	Weighted Average Carbon Intensity. Carbon intensity is the ratio between greenhouse gas emissions (the 6 greenhouse gases considered in the Kyoto protocol) expressed in tonnes of CO2 equivalent (tCO2e) and 2017 PPP GDP in dollars. The carbon intensity of each issuer is weighted by its share in the portfolio and in the index.	EDGAR and World Bank, 2020
	Energy intensity (EJ)	Ratio of total energy supply expressed in exajoules (EJ) and 2011 PPP GDP in dollars.	BP and World Bank, 2020
	Sovereign warming potential: BAU scenario (°C)	Contribution to the increase in global temperature expressed in degrees Celsius (° C) in the current policies scenario (business as usual, BAU).	MSCI ESG Research, 2019
	Sovereign warming potential: NDC scenario (°C)	Contribution to the increase in global temperature expressed in degrees Celsius (° C) in the scenario of the reduction commitment under the Paris Agreements (nationally determined contribution, NDC).	MSCI ESG Research, 2019
	Forest cover (%)	Percentage of area covered by forests.	FAO, 2020
	Share of renewable sources in total energy supply (%)	Share of renewable energy sources in the total energy supply needed by the country in a given year.	IEA, 2020
	Energy mix (%)	Energy sources used for energy supply.	IEA, 2020
S	Gini index	Level of concentration of income distribution in a population. It can vary between 0 (maximum equi-distribution) and 100 (maximum concentration).	OECD, 2018
	Investments in R&D (%)	Percentage of GDP invested in Research & Development.	OECD, 2019
	Female participation in the labour market (%)	Female participation rate in the labour market compared with the male one.	ILOSTAT 2019
G	Democracy index	Examines a country's state of democracy. It focuses on 5 categories: electoral process and pluralism, civil liberties, government function, political participation and political culture. It can vary between 0 (authoritarian regime) and 10 (full democracy).	The Economist, 2020
	Corruption perceptions index	Measures the level of perception of public sector corruption. It can vary between 0 (maximum corruption) and 100 (minimum corruption).	Transparency International, 2020
	Trade vulnerability index	Measures the level of diversification of exports both in terms of exported goods and services and in terms of trading partners. It can vary between 0 (maximum diversification) and 1 (minimum diversification).	World Bank and UNCTAD, 2020

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