EUROPEAN CENTRAL BANK
EUROSYSTEM

Occasional Paper Series

Jana Aubrechtová, Elke Heinle,
Rafel Moyà Porcel, Boris Osorno Torres,
Anamaria Piloiu, Ricardo Queiroz,
Torsti Silvonen, Lia Vaz Cruz

Enhancing Climate Resilience of Monetary Policy Implementation in the Euro Area

No 318

Contents

Abstract

Central banks around the world are increasingly monitoring climate change risks and how these affect their balance sheets and their monetary policy transmission. The European Central Bank (ECB) extensively reviewed its monetary policy implementation framework in 2020-21 to better account also for climate change risks. This paper describes these considerations in detail to provide a holistic perspective of one central bank's climate-related work in relation to its monetary policy implementation framework. The paper starts by characterising the strategic reflections behind the principles of the enhanced framework and their relationship with the ECB monetary policy strategy review. Climate-related disclosures, improvements in risk assessment, a strengthened collateral framework and tilting of corporate bond purchases are the main pillars of the framework enhancements. The paper sheds light on the key motivations behind these enhancements, including the aspects that were reviewed but left unchanged. It also takes stock of the different challenges involved in the identification and estimation of climate change-related risk, how these can be partially overcome, and when they cannot be overcome, how they can constrain the ability of financial institutions, including central banks, to take further action. The integration of climate change considerations into the monetary policy implementation framework is at its inception. As data availability and quality improve, and risk methodologies develop, central banks will be able to deepen their approach. This paper also examines possible future avenues that central banks, including the ECB, might take to further refine their monetary policy implementation using an assessment framework for climate change-related adjustments.

JEL codes: E52, E58, Q54, D53

Keywords: monetary policy implementation, climate change

Non-technical summary

Climate change has become an integral part of our lives. With climate change-related events occurring at an ever-increasing frequency and becoming more extreme, the related financial losses are making a sizeable dent in the economy. As a result, climate change has become a priority for policymakers around the world, and central banks are no exception. Each central bank has its own unique mandate and operational framework which must be considered when assessing its exposure to climate change-related risks.

The ECB has a primary price stability mandate. To achieve its objective, it engages in a wide range of financial transactions with a variety of counterparties to ensure the smooth transmission of its monetary policy. These operations are governed by an implementation framework. The ECB is also working to fulfil its secondary mandate of supporting the general economic policies in the European Union (EU), provided that the price stability objective is not put at risk.

Over the last few years, the ECB and the national central banks of the euro area (jointly referred to as the Eurosystem) have engaged in a far-reaching plan to review all the elements of its monetary implementation framework, which includes identifying and assessing where climate change might have a financial impact. In that context, the Eurosystem has studied ways to mitigate those risks and alleviate undue frictions in the conduct of its operations as these could hamper the achievement of the ECB's primary mandate. The Eurosystem also looked at ways on how to support the secondary mandate without jeopardising the price stability objective.

The Eurosystem essentially carries out two main types of monetary policy operations: collateralised lending operations and outright asset purchases. Both types have their own objectives and entail different risks. This paper covers various practical aspects that the Eurosystem considered when analysing the impact of climate change on these operations. It also explains the measures that were implemented.

The main conclusion gleaned from this evaluation is that the Eurosystem could, and should, play a role in improving climate change-related data. The availability and accuracy of these data have improved considerably but are still a priority. While many actors, most notably large listed corporations, have substantially improved their disclosures of climate change metrics, this does not apply to a significant share of economic actors. Some regulatory EU initiatives planned for the coming years will buttress the disclosures available to market participants and be paramount in making financial markets more efficient vis-à-vis climate change risks. To help achieve this objective, the Eurosystem will make climate change reporting a necessary condition of collateral eligibility for assets, provided their issuers or debtors are subject to the EU Corporate Sustainability Reporting Directive.

Second, the Eurosystem is acting to develop an accurate measurement of climate-related risks. The ECB conducted a climate stress test of its balance sheet where some risks were identified, but the methods used to conduct such exercises

should be strengthened as data become more widely available. Rating agencies and other credit assessment systems extensively used by the Eurosystem for monetary policy purposes are currently advancing on the incorporation of climate risks into their credit risk assessments.

Third, the Eurosystem is adjusting the mix of corporate bonds that it holds in its monetary policy portfolios, increasing its share of bonds of companies that have appropriate disclosures, low emissions and credible and ambitious decarbonisation targets. On top of reducing exposure to the transition risks of emitting companies, this tilting of purchases or reinvestments will favour greener and more transparent firms and help to steer the portfolios towards the objectives of the Paris Agreement.

Finally, while the Eurosystem did not identify a need to adjust its current valuation method for marketable assets due to climate change risks, it amended its haircut calibration methodology to better incorporate these risks. In addition, the Eurosystem will impose limits for collateral pools at the level of individual counterparties to avoid a concentration in high-emitting non-financial corporations. This means in practice that the Eurosystem will reduce its exposure to risks stemming from specific corporations and sectors at risk of being stranded or heavily exposed to transition risk.

The Eurosystem will continue to put emphasis on ensuring that climate change considerations are properly incorporated into its monetary policy implementation framework. It will carry on engaging with the relevant private and public sector actors. It will also further refine the agreed measures and may adopt additional measures in the future, ensuring that this approach remains dynamic in nature and aligned with the monetary policy stance.

1 The relevance of climate change risks for monetary policy implementation

Risks related to climate change and climate policies have implications for both price and financial stability and affect the value and the risk profile of the financial assets held on the Eurosystem balance sheet in two main ways. First, climate change affects the structure and dynamics of the economy and the financial system, posing risks to both price and financial stability. These risks are typically divided into physical risks, which arise from a greater incidence of natural hazards, and transition risks, which arise from the complicated shift to a carbon neutral economy. The implications of climate change for price stability are being assessed using various newly developed macroeconomic models and tools.[1] Second, climate-related risks can translate into higher credit risk on the Eurosystem's balance sheet as they can affect the ability of the Eurosystem's counterparties (i.e. financial institutions), issuers and debtors to service their financial obligations. The Eurosystem is exposed to such risks through direct holdings of securities via its purchase programmes and indirectly, through collateral mobilised by counterparties, in the event of counterparty default.

In the recent monetary policy strategy review (hereinafter referred to as the "strategy review"), the Eurosystem reflected on the monetary policy framework from a climate change perspective.[2] Climate change was one important element considered in the ECB's monetary policy strategy review and, as part of this exercise, the Eurosystem carefully looked into all types of monetary policy operations and their potential adjustment to appropriately account for climate change risks. In this context, the Eurosystem developed an assessment framework to examine all types of potential adjustments and the framework considered how would these adjustments fit into the Eurosystem's primary and secondary objectives.

The outcome of the strategy review led the Eurosystem to prioritise and pursue developments in several areas that resulted in the adoption of targeted policy measures. In July 2021 the Eurosystem announced that it would further incorporate climate change considerations into its monetary policy operations, publishing an action plan with a comprehensive roadmap. One year later, on 4 July 2022, further details were published on the design of specific measures[3] for corporate sector asset holdings, collateral and the risk assessment framework, as well as actions aimed at favouring and developing better climate- related disclosures in the market. The actions in these four areas, the motivation behind them and their planned implementation are explained in the sections below.

---

1 See ECB (2023), "Climate-related policies in the Eurosystem/ECB staff macroeconomic projections for the euro area and the macroeconomic impact of green fiscal measures." *Economic Bulletin,* Issue 1.

2 See "ECB presents action plan to include climate change considerations in its monetary policy strategy," *ECB press release, 8 July 2021*.

3 See "ECB takes further steps to incorporate climate change into its monetary policy operations", *ECB press release, 4 July 2022*.

The remainder of this paper is organised as follows. Section 2 describes the strategic reflections behind the principles embedded in the new framework. Section 3 covers the selected climate change-related adjustments to monetary policy measures and the challenges that those changes entail. Finally, Section 4 discusses several significant aspects of potential future measures within the ECB framework.

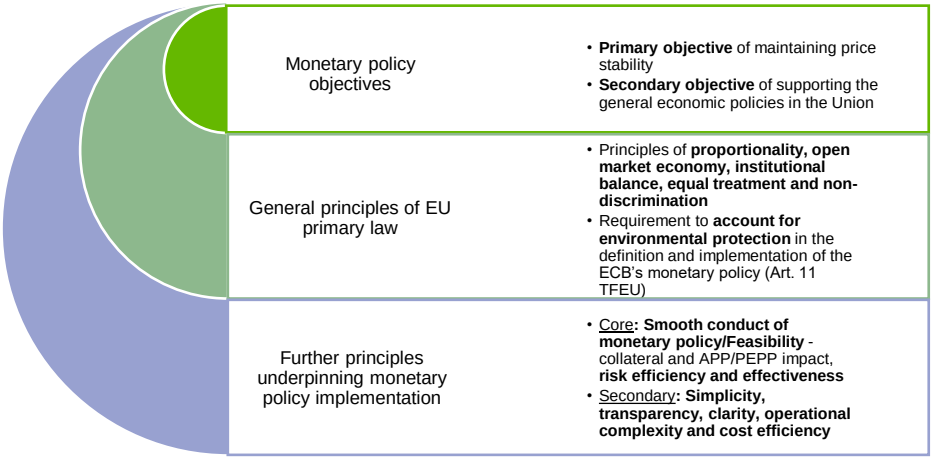
2 High-level reflections on climate change-related measures by the Eurosystem

In its strategy review, the Eurosystem decided to strengthen climate change considerations in its policy framework, in line with its mandate, while at the same time recognising that governments and parliaments have the primary responsibility to act on climate change. This section discusses the key strategic reflections that shaped the Eurosystem's actions from a climate perspective.

2.1 New assessment framework

In the strategy review **the Eurosystem developed an assessment framework to support the structured assessment of possible climate change-related adjustments in its monetary policy implementation** (see Figure 1), also carefully considering the legal boundaries of its mandate (see Box 1). The three pillars of this assessment framework were (i) climate change-related monetary policy objectives, (ii) requirements derived from principles of EU law applicable to the Eurosystem under the Treaties, and (iii) further principles underpinning the monetary policy implementation framework.

Figure 1
Categories of the assessment framework



Source: ECB.
Note: APP stands for Asset Purchase Programmes, PEPP stands for Pandemic Emergency Purchase Programme, TFEU stands for Treaty on the Functioning of the European Union.

The first dimension of the assessment framework considers the extent to which climate change-related measures would be necessary to pursue the monetary

policy objectives of the Eurosystem[4] – noting that its primary objective to maintain price stability (see Table 1 and Box 1 for a more detailed explanation). There is a direct link to the implementation framework, as the protection of the Eurosystem's balance sheet is an essential part of its monetary policy. The potential losses resulting from an insufficient risk framework could damage the Eurosystem's credibility and independence, and therefore impair its ability to achieve its primary objective.[5] Thus, it was examined whether climate-related measures were necessary to protect the Eurosystem's balance sheet.[6] Furthermore, without prejudice to the objective of maintaining price stability, the Eurosystem will support the general economic policies in the EU,[7] including in the area of environmental protection. With regard to the primary and secondary objectives of the Eurosystem, it was concluded that promoting better disclosures of climate-related information would be a means to improve the knowledge of climate risks and address potential market failures involving climate-related information. Moreover, better disclosures were *considered* a prerequisite for fully delivering on the Eurosystem's monetary policy objectives.

Table 1

Climate change-related policy implementation perspectives

Primary objective *Maintain price stability*	Secondary objective *Support the general economic policies in the EU*
Manage the Eurosystem exposure to financial (including climate change) risks8	Incentivise market participants to accelerate the transition to a low-carbon economy
Promote disclosure and transparency among market participants	

Source: ECB

The second dimension of the assessment framework is the consistency of the identified potential policy measures with the general provisions of EU primary law applicable to the Eurosystem under the Treaties. The principles of proportionality, an open market economy, institutional balance and equal treatment and non-discrimination were considered particularly significant in the implementation of climate change considerations in the Eurosystem monetary policy framework. In addition, the framework also considered the requirement to account for environmental protection, in line with Article 11 of the Treaty. These principles should be adhered to even if they may risk departing somewhat from a simple and efficient framework. The principles are described in detail in Box 1.

The third dimension of the assessment framework focuses on other operational principles governing the current monetary policy implementation framework,

4 The objectives and tasks of Eurosystem are set out in Article 127 of the Treaty on the Functioning of the European Union [2012/C 326/01].

5 In other words, the adoption by the Eurosystem of measures designed to circumscribe the risk of financial losses forms part of the definition and implementation of monetary policy, as also reflected in Article 18.1 of the Statute of the European System of Central Banks and the European Central Bank, pursuant to which the Eurosystem may conduct credit operations "with lending being based on adequate collateral."

6 Outside the scope of this paper, it is worth recalling that in July 2021 the ECB also announced that the Eurosystem will expand its analytical capacity in macroeconomic modelling, statistics and monetary policy on climate change.

7 Specifically, the objectives set out in Article 3 of the Treaty on European Union, which include "the sustainable development of Europe" and "a high level of protection and improvement of the quality of the environment".

8 Unless stated otherwise climate change (financial) risks can be attributed to transition and physical risk.

which foster the effective and efficient conduct of Eurosystem monetary policy in pursuit of its objectives. The core operational principles set out that the smooth conduct of policy implementation implies that the framework contributes to achieving the objective of the Eurosystem's monetary policy by ensuring the appropriate transmission of monetary policy impulses. This can only be consistently achieved if the Eurosystem maintains its credibility, which requires, among other factors, an adequate degree of financial risk efficiency and protection provided by its risk control framework. Risk efficiency means that the policy objectives are achieved with the lowest risk possible. The secondary principles are desirable features of the monetary policy implementation framework, which are often of a more practical nature but also important for the smooth implementation and transmission of monetary policy. For example, operational efficiency implies the capacity for a smooth, safe and swift handling of collateral or asset purchases by the central bank as well as by Eurosystem counterparties and securities settlement systems.

Box 1

Legal considerations on incorporating climate change considerations in the Eurosystem monetary policy framework

Prepared by Marguerite O'Connell and György Várhelyi

When implementing climate change considerations in the Eurosystem monetary policy framework, the ECB (and hence the Eurosystem) must do so in a manner that is compliant with its mandate and the rules of primary Union law. This is because, in line with the principle of conferral the ECB must act only within the limits of the competences conferred upon it by the Member States in the Treaties to attain the Treaties' objectives. The Eurosystem first needs to ensure that its actions fall within the limits of its competences, which are laid down in the "objectives" and "tasks" set out in Article 127 of the Treaty on the Functioning of the European Union (TFEU), as well as by the instruments provided for in EU law. As the strategy review considered proposals to amend the legal acts establishing the Eurosystem's collateralised lending and asset purchases, it is important to recall that those measures were originally adopted on the basis that they pursue the primary objective of maintaining price stability. Thus, it was essential to ensure that when including climate change considerations in the design of these measures, they would continue to pursue the primary objective. The existing objective of these measures, namely, to maintain price stability under Article 127 TFEU, along with the legal bases – particularly Article 18.1 of the Statute of the European System of Central Banks and the European Central Bank (hereinafter the "Statute of the ESCB") – therefore remained unaffected.

With regard to the primary objective of maintaining price stability, at a general level, climate change and the transition towards a more sustainable economy affect the outlook for price stability. This occurs because of the impact of climate change and climate transition on a variety of structural macroeconomic relations and the monetary policy transmission mechanism in general.

Consequently, physical and transition risks related to climate change can affect the value and the risk profile of the assets held on the Eurosystem's balance sheet and are thus relevant to the definition and implementation of monetary policy. The adoption by the Eurosystem of measures designed to circumscribe the risk of financial losses forms part of the definition and implementation of monetary policy, as also reflected in Article 18.1 of the Statute of the ESCB, pursuant to which the Eurosystem may conduct credit operations with lending based on adequate

collateral. The Eurosystem must manage, as effectively as possible, the climate-related financial risks to which it is exposed when implementing monetary policy, in pursuit of its primary objective of maintaining price stability.

With regard to the secondary objective of supporting general economic policies in the Union, Article 127(1) sentence 2 TFEU requires the Eurosystem to do so with a view to contributing to the achievement of the Union's objectives as laid down in Article 3 of the Treaty on European Union, which include "a high level of protection and improvement of the quality of the environment". In particular, it is noted that the "European Climate Law" adopted in June 2021 sets a binding objective to achieve climate neutrality in the Union by 2050 in pursuit of the long-term temperature goal set out in the Paris Agreement. As the European Climate Law affects every conceivable aspect of economic policy in the Union, it forms part of its general economic policies, which the Eurosystem is required to support. This, however, does not empower the Eurosystem to amend the corporate sector purchase programme (CSPP) or the collateral framework to pursue a Paris-aligned transition path as an environmental objective in itself, as Article 127(1) sentence 2 TFEU does not establish any standalone, independent legal obligation for the Eurosystem to proactively pursue or autonomously set environmental objectives. Rather, the Eurosystem has a duty to contribute to the attainment of these objectives by supporting the relevant economic policies in the Union when carrying out its tasks.

Pursuing environment-related action as part of this secondary objective is therefore subject to two specific limitations. First and foremost, it should be without prejudice to the primary objective of ensuring price stability. Second, the mandate of the Eurosystem with regard to economic policies in the Union is "supportive". This means that the Eurosystem does not in any circumstances bear the primary responsibility for these policies and does not have the power to make policy autonomously. In cases where the Eurosystem has a choice between policy options that contribute equally to maintaining price stability, but one of the alternatives provides more effective support for the general economic policies in the Union, it must prefer the latter, assuming all other relevant factors are equal. By contrast, where the Eurosystem has a choice between two policy options that do not contribute equally to price stability, the primacy of price stability indicates that the Eurosystem must prefer the option that is more effective for achieving its price stability objective.

There is another significant Treaty provision which the Eurosystem must comply with, and which is relevant for the pursuit of its primary and secondary objectives. Article 11 TFEU requires the Eurosystem to integrate environmental protection requirements into the Union's monetary policy, by considering environmental objectives and reflecting upon them in the performance of its tasks in respect of the pursuit of both the Eurosystem's primary and secondary objectives. As noted above, the Union's environmental objectives are clearly set out and defined in the European Climate Law. The evaluation of the changes to the CSPP and the collateral framework that was announced by the ECB's Climate Change Action Plan helps the Eurosystem to demonstrate compliance with the procedural requirement to "take into account" environmental protection requirements in accordance with Article 11 TFEU. Likewise, they help the Eurosystem to demonstrate that it is ensuring consistency between the Union's policies and activities in accordance with Article 7 TFEU.

Lastly, once it has been established that actions are based on the Eurosystem's objectives and use its instruments, it is necessary to assess whether they comply with the principles of Union law applicable to the Eurosystem under the Treaties.

When incorporating climate change considerations into the Eurosystem monetary policy framework, the principles of proportionality, an open market economy, institutional balance and equal treatment and non-discrimination are particularly important.

First, the Eurosystem's actions need to be proportionate to the respective objectives, meaning that these actions must be suitable for attaining the Eurosystem's objectives and not go beyond what is necessary to achieve those objectives. This is relevant because the climate-related actions themselves need to be proportionate, and also because, in some circumstances, the proportionality of monetary policy measures themselves can be better ensured by properly taking into account climate-related considerations.

Second, the Eurosystem must act according to the principle of an open market economy with free competition, favouring an efficient allocation of resources (the "open market economy" principle). The principle of an open market economy applies when the Eurosystem pursues its primary monetary policy objectives, but also when it supports the general economic policies in the Union in accordance with its secondary objective. However, there is no absolute prohibition on measures which depart from the open market economy principle: if the measures cause interference with this principle, they need to be justified and the justification should meet proportionality standards. Such a departure may be necessary for the pursuit of the Eurosystem's objectives and carrying out of its tasks (such as addressing risk management considerations) or where such an approach may interfere with other principles of primary Union law.

Third, the principle of institutional balance requires the Eurosystem to exercise its powers with due regard for the powers entrusted to other institutions. The objectives of the Eurosystem should not be interpreted in such a way that they transfer to the Eurosystem responsibilities that the Treaties have conferred on other Union institutions. Article 192 TFEU provides that the responsibility for attaining the objectives of the Union policy on the environment under Article 191 TFEU lies with the Union's legislator, namely the European Parliament and the Council. This means, for instance, that it is not within the remit of the ECB to apply the Corporate Sustainability Reporting Directive (CSRD) before it is enacted by the Union legislator.

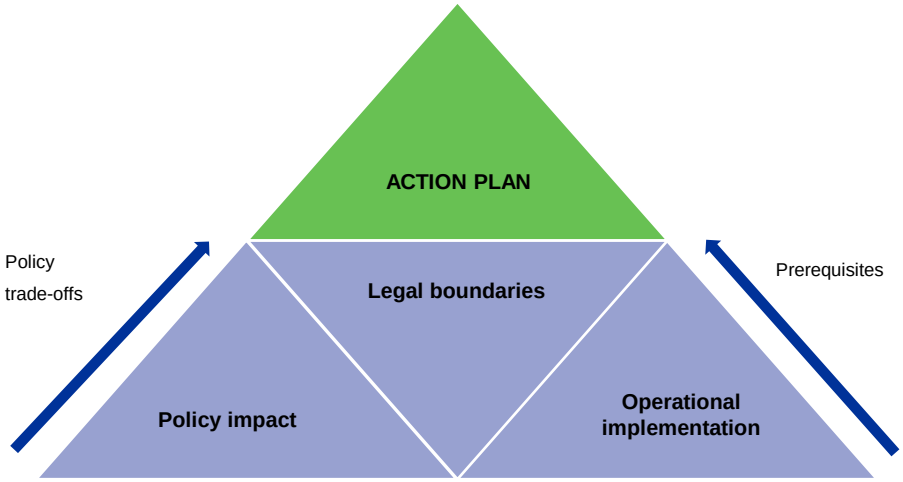
Fourth, the principles of equal treatment and non-discrimination require the Eurosystem to ensure that comparable situations are not treated differently and that different situations are not treated in the same way unless such treatment is objectively justified in each case. The comparability of different situations must be assessed for all the aspects that characterise them. Those aspects must be identified and assessed in the light of the subject matter and purpose of the European Union act which makes the distinction.

2.2 Evaluation process using the assessment framework

The assessment framework was needed to evaluate a broad catalogue of potential measures in a consistent and systematic manner (see Figure 2). The potential adjustments that were considered initially covered all areas of the monetary policy implementation framework, leaving no stone unturned when addressing the impact of climate change. Initially the evaluation mainly used qualitative expert judgement, but more formal quantitative analysis was introduced gradually as part of a

more detailed calibration of the selected policy measures which were deemed most appropriate based on the process described below.

Figure 2
Evaluation process – development of the Action Plan



Source: ECB

On applying the assessment framework, the Eurosystem first considered whether a measure was in line with the Eurosystem's mandate and the policy objectives shown in Error! Reference source not found.**,** in other words, whether the measure fitted into the "legal boundaries" of the Eurosystem's competence. From the broad catalogue of evaluated measures, there were several which pursued the Eurosystem's monetary policy objective of maintaining price stability, in particular by promoting the protection of the Eurosystem's balance sheet while pursuing the price stability objective. These measures – without prejudice to the primary objective – also supported the Eurosystem's secondary objective by providing a smooth transition to a low-carbon economy. It became apparent that, depending on the specific design features of these measures, they may be more supportive of policy objectives than the other alternatives.

The application of the assessment framework revealed differences in policy impact and feasibility across the different monetary policy instruments and (unavoidable) trade-offs. Risk protection measures that also provided positive incentives for transition were deemed preferable to "wide" exclusion measures applied to collateral or asset purchase programmes, as the latter could significantly constrain the implementation and transmission of monetary policy. Specifically, the ensuing exclusion of issuers or counterparties could affect the transmission of monetary policy (e.g. by tightening financial conditions in some sectors of the economy) and reduce collateral availability or asset purchase feasibility, thereby potentially hampering the smooth conduct of monetary policy. A stepwise introduction of measures with the aim of protecting the balance sheet from risks while additionally providing positive incentives for transition to a Paris-aligned carbon footprint path was considered preferable. In addition, by providing positive incentives, the Eurosystem would be acting in line with the principles of an open market economy and institutional balance, allowing market participants to make their choices, and not overstepping the

boundaries of its mandate in view of the role of other institutions, such as the EU legislators. The risk protection analysis also showed that amendments to the Eurosystem's asset purchase programmes are more effective in terms of risk reduction than collateral-related measures. This is mainly because outright asset purchases expose the Eurosystem to risks that are far larger than collateralised lending to eligible counterparties. For collateralised lending there are two layers of risk protection against losses, first, the financial soundness of the counterparty and, second, the respective mobilised collateral. By contrast, losses on asset holdings directly impact the Eurosystem's balance sheet. Moreover, the longer-term nature of climate change risks implies that these risks are more likely to impact asset purchase programmes given that these exposures are expected to remain on the Eurosystem's balance sheet for a long period of time until they reach maturity. Collateral assets, however, must be withdrawn from the collateral pool pledged by counterparties if their risk profile deteriorates to the point where the assets are no longer eligible, with the counterparty bearing the risk of the asset depreciation and having to find a suitable replacement collateral asset. In the case of counterparty default, it is assumed that collateral assets are liquidated within a short period of time, during which the Eurosystem becomes exposed to the risk of holding these collateral assets. Consequently, the Eurosystem risk control framework for collateral assets is calibrated taking into account the short liquidation horizon for the collateral assets, during which climate change risks are not likely to materialise.

Using the assessment framework, the Eurosystem identified the main prerequisites for an in-depth assessment and the operational implementation of any given measure, providing indications of how any challenges could be overcome. Challenges related to data availability and quality, methodological gaps, regulatory developments, and internal Eurosystem analyses and analytical capabilities. Therefore, the Eurosystem considered that while it does not play a leading or primary role in the development of better climate disclosures or reporting standards, in order to pursue its monetary policy objectives, it could act as a catalyst to support the areas responsible for this work, by providing analytical input and concrete suggestions to improve data provisioning.

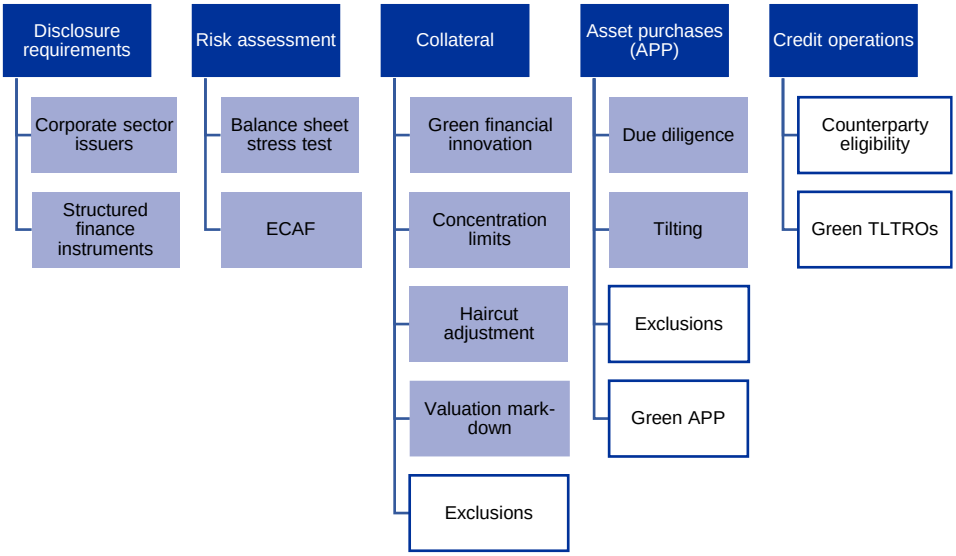
Based on this conceptual framework, the Eurosystem considered a wide range of concrete measures in its strategy review (see Figure 3). These measures covered all areas of monetary policy implementation: the Eurosystem credit assessment framework, the collateral and risk control framework, the asset purchase programmes, the counterparty framework for credit operations, and green lending. The actions considered spanned incentivising measures to exclusions based on climate-related disclosures, vulnerability to climate change risks or the contribution to a "green transition" and were submitted to the Governing Council for discussion. Following the assessment and Governing Council guidance, the Eurosystem focused on adjusting selected areas of the monetary policy implementation framework as published in the roadmap of climate change-related actions (Action Plan).[9] Certain potential measures, such as "green" targeted lending operations, while duly considered, were not included because of the challenges identified in the evaluation,

[9] For further information, see the detailed roadmap of climate change-related actions.

notably in relation to operational feasibility and legal considerations. Nonetheless, the Eurosystem has committed to reviewing the measures regularly to check that they are fit for purpose and aligned with the objectives of the Paris Agreement and the EU's climate neutrality objectives as set out under the European Climate Law.

Figure 3

Climate change-related measures considered in the strategy review



Source: ECB.
Note: Measures highlighted in light blue were included in the roadmap of climate change-related actions (Action Plan). APP stands for Asset Purchase Programmes, ECAF stands for Eurosystem Credit Assessment Framework, TLTRO stands for Targeted Long Term Refinancing Operations

The Eurosystem's effort to reflect on the risks that climate change carries for its monetary policy implementation benefited from global collaboration with other pioneering central banks and informed an exchange with relevant standard-setting and regulatory bodies. The Eurosystem engaged with the Network for Greening the Financial System (NGFS) in developing the review of options for adapting central bank operations to a warmer world (NGFS, 2021). Furthermore, the Eurosystem has engaged in an active dialogue with the European Commission, the European Banking Authority and the European Securities and Market Authority (ESMA) to advance transparency and market discipline in the area of climate-related risks.[10] While the prerequisites relating to data gaps and regulations are largely exogenous to the Eurosystem, to pursue its monetary policy objectives the Eurosystem seeks to provide a supporting role, particularly to help develop better climate-related reporting in various asset segments in which it has financial exposure through outright asset holdings or collateral.

10 See the Joint ESAs-ECB Statement on disclosure on climate change for structured finance products.

3 Adapting specific climate change-adjusted policy measures

Building on the climate roadmap published in 2021, the Eurosystem conducted further work in the targeted areas that guided the action plan published in July 2022, facing several challenges in the process. The quantification of financial risks related to climate change is a complex task, with the severe limitations in data availability and quality giving rise to significant challenges. However, accurate data, in and of itself, would not be sufficient to draw appropriate policy considerations but rather a necessary starting point. Classifying corporations, other issuers and counterparties according to their carbon footprint and their targets is a daunting task.

Building analytical capacity gradually, the Eurosystem tackled these challenges and concluded that it could start implementing its action plan.[11] The action plan recognises the importance of the trade-off between ambition and flexibility. The entire climate-related work area is still developing, but the longer economic agents wait to start implementing measures to mitigate climate change, the higher the overall economic cost may be. As a result, the Eurosystem's strategy is based on gradualism, with incremental steps to enhance measures over time as its internal analytical capacity expands. The Eurosystem has committed to periodically reviewing how well climate change considerations and the related policy measures take into account the rapid evolution of climate regulations, policies, data and practices.

Overall, the Eurosystem is implementing a package of measures to gradually decarbonise its monetary policy operations, taking into account that these initiatives critically depend on the decarbonisation trend across the economy as a whole. Decarbonisation levels depend mainly on authorities' climate change policies and companies' own actions. In parallel with the Eurosystem's adjustment of its policy framework to address climate change risks, the trend towards decarbonisation across the economy is expected to continue, also supporting the decarbonisation efforts of the Eurosystem.

The action plan for the implementation framework was divided into four main areas: (i) climate change-related disclosure requirements for collateral eligibility, as the key prerequisite on which other measures are constructed;[12] (ii) the Eurosystem's risk assessment tools and capabilities; (iii) climate change-related measures in the collateral framework; and (iv) tilting the purchases of the corporate sector assets in the asset purchase programme (APP) and the pandemic emergency purchase programme (PEPP) (jointly referred to as the CSPP).

---

11 See"ECB takes further steps to incorporate climate change into its monetary policy operations", (*ECB press release, 4 July 2022*).

12 The ECB is leading by example in this area by committing to provide additional disclosures of its own portfolios. See "ECB starts disclosing climate impact of portfolios on road to Paris-alignment", *(ECB press release, 23 March 2023)*.

3.1 Climate-related disclosures

Harmonised and reliable climate change-related disclosures for financial products are essential for the identification and accurate pricing of climate-related risks and for the transition to a more sustainable economy. Despite increasing global efforts and clear progress, to some extent data on climate metrics are still non-standardised, incomplete, non-publicly available and scattered, with different types of approaches used by specialised climate data providers. Data on corporate issuers have improved substantially in recent years with firms disclosing more precise information, in particular, emission data for the three emissions scopes (scopes 1, 2 and 3).[13] To obtain more specific and relevant data for its needs, the Eurosystem procured climate-related data in early 2022 from external data providers. This tender marked a key step towards implementing the Eurosystem action plan to incorporate climate change considerations into its monetary policy implementation framework by providing common data sources for the entire Eurosystem.[14] Among other things, harmonised data allowed a proper assessment to be made of the climate impact of firms, their decarbonisation paths and the accuracy of their commitments, which enabled the Eurosystem to draw comparisons across firms.

The Eurosystem actively supports legislative initiatives to improve climate-related disclosures. While disclosure regulations and standards are primarily under the remit of public and private bodies other than the ECB, such as the European Commission, the European Banking Authority, ESMA or the International Sustainability Standards Board, the Eurosystem can play a catalyst role in promoting disclosures. Enhanced disclosures will further enhance the assessment of the effectiveness of the Eurosystem's climate-related collateral and risk management measures, and thus contribute to the pursuit of the primary objective of maintaining price stability. The Eurosystem can also pursue its secondary objective of supporting the general economic policies in the EU, i.e. environmental protection. The Eurosystem included two sets of measures related to disclosures in its climate action plan.

First, the Eurosystem will link collateral eligibility with CSRD compliance for issued marketable assets and credit claims of debtors in the scope of the EU's CSRD. This eligibility-related measure will mainly concern large corporates and issuers of unsecured bank bonds. It will also follow the general timeline for the implementation of the CSRD. As EU legislators are the primary actors with responsibility for adopting legislation in the field of environmental protection under EU law, the Eurosystem must comply with the timeline of the CSRD in its adopted form, which implies that the Eurosystem's measure to link collateral eligibility with CSRD compliance will effectively start in 2026, at the earliest. The Eurosystem had to align its timetable for measures to foster disclosure requirements as an eligibility requirement for its counterparties with the timeline for the implementation of the CSRD, which was

13 The Greenhouse Gas Protocol distinguishes between direct greenhouse gas emissions of companies from owned or controlled sources (scope 1), indirect emissions from purchased electricity, steam, heating or cooling (scope 2) and all other indirect emissions, including those occurring along the corporate value chain, either upstream or downstream (scope 3). See the Greenhouse Gas Protocol for further information.

14 See "Climate-related data successfully procured" *(Deutsche Bundesbank press release, 9 March 2022)*.

subject to some delay given the complexity of the legislative process. The Eurosystem will carry out an exercise ahead of the final implementation of the CSRD-linked disclosure requirements to assist Eurosystem counterparties.

Second, the Eurosystem will support new initiatives by regulators to develop harmonised reporting of climate-related data for eligible structured finance assets (i.e. asset-backed securities (ABSs) and covered bonds). Securitised assets are one of the main asset classes mobilised by counterparties as collateral for Eurosystem credit operations, but harmonised and consistent data, including data on climate considerations do not exist for these asset classes at this stage. To help close this gap, the Eurosystem has engaged in closer dialogue with regulatory authorities such as ESMA, the European Commission and the European Banking Authority to align future reporting requirements, including the Eurosystem's own needs for efficient collateral management. In particular, the Eurosystem is playing a catalyst role and contributing to the work on revising loan-level securitisation reporting templates for ABSs, led by ESMA, with a view to fostering better climate change-related disclosures. More generally, the Eurosystem supports the comparability of future disclosure requirements for funding instruments that are backed by the same type of underlying assets, such as covered bonds for mortgages. Consistent and harmonised requirements for similar instruments would ensure a level playing field across similar asset classes, foster comparability for investors and ensure equal treatment by EU supervisors.[15]

3.2 Risk assessment

The Eurosystem has developed a climate stress testing framework to assess the impact of climate risks on the financial risk profile of the Eurosystem balance sheet. The Eurosystem regards climate scenario analysis as a key tool for assessing the implications of climate change for financial risks. Based on that framework, the Eurosystem has conducted a stress test on its balance sheet, covering a range of financial exposures such as collateralised credit operations and holdings of corporate bonds, covered bonds and ABSs, for which both physical risks and transition risks have been analysed. This exercise indicates that both types of climate risk (transition and physical risk) have a material impact on outright holdings of corporate bonds. Importantly, the analysis shows that Eurosystem corporate bond holdings contribute more to the total increase in risk for both transition and physical risk scenarios than the sum of the other exposures in the scope of the exercise. The results of this exercise, which were published by the Eurosystem in March 2023,[16] confirmed its focus on the CSPP as one of the areas in which climate-related measures are considered to be warranted (see Section 3.4).

The Eurosystem is also incorporating climate change considerations into its existing risk assessment frameworks, with a particular focus on the

15 For further information, see the Joint ESAs-ECB Statement on disclosure on climate change for structured finance products.

16 See ECB (2023), "Results of the 2022 climate risk stress test of the Eurosystem balance sheet", *Economic Bulletin*, Issue 2.

Eurosystem credit assessment framework (ECAF). The ECAF is a key pillar for the mitigation of financial risks for the Eurosystem balance sheet and as such climate change risks should be properly reflected. The ECAF sets the minimum credit quality requirements that ensure the Eurosystem accepts only assets with high credit standards as collateral. The ECAF also sets the minimum credit quality requirements for outright purchases. Since the Eurosystem accepts a very broad range of marketable assets (around 29,000 securities) and non-marketable assets as collateral, it considers information from credit assessment systems belonging to one of the following three sources: external credit assessment institutions (ECAIs), national central banks' in-house credit assessment systems and counterparties' internal ratings-based (IRB) systems. The Eurosystem strives to ensure that all the credit assessment systems that are accepted in the ECAF appropriately incorporate all relevant credit risks. This includes climate change risks to the extent that they influence the creditworthiness of the rated entities.

An assessment of the disclosures of ECAIs – the largest source of credit assessments for marketable assets – that considered climate change risks in credit ratings revealed several areas where there was room for improvement. Although ECAIs have considerably improved their transparency around climate change risks in recent years (e.g. by issuing dedicated environmental, social and governance assessment criteria, which explain how these risks are assessed and how they influence their creditworthiness assessments), there are still large differences in methodologies and disclosure practices across rating agencies and asset classes. Overall, the current level of disclosures does not allow the influence of climate change risks on the credit assessments to be fully understood. Therefore, more systematic and granular disclosures of climate change risks in rating methodologies and processes, as well as of their relevance and materiality assessments for credit ratings are necessary. The Eurosystem assessment identified three main areas for improvement relating to; (i) transparency surrounding the definition and assessment of individual climate change risk factors considered, (ii) disclosure of the magnitude of adjustment in the credit rating (or its methodological factors/sub-factors) stemming from material climate change risks, and (iii) further explanations of the relevant methods and models used for the climate change risk assessments. The Eurosystem continues to urge rating agencies to be more ambitious in their disclosure practices when considering climate change risks in their rating actions and continues to engage in close dialogue with the relevant authorities, such as ESMA or the European Commission, on this matter.[17]

In relation to internal rating capabilities, the Eurosystem has agreed on a set of common minimum standards for how national central banks' in-house credit assessment systems should include climate-related risks in their credit assessments.[18] These internal credit assessment systems, operated by some national central banks, are a key means to assessing credit risks for non-marketable collateral (credit claims) in the Eurosystem collateral framework. The minimum standards include the assessment of climate change risks as part of the regular rating

[17] See Breitenstein et. Al. (2022).

[18] See Koerding and Resch, *Economic Bulletin*, Issue 6, ECB, 2022

process, thereby fulfilling the same quality and reliability standards as the assessment of any other risk. These standards will enter into force by the end of 2024.

The incorporation of climate change risks into IRB ratings is currently at a preliminary stage. Since banks need to progress in several areas before they can systematically include climate change risks in their IRB models, the Eurosystem is closely monitoring the main developments on this front. This includes liaising with the relevant bodies and authorities, such as the European Supervisory Authorities.

3.3 Collateral framework

Climate change considerations were reviewed in the collateral framework via the adaptation of its valuation practices and haircut methodologies and the implementation of a limit on collateral, focusing on the climate dimension, that can be mobilised by Eurosystem counterparties. In addition, the Eurosystem is monitoring and incorporating sustainable financial innovation features into its collateral framework.

Box 2

Primer on the Eurosystem collateral framework and conditions for incorporating climate change risk

Prepared by Jana Aubrechtová, Rafel Moyà Porcel, Anamaria Piloiu, Ricardo Queiroz

There has been a lot of discussion on how to potentially adjust the Eurosystem's collateral framework to incorporate climate change risks or to incentivise issuers/debtors of eligible collateral to transition towards a Paris-aligned path. Before describing the measures identified by the Eurosystem, it is useful to provide a short background on the role and constraints of the collateral framework.

Eurosystem liquidity-providing credit operations are an integral part of the standard Eurosystem monetary policy framework and must be secured by adequate collateral. Article 18.1 of the Statute of the European System of Central Banks and the European Central Bank (hereinafter the "Statute") states that the Eurosystem can only provide funds to eligible counterparties if these mobilise adequate collateral to secure the credit operations. Eurosystem eligible collateral includes marketable securities, such as bonds issued by governments and by private sector entities such as non-financial corporates, and non-marketable assets, which include credit claims. Collateral works as a second line of defence in the event of counterparty default. If a counterparty continues to operate as usual, collateral mobilised by the counterparty to secure Eurosystem credit is just kept by the Eurosystem on a precautionary basis. However, in the event of counterparty default, the Eurosystem can and will sell the collateral in the financial markets to avoid incurring losses from its credit operations. As opposed to the asset purchase programmes for which the "asset valuation channel" is an important monetary policy transmission feature, collateral rules are not intended to affect market prices but to ensure the adequacy of the collateral against which credit operations are performed, as also required by the Statute.[19]

[19] See more about the Eurosystem collateral framework here.

Risk protection and the need to ensure collateral availability are also key considerations when adjusting for climate-related risks. In this respect, measures that incorporate climate change considerations into the collateral framework should, first and foremost, support the assessment and mitigation of climate-related financial risk, as a key aspect of monetary policy in pursuit of the Eurosystem's primary objective to maintain price stability. This means that collateral measures should be calibrated to ensure risk protection while preserving sufficient collateral availability in different economic environments and across euro area jurisdictions and thereby ensure an even transmission of monetary policy. Additionally, collateral measures can act as a signalling device to counterparties and support the general economic policies in the EU, with a view to contributing to environmental protection objectives, without prejudice to the objective of price stability.

3.3.1 Valuation and haircuts

The Eurosystem complements its collateral eligibility criteria through several risk management tools to mitigate the risks of incurring losses. Two fundamental pillars of the risk management framework are the valuation rules and haircuts applied to mobilised collateral for Eurosystem refinancing operations. An additional pillar is the application of limits to minimise targeted risks.

With regard to the valuation rules, the Eurosystem marks to market all assets mobilised as collateral on a daily basis. In this way, it ensures that in the event of counterparty default, it factors in updated price information to assist in the liquidation process. Some assets, however, do not have an available daily price. The Eurosystem values such assets using an internal pricing model based on securities that have similar characteristics (particularly with a similar risk profile).[20]

The Eurosystem reviewed the valuation methodology it uses to price assets with no available daily market prices priced with an internal pricing model through a climate risk lens. Looking at different dimensions of green credentials (e.g. adherence to the preliminary EU Taxonomy[21] requirements, issuers' emission intensities, etc.), no evidence was found at this juncture that suggested that theoretical pricing models needed an additional adjustment when taking into account climate risk. In other words, the present valuation models are fit for purpose and there is no need for an additional climate risk overlay. Despite the current evidence, the Eurosystem annually reviews the valuation methodology and procedures, taking climate change risks into consideration.

Once the valuation of an asset has been performed, valuation haircuts are applied to the value of assets to cater for the risk of a fall in value if those assets need to be liquidated. Haircuts are primarily designed to appropriately reflect market, liquidity and credit risk over a liquidation horizon, which is long enough to ensure it does not have a negative impact on prices through liquidation. These risks and

20 See Bindseil, González and Tabakis (2009).

21 Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, amending Regulation (EU) 2019/2088, OJ L 198, 22.6.2020, p. 13.

liquidation horizons are dependent on the market's capacity to absorb sales of the assets. In other words, haircuts are calibrated based on the risk characteristics of the asset and the liquidity conditions of the asset class, to reflect how easy it would be to find a buyer should the Eurosystem sell the asset on the market. Assets with lower credit ratings or more complex instruments with shallower market liquidity generally receive higher haircuts.[22]

Similarly, the Eurosystem conducted a thorough analysis of whether green credentials on both sides of the asset spectrum (low vs high-emitting assets) would justify a different haircut calibration. The analysis did not reveal significant differences in financial risk in the tail of the loss distribution between assets issued by low and high-emitting issuers. Therefore, the results supported the hypotheses that the market does not materially differentiate between liquidity and volatility conditions based on the underlying green credentials of assets/issuers but treats assets with comparable traditional risk characteristics in a similar way (e.g. credit risk, market risk, etc.). This holds true even in cases where climate risk metrics are materially different among issuers. Thus, current evidence does not warrant changes in haircuts, as they are already designed to be conservative and offer appropriate risk protection against climate change risks. As for valuation procedures, the Eurosystem performs this review on an annual basis, striving to ensure that the haircuts continue to provide appropriate protection against climate change risks.

In summary, both valuations and haircuts are primarily risk management instruments in the Eurosystem operational framework, and current evidence suggests that they appropriately take climate change risks into account. Nevertheless, going forward the Eurosystem will perform annual reviews to assess whether climate change risks are properly reflected in the Eurosystem's haircut and valuation methodologies.

3.3.2 Collateral pool composition requirements

Financial risks can arise from collateral pools that are highly concentrated in assets that are subject to climate change risks if the financial risks of the collateral are correlated with the credit quality of the counterparty ("wrong-way risk"). As explained above, the Eurosystem keeps financial risks arising from credit operations to a minimum via its counterparty framework, daily valuation of collateral, valuation haircuts and additional risk control measures such as concentration limits.[23] Moreover, the expected short liquidation horizon in the event of counterparty default, contrasting with the longer-term nature of climate change risks, renders an additional layer of risk protection. Nevertheless, it is possible that the Eurosystem is exposed to unmitigated financial risks that are not reflected in credit ratings nor mitigated via haircuts if, for example, the collateral pools of counterparties with a strong reliance on Eurosystem funding and exposure to sectors prone to climate change risks are significantly concentrated in assets subject to the same risks. In addition,

22 See Adler, et. Al. (2022).

23 The Eurosystem currently applies limits on the mobilisation of unsecured debt instruments issued by a credit institution or by closely linked entities.

second-round effects might also cause unmitigated financial risks. For instance, transition risks can induce the depreciation of collateral assets resulting from a change in investors' perception of the profitability of carbon intensive assets, which may lead to a sudden loss in market value of such assets.

Having studied various options to restrict climate change risks in counterparties' collateral pools, the Eurosystem decided to implement collateral pool limits for concentration risk based on several considerations using the assessment framework. Limits are already used in the collateral framework (i.e. for unsecured bank bonds) to reduce concentration risks in an effective manner, so counterparties are well accustomed to this measure. In addition, limits can be extended to other dimensions (e.g. climate change) without necessitating a major overhaul of the existing framework. The Eurosystem also assessed other possible collateral pool composition measures, but those were deemed to be less preferable for the time being. For instance, an additional over collateralisation requirement for collateral pools with significant shares of assets exposed to climate change risk was deemed to be operationally more difficult to implement as it would represent a fundamental change to the existing framework and therefore be less risk efficient. Additionally, the full alignment of collateral pools with the climate targets set out in the Paris Agreement (as implemented in the EU through the European Climate Law) was deemed to be "not implementable" for the time being as it would require access to currently unavailable comprehensive forward-looking data for all asset classes which are eligible as collateral. Finally, the introduction of a minimum share of assets with a low-carbon footprint in individual collateral pools was not pursued as it does not directly target assets with high climate change risk and would represent a significant departure from the current framework.

For collateral pool limits, the Eurosystem will use greenhouse gas (GHG) emissions as the main metric to identify entities with a high climate change risk that will be subject to limits. Ideally, it would be preferable to apply concepts enshrined in EU legislation to identify high-emitting entities/assets. However, such concepts do currently not exist (e.g. the EU Taxonomy currently only focuses on sustainable activities). Therefore, to be able to pursue the monetary policy objectives with existing tools, the Eurosystem will refer to GHG emissions – a metric commonly used in financial markets to measure climate change transition risks. This metric will also be used in the context of the CSPP (see Section 3.4).

The exact specifications of collateral pool limits require the Eurosystem to address numerous details. This involves assessing a number of options that are currently being analysed. For example, which limit percentage to apply, which specific data to use (e.g. entity-level data or sectoral information), how to treat entities that currently do not disclose climate data, which economic sector classification to use if sectoral averages are used. It is also important to consider early on how to set up collateral pool limits in such a way as to make them easily scalable to additional asset classes in the future, particularly if these are to be applied to smaller entities for which there is lower data availability (e.g. credit claim debtors).

A Eurosystem exercise will be carried out ahead of the implementation of collateral pool limits to assist counterparties and provide signalling to the

market. The implementation of these limits is planned before the end of 2024, after the go-live of the Eurosystem Collateral Management System, which is currently expected to take place in April 2024. Prior to final implementation, the Eurosystem plans to conduct an impact assessment exercise and publish its results to preannounce the future impact of limits to assist counterparties in their preparations. The measure will not have an impact on the set of eligible collateral at an aggregate level which could contrast with the objective of price stability but is expected to have an impact at the level of collateral mobilised by individual counterparties, particularly those that mobilise sizeable amounts of marketable assets issued by non-financial corporates with high GHG emissions.

3.3.3 Sustainable financial innovation

The Eurosystem's collateral framework already included some climate change considerations prior to the decisions announced in July 2022. For instance, the Eurosystem had already accepted a significant share of European green bonds and sustainability-linked bonds[24] as eligible collateral. According to Eurosystem estimates, at the end of the first quarter of 2022, roughly 70% of the European universe of green and sustainability-linked bonds were eligible as Eurosystem collateral. The main reasons for the ineligibility of additional securities are the failure of these securities to satisfy certain eligibility criteria, mainly because of subordination clauses, lack of sufficient credit quality and non-fulfilment of market listing requirements.[25] The situation for non-marketable assets is less clear as there are insufficient climate-related disclosures, which makes specific measures targeting this asset class difficult to implement at this juncture. Notwithstanding this data caveat, according to information recently gathered by the Eurosystem from its eligible counterparties, the Eurosystem collateral framework does not appear to contain any particular features that would prevent the acceptance of non-marketable assets with legitimate green features.

3.4 Tilting of corporate bond holdings

The Eurosystem approach to integrating climate change considerations varies across its financial asset portfolios, depending on their objectives. Eurosystem central banks hold non-monetary policy portfolios for investment purposes, such as the pension fund or own-fund portfolios that invest these institutions' capital and reserves. At the same time, the Eurosystem has large portfolios that are held for monetary policy purposes related to the ECB's primary objective of maintaining price stability.

---

24 With regard to sustainability-linked bonds, only debt instruments with sustainability performance targets linked to climate change and/or environmental goals/objectives are eligible as Eurosystem collateral. For further information see the FAQ on sustainability-linked bonds.

25 This universe excludes debt instruments issued/settled in Central Securities Depositories (CSDs) located outside of the euro area and debt instruments issued in ineligible currencies (i.e. other than the euro, pound sterling, yen or US dollars).

Of these monetary policy portfolios, the corporate bond holdings that form part of the APP and the PEPP (jointly the CSPP)[26] are some of the riskiest exposures in terms of financial and climate change driven risks, and therefore deserve special attention. Through these holdings, the Eurosystem is directly exposed to the financial risk arising from the transition and physical risks of the different corporate issuers, as the Eurosystem holds senior unsecured debt of these companies. For this reason and considering the higher climate-related data availability and data quality for corporate issuers (compared, for example, with banks or other financial institutions), the Eurosystem has prioritised the incorporation of climate change considerations into this portfolio.

In general, market participants hold corporate bonds for investment purposes and follow different practices to incorporate climate change considerations, depending on their own objectives and preferences. Some investors follow a thematic approach of purchasing bonds only from the issuing companies, which are expected to perform best when faced with climate change challenges and opportunities. This approach could, however, restrict the universe of eligible companies in terms of policy implementation to a very narrow set. Other investors take the other extreme and exclude only very targeted sectors or a few specific companies. This approach is usually applied to limit the number of companies via concrete exclusions, but it takes a punitive approach and does not provide incentives for such companies to gradually build a longer-term green strategy. Some investors adopt simple investment strategies, focusing only on a company's future climate targets, or just focus on its past emissions, and do not combine the wealth of climate data available. The different approaches used by market participants depend on their preferences and constraints and are also evolving as new data and new legislation enter into force.

The Eurosystem has designed its own approach for incorporating climate change considerations into the CSPP, catering for the monetary policy purpose of the portfolio while aiming to follow best market practices, considering the ECB's mandate and the assessment framework explained in Section 2 and Box 3. While most investors can easily adjust their investment frameworks and portfolios without risking major market disruptions, the CSPP currently represents around 30% of its eligible universe.[27] Therefore, abrupt changes in the CSPP investment framework can have a large impact on the market. Subsequently, to integrate climate change, the Eurosystem carefully assessed the impact of any changes in the framework given the sheer size of its monetary policy portfolios.

To fulfil its mandate, the Eurosystem used the risk-efficient approach described above when adjusting its corporate bond purchases framework. This approach ensures that the monetary policy portfolio continues to achieve its primary objective

---

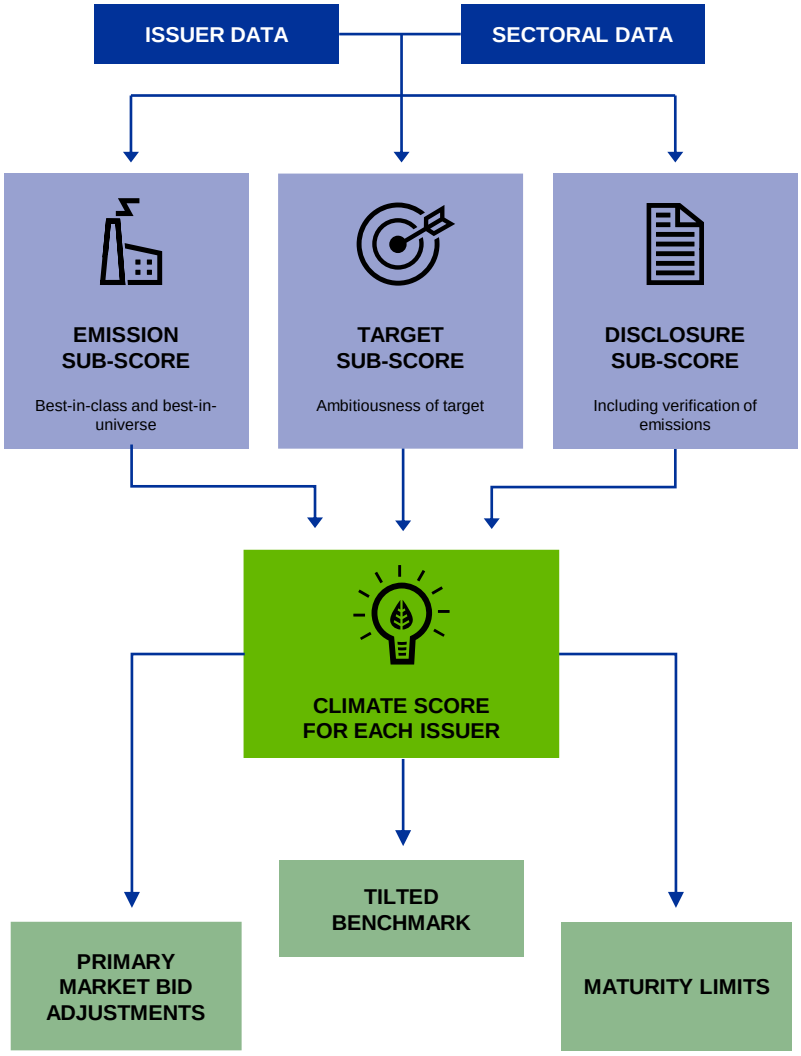
[26] This paper simplifies and calls CSPP to both cover corporate bond holdings under APP and PEPP whereas strictly speaking CSPP entails only the APP part.

[27] In broad terms, the CSPP-eligible universe consists of investment-grade euro-denominated bonds and commercial paper issued by non-bank corporations (i.e. non-financial corporations and insurance corporations) established in the euro area and includes over €1 trillion worth of securities. The size of the CSPP vs the eligible universe varies over time, depending on the growth dynamics of each component. When the CSPP was established in 2016 its eligibility criteria were defined as "broad" for it to fulfil its objectives.

while also incorporating climate change considerations. This means, in practice, that the implementation framework for corporate bond holdings was adjusted following three basic principles. First, the monetary policy objective of the CSPP and effectiveness in achieving this objective must remain unchanged. Second, the adjustments should protect the CSPP against longer-term climate-related risk associated with its outright purchases. Lastly, without prejudice to the primary objective of maintaining price stability, the measures should also support the general economic policies of the EU with a view to contributing to its environmental protection objectives.

Concretely, the Eurosystem decided to incorporate climate change considerations by tilting the CSPP purchases based on an in-house climate score for each eligible issuer. Figure 4 illustrates the main inputs and outputs of this tilting strategy. In a nutshell, the incorporation of climate change considerations in the implementation of the CSPP consists of tilting purchases towards bonds of issuing companies that have a better "climate performance" (as measured by the climate score) and away from bonds of companies with a poorer climate performance. This adjustment is made by tilting the benchmark that guides the purchases and by tilting the primary market purchases. There are stricter maturity limits for issuers with poorer climate performance (see Section 3.4.2).

Figure 4
Overview of the methodological approach to the climate score



Source: ECB

Climate performance relates to a company's carbon impact and in particular to transition risk. Although physical risk is also relevant, the current design of the climate score does not yet incorporate physical risk drivers because the data quality, availability and methodologies are not considered solid enough. The following sub-sections discuss in greater detail how this climate performance is defined and the trade-offs that the Eurosystem has had to make (see Section 3.4.1).

3.4.1 Input data and definition of climate performance in the CSPP

The incorporation of climate change considerations into the CSPP is data driven. In line with other climate change-related measures, the Eurosystem started building up knowledge by collecting data from different data providers and from public sources for all the companies that are eligible for the CSPP. For these companies, it was possible to identify widely available self-reported data on their GHG emissions, although not all the metrics considered had sufficient coverage or were deemed reliable for sound decision-making. Some other datasets were also identified for potential use in the future. Overall, the thorough data collection and analysis allowed for the inclusion of a relatively broad set of information, which in turn helped set a relatively fast implementation timeline.

The process of incorporating climate change considerations into the CSPP also built on available best market practices and methodologies. By reaching out and engaging with different central banks, investors and NGOs, the Eurosystem could gather a wealth of information, compare options and develop the most suitable approach for its own aims.

The choice of data and methodologies is not merely a technical choice, it also has many policy implications. There is a wealth of decisions and trade-offs that a climate and risk conscious policymaker, investor or any market participant needs to take. The Eurosystem deals with these trade-offs by carefully assessing the pros and cons of each choice for each measure, also recognising that these trade-offs evolve over time. This is the essence behind designing an adaptable assessment framework. The following choices were most relevant for the tilting measure.

Choice #1: The Eurosystem identified three dimensions that are relevant for the climate performance of CSPP issuers and used them to build the climate score: (i) the quality of the latest disclosures of GHG emissions, (ii) past GHG emissions (backward-looking), and (iii) decarbonisation targets (forward-looking). Each of these dimensions are relevant for companies' climate risk. High quality disclosures are needed to assess their exposure to climate risk, past GHG emissions reflect transition risks and decarbonisation targets show how companies' plan and commit to mitigating these transition risks. By including the three dimensions, the CSPP tilting aims to incorporate long-term financial risks driven by climate change to incentivise the transition towards a low-carbon economy, and promotes the decarbonisation path in line with the objectives of the Paris Agreement and the climate neutrality objectives of the EU, as set out in the European Climate Law.

Choice #2: The Eurosystem established the relevance (or weight) given to each of these three dimensions in the issuer's climate score. This is a key policy choice with various trade-offs. Trade-offs exist between the backward and forward-looking metrics, as both are crucial for assessing companies' transition risks. Overweighting the backward-looking component would rely on existing "hard" data but could mean that the decarbonisation efforts of an issuer are not fully considered or incentivised. On the other hand, overweighting the forward-looking component could mean that companies in sectors with low emissions and those that struggle to decrease them are penalised despite their low overall emission levels. Moreover, depending on the

forward-looking metrics chosen, overweighting the forward-looking component could reward overly optimistic emission reduction targets. There are similar trade-offs for the disclosure dimension: the highest emitters tend to have the best GHG emission disclosures (seemingly because of market scrutiny), so overweighting this dimension could unduly reward them. The weighting of each dimension also needs to consider data quality and availability. The weighting chosen by the Eurosystem ensures that a company with verified GHG emission disclosures that has credible, ambitious and science-based decarbonisation targets, will obtain a medium score. That score can then be moved higher or lower depending on the emissions of the sector in which the company operates and how its emissions compare with those of its peers (as also known as a "best-in-class" adjustment, described in further detail below).[28]

The relevance or weight of these dimensions is not static and can evolve depending on new data and regulatory developments. For example, forward commitments and the achievement of these commitments could play a more prominent role in the future but once the mandatory disclosure requirements under the CSRD have fully entered into force the element reflecting the quality of the disclosure would no longer be needed. For instance, in line with the Governing Council's planned climate-related disclosure requirements for collateral, this may also mean that companies that do not comply with the CSRD by not disclosing GHG emissions would be excluded, and all other companies would be assessed according to the remaining two dimensions based on their backward-looking carbon footprint performance and their forward-looking commitment to a Paris-aligned net zero path, with the weights being adjusted according to a new assessment that would be made at that point.

Choice #3: The Eurosystem chose specific metrics for each dimension of the climate score. For the disclosure dimension, the Eurosystem decided to consider not only the completeness of the GHG emissions disclosures but also their verification to ensure the reliability of the disclosed data. Companies that do not provide disclosures are ranked lower than others, as it is not possible for the Eurosystem to assess their climate change exposure and the risk they are exposed to. For the backward-looking dimension, there were two main issues to be addressed: (i) the extent to which indirect emissions (scope 3) should be considered, and (ii) whether a company should be compared, in terms of its GHG emissions, with companies in the whole eligible CSPP universe or only with its sector peers (best-in-universe vs best-in-class).

#3.1. The Eurosystem decided to use sectoral scope 3 data for CSPP tilting. This decision was a major leap forward in terms of climate data usage, as scope 3 data are in theory crucial to assessing the full climate impact of a company. However, the current methodologies used to calculate these data vary and data quality can be challenging when used for policymaking. Scope 3 data reflect the GHG emissions along the whole value chain of a company and are therefore relevant when assessing transition risks. Yet many investors tend to exclude scope 3 data because the quality of company-specific scope 3 data is still low given the complexities relating to its calculation. To overcome this problem, the Eurosystem analysed whether sectoral scope 3 data could be utilised rather than company-specific scope 3 data. The Eurosystem found this option to be sufficiently reliable and decided to incorporate

[28] Specific details of the dimensions can be found in the FAQ section on the ECB website.

sector averages of scope 3 data into the backward-looking dimension, considering that its use ensures that the tilting methodology more accurately reflects the contribution of the various sectors to overall emissions. It also allows scope 3 data to be progressively included and reduces the possibility of cliff effects arising from the future introduction of company-specific scope 3 data, given that several EU regulatory and market initiatives are expected to improve scope 3 data quality over time. Subject to this improvement, individual companies' scope 3 data could be later considered in the backward-looking component as well.

#3.2. The Eurosystem decided to compare the GHG emissions of eligible corporate issuers with those of their peers and with the entire eligible universe. Comparing an issuer solely with its peers would bypass the fact that some sectors are much more polluting than others and might therefore require different treatment to have a real impact on the portfolio's carbon footprint. On the other hand, ignoring the peer comparison completely would imply that only companies in the most polluting sectors would be affected and there would be no incentives for companies to improve. A combination of the best-in-class (vs peers) and best-in-universe (vs all) approaches allows the transition risk of a company to be incorporated as a result of its performance in the peer group (e.g. because of a new sector regulation affecting the most polluting companies in the specific sector) and the transition risk of a company compared with its emissions in general (e.g. because of a carbon tax). Furthermore, to avoid the artificial differentiation between companies in sectors that have low or very similar emissions, the Eurosystem methodology does not broadly differentiate between companies in low-emitting sectors but focuses on differentiating between companies in high-emitting sectors (sectors with high average scope 1, 2 and 3 emissions) and sectors where there is a large variance in companies' emissions.

3.4.2 Output: incorporation of climate score into a tilting approach

The main tool used to incorporate the climate score into the CSPP is the tilting of purchases in both the primary and secondary market. This is done by tilting the benchmark that guides the purchases by changing its original market capitalisation-based weights: the benchmark weighting is increased for higher scoring issuers and decreased for lower scoring issuers. The purchases are then tilted as the purchase limits are determined by the benchmark. To ensure that the purchases follow the tilted benchmark, primary market purchases are also adjusted through tilting. Furthermore, primary market purchases provide direct funding for issuers and can be a positive signalling tool that indicates Eurosystem support for better climate scoring issuers.

Tilting is complemented by maturity limits for issuers with lower climate scores. The Eurosystem imposed stricter limits on long-term maturity bonds of issuers with a low climate performance to further mitigate the long-term financial risks arising from climate change, on the grounds that this risk is not considered to be fully reflected in the classical risk assessment systems used in the CSPP framework.

Finally, in addition to tilting purchases based on issuer-level climate scores, the Eurosystem grants preferential treatment to green bonds, when they are purchased in the primary market, subject to certain extra conditions that are imposed to mitigate greenwashing risks. For the two most common sustainable bond market instruments – green bonds (following the use-of-proceeds approach) and sustainability-linked bonds (SLBs), following an approach based on climate-related issuer key performance indicators, the Eurosystem assessed the trade-offs between how useful these instruments are in achieving climate objectives and the greenwashing risks associated with them. SLBs are designed to encourage issuing companies to reduce their carbon footprint by creating specific climate targets for their overall operations, which affects their final funding costs. These SLB targets are related to the issuer's climate performance and in the CSPP framework can be related to the forward-looking component of the issuer's climate performance score. It was therefore not considered necessary to give SLBs special treatment in the CSPP framework as this would amount to double counting. However, genuine green bonds earmark proceeds for specific green projects, which might not be reflected in the issuer's climate score. Green bonds refer to specific projects which might take longer to affect company-wide climate metrics. To mitigate the greenwashing risks that come with the green bond label, the preferential treatment awarded to green bonds is conditional on, among other aspects, the green bond being aligned with a widely used market standard confirmed by an independent second party.[29]

3.4.3 Flexibility, adaptability and accountability of CSPP tilting: present and future

The calibration of the measures and the decision to tilt the CSPP integrates climate ambition with a smooth and flexible implementation of this monetary policy instrument. The new framework is proportionate to its aims and the impact on the overall financing conditions needed to retain a neutral monetary policy stance, as the changes in the framework are implemented without prejudice to the Eurosystem primary mandate (see Box 3 for an assessment of the impact of tilting on euro area corporate bond yields).

The framework for incorporating climate change considerations into the CSPP is adaptable not only to new data and methodologies but also to different monetary policy stances, including net purchases, full and partial reinvestment or even other quantitative tightening phases. An example of this adaptability was the Governing Council's announcement in February 2023 that as it reduces the size of its holdings during partial reinvestment, it will implement a "stronger tilting of corporate bond purchases, including in primary market, towards issuers with better climate performance" in order to support a continued decarbonisation of the portfolio at a satisfactory pace.[30] Overall, the tilting methodology, sometimes referred to as flow-based tilting, can be revised and enhanced, should the prevailing monetary policy stance warrant a different approach.

---

29 See Question 8 of the FAQ on the ECB website

30 For further details, see the ECB Press release on this topic.

Additionally, beyond the public FAQ and explainers on the CSPP on the ECB's website, the Eurosystem committed to detailed disclosures and to report on the CSPP starting from the first quarter of 2023. With the first disclosure published on 23 March 2023 the Eurosystem has demonstrated its continuous adherence to a path of high transparency and accountability[31].

The CSPP tilting framework will be used as one input for the calibration of collateral pool limits (see Section 3.3.2), but some differences among frameworks are needed and warranted. The approaches are expected to differ in certain respects given the difference in scope and risks of the collateral framework compared with the CSPP. A more comprehensive, tailor-made approach for the CSPP compared with collateral can be justified given that outright holdings present more risk to the Eurosystem's balance sheet than collateralised lending. In addition, operational considerations are simpler for asset purchase programmes in terms of eligible assets than for a broader and more permanent collateral framework. More operational challenges will come to the forefront as collateral climate-related measures are expected to be gradually expanded to include additional asset classes in the future (e.g. to eventually include credit claims). This will imply a substantial increase in the number of issuers/debtors to assess, including small entities for which climate data are either not available or harder to obtain. These differences call for a simple, scalable approach for collateral which can diverge from the tailor-made approach that was developed for the CSPP, with a more limited number of large non-financial corporate issuers.

Box 3
Illustrating the potential effects of CSPP tilting on euro area corporate bond yields

Prepared by Giovanna Bua and Daniel Kapp

This box examines the potential impact of changes to the CSPP framework on corporate bond yields ex ante, i,e., before the actual announcement and implementation of the tilting framework. Such an exercise was relevant in order to assess, ex-ante, that the changes in the framework are implemented without prejudice to the Eurosystem primary mandate. As the tilting is implemented, over time it will be possible to have an ex-post assessment of the measure.

One of the ways in which the tilting of CSPP purchases can incentivise firms to reduce their carbon intensity is through changes in relative asset prices. For example, tilting towards lower carbon intensive issuers and away from higher carbon intensive issuers, may improve relative financing conditions for the lower carbon intensive issuers, and vice versa.

At the same time, changes to CSPP purchase modalities must be without prejudice to the objective of price stability. For example, during an expansive quantitative easing phase, one condition for such changes would be that tilting does not constrain the overall amount of CSPP purchases considered to be adequate by the Governing Council for providing a suitable degree of

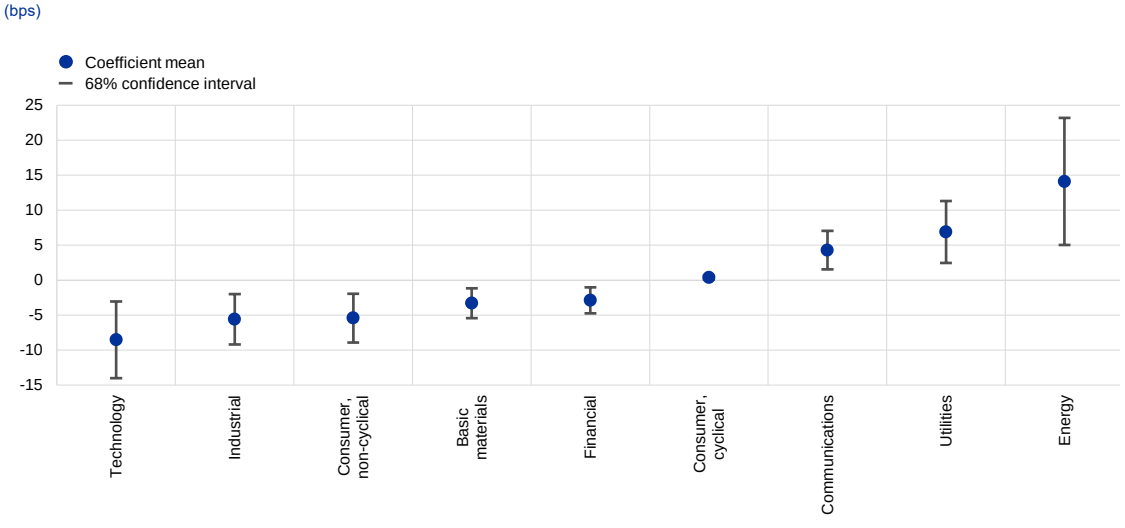
[31] For further details, see the reports of climate-related financial disclosures of the Eurosystem's corporate sector holdings for monetary policy purposes. It considers the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD), the Partnership for Carbon Accounting Financials, and the Network of Central Banks and Supervisors for Greening the Financial System (NGFS), which all provide widely used and accepted standards for sustainability reporting.

monetary policy accommodation. It is also desirable for the overall price impact from a given purchase amount to remain broadly invariant to the change in the composition of the purchases. In other words, tilting purchases should primarily affect relative corporate bond yields while the average yield effect should be broadly unchanged. To provide a framework for assessment, the stylised example below takes an illustrative tilting scenario as a starting point.

To illustrate the potential effect of tilting on yields we build on the extensive literature which examines the impact of central bank asset purchases. The academic literature broadly distinguishes between two channels: the signalling channel (asset purchases are informative about the central bank's future rate-setting intentions) and the portfolio rebalancing channel (asset purchases trigger shifts in investors' asset allocations, hence changing their prices). Since purchases that in terms of a metrics such as market capitalisation only differ from "regular" quantitative easing in that they overweight or underweight a part of the eligible universe of assets, the same two channels are likely to be in play. In this case, the signalling channel is probably small (and difficult to quantify) as the specific tilting and associated communication is unlikely to trigger a significant re-assessment of the overall stance. Therefore, we will focus on the portfolio rebalancing channel. For that channel, the starting point is a reduction in the net bond supply by the central bank that induces investors to reshuffle their portfolios. This allows us to analyse the "duration effect" as, by extracting duration, central bank purchases reduce the aggregate risk borne by market participants. Portfolio rebalancing can also be seen through the lens of a local supply effect: if the net supply of some assets is reduced, term and risk premia embodied in corporate bond yields compress and bond prices increase (while yields decline).[32] As the objective of this box is to gauge variations in prices when tilting towards or away from specific securities, while not changing the overall purchase amount on aggregate under the CSPP, the focus is on the local supply effect.

Figure A

Estimated impact of CSPP tilting on corporate bond yields, by sector



Source: ECB, Iboxx indices from S&P Global and ECB calculations

Concretely, we follow D'Amico and King (2013) who proposed a way to gauge the impact of central bank purchases on individual bond yields. We conducted a counterfactual analysis, in

[32] For an overview of the functioning of central bank asset purchases see "The yield curve and monetary policy", Speech by *Philip R. Lane, Member of the Executive Board of the ECB, 25 November 2019*.

which we estimate the potential impact on yields if the tilting is applied in the first period of net asset purchases under the CSPP. Following these authors, who analyse the impact of the Federal Reserve's Large-Scale Asset Purchase programme on US bond prices, we carry out cross-sectional regressions of CSPP-eligible bond prices on asset purchase volumes and several controls. This is done to create an elasticity between the quantity of individual asset purchases and asset price/yield changes. More specifically, cross-sectional regressions are estimated where the dependent variable is the difference between a bond's price from the day before the announced start of the CSPP (9 March 2016) to the day after the CSPP ended.[33] For the purpose of this exercise, the end of net purchases under the APP in 2018 serves as the last point in the event window (19 December 2018 – the day after the last CSPP net purchase). Controls include the bond's remaining maturity, the bond's initial price, the coupon size and the credit rating. The resulting coefficient/elasticity can then be aggregated at the sectoral level, using stylised examples of changes in asset purchases e.g. considering the reduction of the average weighted emission intensity in the overall CSPP.[34]

Results suggest that while, as intended, tilting is likely to increase (decrease) relative market-based financing costs for companies which are underweight (overweight) in purchases, the positive and negative effects largely cancel out on aggregate – meaning that the average effect on corporate bond yields and therefore on the monetary policy stance is likely to be broadly contained. Figure A shows the estimated sectoral impact on corporate bond yields stemming from an adjustment in relative purchases from companies with worse climate scores to companies with better ones to reduce average weighted CSPP purchase emissions by around 30%. In this simple and stylised example, which captures the gist of the tilting approach based on its key parameters and not on the exact implementation details or the actual selection of bonds, the largest adverse impact on financing conditions could be expected for companies in the energy sector, with an average adverse yield impact (compared with no tilting) of approximately 15 basis points. By contrast, sectors such as technology would benefit from the tilting of CSPP purchases, with an average yield compression close to the relative adverse impact for high carbon sectors. These aggregate results do not imply that all companies in a sector are affected the same way, as within each sector there are companies with higher and lower climate scores. Caveats to these results apply. For instance, the analysis is highly stylised and only analyses one of the channels through which the tilting of CSPP purchases affects corporate bond yields. In addition, estimation uncertainties are large, with parameters being dependent on the choice of the estimation window, inter alia. Finally, results estimated fora period of net purchases only may potentially not be fully transferable to a pure reinvestment phase or a phase in which the portfolio is actively reduced.

---

33 The underlying assumption is that while expectations may have played a role in terms of yield compression over the course of the programme, all effects should have materialised after the final purchase has been implemented. The choice of the review period is consistent with the approach of D'Amico and King, i.e. to use the difference in price between announcement and conclusion of a programme to measure local effects and clean for expectations of future purchases.

The use of the full period of purchases is in line with D'Amico and King (2013), "Flow and stock effect of large-scale treasury purchases: Evidence on the importance of local supply", *Journal of Financial Economics*, May. Analyses of the CSPP have often used shorter time frames, either because they focus on announcement effects, or because at the time of writing the programme was still in the net purchase phase. See De Santis, Geis, Juskaite and Vaz Cruz, ECB (2018), "The impact of the corporate sector purchase programme on corporate bond markets and the financing of euro area non-financial corporations", *Economic bulletin*, Issue 3..

34 The stylised example used here is based on a 30% reduction in the overall emissions intensity of the CSPP portfolio. Company weights are based on an indicator which comprises backward and forward-looking emissions intensity, as well as the quality of disclosures. No intra-sector weighting is assumed, as in this case the cross-sectoral dispersion of the impact of tilting would decline.

4 Looking ahead

The recently adopted climate-related measures in the Eurosystem monetary policy implementation framework are an important first step on a long road. The Eurosystem is committed to continue integrating climate change considerations into its monetary policy operations so that the operational framework duly takes climate change risks into account.

The decisions taken will be reviewed by the Eurosystem on a regular basis to ensure an ever-adapting monetary policy framework as well as an evolving economic and regulatory environment. Regular reviews will ensure that the adopted measures continue to serve their original purpose of reducing climate-related risks for the Eurosystem and supporting a smooth transition to a carbon neutral economy without harming price stability. The assessment framework described in Section 1 will serve as the basis to assess the measures already implemented on an ongoing basis as well as any potential additional measures. The policy effectiveness of the various measures in achieving the intended objectives is a key aspect that will be re-evaluated going forward and will form the basis of further Eurosystem decisions.

As part of its regular market monitoring activities, the Eurosystem will also continue to monitor and assess the degree of market innovation in sustainable financial markets and ascertain whether its collateral rules continue to respect the risk protection and collateral availability concerns relating to climate change risks. In this work, the Eurosystem looks at the robustness of existing instruments and labels and is particularly sensitive to practices or developments that may generate greenwashing risks. On this aspect, the Eurosystem welcomes the upcoming European Green Bond Standard which will provide a harmonised and robust standard for the industry.[35] The Eurosystem also continues to assess whether its collateral rules remain adequate and ensure they do not hinder the development of sustainable financial markets, by always respecting the risk protection principle.

Refinements of the existing measures and the potential implementation of additional policy measures will require certain prerequisites to be met. The availability and quality of climate-related data in different financial market sectors, climate risk modelling and regulatory developments are three areas in which further advancements are of paramount importance and that are likely to benefit from ongoing large changes in the near term. These will support further progress in the Eurosystem's refinement or expansion of the measures already agreed. In addition, the next development phase of the ECB's climate change-related indicators may provide helpful inputs for this work.

The expected improvements in climate-related disclosures in the EU will contribute to a general improvement in the availability and quality of climate-related data. This will allow for a more accurate identification and

[35] Find out more about the ECB's opinion on the development of the European Green Bond Standard in this document.

measurement of climate change risks by the industry (including firms, financial institutions and credit rating agencies) as well as the Eurosystem, in terms of its balance sheet. When such improvements do occur, the Eurosystem could re-evaluate potential measures targeted at structured finance products. In this context, improvements in disclosures for ABSs and covered bonds are essential and the Eurosystem is therefore acting as a catalyst in the regulatory debate to assist in the development of better disclosures.

The Eurosystem has engaged in discussions with European authorities and regulators, especially with ESMA and the European Commission, to provide a better and more transparent understanding of the areas in which improvements are necessary and useful. The Credit Rating Agencies Regulation is a prime example of an area in which amendments targeted at the inclusion and disclosures of climate change considerations for credit ratings issued by ECAIs would be beneficial.

In a wider context, the Eurosystem is openly cooperating with its peers to incorporate climate change considerations into central banking operations. It is playing an active role in international fora, where many central banks and public sector institutions face similar challenges. For instance, the NGFS has been of paramount importance in setting the stage for critical international coordination among central banks and supervisors on topics related to climate finance modelling, central bank operations, banking supervision and enhancements to data availability. The ECB and the Eurosystem national central banks are active members of the NGFS and are both beneficiaries of the exchanges as well as drivers of further reflections in this forum. Solutions to these complex problems can only be reached in a global coordinated manner.

Looking ahead, different or new measures could become more prominent in the medium term. As stated, the Eurosystem considers no measure to be currently off the table as long as it is in line with the ECB's mandate.[36] One example of measures sometimes mentioned by the media that would require more time and further in-depth reflection are central bank lending operations targeting green activities. These operations, however, are particularly complex for several reasons. First, they would need to be aligned with the prevailing monetary policy stance. Second, more reliable data and a harmonised definition of what constitutes green lending are needed. The Eurosystem will continue analysing the feasibility of such operations.

Biodiversity will also play a larger role in the environmental discussion in the future. As an integral part of environmental risks and intrinsically intertwined with climate change, the loss of biodiversity has potentially large consequences for ecosystems and regional economies. However, in such a nascent area of study the estimates of losses and impacts are extremely difficult to quantify given the large uncertainty surrounding them. Therefore, the Eurosystem will first implement its announced climate-related action plan, learn from the process and then study climate change and biodiversity in greater depth. As data availability, general knowledge and research in this area improve in the coming years, the Eurosystem will also be in a

[36] See ECB Governing Council Press Conference, 9 June 2022

better position to reflect on the implications of biodiversity loss for monetary policy, particularly if this is not captured by the climate change measures.

Refinements of the agreed measures or the adoption of additional measures in the future, will in any event be necessary, dynamic in nature and aligned with the monetary policy stance. As announced in July 2022 the Eurosystem is committed to regularly reviewing all the measures announced so far, in order to assess their effects and adapt them, if necessary. While aiming to better manage its balance sheet risks, to contribute to the EU policies and to a transition to the Paris-aligned path towards net zero emissions, it is essential for the Eurosystem to maintain sufficient flexibility in its monetary policy operations so that it can adjust to the prevailing macroeconomic conditions. New steps towards the alignment of the monetary policy framework with the goals of the Paris Agreement (and the European Climate Law) can be considered in the future once data quality and methodologies improve with the understanding that the Eurosystem will always act within its mandate.

References

Adler, M., Camba-Méndez, G., Dzaja, T., Manzanares, A., Metra, M. andVocalelli, G. (2022), "The Valuation Haircuts Applied to eligible marketable assets for ECB credit operations", *Occasional Paper Series.*

Alogoskoufis, S., Dunz, N., Emambakhsh, T., Hennig, T., Kaijser, M., Kouratzoglou, C., Muñoz, M., Parisi, L. and Salleo, C. (2021), "ECB economy-wide climate stress test", *Occasional Paper Series.*

Bindseil, U., Gonzalez, F. and Tabakis, E. (2009), "Risk Management for Central Banks and Other Public Investors", *Cambridge University Press.*

Breitenstein, M., Ciummo, S. and Walch, F. (2022), "Disclosure of climate change risk in credit ratings", *ECB Occasional Paper Series*.

ECB Banking Supervision (2022), "2022 climate risk stress test".

ECB (2023), "Climate-related financial disclosures of the Eurosystem's corporate sector holdings for monetary policy purposes".

NGFS (2020), "Survey on monetary policy operations and climate change: key lessons for further analyses", *Technical document*.

NGFS (2021), "Adapting central bank operations to a hotter world: Reviewing some options", *Technical document*.

Acknowledgements

This paper draws on the findings of the workstream on climate change and monetary policy implementation framework organised under the Market Operations Committee and the Risk Management Committee of the Eurosystem. The authors would like to thank staff from the ECB and the national central banks of those countries that have adopted the euro, who contributed to this workstream:

Martin Adler, Alice Algot-Same, Paola Antilici, Fernando Arranz Gonzalo, Franck Auberger, Laura Auria, Pauline Bacos, Laetitia Badouraly Kassim, Liliana Bara de La Fuente, Julian Barazi, Maxime Barthe, Andrius Balciunas, Verena Barz, Giacomo Beltrame, Enrico Bernadini, Julian Berner, Alexander Bock, Gianmaria Bonagura, Matteo Bonetti, Calogero Brancatelli, Julia Braun, Miriam Breitenstein, Dirk Broeders, Beatrice Brückner, Marco Bruno, Giovanna Bua, Inês Cabral, Susana Caleiro, Carmen Camacho, Fabio Capasso, Bernadette Chmelar, Stefania Ciummo, Olivier Clementin, Sara Dantas, Flavio De Carolis, Assunta Di Chiara, Johny Digiampaolo, Mariëlle Dreuning, Cláudia Acúrcio Duarte, Tomislav Džaja, René Eibensteine, Elisabetta Ferrara, Andreia Ferreira, Timothée Fluteau, Marco Fruzzetti, Giulio Gariano, Gregory Gautelier, Pierre-Yves Gauthier, Filippo Giovannelli, Viktoriya Gocheva, Alice Gonçalves, Vincent Grossmann-Wirth, Justus Grundmann, Daniel Gybas, Benoit Hallinger, Benjamin Hartung, Olivier Haway, Barbara Hebendanz, Hans Hecker, Rafael de Heredia, Clara Hollmann, Anna Hyrske, Roberto Imperato, Lorenzo Isgro, Katri Järvinen, Raphaël Jeudy, Ramona Jimborean, Daniel Kapp, Iliya Karaivanov, Aliki Kartapani, Alexandros Kasmas, Pavol Keckes, Sebastian Keim, Julia Körding, Vassilios Kotsakis, Angelika Kotúčová, Vassilios Koutras, Johannes Krämer, Leander Krammer, Piotr Kusmierczyk, Athanasios Lampousis, Chiara Lattanzi, Nadia Laut, Kieran Leonard, Pauline Lez, Sven Lissek, Veronika Loewe, Floris van Loo, Marco Luca, Cristoph Machiels, Arturo Macías, Alfredo Maldonado, Georgios Manthoulis, Andres Manzanares, Timo Marquardt, Catarina Marques, Marco Marrazzo, Roman Marton, Gonzalo Camba Mendez, Arne Menzel, Christina Mertens, Matteo Metra, Anna Michelina Di Gioia, Marek Micuch, Katri Mikkonen, Gianluca Mosconi, Andreas Moser, María Nalda, Ken Nyholm, Marguerite O'Connell, Seamus O'Donnell, Federica Orsini, Gerardo Palazzo, Rasmus Pank Roulund, Filippo Pasqualone, Elise Peron, Flora Pontecorvo, Andy Pralat, Christelle Puyo, Claudia Rabal Sabater, Oleg Reichmann, Emilio Rodriguez Alonso, Florian Resch, Tom Rood, Seamus Ruddy, Bérengère Rudelle, Francesco Ruggiero, Angel Ruiz, Luigi Russo, Laurence Saccani, Alessandro de Sanctis, Stephan Sauer, Nicolas Sauter, Laura Savio, Francesco Savino, Tim Schmachtel, Miriam Schmelter-Coste, Dominik Staniewski, Bernd Strüber, Marian Sucaet, Jonathan Thebault, Rafael Torrecilla, Stefano Tranquillo, Thomas van der Donk, Nicolaas van Uffelen, Jose Vargas Barroso, György Várhelyi, Naelle Verniest, Marie Vilain, Vesa-Ville Virtanen, Nicole Vorderobermeier, Florian Walch, Jonas Willequet,

The authors would also like to thank Christophe Beuve, Dirk Broeders, Alessandro Calza, Siobhán Devin, Vesela Ivanova, Wolfgang Lemke, Aviram Levy, Fernando Monar, Juha Niemela, Sarah Palmer, Imène Rahmouni-Rousseau, René Rollingswier, Evangelos Tabakis, Ralph Weidenfeller, and Chiara Zilioli, for their guidance and valuable discussions and comments.

The views expressed are those of the authors and all errors remain theirs alone.

This paper should not be reported as representing the views of the European Central Bank, the Eurosystem, one or more of its national central banks,

Jana Aubrechtová
European Central Bank, Frankfurt am Main, Germany; email: jana.aubrechtova@ecb.europa.eu

Elke Heinle
European Central Bank, Frankfurt am Main, Germany; email: elke.heinle@ecb.europa.eu

Rafel Moyà Porcel
European Central Bank, Frankfurt am Main, Germany; email: rafel_moya.porcel@ecb.europa.eu

Boris Osorno Torres
European Central Bank, Frankfurt am Main, Germany; email: boris.osorno_torres@ecb.europa.eu

Anamaria Piloiu
European Central Bank, Frankfurt am Main, Germany; email: anamaria.piloiu@ecb.europa.eu

Ricardo Queiroz
European Central Bank, Frankfurt am Main, Germany; email: ricardo.queiroz@ecb.europa.eu

Torsti ('Toto') Silvonen
European Central Bank, Frankfurt am Main, Germany; email: torsti.silvonen@ecb.europa.eu

Lia Vaz Cruz
European Central Bank, Frankfurt am Main, Germany; email: lia.cruz@ecb.europa.eu

Postal address 60640 Frankfurt am Main, Germany
Telephone +49 69 1344 0
Website www.ecb.europa.eu

PDF ISBN 978-92-899-6062-5, ISSN 1725-6534, doi:10.2866/249583, QB-AQ-23-009-EN-N