



THE ROLE OF ENVIRONMENTAL RISKS IN THE PRUDENTIAL FRAMEWORK

DISCUSSION PAPER

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Legend



Overview of the framework



Analysis



Preliminary conclusions and discussion points



Credit risk



Market risk



Operational risk



Concentration risk



Investment firms

Abbreviations

BCBS	Basel Committee on Banking Supervision	K-AUM	K-factor related to assets under management and ongoing advice
BI	Business Indicator	K-CMG	K-factor related to total margins required by a clearing member
BIC	Business Indicator Component	K-CMH	K-factor related to client money held
BPF	Brown penalising factor	K-COH	K-factor related to client orders handled
CCF	Credit conversion factor	K-CON	K-factor related to concentration risk in large exposures
CCR	Counterparty credit risk	K-DTF	K-factor related to operational risk from daily trading flow
CET 1	Common Equity Tier 1	K-TDC	K-factor related to exposure to default of trading counterparties
CRA	Credit rating agency	LC	Loss component
CRD	Capital Requirements Directive	LEX	Large exposures
CRM	Credit risk mitigation	LGD	Loss given default
CRR	Capital Requirements Regulation	M	Maturity
CSRD	Corporate Sustainability Reporting Directive	MiFID	Markets in Financial Instruments Directive
CVA	Credit valuation adjustment	NGFS	Network for Central Banks and Supervisors for Greening the Financial System
DP	Discussion Paper	PD	Probability of default
EBA	European Banking Authority	PMC	Permanent Minimum Capital
ECAI	External Credit Assessment Institution	RDS	Reference data set
EEA	European Energy Agency	RtC	Risk-to-Client
ESG	Environmental, social and governance	RtM	Risk-to-Market
ESRB	European Systemic Risk Board	RtF	Risk-to-Firm
EU	European Union	RWA	Risk-weighted assets
FCP	Funded credit protection	RWEA	Risk-weighted exposure amounts
FOR	Fixed overheads requirement	SA	Standardised Approach
FRTB	Fundamental Review of the Trading Book	SREP	Supervisory Review and Evaluation Process
GSF	Green supporting factor	UNEP FI	United Nations Environment Programme Finance Initiative
IFD	Investment Firms Directive	UFCP	Unfunded credit protection
IFR	Investment Firms Regulation	VaR	Value-at-risk
IFRS	International Financial Reporting Standards		
ILM	Internal Loss Multiplier		
IMF	International Monetary Fund		
IRB	Internal Ratings Based		
KPI	Key performance indicator		

1. Responding to this Discussion Paper

The European Banking Authority (EBA) invites comments on all proposals put forward in this paper and in particular on the specific questions stated in the boxes throughout the paper (and as summarised in Annex 5 of this paper).

Comments are most helpful if they:

- respond to the question stated;
- indicate the specific point to which a comment relates;
- contain a clear rationale;
- provide evidence to support the view expressed;
- describe any alternatives the EBA should consider.

Submission of responses

To submit your comments, click on the 'send your comments' button on the consultation page by 2 August 2022. Please note that comments submitted after this deadline or submitted via other means may not be processed.

Publication of responses

Please clearly indicate in the consultation form if you wish your comments to be disclosed or to be treated as confidential. A confidential response may be requested from us in accordance with the EBA's rules on public access to documents. We may consult you if we receive such a request. Any decision we make not to disclose the response is reviewable by the EBA's Board of Appeal and the European Ombudsman.

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Disclaimer

The views expressed in this Discussion Paper are preliminary and will not bind in any way the EBA in the future development of the draft final report. They are aimed at eliciting discussion and gathering the stakeholders' opinion at an early stage of the process.



2. Executive Summary

Reasons for publication

Risks stemming from climate change and broader environmental issues are changing the risk picture for the financial sector and will become even more prominent going forward. This raises the question as to whether the prudential framework can sufficiently account for these new risk drivers.

This Discussion Paper (DP) initiates the discussion on the appropriateness of the current prudential framework to address environmental risk drivers and considers the potential justification for a dedicated prudential treatment of exposures substantially associated with environmental and/or social objectives and those subject to environmental and/or social impacts. It is issued in relation to the mandates in Article 501c of Regulation (EU) No 575/2013, i.e. the Capital Requirements Regulation (CRR), and in Article 34 of Regulation (EU) 2019/2033, i.e. the Investment Firms Regulation (IFR), for the EBA to provide reports on the topic.

This DP provides an initial assessment of how the framework interacts with environmental risks and poses questions on whether adaptations are required to effectively address such risks. The analysis is focused on exposures related to assets and activities associated with environmental objectives/impacts. Those related to social objectives/impacts will be considered in the next steps.

Contents

Pillar 1 own funds requirements are only part of the overall prudential framework. These requirements are not intended to cover all risks faced by credit institutions and investment firms. They are complemented by provision requirements based on loss estimates embedded in the accounting framework as well as institution-specific additional Pillar 2 own funds requirements and macroprudential capital buffers.

When considering the introduction of a dedicated treatment of environmental risk drivers, one first needs to evaluate the extent to which these are already reflected in the prudential framework. To the extent that environmental risks are already captured in the prudential framework, any further adjustment should be designed in a way that avoids double counting, to ensure the framework's consistency and robustness. In light of the expectation that environmental risks will induce higher and potentially more extreme losses than in the past, questions also arise as to whether the framework can capture these risks appropriately and whether capital requirements might be underestimated. The DP therefore provides an overview of the existing elements of the

prudential framework and how they interact with environmental risks.

The analysis takes a risk-based approach to ensure that prudential requirements reflect underlying risks and ultimately support institutions' resilience to such risks. Its starting point is that prudential requirements should reflect the risk profiles of exposures and should not be used for other policy purposes. It should be clear that other policy instruments outside the prudential framework have a more important role to play in the transition to a sustainable economy and will have an impact on risks in the financial sector. The paper therefore seeks evidence on whether environmental characteristics of exposures correlate with the level of risk, and in particular with the credit quality of exposures.

The analysis demonstrates that the Pillar 1 framework already includes mechanisms that allow the inclusion of new types of risk drivers such as those related to environmental risks. These include internal models, external credit ratings and valuations of collateral and financial instruments. Furthermore, targeted enhancements or clarifications within the framework are explored to explicitly address environmental risks. In addition, the paper considers the forward-looking nature of environmental risks and puts up for discussion the use of forward-looking methodologies.

As an alternative to recognising environmental risks within the structure of the framework, the potential introduction of specific risk-weighted adjustment factors is considered. The initial analysis indicates that targeted amendments to the existing prudential requirements would address these risks more accurately than such adjustment factors, given the various challenges associated with their design and implementation.

Finally, while there is potential for the existing framework to capture environmental risks, the way in which such risks translate into financial risks over time remains an area of significant uncertainty. Fundamental questions remain as to whether risks to the overall system are likely to grow due to increased environmental risks or if it is more likely that environmental risks imply the need for a reassessment of the risk profiles of firms and sectors in a way that is predominantly neutral to the overall capital requirements. Whereas the latter implies the need for reallocation of capital requirements between sectors, the former may challenge existing assumptions around the optimum capital level for the European banking system.

The EBA encourages further developments in the use of the mechanisms in the Pillar 1 framework to appropriately capture environmental risks. It is also important

that relevant and reliable information on environmental risks and their impact on financial losses of institutions is collected going forward. This will allow not only for improved risk management practices, but also for a more appropriate calibration of prudential capital requirements.

Next steps

Stakeholders are invited to provide their feedback on the analysis in this DP, which will be used by the EBA in finalising its report on the topic. Responses should be provided through a form available on the EBA website by 2 August 2022 at the latest.



3. Background and rationale

1. The impact of climate change, the needed transition to a sustainable economy, and other environmental challenges are bound to transform our society. Environmental risks are expected with a high degree of certainty to become more prominent going forward. The result will be an increase in the frequency and severity of physical risks, as well as more apparent transition risks following from environmental policy implementation, technological developments and changing consumer preferences. This could lead to an increase of risks to financial stability as a whole, with the rise of unpredictable events in the short and medium to long term. The specific characteristics of environmental risks and their direct and indirect consequences, including in particular their multidimensional, non-linear, uncertain and forward-looking nature, could lead to an underestimation of these risks, a phenomenon that will likely accelerate over time.
2. These features of environmental risks are changing the risk picture for the financial sector, which has an important role to play not only in terms of financing the transition, but also due to its role in managing risks. At the same time, environmental and particularly climate-related risk drivers have been identified as sources of financial risks ⁽¹⁾ that can materialise through traditional categories of prudential risk. This raises the question as to whether specific adaptations of the prudential framework are required to account for environmental risk drivers.
3. The EBA is strongly committed to provide adequate supervisory frameworks and tools which can support the European banking sector in the objectives of transitioning to a more sustainable economy and mitigating risks stemming from climate change and broader environmental, social and governance (ESG) factors. This transition should take place in a manner which continues to ensure the existence of a robust banking sector and overall financial stability.
4. The EBA is mandated under Article 501c of Regulation (EU) No 575/2013, i.e. the Capital Requirements Regulation (CRR), and Article 34 of Regulation (EU) 2019/2033, i.e. the Investment Firms Regulation (IFR), to assess whether a dedicated prudential treatment of exposures related to assets, including securitisations, or activities (CRR), and of assets exposed to activities (IFR) associated substantially with environmental and/or social objectives would be justified. The European Commission's proposal for the revisions of the CRR (CRR3 proposal) adds that the EBA should also assess the prudential treatment of exposures subject to environmental and/or social impacts. Therefore, in accordance with the proposed revisions to this mandate, the scope of this Discussion Paper (DP) extends also to exposures subject to environmental and/or social impacts.
5. This DP provides an initial analysis of the framework and identifies areas for further work in this respect. It aims at initiating the discussion and gathering a wide range of views and inputs to allow a comprehensive consideration of these complex issues. The feedback received will be used together with the findings of the Commission High-Level Expert Group on Sustainable Finance as well as the ESRB's publications ⁽²⁾ as input to the EBA's work on the reports requested under the CRR and IFR.
6. This DP builds on previous EBA publications including in particular the EBA Action Plan on sustainable finance ⁽³⁾. In line with that plan, the first phase of the EBA work in this area focused on ensuring sound governance, strategy and risk management of ESG risks and putting in place disclosures of key metrics. This DP is part of the subsequent work, where the EBA is to provide an assessment of the need for potential changes in the Pillar 1 prudential treatment. The EBA intends to provide its final report on the prudential treatment for credit institutions and investment firms jointly, given their interlinkages and the need to conduct consistent analyses ⁽⁴⁾.
7. Prudential requirements were identified as an important element in the European Commission's 2018 action plan 'Financing sustainable growth' under action 8 ('Incorporating sustainability in prudential requirements'). The new strategy announced by the Commission in July 2021, 'Financing the transition', and the Commission's proposed revisions of the CRR ⁽⁵⁾ confirm the mandate given to the EBA and ask the EBA to accelerate its work in this area.
8. This DP focuses on exposures related to assets and activities substantially associated with environmental objectives/impacts, while more limited consideration is given to social objectives/impacts. Following a risk-based perspective, the analysis specifically considers both exposures associated with environmental objectives and environmentally harmful as-

⁽¹⁾ As recognised by NGFS (2018), 'First Progress Report' [\(link\)](#) and further outlined in subsequent publications. See also EBA (2021), 'Report on Management and Supervision of ESG Risks' [\(link\)](#).

⁽²⁾ ECB/ESRB (2021), 'Climate-related risks and financial stability' [\(link\)](#) and (2020), 'Positively green: measuring climate change risks to financial stability' [\(link\)](#).

⁽³⁾ See the EBA's Action Plan [\(link\)](#).

⁽⁴⁾ As already indicated in the EBA's roadmap on investment firms. See EBA roadmap [\(link\)](#).

⁽⁵⁾ See proposal [\(link\)](#).

sets and activities, which are subject to increasing transition risks and physical risks.

9. Despite efforts towards defining social factors at the European level, references to definitions of social factors are generally more difficult to identify than for environmental factors. Against this background, there is less availability of quantitative analysis on social factors, which correlates with the gradual introduction of the EU Taxonomy which focuses on environmental factors in a first stage. The EBA acknowledges that social objectives and impacts have interlinkages with environmental risks. The continuous deterioration of environmental conditions implies heightened social risks, such as when physical events affect populations, exacerbate migration and social and political unrest, or when technological or regulatory changes addressing environmental risks have an impact on labour markets in (non-green) industries. Social risks can also be driven by changes in policies and market sentiment linked to the social transformation towards a more equitable society, for example in relation to labour rights or human rights more broadly. Such social risks may impact institutions' counterparties and drive associated financial risks ⁽⁶⁾. Exposures related to assets and activities associated with social objectives/impacts, as well as their potential correlation with environmental risks, will be further considered in the next phase of the analysis. The EBA welcomes inputs on possible methodologies and available evidence which could inform its future assessment on that aspect.
10. The prudential framework in the EU, which is based on the Basel framework, ensures the sound capitalisation of banks and fosters prudent risk management, in order to avoid or mitigate the disruptions to the financial system that could impact the entire economy. While the overall design of the prudential framework has remained unchanged, it has been adjusted over time to reflect the emergence of new risks. Some flexibility that allows for incorporating new risks is already built in, for instance in the Internal Ratings Based (IRB) Approach for credit risk, where banks are allowed to include new risk drivers in the setting of capital requirements.
11. Given the comprehensive nature of the topic, it should be clarified that this DP does not cover all aspects. In particular:
 - a. This DP does not aim to introduce new definitions of activities substantially contributing to the achievement of environmental objectives ('green' activities) or environmentally harmful activities, which is deemed out of the scope of the mandate entrusted to the EBA. Instead, available definitions and categories from the EU regulatory framework or the literature are used, all the while recognising that these definitions and categories need to be further developed. The EBA is mindful that the EU classification system defining environmentally sustainable economic activities, i.e. the EU Taxonomy ⁽⁷⁾, is of particular importance. At this point, however, data available on the performance of economic activities aligned with the Taxonomy are limited and the process of classifying institutions' exposures into Taxonomy criteria is ongoing ⁽⁸⁾. The development and changes in the classification system should be reflected in the assessments of the justification for changes in the prudential treatment of exposures, as they progress. This includes considerations that may arise if the EU Taxonomy is expanded to cover environmentally (significantly) harmful economic activities.
 - b. While this DP focuses on the analysis of Pillar 1 own funds requirements, it is acknowledged that these requirements cannot cover all risks faced by credit institutions and investment firms. In the prudential framework Pillar 1 requirements are complemented by Pillar 2 additional own funds requirements, which are based on the institution-specific analysis performed by competent authorities. This way, Pillar 2 allows appropriate recognition of different business models and specific risks. Therefore, in the context of the analysis of the idiosyncratic aspects of environmental risks, even if they are not or not fully covered by Pillar 1 own funds requirements, they could still be addressed through Pillar 2. The application of additional own funds requirements is, however, not within the scope of this DP, which is focused exclusively on Pillar 1. It should be kept in mind that any systemic aspects of environmental risks would need to be addressed by the macroprudential framework.
 - c. The EBA has separately published considerations for ESG bonds for own funds and eligible liabilities instruments ⁽⁹⁾, providing an overview of the identified risks as well as policy observations and recommendations on how the clauses used for ESG issuances and the eligibility criteria for own funds and eligible liabilities instruments interact, with the ultimate aim of identifying best practices or practices/clauses that should be avoided. The guidance provided by the EBA is not meant to address potential compliance issues of ESG bonds with ESG requirements. It is aimed at

⁽⁶⁾ For more details on how social factors can lead to financial risks for institutions, please see section 2.4 of EBA (2021), 'Report on Management and Supervision of ESG Risks' [\[link\]](#).

⁽⁷⁾ 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 [\[link\]](#).

⁽⁸⁾ As per Article 8 of the Taxonomy Regulation, financial institutions subject to the Non-Financial Reporting Directive will disclose how and to what extent their activities are aligned with the Taxonomy. They should accordingly gradually be in a position to identify and monitor their Taxonomy-aligned exposures.

⁽⁹⁾ See section 4 of EBA (2020), 'Report on the Monitoring of Additional Tier 1 (AT1) Instruments of European Union (EU) institutions - Update' [\[link\]](#).

clarifying the extent to which some provisions included in ESG bonds may raise regulatory concerns in the context of the eligibility criteria for own funds and liabilities instruments. In addition, the objective of the guidance is not to prevent or promote ESG issuances for capital/loss absorbency purposes, but to clarify the interaction between ESG features and regulatory eligibility criteria. Finally, the EBA has announced that it will continue to monitor the developments of sustainability-linked bonds and possible related KPIs if issued for regulatory purposes.

- d. The EBA, in parallel to the ESRB and the ECB, has received a Call for Advice on the review of the EU macroprudential framework. The three authorities were required to submit their analysis by 31 March 2022, covering whether macroprudential tools are appropriate and sufficient to prevent and mitigate financial stability risks arising from the changing nature of systemic risks, including due to climate change. Consequently, purely macroprudential tools are not covered in this DP.
- e. Accounting values are the basis for applying prudential rules to derive risk-weighted exposure amounts. In principle, the Pillar 1 prudential requirements are designed to only cover the so-called 'unexpected losses', which may arise under specific circumstances, while the 'expected losses' would normally be covered by accounting provisions and impairment write-offs. These are already deducted from CET 1 own funds before the application of prudential rules to derive minimum own funds requirements. Due to the complementary nature of and close interrelations between the prudential and accounting frameworks, it is important to consider to what extent environmental risks are reflected in accounting exposure values, and specifically whether the accounting framework ensures adequate and timely recognition and consistent measurement of these risks – among other things through impairments, provisions and write-downs – which may in turn affect the regulatory capital and the valuation of exposures. Hence, it is also important to monitor the evolution of the accounting rules and the sustainability reporting framework ^[10] in order to guarantee that the discussions around environmental issues are properly considered. In this regard, the EBA has recently commented to the IASB, in relation to the post-implementation review of IFRS 9 (classification and measurement phase), that guidance on the accounting treatment of instruments with ESG features and/or KPI targets would be useful, and that the topic

of ESG instruments would deserve a broader discussion while not being limited to the accounting classification of financial assets ^[11]. An analysis on these issues is included in Annex 3 for information.

12. While this DP has an EU focus, environmental risks are a global challenge. At the international level, the BCBS is investigating the extent to which climate-related financial risks can be adequately incorporated in the existing Basel framework, identifying potential gaps and considering possible enhancements to the framework. This assessment is being conducted across the regulatory, supervisory and disclosure dimensions. Considering the need to ensure consistency of the EBA's deliverables and recommendations with international standards and principles, this DP presents the EBA's initial considerations, while any BCBS findings or policy recommendations will also be considered when preparing the final EBA report. The EBA and its members will continue to participate in and monitor BCBS initiatives with a view to ensuring synergies.
13. Considering the above, this DP initiates the assessment of the need and justification of potential changes to the prudential Pillar 1 framework, focusing on those elements of the framework which are most likely to be affected by environmental risk drivers and hence where the analysis is the most relevant. Chapter 4 covers the principles, premises and challenges that underlie the analysis in this DP. Chapters 5 (Credit risk), 6 (Market risk), 7 (Operational risk) and 8 (Concentration risk) cover the different elements of the prudential framework and how they interact with environmental risks. Chapter 9 sets out how the prudential framework for investment firms interacts with environmental risk drivers. Chapter 10 concludes the DP by setting out final observations and concluding remarks.
14. The analysis presented in Chapters 5 to 7 is conducted on the basis of the expected future rather than the current prudential framework, taking into account the final Basel III standards and the CRR3 proposal. This proposal is still in the legislative process; hence a degree of uncertainty remains about the implementation of this framework in the EU.
15. Whilst containing some key messages, this DP is explorative in nature and draws no final conclusions. Specific questions are included across the DP on which input from stakeholders is particularly welcome. General views on aspects covered by this DP on which no specific questions are posed are also welcome.
16. The feedback received on this DP will be the basis for further analysis towards the publication of a final report. In this final report, the EBA will pursue the analysis set out in this DP, taking into account feedback received as well as insights gained from available data and policy developments at the EU

^[10] See, for example, the IFRS Foundation's Trustees Consultation Paper on Sustainability Reporting (for expanding the scope of IFRS to address sustainability issues) and the EC Renewed Sustainable Finance Strategy (for collaboration with EFRAG, ESMA and the IASB to assess whether IFRS appropriately integrate sustainability risk).

^[11] See paragraphs 13 and 14 of EBA (2022), letter to the IASB ([link](#)).

and international levels, before formulating its policy recommendations. The EBA's focus will remain on how to best ensure a robust risk-based prudential

treatment of exposures associated with environmental and/or social objectives / subject to environmental and/or social impacts.

Question for public consultation:

Q1: In your view, how could exposures associated with social objectives and/or subject to social impacts, which are outside the scope of this DP, be considered in the prudential framework? Please provide available evidence and methodologies which could inform further assessment in that regard.



4. Principles, premises and challenges

17. Chapters 5 to 9 cover the risk-specific dimensions to addressing environmental risk drivers in the prudential framework. A number of cross-cutting aspects and principles are being taken by the EBA as given for its work. These are explained in more detail in this chapter.

4.1. Risk-based approach

18. The EBA is mandated to assess whether a dedicated prudential treatment would be justified. The justification for changes in the prudential treatment of exposures associated with environmental objectives / subject to environmental impacts depends on the approach taken and its underlying objective. Different approaches can be distinguished in this regard ^[12] and the EBA has, in line with its overall approach to the prudential framework, chosen a risk-based approach.

19. The risk-based approach seeks to ensure that prudential requirements reflect underlying risks and ultimately support institutions' resilience to all risks. This includes, from a microprudential perspective, making sure that prudential requirements reflect the underlying risk profiles of exposures associated with environmental objectives / subject to environmental impacts, hence supporting the safety and soundness of individual financial institutions. From a macroprudential perspective, this would mean safeguarding financial stability, by ensuring the robustness of the banking and investment firm sectors, with a view to mitigating potential systemic vulnerabilities of the financial sector as a whole stemming from environmental risks.

20. The focus of the EBA is therefore on exploring whether there are specificities in the risks ('risk differential') of some exposures, e.g. green exposures or exposures to environmentally harmful activities, as such risk differential would be the key element to consider for adjusting the prudential treatment. Such an approach ensures that prudential regulation remains geared towards the safety and soundness of institutions. While the potential revision of the prudential framework may consist in amending the existing framework or introducing new, innovative tools, abiding by a risk-based approach is paramount for the credibility of the prudential framework, for the resilience of financial institutions and for financial

stability. Furthermore, by ensuring that environmental risks are well reflected in banks' capital positions, a risk-based approach contributes to the robustness of the banking sector, which is a general precondition for the stable provision of finance, including to finance the transition towards a more sustainable economy.

21. The analysis presented in this paper is not aimed at incentivising institutions to redirect capital and using prudential regulation to increase demand for green assets or penalise environmentally harmful assets. While this could be the effect of the adopted risk-based approach, to the extent that the environmental profile of certain assets coincides with the underlying risks, the EBA is of the view that a dedicated prudential treatment which would explicitly aim at redirecting lending could have the following undesirable or unintended consequences, which could have an impact on financial stability:

- a. It could undermine the credibility, suitability and efficiency of prudential tools, hindering the ability of these rules to meet their primary objectives of ensuring safety, soundness and financial stability. From a risk-based perspective, it is important to safeguard the reliability of capital requirements as indicators of risk for institutions. Deviations from international prudential standards could also weaken them and tilt the level playing field for international banking.
- b. Directly pushing capital towards green activities could also cause financing risks to build up at counterparties that are still economically uncompetitive and lack credible long-term strategies ^[13].
- c. If limitations were imposed on the financing of environmentally harmful sectors this could have unintended consequences such as impeding the financing of transition activities that would help these sectors to become more sustainable. This is particularly relevant if there are no credible low-carbon alternatives. In addition, such limitations could have unintended negative social consequences if they are implemented without sufficient time for adjustments.

22. One fundamental challenge of environmental risks is the issue of so-called 'negative externalities', where the harmful effect of buying a carbon-intensive product is not felt by the buyer, but by the society at large.

^[12] See, for example, Institute for Climate Economics (I4CE) [2020], 'Integrating Climate-related Risks into Banks' Capital Requirements' ([link](#)); Institute of International Finance [2021], 'Prudential pathways' ([link](#)). Likewise, the 2 Degrees Investing Initiative (2DII) distinguishes three categories: a risk management approach, a financial stability approach and a sustainability approach.

^[13] As mentioned in NGFS [2020], *Guide for supervisors*, 'a "brown" company that has sufficient capital, a strong management, and a credible long-term strategy might manage the transition well, while green companies can face transition risks, too, for instance because their business model might be based on new technologies that have yet to be proven at scale'.

This is a challenge not only for the prudential framework, as investment decisions may not consider the harmful effects on society as a whole, i.e. the pricing may not reflect the environmentally driven social costs. To rectify the issue, a greater recognition of environmental factors and risk drivers is needed in the pricing and capital allocation mechanisms.

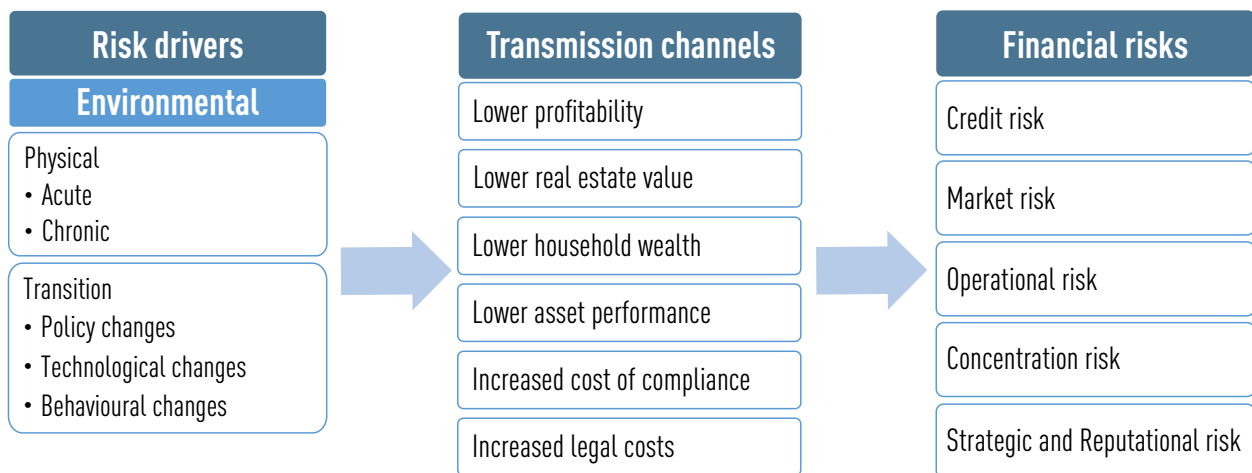
- 23. An important concept in this regard is that of 'double materiality'. From a risk-based perspective, environmental risks for institutions can be defined as the negative materialisation of environmental factors through their counterparties or invested assets. From the outside-in perspective (financial materiality), the economic and financial activities of counterparties or invested assets can be negatively impacted by environmental factors, affecting the value of such activities. From the inside-out perspective (environmental materiality), the economic and financial activities of counterparties and invested assets can have a negative impact on environmental factors, which could in turn become financially material when this impact affects the value of these activities. A risk-sensitive prudential framework should thus take both of these perspectives into account. In the analysis presented in this paper both dimensions of 'double materiality' of the counterparty or invested asset are taken into account to the extent that they affect the credit, market and operational risks of the institutions ⁽¹⁴⁾.
- 24. The primary responsibility and most effective tools for dealing with environmental-risk-related externalities lie within the remit of political authorities. However, while acknowledging that prudential regulation should not serve as a substitute for other

needed public policies, a risk-sensitive prudential framework can contribute to facilitating the recognition of the impacts of environmental risk drivers on financial risks, hence ensuring that these risks are adequately capitalised and are contributing to a more reflective pricing. This does not undermine the need for, and in fact to be truly effective depends on, broader corrective policies addressing environmental negative externalities.

4.2. Transmission channels: physical and transition risks as drivers of traditional risk categories

- 25. As already highlighted in the EBA Report on Management and Supervision of ESG Risks ⁽¹⁵⁾, environmental factors may have a positive or negative impact on the financial performance or solvency of an entity, sovereign or individual. Institutions can be impacted by environmental factors through their core business activities, i.e. through their exposures to counterparties and through their invested assets. Environmental risks should thus be understood as the negative financial impacts stemming from environmental factors on institutions' counterparties or invested assets. These risks include, but are not limited to, climate-related risks. Their main risk drivers are physical and transition risks. Environmental risks should not be considered as an entirely new category of financial risks, but rather as risk drivers that translate through a range of channels into the traditional categories of financial risks, as depicted in Figure 1 below.

Figure 1: How environmental risks may affect financial risks through different (non-exhaustive) transmission channels



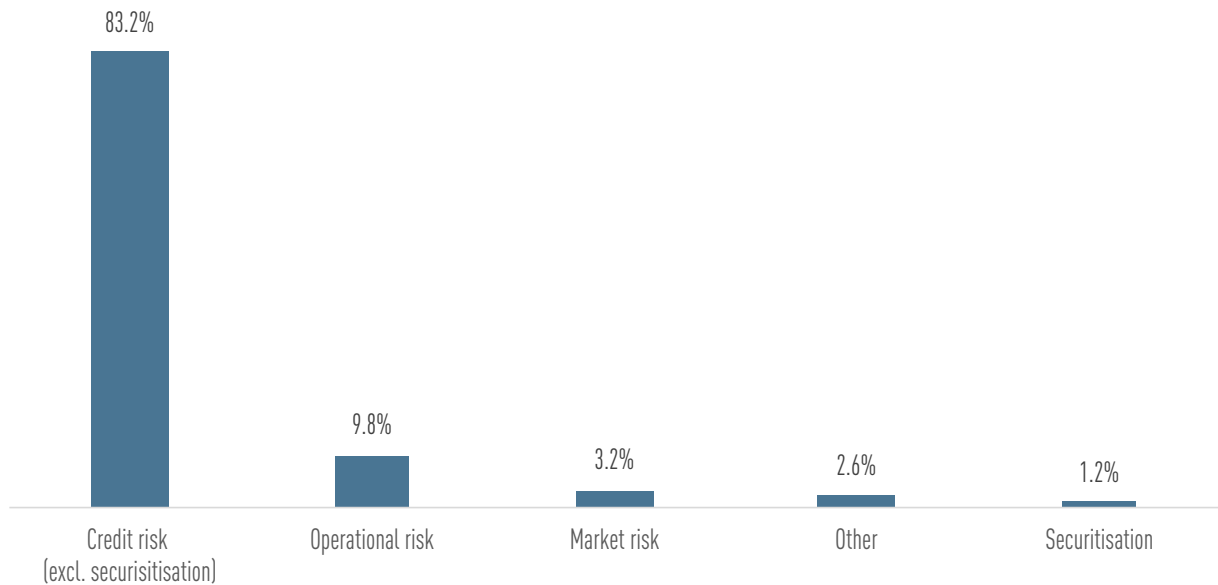
⁽¹⁴⁾ The understanding in this DP of the double materiality concept and how it applies to the definition of ESG risks for institutions and investment firms is based on the understanding of this concept and its application as outlined in EBA (2021), 'Report on Management and Supervision of ESG Risks' ([link](#)).

⁽¹⁵⁾ See report ([link](#)).

26. When looking at the activities of credit institutions and the impacts of environmental risk drivers, credit risk is particularly relevant, specifically in the context of an analysis of risk differentials. Given that the majority of own funds requirements of credit institutions cover credit risk, credit risk is analysed in detail in this DP. The table in Annex 1 outlines in more detail the transmission channels of physical and transition

risks materialising as credit risk for a selected group of exposure classes, namely sovereigns, corporates, retail and exposures secured by immovable properties. Additionally, market risk, operational risk and concentration risk are addressed in this DP, given that these risk categories are also highly likely to be affected by environmental risk drivers and are therefore relevant to analyse.

Figure 2: RWA composition (EU/EEA) by risk type (credit institutions only)



Source: EBA Risk Dashboard September 2021

27. Some aspects of the prudential framework are not covered in depth in this DP. This includes the securitisation framework, although the considerations presented in Chapter 5 by construction also indirectly apply to the prudential treatment of securitisations^[16]. The EBA has also assessed whether liquidity and leverage ratios should be included in the scope of the DP. Liquidity ratios are based on short-term indicators which aim to measure the resilience of the liquidity position by setting, through standardised approaches, a proper buffer of securities. Given that environmental risks are expected to materialise over time horizons longer than the ones in scope for these ratios and that these ratios do not allow for banks' risk-based assessments to capture environmental risk factors to derive liquidity requirements^[17], liquidity ratios are expected to remain mostly unaffected by environmental risks and have a limited role in addressing such risks. Also, the leverage ratio, as a non-risk-based measure which functions as a backstop, does not specifically interact with environ-

mental risks. These parts of the framework are thus not covered in this DP, although feedback or inputs from stakeholders on these aspects are also welcome as part of this public consultation.

28. Finally, the manner in which environmental risks translate into financial risks over time remains an area of much uncertainty, due in part to the likely non-linearity of environmental risks. This will have implications for the extent to which the Pillar 1 framework allows automatic capture of such risk, absent legislative amendment. On the one hand, a gradual build-up of environmental risks may allow for indirect channels in the Pillar 1 framework to partially translate such risk into higher financial risk over time, e.g. through increased expected losses, higher probability of default (PD) or loss given default (LGD), or lower valuations. However, an environmental shock or greater inherent volatility in the estimation of such parameters may imply further increases of unexpected losses and therefore risks to bank capital.

29. More broadly, there remain fundamental questions over whether risks to the overall system are likely to grow as a result of increasing environmental risks, or if environmental risks instead imply the reprofiling of risk between sustainable and unsustainable firms and

[16] On the non-prudential aspects of green securitisation, see EBA report (link).

[17] Factors applied to inflows and outflows are based on the categories of assets, liabilities and off-balance-sheet exposures, as opposed to reflecting the risk assessment of each individual exposure.

sectors in a way that is predominantly neutral to the overall system. Whereas the latter may imply the reallocation of capital requirements between sectors, the former may challenge existing assumptions around the optimum capital level for the European banking

system as a whole. While it is beyond the scope of this paper to definitively opine on such a point, the paper provides an opportune moment to begin consideration of the potential future implications for bank capital arising from environmental risks.

Questions for public consultation:

Q2: Do you agree with the EBA's assessment that liquidity and leverage ratios will not be significantly affected by environmental risks? If not, how should these parts of the framework be included in the analysis?

Q3: In your view, are environmental risks likely to be predominantly about reallocation of risk between sectors, or does it imply an increase in overall risk to the system as a whole? What are the implications for optimum levels of bank capital?

Q4: Should the 'double materiality' concept be incorporated within the prudential framework? If so, how could it be addressed?

4.3. Challenges regarding the nature and measurement of ESG risks

30. This section describes the main challenges that should be considered when assessing ESG risks and their incorporation into regulatory metrics. These challenges relate to:

- a. the identification and measurement of ESG risk drivers to properly discriminate the exposures subject to higher ESG risks (Section 4.3.1);
- b. the measurement of the transmission channels between ESG risk factors and actual losses, due to the lack of observations on the materialisation of the risk in historic databases (Section 4.3.2); and
- c. challenges in the nature of ESG risks, i.e. the time horizon of environmental risks and the associated need to take a long-term, forward-looking perspective, compared to the time horizon embedded in prudential rules, also given the uncertainties on timing and magnitude (non-linearity) of future events (Section 4.3.3).

31. Where relevant, the above challenges are referred to throughout the rest of the DP.

4.3.1. Data availability and other challenges in the measurement of ESG risks

32. The existence of data gaps and other challenges in the context of identifying and measuring ESG risks is well known and has been elaborated on in many reports ^[18]. Challenges exist both on the side of institutions in identifying ESG risks for counterparties, and on the side of regulators and supervisors

in assessing and mapping ESG risks across institutions.

33. The challenges in the measurement of ESG risks which have been identified to date, including by institutions themselves, are summarised in the list below. This list cannot be considered exhaustive, but rather as identifying a frequently observed selection of challenges. For a more detailed overview of these challenges, please refer to Annex 2.

- a. Lack of relevant, high-quality and granular data: availability and accessibility of reliable and consistent environmental data (e.g. scientific data, environmental characteristics of banks' exposures) are often lacking. This poses substantial challenges to risk classification and risk analysis. The various current disclosure initiatives are, however, expected to increase, going forward, both the availability and the quality of environmental data.
- b. Lack of a common, standardised and complete classification system: some definitions of what is green / environmentally harmful / other (e.g. neutral) exist, but these remain fragmented across exposure types as well as across jurisdictions. Also, they are often binary, which is less helpful for the purpose of risk differentiation, considering there can be different 'shades' of green and environmentally harmful, which can affect the level of associated risk. Moreover, corporates currently pursuing environmentally harmful activities may have credible plans and the financial and organisational resources to manage the transition and deliver green products/services in the future. Such corporates have a different risk profile from those which are expected to continue their environmentally harmful activities ^[19].

^[18] See, for example, NGFS (2020), A Status Report on Financial Institutions' Experiences from working with green, non green and brown financial assets and a potential risk differential ([link](#)).

^[19] This is also outlined in ECB (2021), 'Working Paper: The low-carbon transition, climate commitments and firm credit risk' ([link](#)).

- c. Pricing barrier to access high-quality data in the field of physical risks and translation into financial impacts: estimation of the probability of future materialisation of physical risks faces different challenges from estimation of transition risks ^[20]. There is ample scientific evidence on the backward-looking component, especially in the historical databases of the insurance sector. To adequately assess physical risks, granular data on the mitigating measures at collateral level, insurance and financial soundness of the counterparty are needed, whereas most proxies currently used for assessments rely on country-level estimations. These data are very pricey and the translation of these risks into financial impacts is difficult given the uncertainty on the financial implications of acute physical events.
 - d. Challenges in the use of ESG ratings or scores: ESG ratings and scores can suffer from poor quality, a limited and varying scope, and lack of transparency on underlying methodologies used ^[21]. As part of the aim to improve the reliability, comparability and transparency of ESG ratings, ESMA has launched a Call for Evidence on ESG ratings ^[22]. The Call for Evidence seeks to develop a picture of the size, structure, resourcing, revenues and product offerings of the different ESG rating providers operating in the EU.
 - e. Complexity of analysis: the granularity of classifications for what can be considered green and environmentally harmful may vary across different exposure classes (at a minimum, one should look at green, environmentally harmful and neutral). Complexity is further increased by the difficulties around defining common forward-looking indicators.
34. In turn, the above issues result in challenges in assessing the level of financial risk associated with environmentally harmful activities.
 35. The EU Taxonomy, which presents a common classification system of environmentally sustainable economic activities, as well as disclosure and reporting requirements such as the Corporate Sustainability Reporting Directive (CSRD) and the Pillar 3 ESG disclosure requirements published by the EBA in January 2022 ^[23], will provide important steps towards the availability of more consistent data going forward ^[24]. Whilst disclosure can provide a good source of information for supervisors, collection of disclosed data across credit institutions can be cumbersome. Inclusion of ESG information in supervisory reporting, as included in the CRR3 proposal, will provide a valuable basis for meaningful analysis in this area.

Question for public consultation:

Q5: How can availability of meaningful and comparable data be improved? What specific actions are you planning or would you suggest to achieve this improvement?

4.3.2. Challenges in the estimation of losses due to environmental risk factors

36. The prudential framework is calibrated on the basis of historical data, including market prices, and policy judgement complementing the empirical results. Historical data, as well as current market prices, are unlikely to fully reflect environmental risks. The available data series do not include sufficient or comparable information about losses due to climate-related events or transition trends. This lack of observations raises difficulties in identifying relevant risk drivers as well as uncertainties on transforming these risk drivers into financial risk indicators. Given the lack of explicit risk drivers in the prudential framework dedicated to addressing environmental risks, it is uncertain whether and how the impact of environmental risk factors is currently reflected in capital levels.
37. Although some studies of specific aspects have already been performed (see Section 5.1), the lack of reliable data on environmental risks presents a challenge to the application of the Pillar 1 framework and makes the calibration of any capital requirements to prudently account for environmental risks very challenging.
38. While there is in most cases a level of prudence in the overall framework for capital requirements, a question can be raised as to whether historical data are sufficient for the measurement of future, potentially unprecedented, changes driven by the peculiar features of environmental risks. Environmental risk drivers will become more prominent going forward, with an increase in the frequency and severity of physical risks and more acute transition risks, with potential tipping points and non-linear

^[20] Transition risks can be quantified in many ways (e.g. emissions, changes in demand due to policies, etc.), the choices of which are likely more speculative and heterogeneous in nature.

^[21] See Chapter 3.2.3 of EBA (2021), 'Report on Management and Supervision of ESG Risks' ([link](#)).

^[22] See ESMA (2022), Call for Evidence on ESG ratings ([link](#)).

^[23] See EBA (2022), 'ITS on Pillar 3 Disclosures on ESG Risks' ([link](#)).

^[24] Although it will take some time until all the information will become available, and the ITS apply to large and listed companies only.

- effects ^[25]. The data stemming from stressed or downturn periods in financial markets already observed during the past macroeconomic or financial crises may not be appropriate to capture environmental risks.
39. From the Pillar 1 perspective, the use of historical data represents a structural feature of the prudential framework. However, due to the structural shifts created by environmental risks, the dependency on historical data and historical relationships between risk factors may by construction not adequately capture environmental risk dynamics. In most cases, existing estimation techniques cannot sufficiently measure forward-looking financial impacts, driven by (more frequent and extreme) physical events or by (sudden) transition tipping points, making the translation of environmental risks into financial risks and potential losses more difficult. To measure those impacts, the use of other data, based on scientific evidence about climate change and broader environmental degradation, would raise challenges in terms of the availability, collection and methodologies needed to determine the most adequate calibration of prudential requirements for environmental risks.
 40. Nevertheless, while financial institutions operate in constantly changing circumstances, the prudential framework is designed in a way that it allows these changes to be captured and is intended to remain stable over time. It can be noticed that while environmental risk factors are certainly prominent and have specific features such as their non-cyclical and incremental nature, they are not the only new risk drivers institutions are currently facing. The adaptive nature of the prudential framework to some extent allows these changes to be captured through the inputs to the prescribed calculation of own funds requirements. Therefore, this raises a need to clarify which aspects of the Pillar 1 framework will capture changes driven by environmental risks over time, as risks materialise and data evolve, and what further amendments may be needed to ensure a prudent calibration. It is also necessary to analyse the already existing tools which allow capture of the forward-looking perspective, keeping in mind that such tools exist not only in the Pillar 1 own funds requirements, but also in other parts of the prudential framework.
 41. The characteristics of environmental risks (i.e. forward-looking, long-term, uncertain timing and magnitude) also raise challenges that question the ability and/or relevance of the Pillar 1 framework to fully capture such risks. One fundamental challenge is the potential mismatch between the time horizon of the Pillar 1 framework and the long-term time horizon over which environmental risks are likely to fully materialise.
 42. Although there is uncertainty as to the exact time horizons that should be applied to environmental risks, some acute physical and transition risks will possibly materialise in short to medium time horizons (e.g. one to a few years), while most chronic physical risks will fully materialise over a relatively long time horizon, spanning several decades and exceeding typical credit cycles. At the same time, the Pillar 1 framework has not been designed to align with the manifestation of long-term environmental risks, but rather to capture the possible extent of cyclical economic fluctuations. In addition, environmental risks are also characterised by the uncertainty on their exact manifestation and magnitude, with a potential to create structural shifts (non-linearity) and to cause losses over an extended period of time. As a consequence, it is unclear if the business cycle concepts and assumptions that are used in estimating risk weights and capital requirements are sufficient to capture the emergence of these risks. It could therefore imply that the existing Pillar 1 framework may not be able or well founded to capture the full loss potential stemming from environmental risks, especially over long time horizons.
 43. However, in the context of these challenges linked to the nature of environmental risks, conceptual issues should also be considered with regard to the relevant time horizon which should be reflected in the prudential framework. For this purpose, the role of the Pillar 1 own funds requirements should be recalled, considering that other parts of the regulatory and prudential framework can also contribute to addressing the forward-looking and long-term aspects of environmental risks ^[26]. In particular, the following main principles of the current prudential framework should be recalled:
 - a. The losses that the institution expects to bear due to the materialisation of known risks are not covered by the own funds requirements. Instead, it is mostly the role of the accounting framework to capture the expected losses through provisions, impairments, write-downs and appropriate valuation of financial assets. Under the Internal Ratings Based (IRB) Approach for credit risk, expected losses are estimated based on the IRB risk parameters. In all cases, however, the expected losses, including the losses expected over long-term forward-looking horizons, are directly deducted from CET 1 own funds. The own funds requirements are intended to address only the potential additional, unexpected losses,

4.3.3. Challenges due to the nature of environmental risks

41. The characteristics of environmental risks (i.e. forward-looking, long-term, uncertain timing and magnitude) also raise challenges that question the ability and/or relevance of the Pillar 1 framework to fully capture such risks. One fundamental challenge is the potential mismatch between the time horizon of the Pillar 1 framework and the long-term time horizon over which environmental risks are likely to fully materialise.

^[25] See, for example, the IPCCs 6th assessment report, Working Group I contribution: The Physical Science Basis ([link](#)).

^[26] In addition to accounting rules (see Annex), see the EBA (2021), 'Report on Management and Supervision of ESG Risks' highlighting e.g. the findings that institutions should adopt a longer than usual time horizon, inter alia by extending the time horizon for strategic planning to at least 10 years, at least qualitatively, and by testing their resilience to different scenarios, and that ESG risks will need to be proportionately incorporated into the supervisory business model analysis, including by evaluating whether credit institutions sufficiently test the long-term resilience of their business models. Another key element in light of the need to integrate a dynamic forward-looking perspective is the ongoing development of tools, methodologies and expectations related to climate and environment-related stress-testing and scenario analysis, both by institutions and supervisory authorities.

- which may materialise with a certain confidence level, for instance due to changes in economic and/or market conditions.
- b. Under the IRB Approach the PD of an obligor is estimated in a one-year time horizon based on long-run average one-year default rates. However, the risk differentiating factors may be defined in a way that reflects longer-term characteristics of the obligor. The LGD does not have a limited time horizon but extends to the full lifetime of the exposure or the full length of the collection process. The credit conversion factor (CCF) estimates potential additional drawdowns on the exposure before it defaults, under the assumption that it experiences a default event within one year. In addition, both the LGD and CCF are estimated in a way that reflects the situation of an economic downturn.
 - c. The own funds requirements are mostly related to existing exposures of institutions and do not reflect possible changes in the balance sheets of institutions, which would result from specific business strategies or risk mitigating actions. The relevance of the long time horizon within the Pillar 1 framework can therefore be questioned, especially if such long-term considerations were to be applied to exposures with much shorter maturities, and without considering possible management actions over such a time horizon. The purpose of own funds requirements is to ensure resilience of the institution to unexpected adverse circumstances, before appropriate mitigation actions and strategy adjustments can be implemented, pointing rather to short and medium time horizons. As a consequence, those environmental factors that affect institutions in the short to medium term could be reflected in the prudential framework, while for the long-term impact institutions could rather be expected to take appropriate mitigating actions in their strategies.
 - d. In line with the above assumptions, Pillar 1 requirements are designed to protect institutions from existing risks with very high confidence levels. Such precision cannot be achieved based on long-term horizons. Therefore, any consideration of the time horizon to be embedded in the Pillar 1 framework should be coupled with the consideration of an acceptable and feasible confidence level.
 - e. The Pillar 1 own funds requirements are complemented by additional Pillar 2 requirements, which address risks and elements of risks that are not covered or not sufficiently covered by Pillar 1 requirements, based on institution-specific assessments and considerations by the competent authority. To the extent that institutions are exposed to environmental risks in relation to their specific business model, strategy and risk management framework, Pillar 2 considerations are warranted.
 - f. The Pillar 2 additional own funds requirements are further complemented by Pillar 2 guidance, which is based on the results of stress tests and aims at ensuring resilience of institutions in stressed conditions. A typical time horizon for stress tests is 3 years, and for the purpose of Pillar 2 guidance the year with the highest impact is taken into account. Although, as opposed to own funds requirements, the Pillar 2 guidance is not binding, competent authorities may take appropriate steps should institutions repeatedly fail to meet such guidance.
 - g. Finally, systemic risk is addressed by a number of macroprudential buffers which aim to further strengthen financial stability. It could be argued that, given the systemic nature of environmental risks, they might also be addressed through macroprudential tools.
44. While the above elements are not in the scope of this Discussion Paper, they must be taken into account in the overall considerations of the relevant time horizon for the Pillar 1 framework. Without precluding the need to start assessing whether, and if so how, the Pillar 1 rules could adequately capture environmental risks, the ongoing developments of accounting, risk management, and supervisory and disclosure requirements should also be considered to design the most appropriate prudential response to environmental risks.
 45. This Discussion Paper does not conclude on the appropriate time horizon to be reflected in the Pillar 1 framework, but encourages a discussion on the topic. In the following chapters the EBA analyses specific aspects of the existing prudential framework and points out elements which could potentially be amended. Furthermore, potential additional tools that could be introduced are also considered and open questions are asked to seek the views of stakeholders on the appropriate direction of the evolution of prudential requirements. This includes questions as to whether and how to best integrate long-term and forward-looking views for the treatment of environmental risks in risk measurement approaches and the prudential framework.

4.4. Are supporting or penalising factors needed?

46. The EBA is mandated to assess whether a *dedicated* prudential treatment would be justified. A dedicated prudential treatment can at first sight be understood as a specific, additional treatment for green and/or environmentally harmful exposures, which would be distinct from the common Pillar 1 regime grounded on data-driven risk-based considerations. The introduction of adjustments of risk weights applied to green or environmentally harmful exposures would appear to be the most straightforward way to implement a dedicated prudential treatment. It should, however, be clearly understood that taxonomy-based

classifications of green or environmentally harmful exposures are not necessarily risk-based and are not meant to reflect the level of credit quality of exposures, which would require further considerations.

47. When considering an introduction of a dedicated treatment, an understanding of the extent to which environmental risk drivers are already reflected in the prudential regime is needed. This is to ensure that environmental risk factors are appropriately captured, avoiding underestimation or double counting which would weaken the consistency and robustness of the prudential framework. While Chapter 5 assesses the justification of a potential introduction of supporting or penalising factors, the need for changes to the prudential treatment should also be explored through enhancements of the existing prudential framework. In line with the risk-based approach, this DP considers whether green and/or environmentally harmful exposures are or may be adequately treated within the prudential framework, thereby making additional supporting or penalising factors unnecessary or undesirable.
48. From a risk-based perspective, the evaluation of the degree to which the existing prudential framework already captures or may be able to capture financial risks stemming from environmental risk drivers is therefore a key aspect. While the potential risk weight adjustments through adjustment factors seem to be a straightforward solution, it may be difficult to ensure that these are reflecting the risk appropriately. More generally, when addressing environmental risks, a clear distinction should be made between adjustments to the framework aimed at reflecting changing risk profiles, and other tools which may be used to incentivise certain changes in the behaviour of institutions. To avoid the unintended consequences of underestimation or double counting, the possible amendments within the framework and adjustment

factors should be treated as alternative solutions, as they target the same risk. Feedback on these elements in the DP is therefore particularly welcome.

4.5. Preliminary conclusions and discussion points

49. Based on the initial analysis, at this stage the EBA supports the following approach:
- a. A prudential risk-based perspective should underlie the assessment of the justification for modifying the prudential framework.
 - b. Key conditions for assessing the justifications for modifying the prudential treatment are gathering the empirical evidence as to the risk differentials or specific risk profiles of exposures associated with environmental objectives / subject to environmental impacts, and evaluating whether any such risk differential or specific risk profile can be captured by the existing rules.
 - c. In considering how the risk-based approach can be more accurately reflected in the prudential treatment of exposures associated with environmental objectives / subject to environmental impacts, preference should be given to consideration of enhancements within the existing Pillar 1 framework, rather than to the use of supporting or penalising factors.
 - d. The forward-looking and non-linear nature of environmental risks needs to be considered further, given the current role of the Pillar 1 framework, the lack of environment-related attributes in existing historical data for measuring risk, as well as the relevance of forward-looking information with respect to environmental risks.

Questions for public consultation:

Q6: Do you agree with the risk-based approach adopted by the EBA for assessing the prudential treatment of exposures associated with environmental objectives / subject to environmental impacts? Please provide a rationale for your view.

Q7: What is your view on the appropriate time horizon (s) to be reflected in the Pillar 1 own funds requirements?

Q8: Do you have concrete suggestions on how the forward-looking nature of environmental risks could be reflected across the risk categories in the Pillar 1 framework?



5. Credit risk

5.1. Overview of evidence on a risk differential

50. This section provides an overview of published literature on the existence of a risk differential. Some initial studies available from the academic literature have been conducted on assessing a risk differential between green and environmentally harmful assets. Nevertheless, also due to substantial challenges that have been described in Chapter 4, evidence of a risk differential between green and environmentally harmful assets appears to be rather scarce to date and focused on specific sectors and geographies. As indicated in the NGFS report on risk differentials ^[27], the low interest rate environment could add to the difficulty in assessing a potential risk differential because financing costs are currently very low for most businesses, resulting in lower defaults and thereby potentially artificially hiding any possible risk differential ^[28].
51. A current lack of evidence does not, however, necessarily imply that a risk differential does not exist or could not emerge in the future. Hence, existing challenges and data issues should be addressed. It is also necessary to conduct additional analyses going forward.
52. The rather limited and focused nature of existing research prevents drawing any general conclusions from the findings to date. Furthermore, it is important to keep in mind said challenges and data issues when analysing the studies and findings. Lastly, the fact that the studies presented relate to different exposure classes also indicates that a one-size-fits-all approach to measuring environmental risks may not be meaningful, as environmental risk factors will differ across exposure classes.
53. Credit risk is considered the most relevant part of the prudential framework, with RWAs attributable to credit risk accounting for over 80% of total RWAs (see Figure 2). Most available research relates to credit risk and therefore a broader overview of literature is provided for credit risk than for the other risk categories in the chapters that follow. Existing research is focused in particular on retail mortgages in the context of climate risk. Studies are also presented on corporates, sovereigns and other retail exposures.

^[27] NGFS (2020), 'A Status Report on Financial Institutions' Experiences from working with green, non green and brown financial assets and a potential risk differential' ([link](#)).

^[28] See also section on 'Corporate zombification: post-pandemic risks in the euro area' in the ECB (2021) Financial Stability Review ([link](#)).

5.1.1. Real estate exposures

54. Climate risk can impact both the collateral value (and as such the LGD) as well as the solvency of borrowers and hence the probability of default (PD) of mortgage borrowers (see Annex 1). Most of the existing research focuses on residential real estate.
55. With regard to the collateral value and transition risk, there is some early evidence emerging to support the finding that energy efficiency may be a determining factor for the price of real estate as well as rental prices (e.g. Zancanella et al. (2018) ^[29]; Damen (2019) ^[30]). The study by Damen, for instance, shows, using an assessment of available energy labels classified from A (most energy-efficient) to F (least energy-efficient), that properties sold in Flanders with B energy labels changed hands at prices almost 11% higher than properties with D energy labels. In addition, according to the same study, the time it takes to sell the more energy-efficient houses appears to be considerably shorter.
56. As another example, Næss-Schmidt et al. in a study by Copenhagen Economics (2016) ^[31] find a correlation between the energy efficiency of a house and the sales price of the house, based on a sample of around 365,000 single family houses, controlling for various property factors. However, the effect of energy efficiency (through energy cost savings), is only 50–60% of what is expected from theory, based on energy prices and consumption. In a separate study from 2021 ^[32], Copenhagen Economics looks at the impact of energy renovations on collateral values and how this in turn affects the default risk of the overall loan. It investigates any potential implications for the associated capital charges, estimating a reduction in risk weights when factoring in energy renovations of 2–3 percentage points. With increases in energy prices, energy efficiency is also expected to become an even more important factor in the value of a property.
57. Numerous studies exist on the relationship between energy efficiency and collateral values; the above only includes some of those. A study by the Banque de France and the EBA performs a meta-analysis of

^[29] P. Zancanella, P. Bertoldi, B. Boza-Kiss (2018), 'Energy efficiency, the value of buildings and the payment default risk', JRC Science for Policy Report ([link](#)).

^[30] S. Damen (2019), 'Het effect van het EPC en energetische kenmerken op de verkoopprijs van woningen in Vlaanderen', KU Leuven ([link](#)).

^[31] S. Næss-Schmidt et al. (2016), 'Do homes with better energy efficiency ratings have higher house prices?', *Copenhagen Economics* ([link](#)).

^[32] Copenhagen Economics (2021), 'Prudential treatment of green mortgages: Summary and Recommendations' ([link](#)).



existing academic literature ^[33] and private studies, estimating green premiums using hedonic pricing models with more than 84 quantitative studies collected in the meta-base. The meta-analysis confirms the existence of a premium linked to energy efficiency as measured by the EPC labels (acknowledging the caveats in the context of comparing EPC labels across countries as outlined in Annex 2). It concludes that studies show an 8.67% green premium for 'green' properties in Europe in the residential properties sales market, while acknowledging a high degree of heterogeneity, mostly due to different classifications for green versus neutral versus brown and the benchmarks used.

58. Regarding collateral values and physical risk, a recent study by UNEP FI (2021) ^[34] on climate risk and commercial property values observes that existing research, mainly focused on residential properties, finds a relatively modest and short-lived drop in property prices following climate events in areas with more awareness and experience of extreme weather events. In areas which are so far relatively unexposed to extreme climate events, or where the latter's frequency and intensity have only recently started increasing, the paper collects some evidence from the literature of certain weather events leading to long-lasting negative effects on property prices. The following is a selection of a few studies on climate events and property prices:
- a. A meta-analysis performed by Beltrán, Maddison and Elliott (2016) finds that residential house price values (globally) decline by 4.6% for houses located in a 100-year flood plain, but that price decrease diminishes over time after the flooding incident ^[35].
 - b. Another meta-analysis conducted by Daniel, Florax and Rietveld (2009), focused on the U.S., found that an increase in the probability of flooding by 0.01% reduces the house price by 0.6% ^[36].
 - c. A study on the German market by Hirsch and Hahn (2018) finds a negative impact of flood risk on both rents and house prices ^[37].
 - d. Examining transactions in 19 U.S. states between 2000 and 2017, a study by Miller and Gabe (2019) finds that residential properties with waterfront proximity in fact trade at a premium, suggesting that waterfront amenities outweigh any increased water-related risks (except in the case of extreme events) ^[38].
 - e. Hino and Burke (2020) use two decades of sales data from the U.S. and find little evidence that information on flood risk is already priced into residential property prices by the market ^[39].
 - f. Beracha and Skiba (2017) find a price discount of 3.8 percent for single family homes directly after a hurricane, but the discount disappears after 60 days ^[40].
59. With regard to the probability of default and transition risk, a number of studies have analysed the relationship between the credit risk of mortgages and the energy efficiency of the houses used as their collateral (e.g. Guin and Korhonen at the Bank of England ^[41] (2020), Billio et al. (2020) ^[42], Kaza, Quercia and Tian (2014) ^[43]). The Bank of England (2020) assesses a sample of 1.8 million outstanding mortgages throughout the UK and finds that energy-efficient mortgages (rated A–C) have 11 bps lower payments arrears shares than low-energy-efficiency mortgages (rated D–F). This effect is after controlling for factors such as borrowers' income, borrowers' age, LTVs, property and regional factors. A study by the Energy Efficient Mortgage Initiative (EEMI) (Billio et al. (2020) concludes that mortgages on A-rated buildings are less likely to default. The study focusses on the Italian mortgage market, using a sample of almost 73,000 mortgages. It controls for various borrower and building characteristics as well as overall economic conditions, finding a significant, negative correlation between energy efficiency and mortgages' probability of default, and evidence that the degree of energy efficiency matters. However, the authors could not draw more general conclusions about the correlation between energy efficiency and mortgage default risk due to the lack of additional household characteristics (such as income or wealth) and weak findings for the alternative definition of the energy efficiency variable (when not limiting energy efficiency to a strict definition of A-rated mortgages).

^[33] This work was based on two meta-analysis studies performed on the same topic from Cespedes-Lopes et al. (2019) and Fizaine, Voyer and Baumont (2018), and assembles a total of 84 peer-reviewed papers and public reports modelling green premiums in property markets from 2007 to 2019 and 216 estimations.

^[34] UNEP FI (2021), 'Climate Risk & Commercial Property Values: A review and analysis of the literature' ([link](#)).

^[35] A. Beltrán, D. Maddison, and R.J.R. Elliott (2016), 'Is flood risk capitalised into property values?', *Ecological Economics*, 146: 668–685 ([link](#)).

^[36] V. Daniel, A. Florax, and P. Rietveld (2009), 'Flood risk and housing values: An economic assessment of environmental hazard', *Ecological Economics*, 69: 355–365 ([link](#)).

^[37] J. Hirsch and J. Hahn (2018), 'How flood risk impacts residential rents and property prices: Empirical analysis of a German property market', *Journal of Property Investment & Finance*, 36 (1): 50–67 ([link](#)).

^[38] M. Miller and J. Gabe (2019), 'The Impact of Waterfront Location on Residential Home Values Considering Flood Risks', *Journal of Sustainable Real Estate*, 11(1): 84–107 ([link](#)).

^[39] M. Hino and M. Burke (2020), 'Does information about flood risk affect property prices?', NBER Working Paper 26807 ([link](#)).

^[40] S. Below, E. Beracha and H. Skiba (2017), 'The Impact of Hurricanes on the Selling Price of Coastal Residential Real Estate', *Journal of Housing Research*, 26 (2): 157–178 ([link](#)).

^[41] B. Guin and P. Korhonen (2020), 'Does energy efficiency predict mortgage performance?', BoE Staff Working Paper No. 852 ([link](#)).

^[42] M. Billio et al. (2020), 'Final report on correlation analysis between energy efficiency and risk', EeDaPP final report ([link](#)).

^[43] N. Kaza, R. Quercia and C.Y. Tian (2014), 'Home Energy Efficiency and Mortgage Risks', *Cityscape*, Vol. 16, No. 1 ([link](#)).



BOX 1 – EEFIG REPORT AND ITS FINDINGS ON ENERGY EFFICIENCY AND LOAN PERFORMANCE

The Energy Efficiency Financial Institutions Group (EEFIG) ^[44] Working Group on Risk assessment (the quantitative relationship between energy efficiency improvements and lower probability of default of associated loans and the increased value of the underlying assets) published its final report in January 2022 ^[45]. The working group has extensively explored existing research and findings on the link between energy efficiency, loan performance and collateral value. Whilst acknowledging the need for further work in this area, the report finds a positive correlation between energy efficiency and mortgage credit performance, as well as an upward influence of energy performance on house prices. Whilst demonstrating a statistically significant correlation in different geographies, the report also highlights the need for further analysis to assess the causality of the relationship.

The report *inter alia* presents three analyses conducted by members of the working group, namely the UK, Germany and Finland. Regression analyses are based on EPC data and bank-level loan data and establish a link between energy efficiency and the performance of a loan.

The UK study, conducted by Nationwide Building Society (NBS), uses EPC data from a central database

^[44] EEFIG was set up by the European Commission and UNEP FI and comprises over 200 organisations working on energy efficiency investments throughout the EU. EEFIG works through working groups that target specific themes. Through a multi-level stakeholder dialogue, working groups identify opportunities and barriers in the long-term financing for energy efficiency, and propose policy and market solutions, to increase the scale of energy efficiency investments across Europe. More information on EEFIG's work can be found on their [website](#).

^[45] EEFIG (2022), final report ([link](#)).

and matches them to residential mortgage data, resulting in a sample of more than 600,000 households. Using several control variables for borrower (including borrowers' income), mortgage and property type, the analysis finds a significantly lower probability of default for properties with high/medium energy efficiency (EPC of A/B/C/D) than for those with low energy efficiency (EPC of E/F/G).

The German study, conducted by Allianz, uses proxy energy efficiency data based on energy demand (predicted through the building's year of construction) as no sufficient EPC label data are available at central level. Based on a sample of around 35,000 loans and controlling for borrower (such as the credit score) and property characteristics, this study also finds that higher energy efficiency is associated with lower credit risk and concludes that the former might hence be a relevant additional risk factor for mortgages. Further investigation is said to be needed to draw conclusions, also since results are based on energy efficiency proxies.

Findings of the Finnish study, conducted by OP Financial, are aligned with the German and UK studies. Controlling for borrower, mortgage and macro characteristics on around 100,000 mortgages, the analysis finds that high-quality energy-efficient mortgages (EPC labels A/B/C) have lower credit risk than low-energy-performance mortgages. Where no actual EPC data were available, this study also used energy efficiency proxies based on building age and the main heating source. The size and significance of the energy efficiency, however, changes across different models, using different control variables. Work is ongoing to source more data and expand the analysis.

5.1.2. Corporates

60. Corporates can be impacted by environmental risks through various transmission channels, for instance through a decrease in profitability (see Annex 1). This is also explored by the academic literature, as well as in research from rating agencies and international institutes, which indicate that environmental risks, or ESG risks more broadly, are drivers of financial risks. Some of the studies in this regard have been included below. The studies use different classifications of ESG risks and hence cannot be directly compared. Often used measurements include carbon emissions or ESG ratings from ESG data providers, such as MSCI or Sustainalytics.
- a. A study by Capasso, Gianfrate and Spinello (2020) ^[46] shows that the distance to default is

negatively associated with the amount of a firm's carbon emissions and carbon intensity. Companies with a large carbon footprint are therefore perceived by the market as more likely to default.

- b. Another study by Hoeck et al. (2020) ^[47], using credit default swap (CDS) spreads, finds that more sustainable EU non-financial corporates (measured by the environmental rating from MSCI) have a lower credit risk due to lower exposures to reputational, financial, regulatory and event risks. They further find that only companies with high creditworthiness benefit from having a high environmental sustainability score.
- c. Similarly, Ferrarese and Hanmer (2018) ^[48] find that corporate bonds of issuers with lower ESG

^[46] G. Capasso, G. Gianfrate, and M. Spinello (2020), 'Climate change and credit risk', EDHEC-Risk Institute Working Paper ([link](#)).

^[47] Hoeck et al. (2020), 'The effect of environmental sustainability on credit risk' ([link](#)).

^[48] C. Ferrarese and J. Hanmer (2018), 'The impact of ESG investing in corporate bonds', Fidelity International White Paper ([link](#)).



- performance tend to have higher spreads^[49] and higher implied probability of default.
- d. Seltzer, Starks and Zhu (2020)^[50] also find that companies with poor environmental profiles (based on their Sustainability score) have lower credit ratings and higher yield spreads, especially so if located in countries with stricter regulation.
 - e. Similar results are reported by Jung, Herbohn and Clarkson (2018)^[51], who find that the cost of debt is positively related with climate risk (measured by historical emissions and carbon risk awareness).
 - f. Atanasova et al. (2019)^[52] investigate how far the prospect of stranded assets in the context of transitioning to a low carbon economy is reflected in a firm's value. Looking at oil firms, they find that growth in reserves negatively affects a firm's value.
 - g. A study from the Chinese market found a positive correlation between a company's energy consumption and bond default rate (Li, Zhou and Xiong (2020))^[53].
 - h. Moody's (2018) found project finance loans for green use of proceeds have lower risk of default than those for non-green use of proceeds (in the power and infrastructure sector), with results varying across regions^[54].
 - i. Higher NPL ratios during the Covid crisis were observed for institutions with worse ESG management (according to MSCI ESG ratings, including environmental risk management efforts) in a study by MSCI in 2020^[55]. They found that the 'ESG laggards' in their sample saw NPL ratios steadily increase year on year since H1 2017 until 2020, whilst 'ESG leaders' saw their NPL ratios steadily decrease in the same time period.
 - j. A recent ECB working paper (Carbone et al. (2021))^[56] finds that firms with higher levels of GHG emissions are associated with lower market-implied distance to default and lower credit ratings and that government transition policies further affect exposed companies' credit ratings negatively. The authors also find that commitment to emission reduction targets has a positive impact on credit risk.
 - k. A study focused on the Spanish banking system (Delgado (2021))^[57], on the other hand, finds that, following the global financial crisis, the non-performing loan ratio of exposures of banks to sectors potentially affected by transition risk has been lower than for other sectors (potentially driven by size and diversification). Also, the results suggest that the cost of pollution is not (yet) internalised by companies, which may change in transition scenarios going forward.

5.1.3. Sovereigns

61. Sovereigns are impacted by climate risk through physical and transition risk channels affecting, for instance, tax income, the wider economic performance or depleting natural resources.
62. Research on climate risk and sovereigns remains limited to date. Recent research conducted by the IMF (Cevic and Jalles (2020a)) shows that a country's vulnerability to climate risk (measured through Notre Dame Global Adaptation Initiative indices^[58]) can have a direct impact on its creditworthiness, borrowing rates and ability to pay^[59]. The research finds significant effects of climate change resilience and vulnerability on a country's probability of sovereign debt default, using a sample of 116 countries between 1995 and 2015. This effect has been found in particular in low-income countries. In another study, Cevic and Jalles (2020b) find an adverse impact of climate change vulnerability on sovereign credit ratings^[60]. Moreover, the authors conclude that enhancing structural resilience through cost-effective mitigation and adaptation, strengthening financial resilience through fiscal buffers and insurance schemes, and improving economic diversification and policy management can help in coping with the consequences of climate change for public finances and thereby reduce the likelihood of sovereign default.

^[49] Whilst it cannot be taken as conclusive evidence of a risk differential, price differentials observed for different assets and liabilities may further complement the discussion. Price differentials can inform our understanding of investors' and banks' risk assessment of different assets and provide some indication about market players' perception of risk (i.e. a difference in risk potentially already being priced in). They can, of course, also be driven by other factors, such as market demand.

^[50] L. Seltzer, L. Starks and Q. Zhu (2020), 'Climate Regulatory Risks and Corporate Bonds', Nanyang Business School Research Paper No. 20-05 ([link](#)).

^[51] J. Jung, K.F. Herbohn, and P. Clarkson (2018), 'Carbon Risk, Carbon Risk Awareness and the Cost of Debt Financing', *Journal of Business Ethics*, 150(4) ([link](#)).

^[52] Atanasova et al. (2019), 'Stranded fossil fuel reserves and firm value', NBER Working Paper Series, Working Paper 26497 ([link](#)).

^[53] P. Li, R. Zhou, and Y. Xiong (2020), 'Can ESG Performance Affect Bond Default Rate? Evidence from China', article for the School of Finance and Banking, University of International Business and Economics, Beijing ([link](#)).

^[54] Moody's (2018), 'Project finance bank loans for green use-of-proceeds projects demonstrate lower default risk' ([link](#)).

^[55] J. Malich (2020), 'Banks, ESG and Nonperforming Loans During Covid-19', MSCI Research Blog ([link](#)).

^[56] Carbone et al. (2020), 'The low-carbon transition, climate commitments and firm credit risk', ECB Working Paper Series, Working Paper No. 2631 ([link](#)).

^[57] M. Delgado (2019), 'Energy transition and financial stability. Implications for the Spanish deposit-taking institutions', Banco de Espana, Financial Stability Review ([link](#)).

^[58] They measure a country's overall susceptibility to climate change disruptions and a country's capacity to deal with the consequences (<https://gain.nd.edu/>).

^[59] S. Cevic and J.T. Jalles (2020a), 'An Apocalypse Foretold: Climate Shocks and Sovereign Defaults', IMF Working Paper No. 2020/231 ([link](#)).

^[60] S. Cevic and J.T. Jalles (2020b), 'Feeling the Heat: Climate Shocks and Credit Ratings', IMF Working Paper No. 2020/286 ([link](#)).



63. Some research also exists on climate change and pricing of sovereign debt. A relationship between the two would suggest that markets are perceiving higher climate risk for some countries and are pricing this in. Cevic and Jalles (2020c) ^[61] in another working paper find that vulnerability and resilience to climate change impact sovereign bond yields and spreads, based on a sample of 98 countries between 1995 and 2017. They find the effect to be particularly strong for developing countries (due to a weaker capacity to adapt). A study on the U.S. (Painter 2019) ^[62] shows that underwriting fees and initial yields on long-term municipal bonds are higher in counties more likely to be affected by climate change. Kling et al. (2018), in a study on 20 low-income countries, find that higher exposure to climate vulnerability leads to a higher cost of borrowing.

5.1.4. Other retail

64. Retail exposures other than those secured by immovable properties can be impacted in various ways, for example through the effects on retail clients' wealth or tax regulation impacting income and the ability to repay debt (see Annex 1 for more details).
65. Existing research on other retail exposure (beyond housing) is scarce. This is likely to result mainly from the fact that the ultimate purpose of retail lending is very difficult to track (a consumer loan could be used to finance green as well as environmentally harmful activities). One area of retail lending for which the purpose and classification can be traced is consumer loans for cars ^[63]. Evidence on relative performance, however, seems to be limited. With the introduction of car loans in disclosure KPIs and the increasing market for electric vehicles, one could expect more studies and research on this going forward. Some observations from the U.S. market seem to suggest no significant performance differences ^[64].

Question for public consultation:

Q9: Have you performed any further studies or are you already using any specific ESG dimensions to differentiate within credit risk? If so, would you be willing to share your results?

^[61] S. Cevic and J.T. Jalles (2020c), 'This Changes Everything: Climate Shocks and Sovereign Bonds', IMF Working Paper No. 20/79 ([link](#)).

^[62] M. Painter (2019), 'An inconvenient cost: The effects of climate change on municipal bonds', *Journal of Financial Economics* 135(2) ([link](#)).

^[63] These are also included in the [delegated act](#) specifying the information to be disclosed on taxonomy-alignment: KPIs have been set for loans granted to households for the acquisition of a motor vehicle (car loans), and where taxonomy compliance is defined as complying with the technical screening criteria in accordance with Section 6.5 of Annex I of the [Climate Delegated Regulation](#).

^[64] Fitch Ratings (2021), 'CO₂ Emissions Reporting Key to Defining European Green Auto ABS' ([link](#)).

5.2. Standardised Approach

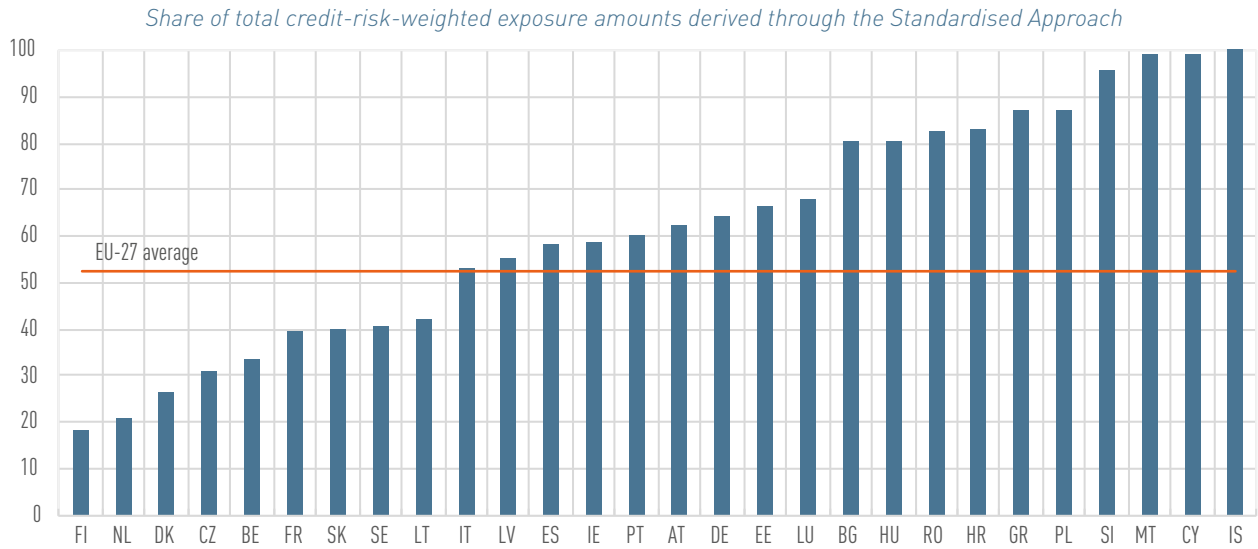
5.2.1. Overview of the framework

66. The Standardised Approach (SA) is the simplest of the approaches to credit risk, whereby risk-weighted exposure amounts are calculated as the product of the exposure amounts (net of specific credit risk adjustments) and supervisory determined risk weights, which depend on the exposure class and, in some cases, may be determined through external credit assessments. This approach aims at striking a balance between simplicity and risk sensitivity and it does not distinguish between potential differences in the creditworthiness of each individual borrower, otherwise than through external credit assessments, where these are available.
67. The SA represents on average around 40% of all credit-risk-weighted exposure amounts in the European Union, although this percentage differs markedly by country (see Figure 3). Smaller banks tend to calculate regulatory capital based on this approach, which does not require sophisticated risk management and measurement practices. Proportionality and avoiding the introduction of excessive complexity are therefore particularly relevant to this framework.
68. Going forward, the SA is set to be also relevant for credit risk exposures under the IRB Approach, as the Commission's CRR3 proposal ^[65] includes the output floor introduced in the Basel III reform, whereby banks' capital requirements calculated using internal models are constrained by a lower bound based on a percentage of the risk-weighted exposure amounts that would have resulted using the SA.

^[65] European Commission (2021), [Banking Package 2021](#) ([link](#)).



Figure 3: Weight of the standardised approach in the credit risk framework, across EU countries



Note: Data displayed as percentages.

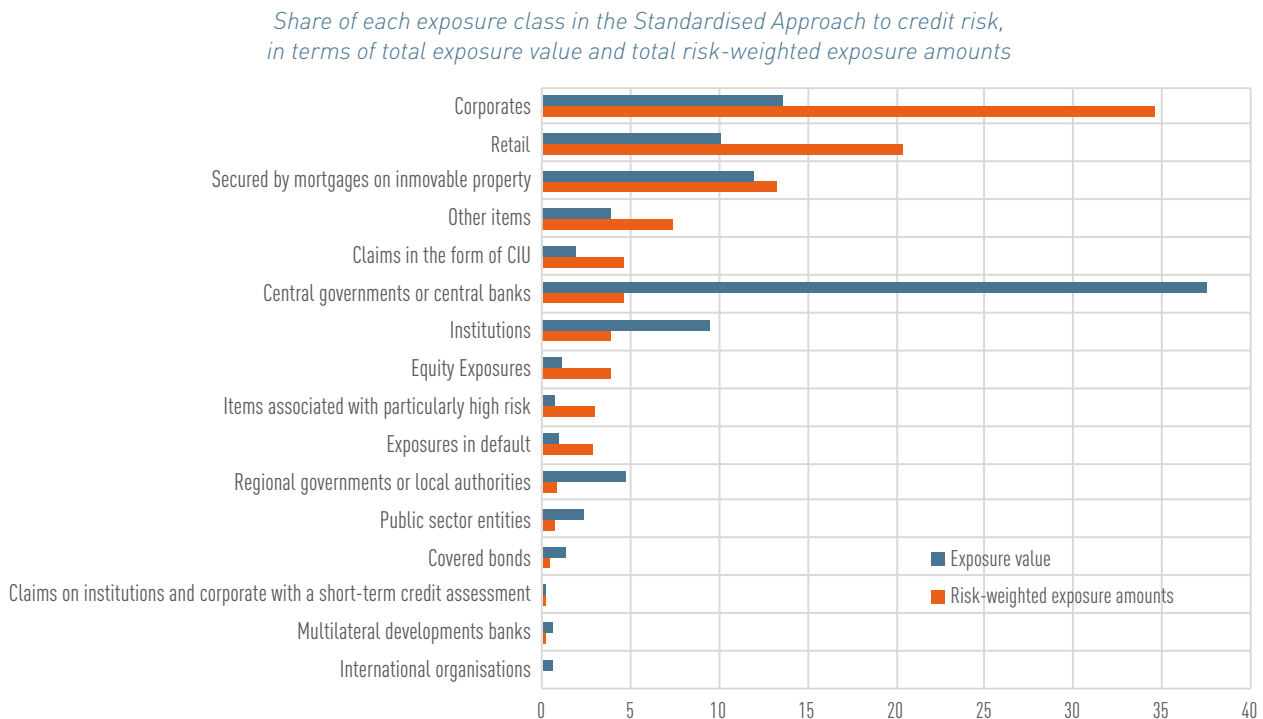
Source: COREP supervisory data as of 2021 Q3, covering all credit institutions.

5.2.2. Interaction between environmental risks and the SA framework

69. Exposures under the SA can be broken down into 17 exposure classes, as detailed under Article 112 of the CRR. Figure 4 provides an overview of the relative size of each category.

70. Supervisory determined risk weights are prescribed under the SA. The CRR allows the use of external credit ratings, when available, to determine risk weights for certain exposure classes, while otherwise it prescribes flat risk weights per exposure class, which in some instances can be further broken down into more granular risk weights depending on specific characteristics of the exposure.

Figure 4: Relative size of exposure classes in the Standardised Approach, EU-27



Note: Excludes securitisation positions. Data displayed as percentages. The orange bar displays the share of a given exposure class in the SA in terms of the exposure value, while the blue bar reflects the share of a given exposure class in the SA in terms of risk-weighted exposure amounts. Source: COREP supervisory data as of 2021 Q3, covering all credit institutions.



a. External credit assessments

71. Under the Standardised Approach risk weights should be based on the exposure class to which the exposure is assigned and, if applicable, on its credit quality determined by reference to the credit assessments of an External Credit Assessment Institution (ECAI) ^[66]. The materiality of external credit assessments in the EU seems limited overall, with the share of risk-weighted exposure amounts (RWEA) derived through an external credit assessment at less than 10% of the total RWEA under the SA in the EU-27. This could be partially explained by the above-mentioned application of the SA predominantly by smaller institutions, which overall may hold less exposures to larger corporates for which an external credit assessment is available. More detailed descriptive statistics can be found in Table 1.
72. Credit rating agencies (CRAs) are required to ensure that credit ratings are based on a thorough analysis of all the information available and relevant according to the applicable rating methodology. However, it is to be noted that the inclusion of environmental or social aspects is not explicitly mandatory under the Credit Rating Agencies Regulation ^[67].
73. Environmental factors seem to be captured unevenly across credit rating agencies and sectors at this stage, according to a report published by ESMA on the level of consideration of ESG factors across credit assessments ^[68]. Based on a survey of industry practices, the report notes the challenges in developing a common understanding on what constitutes an environmental factor and its relevance for a credit assessment. CRAs' possible further integration of environmental considerations into their credit rating methodologies over time must be accompanied by adequate disclosures and transparency on the rating methodologies. CRAs in the EU are required to

Table 1: Relative materiality of external credit ratings in the Standardised Approach, EU-27

Share of risk-weighted exposure amounts (RWEA) derived through an external rating in the Standardised Approach, EU-27

Category	Share of RWEA in the SA derived using an external rating ¹	Memo: exposure class materiality	
		% RWEA ²	% exposure value ³
Total	10%	100%	100%
Of which: exposures where external ratings are allowed:	19%	49.0%	69.9%
– Sovereigns	11%	5.8%	45%
– Institutions	51%	3.9%	9.5%
– Corporates	16%	34.5%	13.6%
– Covered bonds	50%	0.3%	1.2%
– Claims on short-term credit assessments	90%	0.1%	0.1%
Of which: exposures not externally rated	0%	51.0%	31.1%

Note: The sovereign category includes the following exposure classes (the share of the RWEA using an external credit rating is provided in brackets): 'Central governments or central banks' (8%), 'Multilateral development banks' (30%), 'Public sector entities' (23%) and 'Regional governments or local authorities' (17%).

¹ Computed as the ratio between RWEA derived using an external credit assessment for a given category and the total RWEA associated with that category.

² The relative size of the exposure class is derived as the ratio between the RWEA of that category and the total RWEA in the Standardised Approach to credit risk.

³ The relative size of the exposure class is derived as the ratio between the exposure value of that category and the total exposure value in the Standardised Approach to credit risk.

Source: COREP supervisory data as of 2021 Q3, covering all credit institutions.

^[66] An external credit assessment is recognised under the prudential framework if issued by an ECAI in accordance with Regulation (EC) No 1060/2009, the Credit Rating Agencies Regulation (CRAR).

^[67] For prudential purposes the ratings allowed by the CRR refer to external credit assessments, i.e. opinions on creditworthiness, which may include environmental considerations. This is distinct from ESG ratings, which are a type of assessment issued by some agencies, where the focus is solely on sustainability considerations, with no indication on credit quality. The two are therefore serving different purposes.

^[68] ESMA (2019), 'Technical Advice to the European Commission on Sustainability Considerations in the credit rating market' ([link](#)).



provide environmental disclosures^[69], which is improving transparency around whether ESG factors were a key driver of the credit rating action. However, although the overall level of disclosure has improved, a high level of divergence in disclosure of ESG factors is observed^[70]. Going forward, disclosures should be enhanced to further facilitate the understanding of users of ratings on where ESG factors are affecting credit rating actions.

74. Ensuring robustness of credit assessments, including the methodologies in place for incorporating environmental factors, is crucial for an appropriate use of credit ratings in the SA. This is reinforced by the introduction of the output floor as proposed in the CRR3 proposal, which could trigger a broader use of external credit assessments by IRB institutions, if available. Robust methodologies for credit assessments should in principle prevent situations where institutions could potentially 'cherry-pick' credit assessments, when a more favourable rating may be assigned based on less sound policies, for example where environmental aspects are not appropriately considered. This risk is mitigated by safeguards set out in Article 138 of the CRR, which is designed to prevent selective use of credit assessments. Further, ESMA is set to conduct work on the robustness of ESG methodologies^[71].
75. The prudential framework has room to incorporate environmental risks through the use of external credit assessments, which are likely over time to incorporate environmental aspects into their underlying methodologies, as shown by industry surveys. Adjustments to the framework to incentivise the inclusion of environmental risks in external credit assessments will largely depend on the evidence being collected on the robustness of ECAIs' methodologies to capture such risks.
76. The correspondence between external credit assessments of ECAIs and a prudential scale of credit quality steps set out in the prudential framework is established through the mapping tables provided in Implementing Regulation (EU) 2016/1799. The calibration analysis is based on a set of objective quantitative criteria to benchmark the performance of credit assessments, together with qualitative elements to ensure a level playing field across ECAIs, considering varying levels of strictness in the definition of default and stability of the ratings. The mappings are monitored over time and regularly reviewed to ensure that the underlying performance of credit assessments remains aligned with prudential considerations. Environmental risks are currently not explicitly factored into the methodology underlying the mapping assignment. Integration is expected to be done implicitly through the natural incorporation over time of environmental risks in the credit

assessments of ECAIs. Explicit adjustments to the qualitative analysis should be explored following the feedback from the public consultation, to account for varying degrees of integration of environmental risks across rating agencies.

b. Due diligence

77. The current prudential framework includes due diligence requirements as a safeguard when using external credit assessments for own funds calculation, as set out in the provisions of Article 79 point (b) of Directive 2013/36/EU (the CRD), which does not exempt institutions from additionally considering other relevant information when assessing their allocation of internal capital. This due diligence applies both to exposures externally rated and to unrated exposures.
78. The CRR3 proposal is set to further strengthen this safeguard by enhancing due diligence requirements with a view to further mitigating mechanistic reliance on external credit assessments. This is proposed to be implemented through Article 113 (1), which specifies that, where the due diligence assessment reflects higher risk characteristics than implied by the external credit assessment, a risk weight penalty is applied by assigning a risk weight at least one credit quality step higher than that implied by the external credit assessment^[72]. Some degree of proportionality in the implementation of the enhanced due diligence seems warranted, commensurate with the level of sophistication and risk profile of the different institutions.
79. There is room to broaden due diligence requirements to explicitly integrate environmental aspects, to ensure that environmental risks are appropriately captured and reflected in the prudential framework. However, this should not replace the role of ECAIs in appropriately considering environmental risks in their credit assessment. The inclusion of ESG disclosures for credit rating agencies in the EU may support institutions in their due diligence assessments, which are expected to strengthen going forward as availability of ESG-related information for market participants will improve over time, backed by policy initiatives, such as the EU CSRD, and regulatory developments, like the Pillar 3 disclosures on ESG risks for institutions.

c. Credit mitigation techniques

80. The Standardised Approach allows for recognition of credit risk mitigation (CRM) techniques, while avoiding excessive complexity. The CRR makes a distinction between funded and unfunded credit protection, as they follow different dynamics and are recognised based on different methods.

^[69] ESMA [2019], 'Final Report on Guidelines on Disclosure Requirements Applicable to Credit Ratings' ([link](#)).

^[70] Ibid.

^[71] ESMA [2021], ESMA 2022 Annual Work Programme ([link](#)).

^[72] The following exposure classes are exempted from the enhanced due diligence requirements: central governments or central banks, regional governments or local authorities, public sector entities and international organisations.



81. By using unfunded credit protection (UFCP) the institution relies on a payment from the protection provider upon default of the obligor. UFCP represents around 40% of total CRM under the SA. It consists of guarantees, with a residual share of credit derivatives, according to supervisory data as of September 2021 ^[73]. The UFCP may be recognised when calculating capital requirements by applying a substitution approach, where institutions replace the risk weight of the counterparty with the risk weight of the guarantor or the protection provider for the protected portion of the exposure, while the unprotected portion remains with the risk weight of the counterparty. Environmental due diligence considerations presented in the previous section apply to the resulting risk weights when using external credit assessments for own funds requirements calculation.
82. The framework for funded credit protection (FCP) refers to financial collateral, which may deteriorate in value over time, potentially exacerbated by environmental risks ^[74]. For financial collateral, two approaches are available: either the simple or the comprehensive approach, with partial collateralisation recognised. Under the simple approach, institutions replace the risk weight of the counterparty with the risk weight that the institution would assign if it had a direct exposure to the collateral instrument for the secured part of the exposure, where the environmental due diligence considerations presented in the previous section apply to the resulting risk weights. The comprehensive approach allows the exposure amount to a counterparty to be reduced by the value of any eligible collateral, subject to haircuts to take into account potential value fluctuations due to market movements, currency mismatch or maturity mismatch. Furthermore, the current prudential framework requires ^[75] financial collateral to control for concentration risks to particular types of collateral assets, with room to potentially include an explicit reference to concentration risks to collateral with significant exposures to environmental risks.
83. Regarding physical collateral, exposures secured by immovable property are the only type of physical collateral recognised under the SA, which is dealt with in the CRR outside of the CRM framework and which is discussed separately in the next section.
84. Collateral re-evaluation requirements in the framework set out minimum frequencies at which collateral is to be monitored, although more regular assessments are warranted if there is any evidence the value may have changed. In the case of financial collateral this is performed at least every six months, which gives room to incorporate the evolving nature of environmental risks over time ^[76].
85. To conclude, environmental risks may already be embedded in the current CRM framework through the valuation and re-evaluation of collateral. Where the collateral valuations do not yet fully reflect environmental risks, it is expected that they will improve over time with the development of data, standards, tools and methodologies. Modifications to the prudential framework at this stage are therefore not deemed appropriate, although monitoring of valuation and valuation methodologies could more explicitly integrate environmental aspects, backed by policy and regulatory initiatives outside of the Pillar 1 framework.
- d. Exposures secured by immovable properties**
86. Exposures secured by immovable property constitute a separate exposure class under the SA, representing above 10% of total SA exposures in the EU. Environmental risks can affect the valuation of immovable property through the impact of physical risks, such as natural events, or transition risks, via energy prices and the energy efficiency of the property.
87. The simplified mechanics of risk weighting are based on the preferential risk weight that may be assigned for the secured portion of exposure, under certain conditions, which depends on the exposure-to-value ratio. Therefore, the value of immovable property influences the resulting risk weight, and hence the existing framework naturally gives room for environmental risks to affect capital determination through the impact on immovable property valuation ^[77]. The CRR prescribes a flat risk weight of 100% for exposures fully secured by mortgages on immovable property, unless certain criteria are met for residential property exposures, which then get a risk weight of 35% up to 80% of the market value, while the preferential treatment for commercial immovable property exposures is set at up to 50% of the market value, although in both cases the risk weights can be adjusted upwards up to 150% if deemed warranted by a designated authority. The CRR3 proposal enhances risk sensitivity through a more granular risk weighting that introduces new sub-asset classes by type of financing of the exposure (income-producing real estate, which depends on the cash flows generated by the property securing the loan) and by loans financing land acquisition, development or construction. The CRR3 proposal also retains and recalibrates the loan splitting approach into a secured and unsecured part and introduces a more sensitive fallback treatment depending on the exposure-to-value where the property is not eligible for the loan-splitting.

^[73] Based on COREP supervisory data as of September 2021. Guarantees represented 99% of total UFCP.

^[74] Funded credit protection is also available through on-balance-sheet netting and in the form of credit-linked notes issued by the lending institution.

^[75] Article 207(4) points (b) and g(ii) of the CRR.

^[76] Article 207(4) point g(ii) of the CRR.

^[77] The loan-splitting approach is based on exposure. Whenever the loan-splitting approach between the secured and unsecured part of the exposure cannot be performed, a fallback treatment dependent on the exposure-to-value ratio is implemented.



- 88. The value of immovable property collateral is monitored at the minimum every year for commercial property and every three years for residential property [78]. Furthermore, the property valuation is reviewed whenever there is an indication that the value of the property may have declined materially relative to general market prices and where a review is conducted by an independent valuer. These provisions allow for environmental risks to be appropriately reflected in collateral valuation, as environmental risks may intensify over time and require reassessment within the life of collateral. Environmental features such as energy renovations may be adjusted, whose impact may increase over time in a case where energy prices would increase. The CRR3 proposal introduces a cap on the upward adjustment beyond the value at loan origination, but includes a clarification that property improvements related to energy efficiency should be considered to unequivocally increase its value, which may support the objective to achieve a more risk-sensitive capital treatment.
- 89. In addition, physical risk is at least to some extent mitigated by the requirement that the immovable property is adequately insured against the risk of damage. Such insurance should in principle cover damages resulting from environmental events such as floods or fires, but the potential insurance gap in terms of protection against future environmental hazards could be further explored [79].
- 90. The positive relationship between energy efficiency and property value, as discussed in Section 5.1 on risk differentials, might in principle be reflected in the prudential framework through higher values of energy-efficient properties. There also seems to be a positive relationship between energy efficiency and credit performance of the loan (see Box 1 above). Nevertheless, based on empirical evidence it may seem premature to draw firm conclusions on whether the effect of valuation is sufficient to address the different risk profiles of exposures, as the existing analysis faces a number of data challenges.

e. Prescribed risk weights

- 91. This section focuses on corporate and retail exposures, as these are considered the most relevant from the perspective of environmental-risk-related considerations. No specific analysis on sovereign exposures was performed due to the specific treatment of sovereign exposures to Member States granted in the CRR, which goes beyond the discussion of only environmental aspects. Nevertheless, with regard to sovereign exposures that are risk-weighted based on external credit ratings, the discussion presented above on the use of credit ratings applies. Similarly, further analysis on exposures to institutions was not

considered necessary due to broader reliance on external ratings in this exposure class.

- 92. Exposures to corporates may be risk-weighted through an external credit assessment by a nominated ECAI, with current supervisory data showing a limited share of externally rated corporate exposures, at around 15% as displayed in Table 1. The risk weighting scheme is shown in Table 2, with further risk sensitivity introduced by the CRR3 proposal. Whenever an external credit assessment is not available, a flat risk weight of 100% is assigned [80]. For institutions subject to the calculation of the output floor, the Commission introduced in the CRR3 proposal a preferential treatment for unrated corporate exposures with a PD no higher than 0.5% during a transitional period.
- 93. Widening the availability of external credit assessments for corporates may increase the risk sensitivity of the framework and allow the capturing of environmental risks, to the extent that external ratings are capable over time of integrating environmental aspects to a greater degree. The CRR3 proposal includes a mandate to analyse impediments to the availability of external credit ratings by ECAIs, in particular for corporates, and possible measures to address them. Recent policy initiatives such as the proposal for a CSRD will promote the collection of environmental data for large corporates [81], hence supporting the information set available for ECAIs to conduct assessments, as well as facilitating the possibility to broaden the due diligence scope to cover environmental aspects.

Table 2: Supervisory prescribed risk weights for rated corporate exposures

Correspondence table between the credit quality as determined by an external credit assessment, and risk weights for corporates

Credit quality step	1	2	3	4	5	6
CRR2	20%	50%	100%	100%	150%	150%
CRR3 proposal	20%	50%	75%	100%	150%	150%

- 94. Furthermore, a new sub-exposure class is introduced in the CRR3 proposal, capturing specialised lending, which is broken down into six categories: three categories of project finance with risk weights ranging from 80% to 130%, two categories of object finance with risk weights of 80% and 100%, and commodity finance, which is associated with a risk weight of 100%. Rated specialised lending exposures are risk-weighted with the same scheme as the overall corporate exposure class.

[78] Article 208(3) point a.

[79] See for example EIOPA's dashboard on the insurance protection gap for natural catastrophes: https://www.eiopa.europa.eu/document-library/feedback-request/pilot-dashboard-insurance-protection-gap-natural-catastrophes_en.

[80] Whenever the central government of the jurisdiction in which the corporate is incorporated has a risk weight higher than 100%, then the risk weight to be assigned is that of the central government.

[81] Companies with securities listed on regulated markets (except micro-enterprises) are also covered by the proposed directive.



95. The prudential framework includes environmental criteria with respect to the corporate exposures subject to the infrastructure supporting factor, which is described in Section 5.4.1. It could be considered whether specialised corporate exposures introduced in the CRR3 could mirror a similar environmental assessment in order to be eligible for the preferential treatment assigned to high-quality project finance and high-quality object finance exposures, given the similarities across exposures.
96. Environmental risks may affect corporate exposures through physical and transition risk drivers, which may affect their profitability, for instance through expenses for lowering the environmental footprint of industrial processes to stay in line with transition policies, and the potential depreciation of physical assets due to physical environmental events. Against the background of the transition to a more sustainable economy, it could be argued that emission-intensive corporates or corporates relying on emission-intensive products or commodities will face higher transition risks than comparable corporates that are aligned with the transition trajectory. However, the link between higher transition risks and lower creditworthiness cannot be established at the moment, with inconclusive results of the existing research (see Section 5.1).
97. The EU Taxonomy, as a classification system for environmentally sustainable economic activities, gives potential for further differentiation of corporate exposures. However, the prudential treatment should be anchored in a risk-based assessment, while the EU Taxonomy does not provide an indication on the riskiness and associated credit quality of exposures. Criteria that would be useful in this regard would need to correctly differentiate credit risk, and at the same time would need to be objective and easily available, to ensure appropriate application of the prudential framework. Furthermore, the use of such criteria would require a fine level of granularity, and their ease of use should be carefully assessed, so that they can be applied by smaller institutions that may have less statistical and operational capacity.
98. It can also be noted that the current SA framework treats all unrated corporate exposures equally, and provides an overall calibration at a portfolio level, without differentiating risk profiles of individual exposures. In order to maintain the robustness of the framework, any considerations of the risk differentiation between such corporate exposures would have to take into account not only the environmental risks, but also other, potentially more prominent credit risk drivers.
99. **Retail** exposures cover around 20% of overall SA exposures in the EU. This exposure class is assigned a flat risk weight of 75%, except for the case of loans granted to pensioners or employees with a permanent contract against the unconditional transfer of part of the borrower's pension or salary to that credit institution, which, subject to some conditions, are assigned a preferential risk weight of 35%. The CRR3 proposal proposes enhanced risk sensitivity through the introduction of a sub-exposure class of 'transactors', which refers to obligors in relation to facilities such as credit cards and charge cards, where the balance has been repaid in full at each scheduled repayment date for the previous 12 months and which attract a risk weight of 45%.
100. Any adaptation of the risk weight for retail exposures to account for environmental risks would be particularly challenging. As compared to corporate exposures, it is far less clear to determine which of the retail exposures could be considered green or environmentally harmful. Furthermore, the scope of information available to institutions as well as access to potential additional information about the retail clients is much more limited. Finally, existing research on risk differentials is not sufficient to warrant an assessment of potential adjustments to the framework.

5.2.3. Preliminary conclusions and discussion points

101. The SA is designed to balance simplicity and risk sensitivity and tends to be used by smaller banks for capital determination purposes, as it requires less sophisticated risk management measurement and management practices. Environmental risks should be better reflected in the framework, while avoiding excessive complexity, which may be achieved through the following tools:
- External credit assessments have the possibility and will be encouraged to integrate environmental risks over time, although at the moment the integration of environmental elements varies across rating agencies, with further assessment needed on the robustness of the methodologies and the level of transparency.
 - Due diligence requirements may be broadened to explicitly integrate environmental risks, which would be further facilitated by the recent policy initiatives to improve market disclosure of environmental considerations for companies and CRAs. When applying this requirement to smaller credit institutions, the proportionality principle should also be considered.
 - Environmental risks may already be indirectly embedded in CRM through the valuation of collateral and should be increasingly embedded in its re-evaluation over time.
 - For exposures secured by immovable property, the CRR3 proposal includes a clarification that energy efficiency improvements unequivocally increase the property value, which may support the objective to achieve a more risk-sensitive capital treatment. This, however, does not consider the potential negative correlation between energy efficiency and the PD of borrowers which comes in addition to the positive relationship between energy efficiency and property value.



- e. Any adjustments to the framework should be risk-based:
- i. Further empirical evidence on risk differentials should be collected prior to proposing any amendments, as existing analysis is limited in some areas (corporate, retail) or may benefit from closing data gaps and enhanced representativeness (exposures secured by immovable property).
 - ii. While the EU Taxonomy could give room for further differentiation of corporate exposures, a prudential treatment would need to rely on a risk-based assessment which the taxonomy is not designed to provide.
 - iii. The Pillar 1 framework is designed to account for potential unexpected losses related to existing exposure values net of credit risk adjustments. These exposure values may already capture a forward-looking assessment of expected losses, given the accounting treatment of exposures under IFRS 9, as well as specific treatment of defaulted exposures.

Questions for public consultation:

Q10: What are the main challenges that credit rating agencies face in incorporating environmental considerations into credit risk assessments? Do you make use of external ratings when performing an assessment of environmental risks?

Q11: Do you see any challenge in broadening due diligence requirements to explicitly integrate environmental risks?

Q12: Do you see any specific aspects of the CRM framework that may warrant a revision to further account for environmental risks?

Q13: Does the CRR3 proposal's clarification on energy efficiency improvements bring enough risk sensitiveness to the framework for exposures secured by immovable properties? Should further granularity of risk weights be introduced, considering energy-efficient mortgages? Please substantiate your view.

Q14: Do you consider that high-quality project finance and high-quality object finance exposures introduced in the CRR3 proposal should potentially consider environmental criteria? If so, please provide the rationale for this and potential implementation issues.

Q15: Do you consider that further risk differentiation in the corporate, retail and/or other exposure classes would be justified? Which criteria could be used for that purpose? In particular, would you support risk differentiation based on forward-looking analytical tools?

Q16: Do you have any other proposals on integrating environmental risks within the SA framework?

5.3. Internal Ratings Based Approach

5.3.1. Overview of the framework

102. To assess how environmental factors interact with the credit risk framework when IRB models are used, it is useful to recall first the key features of the IRB Approach. Under this approach, institutions calculate own funds requirements by determining four regulatory parameters: the PD, the LGD, the CCF and the Maturity (M). The PD, LGD and M parameters are then plugged into the regulatory risk weight function, whereas the CCF is used to determine the exposure value. The relevant parameters are determined in the following manner:
- a. For all IRB exposure classes, with the exception of the specialised lending exposures under the so-called slotting approach ^[82], institutions estimate PDs by grade or pool from long-run averages of one-year default rates ^[83]. The slotting approach is discussed in a specific subsection below.
 - b. For retail exposures and other exposures for which the institution has the permission of the competent authority to estimate LGDs and CCFs, these should be estimated by facility grade or pool and should be appropriate for an economic downturn (if more conservative than the long-run average) ^[84]. For non-retail exposures, in the case where the institution does not have the permission to use own estimates, regulatory values of LGD and CCF parameters should be used ^[85].

^[82] Other approaches not relying on PDs are also available for the equity exposures. However, these exposures are no longer in the possible scope of IRB models in the final Basel III framework and are hence left out of this section.

^[83] Article 180(1)(a) and (2)(a) of the CRR.

^[84] Article 181(1)(a), (b) and 182(1)(a), (b) of the CRR.

^[85] For the rest of the Discussion Paper, unless specified otherwise, the requirements for the LGD and CCF models apply only to institutions allowed to use own estimates. The cases where regulatory values are used (the so called 'F-IRB Approach') are discussed in a specific subsection.



- c. M is calculated directly for the non-retail exposures and does not need a dedicated model. The M factor in the risk weight function for non-retail exposures recognises the potential for reductions in the obligor's credit quality over the lifetime of the exposure. Where the institution does not have permission to use own estimates of LGDs and CCFs, or has not received the permission referred to in Article 143 of the CRR, regulatory values of M should be used ^[86]. For retail exposures M is not used in the risk weight function, but the average duration of exposures is to some extent reflected in the calibration of the applicable correlation coefficients ^[87].
103. Where own estimates of risk parameters are used, the following steps can be identified in the IRB framework for the estimation process and determination of own funds requirements:
- a. **Step 0 – Establishing of the 'reference data set' (RDS):** the institution should collect all necessary data, i.e. it should be in a position to identify all historical defaults and calculate realised credit losses and their components (i.e. economic loss and realised LGDs, and realised CCFs), as well as collect data on all relevant risk drivers that will be necessary in the model development (in particular under step 1a).
 - b. **Step 1a – Development of the rating system using historical data, risk differentiation:** the model should allow for a meaningful differentiation of risk ^[88] (i.e. appropriate discriminatory power) in order to ensure the grouping of sufficiently homogenous exposures (i.e. obligors or facilities) into the same grade or pool.
 - c. **Step 1b – Development of the rating system using historical data, risk quantification:** institutions estimate PDs by grade or pool (determined in step 1a) from long-run averages of one-year default rates, whereas LGD and CCF estimates are produced by facility grade or pool (determined in step 1a) from the long-run average of realised LGDs and CCFs, and institutions have to use downturn LGD or CCF estimates where these are more conservative than the corresponding long-run average. During this quantification step, the estimates of risk parameters may be increased by a margin of conservatism.
 - d. **Step 2a – Application of the rating system to the current portfolio:** based on the implemented models (step 1), the risk estimates are assigned to each exposure in the application portfolio.
 - e. **Step 2b – Calculation of own funds requirements:** the risk parameters are plugged into the applicable RW formula ^[89] and the exposure value of certain off-balance-sheet items is calculated using the CCF parameters, to eventually derive the own funds requirement for the exposures. Where institutions do not have permission to estimate certain risk parameters, e.g. using the IRB Approach without using own estimates of LGDs and CCFs (F-IRB Approach), the regulatory values are used.
104. It should also be recalled that the use of the IRB Approach is subject to a number of other requirements, and in particular some linked with risk management processes and corporate governance, such as:
- a. use test, introduced in the IRB Approach to ensure a high quality of risk parameters, under the assumption that institutions would not use the estimates of risk parameters for internal risk management if they did not have confidence that these estimates appropriately reflect the actual level of risk ^[90];
 - b. independence of the model development function (the credit risk control unit) from the business functions responsible for originating or renewing exposures ^[91];
 - c. regular reviews of the performance of the model and independent assessments by an independent validation function and the internal audit ^[92];
 - d. involvement of the management body and senior management in the implementation and maintenance of rating systems, as well as robust management information systems ^[93];
 - e. appropriate implementation of capital adequacy stress testing programmes.
- 5.3.2. Interaction between environmental risks and the IRB framework**
105. This section uses the different steps identified in the previous section to identify areas where environmental risks are or could be better integrated into the IRB framework, in particular when own estimates are used.

^[86] Article 162(1) of the CRR.

^[87] An Explanatory Note on the Basel II IRB Risk Weight Functions is available on the [BIS website](#).

^[88] Article 170(1) and (3) of the CRR.

^[89] Article 153 and 154 of the CRR.

^[90] Articles 144(1)(b) and 145 of the CRR.

^[91] Article 190 of the CRR.

^[92] Articles 185 and 191 of the CRR.

^[93] Article 189 of the CRR.



BOX 2: THE RISK WEIGHT FORMULA (extract from BCBS explanatory note) ^[94]

The Basel risk weight functions used for the derivation of supervisory capital charges for Unexpected Losses are based on a specific model developed by the Basel Committee on Banking Supervision (BCBS). It uses the so-called Asymptotic Single Risk Factor models to derive a portfolio invariant capital charge for each exposure:

- To calculate the conditional expected loss, bank-reported average PDs [*i.e.* PDs estimated by the institution based on the long-run average default rate] are transformed into conditional PDs using a supervisory mapping function. The conditional PDs reflect default rates given an appropriately conservative value of the systematic risk factor. The same value of the systematic risk factor is used for all instruments in the portfolio. Diversification or concentration aspects of an actual portfolio are not specifically treated within an ASRF model.
- In contrast to the treatment of PDs, Basel II does not contain an explicit function that transforms average LGDs expected to occur under normal business conditions into conditional LGDs consistent with an appropriately conservative value of the systematic risk factor. Instead, banks are asked to report LGDs that reflect economic downturn conditions in circumstances where loss severities are expected to be higher during cyclical downturns than during typical business conditions.

^[94] BCBS [2005], An Explanatory Note on the Basel II IRB Risk Weight Functions ([link](#)).

The conditional expected loss for an exposure is estimated as the product of the conditional PD and the 'downturn' LGD for that exposure. Under the ASRF model the total economic resources (capital plus provisions and write-offs) that a bank must hold to cover the sum of unexpected losses and expected losses for an exposure is equal to that exposure's conditional expected loss. Adding up these resources across all exposures yields sufficient resources to meet a portfolio-wide Value-at-Risk target.

It should be noted that the conditional PD not only depends on the unconditional PD, but also on a parameter representing the correlation among the individual exposures within the portfolio and the systematic risk factor of the ASRF model.

The single systematic risk factor needed in the ASRF model may be interpreted as reflecting the state of the global economy. The degree of the obligor's exposure to the systematic risk factor is expressed by the asset correlation. The asset correlations, in short, show how the asset value (e.g. sum of all asset values of a firm) of one borrower depends on the asset value of another borrower. Likewise, the correlations could be described as the dependence of the asset value of a borrower on the general state of the economy – all borrowers are linked to each other by this single risk factor. The asset correlations finally determine the shape of the risk weight formulas [*i.e.* the conditional PD and as such the final RW]. They are asset class-dependent, because different borrowers and/or asset classes show different degrees of dependency on the overall economy.

a. Reference data set (RDS) – defaults, realised LGDs and CCFs, risk drivers

106. As a first observation, it should be noted that environmental risks may not be directly linked with the mere identification of the defaults ^[95] nor with the actual calculation of realised LGDs and CCFs. It could, however, be further discussed if the materialisation of some environmental risk factors could be considered as unlikelihood to pay, as Article 178 (3) of the CRR does not provide a comprehensive list of all situations that may indicate the unlikelihood to pay (and hence default) of an obligor.
107. Furthermore, with respect to the identification of relevant environmental risk drivers, as explained in Section 4.3 on data challenges, this is not an easy task and institutions may struggle to ensure the comprehensiveness of the RDS. This is all the more relevant for past exposures for which information on environmental risks was not necessarily collected, as any retrospective assignment of risk drivers not previously collected (*i.e.* database completion) is

challenging. Hence, while many environmental risk drivers are currently expected to be already collected (e.g. the geographical location, the value and nature of the collateral or the sector of the corporates), residual data gaps still exist. Additionally, even where environmental risk drivers are being collected, the frequency and impact of environmental risk events is likely to increase in the future which cannot be observed in the past. In this context, further guidance could be beneficial regarding data collection on potential risk drivers, which would then be analysed by institutions in terms of relevance for the design of the rating model. ^[96] However, at this stage it would be difficult to specify such a list of potential risk drivers, and this could hinder innovation, as institutions should be encouraged to continue research and development of modelling practices also in the absence of such list.

108. One specific element of the RDS used to derive LGD is the valuation of the collateral. The prudential requirements for the SA and F-IRB Approach include

^[95] Article 178 of the CRR.

^[96] In practical terms, this could be achieved by extending the list provided in sections 5.2.2 and 6.2.1 of the EBA Guidelines on PD and LGD estimation.

some principles for valuation, but they do not specify detailed valuation standards. In order to avoid fragmentation of practices, the prudential framework refers to market values, where independent valuers are expected to follow comprehensive valuation standards applicable to a given type of assets, including immovable and movable properties. Already now valuations often include certain elements of environmental risks (for instance, factors such as energy efficiency and location in areas affected by floods are taken into account in valuations of immovable properties). It can be expected that valuation standards will further develop over time to include more explicitly and comprehensively the environmental risk factors. So far, under the A-IRB Approach, the framework requires institutions to establish internal requirements for collateral management, legal certainty and risk management that are generally consistent with the ones applicable under the F-IRB Approach and SA. Nevertheless, one may consider whether additional requirements could be specified for the valuation principles, to explicitly point out the need to consider environmental aspects.

b. Development of the rating system, risk differentiation

109. With respect to the development of the model, it is useful to recall that all relevant information should be taken into account when assigning obligors or facilities to grades or pools. Information should be current and should enable the institution to forecast the future performance of the exposure^[97]. In this context, many environmental risks may already be factored in, to the extent that they are part of the RDS and have led to a materialisation of defaults, realised losses or drawdowns (and hence potentially lower than that expected to occur in the future). In addition, the design of the model leaves some room for human judgement^[98], including the possibility to have subjective input data via expert judgement. Hence, even if environmental risks could not be translated into observable metrics or the observed metrics do not accurately reflect the future performance of exposures, they could still be captured in the model via expert-based qualitative variables. This is of particular importance with regard to the expected increase in the frequency and impact of environmental risks^[99]. Lastly, in the case where environmental risks have led to a materialisation of credit risk in the past, this will already be captured in the performance metric of the model, and a failure to capture them would be considered as a deficiency of the model under the current rules of the framework.

^[97] Article 171(2) of the CRR.

^[98] Articles 172(3) and 174(e) of the CRR.

^[99] See, for example, the IPCC's Sixth Assessment Report, Working Group II contribution: Impacts, Adaptation and Vulnerability.

BOX 3: THE DIFFERENT FORMS OF HUMAN JUDGEMENT

The human judgement refers to three particular notions:

- the human judgement applied in the development of the model used for assigning exposures to grades or pools^[100];
- the human judgement applied in the process of assignment of exposures to grades or pools, in the form of subjective input data (such as qualitative variables based on an expert-based assessment) – this is in particular the case for the slotting approach for specialised lending exposures;
- the human judgement in the form of overrides, either of inputs or of outputs of the assignment process^[101].

^[100] Article 42(a) and (d) of the RTS on assessment methodology, section 4.3 of the GL on PD and LGD estimations.

^[101] Articles 24(2) and 42(b) and (d) of the RTS on assessment methodology, section 8.2 of the GL on PD and LGD estimations.

110. Another question relates to whether environmental risks which have not led to historical credit losses, but are expected to do so, could still be captured in the model (for instance via expert adjustments in the rating function). While this would be possible (and is to some extent already foreseen in the current framework), it may impede model performance evaluation. As the performance of a model is mostly evaluated on past data (e.g. a GINI test can only be applied on past observed defaults) it will be challenging to assess the performance of the rating assignment function when the environmental risk factors have not yet materialised. On the one hand, an unintended consequence could be the risk of authorising models with lower predictive power, under the assumption that poor observed performance is mainly due to the lack of historical observations of environmental risks (hence being in conflict with Article 174(a) of the CRR). The integration of environmental risks beyond what is supported by observations would likely result in a deterioration of model performance. On the other hand, models built solely on historical data may not be well-suited for predicting future defaults/losses, when the frequency and magnitude of environmental risks is likely to be different from past observations.
111. Following the latter argument, it should be kept in mind that the design of an IRB model is not solely based on optimisation of quantitative performance metrics, but also includes expert judgement: the adequacy of the selected risk drivers and rating criteria is assessed both in terms of consistency with the results of statistical tests and with business expectations^[102]. In fact, restricting the model design to the use of his-

^[102] Article 171(1)(c) of the CRR, Article 35(1)(b) of the RTS on assessment methodology.



torical data only that do not allow to account for the expected future changes, such as increased impact of environmental risk drivers on credit risk, would not be desirable from a prudential point of view. Nevertheless, this flexibility is not expected to be used to allow for models to continuously underperform from a quantitative point of view, and as such environmental risks could only be incorporated to the extent that they are expected to materialise in a relatively short term. However, in the case of missing relevant environmental risk drivers, as soon as the related defaults and losses would start to materialise the deterioration of the model performance would be assessed in an early phase through the existing mechanism of annual review of estimates (as discussed below). In this case the rating system may need to be redesigned.

- 112. It is also worth noting that the uncertainty on the risk differentiation part of the model cannot easily be tackled by ad hoc conservatism, as this would break the homogeneity within grades or pools (with therefore unpredictable effects on final own funds requirements, i.e. a conservatism implemented in the risk differentiation does not necessarily lead to more conservative own funds requirements).

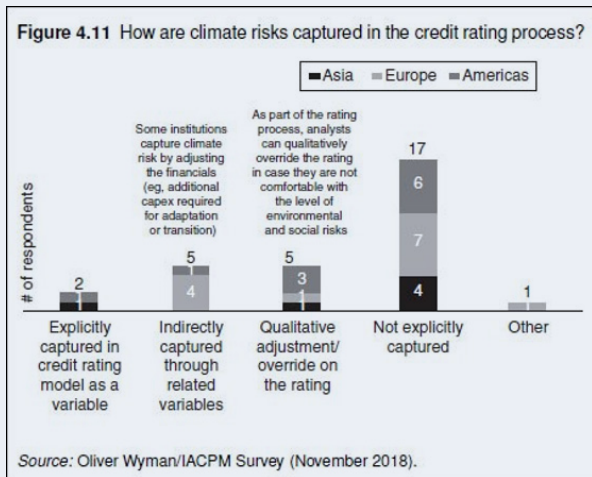
BOX 4: CONSERVATISM IN THE RATING ASSIGNMENT IN THE DEVELOPMENT SAMPLE AND IN THE APPLICATION PORTFOLIO ^[103]

To ensure that RWAs are calculated in a conservative way, IRB models need generally to be applied in a conservative manner, i.e. the rating assignment process itself is required to be conservative. This requirement is frequently implemented by e.g. using conservative assumptions in the case of a lack of information or missing risk drivers.

In contrast to that, when it comes to model development and risk quantification, it is important that the risk quantification is based on an accurate rating assignment. To base the risk differentiation and quantification on a conservative rating assignment will not necessarily lead to more conservative risk parameters.

^[103] Q&A 2021/5761 (link)

BOX 5: OBSERVED PRACTICES OF CLIMATE, ENVIRONMENTAL AND OTHER ESG RISKS INTEGRATION IN CREDIT MODELS



A survey conducted by Oliver Wyman and the International Association of Credit Portfolio Managers (IACPM) in 2018, involving 45 banks across the globe, showed that practices across banks vary, with many of them back then stating that climate risks are not yet captured in their credit rating process. ^[104] Given that the survey was conducted four years ago, some progress might be observed since then.

The Institute of International Finance (2021) ^[105] reports that some banks are aiming to arrive at 'climate-adjust-

ed' PD and LGD estimates based on credit risk models and a form of 'ESG screening' of clients. Firms' approaches employ a range of quantitative and qualitative data, as there is not yet a broadly agreed quantitative approach or sufficient data for mapping to credit risk model parameters. Indeed, insufficient data and few metrics are available to build or back-test statistical models, and what is available is usually limited to specific exposures (e.g. mortgages in a specific geography). At best, firms can derive directional estimates of the impact on PD and LGD, which can still prove useful for strategic decision making.

BlackRock ^[106] finds that, with respect to credit models, and specifically for PD and LGD assessment, banks see a two-step approach as more practical at the current stage. In a first step, this requires a traditional model-driven credit rating PD/LGD assessment, and in a second step it involves expert judgement 'notching and de-notching' ratings. Some banks stated, in the survey which informed BlackRock's report, to have integrated ESG considerations indirectly through input factors into existing PD models for corporate lending. The latter was done, for instance, in the qualitative obligor assessment. Lack of evidence as to how different asset classes are affected by ESG risk is mentioned by banks as inhibiting the integration of ESG considerations into risk parameters.

^[104] IACPM/Oliver Wyman (2018), 'Climate Change – Managing a New Financial Risk' (link).

^[105] Institute of International Finance (2021), 'Prudential Pathways: Industry Perspectives on Supervisory and Regulatory Approaches to Climate-related and Environmental Risks' (link).

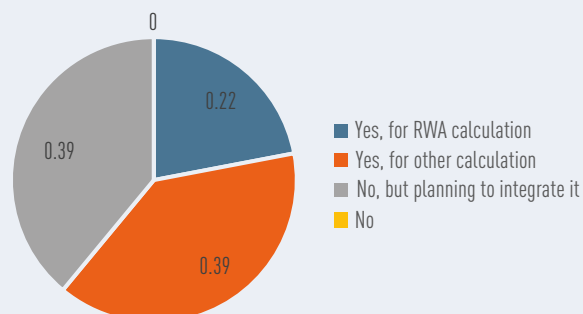
^[106] BlackRock Financial Market Advisory (2021), 'Development of tools and mechanisms for the integration of ESG factors into the EU banking prudential framework and into banks' business strategies and investment policies: Final study' for the European Commission (link).

According to several surveys, only a very limited number of banks have directly integrated environmental factors into internal risk parameters and models. These factors are so far typically not integrated into models used for the calculation of capital requirements due to i) the lack of regulatory guidance; ii) limited evidence of environmental risk materiality and impact; as well as iii) concerns related to quantification methodologies under different time horizons.

Banks that have integrated environmental (or broader ESG) factors into models mentioned that they have done so in models with an impact on credit ratings. This can be done by adjusting other variables in their credit risk models, by applying a quantitative overlay (e.g. an ESG score) to their rating models, or by making a qualitative override to their internal credit ratings. Among the banks which have started to capture these factors, some form of qualitative integration seems to be dominant. However, all surveys concur in finding that only

a minority explicitly integrate environment or climate-specific variables into their models of credit risk.

Figure 5: Direct incorporation of ESG risks into existing parameters/models



Source: BlackRock FMA Study (2021) ^[107]

^[107] Ibid.

c. Development of the rating system, risk quantification

113. With respect to the risk quantification, there are several ways in which environmental risks could potentially be factored in under the framework.
114. When quantifying the PD based on the default rate long-run averages, institutions should ensure that these are 'representative of the likely range of variability of default rates for that type of exposures' and adjust the estimates if they are not ^[108]. According to EBA Guidelines on PD and LGD estimation, institutions need to take into account 'significant changes in the economic, legal or business environment' when assessing the representativeness of the historical data ^[109]. Hence, environmental risks may in principle be reflected in the PD estimates.
115. The LGD and CCF estimates must be adequate for downturn conditions. The details associated with these estimations have been clarified by two products: RTS, which define the nature, severity and duration of the economic downturn, and Guidelines, which clarify how the estimation of the LGD appropriate for an economic downturn should be performed. One may argue that the downturn nature of the estimates should theoretically already include any environment-related deterioration of conditions, at least to the extent that environmental risks have contributed to an economic downturn affecting aggregate macroeconomic and credit-related indicators. However, although market conditions caused by environmental risks might resemble those of an economic downturn, they significantly differ in nature. The economic downturn is expected to have some cyclicity, while an 'environmental downturn' may be unprecedented

(in particular if it is due to the materialisation of a non-cyclical transition risk, but also to some extent for physical risk as the previous realisations were more local than a potential future global 'physical risk downturn'). Therefore, the 'environmental downturn' may be difficult to validate given that empirical data are likely to be insufficient to assess its robustness.

116. With regard to the estimates of all risk parameters, the CRR requires institutions to apply a margin of conservatism to address any deficiencies and uncertainties in the data or modelling methodologies. This is further explained in section 4.4 of the EBA Guidelines on PD and LGD estimation. In principle, missing data on environmental risks may call for additional margins of conservatism, both under current category A (e.g. missing or outdated data on risk drivers and future recoveries and missing information for the purpose of reflecting economic downturn in LGD estimates) and category B (e.g. changes to the market or legal environment or forward-looking expectations) ^[110]. However, under the current framework, the additional margin of conservatism is quantified based on existing data. The difference in practices may then increase the non-risk-based variability and in turn affect the comparability of solvency ratios.
117. Lastly, it is also useful to recall that the estimates are rarely associated with a particular exposure, and rather apply at a more aggregated level, such as to a specific grade or pool. Therefore, any change related to environmental risks in the estimates (e.g. add-ons or additional MoC) would apply subsequently to all exposures falling into that grade or pool, including exposures not particularly impacted by these environmental risks. Therefore, any adjustments to the risk estimates would have to be complemented by the representativeness analysis of the sample used

^[108] See Article 48 (Article 46 in the Commission's act) of EBA (2016), 'Final Draft RTS on Assessment Methodology' ([link](#)).

^[109] See item 83, letter c of EBA (2017), 'Guidelines on PD Estimation, LGD Estimation and the Treatment of Defaulted Exposures' ([link](#)).

^[110] See section 4.4 of EBA (2017), 'Guidelines on PD Estimation, LGD Estimation and the Treatment of Defaulted Exposures' ([link](#)).



for risk quantification vis-à-vis the application sample^[111], with potential unintended consequences such as frequent recalibration needed and lack of stability of risk parameters. A potential way to circumvent this particular issue would be to introduce some 'calibration segments', where the risk quantification would be performed separately between exposures impacted or not by environmental risk drivers. While, in a similar way to what was discussed in the previous section, the difficulty of this approach would be to identify these drivers, it would have the advantage of not distorting the risk differentiation.

d. Application of the rating system

118. With respect to the application of the model, while the assignment of exposures to grades or pools should generally use the model developed in the previous steps, the CRR mentions the possibility of further adjustment, either in the form of ad hoc conservatism, for instance in the case of a lack of information^[112], or in the form of overrides, for instance in the form of a rating upgrade or downgrade^[113]. These ad hoc exposure-specific adjustments, if applied solely in the application phase, do not require changes in the risk quantification and have the benefit of not impeding the quality of the model or impacting the risk estimates of other exposures. However, the override policy would in any case have to be well justified and should not be used excessively, such that the model itself would be undermined. In some ways, setting up a comprehensive environmental-risk-related overrides policy to some extent faces similar challenges to the ones mentioned in the development of the model (i.e. difficulty in selecting relevant environmental risk drivers and environmental information in general, as well as in the possibility to integrate forward-looking drivers that will not materialise in the short term). While the overrides are not intended to be a substitute for the model in general^[114], they could address some specific, individual cases, until the relevant drivers are incorporated into the model to apply more broadly to the whole portfolio of exposures.

119. The CRR explicitly mentions the need for conservatism in the estimates in some specific cases (see Box 6 below). It may be considered whether similar provisions could be clearly defined with respect to environmental risks, to ensure sufficient prudence in cases where obligors, assets or collaterals are exposed to high environmental risks. These considerations may, however, only partially address the recognition of environmental risks in the Pillar 1 framework considering that its use is largely an-

chored in historical data. The emergence of unprecedented economic fluctuations driven by environmental risks may limit the usefulness of these areas of flexibility to capture environmental risks.

BOX 6: CONSERVATIVE REQUIREMENTS IN THE CRR

The CRR explicitly mentions several areas whereby institutions should ensure sufficient prudence:

- for exposures to corporates, institutions, central governments and central banks, where the obligors are highly leveraged or with predominantly traded assets, that the PDs reflect the performance of the underlying assets in the periods of stressed volatility^[115];
- in the case of LGD, for where there is a significant degree of dependence between the risk of the obligor and that of the credit protection or provider of credit protection^[116] as well as currency mismatches between the obligation and the credit protection^[117];
- in case of CCF, for where a stronger positive correlation can reasonably be expected between the default frequency and the magnitude of CCF^[118].

^[115] Article 180(1)(a) of the CRR.

^[116] Article 181(1)(c) of the CRR.

^[117] Article 181(1)(d) of the CRR.

^[118] Article 182(1)(c) of the CRR.

e. Calculation of own funds requirements

120. With respect to the calculation of the own funds requirements, while the RW formula does not explicitly refer to environmental risks, it provides some additional elements and further differentiation, which to some extent may indirectly capture certain environmental aspects.

121. On the PD side, the Basel risk weight function is already using different correlation coefficients between the retail and non-retail exposure classes but also within the retail exposure class via different fixed values for qualifying revolving and real estate exposures. In addition, a specific adjustment is performed for small and medium-sized enterprises based on the value of the annual sales for the consolidated groups the firm is part of, as well as for large and unregulated financial entities. It could therefore be discussed if further differentiation could be introduced in the RW formula based on environmental risks, and in particular on the relation between the capital requirements and the systemic risk. Theoretically, such differentiation could be justified if the status of the economy impacts environmentally harmful assets or assets subject to environmental impacts to a different degree from other exposures, i.e. if the risks faced by such assets are less idiosyncratic and more systematic in nature. For example, exposures subject to transition

^[111] So far, section 4.2.4 of the GL on PD and LGD estimations mentions five dimensions related to this representativeness analysis: (1) scope of application, (2) definition of default, (3) distribution of relevant risk characteristics, (4) the current and foreseeable economic or market conditions and (5) lending standards and recovery policies.

^[112] Article 171(2) of the CRR.

^[113] Article 172(3) of the CRR.

^[114] Article 24(2)(e) of EBA (2016), Final draft RTS on assessment methodology ([link](#)).

risk are likely to be all affected by sudden public policy changes. This would, however, come with difficulties similar to the ones previously mentioned in the development and application of the model:

- a. It would be very difficult at this stage to find common and objective differentiating factors (for instance, exposures subject to transition risk may not be equally affected by policy changes depending on their transition plans).
- b. It would also be very difficult to determine appropriate levels of any adjustments, given the lack of evidence supporting the calibration.
- c. This regulatory adjustment could potentially take various forms and hence the exact functional form of the adjustment would have to be carefully considered in order to ensure the overall consistency and robustness of the framework.
- d. Double counting should be avoided between the potential adjustment and the estimates used as inputs to the formula (in particular the downturn estimates).

122. The maturity adjustment factor is solely based on the PD and maturity of the exposures, with the latter being capped and floored at five and one year (s) respectively. It can be argued that exposures with longer maturities are more exposed to environmental risks, which can materialise over longer time horizons. While this is already captured by the maturity adjustment factor, the fact that M is capped at five years allows efficient long-term financing, which is particularly needed in the context of the transition to an environmentally sustainable economy.

f. Simplified approaches – slotting approach and F-IRB

Slotting approach

123. Institutions have the option to apply a specific approach for the specialised lending exposures, in the case where they are not able to estimate PDs for those exposures. Under this approach, institutions solely develop the assignment methodology of exposures into five categories, using a set of prescribed factors, and do not need to perform the risk quantification step described above. The RW for each risk category is prescribed in the regulation ^[119]. The use of the factors has been further specified in the Commission Delegated Regulation (EU) 2021/598 ('RTS on slotting approach') ^[120], which leverages heavily on Annex 6 of the Basel II standard.
124. As such, the slotting approach makes an extensive use of human judgement in the form of subjective input data (such as qualitative variables derived from an expert-based assessment and weights applied for their aggregation). While environmental risk drivers are not directly mentioned in the set of sub-factors

to be considered in the RTS on the slotting approach, they are nonetheless indirectly captured by some of the sub-factors (for instance, 'stress analysis on the basis of the income being generated during the tenor of the loan', 'insurance against damage', 'political and legal environment' as well as 'security package') and can anyway be added as additional sub-factor components ^[121]. For real estate, the LTV also plays a role in the assignment of the risk weight category (sub-factor of financial strength). It should therefore be assessed whether the regulation could be more explicit on where to incorporate environmental risks (i.e. in which sub-factor and the resulting risks category) exactly ^[122].

125. Another element is the general calibration of the RW associated with each category, along with the related expected losses ^[123]. In the absence of empirical data on environmental-risk-related losses on specialised lending exposures, any recalibration would necessarily be highly speculative, with a risk of double counting if environmental risks is already taken into consideration in the risk category assignment.

F-IRB Approach

126. Under the Foundation IRB Approach (F-IRB Approach), which is available for all non-retail exposures, institutions have to use regulatory values for the LGD and CCF parameters, without building a specific model or performing risk quantification as described above. Leaving aside the CCF, for which the impact of environmental risks would be expected to be generally more limited, on the LGD side it is worth noting that the drivers used for the differentiation in this approach indirectly and partially capture environmental risks. This is because, apart from the seniority of the exposures and their exposure class ^[124], the LGD values depend on the credit risk mitigation associated with each exposure, which factors in environmental risks indirectly (e.g. via the value and haircuts used for funded credit protection, and via the credit risk of the guarantor in the case of unfunded credit protection).

127. However, in a similar way to the case of the slotting approach, the general calibration of risk parameters, including the ones related to the credit risk mitigation, could be reassessed in light of future environmental risks. Yet, at this stage, such an assessment would not be possible due to lack of evidence on a risks differential and the respective levels of losses. For reasons similar to the ones mentioned in the previous section, it would also not be straightforward at this stage to find common and objective new differentiating factors to be added in the F-IRB Approach.

^[119] Article 153(5) of the CRR.

^[120] European Commission (2021), RTS on slotting approach [\[link\]](#).

^[121] Article 3(3) of European Commission (2021), RTS on slotting approach [\[link\]](#).

^[122] Some further clarification could, however, be given for commodity finance.

^[123] Article 158(6) of the CRR.

^[124] Senior claims on other corporates that are not secured by recognised collateral benefit from lower regulatory LGDs.



g. General considerations on stress tests

128. Finally, in accordance with Article 177 of the CRR, banks using an IRB Approach to determine their own funds requirements for credit risk are required to have in place sound stress testing processes and regularly perform a credit risk stress test to assess the effect of certain specific conditions on their total capital requirements for credit risk.
129. The exact design of the stress test is currently left to the institution, though subject to a supervisory assessment. It is required that the test should be meaningful and consider the effects of severe, but plausible, recession scenarios. While there is no impediment under the current framework to incorporating environmental components in the stress test scenario, further specification could be considered to explicitly require banks to use environmental components in their stress test scenarios.

5.3.3. Preliminary conclusions and discussion points

130. The IRB Approach is by design more risk-sensitive than the Standardised Approach, and as such is able to better capture any (new) risk that could result in credit losses. A prerequisite for good modelling is availability of adequate data, therefore ensuring appropriate data gathering and RDS completeness is of crucial importance.
131. However, given that most environmental risks have likely not fully materialised yet, or not in the expected frequency or with the expected impact on credit risk, this raises the question as to the need to improve forward-looking modelling to capture the unprecedented nature and expected changes in the character of these risks and to develop potential further guidance in that regard. In this context, it is necessary to carefully assess in which part of the IRB framework such forward-looking perspective would be appropriate, having in mind specific challenges and consequences. It could therefore be discussed, among other things:
- whether the rating assignment (i.e. risk differentiation step) should be complemented by additional risk drivers, that are based on qualitative judgements embedding environmental risks in the internal credit ratings, or via some sensitivity and scenario analyses – it should, however, be kept in mind that any change in this early step of the modelling impacts the risk quantification (and is hence not necessarily more conservative in terms of own funds requirements);
 - whether the risk quantification should incorporate additional environmental considerations, such as, for instance, margin of conservatism, adjustments to reflect 'environmental downturn' conditions, or calibration segments;
 - whether environmental factors should be considered in the application of the rating system, for instance through overrides;
 - whether the calculation of RWA should be amended, for instance via changes in specific elements of the risk weight formula such as the correlation coefficients, or the systemic risk factors, subject to an appropriate classification of environmental risks. Additional consideration would have to be given to the LGD and CCF parameters, as well as to preventing any double counting if similar factors have already been incorporated in the modelling.
132. The aim of any adjustments in the IRB framework should be to increase the accuracy of credit risk measurement and therefore they should not lead to an undue decrease in the model performance, despite potentially higher reliance on experts' judgement. As such, further incorporation of forward-looking elements in the Pillar 1 framework should be anchored in available empirical evidence on the impact of climate change and environmental degradation. Thus, one key aspect is to find the appropriate balance between the need for accurate model predictions and undue variability among institutions created in the case of too much reliance on subjective assessment of the forward-looking elements. This might require increased scrutiny by competent authorities in their review processes.

Questions for public consultation:

Q17: What are your views on the need for revisions to the IRB framework or additional guidance to better capture environmental risks? Which part of the IRB framework is, in your view, the most appropriate to reflect environmental risk drivers?

Q18: Have you incorporated environmental risks or broader ESG risk factors in your IRB models? If so, can you share your insight on the risk drivers and modelling techniques that you are using?

Q19: Do you have any other proposals on integrating environmental risks within the IRB framework?

5.4. Adjustment factors

133. Capital requirements could be adjusted upwards or downwards to support or limit lending to certain sectors. The current credit risk prudential framework includes two such non-risk-based supporting factors, tailored to SMEs and infrastructure projects. In addition, environment-related adjustment factors are frequently discussed, which would increase capital requirements for environmentally harmful exposures or decrease capital requirements for environmentally sustainable exposures, and thus dis-

incentivise or incentivise financing according to environmental impact. These adjustment factors are often presented in the form of (green) supporting or (brown)^[125] penalising factors.

5.4.1. Current supporting factors in the regulation

134. The factors supporting SMEs and infrastructure projects are EU-specific departures from the Basel standards. The mechanism is to provide a downward adjustment in risk-weighted exposures by applying a discount factor to exposures meeting certain eligibility criteria. Both the SA and the IRB Approach are within the scope of these supporting factors. The EBA has advocated their removal from the prudential framework^[126], on the basis that adjustments should be grounded on risk-based considerations. In the context of the implementation of the Basel III reforms, these supporting factors may imply double counting of preferential treatments for SMEs.
135. Under the SA framework, retail SMEs attract a preferential risk weight of 75%, while the CRR3 proposal maintains a risk weight of 100% for unrated corporate SMEs and for larger unrated corporates. This preferential treatment embedded in the regulation may be further compounded by the capital relief in a second stage through the SME supporting factor, which applies an adjustment of 0.7619 to the part of the SME exposure up to EUR 2.5 million, while the adjustment is set to 0.85 for the part exceeding that threshold. Under the IRB Approach, the risk sensitivity inherent in the approach already implies a risk differentiation that may not require further adjustments.
136. The infrastructure supporting factor attracts a discount of 25% of risk-weighted exposure amounts, subject to meeting certain criteria. At the same time, the CRR3 proposal introduces a distinct treatment for a new sub-class of SA corporate exposures to project finance, where unrated high-quality exposures are assigned a preferential risk weight of 80%, provided that the infrastructure supporting factor is not applied, that 80% of the project to which the exposure is related is in the operational phase and that the exposure meets a number of criteria^[127]. Considering the very similar mechanics of these tools, the framework could be simplified by only keeping one of them, with potentially adjusted criteria.
137. It should be noted that one of the criteria to which the application of the infrastructure supporting factor is subject relates to environmental aspects. The criterion requires the obligor to have assessed whether the project in question contributes to environmental

objectives^[128]. However, it does not require the institution to verify such an assessment and the application of the supporting factor does not depend on the results of such an assessment. Should the infrastructure supporting factor remain part of the framework, consideration could be given to strengthening this criterion by not only requiring an obligor to carry out such an assessment, but by allowing application of the supporting factor only in cases in which the project contributes to one or more of the environmental objectives, while not inflicting significant harm on any of the remaining environmental objectives. This would reflect the lower transition risk of such projects, as well as allowing projects with higher transition risk to be excluded from the application of the supporting factor. In order to ensure the robustness of the framework the criteria for the supporting factor should be specified in a way to reflect the higher credit quality of exposures subject to the preferential treatment.

Question for public consultation:

Q20: What are your views on potential strengthening of the environmental criterion for the infrastructure-supporting factor? How could this criterion be strengthened?

5.4.2. Environmental adjustment factors

138. Several stakeholders have raised the prospect of introducing environment-related adjustment factors in prudential rules, mostly in the form of 'green supporting' or 'brown penalising' factors (GSF or BPF)^[129], that would incentivise institutions to finance green and/or sustainability-linked investments and to reduce their carbon-intensive investments, providing proposals for how such factors could be defined within the prudential framework (see in Annex 4 some proposals suggested by stakeholders).
139. There are several arguments for and against adjustment factors related to environmental risk drivers^[130], from a prudential perspective and a public policy perspective. The latter perspective is included for the sake of completeness, but this is not the approach taken and supported by the EBA (see Chapter 4).

^[125] For the sake of simplicity, the term 'brown' is used in this chapter. The EBA acknowledges that this term is not used any more (e.g. in Taxonomy discussions) and terminology will be adjusted for any potential policy recommendation. In this chapter, 'brown' can be understood as an approximation for 'environmentally harmful exposures'.

^[126] See, for instance, the EBA (2019) reply to the Commission's Call for Advice on the finalisation of the Basel III framework ([link](#)).

^[127] As listed in Article 122a(3)(c)(iii) of the CRR3 proposal.

^[128] Climate change mitigation, climate change adaptation, sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, and protection and restoration of biodiversity and ecosystems, as outlined in Article 501a(1)(o).

^[129] A GSF would reduce prudential capital requirements for environmentally sustainable (i.e. 'green') exposures and/or those that are transitioning towards sustainability, by either lowering risk weights for relevant asset categories or by flat out application of an adjustment factor below 1 to risk-weighted assets (RWAs). A BPF, by contrast, would increase capital requirements for environmentally harmful assets, thus disincentivising this type of financing. As with the GSF, this could be done either by increasing risk weights for certain asset categories or by applying an adjustment factor greater than 1 to RWAs.

^[130] It is noteworthy that some of these pros and cons also generally apply to measures that could be contemplated under instruments of the Pillar 1 framework other than capital requirements (e.g. leverage ratio, large exposures, liquidity). In particular, they illustrate some advantages and disadvantages of a *dedicated* prudential treatment for green and/or environmentally harmful exposures, i.e. an additional, separate treatment from the common baseline framework.



Table 3: Pros and cons of adjustment factors

Prudential perspective	
Pros	Cons
<p>Theoretically better risk profile of sustainable assets in a transition to a more sustainable economy: On a theoretical level, environmentally sustainable activities should on average be better placed to perform well in an environmentally sustainable economy than unsustainable activities, i.e. due to environmental and social policies and consumption trends. Larger impacts are expected in the medium to long term; however, the transition to a sustainable economy is a gradual process so that transition risks for environmentally unsustainable activities can emerge at any time, e.g. due to a sudden recalibration of climate targets ⁽¹³¹⁾. Hence (ceteris paribus), environmentally sustainable activities might carry a lower risk. Furthermore, capital requirements need to reflect the riskiness of exposures over a sufficiently long time horizon and therefore anticipate future changes. Therefore, adjustment factors could support the internalisation of financial risks associated with the transition to a more sustainable economy ⁽¹³²⁾.</p>	<p>Adjustment factors may not be risk-sensitive, leading to possible weakened resilience of institutions: Reduced capital requirements without a correspondingly lower risk of the exposures to which they apply would compromise the reliability of capital requirements as indicators of risk and potentially undermine prudential regulatory goals. Applying a factor which is not risk-based to prudentially calibrated RWAs means that the adjusted RWAs would no longer correspond to the actual risk of relevant exposures. Consequently, applying lower capital requirements without a reduction in institutions' actual risk levels would weaken their ability to manage risks and absorb potential losses stemming from environmental risk factors. Even if a particular exposure was subject to lower/higher environmental risks, generalised adjustment factors could not exactly reflect the actual size of this risk differential (different adjustment factors for individual asset classes could only do so to a limited extent).</p>
<p>Bridging the gap between the short and the long term: Environmental risks arise from activities performed in the present, but materialise presumably in the medium to long term. Hence, it is difficult to price those risks if the time horizon of capital requirements does not match the time horizon of the (negative) effects of the activities they finance. The introduction of adjustment factors would help the recognition and pricing of risks which largely materialise in the medium to long term, in particular if those factors were applied only to exposures with longer maturities. Nevertheless, the calibration of regulatory capital should remain stable over several years. This could justify anticipating future risk differentials in today's capital requirements irrespective of exposures' maturities.</p>	<p>Risk of double counting: The Pillar 1 framework to a certain extent already recognises environmental risk drivers in capital requirements, for instance through external ratings or banks' internal models. Therefore, adjustment factors would lead to double counting of environmental risk drivers to the extent that they are already factored into risk weights applied to the relevant exposures. ⁽¹³³⁾ If lower environmental risks were already factored into risk weights, e.g. through ratings, adjustment factors would lower or increase capital requirements beyond what is justified from a risk perspective. This is in particular the case for capital requirements that are calibrated using internal models. In contrast to the SA, which provides for risk weights that are sufficient on average, internal models aim at quantifying the individual risk of an exposure. This risk sensitivity would be overruled by any adjustment factor.</p>
<p>Safety first: Increased capital requirements for exposures that are associated with higher environmental risks would strengthen the solvency of institutions to account for future risks in the present.</p>	<p>Shifting to non-bank-based finance: Increased capital requirements could lead to a shift in financing of currently less sustainable borrowers to non-bank financial intermediaries (shadow banking), in the worst case to firms outside the scope of prudential regulation.</p>
<p>Adjustment factors could correct potential over-reliance on historical data (see Chapter 4): Given that the forward-looking and long time horizons of environmental risk drivers are not appropriately reflected in observed loss events which form the basis for capital requirements ⁽¹³⁴⁾, adjustment factors could reflect expected changes to the risk picture arising in the medium to long term.</p>	<p>Use forward-looking methodologies: Adjustment factors may misrepresent the dynamic development of environmental risks, e.g. in industrial sectors subject to a transition. Instead of applying generalised adjustment factors that are not evidence-based, a more targeted adjustment of Pillar 1 instruments could be achieved by using forward-looking ratings and models which also recognise that the business model of corporates may be changing towards a more sustainable modus operandi.</p>
<p>Establishing a common instrument for all: By implementing adjustment factors into Pillar 1, there would be a homogeneous application throughout the EU, whereas Pillar 2 recommendations or guidance are more discretionary for supervisors.</p>	<p>Potentially suboptimal prudential instrument: The Pillar 1 framework may have limitations in terms of fully accounting for environment risk drivers due to its evidence-based nature and embedded time horizon. Other instruments in the prudential framework might be more appropriate to cater for medium to long-term and mostly future risks without a historical track record, also allowing for combining the level of risks to which institutions are exposed with a judgement on how the institutions are managing such risks.</p>
<p>Improving analytical capacities: Adjustment factors would stimulate credit institutions to develop screening criteria and methodologies, enabling them to distinguish 'green' from 'environmentally harmful' in order to be able to apply the adjustment factors.</p>	<p>Worsening credit standards: Adjustment factors could lead to reduced lending scrutiny and disproportionate risk taking. This could eventually stigmatise the sector and sustainable finance if it led to a large amount of non-performing 'green' loans.</p>

⁽¹³¹⁾ For example, (i) under the **EU Green Deal** the Commission proposed to tighten 2030 climate targets from 40% to 55% of emission reductions, (ii) the price for emissions allowances under the EU ETS **tripled** between January 2020 and mid-2021.

⁽¹³²⁾ As an illustration, 'green' housing loans should normally carry lower credit risks than non-energy-efficient housing loans due to the higher remaining income of borrowers resulting from lower utility costs (see also risk differential overview). Under this hypothesis, the Hungarian Central Bank (MNB) is testing a preferential capital requirement programme under Pillar 2 of the banking regulatory framework between 2020 and 2023.

⁽¹³³⁾ NGFS (2020), 'Guide for Supervisors' ([link](#)).

⁽¹³⁴⁾ BCBS (2017), 'Basel III: Finalising post-crisis reforms' ([link](#)); and EBF (2017), 'Encouraging and Rewarding Sustainability' ([link](#)).



Public policy perspective

Pros

Alignment with public policy: Adjustment factors would directly incentivise institutions to acknowledge the potentially different risk profile of lending or investment decisions associated with environmental objectives of the EU. An adjustment factor would further indirectly incentivise borrowers that are looking to benefit from better priced loans for environmentally sustainable activities, or to avoid higher interest rates applied to loans for environmentally harmful activities. Thus, adjustment factors would acknowledge the positive systemic value of green projects and activities that reduce long-term environmental risks, and internalise the risks associated with environmentally harmful activities. This is provided that credit institutions passed capital reliefs/aggravations on to their clients. As such, adjustment factors could contribute to **reorienting financing** from [high-risk] environmentally harmful to environmentally aligned activities.

Cons

Suboptimal policy measure: The purpose of prudential regulation should not be tweaked, nor should it serve as a substitute for other changes in public policy. To finance the transition and to tackle climate risks, other financial and non-financial tools may be more suitable. For example, an effective price on the emission of greenhouse gases is considered by many as a more effective measure. Such a price would also internalise external costs and thereby negatively impact the financial performance of 'environmentally harmful' companies which should then be reflected in the inputs to the prudential framework such as, for example, standard credit ratings.

May not support transition: If the policy objective is to support the transition towards a sustainable economy, this goal cannot be achieved through adjustment factors. The exposures that require transition would not qualify for downward adjustment applied to already green exposures and the transition financing could even be subject to upward adjustments. While transition criteria could in theory be incorporated into the design of the adjustment factors, they would likely require some subjective assessments, potentially undermining consistency of the application of the Pillar 1 framework.

Unintended consequences: Increased capital requirements could constrain the flow of capital required to enable the transition towards sustainability of e.g. hard-to-abate sectors and regions. This could in turn lead to significant negative social consequences in certain industry sectors and geographical regions.

Questionable effect: The EU already has experience with adjustment factors, namely the SME supporting factor and the infrastructure-supporting factor. However, so far there is no clear indication that the SME supporting factor has significantly stimulated lending to SMEs, and it seems that in particular micro and small companies have not benefited from it ^[135].

^[135] See EBA (2016), 'Report on SMEs and SME Supporting Factor' [\[link\]](#).

140. In addition to the pros and cons listed above, specific considerations apply to certain potential forms of adjustment factors. For example, a supporting factor for sustainability-linked (or improvement) loans – i.e. loans whose interest rate is partially adjusted downwards depending on the positive evolution of the borrower's sustainability performance – could help improve institutions' own risk management and analytical capacities by incentivising borrowers to build more sustainable business models. However, challenges would be the identification of such exposures in a harmonised way and the determination of prudentially accepted sustainability targets that the borrower needs to achieve which actually lower its environmental risks. Furthermore, adjustment factors would not require institutions to adjust their pricing policies, as the prudential regulation should not interfere with the business strategies of institutions.
141. Another alternative solution could be considered specifically in the context of the transition towards a sustainable economy and the financing necessary to achieve that state. It could be argued that instead of applying adjustment factors to environmentally harmful or sustainable activities, such a tool could be designed to support financing of specific transition programmes, where they are assessed

to be sufficiently reliable, and in effect leading to decreased transition risks of the obligors. Such a 'transition-supporting factor' would therefore not be a permanent solution, but could potentially be applied temporarily, until the economy reaches its sustainable state. Nevertheless, the concerns of potential double counting would remain valid, depending on how the transition risk would already be captured through other Pillar 1 mechanisms.

142. Finally, the framework, through Article 459 of the CRR, could contain a readily available option to address environmental risks through stricter requirements for a subset of (environmentally harmful) exposures. However, although increased capital requirements for environmentally harmful exposures seem more acceptable from a prudential point of view, there is still little empirical evidence of a risk differential. Therefore, activating a tool such as Article 459 of the CRR to override the outcome of prudentially calibrated RWAs may appear premature. In addition, the risk of double counting would remain provided that conventional Pillar 1 instruments properly capture environmental risks. Lastly, Article 459 of the CRR would only allow for a solution limited to one year, meaning that a cliff effect would arise at the end of that period.



5.4.3. Preliminary conclusions and discussion points

143. Considering the balance of arguments presented above, a cautious stance on adjustment factors is warranted. From a prudential point of view, challenging conditions must be met before adjustment factors could be justified. This includes (i) acquiring clear evidence that certain assets display distinct risk profiles due to environmental risk drivers, (ii) assessing that the framework could not (or should not) capture these risk drivers, (iii) overcoming classification challenges which currently hinder the identification of exposures to which adjustment factors could apply^[136], and (iv) conducting proper impact assessment and considering proportionality factors e.g. to identify potential unintended effects.
144. The most consistent way forward from a prudential risk-based perspective leans towards clarifying the extent to which environmental risks are already captured and assessing ways to further integrate these risk drivers into existing Pillar 1 instruments. Although there are some arguments that advocate environmental-risk-related adjustment factors in Pillar 1, e.g. the recognition of potential future risk differentials, such factors might lead to a miscalibration that either overstates or underestimates the real riskiness of exposures. This problem is not avoided by combining upward and downward adjustment factors.
145. Moreover, should adjustment factors be introduced on top of already existing SME and infrastructure supporting factors, the issue of double counting could be multiplied by an overlap not only with the Pillar 1 risk weighting, but also with the other supporting factors.
146. In addition to operational challenges (e.g. the calibration of adjustment factors, degree of granularity needed to differentiate exposures), at this point in time the lack of strong evidence, data and methodologies for identifying and quantifying environmental risk drivers would make the determination of the scope and size of adjustment factors uncertain.
147. Overall, it is key to ensure that the calculation of RWAs is not distorted and to maintain risk-based capital requirements which fulfil their function as safeguards against unexpected losses, hence contributing to safeguarding financial stability. At the same time, acknowledging that fully embedding environmental risk drivers in the existing credit risk framework also raises challenges, alternative approaches should continue to be assessed. In any case, any policy approach should avoid overlapping and double counting effects e.g. between amendments within the framework and adjustment factors, as this could result in an underestimation of risks. It should as well be ensured that the overall level of capital requirements remains adequate from a prudential perspective.

Questions for public consultation:

Q21: What would in your view be the most appropriate from a prudential perspective: aiming at integrating environmental risks into existing Pillar 1 instruments, or a dedicated adjustment factor for one, several or across exposure classes? Please elaborate.

Q22: If you support the introduction of adjustment factors to tackle environmental risks, in your view how can double counting be avoided and how can it be ensured that those adjustment factors remain risk-based over time?

^[136] In order to apply adjustment factors, the classification of exposures based on relevant indicators and accounting for different factors e.g. geographies, sectors and counterparty-specific factors, is a prerequisite. The current lack of a risk-oriented taxonomy, or the inability to match green taxonomies with the related financial risks, hinders such identification. In addition, some granularity would be needed as, for example, not all companies active in high climate impact sectors actually carry out environmentally harmful activities with high transition risks. Furthermore, capital adjustments are often discussed at the level of specific assets (e.g. coal-fired power plant, or wind farm) or activities. However, much bank lending and investment is made to companies rather than to specific assets or projects and there are few companies that are 'pure green' or 'pure brown' along all the value chain.



6. Market risk

6.1. Overview of the framework

148. Market risk is the risk of losses arising from movements in market prices. In prudential terms, it captures:
- the risk of losses related to instruments that are allocated to the trading book; and
 - the risk of losses due to foreign exchange risk or commodity risk in the banking book items.
149. As environmental events continue to occur with increasing frequency and severity, environmental risks may become a source of market uncertainty, given that the value of the financial instruments subject to the market risk regime would ultimately be impacted by environmental factors.
150. The Basel standards on market risk, the so called 'FRTB' (Fundamental Review of the Trading Book) framework, subdivides the market risk scope into five primary risk classes:
- equity risk;
 - interest rate risk;
 - credit spread risk;
 - foreign exchange risk;
 - commodity risk.
151. Other prudential areas that relate to market risk are the following:
- Counterparty credit risk (CCR) aims to capture the potential loss in the event of default of a counterparty to a transaction before the settlement of the transaction's cash flows. The CCR framework applies to derivatives and/or fair-valued security financing transactions (SFTs);
 - Credit valuation adjustment (CVA) risk: aims to capture the risk of an adverse change of the credit spreads for the counterparty to a derivative transaction. The CVA framework applies to non-cleared over-the-counter (OTC) derivatives and/or fair-valued SFTs;
 - Prudent valuation framework: aims to capture the uncertainty surrounding the valuation of fair-valued instruments, especially those related to non-liquid market data inputs. Additional valuation adjustments resulting from the application of the prudent valuation framework are deducted from CET 1.

152. CCR and CVA risk are not specifically investigated as they build on similar concepts to those on which the credit and market risk prudential frameworks are built. Hence, any potential adjustment to reflect environmental risks in those areas could be replicated (and eventually adjusted) so as to fit also in the context of, for example, CVA risk. As far as prudent valuation is concerned (see also Annex 3 for a more detailed discussion of the issue of environmental risks in accounting and valuation), where environmental risks affect the pricing of fair-valued financial instruments, the assessment of the prudent value of such instruments performed under Commission Delegated Regulation (EU) 2016/101 is expected to mechanically reflect the valuation uncertainty stemming from those environmental risks. Thus, no specific action would appear to be needed at this stage. As also stated in Annex 3, the EBA intends to monitor future developments in this respect and reassess whether a change in prudential valuation rules could be warranted in the future to better reflect the valuation uncertainty stemming from environmental risks.
153. The regulatory treatment of market risk is set out in the CRR and in the subsequent delegated regulations, technical standards and guidelines. In particular, the CRR already implemented in the EU most of the FRTB building blocks as agreed at the international level, as reporting requirements. Furthermore, if the European Commission CRR3 proposal is adopted as it stands, the reporting requirements would be transformed into capital requirements as from 2025.

6.2. Interaction between environmental risks and the market risk framework

154. Environmental risks can materialise through market risk via multiple channels. For instance, the transition to a low carbon economy can impact commodity markets, especially fossil fuels which are prone to transition risks. Physical risks emerging from climate change can also cause market price fluctuations, such as more frequent and severe extreme weather events causing losses in equity prices due to destruction of firms' assets or capacity to produce. However, before discussing whether changes to the prudential framework are needed in the area of market risk, it is important to note the following:
- Market risk is typically characterised by a much shorter time horizon than credit risk. For the FRTB Internal Model Approach, the liquidity horizons are 10 to 120 days. Hence, shocks



in market risk measures for the purpose of determining capital requirements are to be frequent and take place over a rather short period of time.

- b. In the area of market risk, a risk factor is a clearly defined object. It is an input to the pricing function, which may be shocked by the institution when calculating the risk measures (see, for example, Article 325bh (1) (a) of the CRR setting the risk factor granularity for internal models). While environmental risks may not lead to the introduction of new risk factors per se, they may affect the magnitude of their shocks. In other words, the presence of environmental risks may lead to a 'classical' risk factor (e.g. an equity price, or an exchange rate) being more volatile than historically observed, or being subject to severe jumps. Therefore, in this section, we will clearly distinguish between environmental risks and environmental risk factors.

6.2.1. Standardised Approach

155. The FRTB Standardised Approach consists of three building blocks:

- The sensitivity-based method (SbM): as laid down in the Basel standards, the capital requirements under the sensitivity-based method are calculated by aggregating three risk measures:
 1. delta: a risk measure based on sensitivities of an instrument to regulatory delta risk factors;
 2. vega: a risk measure based on sensitivities to regulatory vega risk factors;
 3. curvature: a risk measure which captures the incremental risk not captured by the delta risk measure for price changes in an option. Curvature risk is based on two stress scenarios involving an upward shock and a downward shock to each regulatory risk factor.

To calculate the overall SbM requirement, the risk-weighted sensitivities are aggregated with prescribed correlation parameters. In this way, diversification between risk factors is recognised. In order to address the risk that correlations may increase or decrease in periods of financial stress, a bank must calculate three SbM capital requirement values, based on three different sets of correlations.

- The Default Risk Charge (DRC): captures the jump-to-default risk for instruments subject to credit risk and is calibrated based on the credit risk treatment in the banking book.
- The residual risk add-on (RRAO): charge introduced to cover for risks that are not captured in the SbM and DRC.

156. In the SbM, risk weights are directly prescribed in the regulation, and they have been calibrated based on historical data reflecting a period of stress. As environmental events are expected to occur with increasing frequency and severity, market risk estimation based on historical data may not adequately reflect the impact of environmental risks, as such risks were not so frequent and impactful in the past. This may therefore in itself warrant that more forward-looking scenarios are included in the framework.

157. In order to better reflect environmental risks in the SbM, the current applicable risk weights could be complemented by using projections based on forward-looking climate and other environmental-risk-related scenarios. However, the inclusion of forward-looking scenarios, on top of risks calibrated with historical data, would be a significant divergence from the existing approach.

158. At this stage, another alternative seems to be more suitable, namely to include a dimension reflecting environmental or even broader ESG risks when defining the buckets into which a risk factor falls. For example, the risk weight applicable to capture equity risk depends on the economy (advanced versus emerging) and the sector. An additional dimension distinguishing between equity positions that are more subject to environmental risks and those that are less so could be introduced.

159. It should be noted that the CRR3 proposal contains a provision to introduce a lower risk weight for the commodity delta risk factor related to carbon emissions trading, to better reflect the actual price volatility of this EU-specific commodity. Emission Trading Scheme allowances are proposed to have a specific risk category with a lower risk weight equal to 40%.

160. Furthermore, should environmental risks be priced to the extent that the pricing function captures them via a specific risk factor, other adjustments to the framework can be potentially envisaged, e.g. the creation of a specific risk class, or a specific 'risk factor type', on top of delta, vega and curvature. Another element of the framework is the correlation between risk factors. In the sensitivity-based method, banks are already required to apply a high and low correlation scenario, so as to reflect also patterns that are different from those observed.

161. Hence, the correlation framework already embeds some conservatism to protect against different correlation scenarios, even those that have not been historically observed. However, it could be envisaged to assess whether these scenarios cover sufficiently the effect that environmental risks may have on correlation patterns.

162. Furthermore, the standardised approach also entails the calculation of own funds requirements for default risk in the trading book in the form of a jump-to-default. While this falls within the pruden-

tial framework of market risk, the nature of the risk captured is that of credit risk. Hence, the considerations set out in the previous sections, especially in relation to internal or external credit ratings assigned to positions, are applicable to and relevant also for the purpose of default risk. Accordingly, any solution envisaged in the context of credit risk should potentially be replicated when capturing default risk in the trading book.

163. Finally, in the FRTB Standardised Approach, banks are required to compute a residual risk add-on for instruments with exotic underlyings or, more generally, bearing residual risk. Given the objective of this DP, it is worth mentioning that, among instruments subject to this add-on, there are weather options, i.e. options whose pay-off depends on climate/weather-related events. Those options were included in the residual risk add-on scope due to the exotic nature of the underlying. Furthermore, the weather options market is not expected to be liquid. Currently, exposures in those options are not expected to be material. However, should banks start hedging environmental risks in a more active manner (and also via trading book instruments), it cannot be excluded that those options could become more material going forward. If the risk related to the use of such instruments increases, this may lead to a need to recalibrate this part of the framework.
164. In principle, the RRAO framework could be used to capitalise environmental or broader ESG risk. This approach would ensure that the two main building blocks of the framework (i.e. SbM and JTD) are not subject to amendments and would have a characteristic of a dedicated prudential treatment of exposures subject to environmental risks (see considerations in section 4.5, which could also apply in this case). However, the RRAO framework would need to be adjusted as it is not risk-sensitive (based on notional amounts and not allowing netting). The current purpose of this part of the framework is to address risks linked to exotic underlyings or complex payoffs. The scope of RRAO would therefore have to be extended to include also simple trading book instruments, which can equally be affected by environmental risks.

6.2.2. Internal Model Approach

165. In the Internal Model Approach, banks are to calculate an expected shortfall measure calibrated at a 97.5% confidence level for all risk factors passing a risk factor eligibility test (RFET) and a stress scenario risk measure for each non-modellable risk factor (NMRF). In both cases, banks are to calibrate based on historical data, shocks applicable to risk factors so that the risk measures are ultimately used for capital purposes reflect a stress period.
166. In the calculation of the expected shortfall measure, banks can fully recognise diversification effects

between exposures in modellable risk factors. By contrast, the stress scenario risk measure is calculated on a stand-alone basis, i.e. risk factor by risk factor. Correlation among NMRFs is recognised only via a prescribed aggregation formula. The expected shortfall measure and the stress scenario risk measure are then aggregated so as to obtain the capital requirements^[137].

167. To capture environmental risks, banks could be required to adjust their historical data so as to account for potential future (non-historically observed) dynamics. However, adjusting data could affect the accuracy at which non-environmental-risk-related financial risk is captured and may also lead to double counting effects, if the effect of environmental risks is already (even partially) covered in the volatility. Hence, doing this appropriately would be intrinsically difficult.
168. Another policy option which appears more pragmatic and less distortive to the current approach would be to consider environmental risks outside the existing framework. Although in accordance with Article 370 of the CRR the event risk is to be captured in the internal model, the approach on which an internal model of a bank is built may not allow to do so in full. For example, a bank that fully relies on a historical approach for calculating its VaR (or expected shortfall^[138]) would not be able to capture risks linked to events that did not occur within the calibration period. Accordingly, some banks are already capturing outside their internal models some event risks that cannot be captured by just using historical data. These additional elements of risk are covered by an add-on to the risk measure resulting from an internal model.
169. For instance, in the case of material exposures in some foreign exchange (FX) pairs, where a currency peg exists, the historical volatility will be low. That volatility, however, does not capture the risk of potential event risk that such a currency will be unpegged. Such an event cannot be captured just using historical data as they typically do not show any unpegging event for the given currency pair. The unpegging event can indeed lead to much higher shocks than those historically observed (during the time in which the currency was pegged)^[139].
170. A similar treatment could be extended to also capture environmental risks. This would have the following advantages:

^[137] As it is not relevant for the discussion, the aggregation formula used to obtain the capital requirements, outlining the various relevant terms (e.g. the 60 business days average of the risk measures, and the multiplier resulting from the back-testing results) is not displayed here. However, more details can be found in Article 325ba of the CRR.

^[138] Note that these considerations are presented using a legal basis, i.e. Article 370 of the CRR, relating to the current framework (i.e. not FRTB). However, they are equally relevant in the FRTB context.

^[139] A recent example includes the EUR/CHF jump in 2015, when the Swiss National Bank removed the franc's peg to the euro.



- a. Historical data would not need to be adjusted for the purpose of embedding environmental risks. Hence, the traditional market risk measures would not be impacted in terms of accuracy.
 - b. It allows banks to leverage on existing practices.
 - c. A separate explicit recognition of environmental risks based on a dedicated add-on, determined based on the consideration of a specific environmental event scenario, to the risk measure resulting from an internal model would facilitate monitoring and allow transparency.
 - d. The framework would not need to be further complexified. Given that environmental risks would be captured outside the models, the regulatory tests (e.g. the risk factor eligibility test) would not need to be adapted.
171. However, the regulatory framework as it stands requires banks to capture all material risks within their internal model. Hence, banks are in principle already required to capture any environmental risks within the model as soon as these are material. Therefore, should the proposal to capture environmental risks outside the model be considered appropriate, it would require some targeted amendments in the regulatory requirements for internal models.
172. Selected evidence exists on the impact of climate risk on market risk factors such as asset pricing and that in some instances such factors are already priced in by the market. One study finds carbon emission intensity reflected in stock returns, that is stocks of companies with higher CO₂ emissions earning higher stock returns (Bolton et al 2020) ^[140]. A paper by Bonagura et al. (2021) ^[141] finds that green stocks are more liquid. Ilhan et al. (2021) ^[142] in their research further find that the cost of option protection against tail risk is more expensive for carbon-intensive firms (and increasing in times when public attention to climate risk spikes). Further evidence on the effect of climate risk on the cost of debt and firms' value is presented in the credit risk chapter.
173. Studies to date however remain limited and focused on specific sectors. It is not possible to conclude that markets price in climate risk to the full extent and across the board. As a result, fluctuations in prices and other drivers of market risk factors can likely still materialise going forward. To assess the extent to which market risk models adequately cater for environmental risk factors, it is also important to look at the relative volatility of price movements observed in the market due to environmental events versus the volatility captured in the model based on risk values.
174. As regards correlation patterns, even in the current capital framework banks are already required to test correlation scenarios different to those actually observed in the stress period. For example, Article 46 (2) (b) of the EBA final draft RTS on assessment methodology for market risk ^[143] requires the competent authority to check that *'the institution assesses the potential effect that alternative, historically observed, high and low correlations could produce in the VaR calculation'*. It can be reasonably expected that similar requirements will apply in the future also under FRTB.
175. Hence, the correlation framework already embeds some conservatism as there already is a broad requirement to protect against correlation scenarios different to those historically observed. However, it could be envisaged to assess whether this requirement already covers sufficiently the effect that environmental risks may have on correlation patterns.
176. While the above analysis is focused on quantitative and modelling aspects, it has to be noted that the Internal Model Approach is subject to a number of qualitative requirements, which can also be taken into account in the context of environmental risks considerations. One of these requirements is for institutions to have an appropriate capital adequacy stress testing programme. One possibility to reflect the forward-looking nature of environmental risks in the prudential framework could be to require incorporation of environmental risks into such a stress testing programme. As a consequence, institutions would be required to take appropriate steps depending on the stress test results.
177. Finally, in a similar way to the Standardised Approach where banks are to calculate a jump-to-default charge, in the Internal Model Approach banks are to capitalise the default risk via the default risk charge (DRC). Analogously to the considerations set out for JTD, any solution envisaged in the context of credit risk should potentially be replicated when capturing default risk in the trading book via the DRC.

6.3. Preliminary conclusions and discussion points

178. Financial instruments subject to market risk will most probably be affected by environmental risks. It is, however, not clear yet to which extent environmental risks can lead to an increase in the magnitude of the shocks observed historically in a period of stress, and accordingly to which extent (and if) market risk is sufficiently capitalised.

^[140] Bolton et al. (2020), 'Do Investors Care about Carbon Risk?', Columbia Business School Research Paper Forthcoming, *Journal of Financial Economics* (JFE), Forthcoming, European Corporate Governance Institute – Finance Working Paper 711/2020 ([link](#)).

^[141] Bonagura et al. (2021), 'Stocks' liquidity and Environmental Performance', *Journal of the Italian Banking Association* ([link](#)).

^[142] Ilhan et al. (2021), 'Carbon Tail Risk', *The Review of Financial Studies*, Volume 34, Issue 3, Pages 1540–1571 ([link](#)).

^[143] EBA (2016), 'Draft RTS on Assessment Methodology for Market Risk' ([link](#)).



179. In any case, it is important to investigate policy options to address environmental risks in the context of market risk, and to do so by catering for the specificities of the market risk framework, e.g. the relatively short-term horizon relevant to trading book exposures compared to other risks in the prudential framework. Leveraging on existing practices, institutions could be required to estimate the impact of

environmental risks where the internal models are not able to account for these risks on the basis of historical data only. A similar approach could be designed for banks not relying on internal models, as the Standardised Approach is mostly based on a variance-covariance model. Alternatively, specific adaptations to the RRAO framework could be considered.

Questions for public consultation:

Q23: What are your views on possible approaches to incorporating environmental risks into the FRTB Standardised Approach? In particular, what are your views with respect to the various options presented: increase of the risk weight, inclusion of an ESG component in the identification of the appropriate bucket, a new risk factor, and usage of the RRAO framework?

Q24: For the Internal Model Approach, do you think that environmental risks could be better captured outside of the model or within it? What would be the challenges of modelling environmental risks directly in the model as compared to modelling it outside of the internal model? Please describe modelling techniques that you think could be used to model ESG risk either within or outside of the model.

Q24: Do you have any other proposals on integrating environmental risks within the market risk framework?



7. Operational risk

7.1. Overview of the framework

180. The Basel III accord sets out the methodology for the calculation of the own funds requirements against operational risks ^[144]. The transposition of the accord concerning operational risk is planned to be implemented in the EU by 2025 ^[145]. The Commission proposal is partially based on the policy recommendations provided by the EBA ^[146] in response to the Commission Call for Advice on the revised Basel III framework ^[147].
181. Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk but excludes strategic and reputational risk. Operational risk is inherent in all banking products, activities, processes and systems ^[148], which leads to a large variety of losses with different natures and causes, and thus the effective management of operational risk is a fundamental element of banks' risk management. Basel III establishes that banks can be required by their supervisors to map their internal losses into seven regulatory operational risk 'event types' ^[149]. Although the general event types are already included in the CRR ^[150], the EBA has recommended that legislators include a more granular taxonomy of operational risk loss types in the regulation ^[151].
182. In accordance with the Basel III accord, the capital requirements on account of operational risk should be calculated using the new Standardised Approach (BCBS SA), and the use of the current approaches (the Basic Indicator Approach (BIA), the Standardised Approach (TSA), Alternative Standardised Approach (ASA) and the Advanced Measurement Approach) will not be allowed any more.
183. The calculation of the capital requirements in the context of the Basel III accord requires the following elements:
- the Business Indicator (BI), an improved indicator which builds upon the current proxy indicator of a bank's business volume (the relevant indicator under the CRR) by amending some of its components;
 - the Business Indicator Component (BIC), which is obtained by applying fixed marginal coefficients to the BI based on a bank's business volume;
 - the Loss Component (LC), which includes a bank's average annual historical losses over the preceding 10 years;
 - the Internal Loss Multiplier (ILM), which is calculated as a smoothing function of the ratio between LC and BIC;
 - the formula for the operational risk capital requirements under the BCBS SA is then the following: operational risk capital = BIC × ILM.
184. Furthermore, the BCBS SA includes several discretions that a jurisdiction can exercise to adapt the methodology. For example, in the European Commission's proposal the ILM is set equal to 1 for all banks, using a national discretion, instead of being 'bank-specific' and based on historical loss data of each credit institution.

7.2. Interaction between environmental risks and the operational risk framework

185. As mentioned, operational risk is present in all banking activities, and thus the definition of operational risk encompasses losses of a diverse nature. In relation to the various operational risk loss types, it can be recognised that environmental risk factors could function as a driver of any of the loss type categories, because they can materialise and impact banks in very different ways, from damage to physical properties or interruptions of the banks' services and communications, to liabilities arising from environmental factors and resulting in legal and conduct risks. Environmental factors appear most relevant in the case of losses related to this latter risk type, for example in the case of claims emerging from the institution's failure to address its negative impacts on the environment, or in the case of claims arising from a mis-selling of products as 'green' whereas they do not comply with the standards for such products. Additionally, 'damage to physical assets'

^[144] BCBS (2017), Basel III finalisation announcement ([link](#)).

^[145] European Commission (2021), Review of EU banking rules ([link](#)).

^[146] EBA (2017), Policy advice on the Basel III reforms: operational risk ([link](#)).

^[147] European Commission (2018), Call for Advice on the finalised Basel III framework ([link](#)).

^[148] BCBS (2021), 'Revisions to the Principles for the Sound Management of Operational Risk' ([link](#)).

^[149] Internal fraud; external fraud; employment practices and workplace safety; clients, products, and business practice; damage to physical assets; business disruption and systems failures; execution, delivery, and process management.

^[150] The typology is included in Article 324 of the CRR.

^[151] See EBA (2017), Policy advice on the Basel III reforms: operational risk, recommendation OR16 and Annex II, p. 66 ([link](#)).

(which, among other things, lists 'natural disasters' in its definition) and 'business disruption and systems failures' could be driven by environmental factors, for example in cases where physical climate-related events impact the institution's offices or lead to a disruption in its service provision.

186. With regard to the liability-related event type, initial litigation cases against institutions in the context of greenwashing are currently already underway ^[152]. Going forward, claimants could increasingly try to hold credit institutions liable for environmental damages caused by the non-financial corporates they are funding.
187. The current loss event types in the EBA taxonomy do not map the triggers for the losses, for example when an environmental event causes losses that would be allocated to different operational risk types. Thus, while the loss event type taxonomy remains valid for operational risk management and measurement, credit institutions could also be asked to label losses to allow them and supervisory authorities to track the causes, especially those related to environmental risk factors as drivers of the loss type categories.
188. Whether environmental risks are already captured by the operational risk Standardised Approach, and to what extent, may depend on how this approach is implemented in the EU. As explained above, of the two components of the capital requirements formula the BIC is a proxy based on a measure of a bank's income and expenses, whereas the ILM is based on a measure of a bank's historical losses.
189. From the point of view of incorporating the losses related to environmental risks, it appears that the methodology already captures the historical losses via the ILM component. However, should the discretion of ILM equal to 1 be exercised in the EU ^[153], such information would only be considered in the services component in the BIC. Specifically, the BIC stems from the BI, which is a financial-statement-based proxy for operational risk consisting of three elements, each calculated as the average over three years: 1) the interest, leases and dividend component; 2) the services component; and 3) the financial component. Since losses and provisions incurred as a consequence of operational loss events contribute to the services component through 'other operating expenses', the BIC includes some built-in sensitivity to operational risk losses, including those triggered by environmental factors.
190. Nonetheless, even if ILM did not equal 1, the BI and the ILM would only incorporate historical losses, which may be expected to change significantly with the transition to a sustainable economy and climate change and environmental degradation progressing further. In addition, a more forward-looking perspective could be considered. Capital requirements for operational risk are partly based on losses of the past 10 years. However, environmental risks may materialise more and more in the coming decades. It is plausible that with a higher frequency and severity of physical climate damage and more public awareness on the issues of climate change and the sustainability transition, the number of complaints and litigations challenging institutions for their financing of or investing in carbon-intensive corporates will significantly increase.
191. Hence, relying on historical data only might not be sufficient if one wanted to capture a risk materialising in the (near) future. Ways for incorporating forward-looking information in the operational risk framework could therefore be considered (e.g. leveraging on the current work on climate and broader environmental scenarios, provided they cover events relevant for operational risk), bearing in mind that the new BCBS SA for operational risk measurement currently does not include forward-looking elements.

7.2.1. Strategic and reputational risk

192. The operational risk framework explicitly excludes both strategic and reputational risk. However, where appropriate, these risks should be considered by banks' risk management framework. Further analysis is thus merited on the interaction between environmental risks and strategic and reputational risks. These two risk types are currently addressed under the Pillar 2 framework, as specified in the Guidelines on common procedures and methodologies for the Supervisory Review and Evaluation Process and supervisory stress testing ^[154] (SREP Guidelines).
193. Strategic risks can be driven by environmental risks through a change in the business environment and the need to adapt the business model accordingly. The strategic risks stemming from environmental risk drivers are difficult to capture through a one-size-fits-all measure. This is because institutions can choose their business model and formulate their strategies at their own discretion. Assessment of the viability of the business model and of the sustainability of the strategy, as well as analysis of key vulnerabilities, are part of the business model analysis which supervisors conduct as part of SREP ^[155]. In accordance with the recent clarifications provided as part of the review of the SREP Guidelines, the analysis of key vulnerabilities should include in particular potential impacts of environmental risks on the insti-

^[152] For instance, complaints have already been filed against banks arguing that their advertised support for initiatives related to the protection of the environment can be labelled as greenwashing, since it would not be compatible with their exposure to fossil fuel companies (see for example [link](#)). In another ongoing investigation by shareholders against a bank it is being reviewed whether it is functioning in compliance with the Paris Agreement, which has led to an analysis of its investments in oil and gas projects, to assess how far they adhere to the bank's environmental and social policy (see [link](#)).

^[153] As suggested by the Commission in the first version of CRR3 ([link](#)).

^[154] EBA (2018), SREP Guidelines ([link](#)).

^[155] See Chapter 4 of EBA (2018), SREP Guidelines ([link](#)).



tution. Therefore, any measure introduced to capture the strategic risks stemming from environmental risk drivers should allow appropriate recognition of institutions' different business models and their specific risks, rather than be subject to a one-size-fits-all approach, like the introduction of a capital add-on or dedicated treatment, under Pillar 1.

194. Reputational risks can be driven by environmental risks through an increasing difficulty in attracting and retaining customers, employees, business partners and investors if an institution has a reputation for financing activities harmful to the environment or for not adequately addressing environmental impacts on its business. Supervisors need to consider reputational risk when assessing operational risk, owing to the strong connection between the two (e.g. most operational risk events have a strong impact in terms of reputation). However, they should not reflect it in the scoring of operational risk but, where relevant, consider it as part of the business model analysis and/or the liquidity risk assessment, since the main effects it can have are reductions in earnings and loss of confidence in or disaffection with the institution by investors, depositors or interbank-market participants ⁽¹⁵⁶⁾. Given the fact that, like strategic risks, reputational risks are institution-specific, they would also require an appropriate consideration of institution specificities which makes it unfeasible for them to be addressed under the Pillar 1 framework.

7.3. Preliminary conclusions and discussion points

195. A key challenge in analysing the potential need to adapt the operational risk framework is the lack of data to identify how environmental factors have an adverse impact on the operational risk inherent in banks. There may be a presumption that operational risk events due to physical risks and business disruptions, such as power outages, or to legal or compliance risk, may become more prevalent. However, it is currently not possible to properly monitor such developments. Therefore, it appears natural that, as a first step, institutions are required to identify environmental factors as triggers of operational risk losses on top of the existing risk taxonomy. This would also allow identification of whether the part of operational risk that is associated with environmental factors is material, and whether there is an increasing trend in this risk.
196. The BCBS SA includes historical data either via the BI and/or via the ILM depending on how the latter will be implemented in the EU, but there is no forward-looking component at the moment. Any forward-looking element would therefore require a revision of the BCBS SA methodology. Such amendments could be considered once clear evidence and robust data become available.

Questions for public consultation:

Q26: What additional information would need to be collected in order to understand how environmental risks impact banks' operational risk? What are the practical challenges to identifying environmental risk losses on top of the existing loss event type classification?

Q27: What is your view on potential integration of a forward-looking perspective into the operational risk framework to account for the increasing severity and frequency of physical environmental events? What are the theoretical and practical challenges of introducing such a perspective in the Standardised Approach?

Q28: Do you agree that the impact of environmental risk factors on strategic and reputational risk should remain under the scope of the Pillar 2 framework?

Q29: Do you have any other proposals on integrating environmental risks within the operational risk framework?

⁽¹⁵⁶⁾ See Chapter 6 of EBA (2018), SREP Guidelines ([link](#)).



8. Concentration risk

197. The impact of environmental risks on institutions and financial stability will vary based on multiple factors, among which are the sectoral and geographical concentration of assets ^[157]. These factors, which relate to the aspect of concentration risk, deserve specific consideration when looking at how environmental risks are, or could be better, captured by the prudential framework.

8.1. Overview of the framework

198. In general, concentration risks are partly addressed by the framework through the large exposure (LEX) regime, which captures concentration risk associated with the default of a single client or a group of connected clients ^[158]. This serves as a backstop measure to complement the minimum capital requirement and supports efforts to also manage systemic risks by reducing in particular the interconnectedness between systemically important banks and by containing banks' risk exposures to the shadow banking system.

199. The LEX regime addresses idiosyncratic risks in a bank's balance sheet by limiting the concentration risk towards one particular client or group of connected clients ^[159] while not discriminating between sectors or geographical areas. Sectoral and geographical concentration risks are currently addressed by other means, such as specific requirements for risk management by institutions and additional own funds requirements under the Pillar 2 framework.

^[157] See for example: ECB/ESRB (2021), 'Climate-related risks and financial stability' ([link](#)), EBA (2021), Pilot exercise on climate risks ([link](#)), which shows that 58% of corporate exposures assessed in a sample of 29 participating credit institutions were to six climate-policy-relevant sectors and 35% to obligors with GHG emission intensity above the median, or EBA (2021), 'Report on Management and Supervision of ESG Risks' ([link](#)).

^[158] The sum of a bank's exposures to all individual entities included within a group of connected counterparties is deemed to be a single counterparty for the purpose of applying the large exposure limit. An exposure will be qualified as 'large' when the sum of all the bank's exposure towards a counterparty (or a group of connected counterparties) is equal to or above 10% of the bank's Tier 1 capital. The sum of all the exposure values of a bank to a single counterparty or to a group of connected counterparties must not be higher than 25% of the bank's Tier 1 capital at all times. A tighter limit of 15% of the Tier 1 capital has been set for exposures between G-SIBs to mitigate the risk of contagion. Certain counterparties, for instance sovereigns, and certain intragroup exposures are exempted and a specific treatment for some specific exposures to counterparties, for instance covered bonds issued by banks, is applied.

^[159] In the LEX, a group of connected clients relates to the grouping of two or more natural or legal persons because of a control relationship between these persons and/or an economic interdependence, the latter being defined in a strict sense [e.g. reliance on one counterparty for funding, repayment, cash flows, etc.].

8.2. Interaction between environmental risks and the concentration risk framework

8.2.1. LEX regime

200. While environmental risks are not specifically addressed by the LEX regime, it may implicitly capture such risks to the extent that when the size of a green or environmentally harmful exposure towards a particular client or group of connected clients reaches the existing threshold (large exposure limit), it limits the maximum loss coming from such an exposure. The groups of connected clients are to be understood in a broad sense of single risk, entailing not only entities connected through control relationships, but also those that are connected because of economic dependency ^[160]. Therefore, the LEX regime would capture not only the entity that may undertake potentially harmful activities, but theoretically also other entities where economic dependencies exist.

201. Likewise, environmental considerations may also be already covered if a particular exposure associated with environmental objectives / subject to environmental impacts fulfils the requirements set under the interbank exposures in specific sectors under the CRR ^[161]. This European discretion allows for an exemption of specific interbank exposures that are normally subject to large exposures limits. It relates to interbank exposures under legislative programmes or those incurred to promote specified sectors of the economy under some form of government oversight and restrictions on the use of the loans.

202. Existing exemptions from the LEX regime for specific exposures (e.g. intragroup, sovereign, covered bonds, etc.) could thus already accommodate a possible preferential treatment for some green or environmentally harmful exposures, to the extent that they would fulfil the criteria set under the framework, as mentioned above. Also, it should be noted that both the limits and exemptions apply equally to green and environmentally harmful exposures.

203. This notwithstanding, the current objective of the LEX regime is to address the concentration risk stemming from exposures to an individual client or group of connected clients, independently of the sector or geographical area of the client, its risk profile or its impact on the environment. Amending the LEX regime to address (sectorally based or geographi-

^[160] See point (39) of Article 4(1) of the CRR.

^[161] Article 400(2)(e) or Article 493(3)(e) of CRR2. However, this is a specificity of the EU legislation, with a set of conditions to be met and with a clear economic policy motivation.



- cally based) environmental risks explicitly would require a reorientation of its objective and design and would therefore not be warranted.
204. An aspect which may be relevant to consider in this context, however, concerns the reporting requirements related to the LEX regime. The purpose of monitoring large exposures is to raise early warning flags that may then warrant further investigation by the supervisor. The reporting of large exposures allows supervisors to see the large exposures to single entities, among them those that may perform environmentally harmful activities, as well as to other entities that are connected through control and economic dependencies. It could be considered whether supervisors could benefit from additional reporting on the largest exposures subject to environmental risks (such as exposures to carbon-intensive firms) ^[162], even if these exposures would not qualify as large under the current LEX framework. Such provision would be similar to that already in place in Article 394 (2) of the CRR, which requires institutions to report the top 10 largest exposures to shadow banking entities. While this would not limit the exposures themselves, it may help to understand the size of exposures of banks towards environmentally harmful activities/counterparties and, based on the data collected, decide if supervisory follow-up is needed. Nonetheless, the costs and benefits of reporting requirements should remain balanced, taking into account proportionality criteria. Such additional reporting requirements (in combination with other measures) could also be developed as a new standard, independently of the LEX regime.
- 8.2.2. New concentration limit**
205. Apart from the LEX regime, an alternative option which could be considered could be the introduction of new monitoring and reporting requirements or a new concentration limit not for a single client or group of connected clients, but for all clients significantly exposed to environmental risks. Such a concentration limit would aim to decrease the chances that a tail event, where multiple seemingly unrelated exposures are affected by a common environmental risk driver, threatens the viability of the institution.
206. The design of a new concentration limit could take various forms, such as a single limit on all or a limited number of environmental risks, both on the transition and physical risk side. For example, a backstop measure could be focused on only limiting the exposure to counterparties subject to high transition risk, such as carbon-intensive counterparties, or counterparties subject to high physical risks, such as those prone to floods or wildfires, at a percentage of a bank's Tier 1 capital or total RWAs. Such tools could be designed in a way to match higher levels of concentration with a higher intensity of monitoring and possible supervisory reactions.
207. Introducing a new concentration limit could help to reduce the probability that a materialisation of environmental risks puts an individual bank in financial distress. Being applied as a uniform Pillar 1 measure, it could help to ensure a consistent approach by banks. Additionally, as it would complement the existing standards, it could be considered in parallel to the ongoing assessment of any potential enhancements to the current Pillar 1 framework.
208. Any concentration limit should, however, not hinder institutions' counterparties from receiving financing for transitioning to environmentally sustainable, e.g. low-carbon, activities, or for introducing mitigating measures against physical risks. If a specific concentration limit was implemented irrespective of the purpose of exposures or of whether a specific counterparty is on a credible transition path, and if the related regulatory requirement or supervisory reaction was not carefully designed, non-financial corporates could be deprived of their ability to receive bank financing for the sustainability transition. This could weaken their competitiveness, impact their financial position (e.g. due to unabated CO₂ costs) and thereby increase their default risk. Therefore, any concentration measures should take into account the need to safeguard the ability for banks to continue to support the transition of their counterparties to more sustainable activities or their investments towards becoming less vulnerable to physical risks. Furthermore, the relationship between the potential new limit and the Pillar 2 framework would have to be further considered, as the current Pillar 2 framework addresses various dimensions of concentration, including sectoral and geographical concentration.
209. Next to this, there are a number of additional considerations which would be associated with the introduction of a new concentration limit, and which would have to be carefully examined. Firstly, institutions which predominantly operate in specific regions or sectors, and especially smaller institutions, could be disproportionately affected. This would have to be taken into account in the design and calibration as well as in potential exemptions. Secondly, in the design of a concentration limit a classification of environmentally harmful, e.g. carbon-intensive, and transitional economic activities as well as information as to whether counterparties have a credible transition path or credible physical risk mitigation or adaptation plans would be helpful, both of which are not standardised yet. Thirdly, if limits result in a restriction of financing from the banking sector, capital from other sources could be sought, including from sources not regulated or supervised.
210. Consequently, introduction of a new concentration limit while ensuring the ability for banks to finance the transition of their counterparties would call for a careful design. The design of such an instrument would have to carefully consider the scope and definitions as well as calibration issues, while, if needed, addressing some of the considerations above

^[162] Pillar 3 ESG disclosures already require information on the top 20 carbon-intensive firms, however only on an aggregated and worldwide basis.

with potential specific exclusions and a phased-in implementation, for instance starting with a softer limit requirement where potential breaches would not warrant immediate capital measures or rapid rectification, to mitigate the risk of creating a disorderly transition.

8.3. Preliminary conclusions and discussion points

211. The concentration risk related to environmental risk drivers is currently not explicitly addressed in the Pillar 1 framework, but could be to some extent addressed implicitly through the existing mechanisms. The current objective of the LEX regime is to address the concentration risk stemming from exposures to an individual client or group of connected clients, independently of the sector, geographical area of the client, its risk profile or its impact on the environment. Amending the LEX regime to address environmental risks explicitly would require a reorientation of its objective and design and would therefore not be warranted. However, enhancing the LEX regime's reporting obligation or introducing a new monitoring and reporting standard could be considered helpful to improve the understanding of the size of exposures subject to environmental risks. The introduction of such an obligation should, however, be carefully considered through a cost-benefit analysis, would require

a common classification of assets exposed to environmental risks and would not address the risk of multiple, otherwise unrelated exposures being affected by common climate risk drivers. For the latter, the introduction of a new concentration limit could be considered, although such a limit would have to be carefully designed, taking into account the factors outlined above.

212. Various dimensions of concentration risk, including sectoral and geographical concentration, are currently dealt with under Pillar 2, which allows determination of appropriate additional own funds requirements and taking into consideration the specific situation, size and business model of a bank. The supervisory approaches could potentially be further enriched by the assessment of concentration towards counterparties engaged in activities which are subject to environmental risks. The EBA Report on Management and Supervision of ESG Risks^[163], which will be used as a basis to further integrate ESG risks into supervisory processes going forward, recommends supervisors to look at (sub-)sectoral and geographical concentrations when reviewing institutions' strategy and business model from the ESG risks perspective. The EBA welcomes views as to whether this approach should be complemented with a new concentration limit or new reporting and monitoring requirements in Pillar 1 to ensure a minimal level of harmonisation and comparability across the EU.

Questions for public consultation:

Q30: What, in your view, are the best ways to address concentration risks stemming from environmental risk drivers?

Q31: What is your view on the potential new concentration limit? Do you identify other considerations related to such a limit? How should such a limit be designed to avoid the risk of disincentivising the transition?

^[163] EBA (2021), 'Report on Management and Supervision of ESG Risks' ([link](#)).



9. Investment firms

9.1. Overview of the framework

- 213. The specific prudential framework for investment firms is specified in the Investment Firms Regulation (Regulation (EU) 2019/2033 or IFR), and the Investment Firms Directive (Directive (EU) 2019/2034, or IFD). The IFR and IFD entered into force in December 2019, and most of their provisions have been applicable since 26 June 2021.
- 214. With the finalisation of the Basel III accord, it became more and more evident that the provisions of the CRR und CRD would not have taken into account the specificities of investment firms as compared to credit institutions. This led to the change of the regulatory framework and the IFD and IFR were brought into force.
- 215. In accordance with the new prudential treatment, investment firms are subject to a Pillar 1 requirement equal to the highest of the following three components:
 - a. the Permanent Minimum Capital (PMC) requirement;
 - b. the fixed overheads requirement (FOR) equalling 25% of annual fixed overheads;
 - c. capital requirements determined by the K-factors formula incorporating 'Risk to Client' (RtC) and 'Risk to Market' (RtM) – the risks an investment firm can pose to others – and the 'Risk to Firm' (RtF), the risks the firm itself is exposed to.
- 216. As a consequence of the introduction of the IFR/IFD regulatory package, investment firms have been split into the following groups:
 - a. investment firms that are systemically important or exposed to the same types of risks as credit institutions, to which the CRR and CRD requirements continue to apply;
 - b. investment firms that should apply the new, more tailored prudential regime based on K-factors;
 - c. small and non-interconnected investment firms as defined in Article 12 of the IFR, that furnish some limited and non-combined services, to which a very simple regime applies.
- 217. The exact scope of systemically important investment firms or investment firms exposed to the same types of risks as credit institutions is outlined in the table below. These firms are not covered by the analysis presented in this chapter but are subject to considerations of CRR requirements as presented in the previous chapters.
- 218. The small and non-interconnected firms are excluded from the prudential regime based on K-factors, and therefore they are also outside the scope of this analysis.

Table 4: Class 1 investment firms outside the scope of the Discussion Paper

Thresholds	Reference	Applicability of prudential requirements
Investment firms with assets above EUR 30 billion	Article 62 (3) of the IFR	Included in the definition of credit institutions, through an amendment of Article 4 (1) of the CRR; as a result all requirements of the CRR and CRD apply
Investment firms with assets above EUR 15 billion	Article 1 (2) of the IFR Article 2 (2) of the IFD	Requirements of the CRR apply to investment firms authorised and supervised under Directive 2014/65/EU, which carry out any of the activities referred to in points (3) and (6) of Section A of Annex I to Directive 2014/65/EU, and which are not a commodity and emission allowance dealer, a collective investment undertaking or an insurance undertaking
Investment firms with assets above EUR 5 billion	Article 1 (5) of the IFR Article 2 (2) of the IFD Article 5 (1)– (3) of the IFD	

- 219. The main focus of this chapter is on those investment firms that apply the methodologies based on K-factors. Therefore, for the remainder of this chapter, the term 'investment firms' will refer to the investment firms applying the K-factors, and not to the large and systemically important ones or to the small and non-interconnected investment firms.
- 220. The analysis on the interaction between environmental risk factors and the own funds requirements set

out in the IFR should be based on the same overarching principles that led to the establishment of the IFR and IFD as a separate regulatory framework from the one for credit institutions. These principles include the following elements:

- a. **Size:** Investment firms are often smaller and perform simpler activities than credit institutions and thus raise lower concerns in terms of financial stability and systemic risk. Where this is not the case, investment firms are required to apply the prudential framework for credit institutions.
 - b. **Comparability:** logical coherence across the requirements for investment firms and credit institutions should be maintained in all areas where services, activities and risks are comparable.
 - c. **Specificity:** the peculiarities of certain investment firms' specific business models should be taken into account, especially where these business models rely on performing a limited set of MiFID services.
221. The IFR identifies three layers of protection that lead to the capital requirements for all the investment firms not subject to the CRR: permanent minimum capital (PMC), fixed overheads requirement (FOR) and K-factors requirements. However, the PMC is not risk-based, as it is only a fixed amount based on the services provided by the investment firm and not on the volume or riskiness of these services. Similarly, the FOR does not reflect the risk profile of the investments made by an investment firm, but is rather a flat charge proportional to the size of its overheads. Nevertheless, increased ESG screening of portfolios (if applied by the firm) could drive those costs up, so that FOR would indirectly reflect ESG factors. Nonetheless, as per the mandate in Article 34 of the IFR, the subsequent analysis focuses on the K-factors requirements, as they are risk-sensitive measures.
222. The K-factors under RtC capture client assets under management and ongoing advice (K-AUM), client money held (K-CMH), assets safeguarded and administered (K-ASA), and client orders handled (K-COH). The K-factor under RtM captures net position risk (K-NPR) in accordance with the market risk provisions of the CRR or, where permitted by the competent authority for specific types of investment firms which deal on own account through clearing members, based on the total margins required by an investment firm's clearing member (K-CMG). Investment firms have an option to apply K-NPR and K-CMG simultaneously on a portfolio basis.
223. The K-factors under RtF capture an investment firm's exposure to the default of its trading counterparties (K-TCD) in accordance with simplified provisions for counterparty credit risk based on the CRR, concentration risk in an investment firm's large exposures to specific counterparties based on the provisions of the CRR that apply to large exposures in the trading book (K-CON), and operational risks from an investment firm's daily trading flow (K-DTF).
224. The overall own funds requirement under the K-factors is the sum of the requirements of the K-factors under RtC, RtM and RtF. Together they cover all MiFID services^[164]. K-AUM, K-ASA, K-CMH, K-COH and K-DTF relate to the volume of activity referred to by each K-factor. If a firm does not undertake the relevant activity, the amount of the K-factor requirement equals zero.
225. The definitions of the K-factors provided in the IFR clarify that some of these factors are capital requirements against losses stemming from operational failures, improper internal process implementation or legal aspects. Therefore, the same considerations set out for the operational risk capital requirements for credit institutions are valid for certain K-factors. Nonetheless, as the calculation methodologies are different, an explicit integration of environmental risk factors in the IFR framework should account for these differences.
226. Similarly, certain K-factors cover activities related to trading book positions, consisting of either securities or derivatives. Therefore, the relevant K-factors are logically (and, in some cases, directly) associated with the market risk and the counterparty credit risk frameworks of the CRR. Although this may often lead to similar recommendations on capturing risk arising from environmental risk factors, investment firms have the possibility, in certain cases, to apply radically different methodologies. This again suggests the need for specific considerations for investment firms that would not be available for credit institutions.
227. The IFR framework was developed as a risk-sensitive regime and, to serve its purpose, it should remain so with respect to any risk. Therefore, the potential incorporation of environmental risk factors into the IFR framework has to rely on an overall assessment on whether they substantially increase the risk for the investment firms or, indirectly, for the clients and the markets.
228. The next section discusses technical aspects related to each K-factor and how they may differ from the similar requirements for credit institutions. It also provides initial considerations on the incorporation of environmental risk factors into the capital requirements based on the K-factors.

9.2. Interaction between environmental risks and the prudential framework for investment firms

9.2.1. Business models and risk categories

229. The sections below distinguish between risk categories as defined in the IFR (i.e. Risk-to-Client, Risk-to-Market and Risk-to-Firm). The universe of investment firms is very scattered and diverse; therefore,

^[164] The list of core services investment firms can provide or perform is in Section A, Annex I of MiFID ([link](#)).



it is difficult to exhaustively map investment firms to business models. However, intuitively, different risk types are more relevant for certain business models.

230. On the one hand, the Risk-to-Client is more relevant to portfolio managers, advisors and broker-dealers. These investment firms primarily engage in discretionary portfolio management, advice, execution, reception and transmission of orders and running trading facilities. Although performing a relatively limited range of services, these types of investment firms do not usually expose their balance sheet to market and credit risks. As opposed to the operational risk framework for credit institutions, the K-factors under Risk-to-Client were not calibrated on the basis of historical operational risk loss data. Therefore, historical losses do not play a role in any of the formulas (as they would for the ILM in the banking framework); they are instead based on a looser approach where the capital requirements cover all operational risks proportionally to the volume of operations.
231. On the other hand, Risk-to-Market and Risk-to-Firm are more relevant for firms trading on own account (including principal traders, market makers as well as those underwriting on a firm commitment basis) and commodity dealers. These firms have a balance sheet exposure to market changes, either via securities, derivatives or underwriting commitments. For the purposes of this DP, they can be considered a single business model of firms 'trading on own account', although they can act on own account in the name of the client or on a principal basis. Depending on their business strategies, however, they can have very different risk profiles.
232. Wholesale investment firms, those performing all the activities above on a large scale, may be associated with all three risk types.

9.2.2. Risk-to-Client

233. The K-factors under Risk-to-Client are volumetric measures covering those activities where an investment firm may cause harm to clients. These measures were introduced to simplify the capital requirements calculation, therefore reducing the burden for the investment firm to the extent possible without losing the general objective of ensuring financial stability. To this end, only aggregated values are used (an item-by-item analysis by instrument is not foreseen in the IFR), despite the fact that granular data are available to the investment firm. Specifically, on each K-factor the following considerations can be applied:

- a. **K-COH (Client Orders Handled)** captures the potential risk to clients posed by an investment firm which executes orders in the client's name by using as a proxy the volume of orders executed over time. As such, the investment firm is exposed to operational risk, but the firm has no influence on the order received or on the clients' decisions.

Therefore, this specific K-factor requirement addresses the operational risk of the investment firm. As the client himself decides about the financial instruments, there are no environmental risks evolving from CoH as such. Therefore, the incorporation of environmental risk factors into this aspect of the framework does not seem necessary.

- b. **K-CMH (Client Money Held)** captures the potential harm to clients that may occur when an investment firm holds client money on its own balance sheet or in third-party accounts. Client money held by an investment firm, although protected under MiFID, may be exposed to the default of the investment firm. This aspect does not seem to be related to environmental risks. Therefore, consideration of environmental risks in the framework does not seem necessary.
- c. **K-AUM (Assets Under Management)** is relevant for investment firms offering discretionary portfolio management and investment advice. This element of Risk-to-Client refers to operational errors such as poor execution and legal errors. The possibility of committing such errors does not seem to be related to environmental factors and therefore consideration of environmental risks in this part of the framework is not necessary. The composition of the assets under management in terms of their sustainability should not be considered as the basis for differentiating capital requirements for investment firms, as it depends on the client's mandate. However, it should be noted that sustainability of investments is not neglected in the EU regulatory framework, as certain organisational requirements and operating conditions are already addressed in the EU regulation ^[165]. It might be worth highlighting that, despite the considerations above, a loss in income due to a reduction in fees from discretionary portfolio management or advice following environmental events can still impact an investment firm's ongoing viability. However, the analysis of such potential vulnerabilities belongs to the domain of firm-specific business model analysis as part of the Supervisory Review and Evaluation Process under Pillar 2.
- d. **K-ASA (Assets Safeguarding and Administering client assets)** ensures that investment firms hold capital proportionately to activities, which are often closely related, but additional, to portfolio management and investment advice. As such, a capital requirement protects the clients from the operational risks the investment firm is facing. Similarly, as for the other Risk-to-Client K-factors, the element of operational risk addressed under this K-factor does not seem to be significantly affected by environmental risks.

^[165] Commission Delegated Regulation (EU) .../... amending Delegated Regulation (EU) 2017/565 as regards the integration of sustainability factors, risks and preferences into certain organisational requirements and operating conditions for investment firms ([link](#)).



234. As far as Risk-to-Client K-factors are concerned, operational risk is the main risk driver, and it seems to be already well captured by the IFR requirements, taking into account the proportionality principle with a view to avoiding an overly complex framework.

235. In line with Chapter 7, one might argue that almost if not all K-factors may be related to environmental factors, if we take transition risks into account for investment firms. For example, new climate policies, technologies and changing market sentiment may increase reputation and/or liability risks, and may lower the demand for investment services if investment firms cannot meet the new standards. Also, new climate policies may generate stranded assets which trigger an abrupt repricing on financial markets. This may have an impact on market risk for investment firms trading on own account, but also on business model risks for investment firms whose fee income depends on the assets under management or advice. From this point of view, the composition of assets under management in terms of their environmental profile may still be considered as the basis for differentiating capital requirements for investment firms, because the investment firms may run reputational risk and business model risk if they do not take environmental factors into account.

236. Finally, concerning these K-factors, the general considerations on the relationship between environmental factors and operational risk presented in Chapter 7 on operational risks are also valid here. Because of the different underlying methodologies, the approaches used for the two frameworks may differ. In particular, the framework for investment firms is not based on historical observations of operational losses. Therefore, any potential future changes in average frequencies and/or severities of operational events affecting the clients of investment firms will not be automatically reflected in the own funds requirements. Therefore, should such tendencies be observed in the future, the framework may need to be recalibrated.

9.2.3. Risk-to-Market and Risk-to-Firm

237. As explained in section 9.1 above, Risk-to-Market and Risk-to-Firm refer to firms trading on own account and, since the two types of risk are strictly related, they are discussed together in this section.

238. To leverage on the analysis for credit institutions, it is possible to associate specific K-factors with the risk types in the CRR as follows:

Risk types in the IFR	K-factors	Risk types in the CRR
Risk to Market (RtM)	K-NPR	Market risk
	K-CMG	Market risk
	K-TCD	Counterparty credit risk
Risk to Firm (RtF)	K-DTF	Operational risk
	K-CON	Concentration risk

239. Each K-factor merits a separate discussion:

- a. **K-NPR (Net Position Risk)** is defined in the IFR by direct reference to the market risk approach in the CRR and this alignment is expected to be maintained in the future. Therefore, the observations in Chapter 6 on market risk are valid also for investment firms.
- b. **K-CMG (Clearing Member Guarantee)**, similar to K-NPR, is a K-factor that covers the market risk an investment firm is exposed to, although with a different calculation methodology. The use of this alternative method is limited to positions that are centrally cleared via a clearing member and guaranteed by the same clearing member. This method has no equivalent in the CRR framework, and it is not available to credit institutions. Under the K-CMG, the level of capital requirements is set in accordance with the total amount of margins required by the clearing member from the investment firm. As such, it depends on the clearing member's internal models and it is heavily reliant on the netting of the cleared positions. By construction, intervening directly on the calculation of the K-CMG is hard to envisage, as the clearing members' models are not part of a regulatory framework. Therefore, if any concern was identified in the context of environmental risks, a correction could only be possible via either: (a) an external add-on to the K-CMG, or (b) limiting further the use of the K-CMG.
- c. **K-TCD (Trading Counterparty Default)**, despite the different terminology, is for all intents and purposes equivalent to the counterparty credit risk module for credit institutions. Accordingly, the observations with regard to counterparty credit risk in Chapter 6 are valid also for investment firms. The IFR does not take into account capital requirements for credit risk, other than counterparty credit risk, in the Pillar 1 requirements. However, some investment firms may grant credit (as an ancillary service) or have material non-trading-book positions. This might lead to material credit risk exposures, but, in the IFR, this type of risk should be treated under the Supervisory Review and Evaluation Process under Pillar 2.
- d. **K-DTF (Daily Trading Flow)** was introduced recognising the need for the IFR framework to cover operational risk related to trading activities, especially when these activities are of high frequency. Accordingly, the K-TCD is measured on the volume of transactions (either securities or derivatives) and was calibrated to lead to results broadly comparable to capital requirements under the Basic Indicator Approach for operational risk in the CRR. As with other K-factors, the K-DTF is a volumetric measure and is not based on historical operational risk losses. The K-DTF applies to all investment firms which trade on own account. Nonetheless, based on how the K-DTF is defined,



high-frequency trading leads to higher capital requirements. Since high-frequency traders usually operate within a short-term horizon, environmental risk factors seem less relevant for K-DTF.

- e. **K-CON (Concentration)** captures concentration risk in relation to individual or connected counterparties with whom firms have exposures above certain given thresholds, distinguished by type of counterparty. Capital add-ons against this type of concentration risk are set up in the IFR^[166] in line with large exposures requirements for the trading book as specified in Article 397 of the CRR. Although the two frameworks have some differences, in line with the overarching objective of the IFR to maintain a simpler regime for investment firms, the functioning of these capital add-ons is largely equivalent. Chapter 8 on concentration risk elaborates more on the possibility to have additional limits applicable to credit institutions for concentration of positions or counterparties because of environmental risks. Although theoretically the same considerations would be valid for investment firms, the general objective of the IFR of keeping the framework as simple as possible, proportionally to the size and complexity of most investment firms, should be taken into account.
240. Special consideration should be given to commodity and emission allowance dealers. These are defined in MiFID as trading firms whose main business consists exclusively of the provision of investment services or activities related to commodity derivatives or derivatives of emission allowances. It is worth recalling that commodity dealers may be part of banking or investment firm groups, independent firms or part of industrial groups. The prudential requirements for these firms address trading in commodity derivatives (or emission allowances), rather than the underlying 'raw material' itself. For example, a commodity dealer part of an energy group may trade in derivatives on gas prices and also buy and sell gas on behalf of the group. This dealer has to hold capital for its derivative trading, and not for trading in gas. Therefore, for these firms, the K-TCD should be the most relevant K-factor, in terms of capital requirements, followed by the K-NPR. Commodity dealers usually focus on very specific markets, depending on the underlying they are interested in. They differ substantially in terms of hedging and investment strategies, especially in terms of time horizons. Therefore, it might be appropriate to investigate whether environmental risks could justify a dedicated treatment of commodity dealers under the IFR because of the high specialisation of these investment firms. If that was the case, differentiating factors would have to be identified to distinguish those commodity dealers which are materially exposed to environmental risks.

9.3. Preliminary conclusions and discussion points

241. Some preliminary conclusions can be drawn from the analyses in this chapter. Firstly, the IFR prudential framework shows similarities and differences to the CRR framework. Those interrelations must be taken into account when considering potential adjustments to the IFR framework to ensure an overall consistency and proportionality.
242. Second, although it seems difficult to directly associate the Risk-to-Client K-factors with the risks arising from environmental risk drivers, investment firms may face reputational risk and business model risk if the composition of assets under management in terms of their environmental profile is not taken into account.
243. Third, since Risk-to-Market and Risk-to-Firm are closer (conceptually and in methodology) to the existing framework for market risk and counterparty credit risk for credit institutions, any improvement in the CRR could be reflected in the IFR as well, although with due consideration of the proportionality principle.
244. Finally, commodity and emission allowance dealers may need further analysis and special consideration, because of the specificities of their business models and the markets they operate in.

Questions for public consultation:

Q32: With reference to the three risk categories the IFR is based on (Risk-to-Client, Risk-to-Market and Risk-to-Firm), which of these could be related to environmental risks, and to what extent?

Q33: Should any of the existing K-factors incorporate explicitly risks related to environmental factors?

Q34: What elements should be considered concerning the risk from environmental factors for commodity and emission allowance dealers? Are there any other specific business models for which incorporation of environmental factors into the Pillar 1 requirements of the IFR would be particularly important?

Q35: Do you have any other suggestions as to how the prudential framework for investment firms could be adjusted to account for environmental risk factors?

[166] See Article 39 of the IFR: Calculating K-CON.

10. Concluding remarks

245. Prudential regulation should remain risk-based and evidence-based. It needs to be ensured that prudential requirements reflect underlying risks and ultimately support institutions' resilience to such risks. From an environmental risk driver perspective, this means that prudential requirements need to reflect the risk profiles of exposures to support the safety and soundness of individual financial institutions, irrespective of whether these exposures are green or environmentally harmful. In that light, any amendments to the framework should be carefully considered.
246. The Pillar 1 prudential framework sets out the calculation of the minimum required level of own funds, which is a binding requirement for all institutions at all times. In order to maintain a level playing field and appropriate application of these minimum requirements, the calculation should be based on objective, observable values.
247. The analysis in this DP focuses on Pillar 1 own funds requirements. It is, however, acknowledged that these requirements cannot and do not intend to cover all risks faced by credit institutions and investment firms. Pillar 1 requirements are complemented by Pillar 2 additional own funds requirements. Pillar 2 own funds requirements are based on the institution-specific analysis performed by competent authorities and take into account institution-specific risks. In addition, a number of macroprudential tools address systemic risks in the financial sector. Therefore, the overall prudential framework should be considered in a holistic manner, to ensure that the most appropriate tools are used to address specific challenges. In that regard the EBA is undertaking a number of initiatives. These include providing guidance in areas such as disclosures, the role of ESG in risk management by institutions and supervisory practices, as well as carrying out climate stress-testing and contributing to the work on clear and consistent identification of environmentally harmful and sustainable exposures.
248. It is important to acknowledge that environmental risks, as drivers of traditional categories of financial risk, may be already reflected – albeit indirectly and potentially not fully – in the current risk assessments. The Pillar 1 framework already includes a number of mechanisms that allow for addressing new types of risk drivers, for example through internal models, external credit ratings and valuations of collaterals and financial instruments as outlined in this DP. Similarly, under Pillar 2, competent authorities are already assessing additional risks, such as strategic, reputational or concentration risk, which can be affected by environmental risk drivers. There is a strong focus of the European supervisory community on ESG risks. ESG risk drivers were selected as one of the focus areas for supervisory activities in 2022.
249. For those parts of the prudential framework which currently do not reflect environmental risks, these risks can be addressed through targeted amendments, enhancements or clarifications within the framework. Several of these potential amendments are presented through Chapters 5 to 9. It appears that targeted amendments to the existing prudential requirements would address these risks more accurately than dedicated treatments such as supporting or penalising factors, given the various challenges associated with the design and implementation of such factors.
250. The prudential framework has historically been built on backward-looking risk assessments. This does not align well with the forward-looking nature of environmental risks. Hence, emphasis at this stage should be on environmental-risk-related data collection and ensuring that institutions' risk management tools and practices explicitly consider environmental risks. The EBA's Report on Management and Supervision of ESG Risks for Credit Institutions and Investment Firms (June 2021) ^[167] sets out a number of recommendations on this topic, and further guidelines for institutions will be developed by the EBA on the identification, measurement, management and monitoring of ESG risks going forward. Additionally, the EBA is working on the integration of environmental risk considerations into the Pillar 2 framework, including in the Supervisory Review and Evaluation Process (SREP) and stress tests. In relation to Pillar 3, the EBA has published technical standards on ESG disclosure requirements (January 2022) ^[168] which provide an important step towards the availability of more consistent data on the side of supervisors and regulators.
251. Empirical evidence on a risk differential or specific risk profile for green or environmentally harmful assets is only likely to materialise over time. The challenges around data availability which have been outlined throughout this DP imply that currently the empirical data do not allow for a robust assessment of whether the current calibration sufficiently addresses environmental risks. The lack of environmental risk classifications as well as the forward-looking nature of environmental risks are

^[167] EBA (2021), 'Report on Management and Supervision of ESG Risks' ([link](#)).

^[168] <https://www.eba.europa.eu/eba-publishes-binding-standards-pillar-3-disclosures-esg-risks>.

particularly challenging. The prudential framework does, however, have mechanisms that allow addressing environmental risks and support collection of better information on environmental risks going forward. Furthermore, against the background of sound scientific evidence on the existence, pace and impact of climate change and other environmental risks on the economy at large, it may be prudent to assess future environmental risks with forward-looking methodologies.

252. The adaptive nature of the framework will allow better recognition of environmental risks going forward. However, based on conceptual considerations, this DP explores targeted amendments to the framework which could be considered in this regard and on which views are welcome. Moreover, this DP seeks to open a broad discussion on potential fur-

ther amendments that could be considered in the prudential framework, especially with regard to the forward-looking nature of environmental risks. As further evidence will be collected going forward, the EBA will form a final view on these amendments in the final report.

253. The interim findings in this DP do not constitute definitive policy recommendations and do not pre-empt the EBA's final report. Considering both the feedback that will be received to this DP, as well as considering insights gained from further qualitative and quantitative analysis and from monitoring international efforts as regards the reflection of environmental risk in the prudential framework, the EBA will include its final risk-based analysis and associated recommendations in the final report, to allow the Commission to take policy decisions as necessary.



Annexes

Annex 1 – Transmission channels through which physical and transition risks materialise as credit risk per exposure class

Exposure class	Physical risk ⁽¹⁶⁹⁾	Transition risk ⁽¹⁷⁰⁾
Exposures secured by immovable properties	<p>Properties could be exposed to acute (extreme natural catastrophes increasing in number and intensity with global warming, such as flooding events) or chronic (increasing sea levels and deteriorating land output and productivity) climate change events. Acute or chronic physical risk can impact the valuation of the property and its surroundings whether for residential or commercial use. Properties can be destroyed or damaged by natural events ⁽¹⁷¹⁾ or the borrowers' ability to service their loan payments can be impaired due, for example, to the operational incapacity to pursue its income generating activity or an insufficient insurance protection against natural disasters. Banks are exposed to physical risks as much as the loan's collateral or the borrower's income is exposed to climate change events.</p>	<p>In the real estate market, institutions are exposed to energy prices and the impact of energy consumption on the valuation of a real estate asset. A lack of adherence to stricter regulatory standards can lead to a deterioration in collateral values or transform real estate assets into stranded assets. For example, in recent bill proposals British and French governments plan to limit and exclude from the rental market any property that does not comply with a certain maximum energy and carbon consumption level (measured by its EPC grade) ⁽¹⁷²⁾. Similarly, in the Netherlands corporate real estates (CRE) need to have a certain minimum EPC grade/energy efficiency label from 2023 in order to be allowed to be rented out ⁽¹⁷³⁾. At the same time, real estate assets that conform to or go beyond legal standards can see their value increase. Changes in consumer preferences and hence changes in the demand and prices for low-energy-efficiency housing can also affect the value of the collateral ⁽¹⁷⁴⁾. Furthermore, it has been argued that Energy-efficient Mortgages (EEM) on housing renovations could currently be associated with higher capital costs than warranted, against the background of the high empirical correlation observed between energy renovations and collateral value.</p> <p>The CRR3 proposal includes a clarification that property improvements related to energy efficiency should unequivocally increase its value.</p> <p>Some of the risk differentials occurring through the above-described transition risk channels are likely not symmetrical across the different degrees of properties' level of 'greenness'. Retail borrowers occupying energy-wasteful assets, in addition to being more exposed to energy price increases, are likely to have lower income and credit scores. This may lead to an amplified solvency risk compared to borrowers living in highly energy efficient or 'neutral' houses ('accumulation of risk factors'). Conversely, several studies have shown little impact of an investment transforming a property of EPC rating B to A or higher in terms of additional 'green' property value or a significant decrease in operational costs. Properties with higher energy performance tend to be already higher-value properties, with more recent and higher-value construction. Therefore, an asymmetry in risk differentials of mortgage assets with different degrees of 'greenness' can be expected.</p>

⁽¹⁶⁹⁾ For more detailed definitions and explanations of physical and transition risk, see EBA (2021), 'Report on Management and Supervision of ESG Risks' [\(link\)](#).

⁽¹⁷⁰⁾ Transition risks stem from the transition to a low-carbon economy and can arise through i) government policies such as GHG emission taxes; ii) technological change (making cleaner production relatively cheaper); iii) market sentiment (investor and consumer preferences and demand).

⁽¹⁷¹⁾ Article 208(5) of the CRR requires that properties are adequately insured and that institutions shall have in place procedures to monitor this. Hence, properties being destroyed by natural events would only increase credit risk to the extent that the insurance is inadequate or that it affects the borrower in his daily life to generate income.

⁽¹⁷²⁾ Assemblée Nationale (2021), *Projet de loi 3875* [\(link\)](#).

⁽¹⁷³⁾ Dutch Government (2020), *Energy labels* [\(link\)](#).

⁽¹⁷⁴⁾ Copenhagen Economics (2021), 'Prudential treatment of green mortgages' [\(link\)](#).

Exposure class	Physical risk ⁽¹⁷⁶⁾	Transition risk ⁽¹⁷⁹⁾
Corporates	Acute physical risk (e.g. in the form of flood events) can imply disruptions in supply chains and lead to decreased sales ⁽¹⁷⁵⁾ . Similarly, physical damage to plant sites due to environmental events could affect the future financial solvency of a corporate counterparty, with some geographical locations more at risk (e.g. areas prone to flooding or extreme weather events). Chronic physical risk can affect corporates' profitability and land values, depending on the location and the sector ⁽¹⁷⁶⁾ .	A company with high CO ₂ emissions will see an impact on earnings and profitability from GHG emission taxes, which in turn may affect its access to and cost of funding and its ability to repay any outstanding debt to banks. Furthermore, 'stranded assets' on companies' balance sheets, as a result of certain activities no longer being economical or feasible (e.g. extraction of fossil fuels) can affect corporates' income, default probability and collateral values. Technological change in turn could make companies relying on carbon-intensive technologies less competitive and may lead to credit losses. Market sentiment and consumer preferences can further drive demand (e.g. eliminate the demand for certain highly polluting products) and thereby affect corporates' profitability and viability. Increased litigation costs in the context of environmental investigations can further affect a corporate's creditworthiness. Both physical and transition risks can further impact a company's supply chains, affecting its operations and profitability.
Sovereigns	Physical risk events can impact the income of sovereigns inter alia through lower tax revenues from affected corporates and households as natural hazards destroy the physical capital of companies and private households ⁽¹⁷⁷⁾ , damage to infrastructure, a generally weaker overall economy, depletion of natural capital, expenses on prevention measures such as reinforcing dykes, building flood retention basins or afforestation at large scale, as well as higher spending in order to address the economic effects of the physical climate events where damage is not insured (including social costs). This may affect a sovereign's access and cost of borrowing, probability of default and general creditworthiness.	Transition risk can impact sovereigns' riskiness through changes in market sentiment and consumer preferences and a generally weaker overall economy (e.g. as a result of supply and demand shocks) and lower tax income (due to e.g. corporates' expenditures on transition measures which are written off from taxable profits). Like corporates, sovereigns may face higher litigation costs as transition efforts progress ⁽¹⁷⁸⁾ . Fiscal consequences from mitigation and adaptation policies also arise from required public investments, implying increased government spending. Negative feedback loops between the sovereign and financial sector and the risk of political instability arising from climate change exist both for physical and transition risks ⁽¹⁷⁹⁾ .
Other retail	The effects on households from physical risk events is usually captured through the wealth effects from collateral damage (see above). The latter may require expenditures that could jeopardise repayment of the loan or decrease the value or even eliminate the existence of the collateral.	Retail customers' ability to repay debt and hence their riskiness can be impacted through higher emission taxes, leading to higher energy prices which may also affect their ability to repay general consumer loans, or through changes in demand for and taxes on different vehicle types, which could impact the ability to repay consumer car loans ⁽¹⁸⁰⁾ .

⁽¹⁷⁵⁾ BCBS (2021), 'Climate-related risk drivers and their transmission channels' (link).

⁽¹⁷⁶⁾ Agriculture, for example, is expected to be affected by chronic physical risk such as higher temperatures, varying also by crop type.

⁽¹⁷⁷⁾ Parida, Saini and Chowdhury (2021) found that flood impacts in terms of area affected, population affected, and economic losses decrease real per capita GSDP growth in the long run. In: 'Economic growth in the aftermath of floods in Indian states', *Environ Dev Sustain* 23, 535–561 (link).

⁽¹⁷⁸⁾ For a more detailed discussion, see BCBS (2021), 'Climate-related risk drivers and their transmission channels' (link), describing the transition channels through which climate risk drivers impact banks' financial risks, inter alia through the effects of physical and transition risks on corporate counterparties.

⁽¹⁷⁹⁾ For a more detailed discussion on the transmission channels in the context of sovereigns, see also SOAS University et al. (2020), 'Climate Change and Sovereign Risk' (link).

⁽¹⁸⁰⁾ The energy poor are more impacted by an increase in energy prices and more likely to face a double vulnerability because several studies show that energy poverty is most likely to be found among lowest-income households who are at the same time also more likely to live in the lowest energy-performance homes. See also the accumulation of risk factors / asymmetry described further below. (Energy poverty: according to an official definition in the UK and also unofficially used by other Member States within the EU, households are suffering from energy poverty when their energy expenditures represent more than 10% of their total expenditures. See the European Commission's Energy Poverty website).

Annex 2 – Challenges in the context of environmental risks

The below provides a (non-exhaustive) overview of the main challenges, in the context of environmental risks, identified to date, including those raised by institutions themselves. Where applicable, specific challenges or details in the context of certain exposure classes have been highlighted. The identified challenges can serve as a basis for any future analysis conducted by the EBA on risk differentiation, by providing input and limits and explaining

assumptions made. In combination with existing research, the presented data gaps can form the basis for policy recommendations to bridge these data gaps. The following discusses challenges in the broader context of environmental risks, including specifically for climate risks.

The number of challenges identified highlight the complexity involved in consistently identifying environmental risks and assessing to what degree they drive existing risk categories, both for institutions and for supervisors and regulators.

Table 5: Challenges in the context of environmental risks

Challenge	Detail
(1) Lack of (high-quality) data on ESG factors	<p>Availability and accessibility of reliable and consistent environmental data are often lacking. This poses substantial challenges to classification and risk analysis.</p> <p>Specifically, for corporates, the availability and accessibility of data are particularly challenging for SMEs. The various initiatives regarding disclosures, especially the replacement of the Non-Financial Reporting Directive (NFRD) by the CSRD ⁽¹⁸¹⁾, are expected to increase both the availability of sustainability data (as the scope of mandatory reporting by companies will increase) and the quality of data for the corporate segment. Disclosures can be an important source of reliable and comparable data, if presented and constructed in a uniform manner. The replacement of the NFRD by the CSRD provides an important step in this direction. However, SMEs and non-EU corporates currently remain outside the scope of the CSRD.</p>
(2) Lack of a common, standardised and complete classification system	<p>There is to date a lack of a clear definition of what is green / environmentally harmful / other (e.g. neutral). Some established classifications exist; however, they remain fragmented across exposure types as well as across jurisdictions. Furthermore, for the purpose of risk differentiation, classifications should ideally not necessarily be binary, as there can be different 'shades' of green and environmentally harmful, which can affect the level of associated risk. A more granular (standardised) classification system is likely to be more difficult to establish.</p> <p>Sovereigns: No common, established classification system exists to date. For asset classes such as sovereign debt and the public sector more broadly, environmental risks do not apply directly but rather indirectly, on the basis of the status of the underlying economy. This adds an additional layer of complexity to the classification exercise.</p> <p>Corporates: The EU Taxonomy ⁽¹⁸²⁾ presents a first and substantial step towards a common classification system of environmentally sustainable economic activities by non-financial corporate exposures by NACE code ⁽¹⁸³⁾, and provides a strong basis for further classification efforts. Additional work appears to be needed to refine the taxonomy in a number of areas. The taxonomy is limited to EU-based activities and technical screening criteria have been to date established only for climate-related environmental objectives, while those for the four other identified environmental objectives will be worked out at a later stage ⁽¹⁸⁴⁾. It should be noted that the technical screening criteria for the taxonomy are laid down in the delegated act ⁽¹⁸⁵⁾ and started applying from January 2022, meaning that it will take some time for non-financial corporates and credit institutions to fully start applying them ⁽¹⁸⁶⁾. Furthermore, corporates currently pursuing environmentally harmful activities may have credible plans and the financial and organisational resources to manage the transition and deliver green products/services in the future. Such corporates are different from a risk-based perspective.</p>

⁽¹⁸¹⁾ The CSRD contains again disclosure items such as information on the way corporates operate and manage social and environmental challenges more broadly.

⁽¹⁸²⁾ For a more detailed discussion of the EU Taxonomy, please see Box 7 of EBA (2021), 'Report on Management and Supervision of ESG Risks' ([link](#)). Other jurisdictions have also developed taxonomies (e.g. China, Bangladesh), but no global, uniform classification system exists to date.

⁽¹⁸³⁾ More work on the EU Taxonomy towards incorporating environmentally harmful activities and economic activities that credibly contribute to the transition path is envisaged going forward under the Commission (2021) renewed sustainable finance strategy ([link](#)).

⁽¹⁸⁴⁾ Technical screening criteria established in the Commission (2020) Delegated act only cover climate adaptation and mitigation to date ([link](#)). Technical screening criteria for the other four environmental objectives will be published in 2022.

⁽¹⁸⁵⁾ See the Commission (2020) Delegated act supplementing Regulation (EU) 2020/852 on technical screening criteria ([link](#)).

⁽¹⁸⁶⁾ Related disclosure requirements, for instance, are not envisaged until January 2023 for NFCs and January 2024 for financial undertakings, see the Commission (2021) Delegated act supplementing Regulation (EU) 2020/852 regarding disclosure obligations ([link](#)).

Challenge	Detail
(2) Lack of a common, standardised and complete classification system	<p>Specifically in the context of climate risk, a method often used to classify non-financial corporate exposures into green and environmentally harmful exposures is by assessing the level of the counterparty's GHG emissions. However, firm-level data are not always available on this ⁽¹⁸⁷⁾ and in many cases proxies in the form of sector averages have to be used, implying a substantial loss of accuracy. Providers offering emission data cover only a portion of the market, often driven by companies' size and listings. In particular for SMEs, (standardised) emission data are difficult to obtain. Where firm-level data are available, they are often not granular enough [e.g. in the form of scope 1, scope 2 and scope 3 emissions ⁽¹⁸⁸⁾], or data across providers are not comparable because methodologies and models for assessing emission data differ (in cases where no direct company emission data are disclosed, providers run their own assessments).</p> <p>Retail: No common, established classification system exists to date.</p> <p>Immovable properties: Energy Performance Certificate (EPC) labels exists specifically for climate risk. This classification however faces various challenges:</p> <ol style="list-style-type: none"> lack of access to EPC databases, or no existence of the latter (commercial real estate); limited scope: lack of coverage (only those built, sold or rented out in the last 10 years), lack of sufficient historical data, lack of coverage in terms of geographies; comparability issues between EU regions (lack of harmonisation in EPC metrics and classification). <p>In the Netherlands and Belgium, studies show many financial institutions have very limited insight on the current energy efficiency (presented by labels) of the real estate in their mortgage portfolios ⁽¹⁸⁹⁾ ⁽¹⁹⁰⁾.</p> <p>Financial institutions: Similar to sovereign exposures, to a large part environmental risks do not apply directly but rather indirectly, based on the balance sheet exposure of the counterparty institution.</p>
(3) Physical risk: pricing barrier and translation into financial risks	<p>The measurement of physical risk materialisation faces different challenges to transition risk. There is ample scientific evidence and historical data availability (e.g. insurance sector data). Nevertheless, to date these data remain costly and uncertainties with regard to the financial implications of acute physical risk events make the translation into actual financial losses difficult. For the latter, granular data on the mitigating measures at collateral level, insurance and financial soundness of the counterparty are needed. Currently, most proxies used for the assessment rely on country-level estimations</p>
(4) Challenges in the use of ESG ratings or scores	<p>Sometimes lack of quality in ESG ratings ⁽¹⁹¹⁾, limited and varying scope ⁽¹⁹²⁾ and lack of transparency on methodologies and comparability between different ESG ratings pose challenges when using and interpreting them (see also section 3.2.3 of the EBA Report on Management and Supervision of ESG Risks ⁽¹⁹³⁾).</p>
(5) Complexity of analysis	<p>Ideally, a risk differential analysis should look into evidence of a risk differential for green as well as environmentally harmful assets. This neutrality is deemed necessary since risk differentials may not work in a symmetrical way. A green asset may not exhibit lower risk attributes compared to other assets, whilst an environmentally harmful asset might (or vice versa). The same degree of classifications for both green and brown may not always be available for all assets.</p> <p>The complexity of the analysis is also increased by the need to define common forward-looking indicators for aspects related among other things to technology, market and reputational risk. These are more difficult to capture than risks stemming from abrupt regulatory changes (e.g. measures in the form of CO₂ price changes), and developments in the former areas have hence so far been limited.</p>

⁽¹⁸⁷⁾ For companies and sectors covered by the EU ETS scheme, the EU has implemented a statistical hub [\(link\)](#) where all ETS-related data can be accessed at the firm level. Besides information on emission trading operations, actual emissions by companies per year can be obtained.

⁽¹⁸⁸⁾ Not all of these are always available, especially scope 3 emissions are often lacking. Scope 1 emissions refer to a company's direct emissions. Scope 2 emissions encompass indirect emissions, such as the electricity purchased. Scope 3 emissions refer to all emissions along a company's value chain.

⁽¹⁸⁹⁾ De Nederlandsche Bank (2016), 'Time for Transition: an exploratory study of the transition to a carbon-neutral economy', DNB Occasional Studies, Vol 14-2 [\(link\)](#).

⁽¹⁹⁰⁾ Van Tendeloo B. (2020), Transition risk related to real estate exposures in the Belgian financial sector, NBB Financial Stability Report [\(link\)](#).

⁽¹⁹¹⁾ Not to be confused with standard credit ratings.

⁽¹⁹²⁾ For corporates, for instance, coverage amounts to 5,000+ (large cap companies), 8,000 and 12,000 for Moody's, S&P and Sustainalytics, respectively.

⁽¹⁹³⁾ EBA (2021), 'Report on Management and Supervision of ESG Risks' [\(link\)](#).

Annex 3 – Environmental risks in accounting and valuation

Given that accounting values are the basis for the computation of prudential measures, and with a view to avoiding double counting with any prudential rules, it is important to consider to what extent environmental risks are reflected in accounting valuation, rules and disclosures, currently and going forward.

Although a number of smaller institutions apply national accounting frameworks, IFRS, which is applied by all systemically important institutions as well as other institutions and as such is the most widely used accounting framework in the EU financial sector, is the focus of this analysis. For institutions that apply national accounting standards, similar provisions may exist to those in IFRS. To the extent that those standards, like IFRS, are also, *inter alia*, based on historical evidence, the considerations presented below would be applicable to those standards as well.

Under the Conceptual Framework of the IFRS, assets and liabilities may be measured either at the historical cost – which takes into account the information from the price of the transaction which may be adjusted further for any impairment losses and depreciation – or on the current value measurement basis – which takes into account the conditions at the measurement date and includes the methods of fair value^[194], current cost^[195] and the value-in-use (for assets) or fulfilment value (for liabilities)^[196].

Valuation of financial instruments under IFRS

IFRS 9, *Financial instruments*, requires that financial instruments are classified and measured based on the business model applied^[197] (to hold and collect the contractual cash flows or to sell prior to the contractual maturity to realise changes in fair value) and on the characteristics of their cash flows^[198] (solely payments of principal and interest or otherwise). As a result, exposures may be measured at: a) fair value through profit and loss (FVPL), b) amortised cost (AC), or c) fair value through other comprehensive income (FVOCI), with the last two measurement bases being subject to expected credit losses requirements.

The balance sheet of EU credit institutions consists mainly of loans and advances, followed by debt securities and cash balances at similar percentages^[199]. Most

^[194] The price to sell an asset, or paid to transfer a liability, in an orderly transaction between market participants at the measurement date, which reflects market participants' current expectations about the amount, timing and uncertainty of future cash flows.

^[195] The current amount that would be paid to acquire an equivalent asset or received to take on an equivalent liability.

^[196] The entity-specific current expectations about the amount, timing and uncertainty of future cash flows.

^[197] IFRS 9, Paragraph 4.1.1 (a).

^[198] IFRS 9, Paragraph 4.1.1 (b).

^[199] EBA (2021), *Risk Dashboard Q3 2021* ([link](#)) based on a sample of 161 banks, at the highest level of consolidation, loans and advances are 59.5% of total assets, debt securities 12.3% and cash balances 16.1%.

of the financial instruments are measured at AC, followed by financial instruments measured at FVPL and the remaining are measured at FVOCI^[200]. When measuring financial assets at AC or FVOCI, expected credit loss requirements are applicable, as explained below. Hence, at EU level, most of the financial instruments are loans and advances, subject to expected credit loss requirements and a smaller portion of loans and advances (and other financial instruments) are measured at the fair value (through profit or loss).

For the estimation of the expected credit losses, **IFRS 9** requires recognising expected credit losses considering all reasonable and supportable information – which includes forward-looking information – that is available without undue cost or effort^[201]. The IASB highlighted in an educational note^[202] that climate-related issues may affect the estimation of expected credit losses in a number of ways, such as through the obligor's repayment capacity, the value of collateral and the assumptions used for the estimation, including the range of potential future economic scenarios considered. In this respect, one may argue that the expected credit losses of IFRS 9 could address environmental considerations materialising in the future until the maturity of the exposure.

For the measurement of fair value, **IFRS 13** defines fair value as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date (an exit price from the perspective of a market participant that holds the asset or owes the liability at the measurement date). When measuring the fair value, an entity uses the assumptions that market participants would use when pricing the asset or the liability under current market conditions, including assumptions about risks and premiums^[203]. In the IASB educational note mentioned above, it is highlighted that climate-related matters may affect the fair value measurement of assets and liabilities, for example through market participants' views on the impact of potential climate-related legislation on the fair value of an asset or liability.

Hence, notwithstanding the current lack of sufficient, comparable and reliable environmental data, the fair value measurement approach of an exposure should, as all other relevant information for the pricing formation process, reflect also the impact of environmental risks on an exposure, including the future impacts of both physical and transition risks. However, if the valuation technique or the market are not sufficiently long-sighted or correctly internalising/perceiving these risks, the fair value will not reflect accurately the impact of environmental

^[200] EBA Risk Dashboard Q3 2020 based on a sample of 147 banks, covering more than 80% of the EU/EEA banking sector (by total assets), at the highest level of consolidation: financial assets at amortised cost are 76% of financial assets, financial assets measured at fair value through profit or loss are 18% and the remaining 6% of financial assets are measured at fair value through other comprehensive income.

^[201] IFRS 9, Paragraphs 5.5.1–5.5.20.

^[202] See IFRS (2020), Education material on the effects of climate-related matters ([link](#)).

^[203] IFRS 13, Paragraphs 9, 22 and 24.

risks on the value of an exposure. In a similar vein, as several studies suggest ^[204], an appropriate discount rate to reflect the long-term time horizon (and the riskiness of these exposures) would enable the future effects of environmental risks to become relevant for pricing purposes today and address the current mispricing issues resulting from this negative externality.

In the future, considering the increasing relevance of environmental risks both through physical events and the implementation of public policy measures to tackle climate change and other environmental issues in the EU and worldwide, such risks are likely to influence the pricing of financial instruments especially with the increased amount of information being disclosed to the market. Notwithstanding the challenges in isolating these price effects, it will be necessary to monitor them to avoid double counting with any related prudential rules.

Other relevant IFRS: Besides the financial instruments, other types of assets which are held by institutions (for example fixed assets) may be measured either at the historical cost (adjusted for the use of the asset and any impairment losses since its acquisition) or at the current value (if held, for example, as an investment) to reflect the conditions at the measurement date. These valuation methods may reflect environmental considerations, to the extent that they are incorporated in the valuation inputs in accordance with their materiality. In the IASB note mentioned above, it is highlighted that climate-related matters may affect the valuation of these exposures through the estimated residual value and expected useful lives of assets, for example, because of obsolescence, legal restrictions or inaccessibility of the assets.

However, although the current IFRS principles are in principle capable of capturing environmental issues, there are still concerns as to whether this is efficiently done in practice. The aspects where some improvements may be particularly needed relate to the areas of impairment and depreciation rules for non-financial instruments (e.g. properties), provisioning and contingent liabilities. Also, the IFRS focus on market prices based on short-term cash flow generation and the lack of guidance from the IASB on the incorporation of environmental issues when applying current IFRS standards raise some concerns. Furthermore, the possible limitations of IFRS 9 classification rules may not allow for loans linked to sustainability performance targets to be measured at amortised cost. As previously mentioned, the EBA has recently commented to the IASB, in relation to the post-implementation review of IFRS 9 (classification and measurement phase), that some guidance on the accounting treatment of instruments with ESG features and/or KPI targets would be useful, and that the topic of ESG instruments would deserve a broader discussion while not being limited to the accounting classification of financial assets. These are issues that the IASB is currently considering, and hence further guidance is expected to be provided.

On the basis of this, the exposure values under the accounting principles may reflect environmental risks through the expected credit losses and the fair values to the extent that the valuation inputs used consider such risks. While so far environmental risks seem to be reflected to a limited extent due to the lack of sufficient, reliable and comparable data and methodologies and their inconsistent application, improvements in that regard are expected in the coming years following from, amongst other things, initiatives such as the Corporate Sustainability Reporting Directive (CSRD), the European Single Access Point and the establishment of the International Sustainability Standards Board (ISSB). These initiatives, which will improve transparency and market discipline associated with enhanced disclosures on sustainability-related matters by financial institutions' counterparties, will have direct implications also for the prudential requirements as the accounting value affects the own funds of institutions and is the basis for prudential measures.

Differences between accounting standards and other frameworks (including prudential valuation)

Besides the challenges in the accounting valuation methods analysed above, there are also inherent characteristics of environmental issues which cannot be addressed sufficiently in the current accounting framework, as explained below.

Materiality: IFRS are, in principle, based on the concept of (single) financial materiality, where information is material if omitting, misstating or obscuring it could reasonably be expected to influence the decisions of the primary users of the financial statements made on the basis of those financial statements ^[205]. Primary users are existing and potential investors, lenders and other creditors (for example trade suppliers). Thus, a limited group of stakeholders are identified for accounting purposes compared to the multiple stakeholders which are identified under the CSRD ^[206], in which the double-materiality approach is applied. The double-materiality approach considers the impact of environmental issues on the financial institution and the impact of the financial institution on environmental issues, meaning that more stakeholders need to be taken into account. In the meantime, as explained in the IASB note referred to above, current IFRS standards may provide some basis for institutions to consider environmental issues when applying IFRS. For example, as part of credit risk measurement, institutions may need to collect information on environmental risks of their obligors, meaning that the obligors will need to report inside-out (which is covered by the concept of double materiality) in order to inform their credit providers. All in all, it could also be argued that the impact of environmental issues on the financial institution and the impact of the financial institution on environmental issues are both considered from an accounting perspective as well. Both elements could be connected through circular relations, meaning

^[204] See, for example, NBER (2015), 'Climate Change and Long-Run Discount Rates: Evidence from Real Estate' [\[link\]](#).

^[205] IAS 1, Paragraph 7.

^[206] Commission (2021, Corporate Sustainability Reporting Directive [\[link\]](#)).

that some impacts of the financial institution on environmental issues could subsequently result in impacts of environmental issues on the financial institution.

Scope of IFRS: Currently IFRS do not refer explicitly to environmental issues. The IASB expects entities to consider climate-related issues in applying IFRS when the effect of those matters is material in the context of the financial statements taken as a whole ^[207]. The IASB educational note on climate-related issues explained further how climate-related issues may be taken into account when applying IFRS. At the same time, the IFRS Foundation has acknowledged that the area of sustainability reporting requires expansion of its current structure and mandate in order to develop the necessary standards, which is why a new International Sustainability Standards Board (ISSB) has been created. This ISSB is to develop and maintain a global set of sustainability reporting standards and principles initially focused on climate-related risks. This standard-setter will likely make use of existing sustainability frameworks and standards.

Point-in-time measurement: The accounting measurement is a point-in-time measurement confined to the maturity of the assets and liabilities. Especially in the case of fair value, the focus is on the current market conditions, when market participants are often focused on short-term profit making. Environmental issues may materialise in the medium and longer term and hence a measurement concept such as the view of market participants might prove to be insufficient.

Neutrality: The Conceptual Framework of IFRS mentions that the faithful representation of financial information should be neutral, meaning without bias and asymmetry supported by the exercise of prudence, through caution when making judgements under conditions of uncertainty ^[208]. The prudential focus is more asymmetrical to, among other things, ensure the safety and soundness of the EU financial system and assess and monitor risk build-up at micro and macro levels. Thus, prudentially, there might be an incentive to include extra safeguards regarding environmental risks.

Evolution of the accounting rules, including IFRS, needs to be closely followed in the upcoming years to observe how the discussions around environmental considerations progress. This is an area that the EBA intends to monitor considering that the accounting and prudential valuation rules are interconnected and any change in either of them will need to be duly considered.

^[207] IAS 1, Paragraph 7.

^[208] IFRS Conceptual Framework 2.12-2.17.

Annex 4 – Design options and available estimated impacts of supporting or penalising factors proposed in the literature

Design options

The European Banking Federation (EBF) suggests ^[209] analysing whether there **are sub-categories of sectors, activities or projects (SSAPs)** which exhibit a lower (credit) risk profile after consideration of ESG factors. Such sub-categories would be identified based on the EU Taxonomy of environmentally sustainable activities. The risk differential should, according to the EBF, be investigated using forward-looking methodologies such as sectorial forecasted financials, sensitivity or scenario analyses. Where the integration of the ESG profile results in a (projected) lower risk, this would allow the application of a supporting factor applied to the RWAs of such SSAPs. Hence, the EBF suggests a **sectorial green supporting factor (GSF)** which is partially based on projected risk differentials. To fit into the current regulatory framework, SSAPs could be further clustered into a number of eligible sustainable asset classes (ESACs), e.g. loans for energy-efficient real estate could be a sub-asset class of exposures secured by mortgages on immovable property. The supporting factor would apply once RWAs have already been calculated with the Standardised Approach or the IRB Approach.

The Institute for Climate Economics (I4CE) (2020) discusses the potential **combination of a GSF and a brown penalising factor (BPF)**. Under the hypothesis of a risk differential between 'green' and 'brown' assets, it would make sense to adjust capital requirements for both groups ^[210]. However, I4CE cautions that this would still not be a fully fledged risk-based approach, which could only consist of recalibrating all risk weights individually according to their actual riskiness including environmental risks. In addition, possible ways to escape higher capital requirements for brown activities, e.g. shadow banking, would remain and the measure would not necessarily be capital-neutral, depending on the balance between the effect of the GSF and the BPF components.

Two alternative approaches also discussed by I4CE are the introduction of **'environmental-risk-weighted assets'** (ERWAs) ^[211] and the application of a **'green weighting factor'** (GWF). However, both approaches are in principle a combination of a GSF and a BPF as outlined before. For the ERWAs, Esposito, Mastromatteo, Molocchi¹⁹³ propose to take into account the environmental dimension based on the calculation and gradual implementation of pollution-based risk coefficients for capital requirements. Prudentially calculated RWAs are multiplied by a pollution coefficient between 0.5 to 1.5 where

values below 1 are only assigned to activities producing zero or positive environmental impacts. On the other hand, the GWF triggers a negative (up to 24% in the case of brown projects or borrowers) or positive (up to 50% in the case of green projects or borrowers) adjustment of RWAs depending on their sustainability rating ^[212]. This is in practice applied by one financial institution for inter-national analytical purposes and the methodology differs between special-purpose loans and general lending. Both approaches are not risk-based in the sense of historical evidence but rely on the assumption that environmental impact has a bearing on future financial risks.

The 2 Degrees Investing Initiative (2DII) suggests ^[213] a **supporting factor for sustainability improvement loans (SILs)**. SILs are loans whose interest rate is partially adjusted downwards depending on the positive evolution of the borrower's sustainability performance. The sustainability performance is measured either by external ESG ratings, external KPIs, the attainment of internal sustainability targets, the borrower's listing on a sustainability index, or a combination thereof. SILs incentivise borrowers to improve their sustainability action. Thereby, SILs might reduce ESG-related risks to which the borrower is exposed. However, 2DII notes that a correlation between an increased sustainability performance and a lower credit risk is hard to establish as available studies focus narrowly on ESG ratings, sustainable companies might be healthier for other reasons than their sustainability performance, and evidence for such a correlation would not necessarily be found in historical data. In the absence of conclusive evidence on risk differentials, the supporting factor for SILs could be justified by the assumption that SILs would be designed to incentivise the process of reducing ESG risks to which the borrowing company is exposed. In order to avoid financial stability risks, a minimum set of sustainability criteria could be set, e.g. a desired climate outcome for a company in a high-carbon sector. According to 2DII, a capital relief of 10-20% is likely to offset, at least to a significant degree, the negative impact of SILs on the profitability of the lending institution which results from higher screening costs as well as the lower margins of SILs compared to normal loans.

Finance Watch advocates for a **temporary BPF on the legal basis of Article 459 of the CRR** ^[214]. Article 459 empowers the Commission to adopt delegated acts to impose, for a period of one year, stricter prudential requirements for exposures where this is necessary to address changes in the intensity of microprudential and macroprudential risks which arise from market developments affecting all Member States, provided that the instruments laid down in the CRR and CRD are not sufficient. Finance Watch describes a 'climate-finance doom

^[209] EBF (2019), 'Encouraging and Rewarding Sustainability', p. 22 ([link](#)).

^[210] I4CE (2020), 'Integrating Climate-related Risks into Banks' Capital Requirements', p. 14 ([link](#)).

^[211] JRC (2020), 'Extending "environmental-risk-weighted assets": EU Taxonomy and banking supervision' ([link](#)).

^[212] The scale of the chosen adjustment ensures the bank's overall analytical capital remains stable and identical to its prudential capital, so the adjustment factors would need to be different for other institutions and in case of substantial changes to portfolio composition. See I4CE (2020), 'Integrating Climate-related Risks into Banks' Capital Requirements', p. 16 ^[198].

^[213] 2DII (2019), 'Sustainability Improvement Loans: a risk-based approach to changing capital requirements in favour of sustainability outcomes' ([link](#)).

^[214] Finance Watch (2020), 'Breaking the climate-finance doom loop', p. 35 ([link](#)).

loop' as a market development bearing enormous micro-prudential and macro prudential risks. In their view, the European Commission does not only have the possibility, but also the obligation to activate Article 459 of the CRR without delay. By doing so, the Commission should apply a risk weight of 150% to the stock of exposures towards fossil fuel companies and a risk weight of 1250% for new exposures towards such companies.

Existing studies' estimates on the impact of a GSF or BPF

Some studies have looked into the effect of a potential GSF on capital and pricing. A recent study by I4CE ⁽²¹⁵⁾ has looked at the effects of a GSF on project financing, the internal profitability of banks and credit growth. The study focuses on the French energy, transport and building sectors. Testing various scenarios (using GSFs between 15% and 50% on new loans), the study concluded to have found only very limited impacts. The impact of a GSF on the pricing of project finance is estimated at one tenth of a percentage point, even under the most favourable scenario. The study further finds that the impact on loan rates depends on the type of transition project, as it affects the relative share of banks' funding contribution, the maturity of the loan, etc. In terms of credit growth, under the best-case scenario, in which all saved capital would be used for additional lending, the latter increases only by around EUR 70 million per year. The impact on banks' profitability has been found to be small, too, in the

area of EUR 0.1 to 0.4 billion per year. Regarding the BPF, the analysis finds an impact only in scenarios with very high penalising factors, applied to the whole portfolio.

Another study by 2DII from 2017 ⁽²¹⁶⁾ estimates the effect on capital of a GSF and a corresponding BPF in the range of 15-25% ⁽²¹⁷⁾ focusing on the mortgage, consumer credit (cars loans) and corporate segment. Using data from the ECB and applying estimated green and environmentally harmful shares from market research, existing literature and studies, the impact of a BPF is estimated at between EUR 8 and 22 billion in additional capital needed, depending on the definition for the environmentally harmful assets used, as well as the specific BPF range applied. In the case of the GSF, they estimate the capital savings to range between EUR 2 and 8 billion, again depending on the broadness of the definition of green and the GSF range used. The larger impact of the BPF is driven by the larger universe of environmentally harmful versus green assets. Using existing literature on the impact of changes in capital requirements on the cost of capital, the paper further estimates a reduction in the cost of capital of 5-25 bps for green investments (based on a 15-25% GSF), which they conclude to be negligible when put into context with the sometimes very high average financing costs of green products. Similarly, again using existing literature, they estimate lending volumes to decrease by 1-8% for environmentally harmful assets, following the capital effects of a 15-25% BPF.

⁽²¹⁵⁾ I4CE (2021), 'Indexing capital requirements on climate: What impacts can be expected?' [\[link\]](#).

⁽²¹⁶⁾ 2DII (2017), 'The Green Supporting Factor: Quantifying the Impact on European banks and green finance' [\[link\]](#).

⁽²¹⁷⁾ These were the ranges proposed by the European Parliament in 2017 [\[link\]](#). The paper also tested other ranges in addition.

Annex 5 – Summary of questions

Chapter 3 – Background and rationale

Q1: In your view, how could exposures associated with social objectives and/or subject to social impacts, which are outside the scope of this DP, be considered in the prudential framework? Please provide available evidence and methodologies which could inform further assessment in that regard.

Chapter 4 – Principles, premises and challenges

Q2: Do you agree with the EBA's assessment that liquidity and leverage ratios will not be significantly affected by environmental risks? If not, how should these parts of the framework be included in the analysis?

Q3: In your view, are environmental risks likely to be predominantly about reallocation of risk between sectors, or does it imply an increase in overall risk to the system as a whole? What are the implications for optimum levels of bank capital?

Q4: Should the 'double materiality' concept be incorporated within the prudential framework? If so, how could it be addressed?

Q5: How can availability of meaningful and comparable data be improved? What specific actions are you planning or would you suggest to achieve this improvement?

Q6: Do you agree with the risk-based approach adopted by the EBA for assessing the prudential treatment of exposures associated with environmental objectives / subject to environmental impacts? Please provide a rationale for your view.

Q7: What is your view on the appropriate time horizon (s) to be reflected in the Pillar 1 own funds requirements?

Q8: Do you have concrete suggestions on how the forward-looking nature of environmental risks could be reflected across the risk categories in the Pillar 1 framework?

Chapter 5 – Credit risk

Q9: Have you performed any further studies or are you already using any specific ESG dimensions to differentiate within credit risk? If so, would you be willing to share your results?

Q10: What are the main challenges that credit rating agencies face in incorporating environmental considerations into credit risk assessments? Do you make use of external ratings when performing an assessment of environmental risks?

Q11: Do you see any challenge in broadening due diligence requirements to explicitly integrate environmental risks?

Q12: Do you see any specific aspects of the CRM framework that may warrant a revision to further account for environmental risks?

Q13: Does the CRR3 proposal's clarification on energy efficiency improvements bring enough risk sensitiveness to the framework for exposures secured by immovable properties? Should further granularity of risk weights be introduced, considering energy-efficient mortgages? Please substantiate your view.

Q14: Do you consider that high-quality project finance and high-quality object finance exposures introduced in the CRR3 proposal should potentially consider environmental criteria? If so, please provide the rationale for this and potential implementation issues.

Q15: Do you consider that further risk differentiation in the corporate, retail and/or other exposure classes would be justified? Which criteria could be used for that purpose? In particular, would you support risk differentiation based on forward-looking analytical tools?

Q16: Do you have any other proposals on integrating environmental risks within the SA framework?

Q17: What are your views on the need for revisions to the IRB framework or additional guidance to better capture environmental risks? Which part of the IRB framework is, in your view, the most appropriate to reflect environmental risk drivers?

Q18: Have you incorporated the environmental risks or broader ESG risk factors in your IRB models? If so, can you share your insight on the risk drivers and modelling techniques that you are using?

Q19: Do you have any other proposals on integrating environmental risks within the IRB framework?

Q20: What are your views on potential strengthening of the environmental criterion for the infrastructure supporting factor? How could this criterion be strengthened?

Q21: What would in your view be the most appropriate from a prudential perspective: aiming at integrating environmental risks into existing Pillar 1 instruments, or a dedicated adjustment factor for one, several or across exposure classes? Please elaborate.

Q22: If you support the introduction of adjustment factors to tackle environmental risks, in your view how can double counting be avoided and how can it be ensured that those adjustment factors remain risk-based over time?

Chapter 6 – Market risk

Q23: What are your views on possible approaches to incorporating environmental risks into the FRTB Standardised Approach? In particular, what are your views with respect to the various options presented: increase of the

risk-weight, inclusion of an ESG component in the identification of the appropriate bucket, a new risk factor, and usage of the RRAO framework?

Q24: For the Internal Model Approach, do you think that environmental risks could be better captured outside of the model or within it? What would be the challenges of modelling environmental risks directly in the model as compared to modelling it outside of the internal model? Please describe modelling techniques that you think could be used to model ESG risk either within or outside of the model.

Q25: Do you have any other proposals on integrating environmental risks within the market risk framework?

Chapter 7 – Operational risk

Q26: What additional information would need to be collected in order to understand how environmental risks impact banks' operational risk? What are the practical challenges to identifying environmental risk losses on top of the existing loss event type classification?

Q27: What is your view on potential integration of a forward-looking perspective into the operational risk framework to account for the increasing severity and frequency of physical environmental events? What are the theoretical and practical challenges of introducing such a perspective in the Standardised Approach?

Q28: Do you agree that the impact of environmental risk factors on strategic and reputational risk should remain under the scope of the Pillar 2 framework?

Q29: Do you have any other proposals on integrating environmental risks within the operational risk framework?

Chapter 8 – Concentration risk

Q30: What, in your view, are the best ways to address concentration risks stemming from environmental risk drivers?

Q31: What is your view on the potential new concentration limit? Do you identify other considerations related to such a limit? How should such a limit be designed to avoid the risk of disincentivising the transition?

Chapter 9 – Investment firms

Q32: With reference to the three risk categories the IFR is based on (Risk-to-Client, Risk-to-Market and Risk-to-Firm), which of these could be related to environmental risks, and to what extent?

Q33: Should any of the existing K-factors incorporate explicitly risks related to environmental factors?

Q34: What elements should be considered concerning the risk from environmental factors for commodity and emission allowance dealers? Are there any other specific business models for which incorporation of environmental factors into the Pillar 1 requirements of the IFR would be particularly important?

Q35: Do you have any other suggestions as to how the prudential framework for investment firms could be adjusted to account for environmental risk factors?

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