European Commission

JRC CONFERENCE AND WORKSHOP REPORT

Joint JRC - EBA workshop on Banking Regulation and Sustainability

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2020

Joint Research Centre

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EU Science Hub

https://ec.europa.eu/jrc

JRC119403

PDF ISBN 978-92-76-15038-1 doi:10.2760/550084

Luxembourg: Publications Office of the European Union, 2020

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How to cite this report: Alessi Lucia (Ed.), *Joint JRC- EBA workshop on Banking Regulation and Sustainability*, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-15038-1, doi:10.2760/550084, JRC119403.

Abstract

The Joint Research Centre (JRC) of the European Commission and the European Banking Authority (EBA) organized a workshop on November 18-19 at the JRC in Ispra (Italy) on "Banking Regulation and Sustainability". The joint JRC-EBA Workshop moved forward on the various challenges related to integrating sustainability into the EU banking regulation framework. It brought together academics, supervisors, policymakers and industry representatives, promoting a structured dialogue on how banks could measure and manage risks related to the environmental, social and governance dimensions. This report summarizes their contributions.

Acknowledgements

I would like to thank all the people that have helped to make the workshop and the report possible. My special thanks go to Francesca Campolongo, Adrienne Coleton, Katia Colombo, Maria Nieto, Roberto Panzica and Lenka Semradova.

The event on which the report is based was organized jointly with the European Banking Authority.

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Foreword

Lucia Alessi

The Joint Research Centre (JRC) of the European Commission (EC) and the European Banking Authority (EBA) organized a workshop on November 18-19 at the JRC in Ispra (Italy) on "Banking Regulation and Sustainability". The joint JRC-EBA Workshop moved forward on the various challenges related to integrating sustainability into the EU banking regulation framework. It brought together academics, supervisors, policymakers and industry representatives, promoting a structured dialogue on how banks could measure and manage risks related to the environmental, social and governance dimensions.

The opening and policy keynotes provided the big picture, by offering an overview of the responsibilities and plans of the EC and the EBA, respectively, to ensure that banks play their role in the transition to a sustainable economy. We structured the event around four panels with specific topics, broadly reflecting the sustainability-related mandates that have been given to the EBA. These topics have been dealt with from various angles, thanks to the presence, in each panel, of an academic keynote speaker, as well as panellists from policy institutions and the industry, and an EBA moderator. We also included specific sessions on topical issues such as ESG data, as well as a purely scientific session. This report summarizes the various contributions.

In her opening keynote, Nathalie Berger from the European Commission, DG FISMA, set the stage by emphasizing that the EU is fully committed to reach its climate and energy targets and to mainstream sustainable development into EU policies. Against this background, in 2018 the Commission published an Action Plan on Financing Sustainable Growth, and in its more recent communication on "The European Green Deal" it committed to make Europe the first carbon-neutral continent by 2050. She then described actions and initiatives aimed at incorporating environmental, social and governance (ESG) factors in the EU banking supervisory and regulatory framework, including at the international level. As pointed out by the chair Francesca Campolongo from the European Commission, JRC, scientists stand ready to support the development of relevant regulation.

The first session focussed on the need for a common sustainability language, which should underpin disclosure and reporting of financial institutions and companies on climate and environmental activities and risks, as emphasized by Hans Biemans from ING. In this respect, the cornerstone of the Commission's Action Plan on Financing Sustainable Growth is the establishment of an EU Taxonomy of sustainable activities, i.e. a classification system defining which economic activities are 'green'. Lucia Alessi from the European Commission, JRC, described the main features of the Taxonomy as developed by the Technical Expert Group (TEG) on Sustainable Finance. She also mentioned that the Taxonomy will help the development of labels for green financial products or funds and ultimately, it will provide clarity on environmental sustainability to the market.

The first panel, moderated by Piers Haben from the EBA, started with an inspiring academic keynote by Andreas Hoepner from the University College Dublin, who showed evidence of a reduction in firms' downside risks due to increased ESG engagement by institutional investors. The discussion then developed around the need for reliable and comprehensive ESG disclosures to foster transparency. In particular, banks should disclose on the extent to which the ESG risks they face translate into credit, market and operational risks. As mentioned by Pilar Gutierrez from the EBA, the EBA has a mandate to develop technical standards on ESG disclosures by 2020, which will become mandatory for large institutions already in June 2022. Sara Lovisolo, member of the TEG, provided an overview of currently available indicators, the majority of which - as listed in the Non-binding Guidelines of the EU Non-Financial Reporting Directive - relate to climate change mitigation. Olivier Picard from Société Générale discussed current industry practices, arguing that ultimately, banks may be willing to disclose even beyond requirements, to meet the demands of stakeholders and non-financial rating agencies.

Following up on the first panel, the keynote address by Piers Haben provided an overview of the various ESG-related EBA mandates. These derive from the Commission's Action Plan on Financing Sustainable Growth and include the following: i) ensuring that ESG factors are given due consideration in strategy and business models; ii) incorporating ESG risks into banks risk management; iii) enhancing ESG-related banks disclosure; iv) assessing whether the introduction of a 'green supporting factor' in the EU prudential rules would be justified.

The subsequent session on ESG data, chaired by Serena Fatica from the European Commission, JRC, started with a talk by Marina Brogi from Sapienza University of Rome. She broadened the scope from climate-related issues to sustainability as a whole, i.e. also including social and governance aspects, and emphasized the importance – and the shortcomings - of ESG ratings. The second talk by Eirini Kanoni from European Datawarehouse presented a standardised European framework and data collection architecture for energy efficient mortgages, emphasizing the challenges posed by the need to link information from various data

sources, some of which are external to the bank. The session closed with a talk by Steven Keuning, former Advisor to the Board at the European Central Bank. He discussed several statistical issues, rooted in the present lack of standardisation, comprehensiveness and timeliness in sustainability reporting. He concluded that the need for a regular, comprehensive, timely and mandatory data collection calls for an improved, public data infrastructure.

The second panel was moderated by Angel Monzon from the EBA and focussed on scenario analysis and stress testing. In his academic keynote, Stefano Battiston from the University of Zurich offered an analytical framework to translate forward-looking knowledge from climate science and climate economics into quantitative stress-tests. This approach accounts both for the direct impact of a disorderly climate transition on financial institutions portfolios and for the amplification effects due to financial interconnectedness. Then, Antoine Bezat from BNP Paribas, Katarzyna Budnik from the European Central Bank and Julia Van Huizen from the Dutch National Bank explored current approaches to climate stress testing and scenario analysis at banks and policy institutions, stressing that scenario analysis and stress testing are different in nature and answer different questions.

The second day started with the third panel, moderated by Olli Castrén from the EBA and centred on strategy and risk management issues. In her academic keynote, Irene Monasterolo from Vienna University of Economics and Business explained how one can estimate the change in the default probability of a sovereign due to climate policy shocks, as an application of the general framework presented by Stefano Battiston on the previous day. The talks that followed by Christian Elbers from BaFIN, Maria Nieto from the Bank of Spain and Ana Rubio from BBVA touched upon ESG risk management and classification methods, as well as their implications for banks, starting from the very definition of ESG risks.

The academic session comprised four scientific articles. Valentina Lagasio from Sapienza University of Rme presented the first one, focused on the relationship between ESG and financial performance. The main message was that the implementation of ESG policies is positively and strongly associated with company profitability for both financial and non-financial corporations. In the case of banks, in particular, this relationship is more robust in the medium-long term than in the short term. Michela Rancan from the European Commission, JRC, presented the second paper, on the pricing of green bonds. She explained that while supranational institutions and corporates issue green bonds at a premium, this does not happen to banks, unless they have declared commitment to environmental principles. The session continued with a talk by Lorenzo Esposito from the Bank of Italy, who suggested a framework for introducing "environment-risk weighted assets" for banks, aiming at internalizing the pollution risk of the borrower into the lender cost of capital. As an example, he showed how one could apply this tool to real estate mortgages. The last paper was presented by Roberto Panzica from the European Commission, JRC, who provided evidence on the existence of a "Greenium", i.e. a negative risk premium associated with greener assets. As he explained, this finding indicates that investors accept a lower remuneration for their investments, ceteris paribus, insofar as these investments are linked to greener economic activities.

The fourth panel closed the two-day event dealing with one of the most controversial issues, i.e. the prudential treatment of green and brown exposures, and more generally, whether and how ESG risks can be incorporated in prudential rules. As the moderator Slavka Eley from the EBA emphasized, it is essential to ensure that the prudential approach remains risk-based. In his academic keynote, Jakob Thomae from SOAS University of London and 2° Investing Initiative provided estimates for the impact of the green supporting factor and the brown penalty on EU banks. He also proposed, as an alternative, a supporting factor on Sustainability Improvement Loans, i.e. loans whose interest rate is partially adjusted depending on the evolution of the borrower's sustainability performance. Claudia Pasquini from the Italian Banking Association discussed yet another option, namely the Sustainable Finance Supporting Factor proposed by the European Banking Federation, which would apply to exposures related to subsets of activities that are EU Taxonomy-eligible, based on their reduced riskiness. Giovanna Michelon from the University of Bristol instead touched upon several practical issues with the implementation of a particular prudential treatment for green and/or brown exposures. She mentioned the limited reliability and accuracy of available corporate ESG disclosures, the opaqueness surrounding the construction of ESG ratings, as well as the need for systems of checks and balances. Emmanuel Rocher from the ACPR closed the panel by offering a supervisory perspective.

Overall, the workshop spurred a lively discussion around several issues related to how sustainability can be incorporated into the regulatory and supervisory framework of EU credit institutions. There is widespread agreement on the need to appropriately reflect the build-up of climate-related risks and opportunities in certain sectors of the economy. We are just at the beginning of a journey. Under normal circumstances, this journey would require several years before good enough data is collected, to enable the production of scientific

evidence, which would in turn support the development of regulation, to be finally implemented by giving the industry sufficient time to adapt. Unfortunately, we do not have so many years to take decisive action. In this context, academics, policymaker and financial market participants crucially need to work together closely.

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OPENING KEYNOTE

1. Helping the transition to a more sustainable economy: the role of banking regulation

Nathalie Berger, European Commission

The global climate and environmental emergency is becoming day after day more relevant and more obvious. Hence, nobody can sit aside when it comes to the need of working for a more sustainable path for our planet and our economy. The financial system can and must be part of the solution towards a greener and more sustainable economy.

Banks are the main source of finance for the European economy and therefore have an important role to play in closing the investment gap for the transition to a more sustainable economy. Banks may also be exposed to environmental, social and governance (ESG) risks, including climate change-related risks. These risks are gaining an increasing attention among prudential supervisors and regulators. Sustainability and the transition to a low-carbon, more resource efficient and circular economy are key in ensuring long-term competitiveness of the EU banks and of the EU economy as a whole.

Greening the finance: a priority of the new Commission

The new Commission is fully committed to address the climate change emergency with all available tools and instruments, including the financial services regulation. The recently adopted communication 'The European Green Deal' clearly resets the Commission's commitment to tackling climate and environmental-related challenges and transform the EU into a resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use. This Communication presents an initial roadmap of the key policies and measures, including in the area of financial services, needed to achieve those objectives.

The increased importance of ESG risks is one of the reasons why co-legislators integrated, for the first time, environmental and social considerations into bank prudential regulation.

Because the work on ESG risks is still in its seminal stages, the co-legislators have agreed on a gradual approach to tackling those risks. More specifically, the co-legislators tasked the EBA to come forth with ways to define, measure, and manage these risks. They also tasked the EBA to assess how capital requirements can be differentiated in function of the environmental and social impact of banks' assets.

Last, but certainly not least, they introduced additional transparency requirements: large listed banks will have to disclose information on the ESG risks they are exposed to.

These are the first, significant steps in the direction of a more climate-conscious banking sector regulation in the EU that will ensure both financial stability and a more sustainable economy.

The incorporation of ESG factors in the EU banking framework

DG FISMA is fully committed to continue exploring possible tools to contribute identifying the most appropriate solution to incorporate ESG considerations into the EU banking supervisory and regulatory framework. Let me remind the most relevant ones.

As you are aware in March 2019 year the Commission adopted its Action Plan on Sustainable Finance including the establishment of a Technical Expert Group. Since then very significant progress was made on the different actions included in the Plan.

Key regulatory actions are being implemented, notably in the areas of: (i) the establishment of an EU-wide classification system for environmentally sustainable economic activities ('EU taxonomy'), (ii) the development of transparent disclosure requirements on sustainability matters and risks by financial market actors, (iii) the

development of new EU climate benchmarks to help steer private capital to low-carbon investments/assets and (iv) the identification of an EU Green Bond Standard.

High attention is given, politically as well as by businesses and financial institutions, to the Commission's work on an EU-wide taxonomy of environmentally sustainable economic activities. This work is meant to help identify sustainable investments and guide investors seeking to finance sustainable investments. The agreement reached recently by the Parliament and Council is a truly encouraging signal of the unanimous will of all Institutional Actors to progress swiftly on the sustainable finance agenda

Once in place, financial market participants would need to use the EU taxonomy to disclose the level of greenness of financial products that are offered in the EU as 'environmentally sustainable' or having similar characteristics. In addition, undertakings which are subject to the obligations set out in the provisions of the Non-financial Reporting Directive, including certain banks and insurance companies, will need to disclose how and to what extent their activities are associated with environmentally sustainable activities.

More in particular on the issues discussed in this Workshop, DG FISMA will award a contract where the successful tender will be asked to provide the Commission with a thorough analysis on the way ESG risks are currently being integrated into banks' risk management process and in the EU prudential supervision.

On the basis of such stock-take exercise the contractor will be asked to identify best practices/principles on arrangements, processes and mechanisms to be implemented by banks and by EU supervisors to adequately map, assess and tackle ESG risks. A particular prominence will have to be given to the identification of methodologies and metrics to model ESG risks and to assess their impact on the banks financial stability under different scenarios.

A third objective of the study will be to carry out an analysis of the current banks' strategies to integrate ESG factors and foster long-termism into their lending and investment activities and to identify possible initiatives to promote the scaling-up of the market for sustainable financial products.
I have mentioned the two mandates to the EBA included in the recent review of CRD/CRR. Indeed the European Co-legislators also asked the EBA to assess "whether a dedicated prudential treatment of the exposures related to assets or activities associated substantially with environmental and/or social objectives would be justified"

Although the deadline for this second mandate was set in 6 years from the adoption of the revised CRR there's widespread conviction that progress should be made much faster. In this respect we expect receiving an important contribution to such debate from the Working Group recently established by DG Energy on the financial performance of energy efficiency loans.

This working group, established in the framework of the EEFIG (Energy Efficiency Financial Institutions Group set by the EC and the United Nations Environment Program Finance Initiative or UNEP FI), aims at collecting existing data and developing a model to demonstrate if there is a statistical correlation between energy efficiency improvements and, on one hand, the lower probability of default for the associated loans and, on the other hand, the increased value of the underlying assets.

The effectiveness of many of the initiatives we are exploring in order to address the financial risks that arise from climate change and other environmental and social problems depends on the availability of sufficient, reliable and comparable sustainability-related information by financial institutions and companies.

In this respect, besides the transparency requirements included in the CRR which I mentioned at the beginning, let me refer to the disclosure requirements required by the Non-financial Reporting Directive. In their condition of public interest entities as defined in the Accounting Directive, certain large banks and groups are already required since 2018 to publish in their management report sustainability-related information.

In June this year the European Commission published a supplement to the general guidelines from 2017, focussing on the reporting of climate-related information that includes an annex on reporting by banks and insurance companies. These new guidelines integrate the recommendations of the Task Force on Climate-related disclosures (TCFD), developed by the market for the market.

The information needs of the investment community are increasing very substantially and very quickly, and the information reported by companies is not keeping pace with these developments. There is currently a reporting

gap regarding non-financial information. Analyses have shown that reported non-financial information is not sufficiently comparable or reliable, and that a lot of information that users want is not reported at all. That is why the Commission announced in the European Green Deal that it would put forward a proposal to revise the Non-Financial Reporting Directive by the end of 2020. The direction of travel is likely to be towards reporting requirements that are more detailed and more standardised. We are currently looking at options for how this can best be achieved in a proportionate way, taking account of the costs and benefits for different actors in the system.

A financial system that supports global sustainable growth

Before concluding, I would like to quickly touch upon the international dimension of the issues we are discussing today. Climate change puts the entire globe at risk and therefore only globally coordinated actions can provide an effective response to this threat. Financial markets are by nature global and are therefore well placed to contribute to tackling the issue.

It is of paramount relevance to achieve a globally coordinated response to the challenges posed by the potential impact of ESG risks on financial stability. We are therefore pleased to see that the topic is gaining prominence also in global fora like the BCBS. The European Commission, with full support from Member States, has just set up the "International Platform on Sustainable Finance" with the relevant authorities from Argentina, Canada, Chile, China, India, Kenya, and Morocco. The IPSF will focus in particular on the areas of i) green taxonomies (i.e. classification of sustainable economic activities), ii) green financial product standards and labels to provide more confidence to investors, iii) disclosures of sustainability-related information. This will facilitate cooperation between the EU and like-minded countries from other parts of the world to mobilise finance for sustainable investments globally.

To summarise, the Commission has put high on its agenda fostering sustainability into the EU banking regulation and supervision. Many initiatives are on-going and some already well-advanced. However a lot still needs to be done to implement properly the solutions we have identified and to possibly identify additional instruments to enhance the effectiveness of the EU action. The Commission remains fully open to listen to all stakeholders on possible new initiatives in this area. In this respect additional reflections are on-going in light of the upcoming CRR/CRD review package that will have to implement the final Basel III reforms in the EU. In addition, looking forward, the Commission will prepare a renewed sustainable finance strategy by the end of this year.

POLICY SESSION: THE EU SUSTAINABILITY AND TAXONOMY: USABILITY AND IMPACT

2. The EU Taxonomy of sustainable activities and its impact on European financial markets

Lucia Alessi, European Commission - Joint Research Centre

The EU Taxonomy

Sustainable development and the protection and improvement of the quality of the environment are core values of the European Union (EU) and recognized by EU laws and treaties. The Treaty of the Functioning of the European Union (TFEU) requires all proposals by the Commission to include a high level of environmental protection.[1]

The EU has set targets for reducing its greenhouse gas (GHG) emissions progressively up to 2050, with specific milestones in 2020 and 2030. The EU is currently on track to meet the targets for 2020.[2] The European Council agreed on climate and energy targets for 2030 in 2014.

At the end of 2016, the European Commission appointed the High-Level Expert Group (HLEG) on Sustainable Finance with a mandate to recommend financial reforms on which to base the EU strategy on sustainable finance. The group delivered a final report in January 2018, including eight key recommendations and several cross-cutting and sector-specific recommendations to align the financial system with sustainability goals. The HLEG's first recommendation was to 'establish and maintain a common sustainability Taxonomy at the EU level'.[3]

Building on the HLEG's recommendations, the European Commission published in March 2018 its Action Plan on financing sustainable growth. The Action Plan describes the EU strategy for sustainable finance and is part of the implementation plan of Article 2(1)(c) of the Paris Agreement, relating to the alignment of financial flows with global climate goals and the UN 2030 Agenda for Sustainable Development.

As highlighted in the Action Plan, achieving the goal of re-orienting capital flows towards sustainable investments should be underpinned by an EU classification system that provides a common language on what constitutes sustainable activities. So far, there was no EU classification system for sustainable economic activities and the existing market-based practices are not necessarily aligned with EU environmental and sustainability policy objectives. The absence of commonly agreed principles and metrics for assessing if economic activities are environmentally sustainable is generally considered to hinder the redirection of capital towards more sustainable economic activities.[4] The approach for identifying sustainable economic activities and instruments is scattered among Member States and financial institutions identify sustainable economic activities and sustainable investable assets on a voluntary basis. An EU Taxonomy is therefore key to ensure consistency, providing the basis for further policy action in the area of sustainable finance, including standards and labels.

The Technical Expert Group on Sustainable Finance (TEG) was set up to assist the European Commission to implement the Commission's Action Plan. The TEG was mandated by the European Commission to develop recommendations for technical screening criteria regarding economic activities that make a substantive contribution to climate change mitigation or adaptation. To be Taxonomy-eligible, economic activities should also avoid significant harm to the following further European Union environmental objectives: i) sustainable use

[1] Article 11 of the Treaty provides that 'Environmental protection requirements must be integrated into the definition and implementation of the Union's policies and activities, in particular with a view to promoting sustainable development'. Article 114 furthermore requires the Commission to 'take as a base a high level of protection' concerning health, safety, environmental protection and consumer protection. Under Article 191, EU policy on the environment shall contribute to pursuit of the following objectives: i) preserving, protecting and improving the quality of the environment ii) protecting human health iii) prudent and rational utilisation of natural resources iv) promoting measures at the international level to deal with regional or worldwide environmental problems, particularly combating climate change.

[2] https://ec.europa.eu/clima/policies/strategies/progress_en.

[3] https://ec.europa.eu/info/publications/180131-sustainable-finance-report_en.

[4] See in this regard the Commission Staff working Document Accompanying the document Proposal for a Regulation of the European Parliament and of the Council on the establishment of a framework to facilitate sustainable investment (http://data.consilium.europa.eu/doc/document/ST-9348-2018-ADD-2/EN/pdf).

and protection of water and marine resources, ii) transition to a circular economy, waste prevention and recycling, iii) pollution prevention and control, iv) protection of healthy ecosystems.

The development of the Taxonomy relied on the definition of a sector framework. The NACE industrial classification system has been adopted by the TEG as it was established by EU law[5] and is compatible with international and Member State frameworks. It is comprehensive in its coverage of the economy, is used by EU institutions such as Eurostat and is also already used by some financial institutions. In some areas, however, NACE demonstrated to be insufficient, requiring additional categories ensuring further granularity.

The economic activities considered by the TEG have been selected based on their importance for climate change mitigation. Owing to data availability issues, only limited analysis has been conducted for climate change adaptation and the broader environmental objectives set by the Taxonomy.

The work undertaken by the TEG reflects the principles outlined in the proposed Regulation (May 2018), as well as additional principles adopted by the TEG, which follow the technical work undertaken. In this regard, for an action to meet the definition of an "environmentally sustainable economic activity" and thus be considered Taxonomy-eligible, it must:

1. Contribute substantially to one or more of the environmental objectives;

2. Do no significant harm to any other environmental objective;

3. Comply with minimum social safeguards (under the draft regulation, these are defined as ILO core labour conventions); and

4. Comply with the technical screening criteria.

The technical screening criteria can be qualitative or quantitative, or both, and contain thresholds where possible. The criteria build upon EU labelling and certification schemes, carbon footprint methodologies and statistical classification systems, where appropriate.

The TEG proposal is not a legislative act, but will be the basis for a regulation[6] which will enable the Commission to establish technical screening criteria through a series of delegated acts.

The impact of the Taxonomy on European financial markets

The TEG was also asked to carry out an assessment of the impact of the Taxonomy, covering the economic, environmental and, notably, the financial dimension. To support the work of the TEG in this respect, in Alessi et al. (2019) we have developed an analysis based on financial market data. In particular, we have estimated the potential impact of the Taxonomy on selected segments of the European financial market.

Our study first provides an overview of available estimates of additional investment, which is needed to achieve the targets associated with the low-carbon transition under various scenarios. These latter are designed at the macro level, i.e. considering the relevant economic sectors, such as energy, transport and buildings, at an aggregate level. We use these estimates as a macro framework for the analysis we carry out on financial market data, namely individual securities issued by individual firms. By doing so, we ensure consistency between our estimated financial impacts and the investment needs estimated at the macroeconomic level. We also provide our own estimate of investment needs for the transition to a low-carbon electricity production, based on a novel top-down approach.

The central part of the report focuses on the financial dimension. In particular, we use security-by-security data covering the whole European bond and equity markets to provide a picture of where European financial markets stand with respect to the low-carbon transition. Together with data on each security, we also have financial holdings for all European institutional sectors, also disaggregated at the security level. We focus on securities issued by EU non-financial corporations. Based on the NACE code of the issuer company, we first aggregate outstanding securities by so-called "climate-policy-relevant sector" (CPRS, see Battiston et al., 2017). These are economic sectors that build on NACE codes but are better suited for sustainability analysis, and broadly overlap with the sectors used for the estimation of investment needs at the macro level. We estimate that 37% of the

[5] Regulation (EC) No 1893/2006 of the European Parliament and of the Council of 20 December 2006 establishing the statistical classification of economic activities NACE Revision 2 and amending Council Regulation (EEC) No 3037/90 as well as certain EC Regulations on specific statistical domains (OJ L 393, 30.12.2006, p. 1).
[6] Article 16.

outstanding equity and 33% of the outstanding bond amounts are associated with activities that belong to climate-policy-relevant sectors. Figures 1 and 2 show the breakdown of market capitalization and outstanding bond amount by sector, respectively. In terms of holders, the exposure of institutional sectors to firms active in climate-policy-relevant sectors varies from around 30% to 48%.

Figure 1. Breakdown of market capitalization by CPRS over time

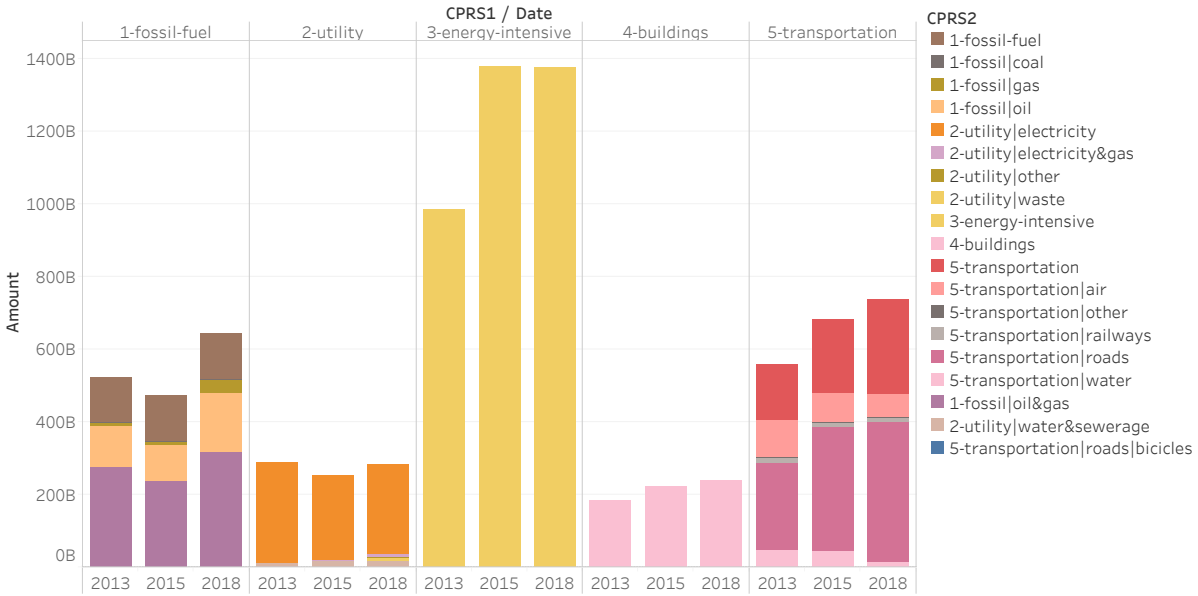
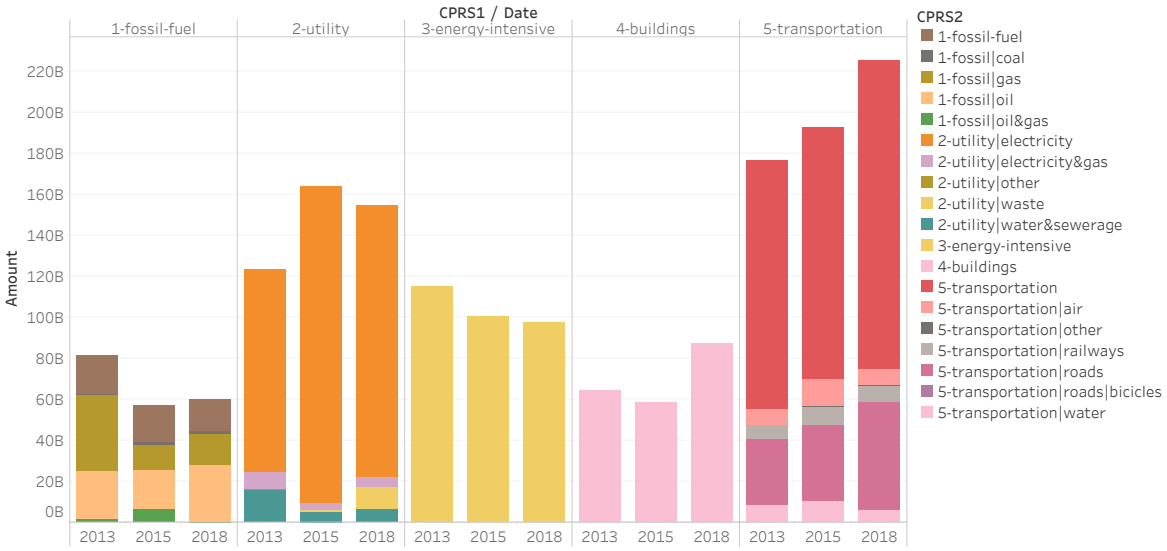


Figure 2. Breakdown of outstanding bond amount by CPRS over time



In a second step, we provide an estimate of the outstanding market capitalization and bond amount that can be associated with economic activities covered by the Taxonomy. Since the Taxonomy focuses on a comparatively small set of economic activities, as explained above, these amounts are also relatively small. As a last step, we estimate the outstanding NFC bond amount and market capitalization associated with Taxonomy-eligible activities, i.e. the subset of taxonomy-considered activities that satisfy the taxonomy

thresholds. To do so, we follow the TEG reasoning and criteria as closely as possible.[7] Table 1 reports the estimated amounts. We cross-check our estimates with outstanding green bond amounts based on Eikon data and from the Climate Bond Initiative, as well as with estimates based on FTSE Russell Green Revenues, concluding that our estimates are reasonable and suggest huge potential for green bonds as a tool to finance the low-carbon transition.

Table 1. Estimated financial investments into EU Taxonomy-eligible activities (based on 2018 data).

	Bonds in EU Taxonomy-eligible activities (estimated)	**Market capitalization in EU Taxonomy-eligible activities (estimated)**
CPRS Sector	**Amount (€ bn)**	**Amount (€ bn)**
Buildings	16.74	45.35
Energy Intensive	0.95	7.37
Transportation	10.59	2.85
Utility	27.82	56.17

In the last part of the report, building on the analyses carried out in the first two parts, we estimate the additional financial investment needed to fill the gap. Estimates vary across sectors and scenarios. In general, however, the increased financial investments towards relevant sectors appear to be within reach, compared to the current size of the corporate bond market and outstanding loans to NFCs. Even in the most stringent scenario, estimates show that the (green) bond and loan issuance would increase by around 4.9% in the energy-intensive sector and by 6.0% in the transport sector.

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[7] Based on the June 2018 version of the Taxonomy Technical Report.

3. A common language for sustainability data: Taxonomy and a nomenclature

Hans Biemans, ING

The need for sustainability data

EU member states, supervisors, investors, banks, research institutes and companies are increasingly looking for data on the percentage of sustainable economic activities of companies. They need these data in order to be able to implement or comply with the EU Taxonomy regulation, the Green Deal, The Green Deal Investment Plan and Just Transition Mechanism, the European Banking Authority (EBA) action plan on sustainable finance, the delegated acts under the Markets in Financial Instruments Directive (MiFID II) and the Insurance Distribution Directive.

Investors and banks

Investors and banks need data for various purposes, such as for climate risk assessment of loan and investment portfolios, for reputation risk management, for the design of sustainable financial products and for sustainability reporting.

EU member states, supervisors and research institutes

EU member states, supervisors, and research institutes need this information for climate policy making, to steer public investments and fiscal incentives, for stress testing, for industrial production (monitoring) and for international environmental trade (customs tariffs and trade agreements for environmental goods) and for the annual environmental economic accounts(8).

Companies

Also companies are looking for sustainability data. As per Taxonomy Regulation, companies must disclose[9] to what extent the corporate's activities are associated with environmentally sustainable economic activities as set out in the Taxonomy and in the case of non-financial companies, also:

a) the proportion of their turnover derived from products or services associated with environmentally sustainable economic activities as set out in Article 3 and Article 5 of the Taxonomy

b) the proportion of their total investments (Capital Expenditure) and/or expenditures (Operating Expenditure) related to assets or processes associated with environmentally sustainable economic activities as set out in Article 3 and Article 5 of the Taxonomy

A common language for sustainability data

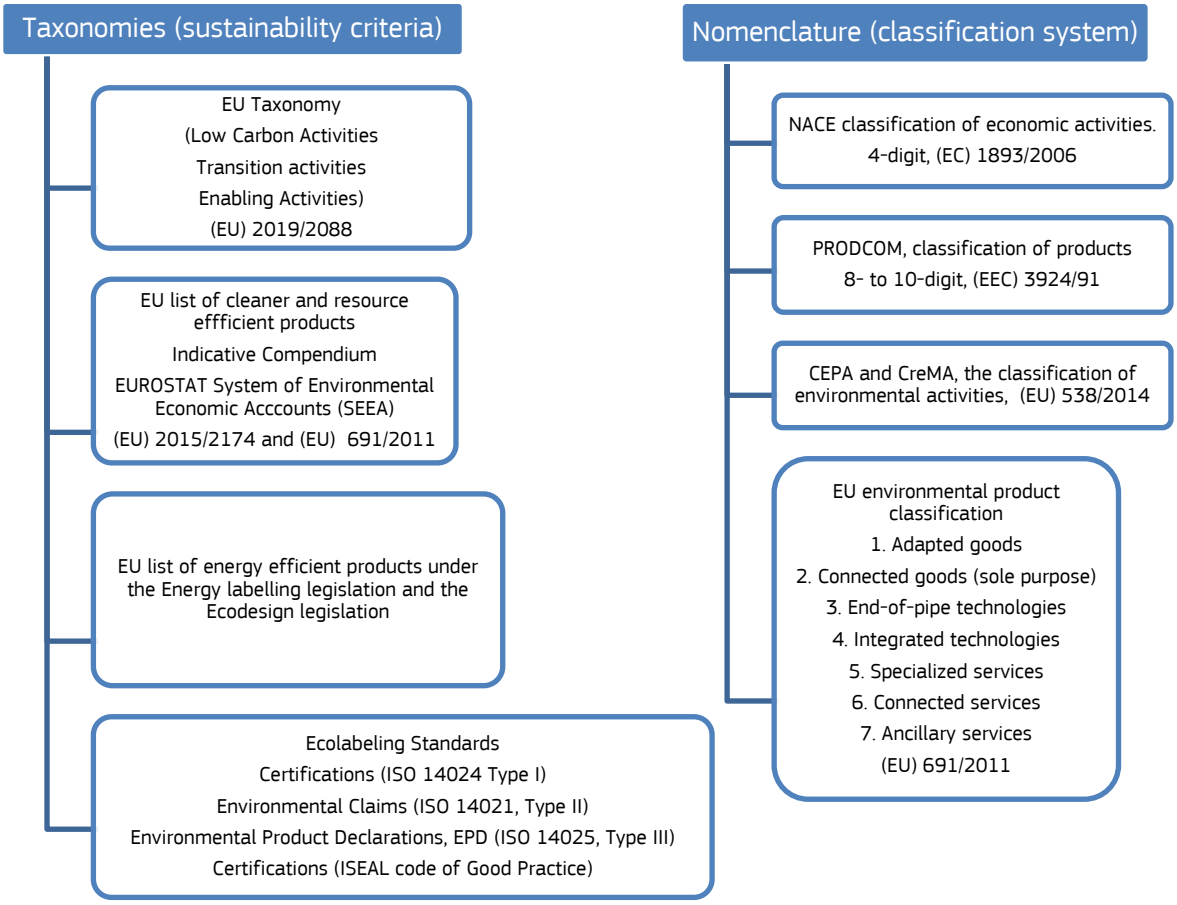
A shared interest in data requires a common language

Shared interests of EU member states, supervisors, investors, banks, research institutes and companies in sustainability data requires a common language( ) with the possibility to exchange data in automated systems. A common language for sustainability needs at least two structural elements: a sustainability taxonomies and a nomenclature or classification system. We have summarized this in Figure 1.

8 For EU member states it is mandatory to use the System of Environmental Economic Accounting (EUROSTAT/SEEA) and to publish environmental economic accounts such as the Environmental Goods and Services Account (EGSS) and the Environmental protection expenditure accounts (EPEA).

9 Anticipated text Dec 2019. Companies who publish non-financial information pursuant to the Accounting Directive (2013/34EU) or the Non-Financial Reporting Directive (NFRD, 2014/95/EU)

Figure 1. A common language for sustainability data: two structural elements. In order to identify a sustainable activity in automated systems the sustainability criteria on the left hand side and "codes" on the right hand side must be combined.



Taxonomies: EU Taxonomy, EU lists of environmental and energy efficient products and ecolabeling standards

The structural element on the left of Figure 1 is the sustainability content. These are technical criteria, tools and labels to identify sustainable activities, products, services or processes. When companies disclose the percentage of sustainable activities, they might refer to the EU Taxonomy but also to other sustainability standards for products or processes. The left hand side of Figure 1 contains the two main ecolabeling standards ISO and ISEAL, the EU "list of cleaner and resource efficient products" ([10]) and the EU "list of energy efficient products"([11]), as examples.

Nomenclature: economic classifications

The first structural element on the right hand side of Figure 1 is the economic classification system. This is nothing else than a coherent numeric coding system to make automated exchange of data possible. An important part of it is the international system of economic classifications (Figure 2).

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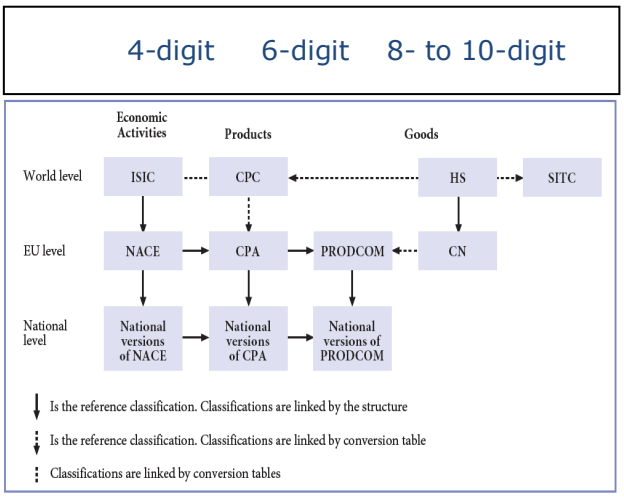
10 Part of System of Environmental Economic Accounts, EGSS (EUROSTAT/SEEA). https://ec.europa.eu/eurostat/web/environment/methodology.

11 Part of the energy labelling legislation and eco-design legislation. Suppliers need to register their appliances in the database and can create tailor-made labels for energy efficient products. https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements_en

Investors and banks currently only use NACE codes or similar (ISIC, NAICS, GICS, etc.). NACE codes (up to 4-digit) are describing the activities of a company, but not the products or services.

Information on groups of products and services, coded via PRODCOM (8- to 10-digit) are collected by EU member states for production statistical purposes, but not yet made available for financial institutions.

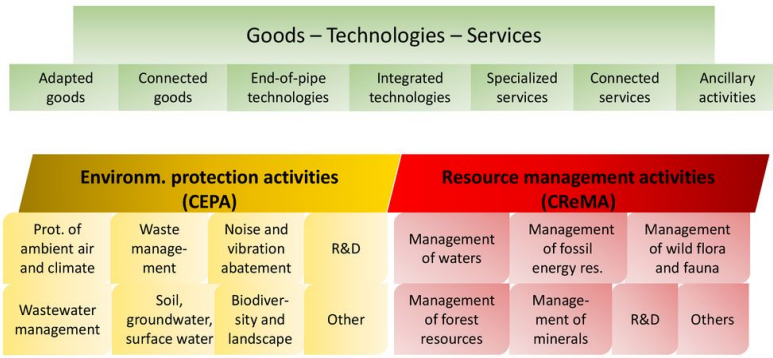
Figure 2. The international system of economic classifications. Source: Eurostat



Nomenclature: environmental classifications

On the right hand side of the Nomenclature in Figure 1 there are also two environmental classifications: CEPA and CReMA and 7 environmental product classes (Figure 3). They are just classifications, thus codes, not criteria. These additional environmental identifiers for an economic activities are a necessary element in the Nomenclature in Figure 1 because product codes alone do not always distinguish between sustainable and non-sustainable products. These environmental classifications are also part the data requirements of the System of Environmental Economic Accounts (SEEA) that EU member states use for their environmental economic accounts.

Figure 3. Environmental classifications in the System of Environmental Economic Accounting (SEEA) Source: Environmental Good and Services Sectors, Sacha Baud, Statistics Austria/Eurostat)



Alignment between the Taxonomy and the Nomenclature is essential

Alignment between the EU Taxonomy and the Nomenclature improves data quality and is essential for automated exchange of sustainability data. A classroom example is the existing EU nomenclature for electric, plugin hybrid and hybrid passenger cars. Product codes for these new products were introduced in the EU PRODCOM list in 2017, see Table 1. The draft EU Taxonomy of June 2019 requires that hybrids are sustainable when they emit less than 50g of CO_2. The EU PRODCOM list does not have a separate code for such hybrids.

This is an example where the EU Taxonomy and the Nomenclature are not harmonized, which is less ideal for automated exchange of data because it then requires two identifiers on the right hand side in Figure 1: one for cars and one for sustainability.

Table 1. Existing EU classification for passenger cars, Reg. (EU) 2017/2119 PRODCOM list of industrial products shows that hybrid, plugin and EV cars can be distinguished via codes. The number of digits increases each time but the basis C29.10 stays the same.

NACE	CPA	PRODCOM Code	PRODCOM Description	CEPA/CReMA domain	Product class
(EC) 1893/2006	(EU) 1209/2014	(EEC) 3924/91		(EU) 538/2014	(EU) 691/2011
C29.10	C29.10.24	C29.10.24.10	Hybrid motor vehicle	CEPA 1 (protection of ambient air and climate)	Adapted goods
C29.10	C29.10.24	C29.10.24.30	Plugin-Hybrid motor vehicle	CEPA 1	Adapted goods
C29.10	C29.10.24	C29.10.24.50	100% Electric motor vehicle	CEPA 1	Adapted goods

Template for non-financial disclosures by companies

Table 2 shows a template that could be a basis for companies who must or want to disclose the proportion of sustainable revenues and expenses. EU Member States already make an estimation of the proportion of environmental activities of companies for the Environmental Economic Accounts. Different data sources are used, like administrative data, telephone calls and regular production surveys. Many companies provide data on a very detailed products level, using the PRODCOM codes. Adding further variables focusing on sustainability of the products is very challenging, time and cost intensive[12]. It is important that the EU harmonizes requests for information, in order to reduce the administrative burden.

Table 2. Template for companies to disclose alignment with Taxonomy and percentage of sustainable revenues and expenses (in this example, one row is one company; companies have multiple rows for different product group

To be filled-in by the company, but supported by equivalence tables														To be filled-in by company			
Company	**NOMENCLATURE (Activity Classification)**								**TAXONOMY (ENVIRONMENTAL CRITERIA)**					**FINANCIAL**			
ID	**Economic classification**						**Environmental classification**		**EU Taxonomy**		**Ecolabel**	**EGSS Compendium**		**Green revenues and expenditures**			
Ticker	NACE code	Product or Service	CPA Code	CPA Description	PRODCOM code	PRODCOM description	CEPA/ CReMA	EGSS Product Class	EU Taxonomy Activity	Aligned (%)	EU ecolabel, ISO Type I, II, II or ISEAL	EU list of cleaner and resource efficient products		Associated revenues (Eur)	Associated revenues (%)	Associated Expenditure (Eur)	Associated Expenditure (%)
Manuf_X	C 29.1	Product	29.10.2	Manufacturing of Passenger cars	29.10.24.50	Electric	CEPA 1	Adapted goods	Light passenger cars and commercial vehicles	100%	Green NCAP	Manufacture of electric and more resource efficient transport equipment		€	€	€	€
Manuf_X	C 29.1	Product	29.10.2	Manufacturing of Passenger cars	29.10.24.10	Hybrid	CEPA 1	Adapted goods	Light passenger cars and commercial vehicles	30% < 50g	EU ecolabel	Manufacture of electric and more resource efficient transport equipment		€	€	€	€
Manuf_Y	C 30.2	Product	30.20.11	Manufacturing of Rail locomotives powered from an external source of electricity	30.20.11.00	Rail locomotives powered from an external source of electricity	CEPA 1	Adapted goods	Passenger rail transport (interurban)	100%		Electric and more resource efficient transport equipment		€	€	€	€
Service_A	M 71.1	Service	71.11 and 71.12.12	Engineering and architectural services for low energy consumption and passive buildings and energetic refurbishment of existing buildings	n/a	n/a	CReMA 13B		Construction, Real estate activities	100%	BREEAM certified auditor (type I)			€	€	€	€
Service_B	H.49.1	Service	49.10.1	Passenger rail transport services, interurban	30.20.11.00	Rail locomotives powered from an external source of electricity	CEPA 1	Adapted goods	Passenger rail transport (interurban)	100%		Electric and more resource efficient transport equipment		€	€	€	€

In this paper we discussed a common language for sustainability data that combines new and existing sustainability criteria (including the EU Taxonomy) and existing environmental and economic classifications or nomenclatures (including CPA and PRODCOM codes) to classify them. The paper also provided a template that could be a basis for disclosures by companies on the percentage of revenues from and expenses for sustainable products and services, based on this language and leveraging their existing reporting efforts..

Companies must comply with disclosure requirements anticipated in the EU Taxonomy Regulation, and expected revision of the EU Non-Financial Reporting Directive (NFRD, 2014/95/EU). Both small and large companies already disclose information on products and services to the EU member States for the Environmental Economic Accounts. Alignment between the data requests for sustainable finance and the data requests for the environmental account is key. It not only reduces the reporting burden for companies but also results in better data.

Reducing uncertainty in the interpretation of the EU Taxonomy technical criteria by the different market actors, auditability and consistency of reporting between different entities, is only possible within a very clear common language of sustainability criteria in combination with existing nomenclatures, as suggested.

12 In the Environmental Economic Accounts, defining the final percentage of environmentally-relevant products and/or services is done by experts of the national statistical offices.

PANEL 1: KEY METRICS AND DISCLOSURES

4. Way forward: disclosing ESG-related risks in a harmonized manner at the EU level as part of pillar 3 requirements

Pilar Gutierrez, European Banking Authority

Transparency plays a key role in promoting market discipline through the disclosure by institutions of meaningful, consistent and comparable information on the risks to institution's financial position, capital or liquidity, reducing asymmetry of information between institutions and users of information and helping stakeholders to make informed decisions.

Fostering transparency on sustainability with granular, consistent and comparable disclosures on ESG risks faced by institutions is key for users of information to understand the risk profile of the institution and the potential impact of ESG factors on its levels of credit, market and operational risk, and on its solvency and liquidity.

ESG Pillar 3 disclosures, including transition and physical risks, will be mandatory for large institutions as soon as June 2022. The EBA is asked to implement these disclosures in a way that conveys sufficient comparable information on institutions' risk profiles. By end 2020, the EBA will consult on a technical standard (ITS) with granular quantitative and qualitative information on ESG risks, notably transition and physical risks.

The EBA will build on the Commission's taxonomy and on existing disclosure initiatives, like the Commission's non-binding guidelines on reporting of climate-related information (COM NBG) and the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD), particularly on those KPIs which set targets in terms of percentage of green assets in institutions' portfolios (Green Asset Ratio). The EBA will also consider disclosures on carbon related exposures. The ITS will include templates with granular and comparable quantitative information on the composition of the KPIs and ratios that institutions will have to disclose, as well as qualitative information and narrative that institution will have to provide in order to explain their strategy, risk appetite and risk management and policies regarding ESG risks.

In the short term, the EBA's action plan on sustainable finance encourages institutions to focus on implementing the COM NBG, particularly the KPIs on Green Asset Ratio, informing how they plan to build them and to embed climate considerations into their strategy and risk management. This will usefully inform the EBAs work.

Scope, e.g. should Pillar 3 refer not only to the risks posed by ESG factors to the bank but also to the risks that the institution may pose to the sustainable objectives

Strictly speaking, the scope of Pillar 3 disclosures should refer to the risks that ESG factors, including transition and physical risk, may pose to the institution. But in the case of ESG risks, and in particular climate change risks, an institution with a higher negative impact on the climate will be more exposed to the risks that arise from the transition to a low-carbon and climate-resilient economy, including risks from policies, litigation and reputational risks, and negative impacts on the creditworthiness of institutions' counterparties or on the market value of their exposures. Similarly, institutions impacting negatively climate change may aggravate the impact of physical risk on their vulnerable counterparties. Therefore, by informing on the risks that the institution may pose to sustainability objectives, the institution is also providing important information on its level of riskiness in terms of climate change. Similarly, the information on climate change risks management should include both perspectives, as by managing the risks that the institution may pose to the environment, the bank is implicitly managing these risks. In this line, setting and disclosing sustainability targets in terms of e.g. green assets ratios and informing on the level of progress towards those targets would provide meaningful Pillar 3 environmental information on how the institution is evolving in its transition to sustainability and therefore mitigating the related risks.

How to ensure uniformity and strike the right balance between quantitative and qualitative information

Consistency and comparability of Pillar 3 disclosures across institutions is key to promote market discipline. For this purpose, institutions are asked to disclose their Pillar 3 information according to pre-defined common templates that include breakdowns of granular quantitative information and common instructions and definitions. Of course there is a need for flexibility and institutions should be able to explain the specificities of their business models, strategy, risks appetite and policies and risk management. For this purpose Pillar 3 standards also set requirements in the form of flexible tables and qualitative explanations that gives leeway to institutions.

Under the Pillar 3 methodology, templates usually refer to the disclosure of quantitative information while tables are used when we are talking about qualitative information. While quantitative information is very important to understand the impact of risks, qualitative information is equally important to understand the institutions' risks' appetite, risk policies and risk management. In addition and in order for users of information to understand the quantitative data disclosed, institutions are usually asked to provide an accompanying qualitative narrative explaining their quantitative disclosures and the evolution of the data across time.

In order to strike the right balance in institutions' disclosures, the Pillar 3 framework asks institutions to take into account materiality, proprietary and confidentiality considerations when preparing their Pillar 3 reports and they can omit information that is not regarded as material or that is regarded as confidential or proprietary.

For the purpose of Pillar 3 disclosures, information is regarded as material where its omission or misstatement could change or influence the assessment or decision of a user of that information relying on it for the purpose of making economic decisions. Information shall be regarded as proprietary to institutions where disclosing it publicly would undermine their competitive position. Proprietary information may include information on products or systems that would render the investments of institutions therein less valuable, if shared with competitors. Information shall be regarded as confidential where the institutions are obliged by customers or other counterparty relationships to keep that information confidential.

Specific challenges for banks (e.g. regarding the disclosure of GHG scope 3 emissions)

Scope 1 are Direct GHG emissions from sources owned or controlled by the company

Scope 2 are Indirect GHG emissions from the generation of acquired and consumed electricity, steam, heat, or cooling (collectively referred to as "electricity")

Scope 3 are All indirect GHG emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions

For institutions, the majority of emissions occur indirectly from value chain activities. The disclosure of scope 3 emissions should help to gauge the thoroughness of institutions' accounting processes and to understand how companies are analysing their emissions footprints.

Both the TCFD recommendations and the COM NBG include specific disclosures by banks of their GHG emissions, with a focus on scope 3 emissions. But both of them recognise the challenges. The TCFD recommendations refer to the GHG protocol as a valid methodology or tool to calculate scope 3 GHG in the financial services sector.

In the case of e.g. project finance it can be relatively easy to account for the scope 3 emissions linked to the project. In this case the challenge is the availability of reliable data on the project's GHG emissions. In the case of equity holdings, the banks' scope 3 emissions can be estimated in proportional ways, based on e.g. the participation of the institution in the equity of the undertaking. One challenge is again the availability of reliable data; in this case there is the extra challenge of how to avoid double counting of emissions. In the case of the loans portfolio and debt holding, other than project finance, the challenges include the availability of reliable data, the availability of appropriate methodologies and again the double counting of emissions.

Alternatively, the EBA thinks that there are disclosures that can also show the climate change risks from and to the institution in a clearer and more reliable way, like a green assets ratio, including information on the volume of exposures by activity with enough level of detail that allow an understanding of the nature of the activity

from an environmental point of view; information on green bonds holdings/issuances compared to total bonds holdings/issuances; or in the case of mortgages or real estate exposures, exposures by type of energy efficiency classification of the collateral/real estate asset funded. Other relevant information would include disclosures on the volume of carbon-related exposures held by the institution.

How to facilitate the disclosure of relevant information by banks (e.g. the role of clients' disclosures and data availability).

Different policy actions can help to facilitate the disclosure of relevant information by banks. The supplement on climate change to the COM NBG, and the TCFD recommendations, are an important step forward that should encourage the disclosure of relevant information by corporations. On the other hand the limited scope of application of the COM NBG (public companies with more than 500 of employees) and their non-binding nature may limit the possible positive impact of the guidelines, in particular in the case of European banks with large SMEs and retail portfolios. In this case, broadening the scope of application of the environmental and climate change disclosures to SMEs and making this type of disclosures more binding would be relevant steps that would facilitate the availability of relevant data. In addition, embedding the ESG factors and in particular environmental and climate change considerations into the credit and lending policies of the banks and into their risk management policies should lead to the systematic request of relevant information by the institutions to their counterparties on a bilateral basis. In this sense, the EBA guidelines on loan origination and monitoring, which ask institutions to include environmental, social and governance (ESG) factors as well as risks and opportunities related to ESG in their risk management policies, credit risk policies and procedures, are a clear policy action that should clearly contribute to the availability of relevant data on a bilateral basis. Any industry driven initiative that should facilitate availability of data is also welcome in this regard.

Link between Pillar 3 disclosures and other disclosure requirements.

Under EU rules, institutions are require to disclose or publicly report different types of information:

- Financial reporting: Institutions have to disclose financial information included in their financial statements as part of their annual reports. For IFRS institutions, the rules that they have to apply are laid down in Regulation (EC) No 1606/2002. For non-IFRS institutions, the rules are included in directive 2013/34/EU, known as the 'accounting directive'.
- Non-financial reporting: Directive 2014/95/EU lays down the rules on disclosure of non-financial and diversity information by large companies as part of their annual reports. It applies to large public-interest companies with more than 500 employees, including banks, which have to disclose information on their policies they implement in relation to environmental protection; social responsibility and treatment of employees; respect for human rights; anti-corruption and bribery; diversity on company boards (in terms of age, gender, educational and professional background). The content of non-financial reporting is further specified in the COM NBG.
- Pillar 3 information - Part Eight of the Capital Requirements Regulation (CRR) sets out the Pillar 3 framework in the EU, including comprehensive Pillar 3 disclosure requirements for institutions. The Pillar framework seeks to promote market discipline through the disclosure by institutions of meaningful, consistent and comparable prudential and resolution information, reducing asymmetry of information between institutions and users of information and helping stakeholders to make informed decisions. The EBA is in charge of developing an implementing technical standard (ITS) implementing and specifying the requirements included in Part Eight of the CRR.

Pillar 3 disclosures include information on risks to institutions' capital and liquidity, on capital and liquidity requirements and on their capital adequacy and liquidity buffers. It also provides resolution information on institutions eligible liabilities and their capacity in case of resolution. In addition to the information on the usual risks, and as explained above, under Article 449a of the amended CRR (CRR2), large institutions with publicly traded securities will be required to disclose information on ESG risks, including physical and transition risk. This information shall complement, in the case of institutions, the financial and non-financial information disclosed providing the view of the impact of risks on institutions' capital and liquidity and the related regulatory requirements, when relevant. The EBA is working on the ITS which will include the specific information on ESG risks that institutions will have to disclose.

Static disclosures as opposed to forward-looking and dynamic disclosures.

Climate change risks impacts may materialise in longer time horizons than other risks. The Paris agreement and the EU agenda on climate and sustainable development set long-term objectives, in 2030 and as far as 2050. Physical risks will become more acute and severe in the long term if appropriate policies are not taken, and long-term policies are needed to meet the different targets set in 10 and more years' time.

These means that relevant disclosures should of course of course include but non only information about the exposure of institutions to physical and transitional risk as of today, that is, taking into account the current policies and current level of environmental degradation, but also considering the possible evolution of risks and exposures taking into account different scenarios both for transitional and physical risk with longer terms than usual time horizons (10 or more years). In addition, physical risk related disclosures should consider forward looking information by locations with different level of riskiness. In the case of international active banks, scenarios should also include different levels of riskiness in terms of transition risk in different jurisdictions, depending on the level of commitment of those jurisdictions with the Paris agreement targets.

Doing scenario analysis and providing forward looking information is challenging and should not be presented or taken as precise forecasts but as another tool and additional information that would help users to understand how institutions may be impacted by climate change risks, and their strategy and policies regarding sustainability. Scenario analysis and forward looking information should not in any case replace but complement actual information on institutions' level of exposure to climate change related risks.

5. Climate-related indicators for banks: what transmission mechanisms?

Sara Lovisolo, EU Technical Expert Group on Sustainable Finance

Policy efforts to measure and mitigate the impact of climate change on the banking sector (based on the approach introduced by the recommendations from the Financial Stability Board's Task Force on Climate-related Financial Disclosures or TCFD) and the impact of the banking sector on climate change mitigation and adaptation (as for example endeavoured by article 173 of the French Energy Transition Law and the EU Non-financial Reporting Directive) have so far primarily relied on transparency or Pillar 3 measures (based on the classification introduced by the Basel framework), as opposed to measures that directly affect banks' capital allocation decisions (as for example via the direct integration of climate-related considerations into the determination of capital charges). However, transparency is only a means to an end. Understanding the transmission mechanisms that lead from transparency to enhanced climate resilience of the banking sector (to mitigate the impact of climate change on banks) – or a greater contribution of the banking sector to funding climate change mitigation and adaptation – is key to the correct selection of transparency indicators that can effectively be used to achieve policy objectives.

What climate-related indicators for banks are currently available?

Two fundamental approaches have been applied so far to determine climate-related indicators[13] applicable to banks: 1. Carbon foot printing approaches; 2. Sector / activity exposure approaches.

Carbon foot printing is the practice of measuring the greenhouse gas (GHG) emissions intensity of loan or investment portfolios based on established GHG accounting standards.

Sector or activity exposure[14] aims to identify the exposure of a portfolio to climate-related risks and opportunities based on the sector or activity breakdown of the holdings – with sectors mapped for example as high-carbon, low-carbon, or Taxonomy[15]-related.

These two approaches have been reflected in the indicators for banks included in the supplement on reporting climate-related information to the Non-binding Guidelines of the EU Non-financial reporting directive, published in June 2019.

Table 1. Indicators for the banking sector included in the supplement to the on-binding Guidelines of the EU Non-financial reporting directive.

KPI	Example	Rationale	Alignment with Other Reporting Frameworks	EU Policy Reference
1. Amount or percentage of carbon-related assets in each portfolio in M€ or as a percentage of the current portfolio value.	€20 m or 20% carbon-related assets of bank's equity portfolio	Show awareness of the exposure of portfolio to sectors affected to varying degrees by climate-related risks and opportunities.	TCFD Common Carbon Footprinting and Exposure Metrics	2030 climate & energy framework
2. Weighted average carbon intensity of each portfolio, where data are available or can be reasonably estimated.	A bank reports the carbon intensity of its equity portfolio in terms of tCO2e per € m using third-party carbon data	Show awareness of the exposure of portfolio to sectors affected to varying degrees by climate-related	TCFD Common Carbon Footprinting and	2030 climate & energy framework
3. Volume of exposures by sector of counterparty.	€1 250 m in energy sector accounting for 17% of total investments	Show the concentration of exposures towards high-carbon and low-carbon sectors.		EU Low Carbon Economy Roadmap
4. Breakdown of assets under management by business sector across asset classes (equity / bonds / infrastructure / real estate / structured products / MBS / derivatives)	Report the net asset value in equity broken down by industry.	Demonstrate awareness of current economic exposure and concentration (if any) in industries that are impacted by climate change in varying degrees.	EU Taxonomy EIOPA SASB FN-IN-410a. GRI 201 -2	2030 climate & energy framework

[13] Indicators are here meant as a sub-set of the disclosures set by the main sustainability reporting frameworks. Based on the TCFD framework for instance, data preparers are expected to report on Governance, Strategy, Risk Management and Metrics and Targets. Indicators here only captures TCFD metrics, not narrative disclosures around the other aspects.

[14] Activity differs from sector for performance criteria associated with the activity. An example of sector electricity generation; an example of activity is electricity generation with average GHG intensity 100gCO_2/KWh. In addition, the determination of activity exposures is predicated on the availability of the revenue breakdown by activity of the Investee Company or borrower.

[15] Taxonomy here means the proposed EU classification system of sustainable economic activities.

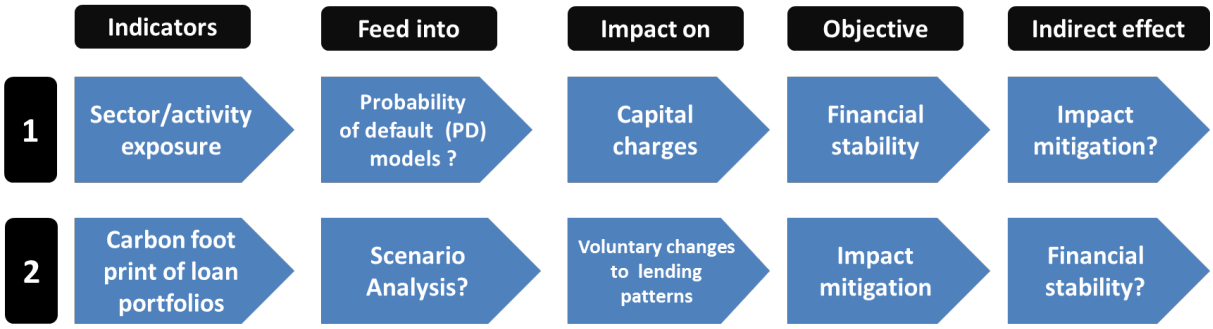
5. Volume of financial assets funding sustainable economic activities contributing substantially to climate mitigation and/or adaptation (absolute figures and compared to total exposures) according to the EU taxonomy.	€650 m accounting for 12% of lending portfolio	Show the concentrations of green investments and their resilience to climate change.		EU Low Carbon Economy Roadmap
6. Volume of collaterals related to assets or activities in climate change mitigating sectors.	% of the total volume of collaterals	12% of collaterals	Show the volume of green collaterals, e.g. with lower carbon exposure	2030 climate & energy framework

Of the six indicators listed above, indicator 2 is based on carbon foot printing, the other five are based on variations of sector or activity exposure. Article 173 of the French Energy Transition Law also introduced carbon reporting for institutional investors.

Which approach should regulators adopt?

The choice of indicators for the purpose of enhancing the resilience to climate change of the banking sector, or mitigating its impact on climate change mitigation and adaptation, should be driven by the use that will be made of the data, either by the data preparers themselves or by data users.
In particular, for banks which are not listed on regulated markets, the identification of use cases for climate-related data is of the essence, as the default use case associated with investment decisions (which applies to public companies) has to be ruled out.

Figure 4. Climate-related data for banks: use cases and transmission mechanisms.



In the case of indicators that are based on sector/activity exposure, the most obvious use case is the application of data to Probability of Default (PD) models, whose output will be used for the determination of capital requirements in the interest of financial stability (see case 1 in Fig. 1).

What is problematic here is whether PD or analytical risk-weighted assets (RWA) models are available that can take account of climate-related risks. For example, French bank Natixis has announced a "Green Weighting Factor" which adjusts the expected rate of return of each financing deal based on its environmental and climate impacts.[16] But it remains to be seen whether industries that make a significant contribution to climate change mitigation will also have better performance from a PD perspective. Hence, in the absence of this correlation, the objective of financial stability (protecting the financial system from transition risks associated with carbon intensive industries) won't necessarily translate into greater flows of capital towards green assets, but only in a higher cost of capital for brown ones (through higher capital charges whose cost is passed on to the borrower). It has to be clear that the transmission mechanism here is not binary (yes or no to high carbon sectors), but is rather a matter of degree, i.e. a matter turning sector exposures into different commercial conditions applied to different sectors based on their climate-related risks. As long as the mechanism is market-based – i.e. the regulators does not dictate exposure quotas or bans funding of certain sectors, which does not seem compatible with the European regulatory environment in the foreseeable future – its effect on the high-carbon economy are hard to estimate. However, this use case sets out a clear transmission mechanism and associated incentives.

[16] See https://pressroom-en.natixis.com/news/natixis-rolls-out-its-green-weighting-factor-and-becomes-the-first-bank-to-actively-manage-its-balance-sheets-climate-impact-2dce-8e037.html

In the case of the carbon foot printing approach instead, it's harder to trace those incentives (see case 2 in Fig. 1). What is problematic here is in the first instance the availability of methodologies for determining the alignment of a loan portfolio with climate scenarios. Moving from a carbon footprint to an assessment of its scenario alignment is a very complex exercise – which needs to heavily rely again on sector exposures – and methodologies are still at a very experimental stage. But even if we assumed that tried and tested methodologies existed, we would only need to rely on corporate responsibility (voluntary) approaches to translate a misalignment with climate scenarios into a review of lending decisions on the part of the bank, while losing sight of financial stability considerations.

Conclusions

The choice of climate-related indicators for the banking sectors should be made working back from the expected policy objective and taking into account the transmission mechanisms that can lead from transparency to impact (either on financial stability or climate change mitigation). Regulators should also look at the state of the art of climate-related modelling for the financial sector, to avoid leaps of faith based on an assumed power of transparency per se to lead to beneficial outcomes. It is also important to consider which indicators can be used for the construction of incentives and which instead can be used only for measuring the application of top-down policies. Carbon foot printing and sector/activity exposure indicators are linked to very different transmission mechanisms and both rely on the availability of models into which the indicators are supposed to feed. As research in the field of climate-related financial modelling deepens and market practice evolves, the applicability of the two different disclosure approaches will be impacted. Ultimately, if action has to be taken quickly in the face of runaway global warming, only impact and usability considerations should drive policy adoption of either approach.

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6. Current practices on integration of ESG factors in banks' disclosures

Olivier Picard, Société Générale

Société Générale has been highlighted by Autonomous research (a Sandford Bernstein company) as the leading European bank on their Paris Agreement readiness index (second worldwide after the Commonwealth Bank of Australia). Besides this ranking, the main message of this research is that there is still a lot to be done to meet the expectations of the Paris agreement. Disclosures should be transparent on this objective of alignment.

Regulatory expectation on disclosure has recently been reinforced and some actors are even disclosing more than expected: But how can banks achieve to disclose a relevant, material, consistent and comparable extra financial information, and what type of issues arise when defining Key Performance Indicators (KPI).

We clearly see a tremendous acceleration of the regulatory expectation in the last few years. We can note the European 2014 Directive (2014/95/UE) and in France the duty of care law, the energy transition law, the "Sapin II" law on anti-bribery, the PACTE law (law for Businesses Growth and Transformation Action Plan). Banks have chosen to disclose even more information (see French Financial Market Authority report Nov 2019) and Société Générale is not alone in publishing:

A- an Extra Financial performance Report included in the Reference Document

B- an integrated report which delivers a compact and somehow simplified disclosure on CSR

C- A TCFD report dedicated to climate change

There are two main drivers for this remarkable trend toward producing more information. First of all, the pressure is coming from extra-financial rating agencies which multiply the number of questionnaires addressed to institutions. The second reason is to differentiate with peers and support company valuation. To that extent if regulation has improved the communication of banks, it could become a limitation if it is too prescriptive on metrics which wouldn't allow for differentiation.

How to achieve a disclosure of relevant and material information? The TCFD has been a turning point in recommending disclosing governance, strategy, risk management and key metrics. The question of materiality is indeed a classic risk management issue. The first step of disclosure, before giving metrics, is to demonstrate what risks of adverse impact may stem from the firm's own activities or from its operations. Firms use materiality matrix on environmental matters, social and employee-related matters, respect for human rights, anti-corruption and bribery matters. To be clear this approach aims at identifying risks that our business may create for stakeholders and the environment whereas traditional risk department responsibility is to identify risks to our capital, shareholders or bond holders. At the end of the day there is a feedback loop from the first ones to the second ones which raises very practical questions on whether to include them in the risk factors in the pillar 3 or to leave them in the extra-financial reporting.

The KPI selected for reporting must be adapted to each risk but often the main question is to demonstrate how actors manage and reduce risk. The disclosure is then presenting the implemented framework, or the dedicated investments made to achieve this objective.

Climate risk is one of the trickiest. As a service company, a bank is less exposed than industries to direct greenhouse gas emissions (scope 1 and scope 2). Nevertheless, it remains a key point to disclose efforts made on energy savings and reduction in CO^2 emissions for our own activities. The main question is on scope 3. For example, Société Générale discloses the exposures to sectors affected by climate change. It can be taken as a starting point but exposures to sectors do not accurately reveal residual risk as some actors in those sectors will have an appropriate adaptation strategy and some won't, which is a question addressed by SG's internal credit policy. Communicating this information requires an element of comparability.

However, the most interesting KPIs concerns efforts made to foster the sustainable and positive impact finance and to exit from thermal coal financing. French institutions also communicate on E&S Sectoral policies (i.e. principles for responsible banking and the Poseidon principles). For the sake of consistency and comparability Positive Impact Finance transactions are accounted using UNEP FI definitions. All disclosed amounts are controlled by external auditors. The next step on climate is probably linked to the attempt to project the induced CO^2 emission of loan portfolios. This raises numerous issues with respect to data availability and aggregation techniques.

Apart from dedicated KPIs, the extra-financial rating of SG (by RobecoSam, Sustainanalytics and MSCI) is also relayed in non-financial communication has been integrated in the Risk Appetite Statement of the bank and is used to calculate the variable remuneration of Chief Executive Officers.

To conclude, regulation pushes institutions to more transparency and sets the right principles for this disclosure: relevance and materiality. Institutions will wish to communicate beyond these requirements to meet the expectations

of extra-financial rating agencies and stakeholders. Beyond communication on the frameworks that have been implemented to manage some risks, I expect institutions to communicate about efforts to accompany energy transition plans. There are multiple path and scenarios for this transition. Comparability is of course necessary, but it is even more necessary to be transparent on targets and measurement methods which should remain agnostic to the contemplated scenarios.

KEYNOTE ADDRESS

7. Towards a simple metric that unlocks banks' green strategies

Piers Haben, European Banking Authority

The climate is changing fast and the role of the financial sector in diverting investment to sustainable activities is one key part of efforts to moderate the impact. The timing and sequencing of public policy in supporting this change is crucial. I explain below how we see the EBA's work, focusing first on the identification of key metrics and using them for strategy setting, risk management and scenario analysis.

Cognisant of the EBA's mandate for maintaining the stability and effectiveness of the EUs financial system, we often hear that prudential authorities should be above the political debate about climate change and that prudential rules should not be used as a substitute for effective public policy. I tend to agree with this view in principle, but we should be cognisant that regulators must be aware of risks as they emerge. All of the scientific evidence tells us that transition and physical risks around climate change have created real and apparent financial risks for financial institutions today. Moreover, the potential amplification of transition risks through sudden changes in public policy spurred on by public concern about climate change, is very real, as is the possibility that physical risks will accelerate suddenly.

It is in this context that we are delighted that the EBA has a new general responsibility to incorporate Environmental Social and Governance (ESG) factors into everything that we do, as will soon be enshrined in the EBAs founding regulation. Our incorporation of ESG factors into our Guidelines in Loan Origination is a great example of how we will have to treat ESG risk factors in our work going forward. The EBA also has a number of specific ESG mandates, which I explain below, and which derive directly from the Commission's action plan on financing sustainable growth and are embedded in various legislative initiatives. In particular, we see a clear mapping between the key pillars of the Commission's action plan, which are in many ways political, and the more technical mandates that are correctly the responsibility of the EBA.

- The first pillar of the Commission's action plan is reorienting capital flows towards more sustainable investments which is clearly an overarching policy objective above the role of supervisors, yet we can see a clear link to the EBA's mandate to ensure that ESG factors are given due consideration in strategy and business models, drawing on the EU taxonomy on sustainable economic activities.
- Perhaps more easily we can see the second pillar of mainstreaming sustainability into risk management clearly manifest into the EBA's work on incorporating ESG risks into banks risk management.
- The third pillar is fostering transparency and long termism which relates directly to our work to enhance banks disclosure of their ESG holdings and risks.

The legal timeframes in which to deliver the new EBA mandates are both too short and too long. Too short in that we have mandates on reporting, disclosure and risk management with consultation and discussion papers to deliver as soon as 2020, with implementation in 2022, and we urgently need to gather evidence and find the right way forward. Too long as we can't wait until 2022 until banks start with effective green strategies, risk management and disclosure. And I note our mandate for the prudential treatment of green assets is 2025. As I hope to illustrate below this may be less concerning than it may at first appear.

The first example of how our timelines are too long and too short is on disclosure, where the EBA has a mandate (Article 434a of CRR 2) to develop technical standards, with a deadline for submission already in 2020. This means the work is urgent, and whilst we will build on existing work, primarily the EU Taxonomy but also the Guidelines on non-financial reporting and the Financial Stability Board Task Force on Climate-related Financial Disclosures (TCFD) recommendations, it will still be difficult. But at the same time ESG-related disclosure will be actually applicable from June 2022, which is arguably too late for the first wave of ESG disclosures. My colleague Pilar will explain more about this.

Similarly, the EBA's mandate on risk management will require lots of early exploratory work. We are aiming for a discussion paper as early as the second half of 2020 to really engage a wide range of stakeholders to develop the common definitions of ESG risks, risk management methodologies and methods for ESG risks to be included in the supervisory review and evaluation process (SREP), based on our mandate of Article 98 (8) of the CRD 5. This is incredibly complex work and needs to be built from the ground up, drawing on all available expertise in this nascent field. After the discussion paper we will complete a final report by mid-2021. But it is only after that report is submitted that we can start working on how supervisors will look at these risks in the SREP. Therefore guidelines in this regard are likely

only in 2022. Once again the timeline for this work is tight for us but banks and supervisors should not wait for the final guidelines to start their own work on this important topic

For stress testing Article 23 (Identification and measurement of systemic risk) of the EBA Regulation includes a specific reference to the potential environmental-related systemic risk to be reflected in the stress-testing regime. We will have to develop qualitative and quantitative criteria to assess the impact of ESG risks under scenarios with different severities. We will draw on international work but even then it will take time to produce a fully informed scenario analysis. Nonetheless, expectations are high that as soon as appropriate metrics are produced they are understood in the context of stressed conditions to allow effective strategy and risk management to be put in place.

The EBA's workload looks enormous. And each step must absolutely be based on evidence, drawing on experience from around the EU, of supervisors and credit institutions. That makes the timelines look daunting if we are to do our job well, gather evidence, listen to a range of stakeholders, consult effectively and draw up the legal mandates well in time for effective implementation. But we will do our best to stick to the legal mandates. Nonetheless, we are also acutely aware that scientific evidence, the expectations of the public at large, elected politicians and market participants suggests that we cannot wait another three years to identify metrics, adopt green strategies and incorporate environmental risks into risk management. Indeed expectations are that change is happening already.

Because of these competing pressure to do things well but do them quickly we see the need for additional early, or interim, actions, primarily driven by the following three factors:

- The long lead-time on the EBA mandates creates a risk that policy makers and the broader public might perceive a lack of specific action in identifying key sustainability risk, metrics and their use for effective strategy and risk management;

- Experience of the approaches and practices developed by institutions will usefully inform the EBAs work ahead of the finalization of the legal mandates; and

- Some aspects such as disclosure metrics will be new to some market participants and the broader public, so work at an early stage to inform market participants and the broader public about the context and use of such metrics will help to inform their use and understanding when the legal mandates come into force.

To that end we are determined that earlier, perhaps informal and voluntary, work is needed now by both supervisors and credit institutions. To that end in explaining our legal mandates we are also communicating supervisory expectations in the following areas:

- Banks should not wait for formal and detailed supervisory guidance, let alone changes in RWA, to start their work on drawing up green strategies and considering ESG factors in their risk management.
- As a starting point urgent action is needed to start classifying balance sheets in line with the EU taxonomy, and identify simple metrics based on the EU taxonomy, such as a green asset ratio. In the first instance we understand some figures may well be estimates and we also understand that alignment with the taxonomy may be considered in ranges rather than precise pin point figures. For example, one could imagine we may invite volunteers to work with us on identifying their green asset ratio in an estimated range (25-35 % with a target of 60-70%) and use that as a starting point for identifying a strategy to move that green asset ratio in a direction that matches a banks green appetite.
- Banks will be invited to start testing their approach to scenario analysis and the EBA may invite a group of volunteers to run a pilot project with us as early as 2020 so that we both gather and share knowledge amongst supervisors and practitioners.

We need to do and learn at the same time. We also need to help market participants and the broader public understand the outcomes of our ESG work in context, particularly the disclosure of key metrics, such as estimated ranges of green asset ratios. In that context we should be alive to the high risk of green washing, which is all the more reason we want informed debate about key metrics and disclosure and the development of mechanisms to provide some assurance that green metrics really are green. That is why we should press on with interim measures and if necessary take calculated risks to start identifying metrics and using them.

Finally let me come to the arguments about the need for a Green Supporting Factor, i.e. a reduction in risk weights for assets that may be considered green to incentivise banks to invest in them. We believe the EBA has an appropriate mandate with appropriate timelines. Article 501c of CRR 2 asks the EBA to assess if a dedicated prudential treatment of exposures related to assets or activities associated substantially with environmental and/or social objectives would be justified. The report is due in June 2025. We believe this timeline is appropriate for two reasons. The first is that any adjustments to RWA should be solely evidence based for prudential purposes. If other incentives are required that is a political decision. Thus the time up to 2025 will give the EBA the appropriate time to collect relevant data and possibly benefit from the use of the new EU taxonomy on sustainable activities. The second reason is that we do not consider that adjustments to RWA are the key to unlocking bank lending to sustainable activities. In fact, all the feedback we get is that pressure from investors, politicians and the public at large is the key driver for banks speeding up their efforts to develop effective green strategies and tell the world about them. We hear that a combination of reputational risk and heightened transition risk, in the form of rapid adjustments in public policy, with an immediate impact on asset valuations, are the key impetus behinds banks efforts. Of course, this pressure operates alongside the high value that many individual employees inside banks themselves place on the importance of doing more to kick start lending to the green economy.

PROFESSIONALS' SESSION: ESG DATA

8. ESG data

Marina Brogi, Sapienza University of Rome

I have the privilege of addressing this important topic – ESG data - from complementary perspectives. In addition to being an academic, I have experience as board member in listed large cap companies, the ones which as of 2018 must provide the market with non-financial disclosures which are at the base of ESG data. There are various points worthy of further attention from the point of view of both academia and policy markets, however, I will focus on just three, one for each of the pillars of the EC action plan.

However, before I start I would like to point out that first of all there seems to be a terminology issue. The boundaries between sustainability, climate change, ESG factors, CSR are still blurred and the impression is that different people attribute different meanings to the same words. Decision makers, policy makers, managers and stakeholders need to understand the implications and effects that the new economic context has on financial measures, operating strategies and investment decisions. This is not surprising considering this how momentous the change has been and the multifaceted implications for the economy as a whole.

As concerns fostering transparency and long-termism, and embedding sustainability in the purpose and culture of companies, the non-financial disclosures directive in my view correctly left companies to identify in which areas they would focus their improvements. Greater flexibility in prioritising was presumably aimed at and will lead to a more tailored and effective approach by companies. This comes at the price of lower comparability. The decision not to mandate a standardised template was the right one to enable companies to work on the most relevant sustainable development factors in their business/industry (Lagasio and Cucari, 2019).

Mainstreaming sustainability into risk management is a fundamental requirement for banks and the focus so far has been on the impact on the value of assets. In this respect, there have been proposals for regulatory incentives within pillar I capital requirements (i.e. the introduction of brown penalising factor or green supporting factor) of a bank, especially in order to include ESG in credit ratings into the regulatory capital framework. Others suggest the inclusion in pillar II which would enable supervisors to adopt a more tailored approach and would also permit a more rapid implementation as the revision of pillar II is programmed for 2020. Disclosure in pillar III is realistically not enough to foster the necessary transition. For banks, an important part of the story is climate risk. Regulatory intervention must be wary of unintended consequences. If the objective is the transformation of industry, new investments to reduce the carbon footprint will require the support of the banking system in the brown to green transition. There are also challenges specifically related to data collection from small companies, which are not equipped to collect and provide the necessary data. This means that models and stress tests will be based on the application of data based on large exposures. Moreover lack of data will be more severe in countries where there are more SMEs.

As concerns the last pillar, a fundamental issue is about reorienting capital flows towards sustainable investments. This applies to banks and institutional investors. On this point, we must be aware that ESG ratings based on the same inputs vary considerably. Rating agencies worldwide have adopted several sustainability reporting methods to measure the ESG performance of firms. There are those deducting the "concerns" from the "strengths" to reach a single score, those using interval scales, those using questionnaires, and those referring to global benchmarks such as the Morgan Stanley Capital International Index (MSCI Index) or the Dow Jones Sustainability Index (DJSI) (Buallay, 2019). However, there is evidence that ESG metrics are heterogeneous and dispersed. In fact, given that ESG ratings adopt different criteria and methodologies, comparability of information is a major barrier (Amel-Zadeh and Serafeim, 2018) and there is a wide dispersion of disclosure profiles (CSR Hub, 2019). Interestingly, the disagreement between ESG ratings is far larger than between credit ratings (Buallay, 2019), and measurement divergence explains over 50 percent of the overall divergence, while scope and weight divergence together are slightly less important. Besides that, there is evidence of a "rater effect", meaning that the rating agencies' assessment in individual categories seems to be influenced by their view of the analysed company as a whole (Berg et al., 2019), Despite the problems of dispersion and heterogeneity, ESG metrics in banks remain of fundamental importance. In banks, the environmental dimension of the ESG score is very significant and positively associated with banks' performance, as measured by ROA. Specifically, the association between the environmental dimension of the ESG score and the ROA is more robust in the medium-long term than in the short term. This provides implications for policy makers as well as for policy-takers. Companies should consider their ESG activities in order to foster their profitability. In financial companies specifically, the environmental dimension is associated with a higher level of profitability when compared with other companies (Brogi and Lagasio, 2019). We must beware however that the substantial rise in the number and assets under management of funds adopting ESG strategies may have created excess demand for stocks of more ESG oriented companies and that in itself may have led to better returns achieved on investment in those companies.

Institutional investors are also an important catalyst for growth because, once they have given their backing to the strategies and visions of the management of a company, then the market can support enterprises with the necessary financial resources that will transform into reality even the most complex projects. Finally, it is important to remember that reorienting the financial system will not be enough. Governments and the European authorities must also ensure that there are measures in place to favour a transition that is sustainable from a social standpoint, which actually means adequate safeguards for people who might have difficulties in reconverting in the new context and may even definitively lose their jobs.

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9. European DataWarehouse - Data Availability & Energy Efficient Mortgages Initiative

Eirini Kanoni, European DataWarehouse

The data is collected using the ECB ABS loan-level data templates. As of the date of this publication, more than 30,000 loan-level data files have been submitted to ED, with around 75mn loans or loan parts secured by 8mn properties, totalling more than 2 bn loan records. ED currently hosts data from 1463 ABS deals from 15 jurisdictions and 7 asset types. In terms of asset classes, the breakdown is representative of the underlying European ABS market, with the majority of transactions being RMBS, followed by Auto ABS, SME ABS, Consumer Finance ABS and Leasing ABS.

The reporting of information to ED is done using the ECB ABS loan-level data templates. With the introduction of the new Securitisation Regulation (EU) 2017/2402 and the finalisation of the secondary legislation these templates will be gradually phased out and will be replaced by the new ESMA templates, which include two data fields on energy efficiency.

Green Storm Securitisation

Among its set of roughly 1500 transactions, ED hosts the data for the first Green RMBS Securitisation, Green Storm 2016, issued by Obvion. Obvion is one of the primary mortgage providers in the Netherlands and is a frequent and long-term issuer of Residential Mortgage Backed Securities (RMBS) bonds in the Netherlands with 42 RMBS transactions reported to ED as of the date of this publication. Green Storm 2016 is the first example of a Green Collateral Securitisation in Europe, where the assets backing the bond are green residential mortgages, e.g. linked to energy-efficient homes, and the proceeds of the bond issuance finance those green residential mortgages.

The selection of underlying mortgages for Green Storm 2016 was based on certain eligibility criteria. In accordance with the Dutch law Directive 2010/31/EU, all properties in the Netherlands have been assigned energy performance certificate (EPC) ratings. The EPC ratings range from 'A', which qualifies for the highest energy efficiency performance, to 'G', which represents properties with the lowest energy efficiency. The selection of underlying mortgages included in the pool have either a provisional or definitive Energy Performance Certificate Class A, or a Definitive Energy Performance Certificate Class B or C and realised a calculated improvement of an energy performance certificate by at least two notches.

The 'true' greenness of the transaction is also evident in the Notes. The Green Storm 2016 Notes meet the ICMA Green Bond Principles requirements and are also in compliance with the Climate Bond Standards. Additionally, a CO2 impact analysis conducted by DWA, a service provider in the sustainable built environment and industry, has shown that the selected properties have a lower CO2 emission compared to a similar group of properties with average energy efficiency.

Following on from three highly successful and popular Green RMBS's in 2016, 2017 and 2018, Obvion issued another in 2019. In addition to being "Green", the 2019 deal also meets the criteria for the Simple, Transparent and Standardised (STS) securitisation under the new Securitisation Regulation (EU) 2017/2402.

The concept of green bonds has been present in the market for some time and has taken off in recent years with BerlinHyp issuing the first European covered bond in 2015, and Obvion issuing the first ever green securitisation in 2016 as well as another 3 transactions thereafter. There seems to be an increased demand for financing sustainable projects. Currently, there are several market standards and other European initiatives for identifying green bonds and loans summarised in Table 1 below.

Table 1. Table summarising the existing criteria identifying green bonds and loans

ICMA Green Bond Principles[17]	Guidelines that recommend transparency and disclosure and promote integrity in the development of green bonds
Climate Bond Standards and Certification Scheme[18]	Climate Bonds Standard & Certification Scheme is a labelling scheme for bonds. It defines criteria for verifying the green credentials of a bond
Rating Agencies	Green evaluation ratings developed by Rating Agencies: • Moody's Green Bond Assessment • Green Evaluation by S&P • Fitch's ESG scoring system
EU Technical Expert Group (TEG) on Sustainable Finance [19]	In June 2019, the TEG published a report on EU Taxonomy which is an EU classification system to determine whether an economic activity is environmentally sustainable
AFME[20]	In September 2019, AFME published a position paper outlining their thoughts on the development of a green securitisation framework. One key point is that AFME is not supportive of "shades of green" but rather a Green collateral approach
Energy Efficient Mortgages Initiative (EEMI)[21]	In December 2018, the EEMI published a common definition of an Energy Efficient Mortgage (EEM)

Even though there are several standards for identifying green bonds, the lack of a common and consistent definition of a green securitisation remains a challenge for the development of the green securitisation market.

In the next section more information is provided on the Energy Efficient Mortgages initiative.

Energy Efficient Mortgages Initiative – EeMAP & EeDaPP

ED participates at the Energy Efficient Mortgages Initiative (EEMI). EEMI is a market-led initiative, funded via the European Commission's Horizon 2020 Programme, which aims to deliver a standardised European framework and data collection architecture for energy efficient mortgages.

Under the umbrella of the EEMI there are two projects: the energy efficient mortgage action plan (EeMAP) and the energy efficient data protocol and portal (EeDaPP).

Energy Efficient Mortgages Action Plan (EeMAP)

The aim of the EeMAP was to create a framework for "energy efficient mortgages". One of the main objectives of the EeMAP was the standardised definition of the "Energy Efficient Mortgage (EEM)"[22]. The EEMs are intended to finance the purchase/construction and/or renovation of both residential (single family & multi-family) and commercial buildings where there is evidence of:

1) energy performance which meets or exceeds relevant market best practice standards in line with current EU legislative requirements and/or

2) an improvement in energy performance of at least 30%.

This evidence should be provided by way of a recent EPC rating or score, complemented by an estimation of the value of the property according to the standards required under existing EU legislation. It should specifically detail the existing energy efficiency measures in line with the EEM Valuation & Energy Efficiency Checklist[23].

[17] ICMA Green Bond Principles (GBP) https://www.icmagroup.org/green-social-and-sustainability-bonds/green-bond-principles-gbp/
[18] Green Bond Standard and Certification Scheme https://www.climatebonds.net/standard
[19] TEG report on EU taxonomy https://ec.europa.eu/info/files/190618-sustainable-finance-teg-report-taxonomy_en
[20] AFME position paper on green securitisation https://www.afme.eu/Portals/0/globalassets/downloads/briefing-notes/2017/110919%20AFME%20Green%20Securitisation%20Position%20Paper.pdf?ver=2019-09-11-144252-467
[21] Energy Efficient Mortgages Initiative https://energyefficientmortgages.eu/
[22] https://eemap.energyefficientmortgages.eu/eem-definition/
[23] More information on the EEMI Valuation Checklist Background Explanation and Guidance can be found at the following link: https://eemap.energyefficientmortgages.eu/wp-content/uploads/2018/11/Valuation-and-Energy-Efficiency-Checklist.pdf

Energy Efficient Data Protocol and Portal (EeDaPP)

The EeDaPP project aims to design and deliver a market-led protocol for the collection of energy efficient mortgage data through a standardised template which will be made accessible via the design of a common data portal.

EeDaPP Consortium

The EeDaPP Consortium[24] is comprised of a group of two universities as well as industry experts in data and technology specialising in structured finance and covered bond markets, bringing together all the necessary competencies to achieve the EeDaPP objectives. The project is led by EMF-ECBC.

EeDaPP Project Update

The EeDaPP project is divided into 5 main operational work packages (WP), each with a clear set of deliverables. Table 3 shows the five deliverables and their status.

Table 2. List of EeDaPP deliverables and their status

Deliverable	**Status**
Identification and summary of best market practices within data systems	Completed
Definition of energy efficiency reporting criteria – "EeDaPP Master Template"	Completed
Design of a standardised data protocol & common centralised portal	Finalised
Data and correlation analysis	WIP
Roadmap for system integration	WIP

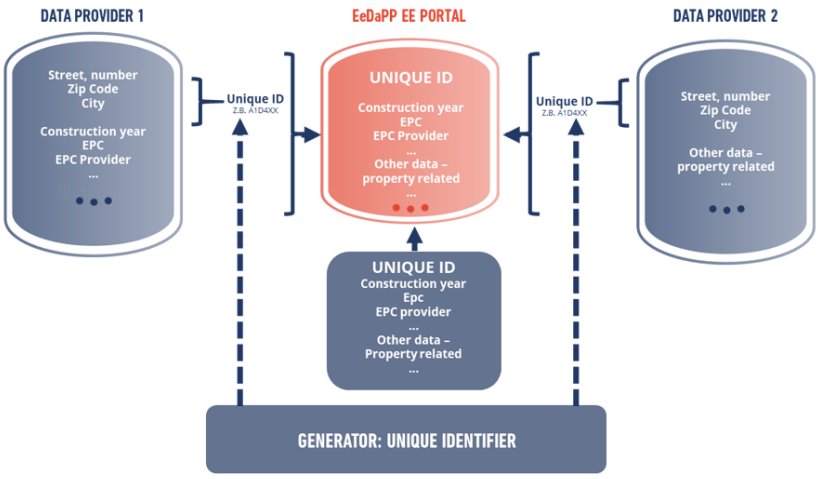
The first deliverable was the identification of the best market practices within existing data systems. Among others, the EeDaPP consortium looked at the current reporting practices and reporting templates available (such as ECB ABS, NHTT, ESMA), and the best practises related to data storage and technology which would allow for flexibility and scalability in a fast-changing environment. Then the EeDaPP consortium moved on to the definition of energy efficient reporting criteria. After carefully reviewing the existing reporting templates and considering the key indicators identified by the EeMAP project on energy efficient mortgages, the EeDaPP partners defined common minimum pan-European green reporting criteria and the development of the "EeDaPP Master template" (see Annex 1)

After consulting the market and more specifically the Pilot Scheme[25] banks on this template, the EeDaPP consortium moved on to the design of a standardised data protocol & common centralised portal. The following graph shows the high-level IT proposal for an energy efficient (EE) portal. In parallel, the technical and financial datasets gathered under the EeDaPP project are intended to link energy efficient features of a building, its value, and the loan performance, thereby creating a better understanding of the impact of energy efficiency on borrowers' probability of default (PD) and on loss given default (LGD). The aim is to identify and demonstrate that energy efficient mortgage assets can be identified for preferential capital treatment based on large-scale standardised data and correlation analysis. The results of this analysis are the main deliverable of the WP on data and correlation analysis. Finally, the last WP will design a roadmap for how the protocol and a centralised data portal concept can be deployed in the market and integrated into already existing data repositories.

[24] https://eedapp.energyefficientmortgages.eu/02-the-consortium/

[25] More information about the Energy efficient Mortgages Pilot Scheme can be found at the following link: https://eemap.energyefficientmortgages.eu/pioneers-2/

Figure 5. EeDaPP Energy Efficiency (EE) portal



Proposed Unique Identifier for Buildings

During EeDaPP's work on the standardised data protocol & common centralised portal, it became evident that it is essential to develop a unique identifier in order to link all the information from various data sources (internal and external). The proposed unique identifier will contain a key set of characteristics that will enable users to query and extract information regarding certain buildings and the green credentials including the following details:

1. Commercial or residential real estate type (C or R);
2. **Property type** (Field RREC9 – Residential: RHOS, RFLT, RBGL, RTHS, MFHS and OTHR; Commercial: PCMM and BIZZ);
3. **Year of construction** (Field CREC25 – 1999, XXXX – unknown);
4. **Property/collateral identifier** (Field RREC3 – FC8FD726B204B331C0B90CA73C519D59);
5. Location based on the Eurostat NUTS coding (Field RREC6 – ITC45, XXXXX - unknown);
6. **Other relevant information that can be updated/changed over time** (size of the property in square meters or other country specific elements);
7. Incremental number for cases where all previous parameters are the same for two properties (3 numeric, 001, etc.).

Following careful consideration and feedback from the Pilot Scheme banks it became evident that this unique identifier concept would only work if it is generated on a national or European level from an organisation such as the Land Registry and is used widely by the financial institutions, the Energy Performance Certificate registries and other utility companies.

10. Incorporating Sustainability into the EU Banking Regulation Framework: Some Statistical Issues

Steven J. Keuning, former European Central Bank

In 2018, the EU launched an Action Plan on Financing Sustainable Growth, which should support reaching its 2030 climate and energy targets through a redirection of financial investments towards climate change mitigation and adaptation.

Climate change risks are a source of financial risks, which may materialise over a longer time horizon than is currently commonly used, except, perhaps, by some institutional investors. As a consequence, these discounted, huge risks may not yet be fully priced in when today's investment decisions are taken and some nudging of these decisions may be required, e.g. through the EU banking regulation framework.

However, if sustainability is to be integrated in the EU banking regulation framework, this concept must first be operationalised, in a way that is conducive to reaching the related EU 2030 targets. For that purpose, the European Commission (2018) has submitted a Proposal for a Regulation on the establishment of a framework to facilitate sustainable investment, in short the EU sustainable finance taxonomy. This taxonomy "establishes the criteria for determining whether an economic activity is environmentally sustainable for the purposes of establishing the degree of environmental sustainability of an investment (my emphasis added)." This definition shows that it is a binary classification: an economic activity is either environmentally sustainable or it isn't sustainable.

For the purpose of the taxonomy, economic activities are grouped by the economy- and EU-wide, legally established NACE industrial classification system (615 categories; Eurostat, 2016), supplemented by some categories to enable a full evaluation of compliance with environmental objectives. For that matter, Eurostat has also published an indicative compendium of environmental activities and environmental products, with the aim to establish the Environmental Goods and Services Sector by EU Member State (Eurostat, 2018). It is intended to link this compendium to the taxonomy.

The EU Sustainable Finance Taxonomy: Statistical Issues

In addition to the screening criteria, the taxonomy requires comprehensive and timely greenhouse gas emission data per kind-of-activity unit (industrial plant), at least for those units belonging to a listed corporation or to another company wishing to acquire funds for an investment to be qualified as environmentally sustainable. At present, lack of standardisation, comprehensiveness and timeliness in reporting still presents major challenges to investors.

An additional complication is that investment according to the Draft Taxonomy Regulation refers to the acquisition of financial assets (equity, bonds, credits) issued by corporations that may undertake a range of economic activities (classified in different NACE headings), some of which may qualify as environmentally sustainable and others may not. In principle, though, for bonds and credits there could be specific issuances earmarked for a sustainable activity.

All this appears to call for a regular, comprehensive, timely and mandatory basic data collection, ideally building on already existing basic data collections and using the same units and classifications (e.g. the Classification of Products by Activity (CPA), which is a more detailed version of the NACE; Eurostat, 2013) as are used for economic statistics (international trade statistics, production statistics, energy statistics, etc.). In order to serve its purpose, data confidentiality should be lifted in this case, and the consistency with e.g. energy use data provided by the same unit should be checked. It appears most efficient if financial institutions only disclose the corporate units in their investment and credit portfolios and these data are then linked, at micro level, to data from other sources on emissions and on prospective emission reductions through sustainable investments. This requires not only distinguishing taxonomy-defined 'green investment' as a separate category in the investment statistics, but also an EU-wide common Business Register and Legal Entity Identifier.

There doesn't yet exist a comprehensive European Business Register, even though there is an EU Regulation 177/2008 establishing a common framework for national business registers. These national registers should contain both the economic activity of the unit, the institutional sector code and the legal form of the corporation to which the unit belongs (which may be the production unit itself in the case of an SME) and information on control and ownership relations: parent/subsidiary legal unit, minority shareholder information, country of global decision centre, and so on. Yet, not all characteristics are recorded for each unit, and quality, completeness and comparability are not checked at European level. It would of course be ideal if economic activity data are linked to Eurostat data on energy use and related emissions at micro level.

In addition to the micro data linkage, it appears important to obtain a better insight into the total emissions caused by each economic activity, i.e. including the emissions caused by producing all inputs used (e.g. the emissions of some food products industries may be moderate, but this may not apply to the agricultural production that delivers their inputs). Since 2014, annual European Environmental Economic Accounts (EEEAs) on air emissions and material flows have become available per EU-country, broken down by 2-digit NACE code (64 industries) plus household air emissions, and in 2017 these accounts were extended with physical energy flows (Eurostat, 2019). These accounts are consistent with the national economic accounts, thus including, for instance, both global emissions by resident airlines and shipping companies as well as all emissions caused by household and government consumption (e.g. private car transport). Besides, the emission (reductions) from housing are incorporated and those from trading activities are correctly recorded. In this way, not only 'green', but also 'brown' industries can be identified and tracked over time.

Unfortunately, the original vision (Eurostat, 2001 and 2003) to set them up as a National Accounting Matrix including Environmental Accounts (NAMEA), thus including the input-output tables, or supply and use tables, has not yet been implemented. If this omission is rectified, these NAMEAs can be used to compute total value chain (so-called Scope 1, 2 and 3) emissions per unit of final demand for the output of each economic activity that is, including the emissions caused by producing all inputs used. They would also allow for a more in-depth analysis of the interactions between the economy and the environment at meso-level; cf. computing air emission footprints, as well as the environmental goods and services sector's share of GDP and employment. Finally, they would enable identifying who ultimately pays the costs for protecting the environment and which labour and household categories may benefit or suffer from more stringent environmental policies.

The EEEAs already have a legal basis (EU Regulations 691/2011 and 538/2014) and were very recently subject to an audit by the European Court of Auditors (2019). These audit has recommended improving the usefulness of these accounts, in particular by improving:

- The strategic framework, including an implementation action plan;
- The relevance of the modules (e.g. by integrating the different modules); and
- The timeliness of the data (the current mandatory time lag is two years).

Conclusions

The usage of both the taxonomy and the EEEAs/NAMEAs (for air emissions) would be much served by a regular, comprehensive, timely and mandatory basic data collection, ideally using the same units and classifications as are used for economic statistics.

If the EEEAs that are already annually compiled by Member States are expanded into NAMEAs, total Scope 1,2 and 3 emissions per unit of final demand for the output of each economic activity can then be computed, so including the emissions caused by producing all intermediate inputs that are used in producing this output. These NAMEAs should be compiled under the guidance of Eurostat and their establishment may require some additional funding for the EU National Statistical Institutes.

This improved, public data infrastructure would not obviate the need for private data providers, which could instead focus on data analysis and developing rating systems and low-carbon benchmarks. The ultimate aim would be that the political debate can focus on policy measures and is no longer hindered by serious doubts about the underlying data. In this context, a parallel may be drawn with the inflation data, which are well established and not causing major public doubts and debates. In order to achieve this aim, which may well be qualified as 'low hanging fruit' for a new European momentum towards climate change mitigation, it appears advisable to bring together all key players in this field at short notice.

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PANEL 2: SCENARIO ANALYSIS AND STRESS TESTING

11. A science-based climate-stress testing framework to integrate forward-looking climate transition risk into existing supervisory tools

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We have developed a scientific framework to allow financial supervisors to conduct a climate stress-test to account both for direct impact of climate policy shocks and for amplification effects due to financial interconnectedness. Our approach builds on a stream of peer-reviewed publications by an international consortium of academic institutions. The framework has been implemented at several policy institutions as a collaborative effort between researchers in financial risk, researchers in climate-economics and financial supervisors. We are currently working with the Network for Greening the Financial System to collect comments from stakeholders in order to foster the mainstreaming of climate-related financial risks among financial institutions.

Policy questions

- Q1. How to translate forward-looking knowledge from climate science and climate economics into quantitative stress-tests?
- Q2. How to carry out climate stress-tests that account both for the direct impact of a disorderly climate transition on financial institutions portfolios and for the amplification effects due to financial interconnectedness?

Challenges

1. Climate-related financial risk is endogenous. Its endogeneity implies multiple economic scenarios with unknown probability, i.e. deep uncertainty (Battiston ea. 2017).
2. Historical market information not sufficient to assess climate transition risk. Backward-looking materiality of risk is misleading. Alone, standard finance approaches to risk and valuation are inadequate.
3. The network of financial contracts, both among institutions and issuers, can both absorb or amplify financial shocks depending on the interplay of several key parameters.

Proposed approach

Financial supervisors can benefit from the following workflow (Battiston 2019; Battiston and Monasterolo 2019):

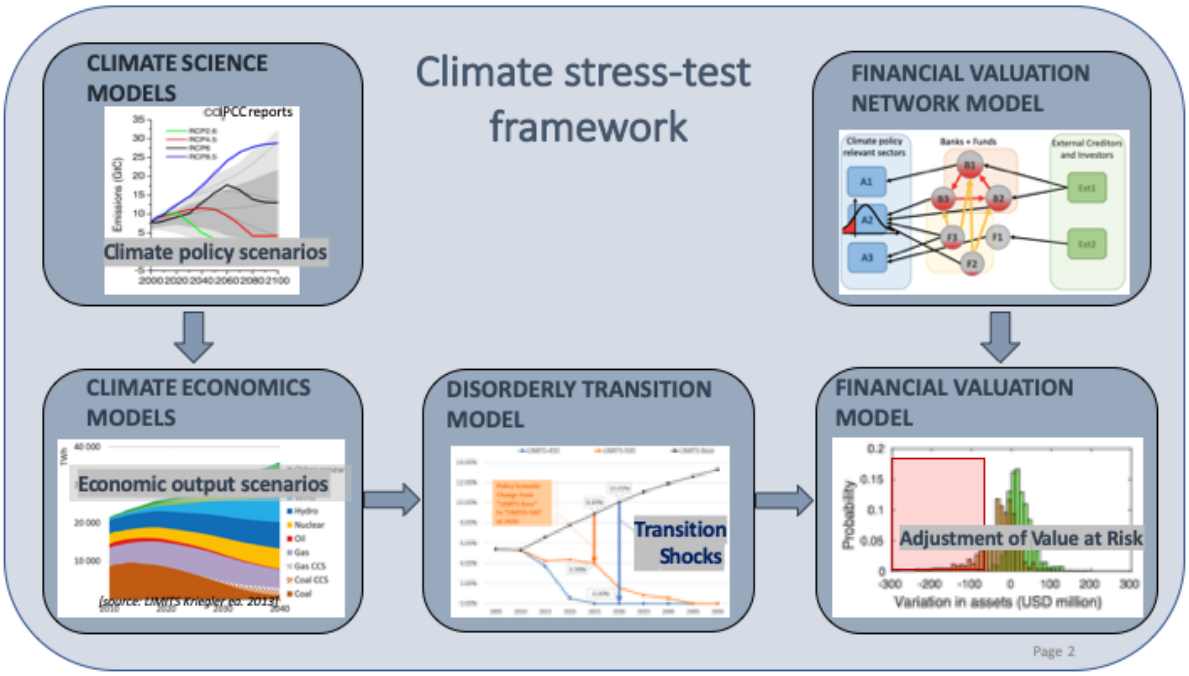
1. Acknowledge within the organization that assessing climate risk requires to account for forward-looking scientific knowledge about climate and climate economics. Hence, credibility of the process of identification of climate policy shock scenarios has to be carried out with the collaboration and under the scrutiny of the scientific community.
2. The CLIMAFIN framework allows to reconcile the deep uncertainty of climate transition risk into the stress-test exercises already existing at financial supervisors:
    a. Based on climate science, we can identify an event tree with few transition scenarios and mid-term horizon of 2025-2030. Moreover, the current social dynamics of opposing vested interests increases the likelihood of a disorderly low-carbon transition.
    b. Classic stress-tests consider scenarios in which each shock consists in changes in macro-economic/sectorial variables across two different equilibrium states of the economy.
    c. CLIMAFIN considers the transition of the economy from a business-as-usual (BAU) trajectory to a given policy trajectory (P) compatible with a 2°C target:
        i. Shocks are obtained from differences sectors' output between the two trajectories (BAU and P) for the same model (e.g. Integrated Assessment Model, IAM, or others).
        ii. The disorderly transition is thus intended as a temporary out-of-equilibrium shift of the economy between two separate equilibrium trajectories. This formulation makes the exercise familiar.

d. Financial contracts are revalued based on our climate pricing model that accounts for the adjustment of default probability of security issuers (see also Monasterolo and Battiston in this JRC Conference report).
e. The effects of the interconnectedness of financial contracts, both among institutions and issuers, are accounted by a network valuation model which provides a precise understanding of the shock transmission channel as function of leverage, recovery rate and asset price volatility (Battiston ea. 2012; 2016, Barucca ea. 2016).
f. We derive quantitative metrics such as the Conditional Climate Value-at-Risk (Battiston ea. 2017): from the sectorial shock, we compute shocks on cash flows and thus adjustments in default probability of firms and sovereign and adjustment in risk and values of equity and bonds. This is a quantitative risk metric, and yet accounting for the deep uncertainty of climate transition risk.

Highlights of the CLIMAFIN framework applied to Climate-stress testing.

1. The climate stress-test framework allows financial supervisors to think of climate risk in terms of purely financial risk: this is relevant for institutions with no public policy mandate.
2. A current major concern for EU financial supervisors and EC DG-FISMA: firms' mismanagement of financial risk would affect the valuation of large portions of asset in the equity, bonds, and loans markets.
3. Indirect amplification effects due to the networks of financial contracts can be as large as the direct effects and need to be accounted for by appropriate network valuation models
4. The framework incorporates scientific knowledge about climate and translates climate transition risk into adjustments of financial risk and financial valuation of assets, including the network effects.
5. Relevant climate policy shocks scenario should to be identified by financial supervisors together with the scientific community, in order ensure the credibility of the exercises.
6. The framework allows to achieve financial stability objectives: if financial firms integrate forward-looking climate-related financial risks, an endogenous (and possibly smooth transition) is more likely to occur.
7. Components of the framework have been already applied in the financial stability review of ECB (ECB 2019) and EIOPA (EIOPA 2018), in collaborative work with National Bank of Austria (Battiston and Monasterolo 2019), with Banco de Mexico (Roncoroni ea. 2019) and with EIOPA (Battiston ea. 2019).

Figure 6. Diagram illustrating the information flow in the climate stress-test framework



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12. Sharing Bank experience on climate risk related stress testing

Antoine Bezat, BNP Paribas

Current approach for stress testing financial risks

In the aftermath of 2008 financial crisis, stress testing has proven very useful for assessing the resilience of the banking sector and since then plays an important role in a well-informed regulatory dialog. For European Banks, the role of stress testing has gained further importance with the intensification of regulatory requirements and in particular the establishment of biannual EBA stress tests.

Initially pushed by regulatory pressure and increasingly leveraging it for internal uses, banks have implemented strong and robust stress testing platforms leveraging on large amount of available data, statistical models and state of the art IT infrastructures. Stress Testing has become a well-established and inserted risk management and capital planning practice for banks.
While this process delivers high value in its current context of application and has become a highly industrialised business-as-usual risk practice for the largest banks, it is important to clearly have in mind its intended purpose and context of usage.

Stress testing has been developed primarily for evaluating the capital needs of the banks in a context of global economic downturn. They are well-adapted for this purpose but much less for evaluating the impact of asymmetric specific shocks and a fortiori the consequences of world economic model change.

Stress tests rely mostly on statistical relationships between risk drivers and macroeconomic factors. Hence, they are able to inform on the consequences of events that show similarities with events from the past but show higher uncertainty when dealing with scenarios that would be out of the range of past observations.

Stress Testing is inserted as a short to medium-term steering tool, rather than an anticipation tool for longer-term structural transformations. The time horizon targeted for these exercises is typically between 3 and 5 years and relies on a static balance sheet assumption for European regulatory stress tests.

Specific challenges related to climate risks

Banks are confronted with two main challenges related to climate change and more broadly ESG topics:

- Ensure they play a positive role in the transformation of the economy by supporting their clients in the transition to a more sustainable business model, and steer their own lending portfolios towards the goals of the Paris agreement.
- Managing the risks on the bank balance-sheet incorporating physical risks and transition risk dimension.

While the first topic can clearly be supported by scenario analysis, stress testing in its traditional acceptance relates to the risks on the bank balance-sheet, hence aims at evaluating potential financial impacts and is not directly a tool to promote the implementation of sustainable business models. When implementing stress tests it is hence important to clearly have in mind the intended purpose of the exercise.

Moreover, the existing stress testing infrastructures implemented by banks or supervisors cannot be directly leveraged for running relevant credit risk impacts related to climate risk scenarios.

The time horizon considered in that context is much longer than for usual stress tests with consequences on the balance-sheet which will significantly evolve over the period. It will in fact have to evolve to comply with the banks' commitments in this field.

The consequences of economic transition will only partially be reflected in macroeconomic variables. While macroeconomic scenarios associated with climate risks are as such difficult to design they only convey a part of the climate-related risks to the banks' portfolio:

- some firms will need to undertake huge investments with meaningful associated risks,
- many firms will need to adapt their business models

- potential carbon tax will unequally impact different firms depending on idiosyncratic characteristics.

The impact of these risk drivers on the default probabilities and LGDs cannot be evaluated using existing stress testing infrastructures due to a lack of data and, more fundamentally, because the models have been designed to reflect dependencies to macroeconomic variables and not to more micro-economic considerations.

In addition, for measuring the long-term impacts of climate change on the bank's cost-of-risk, revenues and ultimately solvency ratio, the impact of physical risks cannot be neglected though it requires very precise physical data.

Conclusion and next steps

For developing adequate tools, be it for steering the portfolio or managing financial risks, one needs to:

- Properly defined the intended purpose,
- Define an approach coherent with this purpose and generate the correct incentives,
- Start collecting data.

The dialog between regulators, academics and the industry is key in this process. It is important that good practices emerge and data gets standardized in order to allow for a proper communication, while avoiding misconception, wrong incentives and green washing.

Progresses are being made in the process of steering the portfolio, where BNPP takes part in several joint initiatives such as PACTA with 2 Degrees Investing.

As far as climate-related stress test is concerned, we are currently at a stage of conception and preparation rather than execution. We believe that proper climate-related drivers in stress testing will be required for managing the risks in the future. Relevant stress tests require to properly incorporate climate-specific drivers at granular level and to adapt the stress testing modelling approach. The intended goal is to deal with the impact of specific drivers at facility or counterparty level rather than econometric analysis at some statistically relevant granularity level. We believe that a slight adaptation of existing frameworks would produce results that are not relevant and mostly limit the topic to a new longer term macroeconomic scenario.

Within BNPP, we have launched a Research Chair on Stress Testing with Ecole Polytechnique laboratory of applied mathematics. Designing the proper approach to deal with climate-related risks is one of the objectives of this chair. We are also willing to exchange with the industry and regulators in order to define together the best suited roadmap to answer these important challenges.

PANEL 3: STRATEGY AND RISK MANAGEMENT

13. Pricing forward-looking climate risks in financial contracts

Irene Monasterolo, Vienna University of Economics and Business
Stefano Battiston, University of Zurich

A science-based approach to embed the uncertainty of climate transition risk in portfolio risk management strategies

There is growing awareness of the fact that the misalignment of countries' economies to the climate and energy targets (e.g. the Paris Agreement) and a disorderly low-carbon transition (i.e. a sudden introduction of climate policies that is not fully anticipated by investors) could bring about new risks for financial stability, at the individual institution and systemic level (Battiston et al. 2017, NGSF 2019). However, most investors are not pricing climate risks (and opportunities) in their portfolios' risk management strategies (Monasterolo and de Angelis 2019, Morana and Sbrana 2019). A main barrier is represented by the lack of quantitative approaches to embed climate risk characteristics into financial risk pricing. We fill the gap by developing a transparent, peer-reviewed quantitative approach to price forward-looking climate transition risks in the value of financial contracts and securities under uncertainty, and we apply it to the sovereign bonds' portfolios of central banks and regulators.[26]

Research-policy questions to guide climate financial risk assessment

- Q1. Why is climate risk a new source of risk for financial valuation?
- Q2. What is the information set that a risk averse investor should use to price climate transition risk in her risk management strategy?
- Q3. What are the channels through which forward-looking climate transition risk can impact the probability of default of individual financial contracts and securities?
- Q4. What is the price of climate risk of sovereign bonds (i.e. the Climate Spread)?

Pricing forward-looking climate risks in the value of sovereign bonds

Climate risk: a new type of risk for investors

Climate change could affect financial stability via two main channels (Carney 2015), (i) climate physical risk, i.e. damages to physical assets, natural capital, and human lives resulting into losses of productive capacity, output and GDP, as a result of climate induced weather events, and (ii) climate transition risk, i.e. a policy, technology or regulatory shock leading to a sudden revaluation of assets. These risks are characterized by:

- *Deep uncertainty* of climate impacts. This is due to the nature of the earth system and it leads to tail events (Weitzman 2009), tipping points and domino effects (Steffen et al. 2018);
- *Non-linearity* of impacts. The probability of forward-looking climate shocks can't be inferred from historical data being non-linear in nature and not normally distributed, Ackerman (2017);
- *Forward-looking* nature of risk**.** The impacts of climate change are on the time scale of two decades or longer, while the time horizon of financial markets is much shorter (few months);
- *Endogeneity* of climate risk. The perception of climate transition risk impact on the risk itself. Indeed, achieving the global climate targets requires the scaling up of climate investments, which in turn are affected by the uncertainty on the introduction of climate policies.

[26] This contribution builds on Battiston, S. and Monasterolo, I. (2019). "A climate risk assessment of sovereign bond portfolios", in collaboration with the Austrian National Bank (OeNB), ssrn: 3376218, and on Battiston, S., A. Mandel, and I. Monasterolo, (2019). "CLIMAFIN Handbook: Pricing Forward-Looking Climate Risks Under Uncertainty", ssrn 3476586.

Traditional financial pricing models (e.g. Merton 1974; Black and Cox 1976) are not adequate to embed the characteristics of climate risks. In particular, their financial risk assessment is based on past firms' performance (e.g. volatility measures based on historical data), and it is constrained by conditions on normal distributions, complete markets, and lack of arbitrage (Battiston and Monasterolo 2019). Thus, pricing climate risks requires to move from the backward-looking nature of traditional financial risk assessment and investors' benchmarks to a forward-looking approach.

Climate financial information set for a risk averse investor

We have identified the information set that a risk averse investor should consider in order to account for climate transition risk:

- Climate scenarios based on CO2 emissions concentration pathways (provided e.g. by the IPCC reports);
- Energy and electricity mix trajectories (fossil fuels, renewables) of the economy consistent with the climate scenarios, provided by climate economic models (e.g. Integrated Assessment Models (IAMs));
- Forward-looking Climate Policy Shock Scenarios (e.g. increasing levels of carbon pricing) that induce a jump of the economy from an equilibrium trajectory (i.e the Business as Usual characterized by no climate policies), to another equilibrium characterized by the introduction of the climate policy.

A science-based approach to climate financial risk pricing: the case of sovereign bonds

Our approach consists of climate scenario adjusted financial pricing models (in this application: sovereign bonds) and in climate scenario conditioned risk metrics (i.e. the Climate Spread) to embed forward-looking climate risk scenarios in the valuation of counterparty risk, in the probability of default (PD) of sovereign bonds, and in the largest losses on investors' portfolios (Battiston et al. 2019). The approach is modular and can be tailored to the characteristics of financial contracts and portfolios:

- Define the risk management strategy that accounts for investor's specific risk aversion levels, for counterparty risk adjusted for climate policy shock scenarios (e.g. Probability of Default (PD), Spread), and for metrics relevant for financial regulation (e.g. risk measure such as the Value at Risk (VaR));
- Define the investor's portfolio of financial contracts (in this case, defaultable sovereign bonds);
- Assess the impact of climate transition risk scenarios (in this application, a Climate Policy Shock) at the level of output of economic activities in carbon-intensive and low-carbon sectors, in their contribution to the countries' Gross Value Added and fiscal revenues, and in the change in firms' cash flows and profitability.
- Provide a valuation model to price credit risk, conditioned to the forward-looking climate transition risk scenarios to adjust the PD of a contract, and cumulatively on the whole portfolio.
- Calculate the Climate Spread, i.e. the change in the spread of a corporate or sovereign bond contract, conditional to a given Climate Policy Shock, in order to account for future climate transition risks in the issuer's solvability.
- Calculate the Climate VaR, representing worst-case losses with a certain confidence level, conditioned to future climate policy shock scenarios.

The framework is illustrated in Figure 1.

Conclusion

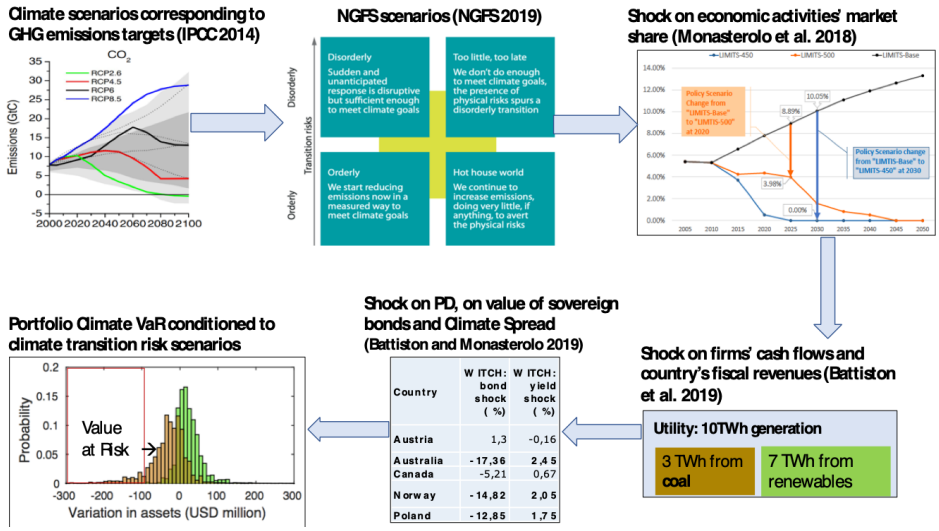
We have developed the first transparent and science-based climate financial risk pricing model to embed forward-looking climate shocks (stemming from a disorderly transition) in the PD and in the value of sovereign bonds. Then, we introduced and calculated the Climate Spread on individual sovereign bonds and in the worst-case losses (within a chosen confidence level, Climate VaR) of a bond portfolio, conditioned to feasible climate transition shock scenarios.

By applying the methodology to the sovereign bonds' portfolio of a central bank and of European insurance companies, in a collaboration with OeNB and with EIOPA respectively, we find that the level of (mis)alignment of a country's economy and the contribution of fossil fuels to its GVA can (negatively) positively affect the value of the sovereign bond and its Climate Spread. This result has two implications. On the one hand, investments' misalignment affects the country's refinancing conditions on the market and its financial solvability. On the other hand, the revaluation of sovereign bonds impacts on the risk profile of the investor who is exposed to them in her portfolio (e.g. via the Climate VaR).

The pricing model presented in this contribution is also a fundamental building block of the Climate Stress test framework presented in the contribution by Battiston and Monasterolo in this JRC Workshop and Report.

Exposures to climate transition risk represent large portions of private and public financial institutions. A mispricing of climate risk could have systemic effects. Therefore, a transparent and science-based climate financial risk pricing model should be considered as a public good. EU financial supervisors and the EU Commission could consider the possibility of fostering the creation of publicly repositories for climate-related financial data and to involve the scientific community in vetting the set of scenarios and the pricing models utilised by the industry.

Figure 1. Diagram illustrating the information flow in the climate financial risk pricing framework



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14. Understanding Environmental Social Governance (ESG) and Its Risk Implication for Banks

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ESG considerations are becoming an important factor not only for investors and institutions when making investment and finance decisions but also for financial regulators. The EU has designed an Action Plan on sustainable finance as part of its broader efforts to support sustainable development. The main objectives are to reorient capital flows towards sustainable investment; to manage financial risks stemming from climate change, resource depletion, environmental degradation and social issues; and to foster transparency and long-term approaches in financial and economic activity.

As yet, no internationally accepted definition of ESG exists and in its absence ESG performance and risks are unlikely to be reflected in financial assets performance and financial institutions risk profiles. In some cases, the three components overlap. A recent example of the interconnection between considerations of environment, social and governance risk factors is the recent public safety power preemptive shutoffs of electrical utilities in California due to the large wildfires caused by the very hot "diablo" winds. The three components of ESG can impact financial statements. Environmental and social risks are driven by external factors and governance driven by internal factors.

Against this background, the European Banking Authority (EBA) has the mandate "to assess the potential inclusion in the review and evaluation performed by the competent authorities of ESG risks" (Article 98 Capital Requirement Directive). In order to look for guidance on how to tackle this mandate, I think that it would be enlightening to analyze what ESG rating agencies are doing. ESG ratings are also called sustainability ratings or corporate social responsibility ratings.

ESG Risk Assessment: The view of the ESG rating agencies

Since the beginning of 1980, ESG rating agencies screen companies for ESG performance in a similar way credit ratings allow investors to screen companies for creditworthiness. However, while creditworthiness is clearly defined as the probability of default, ESG performance is still an evolving concept. Given the increasing importance that investors and financial regulators are putting on ESG, traditional rating agencies are also performing ESG rating assessments and making initial assessments of ESG credit implications.[27]

In a recent paper, *Berg, Koebel and Rigodon (2019)* conclude that ESG ratings diverge not only on the extent of the definition of ESG but they also differ on:[28]

(i) The scope of the selection of the different sets of categories or aspects that are included in its components: "environment" (e.g. relative importance of the Green House Emissions vs Pollution), "social" (e.g. relative importance of customer relations vs social inclusion) and "governance" (e.g. gender gap at the board level vs compensation policy). This is the case in spite of the fact that the Sustainability Accounting Standards Board has identified 26 so-called general issue categories;[29]

(ii) The numerical measurement of those categories or aspects within "environment", "social" and "governance." More than 50 percent of the ESG ratings or sustainability divergence is explained by measurement divergence. The measurement divergence of the "social" and "governance" components is particularly relevant for explaining the differences in ESG rating. However, there is less divergence among ESG rating companies on the measurement of the "environmental" component;

(iii) The relative weight of the importance of the different categories or aspects. This is the aggregation rule.

Differences in the numerical measurement of the categories or aspects that are included in each of the components of ESG can be at least partly attributed to the fact that the "social" and "governance" components are largely related to financial institutions market conduct (e.g. banks´ interaction with the society at large and corporate behavior) that

[27] For example, Moody´s bought Vigeo-Eiris and S&P bought ESG ratings business from Robeco SAM in 2019. Fitch and S&P recognize that the impact on credit risk differs around the world.

28 These authors include five different ESG rating providers: KLD8, Sustainalytics, Vigeo-Eiris, Asset4, and RobecoSAM.

29 See https://materiality.sasb.org.

may or may not materialize in asset quality, although consensus exist among credit rating agencies that "governance" is a key contributor to banks´ credit strength. "Environmental" risks, and in particular climate risks, have clear financial stability implications.

ESG: What are the risk implications for banks?

In light of all the above, what are the ESG risk implications for banks´ financials? All three components could impact profitability. In the case of "Social" and "Governance", if the adverse impact is sufficiently large (e.g. high litigation charges), it could also have implications for banks´ solvency. Inadequate risk governance could have an impact on asset quality. Environmental and in particular climate risks could definitely have an impact on asset quality due to physical or transition risks (e.g. stranded assets). Moreover, climate risk could have an impact on systemic risk via the following transmission channels (*Nieto, 2019*): GDP growth, direct exposures and second round effects due to financial system indirect exposures:

(i) GDP growth as a result of supply and demand disruptions caused by (1) the adverse effects of direct environmental hazards or severe natural disasters; (2) regulatory and other policy initiatives that seek to mitigate the consequences of climate change and, (3) disruptive technological shocks related to the management of environmental risks;

(ii) Direct exposures to "stranded assets" (financial assets whose underlying value depends on the extraction or usage fossil fuels) and high environmental risk sectors and;

(iii) Second round effects due to the financial system´s indirect exposures to carbon intensive assets and the global nature of climate change risks.

ESG can also have an impact on banks´ liquidity. Poor customer relations or poor corporate behavior could raise risk premiums, while green finance opens the possibility to banks´ funding diversification.

The Way Forward: Some Thoughts

In sum, the full implementation of the EU Action Plan requires that European Supervisory Authorities agree on harmonized definitions of ESG components as well as their attributes and relative importance. The regulatory approach of the "social" and "governance" risks would require close cooperation of prudential and market conduct regulators because risks are often associated with bad corporate behavior. Because of the long term implications of "social" and "governance" risks, deterrence is most important. "Environmental" and, in particular, climate risks have financial stability implications. Analysis of the complexity of the potential risks to the financial sectors as well as the prudential regulatory treatment of those risks are at an early stage.

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ACADEMIC SESSION: GREEN/BROWN ASSESTS

15. ESG and profitability: the case of financial institutions

Valentina Lagasio, Sapienza University of Rome

International standard setters, policy makers and institutional investors have progressively intensified their focus on Corporate Social Responsibility (CSR) and Environmental Social Governance (ESG) factors (Friede et al., 2015; Brooks & Oikonomou, 2018), pointing out their importance for companies' long-term value creation. At the same time, there has been an exponential increase in the implementation of CSR practices and ESG disclosure by companies worldwide, based on the idea that "doing good is good for business". Recently the European Commission placed CSR – aimed at companies, also via Non-financial disclosure (NFD) requirements for large companies - and ESG – targeted to investors and financial institutions - at the heart of its policies, aimed at more sustainable path for growth.

There has been a sharp increase in implementation of CSR practices worldwide (Vartiak, 2016), as companies have been encouraged to behave in a socially responsible manner on a wide range of issues (Engle, 2007). In line with these recent changes, academic studies also began to turn their attention to the level of ESG practices implemented by firms.

Indeed, from an academic perspective, the relationship between Environmental Social Governance (ESG) and performance has been deeply investigated in the literature in the last four decades. It is perceived as a particular topic of the instrumental stakeholder theory (Donaldson and Preston, 1995; Waddock and Graves, 1997) and the resource-based view of the firm (Korschun et al., 2014).

Even though the literature on this topic is constantly increasing, there are only a few recent studies focusing on financial intermediaries (Simpson and Kohers, 2002; Malik et al., 2015; Fayad et al., 2017), and directly comparing industrial firms with financial institutions (Brogi and Lagasio, 2018). In the last paper, the authors find that the implementation of ESG policies is positively and strongly associated with company profitability, proxied by return on assets (ROA) when investigating both industrial and financial companies. They use a two-steps methodology over 17,358 observations of US listed companies based on MSCI ESG KLD STATS data from 2000 to 2016. Firstly, they create an ESG index by equally weighting the scores registered in each of the Environmental (E), Social (S) and Governance (G) dimensions of ESG by each company in the sample. The ESG index is then regressed on company profitability. For industrial companies, the effect on profitability gradually slows during the years. In banks, the environmental dimension of the ESG score is very significant and positively associated with banks' performance, as measured by ROA. Specifically, the association between the environmental dimension of the ESG score and the ROA is more robust in the medium-long term than in the short term. Indeed, the growing concern for environmental problems is driving banking institutions to adopt sustainability measures in terms of Environmental strengths, thus this result is encouraging in terms of expected profitability as well as global development. Banks should continue to focus on both risks and opportunities from implementing ESG practices to move to a sustainable business. This may include investment in more sustainable activities, design products with ESG-related features and the engagement with their customers and stakeholders on ESG issues.

To conclude, ESG metrics in both industrial companies and financial institutions remain of fundamental importance. Regulators and Supervisors should thus continue to support and enhance companies' (and in particular banks') ESG activities, by also assessing the costs and benefits of introducing new rules that may lead to a better ESG responsiveness (for instance, a green supporting factor or ESG supporting factor, or a brown penalizing factor). Also, the role of disclosure and the reporting framework (i.e. taxonomy) is a relevant issue (Lagasio and Cucari, 2018), that should be in line with the materiality of all three dimensions of ESG in the different industries.

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16. The pricing of green bonds: are the financial institution special?

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Among the activities and instruments of sustainable finance, green bonds represent one of the most promising market-based solutions to channel funds to environmentally beneficial projects, as well as to raise awareness of environmental risks. As a relatively new practice in corporate finance, there is no commonly agreed definition for green bonds. We investigate the pricing implications of the green label on the primary market for bond issuances.

Using a large sample of bonds issued worldwide from 2007 to 2018, we investigate the determinants of the yield of new bond issuances.[30] We find that green bonds are not always issued at a premium compared to ordinary bonds, but with some heterogeneous pattern across different issuers. Specifically, we find a premium for green bonds issued by supranational institutions and corporates, while there is no effect for financial issuers. This evidence is confirmed by the findings in the additional tests that we run to gain further insights regarding the main determinants of bond yields in the green market. First, we test the impact of external review – a market-based solution to reduce information asymmetries between issuers and investors based on third-party evaluation of the compliance with some green bond principles. Second, we test whether green bonds issued by repeat issuers are priced differently than those issued by one-time issuers in the green market. Indeed, we find that repeat issuers benefit from an additional premium.

We interpret this as evidence of a reputation effect on the green bond market, at least for non-financial corporates. In addition, we find that the results hold for corporates in developed economies, while we do not find an effect in emerging markets. Controlling for credit risk and other relevant issuer characteristics does not alter our conclusions. Taken together, our results suggest that the green bond label per se is not enough to raise funding at a lower cost. This is most likely due to the difficulties for the investors to disentangle issuers with a genuine commitment to environmentally friendly projects from those engaging in mere 'greenwashing'. Indeed, it might be more difficult for some issuers to credibly signal to the market their engagement towards green activities. This is particularly true for financial institutions, whose core lending business is inherently based on private information.

The second part of the analysis focuses on financial institutions. We make an attempt to explain the reasons behind the absence of a 'greenium' for financial issuers. First, we find that institutions that have declared commitment to environmental principles (i.e. those subscribing the United Nations Environment Programme Financial Initiative) issued green bonds at a premium. We then explore the lending decisions of banks after green bond issuances. To this end, we match syndicated loans data with the bond issuance data. Using information on the sector-country pollution intensity – approximated by the greenhouse gas emissions – we are able to identify whether lending is redirected towards less polluting activities following a green bond issuance. Our results show that lead banks having issued a green bond reduce their exposure towards more polluting activities. However, the results are not confirmed in all specifications when we include the amount lent as participant bank.

In the light of the results about pricing, one might conclude that the market is somehow failing to adequately price in the environmental efforts of financial institutions to the extent that this is not clearly signalled, for instance through subscription to environmental initiatives. Alternatively, the market might not consider the reduction of lending towards more polluting activities enough to justify a lower yield for green bonds. Overall, our analysis suggests that activity on the green debt market is part of a broader environmental strategy whereby banks reduce lending to more polluting sectors.

This contribution has a number of implications. First, while the size of the green segment is still tiny relative to the whole bond market, our findings on the 'greenium' suggest that some types of issuers do have a market incentive to the issuance of green bonds. Second, it is not clear whether and to what extent the 'greenium' is able to compensate borrowers for the additional costs associated with obtaining the green label, and can de facto contribute to the development of the green bond market. Finally, policy intervention might be necessary in order to set up adequate incentives for both the demand and the supply side, and thus ultimately enhance the market of green securities.

[30] Fatica, S., Panzica, R., & Rancan, M. (2019). The pricing of green bonds: are financial institutions special? JRC Working Papers in Economics and Finance, 2019/7.

17. Extending 'environment-risk weighted assets': EU taxonomy and banking supervision

Lorenzo Esposito, Bank of Italy

Last years marked a significant change in the mass perception on the need to tackle climate change. The world is becoming aware of how quickly and radically the economy has to change to meet the goals posed by the Paris Agreement (December 2015). It is also increasingly clear that financial system must be engaged in full to help the transition to the green economy. Europe is at the forefront of the fight against climate change, having put sustainability at the core of its development strategy (for instance, with the EU 2050 long term climate strategy: "A clean planet for all").

Notwithstanding the growing interest in these topics, the discussions on the role of financial actors in the transition remain at a high level of abstraction, particularly in the field of banking regulation. To push the discussion towards practical proposals, we recently suggested a tool called "environment-risk weighted assets" (ERWA) that is able to internalize the pollution risk of the borrower into the lender cost of capital[31]. This is achieved using a correction for the environmental risk in the ordinary prudential weighting of the financial assets[32]:

$$e = c * r * a \tag{1}$$

Where: a is the book value of the asset; r is the weight assigned to the asset according to the ruling framework for banking regulation; c is the sectoral coefficient representing the environmental impact associated to the asset.

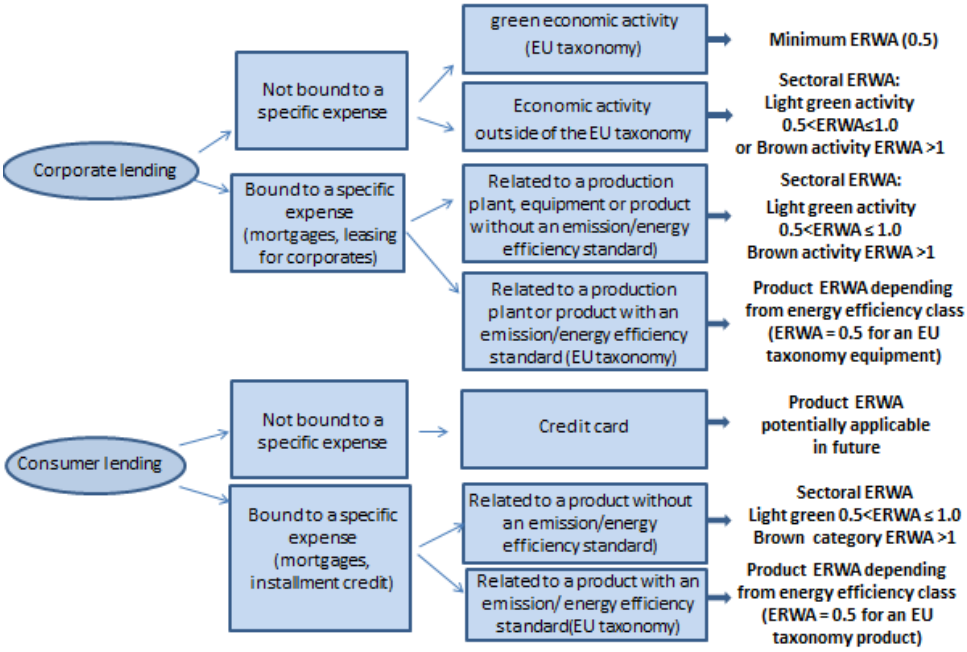
In EMM we developed ERWAs grounded on a sectoral approach with the NACE classification system (both using statistics on direct air emissions and by estimating the social external costs related to emissions). Now we applied Input-Output Analysis to estimate the indirect external costs "embedded" in a certain product category and related to air emissions released along its production chain until purchase for final consumption. The data show that, in the Italian scenario, most economic sectors are light green (i.e. external costs are lower than the economy-wide average) while lending tends to be allocated to sectors with higher external costs than the average, although with the IOA approach differences among sectors shrink because it takes into account the external costs related to sector's supply chain.

As a step forward, we developed a conceptual framework to update the ERWA proposal to the approach adopted by the EC action plan on financing a sustainable growth (March 2018) by considering in particular the EC regulation proposal on the Taxonomy of environmentally sustainable activities and the related report of the Technical Expert Group (TEG) published on 18 June 2019. The EC proposal is based on four main criteria to be fulfilled by environmentally sustainable activities (substantial contribution to at least one of six environmental objectives, do not significantly harm other objectives, labor safeguards and compliance with technical screening criteria), while the TEG report proposes the technical screening criteria for a wide set of economic activities that make a substantial contribution to climate change mitigation and adaptation. Even if the EC regulation proposal applies to financial products such as investment funds, the technical framework developed by TEG could be potentially and voluntary applied by banks too. Since the taxonomy approach allows to identifying green economic activities (allowing substantial emission and external costs reductions), these activities can be considered in the ERWA approach by assigning them the minimum ERWA value of 0.5. Moreover, the sectoral ERWA values can be assigned to loan types that cannot be easily related to specific activities (but can be more easily related to the broader sector of activity of the borrower). Hence, for loans aimed at financing specific activities or goods (vehicle leasing, car loans, house mortgages, etc.) that are not compliant with the taxonomy technical screening criteria we propose to assign specific product ERWAs values consistently shaped with the indicators or energy efficiency classes used by the specific technical screening criteria of the taxonomy. Our overall proposal for ERWA application is summarized by the following graph:

[31] Esposito L., Mastromatteo G. and A. Molocchi A. 2019. "Environment – risk-weighted assets: allowing banking supervision and green economy to meet for good", *Journal of Sustainable Finance & Investment*, 9:1, 68-86 (from now on EMM).

[32] In EMM we discussed practical issues to make the tool operational (for instance, we suggested to put c value between 0.5 and 1.5, with 1 being the general average, assumed as the threshold between brown and green activities and where the minimum weight is only assigned to truly green economic activities, that is economic activities able to produce zero or positive environmental externalities).

Sectoral ERWAs and Product ERWAs: integration with the EU taxonomy framework



The same logic can be in principle applied to corporate bonds and other financial assets like asset-backed securities. Combining sectoral and product ERWAs, this approach can help to reassess almost every asset of the banks, thus remaining business neutral.

The paper provides a practical example for real estate mortgages, that is in terms of credit dimension, by far the most important possible application of product ERWA (they represent the 30% of EU banking sector total assets), taking into account evidence from the EeMAP Initiative[33] and other recent literature that show how buildings' energy efficiency is associated with lower probability of default. Energy efficiency classes of buildings can be used to define capital requirements on mortgages, allowing the minimum requirement to green mortgages (compliant with the taxonomy technical screening criteria for buildings). The paper also provides other examples on how to build product ERWAs, consistently with the indicators used for technical screening criteria, for passenger and freight transport vehicles.

All in all, the ERWAs approach is in line with art. 1.2.c of the Paris agreement (financial flows should be made consistent with mitigation and adaptation goals), allowing the involvement of the banking sector in the transition.

To apply ERWA there are practical and political difficulties that must be overcome. Among them, we cite the problem of data collection (e.g. on linkages between loans and borrower activities), the different energy mix and environmental performances of the single countries and hence different results of ERWAs application on an international scale, and the dynamic change in sectoral emissions that suggests periodical realigning of ERWAs too. To give stability to banks' strategy, we propose to update ERWAs in coherence with the TEG suggested periodical update of the technical screening criteria for the "mitigation activities", that is every five years starting from 2020, so to match last year with the deadline of the current EU energy and climate policy (2030). The technical discussion is still in an initial phase and more research is needed to give regulators options on whether ERWAs should be applied to the existing banking book and how, with pros and cons of the different alternatives.

[33] See the website: https://eemap.energyefficientmortgages.eu/.

18. The Greenium matters: evidence on the pricing of climate

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Climate change is a fact, but we are not sure what the economic costs associated with this change will be. At the same time, the consequences of a transition to a low-carbon, resource-efficient and circular economy, or lack thereof, are also largely uncertain. Hence, these issues have to be addressed as aspects of long-run risk. To do so, we first show that indeed, the European market prices climate risk in the form of a green factor, in the context of a standard asset pricing model. Second, we estimate that the market associates a negative risk premium, which we label Greenium, to more environmentally friendly activities.

We identify the green factor based on a precise definition of green.[34] In particular, we first construct portfolios characterized by different shades of green. This is done based on a careful assessment of the environmental impact of individual companies. In particular, we use firm-level information on greenhouse gas (GHG) or CO2 emissions, combined with a measure of the completeness of such information, to yield a synthetic greenness index for each stock. Companies which disclose comparably low levels of emissions, and are very transparent, attain the highest scores and are included in a green portfolio.

Conversely, companies which do not disclose information on their environmental performance are labelled as non-transparent. Among these non-transparent companies, those active in carbon-intensive sectors, e.g. companies operating coal power plants, are included in a brown portfolio. The green factor is constructed based on 942 companies listed on the STOXX Europe Total Market Index.

We show that in the context of a standard asset pricing model, the green and brown portfolios are associated with a positive intercept, suggesting the existence of an omitted factor. Based on this evidence, we propose to include a green factor, which we construct based on a long-short strategy involving the green portfolio and the brown portfolio. We find that the Greenium, i.e. the risk premium associated with this green factor, is negative and significant. This means that investors accept a lower remuneration for their investments, ceteris paribus, insofar as these investments are linked to greener economic activities. We interpret this as evidence of climate risk being viewed as significant, with the market seeing value in investing in green assets as a hedging strategy towards worse environmental outcomes. Indeed, in a scenario of heightened risks resulting from climate change, there would be a stronger push towards more environmentally friendly activities, with more decisive political action likely to be taken to promote sustainable growth. Hence, companies active in green sectors would operate in a more favourable environment, possibly supported by incentives, e.g. fiscal or of other nature. At the same time, the likelihood would increase that some assets, e.g. coal, would become stranded. In this context, forward-looking investors who base their portfolio allocation on a broader information set than past returns, invest in green assets already today.

The evidence we provide on the existence of a Greenium has clear financial stability implications. Indeed, we show that the European market as a whole does price climate risk. In this context, if an investor does not factor in climate risk in the construction of her portfolio, she is in fact pricing her holdings based on a misspecified model, where the green factor is omitted. Should this mispricing affect the assets held by systemically important financial institutions (SIFIs) such as large banks, insurers and pension funds, there could be consequences in terms of systemic risk. In particular, asset returns on their holdings could be negatively affected by climate change via two main channels. First, in a longer horizon perspective, more frequent and severe natural catastrophes stemming from climate change (e.g. typhoons and floods) could negatively affect returns on assets linked to particularly vulnerable economic activities. These are so-called physical risks related to climate change, that we do not tackle in this paper directly.

Second, in a medium term perspective, the implementation of sustainable finance policies will imply higher costs for firms with higher emissions, causing a generalized drop in the dividend that brown firms will be able to pay to their shareholders.

This is the so-called transition risk. These two channels characterize an environmental risk factor that investors should price. Given the lack of data on the exposure of individual companies to physical risks related to climate change, in this analysis we will focus on transition risks, i.e. the potential impacts of a shift to a lower carbon-footprint economy on firms active in climate-policy-relevant sectors.

[34] Alessi, L., Ossola, E., & Panzica, R. (2019). The Greenium Matters: Evidence on the Pricing of Climate Risk. JRC Working Papers in Economics and Finance, 2019/12.

Based on our model, we estimate that in an extreme but plausible scenario where green assets outperform brown assets, all institutional sectors at the global level, including e.g. governments, non-financial institutions and financial corporations, as well as all European SIFIs, would be hit by losses. By halving their exposure to carbon-intensive sectors and reallocating their investments towards greener assets, they could somewhat reduce the loss. However, investors could only avoid losing money if they would reallocate their investments towards greener sectors. The magnitude of the expected losses we estimate is admittedly not breath-taking. Still, we show that no one is in a safe place when it comes to climate risk, as the consequences of brown asset mispricing would be widespread. We use a simple model to compute losses, based on the marginal expected shortfall. This approach does not factor in losses resulting from second-round effects, like fire sales, which could magnify first-round losses. Taking all this into account, we conclude that a climate or climate-policy shock could have serious implications in terms of financial stability, especially if coupled with shocks of other nature. Hence, we argue that a carbon stress test is warranted for systemically important institutions to monitor their resilience to climate change. The green factor we construct could indeed be used by investors, to hedge against climate risk, and by supervisors, to measure SIFIs exposure to this risk. Notice that looking forward, we can only expect greater policy pressure to reducing carbon emissions and moving to a sustainable development path.

All in all, our study provides evidence on the existence of a negative Greenium, i.e. a green risk premium, based on European individual stock returns. By defining a green factor which is priced by the market, we offer a tool to assess the exposure of a portfolio to climate risk and hedge against it. We estimate that in a stressed scenario where green stocks very much outperform brown stocks, there would be losses at the global level, including for European large banks, should they fail to price the Greenium. These results call for the introduction of carbon stress tests for systemically important institutions

PANEL 4: PRUDENTIAL TREATMENT

19. Role of business models in mitigating sustainability risks in banking sector

Slavka Eley, European Banking Authority

In recent years, the financial sector has been increasingly paying attention to the risks stemming from environmental, social and governance factors (ESG factors) under a broader concept of sustainable finance. Sustainable finance is understood as financing and related institutional and market arrangements that contribute to the achievement of strong, sustainable, balanced and inclusive growth, through supporting directly and indirectly the framework of Sustainable Development Goals[35]. As included in the European Commission's Action Plan: Financing Sustainable Growth[36], sustainable finance also refers to the process of taking due account of environmental and social considerations in investment decision-making, leading to increased investments in longer-term and sustainable activities.

Environmental considerations are those related to climate change mitigation and adaptation, and more broadly, the environmental risks. Social considerations include issues of inequality, inclusiveness, labor relations, and investment in human capital and communities. The governance of public and private institutions plays an important role in considering the environmental and social considerations in the management process and business mix[37].

ESG factors and the specific attention of society on climate change has led the regulatory and supervisory community to consider these factors as a new source of financial risks to which the public and private sectors need to pay attention. As stated in the report 'A call for action'[38] prepared by the Network for Greening Financial System, climate change has distinctive characteristics which mean it needs to be considered and managed differently. These include (i) far-reaching impact in breadth and magnitude, (ii) foreseeable nature, (iii) irreversibility, and (iv) dependency on short-term actions.

What does 'to be considered and managed differently' mean for the approach to mitigate potential impact of climate change, and more generally for the management of risks stemming from the ESG factors (ESG risks)?

The current regulatory and supervisory framework for banks puts emphasis on institutions on sound governance, oversight and management of risks with specific requirement on adequate capital and liquidity to cover identified risks. The time horizon for the estimation of capital needs to cover unexpected losses under the internal capital adequacy process is 12 months. Aspects of business strategy and product mix of banks are largely not covered by regulation as these are in the core of their entrepreneurship.

Supervisors look on banks' business models as part of the analysis done under the supervisory review and evaluation process (SREP)[39] considering viability of the current business model for the upcoming 12 months and sustainability[40] of the intended business model normally in a three-year time horizon. This time horizon is generally aligned with the financial planning of banks and remuneration rules (e.g. deferral of variable remuneration is as a minimum 3 to 5 years) and prudential stress testing.

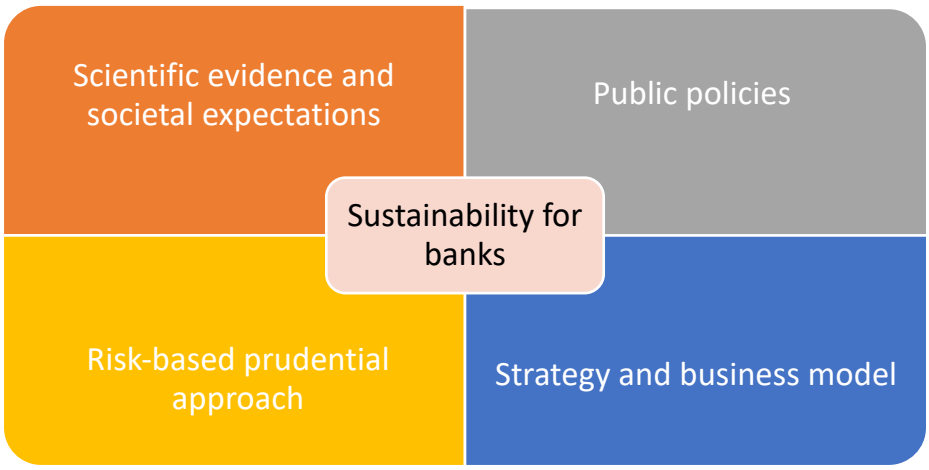
On the other hand ESG risks are expected to materialize, particularly considering possible climate scenarios translating into physical and transition risks (including social impact), far beyond the time horizon of three years and range in decades (e.g. based on the scientific reports[41]).

Therefore, the current risk management tools and methods, built around the short-term nature of managing financial risks, might not yet show the impact of the ESG risks as material considering the time horizon or not indicate enough potential vulnerabilities longer-term, in particular in case of a quick shift in public policies. At the same time, the success of a transition to a more sustainable economy, including more sustainable financing of real economy by the

[35] http://www.g20.utoronto.ca/2018/g20_sustainable_finance_synthesis_report.pdf
[36] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018DC0097&from=EN
[37] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018DC0097&from=EN
[38] https://www.banque-france.fr/sites/default/files/media/2019/04/17/ngfs_first_comprehensive_report_-_17042019_0.pdf
[39] https://eba.europa.eu/regulation-and-policy/supervisory-review-and-evaluation-srep-and-pillar-2/guidelines-for-common-procedures-and-methodologies-for-the-supervisory-review-and-evaluation-process-srep-and-supervisory-stress-testing
[40] In this context sustainability is defined as the ability to generate acceptable returns based on strategic plans, financial forecasts and the business environment.
[41] https://www.ipcc.ch/sr15/

banking sector, depends on short-term action or 'acting now' to reshape the business mix to becoming less vulnerable to the potential future far-reaching and irreversible impact of climate change and related social implications.

How to get the banking sector on the transition path considering the scientific evidence, societal expectations, public policies (e.g. Paris agreement and Sustainability Development Goals), while ensuring a risk based prudential approach and respecting the freedom for banks to choose business models considering their strategic objectives?



Generally, there are two main avenues for achieving 'acting now' on the ESG risks by the banking sector. The first approach is via risk management, incorporating ESG factors into the framework and translating the ESG risks into financial risks. This avenue involves incorporating a longer-term time horizon into the risk management with easily understood, simple and comparable metrics. In particular it involves scenario analysis as an important tool to understand the potential impact. From the understanding of the impact on financial performance and financial stability of a bank, the management can reflect such knowledge into adjustments of business model and internal processes.

The second approach involves recognizing that scientific evidence and public policies included in specific long-term commitments of many governments, and other public bodies constitute significant changes for the economic environment long-term and these, if not considered in the adjustments of the business model and transition strategy, might negatively affect financial stability and solvency of a bank long-term. This avenue also considers societal expectations on public and private players to contribute to the overall objectives of sustainable development.

The first approach is fully consistent with a risk-based prudential framework; however, it can be seen as 'reactive' as first banks need to conduct material scenario analysis and measurement of potential impact as evidence to adjust their business model.

The second approach is also compatible with a risk-based approach while being 'proactive.' Under this approach, by analyzing the expected impact of public policies and customers' expectations, banks proactively implement changes of the business models and internal processes (e.g. sustainable business targets, green and social products, loan origination procedures, pricing considering ESG risks) to reflect these. At the same time, proactive strategies for incorporating sustainability considerations in business strategy and internal processes can effectively play a role of an important mitigation tool of the potential impact of the ESG risks on banks long-term.

Such a proactive approach in strategies and business model changes could be seen as one of the tools for 'to be considered and managed differently'. To that end, the following aspects of the strategy and business model could be considered by the banking sector as 'novelty components' in their governance to address the ESG risks:

- Setting clear objectives and targets for environmentally and/or socially sustainable exposures using simple metrics
- Advising corporate and retail clients on their transition path
- Implementing sustainability culture across the organization

By setting long-term objectives and targets for changing the composition of the balance sheet into more sustainable exposures, and by disclosing the status of transition, the banks can not only show their corporate and social responsibility, but actively building long-term sustainable business.

Institutions can meet their objectives and targets only if these match the demand for more sustainable products and investments by their customers. At the same time, the same customers will be affected by changes in sustainability related public policies. The majority of businesses will need to adjust their operations to these new policies or will be generally affected by the impact of ESG factors, as well as private individuals. Thus, banks have a new opportunity to play the role of business advisor to support the transition of their clients to more sustainable businesses and/or housing, and other retail financing needs. By accepting and implementing such role, banks can create new business opportunities for financing the transition of businesses and citizens, and that way maintain long-term profitable customers.

The success of a proactive approach for sustainable strategy and business model requires the implementation of sustainable culture across the banking organizations, where the objectives and targets are translated into specific business and risk metrics, internal processes, business policies and procedures, as well as general awareness and understanding in the institutions of the sustainability objectives and ESG risks.

Regulators and supervisors may argue that their mandate does not include 'promotion' of certain business strategies or 'directing' institutions on certain types of business models. Such arguments correctly point to the role of public policy but that is not argued here. Rather long-term sustainable strategy and targets are a key part of the risk mitigation toolbox, as physical and transition risks matter now and there is therefore no issue with supervisors entering into conversations with banks on their long-term sustainable business strategies and adjustments of business models. Such conversation should not pivot around the request to develop specific ('green') strategies, but rather to require them to define long-term sustainable strategy that take into account ESG considerations, translated into the business mix and processes. This proactive approach by banks and supervisors, in combination with the incorporation of the ESG factors into the banks' risk management, can deliver better on 'being considered and managed differently' and the need 'to act now.'

20. Adjusting regulatory requirements: Perspectives on green and "sustainable" supporting factors under pillar I

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The political context

With the adoption of the ten-point action plan on "Financing Sustainable Growth" in March 2018, the European Commission (EC) has sought to establish a framework for integrating sustainability considerations in the European Union's (EU) financial policies. Action 8 provides the incorporation of sustainability in prudential regulation requirements, envisaging the potential introduction of a Green Supporting Factor (GSF) that adjusts the capital requirements for 'green' financial instruments. The policy intervention is at least in part inspired by the SME Supporting Factor. The SME supporting factor, implemented in 2013 under Article 501(1) of the EU Regulation No 575/2013 on prudential requirements for credit institutions and investment firms is equal to 0.7619, or 8%/10.5%.

The desired outcome is to set free "the critical mass of investments needed to close the gap for the transition to a more sustainable economy" (European Commission, 2018). Think tanks and non-governmental organisations (NGOs) have broadened the discussion by advocating for a 'Brown Penalty' (BP) on carbon-intensive assets. Here, the logic is the inverse of the GSF, where 'brown' (i.e. carbon-intensive) assets are penalised with a relatively higher risk-weight when calculating capital requirements. Opponents of the GSF claim that "the extra risk of 'brown' does not make 'green' extra safe" (Boot and Schoenmaker, 2018). The BP, they argue, would increase lenders' resilience to energy transition-related risks as well as render investment in assets contributing to climate change less attractive (Boot and Schoenmaker, 2018; Matikainen, 2017). Other research is looking at incentivizing 'green transition' or 'sustainability improvement' in order to avoid risks of inflating an asset bubble – focusing on the transitioning of assets, rather than their stock.

According to the academic literature, capital requirements serve two core functions. First, the literature argues that capital functions as a buffer to counter deficits and second, that it may limit risk-taking as the banks' capital becomes equivalent to shareholders' potential losses in case of insolvency (e.g. Hellmann *et al.*, 2000; Holmstrom and Tirole, 1997 and Jensen and Meckling, 1976, as cited in Perotti *et al.,* 2011). Overall, there is a broad consensus, backed by empirical evidence, that higher capital requirements can increase financial stability as banks' assets have lower riskiness (Martinez-Miera and Suarez, 2014; Santos, 1999; De Jonghe, 2010). Of course, this may hypothetically be offset where *expectations* of future capital requirements adjustments increase risk-taking today or increase franchise value that in turn increases funds that can be used for risky investments.

The literature on the potential effects of capital requirements on banks' lending largely focuses on incidents of increases in capital requirements, notably summarised in a report by the International Monetary Fund (IMF) (Dagher *et al.*, 2016). Dagher *et al.* conclude that an increase in capital requirements by 1 percentage point has an impact of about 2 to 20 basis points on lending rates (2016). Their findings are based on 13 studies that assessed the steady-state impact of higher capital requirements on the cost of bank credit. The same report finds that the transitional impact of higher capital requirements on the cost and volume of bank credit is more significant, according to the findings of 12 papers with varying geographic focus, type of intervention, time series and methodology.

Potential impact of the Green Supporting Factor

Based on current definitions (covering mortgages, as well as hybrid and electric vehicle finance), the total impact of a GSF in the range suggested by the EP (15-25%) is estimated to be between €3-4 billion. The risk-weighted value of these assets is estimated at roughly €244 billion,[42] implying a current total capital charge of €17 billion (assuming a 7% total capital charge). Assuming the definition of 'green' assets could be meaningfully and appropriately extended to a broader suite of assets – as described above – the GSF generates between €5-8 billion in capital savings. This compares to around €12 billion in estimated capital savings for the SME supporting factor (EBA, 2016).

[42] The estimates assume a 50% risk-weight on mortgages and a 100% risk-weight on consumer credit. Risk weights at a 100%-level for both the GSF and the BP were assumed, based on assumptions for risk-weighting commercial loans (Reserve Bank of New Zealand, 2007), the most relevant category for the policy instrument's target.

Potential impact of a Brown Penalty

The results suggest that a BP could create total additional capital charges for the EU banking sector of up to €25 billion if the EP proposal was reversed, and up to almost €40 billion if the penalty went as high as 50%. At a 25% increase in the risk-weight, these results would roughly align with an aggregate increase of 0.1% in the capital requirements of banks. The analysis clearly demonstrates that a BP is likely to have more pronounced effect on capital reserves than a GSF. This is somewhat intuitive since the universe of 'brown' assets – even given a partial application – is larger than the universe of 'green' assets. Figure 3 shows the potential capital shortfall in € billion under various levels of 'penalty' applied either partially or totally.

Of course, here, too, a definitional issue may be a challenge. There is no consensus on one taxonomy, although the taxonomies that do exist tend to more directly respond to financial assets. Examples are the environmental risk classification by Moody's, or the models applied by the Sustainable Energy Investing metrics project. Where it becomes particularly challenging is identifying 'brown' assets in carbon-intensive sectors with no clear transition pathway – notably industry and non-road transport – although a simple short-term solution would be to exclude them.

Sustainable improvement loans factor – a potential alternative?

An alternative to the interventions described above relate to the concept of a supporting factor on Sustainability Improvement Loans (SILs) that have been gaining currency in loan markets in the past 18 months. SILs are loans, usually revolving credit facilities, whose interest rate is partially adjusted (a premium or discount is usually applied to the margin) depending on the evolution of the borrower's sustainability performance. This sustainability performance may either be assessed based on external ESG ratings or KPIs, on the reaching of internal sustainability targets measured internally or externally, on the company's listing on a sustainability index, or on several of the above at the same time. The issuer of the loan may either be a single commercial bank, or a consortium of several financial institutions. Some estimates suggests this market may outpace the green bond market as early as 2020, despite its relative nascence.

A SI support factor could help mitigate the negative effect on profitability in a revenue neutral way by reducing capital requirements of the loan. A 20% risk weight adjustment with a 25-basis point SI covenant would imply a reduce profitability of 2% or less at interest rates of 5%-8% and be profitability neutral or even positive at any interest rate above 8%.

In terms of effects, a simple approach chosen here estimates the potential effect assuming a 0-40% market penetration of the instrument, using as a case study European banks to which this instrument would be applied in the context of the implementation of the EU Sustainable Finance Action Plan. The results suggest that the application of a SI support factor could reduce the capital of European banks by €16 billion assuming an extended application (20% adjustment of the risk-weight, 40% market penetration). Of course, lower market penetration would thus imply a lower capital reduction.

Adjustments of capital requirements on SI loans have a number of advantages relative to the current policy initiatives – notably the Green Supporting Factor under discussion. First, the instrument directly incentivizes sustainability action. When sustainability improves, interest rate goes down. Second, by incentivizing banks to develop tailored sustainability risk management procedures, as well as focusing on a discrete set of criteria that can be scoped to reflect sustainability risks, the instrument directly rewards reduced risk with lower capital requirements. Thirdly, it can be calibrated as an incentive that directly responds to the profitability gap the SI loan creates, thus creating the opportunity to be finely calibrated, without creating a revenue strain on financial policymakers. Fourth, the mechanisms ensure that when there isn't compliance (e.g. the sustainability covenant is broken), the support isn't triggered and thus neither would the support factor. Finally, the policy initiative is likely to be a lot more palatable to key stakeholders (financial supervisors, NGOs) worried about greenwashing and financial risk, without necessarily creating the same kind of policy barriers associated with a 'brown penalty' – not the least of the negative effect a brown penalty may have on overall lending volume.

21. Prudential treatment and challenges ahead

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Some industry associations have called for the introduction of "green supporting factors". However, banking supervisors agree that the purpose of prudential regulation should not be to support a specific investment strategy or a specific sector, but to ensure the robustness of banks through a risk-based framework. Thus, the idea of raising capital requirements on assets with high sustainability risks ("brown penalising factor") would make more sense. This is not an easy debate, and research on the topic is at very early stage (Thomä and Gibhardt, 2019). Broadly speaking, the effort to consider ESG factors in prudential regulation is positive. However, for the reasons that I will discuss below, the introduction of a green supporting factor entails several challenges, whereas a brown penalising factor would be more prudent, effective and aligned with a general precautionary principle, than a green supporting factor.

Reliability and accuracy of corporate ESG data

Any capital requirement policy incorporating ESG risks considerations would require the availability of reliable and accurate ESG data. However, accounting research suggests that self-reported corporate ESG information may not have that level of relevance, reliability and accuracy of financial information, and ESG disclosures are very much dependent on firm-specific incentives (Cho et al., 2015; Michelon et al., 2015; Christensen et al., 2019). For example, evidence suggests that companies "restate" ESG indicators after they have been reported, even in the presence of assurance of the sustainability reports (Ballou et al., 2018; Michelon et al., 2019). Such restatements are not formally communicated to the market and are disclosed in footnotes in sustainability reports with different degree of completeness. There is also evidence that in certain climate-policy-relevant sectors, narrative disclosures on corporate risks are often boiler plate and, most importantly, climate change is hardly considered a material risk in terms of potentially having financial impacts on the value of corporate assets (Bebbington et al., 2019).

Currently companies can disclose ESG information following various guidelines and frameworks rather than common mandatory standards. However, even if the standards were uniform and enforcement was high, as long as firm's reporting incentives differ, comparability benefits may not be granted (Christensen et al., 2019).

Assurance of ESG information is often granted on limited levels of engagement and it is not as regulated as financial audits are (Michelon et al., 2019). For example, sustainability reporting assurance is provided by accounting firms, but also by other types of consultants. Typically, assurance of ESG information by Big4 accounting firms falls within their consultancy business (e.g. not auditing).

Third-party ESG "scores" and ratings

ESG data can also be provided by third party agencies such as MSCI, Sustainalytics (now Morningstar), Vigeo-Eiris (now Moody's) and Thomson Reuters Asset4. However, research shows lack of comparability in the ratings provided by different agencies (Berg et al., 2019). The industry is not regulated, and methodologies are considered "proprietary" information. To a certain extent, this is not surprising given that ESG rating providers are selling "a product", but the lack of regulation and transparency implies that the overall ESG ratings (or scores) may be unsuitable for the purpose of feeding capital requirement regulations. Nevertheless, it is still possible that the data points underlying the overall "scores" provided by these rating agencies may be useful, relevant and important for financial institutions, who can then use these data points to assess risk. However, since they heavily rely on self-reported information, it is important to consider the limitations presented in 1. above.

Enforcement, checks and oversight

Even in the presence of a green taxonomy, there is matter of understanding how enforceable it will be, and what systems of checks and balances will be put in place to oversee activities that are labelled as "green" (Christensen et al. 2019). Overall, challenges on ESG data are not simply related to issues of greenwashing or reporting reliability, but generally speaking to maturity levels in both practice and institutions needed to oversee corporate practices.

Tackling physical risks

If "green" activities (or ESG risks) were misclassified due to (something as simple as) wrong data, we would be injecting in the system even more riskiness. To a certain extent, a policy based on a brown penalising factor may be easier to oversee (it is unlikely that there are incentives to "brownwash"), although it does entail the challenge of defining what is "brown" – which the taxonomy at this stage does not do. Further, science (Ripple et al., 2019) suggests that most

impactful action to tackle climate change is to leave fossil fuels. Any transition that does not include a gradual, yet consistent, decrease of fossil fuels may not allow us to achieve the goal established by the Paris Agreement. A brown penalising factor may encourage this transition more steadily than a green supporting factor. Although it is very hard to predict and quantify the physical risks associated with climate change, it is likely that increasing global temperatures will increase their likelihood and impact, and eventually also call for a more disruptive transition (i.e. increase the risk of a disorderly transition; e.g. Roncoroni et al., 2019).

Having said so, the extent to which financial exposures will translate into shocks also depends on the ability of market participants to anticipate climate policy measures. It may be that only introducing a brown penalising factor may be perceived as more disruptive than a green supporting factor. As of now, research is too scant to provide a definitive answer.

Conclusion

Summarising, the introduction of a green supporting factor would require establishing a complex system of institutions aimed at assuring the quality, reliability and accuracy of the underlying data. At the same time, the introduction of a brown penalising factor may contribute to limit physical risks more incisively than a green supporting factor.

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22. Encouraging and rewarding sustainability: Accelerating sustainable finance in the banking sector

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To meet the objectives of the Paris Agreement and achieve the Sustainable Developments Goals (SDGs), trillions of euros will need to be mobilised globally.

Europe alone has identified a yearly financial gap of more than EUR 180 billion to finance policies and investments necessary to keep the global temperatures in line with the objectives of the Paris Agreement. It is more than obvious, that without the private sector, the funding gap cannot be closed.

Given that around two thirds of the European economy is financed by banks, banks play, and will continue to play a crucial role in the transition to a more sustainable future acting as investors, capital providers and capital intermediaries.

While the financial industry is facing some impediments and challenges such as the lack of available projects and products or the difficulty in identifying eligible projects or assets to refinance, the "pure green financing market" functions relatively well. However, to reach the objectives of the Paris Agreement and SDGs, the growth of sustainable activities must take place throughout all economic sectors, especially manufacturing and services. The sustainable financing markets must mirror the sustainable developments in the real economy and be able to finance and support that development without too many limitations and channel financial resources towards sustainable projects in a timely manner to help transitioning of the economy.

Most companies are at different stages in their transition journey towards low-carbon and sustainable activities. Banks have a role to play in supporting corporates and SMEs on this journey, providing the funding needed to achieve this transformation.

The steps being taken towards increased sustainability should be encouraged and supported by the legislation. The introduction of an incentive system is necessary given the need to accelerate the shift towards sustainable European economy. In the absence of any time pressure, markets would sort out the financial resources' allocation over time.

In this framework the European Banking Federation EBF has issued the Report "ENCOURAGING AND REWARDING SUSTAINABILITY - Accelerating sustainable finance in the banking sector" whose objective is to stimulate and contribute to the debate of the European institutions, regulators and banks on how to:

- Scale up sustainable activities, including transitioning activities that contribute towards increased sustainability;
- Mobilise and redirect private financial flows to support such activities;
- Develop new instruments to finance sustainable activities;
- Increase the number of projects;
- Help capital market development;
- Promote literacy on Sustainable Finance and overall Sustainability

Here we focus on proposal number 2 described in the Report[43]:

Risk Management - Reduction of capital requirements for certain sustainable assets that show a lower financial risk

Credit risk sensitivity should be followed as a main principle when considering any capital reduction measures. The capital relief proposed under the name Sustainable Finance Supporting Factor (SFSF) should be, to a certain extent, reflective of the reduced financial risk, while acting as an incentive to invest in sustainable activities at the same time.

The SFSF is different from the so called Green Supporting Factor for several reasons but the most important one is that the SFSF is risk driven.

[43] The other 4 proposals are:

Creation of a European Sustainable Finance Guarantee Fund
European Green Funding
Preferential treatment of collateral
Fiscal and financial measures

With banks' essential role of financing the economy comes an important responsibility to society. As a partner in everyday life, whether for individuals, companies, social business or government, the banking industry has long been aware of the broad role it plays in society. Interacting responsibly with individuals and businesses, responding to the demands and expectations of consumers, investors, companies and their own employees is key.

Banks are eager to connect societal and financial goals and contribute effectively to major challenges such as climate change and the sustainable energy transition and social inclusion. Many European banks are increasingly looking to embrace sustainability as a key element of their business strategy and to contribute to the objectives of the Paris agreement and SDGs.

However, individual actions are not sufficient to address the sustainability challenges properly. At EU level, we believe these initiatives should be complemented by a well-designed regulatory framework that can reduce uncertainty, ensure comparability, allow competitive solutions on a global basis and mobilise the shift towards more sustainable activities and its financing.

Currently, the sustainable finance market is limited to a restricted number of actors and products, affecting only certain sectors. For example, renewable energy, industrial energy savings and climate change mitigation projects, automotive (electric cars), real estate developers financing green buildings, social enterprises, some other "pure play environmental" companies such as those dealing with waste, water, environmental technology, forestry and rail are the obvious current market actors. However, to reach the objective of Paris Agreement, the growth in sustainability must also come from other sectors such as manufacturing and services.

If financial flows are to be mobilised in the required volumes and speed, both on supply and demand side, the legislative and non- legislative framework should be reviewed, to encourage and reward sustainability. The implementation of specific incentives to support lending and investment into sustainable projects, technical assistance, as well as risk-sharing by the public sector, would act as a catalyst to EU policies, bearing in mind the role banks play as providers of finance.

Incentives should be carefully designed to encourage long-term, sustainable investments while considering the materialisation of the associated risks and their impact on the EU financial system. Furthermore, the multiplying effects of incentives at the level of the product issuer, investor and investee need to be integrated into this assessment. Moreover, they should be analysed in light of international initiatives and in the spirit of the EU Action Plan on Financing Sustainable Growth. Clear criteria and precise information to access and benefit from such incentives should be defined in the approval and monitoring phase.

Banks are required to hold sufficient capital buffers to cover for unexpected losses and remain solvent in a period of stress. As a main principle in the Capital Requirements Regulation (CRR) and the Capital Requirements Directive (CRR) (and their revisions), the amount of capital required depends mainly on the credit risk related to bank's risk exposures. The riskier an exposure is, the higher the risk weight (RW) of the asset and the amount of capital required.

The estimation of the level of risk is often based on a retrospective analysis (time series) that has proved to be predictive of the credit loss, taking into account a set of characteristics of the exposure and of the counterparty.The speed of negative climate change impact, potential new climate regulation or taxation and changing consumer behavior represent a structural breach. The traditional retrospective approach does not capture the risk. While sound forward-looking techniques capturing the longer-term nature of environmental risks are emerging they are not yet available at large scale, and may not be easily incorporated into the prudential framework given the different time horizon[44][45].

[44] ECB - Climate change and financial stability "A monitoring framework for climate change-related risks in the financial sector would require more comprehensive information on carbon emissions and the exposures of banks and other financial institutions. In addition, scenario analyses and/or stress tests need to be developed to cater for transition risk in a forward-looking manner."
https://www.ecb.europa.eu/pub/financial-stability/fsr/special/html/ecb.fsrart201905_1~47cf778cc1.en.html#toc1

[45] Some forward-looking approaches are emerging even if mainly in the field of investment portfolios. For example CLIMAFIN methodology, is now applied by several central banks and regulators (e.g. EIOPA) to price climate transition risks in the value of sovereign bonds and assess the largest losses on insurances' portfolios. The methodology is transparent and peer reviewed and already operational and applied e.g. to the portfolio of the Austrian National Bank)The logical framework (taking into account climate scenarios and climate policy/transition scenarios in order to assess the risk connected to some assets) could be analysed in order to be replicated on sample exposure from a portfolios of loan exposures asset classes. For the climate stress test methodology using forward looking climate transition scenarios and shocks trajectories to calculate climate financial risk metrics, please refer to: Battiston S., Mandel A, Monasterolo I., Schuetze F. & G. Visentin (2017). A Climate stress-test of the EU financial system. Nature Climate Change, 7, 283–288.
Reference to the methodology for pricing forward-looking climate risks in the value of sovereign bonds:
Battiston, S. and Monasterolo, I. (2019). A climate risk assessment of sovereign bonds' portfolio. Working paper available at SSRN: https://ssrn.com/abstract=3376218.

The EBF is willing to take an active part in the development of proper new methodologies, the collection of experience necessary for a better integration of the ESG dimensions into the internal rating systems for IRB approaches, as well as solutions for the Standardised Approach.

The Sustainable Finance Supporting Factor

As a precondition for the introduction of any measure, it is important to identify sectors, activities and projects that are considered not only green but sustainable in general as envisaged by the EU taxonomy. The identification should be based on a uniform set of criteria in order to ensure level playing field. Pending the development of the methodologies for incorporation of the ESG factors into the supervisory framework and in line with the objective to maintain the link between long-term risk considerations and capital, we suggest that the European Banking Authority explores the possibility of temporarily introducing a supporting factor for certain assets that are classified as sustainable under the EU taxonomy and, at the same time, meet additional eligibility criteria established by the European Banking Authority.

The proposed supporting factor (Sustainable Finance Supporting Factor) would therefore apply to exposures related to a sub-category of sectors/ activities/projects (SSAP) of sustainable taxonomy currently under development in the EU.Using forward-looking methodologies[46], we suggest that the European Banking Authority investigates whether there are groups of SSAP under the EU taxonomy that show a lower financial risk, and, specifically, a lower credit risk profile.To identify the eligible SSAPs, we suggest that the EBA conducts sample studies in order to collect evidence as to which SSAPs show a reduced financial/credit risk after integration of ESG considerations. The objectives of such studies would be the identification of SSAPs with samples that are characterized by a positive delta ESG risk.[47]

A positive delta ESG risk means that given a certain level of foreseen financial risk, by integrating the ESG profile (regardless of the approach)[48], a decrease in the level of financial risk will occur.

We call these eligible SSAPs. The eligible SSAPs should be disclosed by the EBA. The exposures belonging to such eligible SSAPs could then benefit from a lowered capital requirement by means of application of a supporting (reduction) factor on their already calculated RWA.For a well-calibrated prudential regime, eligible SSAPs could be further clustered into a number of Eligible Sustainable Asset Classes (ESAC).For instance, in the CRR, "Salary found credits" exposures are a specific asset class (a sub-asset class of retail exposures) and receive a specific treatment. Therefore, other sub-asset classes can be defined in relation to some eligible SSAP (e.g. green or energy efficient mortgages, energy efficiency device production, etc.).

Introducing a targeted supporting factor for eligible SSAPs exposures does not substitute the creditworthiness assessment performed by credit institutions and required by the existing prudential framework. As with any other credit exposure, the first prerequisite to grant the credit remains a proper credit quality standing and proper risk management. Therefore, as in the case of any other specific asset class already foreseen in the CRR, the creditworthiness of eligible borrowers and capital requirements will be assessed by banks according to the Regulations and Guidelines in force, before the supporting factor is applied, as an adjustment to risk weights for non- defaulted exposures. The supporting factor would only apply after the capital has been computed as usual and therefore be used as a "discount at checkout", irrespective of the use of the standard or the IRB/IRBA approach, the type of financial product or its duration. Exposures that are sustainable under the EU taxonomy but do not belong to the eligible SSAPs would not benefit from the reduction in own funds requirements and will continue to be subject to the usual capital calculation regime.

As for the supporting factor on infrastructure and social projects recently introduced (Art.501a of CRR II), which can be combined with the one for SMEs exposures (SMESF), it should be possible to combine the SFSF with other supporting factors. The application of one supporting factor should not rule outthe application of other supporting factors; rather, there should be a cumulative approach making it possible to acknowledge all the relevant factors for each category. The introduction of the supporting factor should be subject to an evaluation three years after its introduction, in particular, to assess its effectiveness in steering funds towards sustainable activities and the increase in the proportion of banks' sustainable business.

"Climate risk and financial stability in the network of banks and investment funds" Alan Roncoroni, Stefano Battiston, Luis Onesimo Leonardo Escobar Farfan, and Seranfin Martinez Jaramillo.

[46] To evaluate if some SSAP show a reduced climate related financial risk, we suggest to take into account at least two time horizons: (3-5 years) and (5-10) years.

[47] A potential eligible SSAP could be the one that might be identified with the EEMAP project on energy efficient mortgages.

[48] Some technics already used in other ESG studies could be applied at a sectorial/SSAP level in order to integrate the ESG dimension into the traditional prospective economic evaluation. Among these:

•Sectorial forecasted financials: Adjustments are made to forecasted financials for the expected impact of ESG factors.

•Sensitivity/scenario analysis: Adjustments are made to variables (sensitivity analysis) and different ESG scenarios (scenario analysis) are applied to valuation models to compare the difference between the base-case sectorial valuation and the ESG-integrated valuation.

Summary of the main SFSF features

Limited scope – application to eligible Sustainable Sectors / Activities/Projects (SSAP) with reduced financial risk identified by the EBA.

Risk sensitivity: the eligible SSAP - with reduced financial risk assessed by forward-looking approaches - could be clustered into a number of eligible sustainable asset classes (ESAC) under the prudential regime (e.g. green mortgages, energy efficiency device production, circular economy projects, etc.).

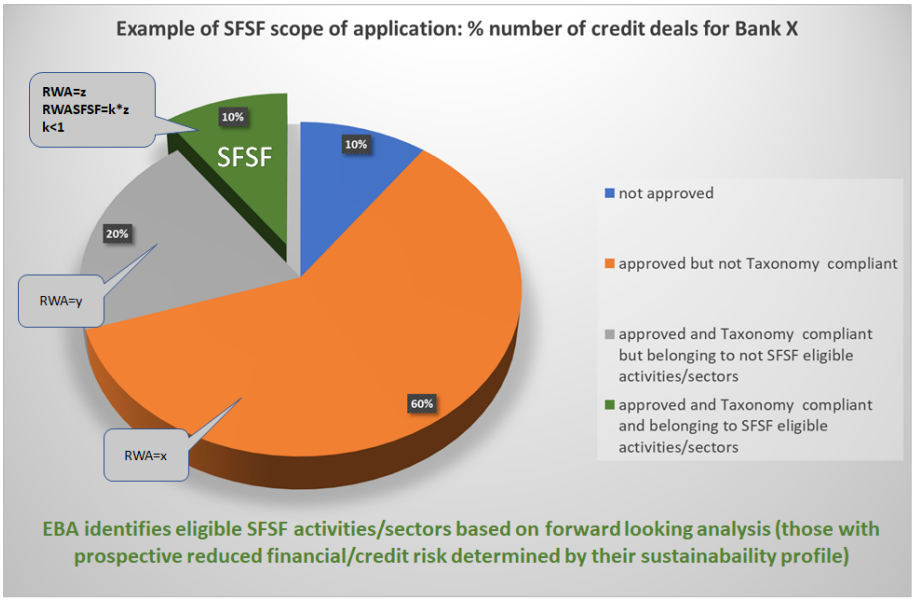
Objectivity – scope defined by the EBA.

Level playing field – the SFSF would apply to both standard and IRB / IRBA approaches.

Not replacing risk management – the application of the SFSF would not exempt the banks from the prior creditworthiness analysis. The SFSF would apply only after calculating own funds requirements as usual. The SFSF would be applied as a "discount at checkout", similar to the SME Supporting Factor.

Relatively easy implementation based on information provided by third parties in terms of simple codes of eligible SSAP or ESAC. Evaluation after 3 years.

Illustrative example



Bank X has 100 potential credit deals. Following creditworthiness analysis, 90 are approved and become exposures. Under existing prudential regulation, 90 RWAs are being computed. Out of 90, 30 exposures are considered sustainable according to the EU taxonomy defined by the Technical Expert Group (TEG). Out of 30, 10 will be eligible following the EBA classification (meaning these have a lower Sustainability-related financial risk). The bank will only check which out of 30 exposures belong to the eligible SSAP or ESAC as disclosed by the EBA. Banks will apply SFSF on the 10 RWA linked to the eligible SSAP or ESAC. This applies both to STA and IRB/A-IRB approaches but once banks applying IRB/IRBA approach will have embedded the sustainability profile in their validated internal rating model, the SFSF can no longer be used.

23. Banking Regulation and Sustainability – a Supervisor's perspective

Emmanuel Rocher, ACPR France

The French Autorité de Contrôle Prudentiel et de Résolution (ACPR) fully supports the view expressed by the Network [of central banks and supervisors] for Greening the Financial System (NGFS) that stated, in its first 2018 progress report, that "climate-related risks are a source of financial risks". It is therefore in the ACPR mandate, as a supervisor, to ensure that the financial system takes these risks sufficiently into account.

The integration of the climate-related risks into the micro-prudential supervision framework is a key challenge for supervisors today. Based on available disclosures, we consider that a majority of banks will inevitably be exposed to climate-related risks, but these risks are at this stage not sufficiently captured both by the supervisory reporting requirements and the internal risk management procedures within the banking organizations.

As a consequence, our approach is twofold: we first need to improve the assessment of climate-related risks borne by banks, which necessarily implies enhanced reporting and disclosure requirements; relying on a precise diagnosis, we could then consider the question of how and to what extent we shall adjust the banking regulatory requirements.

Against this backdrop, we have first raised awareness among the institutions and the industry on climate risks issues. ACPR has undertaken an intensive dialogue with banks to encourage a more proactive approach towards those risks. Secondly, on the risk measurement issue, which is key, the ACPR is strongly committed, at the international level, along with the NGFS, the European Systemic Risk Board (ESRB), the European Banking Authority (EBA) and the others European supervisors, to working on scenario analysis, risk indicators and stress-testing that include ESG factors. In this context, the ACPR will carry out a pilot exercise involving both French banks and insurance companies in 2020.

Going forward, as credit institutions will face increasing physical and transitions risks in relation with climate change, these risks need to be adequately regulated and supervised.

ACPR also acknowledges the significant challenges that have to be overcome prior to any changes in the regulation, such as: data issues but also modelling challenges in order to properly assess the impact of climate change on economic and financial conditions and banks' balance sheets.

For these reasons, ACPR will continue to actively participate in the international working groups, such as the EBA and the NGFS. The Authority will also take advantage from the work undertaken by its new Commission on Climate and Sustainable Finance. Created on 3 October, 2019, this Commission gathers high-level experts from NGOs, think tanks, academia and the industry to provide guidance to ACPR work on climate-related risks and to monitor and assess engagements made by French financial institutions with respect to climate transition. Its first annual report is expected at the end of 2020. It will be a joint report with the Autorité des Marchés Financiers, which created a twin Commission to monitor and assess asset managers and financial issuers' engagements. Finally, the ACPR Commission will also factor in the developments of the EU taxonomy on Green assets in its regular assessment once completed.

Workshop Programme

18 November

09:30 – 10:00 **Opening Keynote: Nathalie Berger** (Head of Bank Regulation and Supervision Unit, DG Financial Stability, Financial Services and Capital Markets Union, European Commission)

Chair: **Francesca Campolongo** (Head of Finance and Economy Unit, Joint Research Centre, European Commission)

10:00 – 10:45 **Policy Session: The EU Sustainability Taxonomy: usability and impact**

Lucia Alessi (Project Leader, Finance and Economy Unit, DG Joint Research Centre, European Commission)

Hans Biemans (Head of Sustainable Markets, ING)

10:45 – 11:15 Coffee break

11:15 – 13:00 **Panel 1: Key metrics and disclosures**

Moderator: **Piers Haben** (Director of Banking Markets, Innovation and Consumers, European Banking Authority)

Keynote Lecture: **Andreas Hoepner** (Professor of Operational Risk, Banking & Finance, University College Dublin)

Panellists:

Pilar Gutierrez (Senior Policy Expert, European Banking Authority)

Sara Lovisolo (Group Sustainability Manager, London Stock Exchange Group)

Olivier Picard (Senior Expert Climate Risk, Societe General)

13:00 – 14:30 Lunch and JRC Visitor Centre guided tour (optional)

14:30 - 15:00 **Keynote Address: Piers Haben** (Director of Banking Markets, Innovation and Consumers, European Banking Authority)

15:00 – 16:00 **Professionals session: ESG data**

Chair: **Serena Fatica** (European Commission – Joint Research Centre)

Marina Brogi (Professor of International Banking and Capital Markets, University of Rome, La Sapienza)

Eirini Kanoni (Vice President, Senior Business Development Manager, European Datawarehouse)

Steven Keuning (retired Adviser to the Executive Board, European Central Bank)

16:00 – 16:30 Coffee break

16:30 – 18:15 **Panel 2: Scenario analysis and stress testing**

Moderator: **Angel Monzon** (Head of Unit, Economic Analysis and Statistics, European Banking Authority)

Keynote Lecture: **Stefano Battiston** (Professor of Banking, University of Zurich)

Panellists:

Antoine Bezat (Head of Stress Testing Methodologies and Models, BNP Paribas)

Katarzyna Budnik (Financial Stability Expert, DG Macroprudential Policy and Financial Stability, European Central Bank)

Julia Van Huizen (Policy Expert Climate Risk and Green Finance, Dutch National Bank)

19:00 – 21:00 Social Dinner at Hotel Conca Azzurra, Ranco

19 November

09:30 – 11:15 **Panel 3: Strategy and risk management**

Moderator: **Olli Castrén** (Head of Economic Analysis, European Banking Authority)

Keynote Lecture: I**rene Monasterolo** (Professor of Climate Economics and Finance, Vienna Univ. of Economics and Business, and Cefes Milano Bicocca)

Panellists:

Christian Elbers (Senior Advisor to the Chief Sustainable Finance Officer, BaFIN)

Maria J. Nieto (Senior Advisor, Bank of Spain)

Ana Rubio (Head of Financial Regulation, BBVA)

11:15 – 11:45 Coffee break

11:45 – 13:15 **Academic session: green/brown assets**

Chair: **Katja Neugebauer** (European Commission – Joint Research Centre)

1. Environmental, social, and governance and company profitability: Are financial intermediaries different? Marina Brogi and **Valentina Lagasio** (All University of Rome - La Sapienza)
2. The pricing of green bonds: are financial institutions special?

   Michela Rancan with Serena Fatica, and Roberto Panzica (All European Commission – Joint Research Centre)
3. Environment – risk-weighted assets: allowing banking supervision and green economy to meet for good
   Lorenzo Esposito (Bank of Italy) with Giuseppe Mastromatteo (Economic Policy Department - Università Cattolica del Sacro Cuore) and Andrea Molocchi (Italian Ministry of Environment - AT Sogesid)
4. The Greenium matters: evidence on the pricing of climate risk.
   Roberto Panzica with Lucia Alessi and Elisa Ossola (All European Commission – Joint Research Centre)

13:15 – 14:15 Lunch

14:15 – 15:45 **Panel 4: Prudential treatment**

Moderator: **Slavka Eley** (Head of Unit, Banking, Markets and Products, European Banking Authority)

Keynote Lecture: **Jakob Thomae** (SOAS University of London and 2° Investing Initiative)

Panellists:

Giovanna Michelon (Professor of Accounting, University of Bristol)

Claudia Pasquini (Head of Risk Control and Sustainability, Italian Banking Association)

Emmanuel Rocher (Deputy Director International Affairs Department, Autorité de contrôle prudentiel et de résolution, France)

15:45 – 16:00 **Closing remarks: Lucia Alessi** (Project Leader, Finance and Economy Unit, DG Joint Research Centre, European Commission)

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KJ-01-20-015-EN-N

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doi:10.2760/550084

ISBN 978-92-76-15038-1