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Disclosure of climate change risk in credit ratings

An analytical framework to perform a status-quo assessment of the disclosure of climate change risks in rating methodologies and ratings reports by selected credit rating agencies

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Contents

Abstract	2
Non-technical summary	3
1 Introduction	5
1.1 Role of credit assessments by credit rating agencies in Eurosystem monetary policy frameworks	5
1.2 Eurosystem acceptance and due diligence of ECAs	7
1.3 ECB commitment to investigate climate change risk in credit ratings	9
2 Analytical framework for assessing CCR in methodologies and disclosures by ECAs	10
3 Assessment of CCR in ECAI methodologies and disclosure practices	14
3.1 CCR methodologies and definition	14
3.2 CCR assessments models and methods	16
3.3 Data and metrics	18
3.4 Assessment of relevance and materiality of CCR	19
3.5 Impact of CCR on credit rating	21
4 Main findings and areas with room for improvement	23
5 Conclusion	25

Abstract

Climate change can be a source of financial risk. This paper examines how credit rating agencies accepted by the Eurosystem incorporate climate change risk in their credit ratings. It also analyses how rating agencies disclose their assessments of climate change risks to rating users. The paper develops an analytical framework to compare the agencies' definitions, methodologies, assessment models, data usage and disclosure practices. The paper reveals large differences in methodologies and disclosure practices across rating agencies and asset classes. The authors identify three main areas for improvement with respect to climate-related disclosures. These areas concern the level of granularity of definitions of climate change risk, the transparency around models and methods used to estimate the exposure to climate change risk and the disclosure of the magnitude of the impact of material climate change risk on credit ratings.

JEL classification: E52, E58, G24, G32, Q54.

Keywords: climate change, monetary policy, risk management, credit risk, credit rating agencies.

Non-technical summary

When conducting its monetary policy operations, the Eurosystem is exposed to financial risks, including credit risk. Climate change can be a source of financial risk. The paper examines how credit rating agencies accepted by the Eurosystem as part of its Eurosystem Credit Assessment Framework (ECAF) incorporate climate change risk in their credit ratings. It also analyses how rating agencies disclose their assessments of climate change risks to rating users.

The paper develops an analytical framework to perform a systematic and consistent assessment of the methodologies and disclosure by credit rating agencies on climate change risk. The framework is based on 11 criteria that together form a holistic approach to classify the level of disclosure from the perspective of a credit rating user. A high level of disclosure under all criteria would allow a user of credit ratings to fully understand the impact of climate change risk on the creditworthiness assessment performed by the rating agencies and, in turn, to perform better internal due diligence. The 11 criteria of the analytical framework map to five disclosure areas: climate change risk methodologies and definitions, climate change risk assessment models and methods, data and metrics, assessment of relevance and materiality of climate change risk and impact of climate change risk on the credit rating. The paper uses the analytical framework to assess the methodologies and disclosure practices of the four rating agencies accepted by the Eurosystem as External Credit Assessment Institutions (ECAs), based on the practices of ECAs in spring 2022.

The analysis yields a number of horizontal findings. Despite the significant progress achieved in the disclosure around climate change in recent years (and around environmental, social and governance (ESG) considerations more generally), the authors find that the current level of disclosure does not allow a user of credit ratings to draw a definite conclusion on what would have been the credit rating in absence of climate change risk. Transparency on definitions and assessment of climate change risk is at times not granular enough to extract an agency's assessment of a particular climate change factor. For most ECAs and asset classes, the current level of disclosure does not allow a user to conclude on the impact of individual climate change risk subcategories like transition risk and physical risk. The magnitude of the impact of material climate change risk on credit ratings is rarely disclosed, and similarly it is not fully clear how sectoral assessments inform entity-specific climate change risk assessments.

Three areas for possible further transparency are identified by the authors. First, the authors believe that ECAs' credit rating reports and/or press releases could be more transparent about both the definition and the assessment of the individual climate change risk factors within the environmental pillar. ECAs could disclose (i) the individual climate change risk factors considered for the individual entity's creditworthiness assessments, (ii) the link between sectoral and entity-specific climate change risk assessments and (iii) whether the individual climate change risk

factor was assessed as relevant to the credit rating and how it materially affected the creditworthiness of the entity's assessment for each climate change risk factor considered. Second, the authors believe that it would be useful if ECAs could enhance their disclosure on the magnitude of adjustments to the credit rating (or its methodological factors/sub-factors) stemming from material climate change risk. ECAs could present such information (i) in each credit rating decision where an adjustment was applied and, (ii) showing where in the rating methodology such adjustment was applied (as climate change risk is one of the aspects considered in it). Third, the methods and models used for the climate change risk assessments could be further explained. ECAs could elaborate further, either within the environmental, social and governance assessment criteria or within the credit rating methodologies, by describing the models and methods used to assess climate change risk and outlining the data input and sources used.

EU regulators could consider requiring more granular disclosure by rating agencies on climate change risk and their incorporation into credit ratings. Such granular disclosure requirements could be informed by the three areas for improvement identified in this paper. However, it would need to be considered how such improvements could be made compatible with the individual methodological approaches used by the rating agencies to preserve their methodological independence.

1 Introduction

In this paper, the authors analyse how credit rating agencies accepted by the Eurosystem as part of its Eurosystem Credit Assessment Framework (ECAF) incorporate climate change risk in their credit ratings. It also analyses how rating agencies disclose their assessments of climate change risks to rating users.

1.1 Role of credit assessments by credit rating agencies in Eurosystem monetary policy frameworks

When conducting its monetary policy operations, the Eurosystem is exposed to financial risks, including credit risk. In its credit operations, the Eurosystem lends to counterparties against adequate collateral.¹ Liquidity provision to counterparties is subject to counterparty credit risk and, in the event of a counterparty's default, also to the financial risks associated with the collateral provided by the counterparty. In its outright purchase programmes, the Eurosystem is directly exposed to the financial risks stemming from the purchased assets.

The Eurosystem mitigates exposure to credit risk in its credit operations by means of risk control measures embedded in both its counterparty framework and its collateral framework. The counterparty framework ensures that the Eurosystem is lending only to financially sound counterparties, thus reducing the counterparty's default risk. The collateral framework is there to mitigate financial risks stemming from counterparties' collateral upon their default, and consists of eligibility criteria, valuation and risk control measures (e.g. haircuts). The collateral framework's eligibility criteria rely on, *inter alia*, credit assessments by credit assessment systems accepted within the ECAF. The ECAF defines the procedures, rules and techniques to ensure that the Eurosystem requirement of high credit standards for eligible assets is met. For the purpose of the ECAF, the Eurosystem defines credit quality requirements in the form of credit quality steps by establishing threshold values for the probabilities of default (PD) over a one-year horizon for credit assessment systems from three different sources: external credit assessment institutions (ECAs), national central banks' in-house credit assessment systems (ICASs) and counterparties' internal ratings-based (IRB) systems.² ECAs (*i.e.* credit rating agencies) are largely used to assess the creditworthiness of marketable collateral, while ICASs and IRBs are used for non-marketable collateral. The Eurosystem uses all three credit assessment systems to determine the extent to which the collateral complies with the minimum credit quality requirements of the

¹ In line with Article 18.1 of the [Statute of the European System of Central Bank and of the European Central Bank](#).

² In May 2019, the ECB announced its intention to phase out the use of rating tools from its general framework for monetary policy operations owing to cost-benefit considerations (see this [press release](#)). The ECB also indicated that accepted rating tools may continue to be used until further notice in the national central banks' additional credit claims framework.

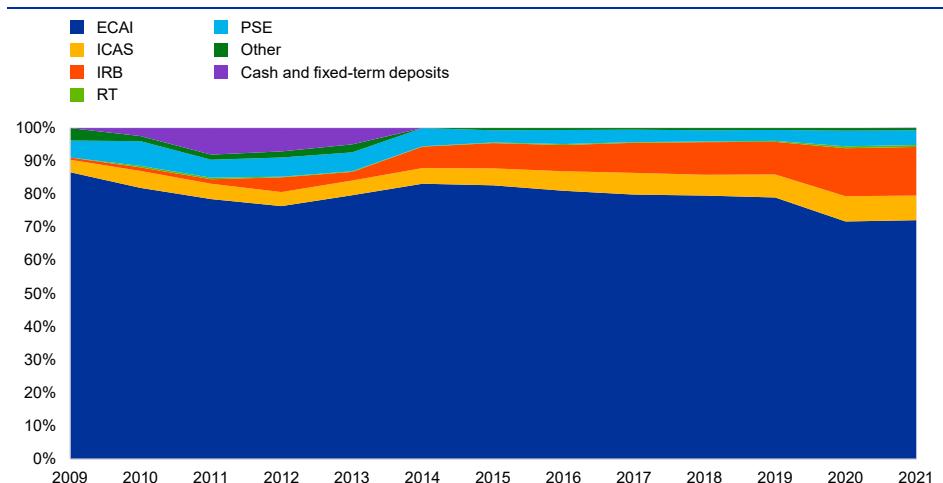
Eurosystem. Risk control measures such as haircuts for marketable assets also build on the information obtained from the three credit assessment systems.

In the Eurosystem's outright purchase programmes, exposure to credit risk is also mitigated via the establishment of appropriate eligibility criteria, including a minimum credit quality threshold. More precisely, the eligibility of an asset as collateral is a necessary but not sufficient condition for its eligibility for purchases within the outright purchase programmes. As a result, credit assessments by the ECAs are also play an important role in the risk control framework for outright purchase programmes.

All in all, as presented in Chart 1, ECAs are the most frequently used credit assessment source for the eligibility verification of collateral and, although their relative importance has slightly declined in recent years, it still remains high. Hence, the Eurosystem, as a user of credit ratings, relies on the credit quality assessments by ECAs and that they adequately capture the financial risks to which it is exposed in both its credit operations and outright purchases over the relevant time horizon.

Chart 1

Historical overview on the use of credit assessment systems by the Eurosystem to verify collateral eligibility



Source: ECB, percentages at the end of each year.

Notes: The chart reflects the overall volume of collateral submitted to the Eurosystem in its general (ECAF) and temporary collateral frameworks. PSE refers to euro area regional government, local authority and public sector entity issuers, debtors or guarantors without an ECAI credit assessment, as laid out in Article 87 of the ECB General Documentation Guideline (ECB/2014/60) or "GD". RT refers to rating tools (see footnote 2). IRB refers to ECAF-approved internal ratings-based systems and ICAS to national central banks' in-house credit assessment systems (as laid out in Article 119 of the GD).

1.2

Eurosystem acceptance and due diligence of ECAs

ECAs are credit rating agencies (CRAs) whose ratings are considered suitable by the Eurosystem for the specific purpose of its monetary policy operations. ECAs' credit assessments, expressed in the form of own individual rating grades and scales, are mapped to the Eurosystem harmonised rating scale (see Table 1). The Eurosystem currently accepts four CRAs as ECAs: DBRS Morningstar, FitchRatings, Moody's and Standard & Poor's. These four rating agencies are the focus of this paper.

Table 1

The Eurosystem's harmonised rating scale

ECAI credit assessment		Credit quality steps				
		1	2	3	4	5
Short-term	DBRS Morningstar		R-1H, R-1M	R-1L, R-2H, R-2M, R2-L, R-3		
	FitchRatings		F1+	F1, F2, F3		
	Moody's		P-1	P-2, P-3		
	Standard and Poor's		A-1+, A-1	A-2, A-3		
Long-term	DBRS Morningstar	AAA/AAH/AA/AAL	AH/A/AL	BBB/BBB/BBBL	BBH	BB
	FitchRatings	AAA/AA+/AA/AA-	A+/A/A-	BBB+/BBB/BBB-	BB+	BB
	Moody's	Aaa/Aa1/Aa2/Aa3	A1/A2/A3	Baa1/Baa2/Baa3	Ba1	Ba2
	Standard and Poor's	AAA/AA+/AA/AA-	A+/A/A-	BBB+/BBB/BBB-	BB+	BB

Source: ECB website.

Any user of credit ratings should regularly conduct due diligence on these ratings so as to not become overly reliant on them, as that could lead to relevant financial risks being ignored. The importance of due diligence on credit ratings is also embedded in the EU Credit Rating Agencies Regulation (CRA Regulation)³ and particularly in its Recital (9): "Over-reliance on credit ratings should be reduced and all the automatic effects deriving from credit ratings should be gradually eliminated. Credit institutions and investment firms should be encouraged to put in place internal procedures in order to make their own credit risk assessment and should encourage investors to perform a due diligence exercise. Within that framework, this Regulation provides that financial institutions should not solely or mechanistically rely on credit ratings. Therefore, those institutions should avoid entering into contracts where they solely or mechanistically rely on credit ratings and should avoid using them in contracts as the only parameter to assess the creditworthiness of investments or to decide whether to invest or divest." In the spirit of the CRA Regulation, it follows that an investor needs to be able to understand which risks underpin a creditworthiness assessment and how certain risks are assessed, measured and reflected in that assessment.

³ See Regulation (EU) No 462/2013 of the European Parliament and of the Council of 21 May 2013 amending Regulation (EC) No 1060/2009 on credit rating agencies.

The Eurosystem, in view of the importance of credit quality information for eligibility and risk control measures, conducts regular due diligence on ECAs – like on all other credit assessment sources – both when accepting a new system and on an ongoing basis. More precisely, to be recognised as an ECAI by the Eurosystem, a credit rating agency must gain acceptance within the ECAF and hence must comply with the general acceptance criteria for ECAs, which include, among other things, (i) being registered by ESMA in accordance with Regulation (EC) No 1060/2009 of the European Parliament and of the Council of 16 September 2009 on credit rating agencies (CRA Regulation), (ii) meeting the operational criteria (e.g. provision of daily rating information to the Eurosystem), and (iii) complying with the minimum coverage requirements in terms of rated assets, rated issuers and rated volume diversified across the eligible asset classes and euro area countries.⁴ For external credit assessment sources, the requirements are designed to ascertain sufficient coverage, market testing and an adequate performance track record of their ratings.

The Eurosystem is equipped with a set of tools to perform due diligence on credit ratings on an ongoing basis. Primarily, this is pursued by means of the ECAF performance monitoring process, which consists of a quantitative statistical analysis aimed at verifying the appropriateness of the mapping of an ECAI's rating scale to the Eurosystem harmonised rating scale, and of a qualitative analysis focused on the ECAI's credit assessment processes and methodologies. Through the ECAF, the Eurosystem aims to address any performance issues that might have been identified for a certain agency as well as request updated information from the agency on specific areas of concern or interest. Further to this, the Eurosystem has enhanced its due diligence on ECAI ratings, rating processes and methodologies, to prevent mechanistic reliance on ECAI ratings on asset classes such as sovereigns and structured finance ratings. As an example, in the asset class of structured finance the Eurosystem has introduced minimum disclosure requirements for asset-backed securities (ABS) and covered bond ratings to ensure that there is sufficient and timely information available to the Eurosystem so that it can understand the credit ratings and ensure their reliability both at issuance, through the new issue reports, and on an ongoing basis, through the surveillance reports. This enhanced due diligence on ABS and covered bond ratings was deemed particularly important by the Eurosystem as these are purchased by the Eurosystem and can also be used as collateral by the issuers acting as counterparties for Eurosystem credit operations. Such enhanced due diligence allows the Eurosystem to act promptly (e.g. by taking discretionary measures) on credit assessment systems that are not considered in line with the ECAF standards, and also on individual assets, as the enhanced due diligence allows users to better understand ratings and thus deviate if they disagree with the credit assessments.

⁴ See Guideline (EU) 2015/510 of the European Central Bank of 19 December 2014 on the implementation of the Eurosystem monetary policy framework (General Documentation Guideline) (ECB/2014/60).

1.3

ECB commitment to investigate climate change risk in credit ratings

Following its Strategy Review of 2020-21, the ECB presented an action plan on how to include climate change considerations in its monetary policy strategy.⁵

This action plan echoes the ECB's commitment to more systematically reflect climate change considerations in its monetary policy framework, on the clear understanding that addressing climate change is a global challenge and a policy priority for the European Union. The detailed roadmap underpinning the ECB action plan on climate change includes, among others, a commitment to investigate whether ECAs have disclosed the necessary information for the Eurosystem to understand how they incorporate climate change risk (CCR) into their credit ratings. Hence, it can be concluded that the Eurosystem, as an investor, pays close attention to climate change risks and as a consequence is set to achieve a granular understanding on how these are incorporated in credit ratings.

Section 2 of this paper develops and explains an analytical framework to perform a status-quo assessment on ECAs' disclosure on CCR into credit ratings and credit rating methodologies. Section 3 contains the status-quo assessment of the four ECAs. In section 4, the authors highlight the main findings of the analysis and identify three concrete areas with room for improvement. Section 5 concludes.

The authors' analysis is based on publications, documents and reports made available by the ECAs to the general public or to subscribers of their services. The analysis has also benefitted from direct exchanges with ECAs. The paper is based on the practices of ECAs in spring 2022. The analysis is restricted to the four ECAs that are accepted by the Eurosystem at time of publication (DBRS Morningstar, FitchRatings, Moody's and Standard & Poor's) and does not allow conclusions to be drawn on other rating agencies. The analytical framework set out in this paper has the sole purpose of supporting the analysis presented in this paper and should not be construed as a position or expectation of the Eurosystem or the ECB. In particular, the paper does not define or imply any acceptance criteria for ECAs under the ECAF. The findings and areas for improvement identified in the paper are solely the views of the authors. Any proposals made in the paper must be weighed against the principle of non-interference in credit rating methodologies and credit ratings.

⁵ See [PRESS RELEASE – ECB presents action plan to include climate change considerations in its monetary policy strategy](#).

2 Analytical framework for assessing CCR in methodologies and disclosures by ECAs

The analytical framework discussed in this section allows for a systematic and consistent assessment of methodologies and disclosure by credit rating agencies on CCR. The framework takes the perspective of a user of credit ratings who wishes to understand all aspects of how CCR is incorporated in credit ratings. Thus, the framework can prove useful for any user to identify areas of mechanistic reliance and inform his or her decision around, for instance, the development of internal procedures targeted at those areas. The framework is based on 11 criteria, which were identified to facilitate a holistic approach that aims to classify disclosure from the perspective of a credit rating user. High disclosure under all 11 criteria would allow a user of credit ratings to fully understand the impact of CCR on the creditworthiness assessments performed by the ECAs. This in turn would allow the rating user to perform a better internal due diligence, as foreseen in Recital (9) of the CRA Regulation. The holistic approach was informed by extensive desk research around existing publications on the topic by the ECAs, as well as a comparison of disclosure practices on credit ratings on a broad level. The 11 criteria of the analytical framework were mapped to five areas of disclosure: I. CCR methodologies and definitions; II. CCR assessment models and methods; III. Data and metrics; IV. Assessment of relevance and materiality of CCR; and V. Impact of CCR on credit rating. The analytical framework and its criteria are presented in Table 2 below.

Table 2:

Analytical review structure for the assessment of CCR disclosure in creditworthiness analyses by ECAs

Area of disclosure	Element of disclosure
I. CCR methodologies and definitions	1 Definition and assessment of individual CCR sub-categories within the E, S and G pillars, including the linkage between sectoral and entity-specific considerations. For example, disclosure on the various CCR sub-categories of risk within the "E" pillar.
II. CCR assessment models and methods	2 Disclosure of models and methods used to assess CCR , in the credit opinion report or in the relevant rating criteria, including whether these are qualitative or quantitative, whether conducted at entity or sector level and their main inputs and key assumptions. 3 Disclosure of the (qualitative or quantitative) results of the CCR assessment models and methods in the credit opinion report for the individual credit rating assessment, making it easier to comprehend the models and their impacts on the credit analysis.
III. Data and metrics	4 Disclosure of data and metrics used as input to assess CCR in the credit opinion report, preferably pertaining to each climate change sub-category to indicate the data connected to material factors, i.e. those that had an influence on the creditworthiness assessment. 5 Disclosure of granularity of the data used, i.e. whether provided for a rated entity within the rating report or – less granular – for each asset class or sector within the same asset class (e.g. corporates). 6 Disclosure of sources of data , including whether the data have been collected externally vs. internally, and of reported vs. modelled origin, if applicable. 7 Disclosure of the time horizon of the data considered for the CCR factors, specifically providing differentiation between past and forecast data.
IV. Assessment of relevance and materiality of CCR	8 Disclosure of the assessment of relevance and materiality of CCR , specifically by indicating how the CCR assessment models and methods flow into the more general credit rating methodologies, i.e. which methodological factors/sub-factors are affected. 9 Disclosure of the main considerations around the decision on relevance and materiality of CCR , such as by providing the main considerations by the rating committee when agreeing on relevance and materiality of CCR for a given credit rating.
V. Impact of CCR on credit rating	10 The magnitude of adjustment in the creditworthiness assessment stemming from material CCR , to understand the overall CCR impact to credit ratings and/or to its methodological factors/sub-factors (in the event that an ECAI does not use a CCR overlay to adjust the credit rating but incorporates this risk into other areas of the methodology). 11 Disclosure of the area within the credit rating methodology where material CCR had an impact to indicate whether this had an effect on the methodological components and sub-components.

The first area of disclosure of the analytical framework targets the CCR methodologies and definitions used by rating agencies, including the sub-categories of CCR considered in their CCR assessments. A high level of transparency in this respect, from the perspective of an investor willing not to mechanistically rely on credit ratings, would consist of a rating agency providing a clear framing of CCR assessments within their broader ESG assessment frameworks. This would include presenting the definition of the individual CCR sub-categories under consideration and explaining how they flow into the assessments of the E, S and/or G pillars.

Rating agencies may sometimes assess the exposure of industries and sectors to CCR, which in turn could serve as input for a creditworthiness assessment of an entity or asset pertaining to those industries or sectors. In such cases, an investor would ideally know the link between sectoral and entity-specific CCR assessments as these would be made available. More generally, it is useful if a rating agency is transparent in its methodology on the linkage between sectoral and entity-specific considerations. This could entail the possibility for an investor to

further reduce their reliance on rating agency's assessments as they would be able to discern how an entity compares with its industry or sector peers in terms of exposure to such risks and as a result, to fully understand the rationale behind the conclusions by rating agencies on the individual CCR assessments, all else being equal.

Second, the analytical framework evaluates the disclosure on the models and methods that agencies use for their CCR assessments. This complements the first area as it "zooms in" from the broad picture of general CCR methodologies to focus on the individual models and methods used. From the perspective of an investor, this information would help to understand why the rating agency has assessed a certain physical or transition CCR as being low or high, e.g. the likelihood of relevant flooding events. High disclosure consists of providing information on (i) the models and methods used by rating agencies to assess CCR and (ii) their (qualitative or quantitative) results. In the credit opinion report or in the relevant rating criteria, transparency on the models and methods used for CCR assessments, including whether these are of a qualitative or quantitative nature and whether these were conducted at the entity or sector level, would allow the user to better understand the rating agency's conclusion on relevance and materiality of CCR factors. A CCR factor is defined as relevant if it is assessed by a rating agency so as to potentially affect creditworthiness. From the perspective of the user of a credit rating, it is hence expected to be assessed by rating agencies within their credit rating review as any other credit risk factor. Material CCR factors are defined instead as the subset of relevant CCR which were assessed as influencing creditworthiness (e.g. by affecting one or more methodological factors). In both cases, the disclosure of the main inputs and key assumptions should be presented by a credit rating agency wishing to ensure that users understand its CCR assessments, given also the fast-evolving pace of CCR research and activities by economic actors. To facilitate the comprehension of the models and methods and their ultimate impacts on the credit analysis (and ultimately on the credit rating) a rating agency could also disclose the results obtained. These could be quantitative as well as qualitative, and the level of detail and granularity could be the entity/issue and/or its sector/industry, depending on the proprietary assessment methodology. Ideally, the level of granularity of the results provided could match the level of granularity of the assessments carried out around CCR, so as to allow an investor to be in a position to recognise how CCR influences an entity/issue with respect to its peers in the same sector or industry and ultimately understand the rating agency's judgement regarding its impact on creditworthiness.

Assessment models and methods rely on a number of metrics and factors, for which a rating agency regularly collects data inputs. Hence, a third area of disclosure of the analytical framework covers CCR data and metrics. The area tackles four elements of disclosure, namely (i) the data and metrics used, (ii) their granularity, (iii) their sources and (iv) the time horizon considered. In a high-disclosure scenario, which would entail no assumptions or uncertainty by an investor when interpreting CCR assessments by rating agencies, credit rating reports could include the data and the metrics used as input to assess CCR, preferably linked to the sub-category of risk for which it was used, for each of the CCR sub-categories

considered for the individual credit analysis. Moreover, it could be made transparent whether such information was available at the entity level or at the sector/industry level and its source of collection (e.g. whether externally provided or internally available). Lastly, the time horizon considered for such information could be disclosed, to allow the user of credit ratings to differentiate between past and forecast data.

Fourth, the analytical framework “zooms in” on the disclosure of the assessment of relevance and materiality of CCR for a given credit rating. This encompasses (i) how the CCR assessment models and methods flow into the more general credit rating methodologies and (ii) the main considerations around the decision on relevance and materiality of CCR for a credit rating. The first aspect targets the way CCR assessments are considered within the credit rating criteria and it is deemed essential to understand the interlinkage between the two. Here, a high level of disclosure could consist of presenting the effect of CCR assessments on a given credit rating, by also explaining its influence on the rating criteria for that specific case. Additionally, it is understood that while credit rating analysts perform CCR assessment following the agency’s proprietary methodology and criteria, the ultimate body taking a decision on credit ratings, i.e. endorsing or overruling the initial analysts’ proposal, is the rating committee. Since the rating committee is responsible for taking a decision on a given credit rating, it does so also on its CCR relevance and materiality. It could happen that CCR impact is deemed not to be adequately captured by the proprietary assessment methodologies. In such cases, the analyst would be expected to apply an adjustment to the methodological factors/sub-factors to reflect such issue, which ultimately would be discussed and decided by the rating committee. An investor willing to identify such cases would be able to do so only if the credit rating report transparently discloses the relevant information.

In the fifth area of disclosure, the analytical framework looks at the impact of CCR on the credit rating. Concretely, a high disclosure in this area could consist of indicating the magnitude of the adjustments to credit ratings (and to its methodological factors/sub-factors) stemming from material CCR. In a way, this element of disclosure links back to all of the previous four areas by complementing them with the information on the extent to which a rating, or the methodological factors flowing into its estimate, was adjusted due to relevant CCR. The user of the credit rating would most easily and unambiguously understand the magnitude of the CCR impact on the credit rating if the publication explicitly stated the number of notches of adjustment applied to the credit rating and/or its methodological factors/sub-factors. This area is the most challenging for a credit rating agency, as CCR might affect multiple methodological factors/sub-factors at the same time, or its impact might currently be assessed based only on a qualitative expert-based methodology. Hence, such level of disclosure might not be realistically achievable by any credit rating agency at the current stage, in view also of the challenges identified more generally in CCR assessments.

3 Assessment of CCR in ECAI methodologies and disclosure practices

This section assesses ECAI methodologies and disclosure practices against the analytical framework. The analysis reflects the situation up to spring 2022 and does not consider envisaged rollouts or extensions by the ECAIs. Each of the following subsections focuses on one of the five areas of disclosure of the analytical framework as introduced in the previous section. As CCR is a subset of ESG risk, it is necessary to first understand how ECAIs approach ESG risk more generally. Hence, for each of the five disclosure areas broader ESG practices are outlined, where applicable, before focusing on CCR specificities.

While there is some variation in the definition of ESG risk, all ECAIs seem to restrict their focus to those ESG risks that might have an influence on the creditworthiness assessments, thus excluding concepts such as the environmental sustainability of a certain entity or asset. Not all rating agencies provide a definition of ESG risk in their ESG assessment criteria. Those that do see ESG risk as relating either to the sustainability of an organisation (e.g. via the influence on its capacity and willingness to meet its financial commitments or via the quality of its governance) or to the organisation's impact on the natural and social environment. Overall, ECAIs deem ESG risk factors as important elements in assessing the creditworthiness of entities and they stress in their ESG assessment methodologies that these considerations have always been informing the credit ratings.

3.1 CCR methodologies and definition

To assess E, S and G risk, ECAIs have established a conceptual framework and have defined a holistic set of sub-categories of risk within these three E, S and G pillars. In most cases, the subcategories are disclosed or at a minimum explained via sector-specific examples. ECAIs use the conceptual framework for all sectors and asset classes globally. The sub-categories of E, S and G risk considered by the ECAIs differ in number across ECAIs (ranging from 13 to 17) and their applicability might vary across sectors and industries, in view of the differences in ECAIs' proprietary credit rating methodologies and ESG assessment criteria.

CCR is considered by ECAIs as part of their assessment of environmental risk. Within the environmental pillar, rating agencies foresee individual sub-categories to assess climate physical risk and climate transition risk. However, based on the current level of disclosure provided in the ESG frameworks, it is not always fully clear whether the two physical and transition risk sub-categories also include considerations other than CCR. Moreover, it seems that in most cases CCR is assessed only within the E pillar, though it is understood that its potential spill-over effects to the governance and/or social responsibility of an entity would be taken into

account if warranted (e.g. if management or mismanagement of climate factors would be considered to have impact on governance and/or social considerations). Rating agencies complement the disclosure of distinct transition and physical CCR sub-categories of risks by also elaborating on the factors applicable and considered within each sub-category. In the case of transition risk, ECAs consider factors such as carbon emissions as well as regulatory aspects, such as the current positioning for the carbon transition, carbon and greenhouse gas (GHG) emission costs, the reputational/societal impact of emissions, regulatory and emission standards and risk of stranded assets. For the physical risk sub-category of the E pillar, rating agencies generally consider factors such as exposure to adverse and/or extreme weather events.

CCR sub-categories and their factors are not universally or evenly applied across all sectors and/or industries, as their influence on the entities/issues might vary. At a minimum, ECAs provide a high-level definition of the CCR sub-categories and, depending on the sector, examples on how these two general CCR sub-categories (for physical and transition risks respectively) could be tailored to the individual credit analysis. Hence, it follows that the high-level CCR sub-categories definition can be mapped to a broader range of individual concerns, which could flow into the creditworthiness assessment, depending on the sector/industry. Then, the rating agencies might also disclose not only the factors considered within each CCR sub-category, but also their applicability to a certain sector/industry. General CCR sub-categories are sometimes mapped to sector/industry-specific CCR factors and metrics that inform the individual creditworthiness assessments, and such mapping is provided at a granular level as it gives access to the full set considered by the rating agency. Alternatively, the list of CCR assessment factors is mapped only to the respective sub-category of CCR (transition or physical) – though it is understood that use of such factors might vary depending on both the sector and the availability of information for a certain entity/asset. In such cases, the credit rating user would not know which of the factors would ultimately inform the individual credit analysis, but only that some factors might do.

CCR assessment methodologies might consist of either qualitative or quantitative assessments or a combination of both. These are used by ECAs to establish the extent to which these risks affect the creditworthiness of an entity/asset. In some cases, sector-specific issues might be the focus of the assessment of CCR credit relevance and materiality. As a result, each of the individual sub-categories of CCR risks is assigned a score (which could also be given to the individual CCR factors); these scores might then be aggregated into the three E, S and G pillar scores and reflected in the overall ESG score. Alternatively, the E, S and G risks might be assessed separately, based on an initial broad sector-based evaluation. In such cases, sector assessments flow into the assessment of E, S and G risks for a certain entity/asset, leading to the issuance of three scores – one for each of the three ESG pillars – and an overall ESG score, which can be interpreted as the overall ESG relevance and materiality to a credit rating. Lastly, ESG risk that may materially influence the future creditworthiness of an entity/asset could be assessed via one or more credit rating components within their methodological assessments.

Based on the status quo assessment of ECAI disclosure against the first area of the analytical framework, this paper identifies two general types of disclosure practices, which are in turn mapped to a higher and lower level of reliance by an investor on their CCR definition and assessments. More details are presented in Table 3.

Table 3:

Status quo assessment of ECAI disclosure against area I of the analytical framework

Level of disclosure	Low	High
1. Definition and assessment of individual CCR sub-categories	High-level examples of the sub-categories of CCR that could flow into creditworthiness assessments are disclosed. With respect to the assessment, these are provided at the ESG level and in the form of an explanatory text.	Individual CCR sub-categories of risks and specific CCR factors considered for a certain sector/industry are disclosed. Relevance assessments are provided at the granular level of CCR sub-categories, of E considerations and of ESG risks, including the relevance assessment of the respective sector.

3.2

CCR assessments models and methods

ECAIs have issued dedicated ESG assessment criteria (see section 3.1) that explain, at a broad level, how this risk informs their creditworthiness assessments, with the aim of providing more transparency to the market. The general credit rating methodologies have not been amended to account for CCR more explicitly and/or to allow for a more structured disclosure of their impact on the different building blocks of the credit rating methodology, as rating agencies consider them flexible enough to factor in ESG considerations.

ESG risk and CCR are not assessed on a stand-alone basis within the rating methodology but within the already existing analytical categories of the rating methodologies. CCR assessment is thus integrated into the different categories and blocks of the rating methodologies. As a result, in some cases the CCR assessment might result in a qualitative overlay applied to the methodological rating and/or its factor/sub-factors. In the majority of cases, CCR impact is incorporated in not only a qualitative but also a quantitative manner, depending on the availability and applicability of quantitative CCR assessment models/methodologies. Similar to other risk drivers, CCR is assessed heterogeneously by the ECAIs as part of their credit rating methodologies, as they factor in different aspects with different weights on the final rating. In some cases, it is understood that the E pillar score is consolidated by means of a qualitative assessment with the S and G scores to yield an overall ESG score. As a result, the assessment of CCR might be balanced and possibly cancelled out by other considerations. In other cases, and in the absence of ESG scores, it is rather difficult to be able to trace the CCR implications on the overall rating result and to conclude on the type of assessment carried out. All ECAIs justify their approach with the claim that CCR can affect multiple credit risk factors that inform the credit rating and thus it is difficult to isolate them into a stand-alone credit risk factor within the credit rating methodologies.

ESG and specifically CCR are assessed by credit rating agencies also at sector or industry level. These assessments lay out the exposure of a certain industry or sector to ESG and CCR, as well as the exposure of individual entities within the industry or sector to these risks, and serve as input for the entities' creditworthiness assessments. ECAs started issuing many sectoral ESG reports and commentaries, although the level of comprehensiveness might vary substantially across rating agencies. In some cases, commentaries outline the ESG factors applicable to a specific sector, reflecting in a qualitative manner (via explanatory text) on how the relevant risk factors of the E, S and G pillars could affect credit ratings of issuers and assets in those industries. In other instances, ECAs provide heat maps for industries, sectors and regions, at the level of detail of the E, S and G pillars. With respect to the E pillar, the heat map report might include qualitative and quantitative evaluations of exposure to the climate change sub-categories and outline the credit materiality of environmental risks by assigning an environmental score. Materiality is thereby defined as identifying visible pressure on the credit profiles of a broad set of issuers from the respective sector at the time of the assessment or in the foreseeable future. The heat map takes into account both exposure and ability to mitigate environmental risks. The disclosure of each sector's environmental scores is accompanied by an explanatory text which references relevant metrics. Alternatively, the heat map reports might indicate rather the relevance of individual ESG concerns to credit ratings, while ex post information on the relevance and materiality to credit ratings stemming from credit analysis is provided via a separate interactive tool. The scoring presented in the heat maps seems to be based on a qualitative approach, though this could not be fully verified. In some instances, sectoral commentaries are available to outline either the ESG risk factors applicable to a specific sector – and thus their potential effect on credit ratings – or the exposure of a sector/industry to ESG credit-relevant factors. This information might be provided at the granular level of the sub-categories of risks within each pillar, reflecting the assessments carried out in that sector/industry with respect to ESG (and its components). However, the reflections included seem to be based on qualitative assessments, and the authors were not able to fully understand the models or methods used to identify the CCR at the sector/industry level. With respect to the overall interpretation of the information provided at sector/industry level by ECAs, this might be understood as ex post communication on the output of the credit rating assessment with respect to either the relevance or the materiality (or both) of ESG/CCR risks or, alternatively, as exposure to these risks and hence indication on potential relevance or materiality, or both. The extent to which sectoral assessments inform entity-specific assessments around CCR is not always disclosed by ECAs in a way that would allow the rating user to fully grasp the link to the individual entity-specific CCR assessments, or draw comparisons within the same sector for the same rating agency. In such cases, the reader of a heat map or sectoral commentary might not be able to connect it with the CCR assessment provided in a credit rating report.

The models used for analyses around climate change, which are then employed by ECAs to assess their relevance and materiality, are also not fully disclosed. The available methodological documentation does not necessarily elaborate with any high level of detail on the analyses that are performed to assess physical and/or transition risk. Consequently, assumptions and/or models are not

fully known either. Notwithstanding, most ECAs claim that they do perform internal analyses to support the CCR assessments (e.g. scenario analyses). In one case and for transition risk only, sector-specific methodology to assess transition risk is made available, though limited currently in coverage to those sectors considered to be the most affected by transition risk. In addition, with the current level of disclosure it is not always possible to identify which methodological factors are (simultaneously) affected by CCR, as this information is not entirely disclosed, at least not at the level of detail of the individual credit rating report. Also, CCR might be assessed differently depending on the sector and on the credit rating methodology for that sector, though once again the current level of disclosure does not allow a user to fully grasp these cases. ECAs justify their approach by stating that a more granular level of disclosure would potentially lead to overstating the effect of CCR considerations on the rating and run the risk of double counting.

Overall, the rating user can identify to some extent the methodology employed by ECAs to assess CCR, though not in a level of detail and completeness that fully prevents mechanistic reliance on its influence on the individual credit rating decision. The current level of disclosure practices on transparency in area II of the analytical framework is as follows:

Table 4:
Status quo assessment of ECAI disclosure against area II of the analytical framework

Level of disclosure	Low	High
2. Disclosure of models and methods used to assess CCR	High-level information on the CCR assessment models is provided, which hampers the understanding of, at a minimum, how CCR assessment is carried out at a sectoral/industry and entity/issue level, and how these assessments are linked.	Disclosure of models and methods at entity/issue and sector level, at a minimum level of granularity that allows the investor to have an intuition over their linkage.
3. Disclosure of (qualitative or quantitative) results	Highly aggregated assessment results are disclosed.	Final results are disclosed for both the entity and the sector.

3.3 Data and metrics

ECAs do not currently disclose the data used to assess CCR at a granular level for each individual credit rating. This may be down to either the reliability and consistency of the quantitative data or the fact that rating agencies are still in the process of building up the necessary databases of quantitative CCR metrics. Also, to the extent that ECAs use the quantitative data available, the time horizon of the data input employed is not always disclosed (e.g. in numbers of years of data, singling out these that are forecasts), and nor it is fully clear which data input is qualitative and which is quantitative. Overall, it is sometimes difficult for a rating user to know which data sources are used to assess one or other CCR consideration, i.e. there is no matching between the metric assessed and the input data source (see Table 5). Hence, the level of reliance of a rating user on the credit rating can be regarded as relatively high in this area of the analytical framework.

Table 5:

Status quo assessment of ECAI disclosure against area III of the analytical framework

Level of disclosure	Low	High
4. Disclosure of data and metrics	Not disclosed	Data and metrics considered are outlined at the sector level
5. Disclosure of granularity	Not disclosed	Explanatory text outlines the level of data and metrics considered
6. Disclosure of sources	Not disclosed	Explanatory text outlines the sources to the degree possible
7. Disclosure of the time horizon	Not disclosed	Explanatory text outlines the time (period) to the degree possible

3.4

Assessment of relevance and materiality of CCR

The user of a credit rating would typically take a look at the credit rating report to find information on the CCR sub-categories of risk (and their CCR factors) that were deemed relevant for a credit analysis, meaning those that were considered by the rating agencies as potentially having an influence on the analysis (and its outcome).⁶ ECAs display information on relevance heterogeneously, with a level of granularity and detail that varies across sectors and, within the same sector, across publications. At a minimum, all rating agencies include an explanatory paragraph or text clarifying in broad terms whether ESG risks were deemed relevant to a credit rating. The heterogeneity in the level of transparency around relevance assessments is also due to the recent introduction by ECAs of newer disclosure formats and layouts, more detailed in comparison with the older publications. These are often released by ECAs following credit rating reviews and hence their availability is conditional on the frequency of the rating reviews. This more granular type of disclosure is expected to replace over time the explanatory text in all credit rating reports. Sometimes more detailed information is disclosed only when there is a change in the credit assessment and not for intermediate reviews. Assessments of relevance (and materiality) of ESG risks might be disclosed via checklists, allowing users to see the individual sub-categories of CCR that were assessed as relevant and/or material to the credit rating. Alternatively, it may be communicated in credit reports by means of an overall ESG assessment score. These ESG scores might indicate the ESG effect on the credit rating, reflecting as such the relevance (and materiality) of individual ESG considerations. Alternatively, they might be interpreted only as the materiality of ESG considerations, in which case it would be harder to understand the relevance assessment of a rating agency without complementary information. With respect to the relevance assessment of the

⁶ It is recalled that ECAs need to comply with the ESMA Guidelines on ESG disclosure, which became applicable in March 2019. The Guidelines provide that rating agencies need to indicate it in the accompanying press release, or report, when ESG factors were a key driver behind a change to rating or rating outlook. They should also identify the key factors that were considered to be ESG factors (as per the rating agencies' definition) and explain why these were material to the credit rating or rating outlook. They should also include a link to the website or a document in the publication that explains how ESG factors are considered within methodologies or associated models.

individual considerations within the broader ESG category, this might either be displayed at the level of granularity of the individual pillar, i.e. presenting the relevance assessment of E, S and G considerations to a credit rating, or at the level of the three pillar sub-categories, or only at the overall ESG level.

ECAIs disclose to a certain extent whether relevant CCR considerations were also material to a credit rating or not. In most cases the rating agencies provide qualitative statements and/or scores accompanied by explanatory text, although this does not always provide users of credit ratings with information on the magnitude of the impact that CCR, or its individual sub-categories (i.e. physical and transition), had on the credit ratings and/or its methodological factors/sub-factors. If CCR were deemed to materially affect the creditworthiness assessment, disclosure by rating agencies ensures at least that the user of a credit rating understands it, though without always being able to deduce what the credit rating would have been in the absence of CCR. Besides, it is difficult to grasp whether a particular relevant CCR may have been considered in the creditworthiness assessment but then discarded as being not material, as there is often no disclosure on this. For the most part, the ECAIs explain in a paragraph – consisting at a minimum of a one-sentence statement – whether “at least one” ESG factor was material to the rating decision. This textual disclosure does not allow the user to trace back the materiality to the individual CCR sub-categories. Overall, it is difficult to draw a clear conclusion on ECAI disclosure of CCR materiality as there are only few cases in which these risks materially affected the credit rating.

To be able to fully understand the assessment of CCR relevance and materiality for a given credit rating, it is necessary to understand how CCR assessment methodologies inform the more general credit rating criteria and, ultimately, which considerations shape the decision on how they influence the credit rating. ECAIs have issued general ESG assessment methodologies (see section 3.1) that present how CCR assessment might be carried out, based on dedicated methods and models (see section 3.2) and data inputs (see section 3.3). It is understood that such CCR assessments flow into the more general credit rating methodologies and that they can trigger adjustments to the general factors and/or sub-factors considered for a given entity or asset. However, the rating agencies currently explain only in a high-level manner how the assessment of relevance and materiality of CCR for a given entity or asset flows into the broader rating criteria. For example, it could be useful for the user to have a complete list of the methodological factors that might be affected by CCR assessments. Similarly, in the event that the rating committee decides to apply an adjustment to the credit rating proposal of the credit analysts due to ESG or, in the specific, CCR considerations, it could be useful for the reader of a credit rating opinion to be informed about this. Overall, the user of a credit rating would not be able to fully understand, based on the current level of disclosure, what the credit rating would have been in the absence of CCR impact, or the methodological factors/sub-factors that are influenced by CCR assessments (see Table 6). It is, however, understood that such level of granularity in the disclosure might not be achievable for the ECAIs, as also indicated in section 2 of the paper.

Table 6:

Status quo assessment of ECAI disclosure against area IV of the analytical framework

Level of disclosure	Low	High
8. Disclosure of the assessment of relevance and materiality of CCR	Not disclosed	The description of how CCR assessment models and methods flow into the more general credit rating methodologies is disclosed only at a high-level
9. Disclosure of the main consideration around the decision on relevance and materiality	Not disclosed	The main considerations of the rating committee when taking a decision on CCR relevance and materiality for a credit rating are currently disclosed

3.5

Impact of CCR on credit rating

With the current level of disclosure, it is often challenging to understand how the influence of CCR on the credit rating is accounted for in the rating methodology, i.e. to understand in which area of the credit rating methodology the CCR had an impact. This stems from the fact that it might be difficult for ECAsIs to disentangle the CCR assessments from the overall credit analysis, as research and analyses on this topic are currently in progress. As mentioned, CCR materiality to credit ratings is always displayed by ECAsIs, though in a heterogeneous manner. It could be provided with a high level of granularity by means of a scoring, where the scores present the impact in terms of relevance and materiality of CCR sub-categories on the credit rating. Alternatively, scores and accompanying text might reflect the ESG assessments at pillar level, but not at the level of CCR sub-categories. For this type of disclosure, it is more challenging for a user of the credit ratings to disentangle the CCR contributions to the E pillar score, and even more challenging to understand their effects on the credit rating, if these are expressed in an aggregated way (at the ESG level).

Overall, the magnitude of the adjustment stemming from material CCR to credit ratings is currently either not disclosed or only somewhat disclosed.

None of the ECAsIs seem to disclose the area within the credit rating methodology where relevant CCR had an impact. It is expected that, where CCR was a key driver behind a rating change or a rating outlook change, the disclosure by ECAsIs would allow the user to understand this, though no examples were found by the authors to verify such expectation. In all cases where CCR was not a key driver behind a change in the credit rating or its outlook, but did nevertheless serve as input for a credit analysis and have an impact on that analysis, the current degree of transparency prevents the user from understanding the magnitude of such impact and how it was determined. Credit rating agencies argue, in this respect, that the disentanglement of the impact of CCR sub-categories is very challenging if not impossible at the moment. This is a fair point, though it is still important in the view of the authors to highlight this circumstance, as an investor would not be able to avoid any reliance on the agencies' CCR assessments, given that CCR impact relies heavily on qualitative assessments, can affect multiple factors of the rating criteria

and is ultimately contingent on the discussions that take place at the rating committees.

The status quo assessment against area V of the analytical framework is as follows:

Table 7:

Status quo assessment of ECAI disclosure against area V of the analytical framework

Level of disclosure	Low	High
10. The magnitude of adjustment stemming from material CCR to credit ratings	An explanatory text indicates that CCR had an impact on the credit rating	A qualitative text describes the magnitude of the impact of ESG risks to credit ratings or its methodological factors/sub-factors but without providing a quantification
11. Disclosure of the area within the credit rating methodology where material CCR had an impact	Not currently disclosed	

4 Main findings and areas with room for improvement

The comparative analysis conducted by the authors results in a number of horizontal findings around ECAs' ESG methodologies and disclosure practices.

The analysis shows that ECAs have made significant progress with their disclosures and methodologies around ESG in recent years and that further progress is being made at time of publication. The level of disclosure around CCR differs across ECAs and, for each ECAI, across asset classes. The disclosure on the definition and assessment of CCR is not always granular enough to extract an agency's assessment of a particular climate change sub-factor. For most ECAs and asset classes, the authors believe that the current level of disclosure does not allow a user to draw definite conclusions on the materiality of individual CCR sub-categories like transition risk and physical risk. The magnitude of impact of material CCR on credit ratings is rarely disclosed, and similarly it is not fully clear how sectoral assessments inform entity-specific CCR assessments. In addition, ECAs do not always explain the models and data used for such CCR assessments in sufficient detail.

Mindful of ESMA Guidelines and of the efforts already taken by ECAs to move towards enhanced disclosure in comparison with other credit assessment systems, the authors have identified three areas for possible further transparency and disclosure.

However, not all proposed improvements are applicable to all agencies and improvements would need to be implemented in a way that is compatible with the individual methodological approaches used by each of the rating agencies.

First, the authors believe that ECAs could be more transparent in a credit rating report and/or press release about both the definition and the assessment of the individual CCR factors within the E pillar. ECAs could disclose (i) the individual CCR factors within the E pillar considered for the individual entity's creditworthiness assessments; (ii) the link between sectoral and entity-specific CCR assessments; and (iii) whether the individual CCR factor was assessed as relevant to the credit rating and how materially it affected the creditworthiness of the entity's assessment, for each CCR factor considered. Elements (i) and (iii) would add granularity to the current level of disclosure, which is often only at the level of the E pillar, i.e. without going to the level of detail of the individual CCR factors considered for the specific creditworthiness assessment. In relation to element (ii), while it is somewhat known that sectoral assessments inform entity-specific CCR analysis, the linkage between the two is not fully disclosed. This would be especially important for a rating user to understand for which entities/assets ESG risk assessments fully rely on an assessment at sector or industry level because more granular information is not available. The implementation of further transparency around these three elements would not be entirely consistent with ECAI transparency on other aspects flowing into their credit assessments. Disclosing (i)

would be comparable to current practices regarding the other individual factors flowing into the credit assessment. The disclosure of (iii) – and potentially (ii) – could go beyond the status quo of explaining which methodological factors were informing the individual credit assessment, as it would require ECAs to outline not only how individual factors are assessed but also how these affected other methodological factors. However, transparency on (iii) and (ii) is considered useful to understand ECAs assessments and judgement around CCR, thus avoiding mechanistic reliance among investors. Additionally, since (ii) and (iii) are expected to be well known to ECAs, as any other element of their credit rating methodologies, the additional challenge for them would lie in the operational process supporting an enhanced disclosure.

Second, the authors believe that it would be useful if ECAs could enhance their disclosure on the magnitude of adjustments to the credit rating (or its methodological factors/sub-factors) stemming from material CCR. ECAs could present such information (i) in each credit rating decision where an adjustment was applied and, (ii) showing where in the rating methodology such adjustment was applied (as CCR is one of the aspects considered in it). At present, while ECAs tend to disclose whether ESG risk is material to a credit rating, this is usually reported in a qualitative and descriptive manner, often without disentangling the materiality stemming exclusively from CCR (if applicable). Also, the size of the adjustments applied to an entity's creditworthiness assessment – in terms of notches – is not known. Disclosing (i) and (ii) would be somewhat in line with current practices. ECAs currently present the assessment of each methodological factor in credit rating decisions, thus disclosing their contribution to the final credit rating, and also partially elaborate on any adjustments applied and explain where these took place (i.e. in which methodological factor or sub-factor). As a result, (i) and (ii) would go to some extent beyond the present level of transparency, as they would entail homogeneity of disclosure across sectors and rating decisions for all adjustments driven by CCR. The authors understand that there are methodological limitations for rating agencies in identifying the quantitative impact of climate change on ratings.

Third, the methods and models used for the CCR assessments could be further explained. ECAs could elaborate further, either within the ESG assessment criteria or within the credit rating methodologies, by describing the models and methods used to assess CCR, outlining the data input and sources used. This would allow users to unequivocally deduce the significance and consideration of CCR assessment methods and models within credit rating assessments. It is noted that this area could not be achieved by those rating agencies only relying on qualitative CCR assessments. Additionally, this aspect is recognised as a challenge for all credit rating agencies in view of the existing caveats regarding climate change data.

5 Conclusion

The Eurosystem has pledged to investigate whether ECAs have disclosed the necessary information for the Eurosystem to understand how ECAs incorporate CCR into their credit ratings. The authors of this paper develop an analytical framework based on 11 criteria to analyse the level of disclosure of rating agencies from the perspective of a user of credit ratings. An assessment of the status quo on CCR disclosure against the 11 criteria of the analytical framework reveals that ECAs have already made progress in disclosures and methodologies around climate change risk over recent years. The authors find that the level of disclosure around CCR differs across ECAs and, for each ECAI, across asset classes. The authors identify three areas for possible further transparency and disclosure, namely (i) transparency about definition and assessment of CCR; (ii) disclosure of the magnitude of adjustment to the credit rating stemming from material CCR; and (iii) an explanation of the methods and models used for CCR assessments. ECAs are gradually and continuously enhancing their methodologies and disclosure practices and further developments can be expected in the near future. EU regulators could consider requiring more granular disclosure by rating agencies on climate change risks and their incorporation in credit ratings. Such granular disclosure requirements could be informed by the three areas for improvement identified in this paper. However, it would need to be considered how such improvements could be made compatible with the individual methodological approaches used by the rating agencies so as to preserve their methodological independence.

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