

# SUSTAINABLE FINANCE. WHY AND HOW?

FROM THE EDITORIAL DESK

**Sustainability and Finance - Why and How?** by Giorgio Barba Navaretti, Giacomo Calzolari and Alberto Franco Pozzolo

**Numbers** by José Manuel Mansilla-Fernández

**Institutions** by José Manuel Mansilla-Fernández

**A Bird Eye (Re)view of Key Readings** by José Manuel Mansilla-Fernández

ARTICLES

**Sustainable Finance: Three Questions in Search of an Answer** by Alessandro Giovannini and Fabio Tamburrini

**Sustainable Finance Policy-Making: Why and How** by Emanuele Campiglio and Francesco Lamperti

**The Green Transition and Bank Financing** by Hans Degryse, Roman Goncharenko, Carola Theunisz and Tamas Vadasz

**Disclosure of Bank Fossil Fuel Exposures** by Winta Beyene, Manthos Delis and Steven Ongena

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**Sustainable Finance. Why and How?**



# What is European Economy

*European Economy – Banks, Regulation, and the Real Sector* ([www.european-economy.eu](http://www.european-economy.eu)) is a journal to encourage an informed and fair debate among academics, institutional representatives, and bankers on the regulatory framework and its effects on banking activity and the real economy. It is resuming publication in 2021 thanks to the financial support of Fondazione Compagnia di San Paolo and Bank of Italy.

The journal aims at becoming an outlet for research and policy-based pieces, combining the perspective of academia, policy making and operations. Special attention will be devoted to the link between financial markets and the real economy and how this is affected by regulatory measures. Each issue concentrates on a current theme, giving an appraisal of policy and regulatory measures in Europe and worldwide. Analysis at the forefront of the academic and institutional debate will be presented in a language accessible also to readers outside the academic world, such as government officials, practitioners and policy-makers.

The 2021.2 issue of *European Economy – Banks, Regulation and the Real Sector* focuses on sustainable finance. That environmental sustainability should gradually become strictly interrelated to financial activities is a widespread and fully accepted principle, pursued through financial regulation, supervision and banks' and financial institutions' voluntary actions. But as discussed in this issue, it is not so obvious why this is the case. If markets were able to fully internalize environmental costs and risks, these should be adequately priced by financial institutions and banks. The allocation of credit and other financial resources would then reflect such costs and risks. And if there were, as there are, market failures, these should be addressed by policy instruments specifically targeted to reducing emissions, like carbon pricing or other fiscal tools, so that financial institutions could then face and respond to adequate pricing signals. So why is there a need for sustainable action in financial and banking markets? This is one of the two questions addressed in this issue of *European Economy*. The other one, is how this should and is being done, especially through regulatory and supervisory frameworks, voluntary actions and standards for measuring and disclosing climate and environmental risks.

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# **From the Editorial Desk**



# Sustainability and Finance - Why and How?

by Giorgio Barba Navaretti<sup>1</sup>, Giacomo Calzolari<sup>2</sup>, Alberto Franco Pozzolo<sup>3</sup>

## 1. Introduction

That environmental sustainability should gradually become strictly interrelated to financial activities is a widespread and entirely accepted principle, pursued through financial regulation, supervision, and banks' and financial institutions' voluntary actions.

But it is not so obvious why this is the case. If markets were able to internalize environmental costs and risks fully, these should be adequately priced by financial institutions and banks. The allocation of credit and other financial resources would then reflect such costs and risks. And if there were, as there are market failures, these should be addressed by policy instruments targeted explicitly to reducing emissions, like carbon pricing or other fiscal tools, so that financial institutions could then face and respond to adequate pricing signals.

Moreover, by affecting the allocation of assets in terms of their environmental intensity, financial regulations also influence their risk mix. Polluting activities or activities potentially exposed to climate change face physical (environmental damage) and transitional (change in regulation) risks. But green assets are frequently based on new and untested technologies. Hence they are also risky. The ideal mix between these two types of risk

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should in principle be identified by the objective function of policy makers or social planners, not necessarily by financial regulators.

So, why is there a need for an environmentally-focused action in financial and banking markets? This is one of the two questions addressed in this issue of European Economy. The other one, is how this should and is being done, especially through regulatory and supervisory frameworks, voluntary actions and standards for measuring and disclosing climate and environmental risks.

As for the why, a simple argument is that climate-related risks could impair the ability of central banks to achieve their mandated objectives, for example because climate change and mitigation policies may affect inflation dynamics and also financial stability, as discussed by Campiglio and Lamperti in this issue. Consequently, central banks could directly target green financial instruments in their asset purchase actions.

At the same time, central banks, along with other mandated authorities, could affect the market behaviour of banks and financial institutions through regulatory and supervisory tools. Four other arguments support this type of action.

The first one is that environmentally stringent regulation for financial institutions is less politically costly to be put in place than fiscal instruments affecting the generality of businesses and consumers. Paradoxically, even though nowadays no political party could be elected without a platform explicitly addressing climate change, fiscal tools raising the prices of fossil fuels can give rise to massive political resistance and turmoil, see for example the uprising of the Gilets Jaunes movement in France following a fiscally induced slight increase in fuel prices. At the same time, an effective carbon taxation should be global and fully harmonized through border adjustments. In this respect, a coherent global policy alignment is difficult to implement and faces a lot of resistance, as shown by the recent, pretty generic commitments reached during the United Nation Conference on Climate Change, Cop 26 conference. These policies are necessary of course, but they are not there yet.

Financial institutions are easier to regulate. There is consensus on the need to reduce the riskiness of financial markets in itself, and on the fact that climate change raises high physical risks (e.g. environmental disasters) and transitional risks (e.g. changes in regulation and consequent stranded assets).

In that respect, especially banks, have an issue of legacy stranded assets that regulators are bound to face, for example in fossil fuels. Investors are also increasingly sensitive to the pursuance of ESG objectives and are in favour of stringent environmental targets. The risks of investing in green technologies are certainly sizeable and frequently uncertain, but the pressure toward the environmental transition partly reduces the perception of such risks.

A second reason for targeting financial markets is that since fiscal tools are not yet (or are just partially) in place, or in the end they cannot be fully enforced, and consequently market prices do not adequately internalize environmental costs and risks, there is a need for a rapid action, which can more easily be taken by directly targeting financial markets. The mitigation of both physical and transitional risks in asset allocation can more effectively be achieved through financial regulation in the short/medium term. The following section of this editorial discusses this issue at length.

A third one, is that the financial effort required to achieve environmental targets and mitigate climate change is enormous and all resources must be mobilised towards this goal as soon as possible, pressing financial markets in this direction even beyond what would be achievable with mere fiscal incentives.

Fourth and finally, as discussed below, there are failures that cannot be targeted by fiscal instruments and directly pertain to financial markets and interact with pure environmentally induced market failures. For example, credit constraints induced by asymmetric information. Also, De Haas and Beyene et al. in this issue discuss at length how banks generally price environmental risks less than capital markets and how this is also related to the limited perception that depositors, in contrast to direct investors, have on the allocation of banks' assets. The last part of this editorial will discuss the role of banks vs. capital markets in financing the environmental transition.

As for the how, several contributions in this issue discuss the regulatory and supervisory frameworks adopted or planned (Beyene et al., Mikkelsen et al. and Marullo Reedtzt). These, in general, pertain to several domains. First the definition of shared criteria for the measurement and disclosure of the environmental risk, both concerning assets with implicit physical riskiness and those involving transitional costs. Second, the evaluation and inclusion of such risks by financial institutions in their risk appetite frameworks and in supervisory actions and stress tests and the provision by supervisors of clear guidelines. Third, a balanced

use of regulatory tools like capital requirements, on the one hand to favour asset allocation towards sustainable investments and, on the other hand, to reduce the risk of rapid divestment from established fuel intensive assets.

The issue focuses especially on the actions of EU institutions, initially triggered by the EU Commission Action Plan on Financing Sustainable Growth in March 2018 and which involves the European Central Bank (ECB), the European Banking Authority (EBA).

Also important are frameworks which imply a voluntary action by financial institutions. In particular, the Task Force on Climate-related Financial Disclosures (TCFD) was established by the Financial Stability Board (FSB) for climate related disclosures and the Net-Zero Banking alliance, which now involves all major financial players. There is an open issue of how far these voluntary arrangements should become compulsory in the longer term.

In what follows, we develop the arguments for why financial regulation should address environmental issues and discuss the different position of banks and capital markets as recipients of such regulatory frameworks.

## **2. Why financial regulation?**

Problems of sustainability of economic decisions are inherent problems of adverse external effects: “the negative effect of production, consumption, or other economic decisions on another person or party, which is not specified as a liability in a contract” (Core, 2017) and therefore is not taken into consideration by a selfish profit or utility maximizing economic agent.

Consider the most debated one: emissions of greenhouse gases causing global warming (Stern and Stern, 2007). Like any other type of pollution, it is a negative externality. Negative externalities have been thoroughly analysed in the economic literature. Two leading solutions have been proposed: limits to production and taxation. Indeed, the most obvious solution in front of a polluter is to force him to stop. But this is an oversimplification because the social costs of completely halting the activities of a polluter can often be higher than the benefits (if Pfizer were marginally polluting to produce vaccines, we would probably be unwilling to force its closure). Welfare maximization requires comparing costs and benefits and set any quantitative

limit to production at the level that equates the marginal social costs of production with the marginal benefits. However, this is more easily said than done, especially when producers are in large numbers – coordination on quantity limitations is complex among countries, let aside among single firms – and when the adverse external effects are not instantaneous but delayed in time, as in the case of global warming.

Fixing precise limitations to any activity that generates external effects and imposing them on each economic agent is clearly infeasible. A first option to circumvent this problem is cap and trade policies, i.e. to define a measure of the negative external effect (e.g., tonne of carbon emissions) and price them (see Campiglio and Lamperti in this issue). Once this is done, these policies can go a long way in solving the coordination problems of quantity limitations by allowing firms to trade the right to emit among themselves. Although the decision on how to initially allocate these rights is not obvious, the outcome is efficient, because those firms who incur the lower costs to reduce emissions have the higher incentive to do so. At the same time, the total amount of rights to emit that are granted allows to control the aggregate level of emissions.

Taxation is the alternative to impose quantitative limits, directly or through cap-and-trade policies. Set a Pigouvian tax equal to the marginal external cost – the difference between the (possibly delayed) marginal social cost and the private social cost – and profit maximizing firms will automatically choose the socially optimal production level. Taxation allows to force economic agents to internalize the external effect of their actions, leading to an optimal aggregate level of carbon emissions. According to this view, the optimal strategy to limit greenhouse gas emissions – or any other external effect in production or consumption – is to levy a Pigouvian tax. As such, there is no need to adopt indirect strategies, such as regulations in the financial markets making the cost of funding dependent on how “green” an investment is, so as to “reorient capital flows towards sustainable investment in order to achieve sustainable and inclusive growth” (EU Commission, 2018).

However, there are at least two main problems with this prescription. One is the interaction of the external effects with other features of the economic system, such as imperfections in financial markets. The other is the evaluation of the joint riskiness of both the impact of the negative external effect (e.g., global warming) and the actions addressing it.

The case of imperfections in the financial markets is relatively straightforward. Consider two firms that must decide whether to invest in adopting a greener production technology. To simplify the analysis, assume for the moment that such technology is readily available, and its cost and benefits are known. One incurs lower costs to adapt to the new technology, but due to credit constraints, it faces high borrowing costs and prefers to renounce investing. The other firm has low borrowing costs, but it is also unwilling to invest since it faces high adaptation costs. Taxing carbon emissions would increase the costs for both firms if they did not invest in acquiring the new technology. The firm facing high adaptation costs may be forced to make the investment, despite the higher adaptation costs, while the credit constrained one may still find unprofitable to invest. An alternative policy, introducing incentives to finance green investments, would instead reduce the borrowing costs for the credit constrained firm, making it more likely to invest in green technology. For reasonable ranges of the differences between the costs of adopting the new technology and the borrowing costs for the two firms, it is possible that financial market regulation allows to achieve a lower level of emissions with the same impact on production. Regulations favoring investments in greener productions or technologies may thus be more effective than directly taxing emissions.

The issue of riskiness is two-faceted (on this theme, see also Campiglio and Lamperti in this issue). On the one side, there is a legacy problem: economic activities started when the global warming problem was underestimated (and therefore Pigouvian taxes were not introduced) can suffer significant losses, causing a surge in the riskiness of the existing portfolio of investments. On the other side, there is a perspective problem because the development and adoption of environmentally sustainable technologies require large investments, typically involving a high riskiness of both private and social returns.

The consequences of the permanent increase in average world temperature caused by greenhouse gas emissions are the object of an intense debate among scientists. Their economic effects are also the focus of a growing body of research (Cruz Álvarez and Rossi-Hansberg, 2021). It seems unquestionable that exceptional risks loom ahead.

From a portfolio management perspective, the problem is whether these risks are priced correctly by investors, particularly by financial intermediaries.

If global warming led to extreme events causing radical changes in the economic system – from severe weather conditions to substantial relocations of economic activities – the value of assets held by financial intermediaries would collapse. If provisioning to face these risks was insufficient, a financial crisis would likely unfold. As already seen with the global financial crisis of 2007-2008, this may cause monetary policy problems, calling for radical interventions by central banks.

Provisions may be inadequate for two main reasons. First, investors may be unable to collect and process the vast amount of information required for a sound assessment of the risks caused by global warming. A possible solution would then be to elaborate and provide information on the risks caused by global warming to economic activities, to help investors accounting for their effects in their decisions. As argued by Degryse et al. in this issue, this is already happening, at least in part.

Second, the investors and especially financial intermediaries may not have the right incentives to set aside adequate provisions if they believe that the effects of global warming will be so pervasive to require in any case an intervention by public authorities. We can dub this as a “too-pervasive-to-face” problem. The obvious response to such a scenario is to introduce specific regulations of financial markets forcing intermediaries to cover the risks caused by global warming adequately.

In principles, the rationale for such interventions is not to sustain the funding of investments in greener technologies but to cover the risks caused by greenhouse gas emissions. In fact, such risks may even be unrelated to the production of negative external effects, depending only on how much the existing economic activities are exposed to the consequences of such effects. In practice, requiring higher provisions to cover the risks of the activities more severely affected by global warming will also impact on the allocation of portfolios towards greener investments. First, corporations such as airlines both produce negative external effects and are affected by events extreme weather events caused by global warming. Second, the likely introduction of a Pigouvian tax on polluting corporations is itself a risk that regulations will ask to cover, making it less profitable to conduct these economic activities.

The second type of risk is related to developing and adopting “green” technologies, which is an effective alternative to reducing the level of

production in industries that negatively impact the environment. The question is how much shall we invest in this endeavour? Welfare maximization requires comparing the cost of developing and adopting these technologies with the benefit that they guarantee in reducing the external costs. However, both costs and the benefits entail significant risks, which are difficult to evaluate, making it difficult to find the funding required for such investments (as in the well-known cases of R&D financing) especially by financiers like banks and traditional investment funds. In complete and perfectly working financial markets, a Pigouvian tax increases the costs of production, providing an incentive to reduce its levels and, therefore, those of greenhouse gas emissions.

However, Pigouvain taxation may be more challenging to organise, and it can create an additional layer of uncertainty, related to its application through time, relative to a financial regulation that favours financing the development and adoption of greener technologies. As discussed in more detail in the next session, differences in risk aversion across financiers can also impact the adoption and development of green technologies.

### **Banks vs. markets**

Finance and investments are necessary ingredients for a swift green transition. This observation naturally begs the question about the most effective ways to finance the investments that the green transition requires. This question has no unique answer, as it depends on the characteristics of the investing firms and the type of investments. The heterogeneity of firms and investments relevant to the green transition explains some of the mixed results identified in the academic literature and discussed in the articles in this issue of *European Economy*. We identify three critical factors for financing investments in general and the green transition in particular.

First, to understand the role of finance in the green transition, one needs to move away from the ideal world of the Modigliani and Miller theorem, where the source of finance does not matter for firms (value). In a realistic realm, the “pecking order theory” for finance (Myers and Majluf, 1984, for its adverse selection incarnation and Jensen and Meckling, 1976, for the cost-of-agency one) provides a first helpful step in understanding how firms finance

different investments. Ample empirical evidence shows that to address issues of asymmetric information and reduce the cost of financing, firms first rely on retained earnings as the cheapest source of funds and then on external finance, first debt and then equity, with increasing financing costs that reflect the higher associated risk for the external parties.

A second relevant element is that the mentioned hierarchy of financing sources adapts to the “financial growth cycle” of the investing firm and its characteristics, such as size and actual and prospective growth. For example, small start-ups with high growth potential and high risk very often rely on venture capital and private equity.

A third key point is the nature of the investments needed for the green transition. Simplifying and relying on the articles on the present issues of the European Economy, we can identify two types of investment: one aiming at drastic innovations and another helping polluting firms start coping with and reducing their emissions using existing technologies. These types of investments are different. The former is much riskier as it aims at delivering new technologies with a long investment span. The latter is less so and could be seen as “retrofitting” or adapting existing production activities with abatement technologies. Also, the output of the former type of investment is typically intangible, such as with intellectual property rights and trade secrets. Instead, that of the latter is incorporated in production assets, such as renewable energy generation. As we further explore below, these critical differences in risk, investment span, and intangibility have material implications for funding different parts of the green transition.

Combining all these factors, the hierarchy in cost of finance, the characteristics of the investing firms, and the types of investments offers a rich picture to understand how and to what extent sustainable finance can contribute to the green transition. In particular, we are interested in understanding which type of finance is better suited to provide funds for the green transition. Given our three key elements, it is clear that the answer to this question depends on the possible matches between the alternatives, in particular (i) the source of funding, e.g., banks or financial markets, (ii) the characteristics of the investing firm, e.g., established firms or high-growth potential start-ups, and (iii) the type of green investment, e.g., new technologies or existing abatement technologies. The possible matches of the factors (i)-(iii)

provide 2x2x2 combinations, some of which are more apt to finance the green transition than others.

In particular, in light of these observations, banks may face relevant issues in financing green investments when associated with certain matches combining points (i)-(iii) discussed above. A first specific problem often mentioned is that the green transition operates in a pre-existing environment where banks provide funds to firms, typically relying on debt contracts and associated collaterals. The green transition is intended to shift activities from pre-existing ones to more environmentally friendly ones. This transition tends to reduce the value of pre-existing technologies and associated assets that banks hold in their accounts. Banks may thus prefer not to contribute with their actions that may accelerate this devaluation of assets and collateral related to dirtier technologies. This observation, also discussed in Degryse et al. and De Haas in this Issue of the European Economy is reminiscent of what we have observed with the Non-Performing-Loans(NPL) crisis a few years ago, where banks avoided for quite some time the write-down of bad debts (see the European Economy 2017 issue n. 1). Although unilaterally, the fear of the risk of an adverse market reaction was understandable, collectively, keeping NPL in banks' balances contributed to a general instability of the whole sector and required prompt policy interventions.

The problem of pre-existing lending to non-clean investments shares some similarities with NPL and some significant differences. In particular, although NPL banks had clear individual incentives to keep inflated asset values, with the green transition, it is difficult to imagine that each bank individually anticipates and fears the devaluation effects in legacy portfolios and hence perceives the risk of the transition of its lending to innovative green technologies. For example, Beyene et al. (2021) show that banks continue to underprice the risk of asset devaluation for traditional investment due to the green transition, which seems odd with a bank' strategy of limiting entry green innovative firms with credit rationing. Relatedly, other banks' characteristics contribute to their attitude towards green investment. Since banks tend to have a shorter investment time horizon than equity markets, they consequently tend to care less for possible future devaluation of assets associated with a high-carbon footprint. In this respect, capital markets seem more apt for prompt corrective action incorporating the increasing environmental risks.

Traditional banks also perceive less pressure to adapt to changing needs and preferences of ultimate funders, in their case depositors, as compared with investment funds. Although attention toward cleaner activities and investments is increasing, traditional banks offer a bundle of many different services to depositors, which may dilute the perception by depositors of the greenness of banks' asset allocation. Relatedly, the actual exposure of banks towards polluting activities and or the fossil fuel sector is not readily available to banks depositors, as emphasized in Beyene, Delis, and Ongena in this Issue of European Economy. On the contrary, when investors patronize investment funds, the link between the funded projects and the investors' preferences is more direct and visible. Relatedly, the universal-service characteristic of traditional banks makes it more difficult for banks' management to keep track of the specific technologies adopted by the firms they lend to. This limited knowledge may ultimately weaken banks' ability to invest in environmental-friendly innovations.

The different technologies relevant to the green transition can more or less fit what banks can effectively offer and handle. Banks can play a significant role in funding transition investments that allow firms to "retrofit" and adapt their production process towards cleaner approaches. In these cases, borrowers' traditional assets can offer collaterals that banks can rely on for lending. Instead, financing the developments of drastic innovations for new green technologies may be problematic for banks because these types of innovations typically produce intangible outputs such as patents and trade secrets. As with any type of R&D intense investments, when the outcomes of the investments are intangible and thus non-pledgeable, banks can provide limited funding sources, and capital markets are more apt to address these environments. This is also convincingly emphasized by the papers of De Haas and Degryse et al. on this Issue of European Economy, which illustrate that green patented innovations expand faster in countries where equity finance is more prominent compared with bank lending. This observation is particularly relevant for bank-centric Europe that should channel as much as possible equity funding towards environmental innovations, possibly also rebalancing tax biases in favour of equity rather than debt.

How effective are banks dealing with polluting firms? There is some evidence that banks can price loans incorporating environmental impact. Chen

et al. (2021) show that firms that emit more pay higher interest rates than banks, primarily when emissions are associated with more risky borrowers and weak governance. However, the question is whether banks are better able than capital markets to price environmental risks correctly. As discussed by De Haas in this Issue of *European Economy*, access to credit per-se favours investment in cleaner technologies, although the most relevant factor seems instead the quality and attitude of firms' management towards environmental issues. Moreover, since banks continue to underprice the risk of asset devaluation for traditional investment, firms relying on carbon-heavy technologies are currently moving away from bonds to bank credit, as documented by Beyene et al. (2021b).

Interestingly, both De Haas and Degryse et al. in this Issue of *European Economy* have shown that the best outcomes from the credit markets obtain when "green-meets-green," when banks explicitly commit to green lending match with environmental conscious borrowers that effectively disclose their attitude. In these cases, mutual commitment and disclosure on the two sides of the credit market allow for a cheaper lending cost. An immediate policy implication seems thus that of facilitating credible disclosure of the environmental attitude of both sides of the credit market.

Overall, banks' difficulty in correctly pricing environmental risks combines several elements, as argued above. The articles in this issue of *European Economy* provide several policy actions that could redress this problem. Essential in this direction will be improving transparency and disclosure requirements about actual exposure to polluting industries and environmental risks. Moving from a voluntary approach (prone to manipulation and cherry-picking, as shown in Bingler et al. 2021) towards mandatory requirements, such as recently announced by New Zealand, the United Kingdom, and Switzerland seems a fundamental step.

### **3. Conclusions**

In principle, Pigouvian taxation could fully internalize environmental costs and risks, making it useless to introduce ad hoc financial regulations (see Cochrane, 2021, for a view along these lines). But to attain a more sustainable

equilibrium in the presence of other market failures, policy interventions in the financial markets can be an effective complementary tool to Pigouvian taxation.

Two main types of interventions have been proposed and are being put in place (see, in particular, Marullo Reedtz and Mikklesen et al. in this issue for a comprehensive analysis). First, the provision of rigorous and standardized information to investors, through the definition of criteria for the measurement and disclosure of environmental risks (e.g., the Taxonomy Regulation of the EU, the Sustainable Finance Disclosure Regulation, the Regulation on European green bonds), and the requirement that large public-interest entities publicly report on sustainability issues (e.g., Directive 2014/95/EU). Second, the explicit inclusion of environmental risks in the bank supervisory framework, including capital requirements and stress tests (e.g., EBA's Implementing Technical Standards on Pillar 3 disclosures on ESG risks), and in central bank's analyses (e.g., ECB's Guide on climate-related and environmental risks).

The ample set of policies proposed in the financial sector will be paralleled by more traditional interventions addressing the effect of negative externalities through taxation and quantitative limitations. These will also impact investment returns (see also the discussion in Giovannini and Tamburrini, in this issue). Overall, the impact on the entire financial industry will be pervasive, affecting the choices and performance of banks, investment funds, insurance companies, and retail investors.

A natural set of questions thus arises. What objective function is driving this process? Who has chosen this objective function? Who is controlling that, when enacted simultaneously, the selected policies point in the right direction to achieve the desired goals?

The answer to the first question is apparently easy: the objective of all proposed policies is to internalize the adverse external effects that make individual choices unsustainable. But this goal requires a precise quantification of the social surplus to be maximized, a daunting task in any welfare analysis. In the absence of a unique solution, the objective function to be maximized should be chosen by citizens, following a democratic process. This observation leads to the answer to the second question that elected governments should determine the objective function to be maximized. While

it may be largely agreed that the mandate of financial regulatory authorities reflects the government's will for financial stability and the general working of financial markets, that such a mandate also reflects government choices on environmental issues is not so obvious. This may call for stricter directives from governments to financial authorities on environmental issues so as to enhance their accountability.

The last question has apparently no answer. Different bodies define different sets of rules, often with a large degree of autonomy. But a body or a framework coordinating the different policies and controlling that their decisions are not contrasting is absent. Given the large number of proposed and implemented interventions, the risk of a lack of coordination is substantial. This calls for a coordination table on environmental issues among all interested bodies. This framework should be set at the European level. In addition, given the global scope of environmental issues, it should be organized at the world level (see also Panetta, 2021).

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## References

- Beyene, W., Delis, M., and Ongena, S. (2021a). Disclosure of Bank Fossil Fuel Exposures. *European Economy – Banks, Regulation and the Real Sector, this issue*.
- Beyene, W., de Greiff, K., Delis, M., and Ongena, S. (2021b). Too-Big-To-Strand: Bond to Bank Substitution in the Transition to a Low-carbon Economy, Swiss Finance Institute, Mimeo.
- Bingler, J. A., Kraus, M., and Leippold, M. (2021). Cheap Talk and Cherry-Picking: What ClimateBert Has to Say on Corporate Climate Risk Disclosures, University of Zürich, Mimeo.
- Bowles, S., Carlin, W. and Stevens, M. (2017). 'Market, efficiency, and public policy'. Unit 12 in The CORE team, *The Economy*. Available at: <https://www.core-econ.org>. [Accessed on April 17<sup>th</sup>, 2022].
- Campliglio, E., and Lamperti, F. (2021). Sustainable finance policy-making: Why and how. *European Economy – Banks, Regulation and the Real Sector, this issue*.
- Chen, I-Ju, Iftekhar Hasan, Chih-Yung Lin, Tra Ngoc Vy Nguyen, 2021, Do Banks Value Borrowers' Environmental Record? Evidence from Financial Contracts, Working paper.
- Cochrane, J.H. (2021). Testimony of John H. Cochrane to US Senate Committee on Banking, Housing, and Urban Affairs. Available at: <https://www.banking.senate.gov/download/cochrane-testimony-> [Accessed on April 17<sup>th</sup>, 2022].
- The CORE Team (2017). *The Economy: Economics for a changing World*, Oxford University Press.
- Cruz Álvarez, J.L. and Rossi-Hansberg, E. (2021). *The Economic Geography of Global Warming*. NBER Working Paper Series, No. 28466. Cambridge, MA: National Bureau of Economic Research.

- De Haas, R. (2021). Finance and firms on the road to net zero. *European Economy – Banks, Regulation and the Real Sector, this issue.*
- Degryse, H., Goncharenko, R., Theunisz, C., and Vadasz, T. (2021). The green transition and bank financing. *European Economy – Banks, Regulation and the Real Sector, this issue.*
- European Commission (2018). *The Action Plan for Financing Sustainable Growth.*
- Giovannini, A., and Tamburrini, F. (2021), Sustainable Finance: Three Questions in Search of an Answer. *European Economy – Banks, Regulation and the Real Sector, this issue.*
- Jensen, M.C., and Meckling, W.H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3: 305-360.
- Mikkelsen, D., Viscardi, S., Montes, M., and De Amicis, F.P. (2021). Climate change regulation and supervision in Europe and implications for commercial banks. *European Economy – Banks, Regulation and the real Sector, this issue.*
- Marullo Reedtz, P. (2021). Financing the environmental transition in Europe. *European Economy – Banks, Regulation and the real Sector, this issue.*
- Myers, S.C., and Majluf, N.S. (2021). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13: 187-221.
- Panetta, F. (2021). A Global Accord for Sustainable Finance. Available at: <https://www.project-syndicate.org/commentary/sustainable-finance-global-taxonomy-agreement-by-fabio-panetta-2021-05> [Accessed on April 17<sup>th</sup>, 2022].
- Stern, N., and Stern, N.H. (2007). *The economics of climate change: the Stern review.* Cambridge University Press.

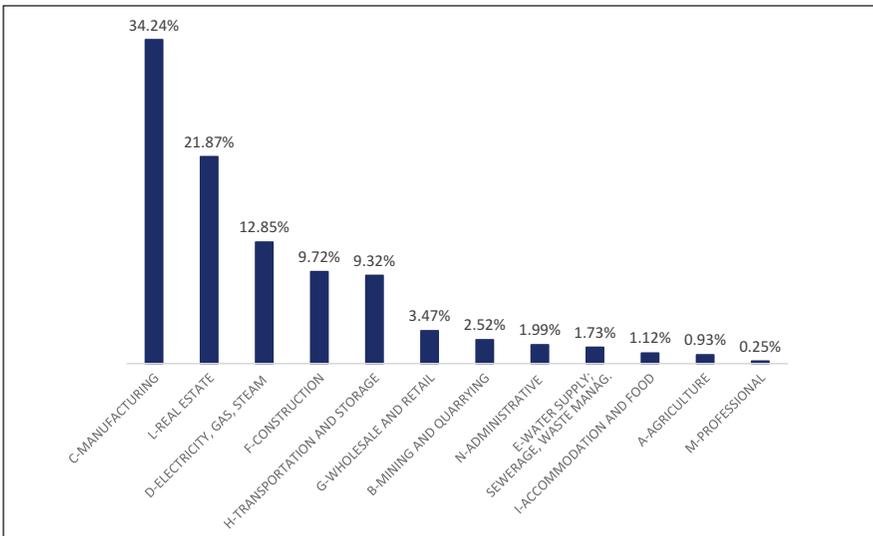


# Numbers

by José Manuel Mansilla-Fernández<sup>4</sup>

## A sector-based classification approach

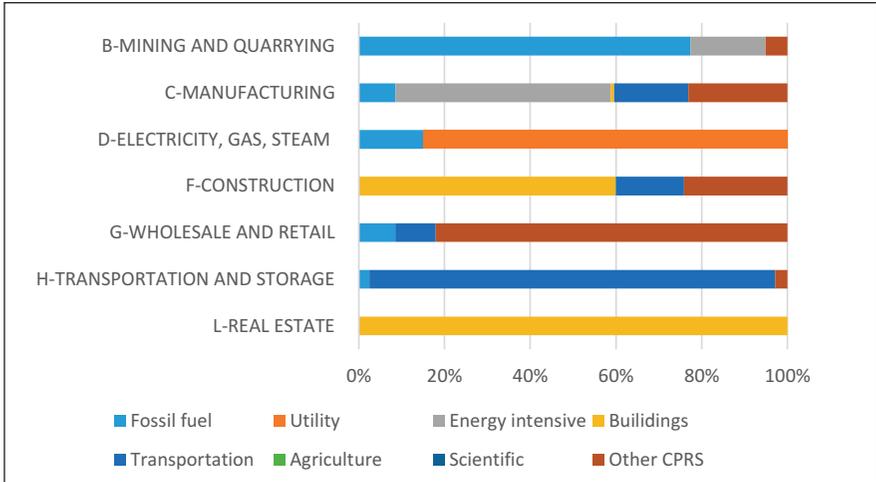
Figure 1. European banks' exposure towards climate-policy-relevant sectors.



Notes: Own elaboration based on the classification of climate-policy-relevant sectors (CPRS) proposed by Battiston et al. (2017)<sup>5</sup> applied to EU banks' exposures provided by EBA. The CPRS consists of 8 categories, with different incidence in each sector: 1. Fossil fuel, 2. Utility, 3. Energy-intensive, 4. Buildings, 5. Transportation, 6. Agriculture, 7. Finance and 8. Others. Exposures to categories 1 to 6 are defined as those that may be affected by climate transition risks. The total value of expositions is of 2,346.53 billion of euros.

4. Public University of Navarre and Institute for Advanced Research in Business and Economics (INARBE).  
5. Battiston, S., Mandel, A., Monasterolo, Schütze, F and Visentin, G. (2017). A climate stress-test of the financial system. Nature Climate Change 7: 285-288. DOI: <https://doi.org/10.1038/nclimate3255>

**Figure 2: European banks' exposure towards climate-policy-relevant sectors by category of climate transition risk.**

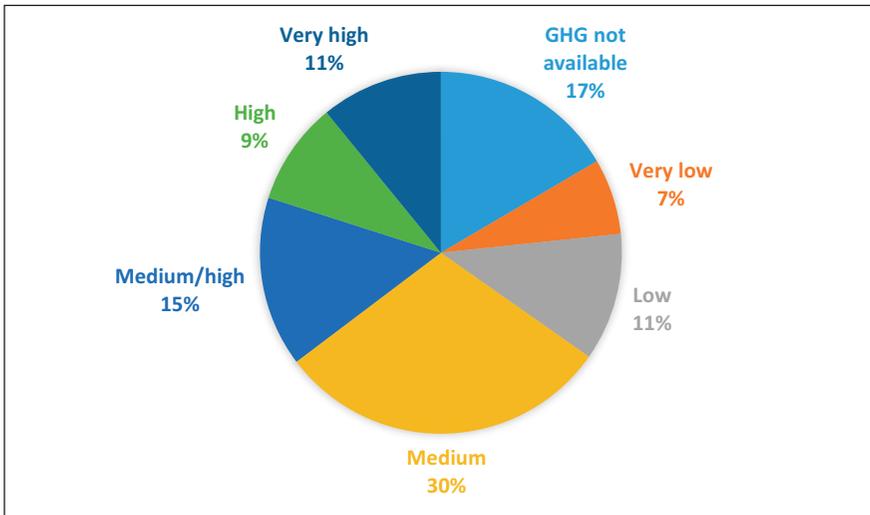


Notes: Based on the classification of climate-policy-relevant sectors (CPRS) proposed by Battiston et al. (2017)<sup>6</sup> applied to EU banks' exposures provided by EBA. The CPRS consists of 8 categories, with different incidence in each sector: 1. Fossil fuel, 2. Utility, 3. Energy-intensive, 4. Buildings, 5. Transportation, 6. Agriculture, 7. Finance and 8. Others. Exposures to categories 1 to 6 are defined as those that may be affected by climate transition risks. The total value of expositions is of 2,346.53 billion of euros.

6. Battiston, S., Mandel, A., Monasterolo, Schütze, F and Visentin, G. (2017). A climate stress-test of the financial system. Nature Climate Change 7: 283-288. DOI: <https://doi.org/10.1038/nclimate3255>

### A greenhouse gas (GHG) emission-based classification approach

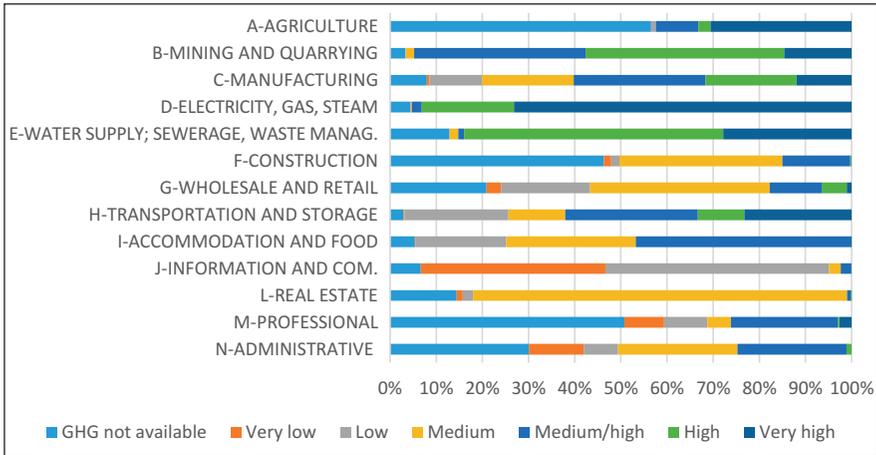
Figure 3: European banks' exposure according to greenhouse gas emission intensity



Notes: Based on EBA. Greenhouse emission intensity buckets applied to EU banks' exposures provided by EBA. Buckets are defined based on percentiles of the distribution of greenhouse gas, produced by Trucost (S&P Global) <https://www.trucost.com> (see the table below). The total value of expositions is of 2,346.53 billion of euros.

GHG intensity (X-axis)	
Level	Range
Very low	$GHG \leq P10$
Low	$Q1 \geq GHG > P10$
Medium	$Median \geq GHG > Q1$
Medium/high	$Q3 \geq GHG > Median$
High	$P90 \geq GHG > Q3$
Very high	$GHG > P90$

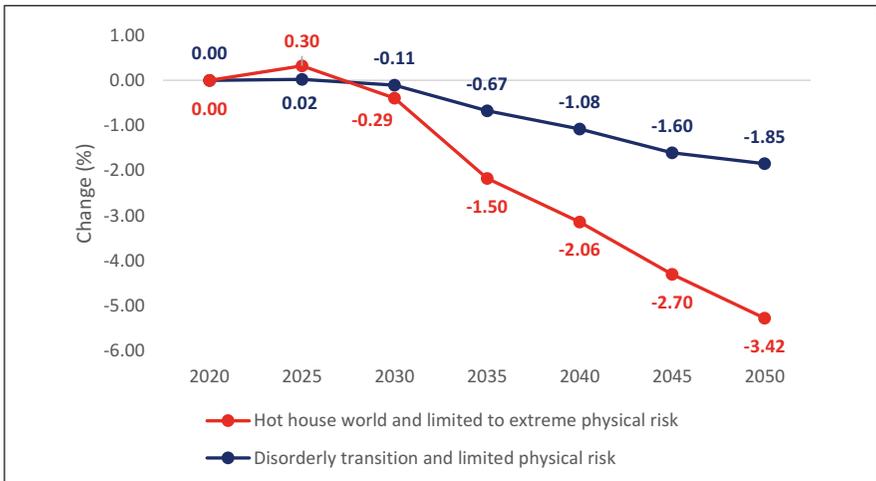
Figure 4: European banks' exposure according to greenhouse gas emission intensity and sector.



Notes: Based on EBA.

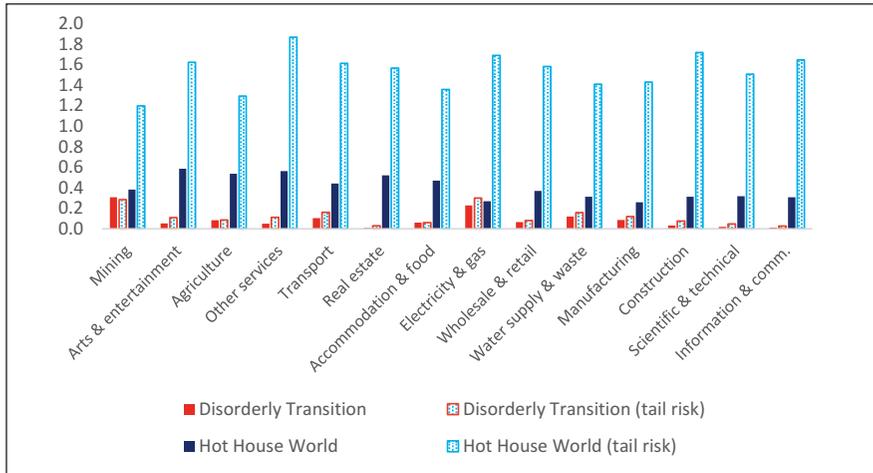
### A scenario analysis

Figure 5: GDP evolution under different climate scenarios.



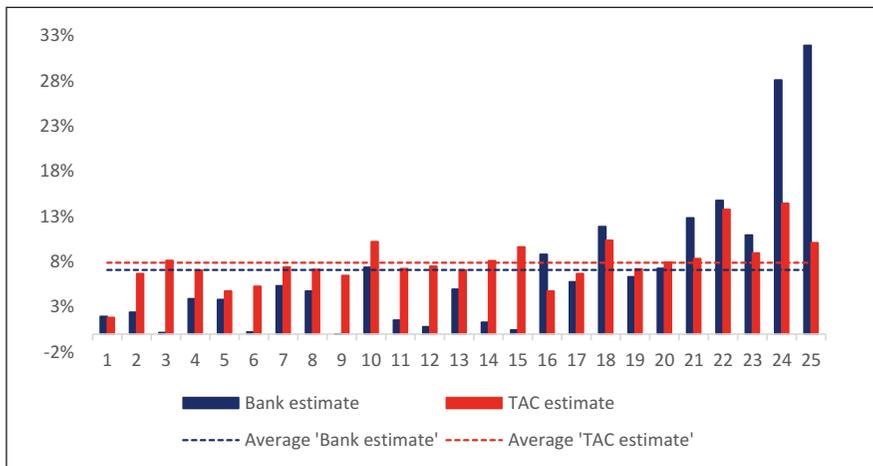
Notes: Based on the EBA. The two scenarios represent the difference with respect to orderly transition, and they are built using the parameters sourced from the new ECB climate risk stress test framework, which includes the impact of both the transition and physical risks. The 'disorderly' scenario is associated with relatively high costs from a delayed/ineffective transition, and the 'hot house world' scenario is when no policies are implemented and natural catastrophes might occur.

Figure 6: Changes in firm-level probability of default with respect to the orderly transition scenario (2020 to 2050).



Notes: Based on EBA. Full bars represent the average increase in the probability of default across firms; dotted bars the increase for firms that are more vulnerable to physical risk. The two scenarios represent the difference with respect to orderly transition, and they are built using the parameters sourced from the new ECB climate risk stress test framework, which includes the impact of both the transition and physical risks. The 'disorderly' scenario is associated with relatively high costs from a delayed/ineffective transition, and the 'hot house world' scenario is when no policies are implemented and natural catastrophes might occur.

Figure 7: Green asset ratio.



Notes: Based on the EBA. The green asset ratio is constructed for each bank by dividing the green exposure – available only for a subset of exposures – by the total original exposure. The green amount is constructed using either bank's self-reported data or TAC estimates.



# Institutions

by José Manuel Mansilla-Fernández

## Recent international commitments to climate change

The United Nations (UN hereafter) **Climate Change Conference (COP26)**, which was held in Glasgow (UK), brought together many of the world's leaders to address concerning issues related to climate change. The headline decision of COP 26 was the **Glasgow Climate Pact**, an initiative of the UK COP Presidency to capture progress beyond the formal agenda. The **Intergovernmental Panel on Climate Change (IPCC)** released a report in 2018 that identified that global emissions would need to reduce to zero level by at least 2050 to retain a 'high-confidence' level to limit the rise of temperatures to sustainable levels (Masson-Delmotte et al., 2018). The US Treasury Secretary Janet Yellen stated that "rising to this challenge will require the wholesale transformation of our carbon-intensive economies" and that "addressing climate change is the greatest economic opportunity of our time." (COP26, 2021; Depledge et al., 2022).<sup>7</sup>

On the heels of the COP26 Finance Day, the banking industry leaders also met in Glasgow to discuss the leadership role of the banking sector toward net-zero emissions. UN-convened **Net-Zero Banking Alliance** also committed to coordinating climate actions for financial institutions and aligning their

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7. The World Economic Forum and PwC released jointly the *Harnessing Technology for the Global Goals* report that identified the significant role that digital technology can play in improving resilience to global warming related, natural hazards, reducing emissions, and improving the ability for humans to take the necessary steps to achieve the zero net target (World Economic Forum & PwC, 2021).

lending and investments portfolios with zero-net emissions by 2050. At the time of writing this note, the Alliance brings together around 100 banks worldwide, representing over 40% of global banking assets. The Alliance acknowledges the crucial role of banks in supporting the transition of the real sector to a greener economy (see Beyene et al., *this issue*).

## The European Commission's sustainable finance strategy

The High-Level Expert Group on sustainable finance was created in 2016 and included members from the civil society, the financial sector, and the Academia from international institutions.<sup>8</sup> Notably, the 2018 group's final report established the pillars for the **Action Plan on Financing Sustainable Growth**, which is intended to develop the European Union's sustainable finance strategy and to incorporate environmental, social, and governance (ESG) considerations into the European financial system (European Commission, 2019, González-Martínez, 2021). The **Taxonomy Regulation** (Regulation (EU) 2020/852 of June 2020) is the cornerstone of the whole Action Plan since it establishes the classification system for the 'sustainable' economic activities.<sup>9,10</sup> Interestingly, the **EU Ecolabel** for retail financial products is dedicated to expressing investors' preferences regarding sustainability and the more straightforward access to sustainable products.

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8. The European Commission defines **sustainable finance** as the process of duly taking environmental and social contemplations into account when making long-term decisions in sustainable activities (European Commission, 2018). Accordingly, the so-called **Capital Markets Union** is a priority, and a key step for implementing the **Paris Agreement** and the **European Union's sustainable agenda**.

9. See also Regulation (EU) 2019/2088 and Regulation (EU) 2019/2089.

10. In this regard, the European Commission introduced two supplements. First, the **Commission Delegated Regulation (EU) 2021/2139** supplements Regulation 2020/852 by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives. Second, **Commission Delegated Regulation (EU) 2021/2178** supplements regulation 2020/852 by specifying the content and presentation of information to be disclosed by undertakings subject to Articles 19a or 29a of Directive 2013/34/EU, the methodology to comply with that disclosure obligation.

## Disclosures

The Financial Stability Board created the **Task Force on Climate-related Financial Disclosures (TCFD)**, which provides recommendations for assessing and reporting their climate-related strategy.<sup>11</sup> In particular, the final report makes sector-specific recommendations on how companies should disclose climate-related financial risks to inform better their investors, lenders, and insurers (Campiglio, 2016; Campiglio et al., 2018). Notably, the **PCAF Global Greenhouse Gas Accounting and reporting Standard for the Financial industry** offers detailed statistics on measures and disclose emissions for specific assets. The **Science Based Target initiative (SBTi)** published the **Financial Sector Science-Based Targets Guidance** which enables companies to set emissions reductions targets according to the foremost climate science (SBTi, 2021).

The European Commission adopted in April 2021 a proposal for **Corporate Sustainability Reporting Directive (CSRD)** that introduces stricter reporting requirements and widens the scope of applicability with respect to the existing non-financial reporting directive (NFRD). Furthermore, Regulation (EU) 2019/2088 will apply from March 2021. Regarding the development of a **European Union Green Bond Standard**, in early July 2021 the European Commission presented its proposal based on a voluntary framework that remarks transparency, the need for external review, and the European Securities and Markets Authority should supervise it.

Remarkably, integrating ESG risks into the **Supervisory Review and Evaluation Process (SREP)** performed under the Pillar 2 as not exempt from difficulties. However, the EC has considered these recommendations in developing the **EU Banking Package** that finalises the implementation of **Basel III** in Europe. Formally, Pillar 3 disclosure requirements are expanded from applying to large, listed institutions to all in the scope of the CRR (EBA, 2021; Marullo Reedtz, *this issue*). Importantly, as a part of the Pillar 3 disclosure and the NFRD, the **Green Asset Ratio** measures the “greenness” of the bank’s balance sheet, and it will allow investors and regulators to evaluate and foster

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11. Disclosures of the financial impacts of climate-related and environmental risks are crucial for achieving the transparency necessary to preserve market discipline. In other words, promoting peer pressure incentivizes companies to manage and diminish their individual risk (ECB, 2020).

new legislation toward green finance. Recently, in January 2022 the European Banking Authority (EBA) released the final draft of the *Implementing Technical Standards* (ITS) on Pillar 3 disclosures on ESG risks (Mikkelsen et al., *this issue*).

## The role of central banks

Globally, the **Network of Central Banks and Supervisors for Greening the Financial System** (NGFS) in December 2017 was aimed at defining and promoting good practices, conducting analysis, fomenting climate risk management in the financial sector, and mobilising funds needed for a transition towards a sustainable economy (NGFS, 2021). In Europe, the national central banks incorporate climate-related questions into their actions. Furthermore, central banks not belonging to the Eurosystem are even introducing environmental questions into their design of the monetary policy. Central banks have begun integrating sustainable and responsible investment (SRI) principles into their portfolio management (NGFS, 2019, 2020). Outstandingly, the European Central Bank is progressing in evaluating and limiting the potential aftermaths of climate change (ECB, 2021a,b; Reghezza et al., 2021). The European Central Banks is advancing on preparing and executing the ECB Thematic Review on Climate-Related and Environmental (C&E) Risks and the ECB Climate Stress tests that include transition and physical risks in a horizon of 30 years. Accordingly, the SSM included climate-related risks in its 2019 and 2020 roadmaps that draw up supervisory expectations for relevant banks (Alonso and Marqués, 2019; Gonzalez and Núñez, 2020, 2021).

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### References

- Alonso, A., and Marques, J.M. (2019). Financial innovation for a sustainable economy. Occasional paper No. 1916. Bank of Spain. Available at: <https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/PublicacionesSeriadadas/DocumentosOcasional/19/Files/do1916e.pdf> (Accessed on April 18, 2022).
- Beyene, W., Delis, M., and Ongena, S. (2021). Disclosure of banks fossil exposures. *European Economy – Banks, Regulation and the real Sector*, *this issue*.
- Campiglio, E. (2016). Beyond carbon pricing: The role of banking and monetary policies in financing the transition to a low-carbon economy, *Ecological Economics* 121, 220-230. DOI: <https://doi.org/10.1016/j.ecolecon.2015.03.020>

Campiglio, E., Dafermos, Y., Monnin, P., Ryan-Collins, J., Schotten, G., and Tanaka, M. (2018). Climate change challenges for central banks and financial regulators. *Nature Climate Change* 8, 462-468. DOI: <https://doi.org/10.1038/s41558-018-0175-0>

COP26. (2021). COP26 Goals. Available at: <https://ukcop26.org/cop26-goals>. (Accessed on April 18, 2022).

Depledge, J., Saldivia, M., and Peñasco, C. (2022). Glass half full or glass half empty?: The 2021 Glasgow Climate Conference, *Climate Policy*, 22, 147-157, DOI: 10.1080/14693062.2022.2038482

European Central Bank (2020). ECB report on institutions' climate-related and environmental risk disclosures. Available at: <https://www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.ecbreportinstitutionsclimaterelatedenvironmentalriskdisclosures202011-e8e2ad20f6.en.pdf> (Accessed on April 18, 2022).

European Central Bank (2021a). Climate-related risk and financial stability. ECB/ESRB Project Team on climate risk monitoring. Available at: <https://www.ecb.europa.eu/pub/pdf/other/ecb.climateriskfinancialstability202107-87822fae81.en.pdf> (Accessed on April 18, 2022).

European Central Bank (2021b). Detailed roadmap of climate change-related actions. Available at: [https://www.ecb.europa.eu/press/pr/date/2021/html/ecb.pr210708\\_1\\_annex-f84ab35968.en.pdf](https://www.ecb.europa.eu/press/pr/date/2021/html/ecb.pr210708_1_annex-f84ab35968.en.pdf) (Accessed on April 18, 2022).

European Commission (2019). Guidelines on reporting climate-related information. Available at: [https://ec.europa.eu/finance/docs/policy/190618-climate-related-information-reporting-guidelines\\_en.pdf](https://ec.europa.eu/finance/docs/policy/190618-climate-related-information-reporting-guidelines_en.pdf) (Accessed on April 18, 2022).

González-Martínez, C.I. (2021). Overview of global and European institutional sustainable finance initiatives. Bank of Spain. Available at: <https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/InformesBoletinesRevistas/ArticulosAnaliticos/21/T3/Files/be2103-art30e.pdf> (Accessed on April 18, 2022).

González, C. I., and S. Núñez (2020). Cambio climático y sistema financiero: una necesaria mirada al futuro. *Papeles de Economía Española* No 163, pp. 130-145. Available at: <https://www.funcas.es/articulos/cambio-climatico-y-sistema-financiero-una-necesaria-mirada-al-futuro-transicion-hacia-una-economia-baja-en-carbono-en-espana-2019-n-163/> (Accessed on April 18, 2022).

González, C. I., and S. Núñez (2021). Markets, financial institutions and central banks in the face of climate change: challenges and opportunities. Occasional Paper No. 2126. Bank of Spain. Available at: <https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/PublicacionesSeriadadas/DocumentosOcasionales/21/Files/do2126e.pdf> (Accessed on April 18, 2022).

Marullo Reedtz, P. (2021). Financing the environmental transition in Europe. *European Economy – Banks, Regulation and the real Sector, this issue*.

Masson-Delmotte, V., Zhai, P., Pörtner, H. O., Roberts, D., Skea, J., Shukla, P. R., and Waterfield, T. (2018). Global warming of 1.5C. An IPCC Special Report on the impacts of global warming of, 1(5).

Mikkelsen, D., Viscardi, S., Montes, M., and De Amicis, F.P. (2021). Climate change regulation and supervision in Europe and implications for commercial banks. *European Economy – Banks, Regulation and the real Sector, this issue*.

NGFS (2019). First comprehensive report. A call for action, April.

NGFS (2021). Annual Report 2020, April.

Reghezza, A., Altunbas, Y., Marques-Ibañez, D., Rodriguez d'Acri, C., and Spaggiari, M. (2021). Do banks fuel climate change? ECB Working Paper Series No. 2550. Available at: <https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2550-24c25d5791.en.pdf> (Accessed on April 18, 2022).

Science-Based Targets initiative (SBTi). 2021. Financial Sector Science-Based Targets Guidance Pilot Version 1.1, Science-Based Targets initiative (SBTi), Report. Available at: <https://sciencebasedtargets.org/resources/files/Financial-Sector-Science-Based-Targets-Guidance-Pilot-Version.pdf> (Accessed on April 18, 2022).

World Economic Forum & PwC (2021), Harnessing Technology for the Global Goals: A framework for government action, Accessed on 31st October 2021. Accessed at: <https://assets.2030vision.com/files/resources/wef-harnessing-technology-for-the-global-goals-2021.pdf?470b76352b> (Accessed on April 18, 2022).

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### Legislation cited

Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives. Available at: [http://data.europa.eu/eli/reg\\_del/2021/2139/oj](http://data.europa.eu/eli/reg_del/2021/2139/oj) (Accessed on April 18, 2022).

Commission Delegated Regulation (EU) 2021/2178 of 6 July 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by specifying the content and presentation of information to be disclosed by undertakings subject to Articles 19a or 29a of Directive 2013/34/EU concerning environmentally sustainable economic activities, and specifying the methodology to comply with that disclosure obligation. Available at: [http://data.europa.eu/eli/reg\\_del/2021/2178/oj](http://data.europa.eu/eli/reg_del/2021/2178/oj) (Accessed on April 18, 2022).

Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information by certain large undertakings and groups Text. Available at: <https://eur-lex.europa.eu/eli/dir/2014/95/oj> (Accessed on April 18, 2022).

European Commission (2019). Communication from the Commission — Guidelines on non-financial reporting: Supplement on reporting climate-related information (2019/C 209/01). Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52019XC0620%2801%29> (Accessed on April 18, 2022).

European Commission (2018). Communication from the European Parliament, the European Council, the Council, the European Central Bank, The European Economic and Social Committee of the Regions. Action Plan: Financing Sustainable Growth (COM/2018/097 final). Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52018DC0097> (Accessed on April 18, 2022).

Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088 (Text with EEA relevance) Available at: <https://eur-lex.europa.eu/eli/reg/2020/852/oj> (Accessed on April 18, 2022).

Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 on sustainability-related disclosures in the financial services sector (PE/87/2019/REV/1). Available at: <https://eur-lex.europa.eu/eli/reg/2019/2088/oj> (Accessed on April 18, 2022).

Regulation (EU) 2019/2089 of the European Parliament and of the Council of 27 November 2019 amending Regulation (EU) 2016/1011 as regards EU Climate Transition Benchmarks, EU Paris-aligned Benchmarks and sustainability-related disclosures for benchmarks (PE/90/2019/REV/1). Available at: <https://eur-lex.europa.eu/eli/reg/2019/2089/oj> (Accessed on April 18, 2022).

Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012 Text with EEA relevance. Available at: <http://data.europa.eu/eli/reg/2013/575/oj> (Accessed on April 18, 2022).



# A Bird Eye (Re)view of Key Readings

by José Manuel Mansilla-Fernández

This journal section indicates a few and briefly commented references that a non-expert reader may want to cover to obtain a first informed and broad view of the theme discussed in the current issue. These references are meant to provide an extensive, though not exhaustive, insight into the main topics of the debate. More detailed and specific references are available in each article published in the current issue.

## **On the relevance of climate change risks**

Understanding the effects of climate change on the financial system has emerged as one of the forefront issues globally (Hong et al., 2019, 2020). Climate change is believed to increase the frequency and intensity of extreme weather events, raise average temperatures, and rising sea levels. Importantly, climate change already impacts economic and financial outcomes, which might have negative repercussions on financial systems. Correlated risks from climate change shocks could have effects beyond individual banks and borrowers to the broader financial system and economy. In this regard, in the pricing of residential mortgages does not incorporate climate change risks, a sudden correction could result in large-scale losses to banks, leading to reduced lending supply and jeopardizing financial stability. The subsequent declines in wealth could amplify the effects of climate change on the real economy, thus producing knock-on effects on financial markets (Nguyen et al., 2021).

Financial institutions must assess their vulnerabilities to relevant climate risks, as well as risks' likely persistent and breadth, to be able to continue meeting the financial needs of households and companies when hit by disruptions caused by climate change. Remarkably, considering climate risks is relevant from the regulatory point of view. In this vein, the Federal Reserve created a dedicated supervision climate committee to observe the risks of climate change to individual banks. Likewise, the Bank of England expects its banks to understand and assess the financial risks related to climate change (Nguyen et al., 2021).

The recent studies are focused on exploring the *ex-post* effects of acute hazards, e.g., storms, floods, wildfires, on banks. In this regard, North and Schüwer (2018) show that natural disasters weaken financial stability. Similarly, Issler et al. (2020) find an augment in mortgage delinquency and foreclosure after wildfires. Ouazad and Kahn (2021) find that lenders are more likely to approve mortgages that can be securitized after hurricanes. Unlike acute hazards, the chronic ones -e.g., slow increases in sea levels- introduce the possibility that losses may arise from natural disasters. Despite the risk of chronic hazards causing losses, economists still know little about how such risks are priced *ex-ante* by banks. Consequently, more research is needed to understand how climate risk can be priced -ante by financial institutions, particularly the pricing of loans.

Interestingly, banks may not be able to price long-term climate change risks. The Board of Governors of the Federal Reserve System (2020a, b) states that banks' models still lack the necessary geographic precision or horizons to price climate risks. Another challenge can be uncertainty regarding the time horizon over climate risk can be materialized (Barnett et al., 2020). Furthermore, many banks still rely on traditional backward-looking models based on historical exposures, which might not adequately reflect climate risks' complex and continuous changing nature. Moreover, considering the set of risks that banks are currently facing -e.g., cybersecurity, geopolitical risks, and risks associated with the credit cycle-along with the relative long-term horizon around climate change and risk (Nyberg and Wright, 2015). For instance, sea levels rise is a non-conventional risk and therefore, lenders pay equal attention to this risk or incorporate it into their pricing loan decisions (Jiang et al., 2020).

## On carbon pricing and its repercussions on lending

Research on carbon risk is still embryonic. **Stranded assets** are physical assets whose value declines substantially due to climate risk. The carbon reduction requirements in the Paris Agreement and the policies oriented to fossil fuel firms might not be able to fully utilize their existing fossil fuel reserves (McGlade and Ekins, 2015), leading to a decline in the financial values of such reserves. The carbon risk from stranded assets in the fossil fuel industry can be priced, which constitutes an approach for assessing climate-related financial risks. However, carbon risk goes beyond stranded assets. Firms issuing large volumes of carbon are relatively more likely to suffer financial penalties if environmental policies tighten. Direct penalties can result from additional costs of carbon taxes on firms' emissions. These can apply to firms in all industries with a carbon footprint and are not limited to fossil fuels producers (Ehlers et al., 2021).

The pricing of carbon risk in the loan markets changed significantly after the Paris Agreement.<sup>12</sup> The difference in risk premia due to carbon emission intensity is apparently across industry sectors. Additionally, this phenomenon is broader than simply stranded assets in fossil fuel emissions or other carbon-intensive industries. Including loans fees and the premium is not prevalent in the years before the Paris Agreement, which increased banks' awareness of carbon risk (Krueger et al., 2020). However, Delis et al. (2021) assess syndicated loan data for fossil fuel firms to investigate whether banks price the risk of stranded assets.<sup>13</sup> They reveal that only after the 2015 Paris Agreement banks started pricing the risk of stranded assets related to fossil fuel reserves. Similarly, Kleimeier and Viehs (2018) also use syndicated loans data to investigate if firms voluntarily disclose their carbon emissions to the Carbon Disclosure Project, which allows them to reduce their cost of credit compared to non-disclosing firms. This result supports Antoniou et al. (2020), who theoretically find that loans spreads for firms participating in cap-and-trade

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12. See the Institutions section in this issue.

13. The corporate loan market, and specially the syndicated loans markets, constitutes an ideal laboratory to test hypotheses about the effects of climate change / risk on loan pricing, because banks that are the lead arrangers of syndicated loans are informed and incentivized to monitor, and data are widely available (Delis et al., 2021).

programs function the cost of compliance and the specific features of the permits markets. Using the EU Emission Trading System, which is designed to pass the cost of CO<sub>2</sub> emissions to polluters, this study suggests that the higher permits storage and lower permit prices, the lower firm financing costs.

Importantly, banks have started to internalize possible risks from the transition to a low-carbon economy across various industries. Krueger et al. (2020) suggest that carbon emissions indirectly caused by production inputs were not priced at the margin, suggesting that the overall carbon footprint is less of a concern to banks those direct missions. Likewise, Bolton and Kacperczyk (2021) find that the likelihood of disinvestment by institutional investors significantly augments with the degree and intensity of emissions directly attributable to firms. This suggests potential for 'green-washing' since the aforementioned emissions mentioned above can be reduced simply by outsourcing carbon-intensive activities without lowering the firm's carbon footprint (Ben-David et al., 2018).

### **On the impact of climate change on equity markets**

So far, research on the pricing of climate change risk, including carbon risk, has focused on the pricing of climate-related risks in **equity markets**. Recently, economists indicated that a **transition risk premium** in equity and option markets, which seems to be more pronounced in times of high climate change awareness. Mainly, the price of protection of option securities against the downside tail risk is higher for carbon-intense firms. In this regard, Bolton and Kacperczyk (2021) identify a carbon premium in the cross-section of the US stock market over the last decade. Particularly, the 2016 US climate policy shocks (the Trump election who appointed Scott Pruitt, a climate sceptic, as administrator of the US Environmental Protection Agency) provide additional evidence that firms' exposure impacts on their stock market valuation (Ramelli et al., 2021). Consequently, the valuation of carbon-intense firms rose. Goergen et al., (2020) assess carbon risk measures based on the firm's overall strategy and its operational exposure to transition risk, including carbon emissions. Although they find that carbon risk is a priced risk factor, it does not find any evidence for a carbon premium in the global equity market.

## On the capacity of banks to boost the climate change

As major providers of credit, banks are the key players in the effort to transition from a brown to a green economy. The momentum established by the COP21 enlarges the set of investment opportunities to finance green projects and renewable energy. Indeed, investment in the green economy has recently increased and is expected to grow enormously in market share (IEA, 2015; International Renewable Energy Agency, 2016). This increase is motivated by a growing consensus that supports movements towards a low-carbon economy and technological improvements that will lead to cost reductions in renewable energy, making alternatives to fossil fuel more appealing (Mazzucati and Perez, 2015; Krueger et al., 2015).

This might raise the question of how climate risks might directly impact financial institutions. Importantly, banks take on new risks in this regard, particularly physical and transition risks. On the one hand, **physical risks** arise from weather and climate-related disasters (Nordhaus, 1977; Stern, 2008; Nordhaus, 2019). These events can damage properties, reduce agricultural productivity, and impact deleteriously on human assets (Deryugina and Hsiang, 2014; O’Neil et al., 2017). Should this reduce the firms’ profitability and deteriorate their balance sheets, banks would be negatively affected in terms of asset values, collateral quality, and credit risk exposure. Furthermore, banks suffering large losses could diminish their lending availability, thus exacerbating the financial impact of physical risks by reducing credit supply. The blossoming literature provides theoretical and empirical evidence that banks should consider such physical risks in their investment decisions. Accordingly, Addoum et al. (2019) and Pankratz et al. (2019) show a negative correlation between firms exposed to extreme temperatures and profitability. Balvers et al. (2017) find that firms suffering from relatively high temperatures have higher cost of capital. This result connects with the literature advocating that extreme weather events are incorporated to stock and option markets (Dell et al., 2014; Kruttli et al., 2019; Choi et al., 2020).

On the other hand, banks should face **transition risks** that might arise from adjustments made toward developing a green economy. Particularly, transition risk depends on the timing and the speed of the process. Unanticipated changes in climate policies, regulations, technologies, and

market sentiment could reprice the value of bank assets (CISL, 2019; Hong et al., 2019). Consequently, banks exposed to climate-sensitive sectors might be forced to fire carbon-intensive assets, leading to liquidity problems (Pereira da Silva, 2019). Therefore, this could create uncertainty and procyclicality and increase banks' market risk (BoE, 2018). Transition risks could impact on bank credit risk if new technologies or changes in consumer behaviour towards "environmentally friendly" sectors lowered carbon-intensive firms' profitability, further increasing their default risk (Krueger et al., 2020). Reghezza et al. (2021) analyse whether climate-oriented regulatory policies impact the flow of credit towards polluting corporations. Following the Paris Agreement, they find that European banks reallocated credit away from polluting companies. Consequently, green regulatory initiatives in banking can significantly impact on combating climate change.

Importantly, the COP21 is expected to impact the banking sector's decisions. De Greiff et al. (2018) and Degryse et al. (2020a, b) assess the effect of climate risks on pricing in the syndicated loans. Since the COP21, banks have charged a premium for climate risk driven by increased awareness of climate policy-related risks. In particular, green firms have borrowed at comparatively lower prices since COP21 came into force. Likewise, Delis et al. (2018) analysed the risk stemming from stranded fossil reserves, suggesting that, after 2015, banks started to price climate policy exposure by raising the cost of credit due to their awareness of transition risk. Ilhan et al. (2018), using a sample of high-emission industries in the S&P 500 before and after COP21, find that investors already incorporate information on climate-related risks when assessing risk profiles. Ginglinger and Moreau (2020) show that, after COP21, French companies subject to large climate risks reduced their leverage.

Regarding the financial system structure, De Haas and Popov (2019) find evidence of relatively lower CO<sub>2</sub> emissions in more equity-funded economies, and they argue that stock markets contribute to reallocating investments toward less polluting industries. Similarly, Mesonnier (2019) investigates whether French banks reallocate credit from low intensive industries over the 2010-2017 period. They find that French banks reduce credit provision to more polluting industries.

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**References**

- Addoum, M. J., Ng, T. D. and Ortiz-Bobea, A. (2020). Temperature shocks and establishment sales. *The Review of Financial Studies*, 22: 1331-1336.
- Antoniou, F., and Kyriakopoulou, E. (2019). On The Strategic Effect of International Permits Trading on Local Pollution. *Environmental and Resource Economics*, 74: 1299-1329.
- Barnett, M., Brock, W., and Hansen, L. P. (2020). Pricing uncertainty induced by climate change. *Review of Financial Studies*, 33: 1024-1066.
- Ben-David, I., Franzoni, F., and Moussawi, R. (2018). Do ETFs Increase Volatility? *Journal of Finance*, 73: 2471-2535.
- Board of Governors of the Federal Reserve System. (2020a). Statement by Governor Lael Brainard. Available at: <https://www.federalreserve.gov/publications/brainard-comment-20201109.htm> (Accessed on February 2, 2022).
- Board of Governors of the Federal Reserve System's Financial Stability Report, November (2020b). See: <https://www.federalreserve.gov/publications/files/financial-stability-report-20201109.pdf> (Accessed on February 2, 2022).
- BoE (2018). Transition in thinking: The impact of climate change on the UK banking sector. Bank of England Report, September 2018.
- Bolton, P., and Kacperczyk, M.T. (2020). Do investors care about carbon risk? *Journal of Financial Economics*, 142: 517-549.
- Choi, D., Gao, Z., and Jiang, W. (2020). Attention to global warming. *The Review of Financial Studies*, 33: 1112-1145.
- CISL (2019). Unhedgeable risk: How climate change sentiment impacts investment. Cambridge Institute for Sustainability Leadership, Cambridge.
- De Greiff, K., Ehlers, T. and Packer, F. (2018). The pricing and term structure of environmental risk in syndicated loans. Mimeo, Bank for International Settlements.
- De Haas, R. and Popov, A. (2019). Finance and Carbon Emissions. ECB Working Paper Series, No 2318. Available at: <https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2318~44719344e8.en.pdf> (Accessed on February 2, 2022).
- Degryse, H., Goncharenko, R., Theunisz, C. and Vadasz, T. (2020). When green meets green. Centre for Economic Policy Research. [https://cepr.org/active/publications/discussion\\_papers/dp.php?dpno=16536](https://cepr.org/active/publications/discussion_papers/dp.php?dpno=16536)
- Degryse, H., Roukny, T. and Tielens, J. (2020), Banking barriers to the green economy. NBB Working Papers, No 391. Available at: <https://www.nbb.be/en/articles/banking-barriers-green-economy> (Accessed on February 2, 2022).
- Delis, D. de Greiff, K., Iosifidi, M., and Ongena, S. (2021). Being Stranded with Fossil Fuel Reserves? Climate Policy Risk and the Pricing of Bank Loans. Swiss Finance Institute Research Paper No. 18-10. DOI: <http://dx.doi.org/10.2139/ssrn.3125017>
- Delis, M., De Greiff, K., and Ongena, S. (2018). Being stranded on the carbon bubble? Climate policy risk and the pricing of bank loans. Swiss Finance Institute Research Paper Series, No 18-10, Swiss Finance Institute. DOI: <http://dx.doi.org/10.2139/ssrn.3125017>
- Dell, M., Jones, F. B., and Olken, B. (2014). What do we learn from the weather? The new climate-economy literature. *Journal of Economic Perspectives*, 52: 740-798.

Deryugina, T., and Hsiang, M. S. (2014). Does the environment still matter? Daily temperature and income in the United States. NBER Working Papers, No 20750, National Bureau of Economic Research, December. DOI 10.3386/w20750

Ehlers, T., Packer, F., and Greiff, K. (2021). The pricing of carbon risk in syndicated loans: which risks are priced and why? BIS Working Papers No 946. Available at: <https://www.bis.org/publ/work946.pdf> (Accessed on February 2, 2022).

Ginglinger, D., and Moreau, Q. (2019). Climate risk and capital structure. Mimeo.

Goergen, M., Jacob, A., Nerlinger, M., Riordan, R., Rohleder, M., and Wilkens, M. (2020). Carbon risk. Working Paper. Available at: <https://www.frbsf.org/economic-research/events/2019/november/economics-of-climate-change/files/Paper-6-2019-11-8-Riordan-1PM-2nd-paper.pdf> (Accessed on February 2, 2022).

Hong, H., Karolyi, G. A., and Scheinkman, J. A. (2020). Climate finance. *Review of Financial Studies*, 33: 1011-1023.

Hong, H., Li, F. W., and Xu, J. (2019). Climate risk and market efficiency. *Journal of Econometrics* 208: 265-281.

International Energy Agency. (2015). *World energy outlook 2014*, Paris.

Ilhan, E. Z. S., and Vikov, G. (2018). Carbon tail risk. *SSRN Electronic Journal*.

Issler, P., Stanton, R., Vergara-Alert, C., and Wallace, N. (2020). Mortgage Markets with Climate-Change Risk: Evidence from Wildfires in California, Working paper. DOI: <http://dx.doi.org/10.2139/ssrn.3511843>

Jiang, F., Li, C. W., and Qian, Y. (2020). Do costs of corporate loans rise with sea level? Working paper. DOI: <http://dx.doi.org/10.2139/ssrn.3477450>

Kleimeier, S., and Viehs, M. (2018). Carbon Disclosure, Emission Levels, and the Cost of Debt. DOI: <http://dx.doi.org/10.2139/ssrn.2719665>

Krueger, P., Sautner, Z., and Starks, L.T. (2020) The Importance of Climate Risks for Institutional Investors. *The Review of Financial Studies*, 33: 1067–1111.

Kruttili, S. M., Tran, R. B., and Watugala, W. S. (2019). Pricing Poseidon: Extreme weather uncertainty and firm return dynamics. *Finance and Economics Discussion Series*, No 2019-054, Board of the Federal Reserve System.

Mazzucato, M., and Perez, C. (2015). Innovation as growth policy. The Triple Challenge for Europe. In Fagerberg, J., Laestadius, S., and Martin, B.R.: 229-264. DOI: 10.1093/acprof:oso/9780198747413.001.0001

McGlade C, and Ekins P. (2015). The geographical distribution of fossil fuels unused when limiting global warming to 2 °C. *Nature*. Jan 8;517(7533):187-90. DOI: 10.1038/nature14016. PMID: 25567285.

Mesonnier, J. S. (2019). Banks' climate commitments and credit to brown industries: new evidence for France. *Banque de France Working Papers*, No 743, Paris, November. DOI: <http://dx.doi.org/10.2139/ssrn.3502681>

Nguyen, D.D., Ongena, S., Qi, S., and Sila, V. (2021). Climate Change Risk and the Cost of Mortgage Credit. *Swiss Finance Institute Research Paper Series N°20-97*. DOI: <http://dx.doi.org/10.2139/ssrn.3738234>

Nordhaus, W. D. (1977). Economic growth and climate: The carbon-dioxide problem. *American Economic Review*, 67: 341-346.

- Nordhaus, W. D. (2019). Climate change: The ultimate challenge for economics. *American Economic Review*, 109: 1991-2014.
- Noth, F., and Schuwer, U. (2018). Natural disaster and bank stability: Evidence from the US financial system. SAFE Working Paper No. 167. DOI: <http://dx.doi.org/10.2139/ssrn.2921000>
- Nyberg, D., and Wright, C. (2015). Performative and political: Corporate constructions of climate change risk. *Organization*, 23: 617-638.
- O'Neil, C. B., Kriegler, E., Ebi, L. K., Kemp-Benedict, E., Riahi, K., Rothman, S. D., Van Ruijven, J. B., Van Vuuren, D. P., Birkmann, J., Kok, K., Levy, M., and Solecki, W. (2017). The roads ahead: Narratives for shared socioeconomic pathways describing world futures in the 21st century. *Global Environmental Change*, 42: 169-180.
- Ouazad, A., and Kahn, M. E. (2021). Mortgage finance and climate change: Securitization dynamics in the aftermath of natural disasters. NBER working paper 26322. Available at: <https://www.nber.org/papers/w26322> (Accessed on February 2, 2022).
- Pankratz, N. M. C., Bauer, R. and Derwall, J. (2019). Climate change, firm performance and investor surprises. DOI: <http://dx.doi.org/10.2139/ssrn.3443146>
- Pereira da Silva, L. (2019). Research on climate-related risks and financial stability: An epistemological break? Based on remarks at the Conference of the Central Banks and Supervisors Network for Greening the Financial System (NGFS).
- Ramelli, S., Wagner, A.F., Zeckhauser, R.J., and Ziegler, A. (2021) Investor Rewards to Climate Responsibility: Stock-Price Responses to the Opposite Shocks of the 2016 and 2020 U.S. Elections. *Review of Corporate Finance Studies*, 10: 748-787.
- Reghezza, A., Altunbas, Y., Marques-Ibañez, Rodríguez-d'Acari, C., Spaggiari, M. (2021). Do banks fuel climate change? ECB Working Paper Series, No 2550. Available at: <https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2550~24c25d5791.en.pdf> (Accessed on February 2, 2022).
- Stern, N. (2008). The economics of climate change. *American Economic Review: Papers & Proceedings*, 98: 1-37.



# Articles



# Sustainable Finance: Three Questions in Search of an Answer

by Alessandro Giovannini<sup>14</sup> and Fabio Tamburrini<sup>15</sup>

Sustainable finance, broadly defined as the integration of environmental, social and governance (ESG) aspects into financial decision-making, has grown rapidly in recent years (ECB, 2020). From a niche market for specialized investors, it has become mainstream, driven not only by top-down initiatives by financial institutions and corporates, but also by a growing and genuine demand from investors (Panetta, 2020).

The pace of growth of this market is only matched by the proliferation of government policies in this area. The UN Agenda for Sustainable Development and Paris agreement contributed significantly to this process: in particular the international commitment to “making financial flows consistent with a pathway towards low greenhouse gas emissions and climate resilient development” has prompted policymakers to see sustainable finance as a key policy tool to mobilise and shift financial flows, to support, or even catalyse the transition to a low-carbon economy (Thimann, 2019). The European Union has notably been leading the way internationally in regulating sustainable finance (European Commission, 2018), but initiatives have rapidly expanded globally to promote the growth and integrity of this market and formally integrate sustainability into financial decision making (Panetta, 2021).

These trends point to a broad consensus over the *desirability*, or even the *necessity* of sustainable finance; yet the burgeoning new industry and the growing corpus of regulatory measures remain surrounded by a general

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14. European Central Bank.

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ambiguity as regards the specific objectives they pursue, the mechanics of how they are supposed to achieve such goals, and the evidence over their concrete effectiveness.

This article argues that a clearer and more rigorous examination of this new area of finance is needed. A deeper understanding of sustainable finance is essential to design effective public policies, guide efficient private investment decisions, as well as to obtain a balanced assessment of the role of sustainable finance among the broader toolkit to achieve the transition to a sustainable economy. The discussion is structured along three key questions: (i) what is the aim of sustainable finance? (ii) How is sustainable finance supposed to work? (iii) Does sustainable finance actually work in practice?

### **What is the objective of sustainable finance?**

A former investment banker and private equity professional once said “sustainable investing is a confusing area of finance that often means different things to different people” (Fancy, 2021). A closer look at the relevant literature, at the policy debate and the advertisements by investment professionals shows that they have not only been using different terminologies, but they also approach the field from different perspectives. The latter – although loosely associated – betray at close inspection a fundamental lack of consensus over the *purposes* of sustainable finance

This lack of consensus is arguably the key obstacle to the development of a coherent conceptual understanding and to deeper analysis of sustainable finance, which in turn generates confusion or even scepticism about the merits of sustainable finance, harming the credibility of the nascent market (Migliorelli, 2021).

To begin with, it is therefore essential to shed light on the motivations of sustainable finance, in other words, what are the objectives that sustainable finance is set to achieve? While numerous such typologies have been proposed (Busch et al., 2021), a minimal classification should distinguish between three main approaches, based on the main objectives each of them pursues.

1. The first approach’s main motivation is to align investments with ethical preferences: under this model, which has arguably been the first one to appear

historically (Busch et al., 2021), sustainable finance can be conceived as a tool to screen and adjust portfolios to better match the moral preferences of the investor, based on selective exclusions or penalisation of “undesirable”, “unethical” or “unsustainable” activities. Investment decisions are guided by non-monetary motives: the investor’s utility function is thus multidimensional, with utility derived not only by the risk-adjusted returns, but also by non-pecuniary rewards, such as consistency with the investor’s value system. In this approach, what matters is the subjective motive of the investor: any real impact of these investment decisions, e.g. any effect on businesses’ incentives and actions, is not the prime objective, but rather a (potential) by-product of investment decisions that maximise subjective utility.

2. A second approach sees sustainable finance as an enhancement of conventional financial decision-making: its stylised goal is to better capture financial risks associated to non-sustainable business activities which conventional finance is unable to detect. This model does not depart from the conventional financial motive of maximising returns: it carries instead the promise of combining ethical, social and environmental purposes with the traditional financial motive of maximising returns. Under this framework investors take into account ESG aspects in addition to conventional financial metrics, because this information is financially material and is considered to improve investment performance in the long-term (Amel-Zadeh & Serafeim, 2018). In this approach, individual self-interest and societal goals are not in contradiction, and no trade-off exists between the pursuit of financial returns and the achievement of desirable societal goals.

3. Finally, a third approach – which is arguably predominant among policy-makers – sees the primary purpose of sustainable finance as to produce real-world changes, e.g. solving social challenges and/or mitigating ecological degradation. Under this framework, sustainable finance is at the service of society at large. The underlying objective is not the monetary rewards of individuals, but the broader mitigation of sustainability risks for society. Individual investors do not only aim to maximise individual utility, but also social welfare. To this end, investors are willing to forego part of their returns or take greater financial risks in order to generate positive *impacts* on the society at large (Brest & Born, 2013).

## How is sustainable finance supposed to work?

These various conceptual frameworks are not mutually exclusive and often coexist to some degree in investors' motivations or in the products offered by the industry. Their different focus affects the specific investment strategy adopted. Numerous typologies of such strategies exist. Seven main strategies can be broadly defined (GSIA, 2017): (a) negative/exclusionary screening; (b) positive/best-in-class screening; (c) norms-based screening; (d) integration of ESG factors; (e) sustainability themed investing; (f) impact investing; (g) corporate engagement and shareholder action.

Linking these strategies to the motivations discussed in the previous section, it emerges that exclusionary approaches (*a* to *c*) are particularly common among *ethically* motivated investors. ESG integration (*d*) or best-in-class approaches (*b*) is the dominant approach for those investors that see sustainability as enhancing investment performance. Impact investment and corporate engagement (*f* and *g*) put an emphasis on real world impact.

Yet, a rigorous analysis needs to go beyond acknowledging the coexistence of different motivations and investment strategies. These different approaches imply entirely different *theories of change* of corporate behaviour that are underpinned by contradictory assumptions over how sustainable finance is supposed to achieve its goals.

Perhaps the most striking contradiction involves the role of returns.

If the purpose of sustainable finance as to produce real-world changes, then portfolio adjustments or divestments of unsustainable activities should lead to a higher cost of capital for unsustainable companies, either via change stock prices (and the cost of external capital more broadly), or through the reputational impact that divestment announcements can make (Heinkel et al., 2001). The higher cost of capital should, in turn, incentivise corporates to move away from unsustainable activities (Pastor et al., 2021). As such, sustainable investors should be willing to *forego part of their financial returns* for societal goods.

This theory of change is inconsistent with the alternative view that ESG investing *improves financial performance*, by providing investors with material information over the long-term financial performance of a company and thus leading to outperformance of ESG investments over conventional ones. In this

model, sustainable firms perform better financially regardless of the action of sustainable investors, and sustainable investing simply reflects this intrinsic outperformance (Friede et al., 2015). In this framework, being sustainable *in itself* delivers financial rewards for the company, without the need for the investor to step in to provide the extra incentive. ESG investors simply reap the benefits of companies' self-interested sustainable behaviour. This is in contradiction with impact-oriented approaches, where sustainable behaviour *emerges* as a result of sustainable investors' willingness to forego part of their returns, thus reducing the cost of capital for sustainable activities.

These two approaches are in antithesis: if the former approach is correct, and ESG investment improves financial returns, then the latter is wrong, and sustainable finance cannot affect companies' financial incentives and produce meaningful real-world impact. While different actors may well adopt one or the other, and the two may coexist in the industry as a reflection of different understandings and assumptions by users, logically they are mutually exclusive approaches that cannot be held as valid at the same time.

### **What is the evidence of sustainable finance?**

Whether the different approaches outlined above work in practice, and which one best delivers on its intended goals, could be ultimately set by empirical investigations. Yet, the confusion existing over the various conceptual frameworks of sustainable finance, has also affected the empirical analysis conducted so far. While a large and growing literature has looked at the relative financial performance of sustainable investments over conventional or unsustainable ones, little is known about the impact of sustainable finance on companies' decisions, its channels, and their magnitudes. To date the vast majority of studies uses ESG metrics as an explanatory variable and only very few have analyzed ESG metrics as a dependent variable, leaving the following two fundamental questions unanswered (Kölbel et al., 2020). First, if there is no agreement on the size of the effect sustainable investors have on asset prices, how can we be sure about the material effect of sustainable finance? Second, even in the presence of evidence that the capital allocation of sustainable investors has affected asset prices, is there evidence that such

changes in asset prices have translated into changes in ESG practices by the companies?

This literature gap is striking and worrying, calling for further research. In the absence of the latter, the question whether sustainable finance is capable of delivering on the high public expectations which the industry and the public sector have put on it remains still unanswered. The absence of such research negatively impacts on the ability to design effective public policies to promote sustainable finance able to address societal challenges.

## Conclusions

Coherently answering what sustainable finance is, how it works and whether it concretely delivers, is of the essence for a clearer debate on the government policy and regulatory initiatives needed to make it work. The current confusion and lack of a clear conceptual understanding of sustainable finance, on the contrary, risks limiting its development, triggering public scepticism over sustainable finance and ultimately hindering its transformative potential. It could, in fact, lead to the opposite, giving a false sense of hope that the dramatic growth of sustainable finance will be able – alone – to make the necessary adjustments in our economy to meet the major challenges of climate change and sustainable development. If we fail, there is a real risk that sustainable finance is merely a placebo that ultimately harms public interest (Fancy, 2021).

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## References:

- Amel-Zadeh, A., and Serafeim, G. (2018). Why and How Investors Use ESG Information: Evidence from a Global Survey. *Financial Analysts Journal*, 74(3): 87-103
- Brest P., and Born, K. (2013). When can impact investing create real impact. *Stanford Social Innovation Review*, 11(4): 22-31.
- Busch, T., Bruce-Clark, P., Derwall, J., Eccles, R., Hebb, T., Hoepner, A., ... and Weber, O. (2021). Impact investments: a call for (re) orientation. *SN Business & Economics*, 1(2), 1-13.
- ECB (2020). The performance and resilience of green finance instruments: ESG funds and green bonds. *Financial Stability Review*, November 2020
- European Commission (2018). Action Plan: Financing Sustainable Growth Brussels, 8 March 2018.

- Fancy, T. (2021). The Secret Diary of a 'Sustainable Investor'. Available at <https://medium.com/@sosofancy/the-secret-diary-of-a-sustainable-investor-part-1-70b6987fa139> (Accessed on March 11, 2022).
- Friede, G., Busch, T., and Bassen, A. (2015). ESG and financial performance: aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, 5(4): 210-233.
- GSIA (2017). 2016 Global Sustainable Investment Review, Global Sustainable Investment Alliance.
- Heinkel, R., Kraus, A., and Zechner, J. (2001). The effect of green investment on corporate behavior. *Journal of Financial and Quantitative Analysis*, 36: 431-449.
- Kölbl, J.F., Heeb, F., Paetzold, F., and Busch, T. (2020). Can sustainable investing save the world? Reviewing the mechanisms of investor impact. *Organization & Environment*, 33 (4): 554-574.
- Migliorelli, M. (2021). What Do We Mean by Sustainable Finance? Assessing Existing Frameworks and Policy Risks. *Sustainability*, 13, 975.
- Panetta, F. (2020). "Sustainable finance: transforming finance to finance the transformation", Keynote speech by Fabio Panetta, Member of the Executive Board of the ECB, at the 50th anniversary of the Associazione Italiana per l'Analisi Finanziaria.
- Panetta, F. (2021). A Global Accord for Sustainable Finance. Op. Ed Project Syndicate.
- Pástor, L., Stambaugh, R. F., and Taylor, L. A. (2021). Sustainable investing in equilibrium. *Journal of Financial Economics*, 142(2): 550-571.
- Serafeim, G. (2021). ESG: Hyperboles and Reality. Harvard Business School Research Paper Series Working Paper 22-031
- Thimann, Ch. (2019). Finance and sustainability: the end of "business as usual", BaFin Perspectives, Issue 22019.



# Sustainable Finance Policy-Making: Why and How<sup>16</sup>

by Emanuele Campiglio<sup>17</sup> and Francesco Lamperti<sup>18</sup>

Why should central banks and financial supervisors worry about climate change and decarbonisation? And how are they supposed to act upon them? These questions have been asked many times in recent years, but have yet to receive a definitive answer.

The main institutional answer given so far - at least in Europe and similar jurisdictions - has been based on the possibility that climate change or the low-carbon transition might affect the ability of central banks and supervisors to achieve their mandated primary objectives, such as price and financial stability (Schnabel, 2021; Semieniuk et al., 2021). If these climate-related risks were found to be material, stronger policy action would be justified.

But how are we supposed to find proof of the materiality of climate-related risks? At the moment, deep knowledge gaps remain in all the necessary ingredients: i) abundant and granular data; ii) methods to analyse and understand empirical evidence; and iii) reliable modelling methods to explore future scenarios. In the face of climate change and the urgency of decarbonising the global economy, obtaining incontrovertible results on risk materiality, if possible at all, might take too much time.

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Even without proof, there are a number of things policy-makers can do and, to some extent, are already doing. One is to put a price on carbon; governments should attend to that. Another is to expand the information set available to market participants, to allow them to price risks correctly. Central banks and supervisors can play a key role in this dimension, supporting the development of risk assessment methods and pushing financial institutions to disclose their exposure to climate-related risks. Both these policies have a theoretical backing in the idea of correcting specific ‘market failures’, i.e. the environmental externality and imperfect information.

Will this be enough? It’s unlikely. There are several political obstacles to carbon pricing, and many additional failures affect the functioning of markets, especially financial ones. Two main alternative options can be considered. The first option is to lower the level of sophistication of mechanisms supporting the implementation of unconventional monetary/financial policies addressing climate risks. Empirical evidence shows that, in the face of radical uncertainty about the future, policy-making decisions based on ‘fast and frugal’ rules of thumb can outperform more sophisticated decision-making rules trying to capture the ineffably complex dynamics of the global economy. The second option is to explicitly modify the institutional structure to ensure more effective climate action, e.g., changing the mandates of central banks and supervisors, or creating additional delegations to independent institutions. Both options might require bending and adapting the current institutional boundaries, which comes with some risks to be accounted for.

In the remainder of the article, we discuss these points more in detail. We start by presenting the current conceptual and institutional justifications for existing sustainable finance policies. We then discuss their limitations in ensuring effective climate action and explore alternative strategies going beyond existing institutional frameworks. We conclude by inviting to a deeper analysis on the potential benefits and risks of these institutional options.

### **Sustainable finance policies: a recap**

The pivotal role of finance in supporting an orderly and rapid decarbonisation process (and thus the mitigation of climate impacts) has been

increasingly recognized by the international community. First, the discovery, commercialization, deployment and diffusion of low-carbon technologies require adequate financial investments in the form of bank loans, debt and equity finance. Second, the financial risks materialising during the transition (e.g. an excessively rapid devaluation of carbon-intensive assets, or a 'green' bubble) need to be safely absorbed, minimising financial and economic instability.

Several 'market failures' might prevent financial market actors to autonomously align along a technological transition compatible with climate stability (e.g. maintaining temperatures below 1.5-2°C, as stipulated by the Paris Agreement). If this is the case, adequate policy guidance is needed. However, policy action is even harder than usual in this context, as financial policy-making and regulation functions are often in the hands of delegated authorities, i.e. independent or semi-independent institutions that have received a mandate to achieve specific and limited objectives. This is especially the case of central banks, which in many jurisdictions enjoy a high degree of independence in pursuing price stability (the quintessential central bank objective), macroprudential stability (especially after the 2007-08 global financial crisis), and whatever other goal governments have opted to delegate to them.

Nonetheless, we have experienced an increasingly strong presence of delegated authorities in the climate debate. Starting with the 'Tragedy of the horizon' speech of the Governor of the Bank of England (Carney, 2015), central banks and financial supervisors have played a key role in mainstreaming sustainable finance, e.g. with the creation of the Task-force on Climate-related Financial Disclosures (TCFD, 2017) and supporting the work of the European High-Level Expert Group on sustainable finance (EU HLEG, 2017). Further, the creation of the Network for Greening the Financial System (NGFS) in 2017 reflected the desire for an intensified international cooperation, in the attempt to strengthen the global response required to meet the goals of the Paris agreement.

Several delegated authorities have nudged or required companies and financial intermediaries to 'stress-test' their portfolio against climate-related risks and disclose the results, or have run system-wide climate stress-tests of their banking and financial systems (Baudino and Svoronos, 2021; ECB, 2022; Vermeulen et al., 2018). Other delegated authorities, especially in emerging economies, have gone further, employing their policy toolkit to actively promote

green and low-carbon investments, such as differentiated reserve and capital requirements depending on the greenness of bank lending, favourable refinancing lines and green credit quotas (Campiglio et al., 2018; D’Orazio, 2022).

But why are central banks and supervisors acting on climate in the first place? And what determines their degree of engagement?

### **Climate-related risks might affect price and financial stability**

A first argument for action builds on the possibility that climate-related risks could affect the ability of central banks and others’ financial authorities to achieve their mandated objectives (price stability, financial stability, and others).

As emphasised by Schnabel (2021), there are three reasons for which climate-related risks might impair central banks’ effectiveness at managing inflation. First, the transmission of central banks’ monetary policy measures to the financing conditions faced by households and firms are likely to be affected by climate-induced losses. Losses from materialising physical risks or asset stranding (such as fossil reserves that will remain unextracted as the world decarbonises) could weigh on financial institutions’ balance sheets, reducing the flow of credit to the real economy and impairing the credit channel (Lamperti et al., 2019). Second, climate-related risks (e.g., productivity losses induced by physical risks, or diversion of resources from more productive activities, such as R&D and education, to climate adaptation) might reduce the real equilibrium interest rate, pushing central banks closer to the boundaries of conventional monetary policy (Boneva et al., 2021). Third, both climate change and mitigation policies can have a direct impact on inflation dynamics by amplifying business cycles fluctuations and uncertainty, thereby requiring a greater interventionism through conventional channels.

Climate-related risks could also affect the stability of financial systems (Semieniuk et al., 2021). While the precise nature of risks and transmission channels is different between climate impacts and a low-carbon transition, they exhibit some key shared features. Non-financial firms could be affected by both a change in costs or revenues leading to a decline in profits (e.g. due to a carbon tax or climate-induced supply chain disruptions) and balance sheet losses (e.g.

destruction of physical assets due to extreme weather events). These costs could then propagate to financial institutions in two main ways: i) firms defaulting on their bank loans; ii) a drop in the valuation of firms' financial assets. Exacerbated by production and financial network effects (Cahen-Fourot et al., 2021), large enough initial shocks could eventually have systemic implications, causing a macro-financial crisis — what Bolton et al. (2020) call a 'Green Swan'. An overvaluation of green assets leading to the burst of a bubble is also a possible mechanism of transition-related financial disruption.

### **Can we 'prove' the materiality of climate-related risks?**

So far, we have claimed that climate change and the low-carbon transition *might* affect price and financial stability. Policy-makers and academia have started developing theoretical conceptual frameworks describing what a 'disorderly transition' or a 'Climate Minsky moment' could look like (NGFS, 2019). However, we still don't know to what extent these scenarios are actual possibilities we should worry about, nor do we have a reliable assessment of the economic and financial implications of climate-related risks. In jurisdictions characterised by the presence of independent authorities with clear and limited objectives, the absence of reliable proof of the materiality of climate-related risks represents a crucial obstacle to policy action.

What would we need to reliably assess the materiality of climate-related risks and justify action? Three elements are key: i) abundant, harmonised and sufficiently granular data; ii) empirical methods to analyse and interpret the data; and iii) modelling methodologies to examine future scenarios in all their dynamic complexity. Unfortunately, several key knowledge gaps currently exist in all three dimensions.

First, data is often absent, scattered or not harmonised. Several projects have been set up to collect and analyse asset- and firm-level information, e.g. for coal/gas plants, housing properties, and infrastructure (see for instance the GeoAsset project). However, more work is needed to provide an integrated perspective across countries and sectors. In addition, clear large-scale data maps of real-financial linkages are often absent and, when available, they typically do not encompass sufficient spatial detail to quantify physical risks.

Second, the empirical analysis of the data is also in its infancy. The analysis of exposures is becoming common, both for what concerns physical assets (Tong et al., 2019) and financial assets (Giuzio et al., 2019). However, the analytical and quantitative power of such tests is likely to remain limited, given their static nature. It is also hard to link exposure data to the probabilities of individual counterparties defaulting due to climate-related drivers that have no historical precedents. In addition to exposure data, it would be key to have a better understanding of climate-related expectations and beliefs of economic agents, as these would contribute to defining the response of the system to shocks. Asset pricing methods can be used to study the extent to which climate-related risks are already internalised by investors. Bolton and Kacperczyk (2021), for instance, find evidence of positive carbon risk premia in recent years, suggesting that investors increasingly request compensation for the potential costs that mitigation efforts would create for carbon-intensive firms. Alternative approaches to capturing climate-related ‘sentiments’ include using text analysis methods to study communications — such as social media posts, speeches, newspaper articles (see for instance Engle et al., 2020) — and running surveys of investors to elicit their opinions and beliefs (e.g. Krueger et al., 2020). However, much more work is still needed in this direction.

Third, one should feed the data and estimated parameters to adequate models enabling a dynamic exploration of possible futures. Several features would need to be present for a model to be able to fully grasp the complexity of possible macro-financial and transition patterns, including: (i) a multi-sectoral perspective, including inter-industry exchange of intermediate inputs and supply chains; (ii) multiple technologies with different physical, financial and sustainability characteristics; (iii) clear links between the real and financial parts of the model, including mechanisms of portfolio choice and credit provision; (iv) mechanisms to incorporate propagation of shocks across both production and financial networks; (v) a realistic representation of dynamic human behaviour, including its irrational and socially-determined dimensions; (vi) a way to incorporate uncertainty and its impacts on decision-making. Unfortunately, although not surprisingly, the assessment of climate-related risks is currently being carried out employing models that generally do not exhibit all of the dimensions above (Baudino and Svoronos, 2021; ECB, 2022),

though some alternatives are gradually emerging (see for instance Lamperti et al., 2021, 2018). More in general, models are by definition aimed at reducing real-world complexity in order to understand its key mechanisms. This requires making a number of limiting assumptions on human behaviour and the functioning of economic systems, which in turn makes all models susceptible to criticism and non-acceptance. In other words, the perfect model, accepted by everyone, might never come.

Considering all of the above, a question ensues: what happens if a solid and incontrovertible proof of the materiality of climate-related financial risks never materialises? We discuss two main strategies in the coming sections: (i) find ways to act within the existing institutional framework; (ii) adopt policy choices that bend or modify the institutional framework.

### **Strategy 1: act within the existing institutional framework**

A first strategy is to accept the limitations imposed by the current institutional framework and do whatever is already allowable within it. Luckily, there are plenty of options available and, to some extent, already pursued.

The most prominent policy option is of course to put a price on carbon, either via taxes or the introduction of a market of carbon allowances (Baranzini et al., 2017). In simple economic terms, this is directed at addressing a market failure, i.e. the environmental externality. Since many environmental goods and services (including climate stability) do not have a market price, private economic agents are able to keep the benefits of polluting (i.e. production and associated profits) for themselves, while socialising its costs. This constitutes a strong disincentive to shift towards cleaner production technologies. If, however, the externality was to be internalised via policy (e.g. a carbon tax), consumers would have the incentive to move towards green products and firms would be more inclined to innovate their technologies and substitute high-carbon for low-carbon intermediate inputs. In absence of additional market failures, this should also convince financial institutions to support low-carbon activities.

Of course, fiscal policy is not really a function under the control of central banks or financial supervisors, but rather of governments and finance

ministries. So, unless there is a modification of the current institutional framework (e.g. via a carbon central bank, see last section), delegated authorities' only role in this regard is to remind that carbon pricing is necessary and urgent, via both research and institutional pressure (e.g. speeches). However, this does not make central banks powerless. Indeed, there are a variety of possible climate finance policies, whose scope will depend on the underlying institutional framework. In high-income western economies like the European Union, where delegated objectives are narrow, at least two categories of initiatives can be launched.

First, central banks and financial institutions have a central role to play in supporting the scientific community in the assessment of climate-related risks. Not only they hold the largest and most detailed data sources about financial and non-financial firms' transactions; they also have a long tradition in developing macroeconomic models. These can offer insights on how business cycles are affected by both credit and asset market dynamics, including cases where assets' values go burst (e.g. housing market models) and financial flows need moving from the banking sector to the real economy. In addition, thanks to their supervision activities, they can retrieve the sectoral and geographical exposure of banks and institutional investors. The expertise and data held by statistical and research departments within central banks are highly complementary to the knowledge stock on the effects of emission mitigation pathways and physical hazards. The question is how this information can be used effectively.

Second, central banks and financial regulators can increase information available to markets. This would reduce the existence of an information asymmetry failure. Banks and financial institutions face difficulties in inferring the exposure of a counterpart to transition risks and physical events. Central banks can develop forward-looking models of risk evaluation to account for climate and transition futures. If all information was available, in principle, financial firms would allocate credit more efficiently and effectively pricing climate-related risks. However, if this is not possible, distortions will emerge. The presence of deep uncertainties, as discussed above, is likely to make this process exceptionally hard or long, while evidence suggests that climate change is accelerating and carbon budgets to meet ambitious mitigation are rapidly depleting.

## Will this be enough?

It is hard to know whether the initiatives outlined above, if implemented in a strong and credible manner, could provide a sufficient push to rapidly decarbonise the economic system. What we can certainly notice is that, at the moment, they are not fully implemented.

Carbon pricing initiatives have been multiplying and strengthening in recent years (World Bank, 2021). The EU Emission Trading Scheme, after long years of disappointment, has started to deliver strong carbon price signals, and the launch of Chinese national market of permits promises to be a further important step in the right direction. However, in general, recent evidence signals that carbon pricing is far more discussed in the academic debate than it is used in practice (Peñasco et al., 2021). This is due, at least partially, to its relatively low political acceptability and the dependence of policy action to the electoral cycle. Further, carbon pricing is complicated by three factors. First, the transition will come at some cost, at least for certain countries, sectors and firms; and the cost will be itself an outcome of how well is the policy effort carried out (i.e. an abrupt climate policy might trigger macro-financial disruptions). Second, fundamental uncertainty renders any calculation of the desirable carbon price questionable, which makes it difficult to credibly commit to a specific price path. Third, carbon pricing can be successful in reshaping economic decisions and financial flows only if markets work well. Unfortunately, this is hardly the case (Stern et al., 2021). Indeed, markets are prone to frictions, multiple equilibria, volatility and excessive market power, suggesting that price signals will hardly be sufficient to manage climate-related risks, and that carbon pricing should be considered as part of a much wider policy spectrum.

The informational policies mentioned in the previous section, aimed at assessing and disclosing climate-related financial risks, also have important limitations. First and foremost, the result that novel information is adequately reflected in financial prices follows from the demanding “efficient market hypothesis”. Beyond a number of historical failures of such hypothesis, recent evidence from a survey of institutional investors, whose portfolio is characterized by long maturities compatible with the scales of climate risks, rejects the view that additional and more precise information of climate-

related risks can suffice to align their investment strategies (Ameli et al., 2021, 2020). Further, collecting information about climate risks and exposure of individual counterparts, as well as formalizing harmonized disclosure procedures aimed at generating reliable taxonomies and benchmarks may require time that would further delay markets' reaction.

Considering these limitations and obstacles to implementation, it appears wise to explore additional and alternative policy options, even if these require some modification to the existing distribution of institutional responsibilities and functions.

## **Strategy 2: go beyond existing institutional framework**

Going beyond what the current institutional framework allows is, of course, possible. Institutions are social constructs and they change as societies change. Indeed, current institutional frameworks are different from the ones of the past and evolved following changing societal needs. For what concerns central banks, the most recent paradigmatic shift has been the movement to central bank independence in a large number of countries during the 1990s, often accompanied by a focus on inflation targeting via interest rate manipulation (Vonessen et al., 2020). This constituted a significant change with respect to the traditional role central banks used to play throughout history.

To modify the existing institutional framework in an orderly and effective manner, three main ingredients are necessary. First, we need a theoretical justification for institutional change. This can be provided either by employing a conceptual framework centred around the concept of market failures or by invoking a precautionary approach in the face of deep uncertainty (Chenet et al., 2021). In either case, a theoretical justification for action is possible, even if not entirely present at the moment. Concerning failures, markets (including financial ones) are ripe with them, including the inability of individuals to understand complexity and their myopic and irrational behaviour. Credit markets may not be willing to provide the necessary liquidity to low-carbon firms, even in the presence of the 'right' prices (Campiglio, 2016). Alternatively, another argument supporting the use of financial regulation comes from recognizing the deep uncertainty that surrounds our current

ability of monitoring and quantifying these risks. In a context where losses induced by physical events and transition frictions are hard to quantify and uncertainty about their unfolding in complex economic systems is pervasive, a precautionary approach centred around simple regulation aimed at avoiding worst-case scenarios (e.g. temperatures above 2 or 3 degrees) might be not just the only viable option from a practical perspective, but one that outperform alternative solutions (Aikman et al., 2021; Chenet et al., 2021). Indeed, markets tend to perform poorly in delivering rapid, desirable, and efficient allocations of funding sources in presence of asymmetric information and uncertainty about future states of the world. Similarly, policy makers face difficulties in designing monetary-based instruments (e.g. carbon taxation) that are politically acceptable and effective when externalities are hard to quantify and markets may not work as perfectly as theory would prescribe.

Second, we need a good understanding of the risks of institutional change, so to put in place forward-looking risk mitigation strategies. Two main risks appear to be present in this case (Baer et al., 2021). First, transferring additional policy functions to an unelected technocratic institution without a proper mandate would mean moving this function away from democratic control. Second, an excessive diversification of policy functions would make central banks more prone to failure, especially if there are possible conflicts between them, and potentially less credible in their commitments. This could in turn have negative impacts on their capacity to maintain price and inflation stability. If brought to the extreme, this scenario could lead to a transfer of policy functions back to the governments and the loss of central banks independence.

Third, we need to identify a strategy to reach the institutional framework we believe is the most appropriate to deal with societal challenges. We identify two main possible avenues to achieve this, on which we expand in the next section.

## **Ideas for the future**

A first avenue to ensure more effective climate action is to accept the limitations of risk assessment methods and start acting with whatever indication we can extract using existing datasets and methodologies. In

situations where risks are easily computable, there is no cost to complexity: more information is always perceived to be better than less; and decisions should optimally weight all relevant factors. Contrarily, taking uncertainty seriously may imply that financial regulation built on simple indicators, available data and shared estimates outperform more complex assessments. This matches what Stern et al. define a “guardrail approach” (Stern et al., 2021): if there are actions that are likely to limit the chances of disastrous events and have moderate costs, they should be undertaken. For example, if capital requirements are used to limit banks’ risk-taking, one should ideally define them in a way to perfectly mirror the probability of default of each asset in their portfolio, possibly taking into account cross-exposures and interconnectedness. However, this entails an extremely complex use of data and modelling. Aikman et al. (2021) have shown that capital requirement rules based on Basel II criteria employing fixed rating agency outlooks outperformed approaches allowing internal estimation of counterparty-specific probability of defaults, especially in environments with changing regimes. The key question is whether and how a “fast and frugal” approach can be designed to address climate physical and transition risks.

Several initiatives that have been already undertaken in some countries aim at enriching the current regulatory framework, encompassing stress testing procedures, mandatory disclosure of climate-related risks, differentiated capital requirements for low- and high-carbon assets, and more. We argue that the success of these initiatives is largely dependent on their implementation strategy, which need to be (i) forward-looking; and (ii) immediately feasible. Forward-lookingness, in this context, indicates anticipation of conditions that have been hardly or not experienced. One simple way of doing this is through narratives and statistical analysis with higher weights on rare past events. This would reflect the intuition that a way to be prepared for unknown conditions is via fictitious scenario construction informed by the analysis of historically infrequent events. On a different ground, immediate feasibility refers to the fact that available or easy to retrieve information should be used to define regulations that are rapid to adopt, simple to monitor and flexibly adjustable as experience becomes available.

An example can be offered with respect to capital requirement regulation. While exact exposure of assets to weather events and climate policy is difficult

to measure (as mentioned above), we have some systematised sources of information about susceptibility to both. In the same way rating agencies scores provide an imprecise yet easily accessible advice on credit risk, long term weather forecasts offer well-organised and public information about the likelihood of experiencing weather conditions significantly different than in the past, under scenarios of possible futures. Further, input-output data tracking flows of value added across sectors of economic activities are available to determine industries' average emission intensity as well as reliance on high-emission intermediate products. It would be relatively easy to indicate whether locations are likely to experience more extreme weather with respect to the past and industries are likely to shrink production if carbon prices rise as much as in some rare historical event. At this point, Monte Carlo analysis can be used to analyse the minimum capital cushions that would be needed to absorb an extreme case where all assets within sectors and locations are "at risk" of default. Such an exercise could help the construction of a long run, dynamically-evolving and forward-looking target for the bank, and the key advantage of such an approach is that it just relies on information on sector and location, in addition to publicly available data about weather projections and value chain structure.

A second avenue for stronger climate action is to adopt bolder strategies of institutional change, in place of, or in addition to, adopting a different rule-making routing. Several alternatives exist. For instance, the mandate of delegated authorities can be modified so to include climate-related objectives. This was the path chosen by the United Kingdom, whose government in 2021 has updated the remit of both the Monetary Policy Committee and the Financial Policy Committee of the Bank of England to reflect the government's strategy to achieve an economic system which is "environmentally sustainable and consistent with the transition to a net zero economy" (Sunak, 2021). Alternatively, new delegations can be imagined, so to transfer policy functions linked to the achievement of a clear forward-looking schedule of carbon prices to an independent institution capable of abstracting from electoral cycles, i.e. a 'carbon central bank' or a 'carbon council' (G30, 2020). This could reduce uncertainty around climate-related risks, acting not on the basis of quantified climate-related risks, but rather on the necessity of reaching politically-determined net-zero targets.

## Conclusions

In this article we have discussed the evolving academic and policy debate on sustainable finance policy-making. While much can be done within current institutional arrangements — e.g. put a price on carbon or expand the information set available to markets via improved risk assessment methods and disclosure — this is unlikely to trigger a rapid and orderly decarbonisation process, due to multiple market failures and political obstacles.

In the face of the complex climate change challenge, simpler and more direct guidance should be offered to financial markets. While the dominant paradigm for studying decision-making in finance is based on rational management of known and (presumably) calculable risks, the presence of uncertainty can overturn the picture. Decision rules that attempt to achieve ever greater precision can become increasingly imprecise moving from theory to practice. Rules that attempt to weight optimally all the relevant information can sometimes generate poorer results than simple, ‘fast and frugal’ rules of thumb.

Unconventional thinking and policy-making, going beyond current practices and institutional boundaries, might thus be recommended. However, institutional changes may not be trivial, and could come at a cost. Reforming the mandate of the European Central Bank, for instance, is a particularly difficult task. The recent experiences of the Global Financial Crisis and the Covid-19 pandemics have also shown that some of the interventions carried out to face large downturns can encounter legal issues. It is thus crucial to explore all the possible ramifications of changing institutional practices and identify sustainable ways to ensure institutional coordination towards the decarbonisation objective.

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## Bibliography

- Aikman, D., Galesic, M., Gigerenzer, G., Kapadia, S., Katsikopoulos, K., Kothiyal, A., Murphy, E., and Neumann, T. (2021). Taking uncertainty seriously: simplicity versus complexity in financial regulation. *Industrial and Corporate Change*, 30: 317–345. <https://doi.org/10.1093/icc/dtaa024>
- Ameli, N., Drummond, P., Bisaro, A., Grubb, M., and Chenet, H. (2020). Climate finance and disclosure for institutional investors: why transparency is not enough. *Climatic Change*, 160: 565–589. <https://doi.org/10.1007/s10584-019-02542-2>
- Ameli, N., Kothari, S., and Grubb, M. (2021). Misplaced expectations from climate disclosure initiatives. *Nat. Clim. Chang.*, 11: 917–924. <https://doi.org/10.1038/s41558-021-01174-8>

- Baer, M., Campiglio, E., and Deyris, J. (2021). It takes two to dance: Institutional dynamics and climate-related financial policies. *Ecological Economics*, 190, 107210. <https://doi.org/10.1016/j.ecolecon.2021.107210>
- Baranzini, A., Bergh, J.C.J.M. van den, Carattini, S., Howarth, R.B., Padilla, E., and Roca, J. (2017). Carbon pricing in climate policy: seven reasons, complementary instruments, and political economy considerations. *WIREs Climate Change*, 8, e462. <https://doi.org/10.1002/wcc.462>
- Baudino, P., and Svoronos, J.-P. (2021). Stress-testing Banks for Climate Change: A Comparison of Practices. Bank for International Settlements, Financial Stability Institute.
- Bolton, P., Despres, M., Pereira da Silva, L.A., Samama, F., and Svartzman, R. (2020). The green swan. Central banking and financial stability in the age of climate change. Bank of International Settlements, Basel.
- Bolton, P., and Kacperczyk, M. (2021). Do investors care about carbon risk? *Journal of Financial Economics*. <https://doi.org/10.1016/j.jfineco.2021.05.008>
- Boneva, L., Ferrucci, G., and Mongelli, F.P. (2021). To Be or Not to Be “Green”: How Can Monetary Policy React to Climate Change? (Occasional Paper Series No. 285). European Central Bank, Frankfurt am Main.
- Cahen-Fourot, L., Campiglio, E., Godin, A., Kemp-Benedict, E., and Trsek, S. (2021). Capital stranding cascades: The impact of decarbonisation on productive asset utilisation. *Energy Economics*, 103, 105581. <https://doi.org/10.1016/j.eneco.2021.105581>
- Campiglio, E. (2016). Beyond carbon pricing: the role of banking and monetary policy in financing the transition to a low-carbon economy. *Ecological Economics*, 121: 220–230. <https://doi.org/10.1016/j.ecolecon.2015.03.020>
- Campiglio, E., Dafermos, Y., Monnin, P., Ryan-Collins, J., Schotten, G., and Tanaka, M. (2018). Climate change challenges for central banks and financial regulators. *Nature Climate Change*, 8: 462–468. <https://doi.org/10.1038/s41558-018-0175-0>
- Carney, M. (2015). Breaking the Tragedy of the Horizon – climate change and financial stability (Speech given at Lloyd’s of London by the Governor of the Bank of England). Bank of England, London.
- Chenet, H., Ryan-Collins, J., and van Lerven, F. (2021). Finance, climate-change and radical uncertainty: Towards a precautionary approach to financial policy. *Ecological Economics*, 183, 106957. <https://doi.org/10.1016/j.ecolecon.2021.106957>
- D’Orazio, P. (2022). Mapping the emergence and diffusion of climate-related financial policies: Evidence from a cluster analysis on G20 countries. *International Economics*, 169: 135–147. <https://doi.org/10.1016/j.inteco.2021.11.005>
- ECB (2022). Macro-financial scenarios for the 2022 climate risk stress test. European Central Bank.
- Engle, R.F., Giglio, S., Kelly, B., Lee, H., and Stroebel, J. (2020). Hedging Climate Change News. *The Review of Financial Studies*, 33: 1184–1216. <https://doi.org/10.1093/rfs/hhz072>
- EU HLEG (2017). Financing a sustainable European economy. European Commission, Brussels.
- G30 (2020). Mainstreaming the Transition to a Net-Zero Economy. G30 Working Group on Climate Change and Finance.
- Giuzio, M., Krušec, D., Levels, A., Melo, A.S., Mikkonen, K., and Radulova, P. (2019). Climate change and financial stability. *Financial Stability Review* 1.

- Krueger, P., Sautner, Z., and Starks, L.T. (2020). The Importance of Climate Risks for Institutional Investors. *The Review of Financial Studies* 33, 1067–1111. <https://doi.org/10.1093/rfs/hhz137>
- Lamperti, F., Bosetti, V., Roventini, A., and Tavoni, M. (2019). The public costs of climate-induced financial instability. *Nature Climate Change*, 9: 829–833. <https://doi.org/10.1038/s41558-019-0607-5>
- Lamperti, F., Bosetti, V., Roventini, A., Tavoni, M., and Treibich, T. (2021). Three green financial policies to address climate risks. *Journal of Financial Stability*, 54, 100875. <https://doi.org/10.1016/j.jfs.2021.100875>
- Lamperti, F., Dosi, G., Napoletano, M., Roventini, A., and Sapio, A. (2018). Faraway, So Close: Coupled Climate and Economic Dynamics in an Agent-based Integrated Assessment Model. *Ecological Economics*, 150: 315–339. <https://doi.org/10.1016/j.ecolecon.2018.03.023>
- NGFS (2019). A call for action: Climate change as a source of financial risk. Network for Greening the Financial System, Paris.
- Peñasco, C., Anadón, L.D., and Verdolini, E. (2021). Systematic review of the outcomes and trade-offs of ten types of decarbonization policy instruments. *Nat. Clim. Chang.*, 11: 257–265. <https://doi.org/10.1038/s41558-020-00971-x>
- Schnabel, I. (2021). Climate Change and Monetary Policy [WWW Document]. IMF F&D. URL <https://www.imf.org/external/pubs/ft/fandd/2021/09/isabel-schnabel-ECB-climate-change.htm> (accessed 2.15.22).
- Semieniuk, G., Campiglio, E., Mercure, J.-F., Volz, U., and Edwards, N.R. (2021). Low-carbon transition risks for finance. *WIREs Climate Change*, 12, e678. <https://doi.org/10.1002/wcc.678>
- Stern, N., Stiglitz, J.E., and Taylor, C. (2021). The Economics of Immense Risk, Urgent Action and Radical Change: Towards New Approaches to the Economics of Climate Change (Working Paper No. 28472), Working Paper Series. National Bureau of Economic Research. <https://doi.org/10.3386/w28472>
- Sunak, R. (2021). Remit for the Monetary Policy Committee (MPC). HM Treasury, London.
- TCFD (2017). Recommendations of the Task Force on Climate-related Financial Disclosures. Task Force on Climate-related Financial Disclosures.
- Tong, D., Zhang, Q., Zheng, Y., Caldeira, K., Shearer, C., Hong, C., Qin, Y., and Davis, S.J. (2019). Committed emissions from existing energy infrastructure jeopardize 1.5 °C climate target. *Nature*, 572: 373–377. <https://doi.org/10.1038/s41586-019-1364-3>
- Vermeulen, R., Schets, E., Lohuis, M., Kölbl, B., Jansen, D.-J., and Heeringa, W. (2018). An energy transition risk stress test for the financial system of the Netherlands (Occasional Studies No. 16–7). De Nederlandsche Bank, Amsterdam.
- Vonessen, B., Arnold, K., Mas, R.D., and Fehlker, C. (2020). The case for central bank independence: a review of key issues in the international debate. ECB Occasional Paper.
- World Bank (2021). State and trends of carbon pricing 2021. The World Bank, Washington, DC.

# The Green Transition and Bank Financing

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## 1. Introduction

Climate change is one of the largest environmental hazards affecting our society. There is a scientific consensus that greenhouse gas (GHG) emissions are at the root of the problem, the consequences of which are widespread. In particular, the rise in GHG emissions in the atmosphere is associated with an increase in global temperatures leading to extreme weather events and sea level rise, amongst others.

Governments have not been ignorant with regard to climate change. Already in 1992, the United Nations Framework Convention on Climate Change (UNFCCC) was established in order to ‘stabilize greenhouse gas emissions in the atmosphere’. Each year, the Conference of the Parties (COP) meet to assess the progress in dealing with climate change, to make pledges and to set out future objectives concerning climate change policies. The Paris Climate Accord (COP21) was the result of the 2015 convention. This Accord, signed by nearly 190 countries, aims to limit the increase in average global temperatures to 1.5 degrees Celsius relative to the pre-industrial level. The pathway towards a carbon-neutral economy is often referred to as the green transition.

As a contribution to the green transition, countries have submitted national climate action plans, the so-called nationally determined contribution

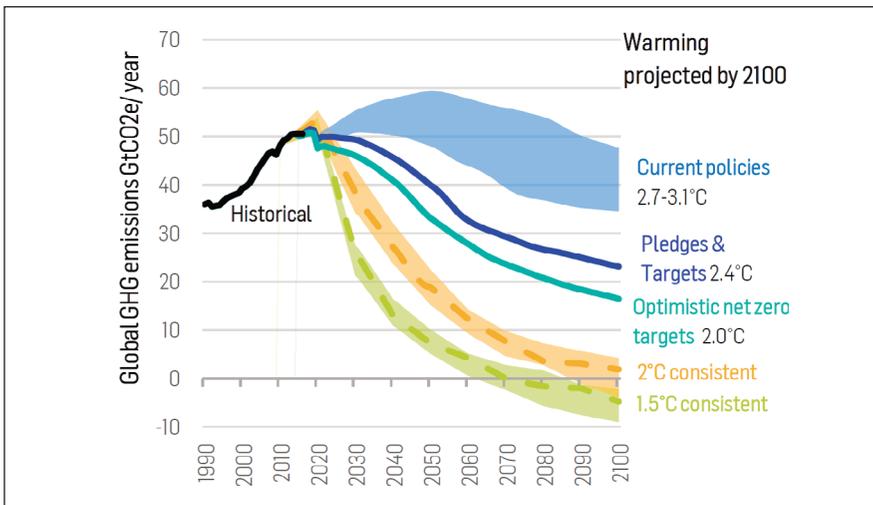
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20. KU Leuven.

or NDCs. At the most recent convention, in Glasgow 2021, countries re-engaged ‘to keep the target of 1.5 degrees Celsius alive’. That is to say, the original pledges and climate policies were not sufficient to protect the planet from warming further, rising above the aimed 1.5 degrees Celsius. However, as Figure 1 below depicts, considering the current exhaust of GHG emissions and the expected warming based on the current NDCs, the projected warming will still far overshoot the aspirational Paris Accord target. In fact, as illustrated in the chart below, the policy gap is quite substantial.

Figure 1. 2100 Warming Projection: Emissions and expected warming based on pledges and current policies.



Source: Solactive, Climate Action Tracker (2021)

The uncertainty regarding future regulatory adjustments and the risks posed by climate change presents investors with significant challenges. These challenges are broadly classifiable into two risk groups. First, the financial system faces physical climate risks. These risks impact the financial sector directly. For example, as natural disasters occur more frequently and become more intense due to climate change, the materialization of climate-related physical risks can potentially result in large financial losses. Second, transition risks can be defined as risks of financial losses or economic dislocation related to the pathway towards a low-carbon economy and the accompanied policy

tightening. They may impact the financial sector indirectly, through shifts in asset- and collateral values or higher costs of doing business. Physical risks and transition risks may interact with one another. For example, not making a transition (with effective policy measures) implies that the physical risks from climate change are likely to increase over time. Or the other way around, regulatory intervention which substantially speeds up the green transition at short-term economic costs could reduce the probability of future physical risks.

The Paris Climate Accord highlighted the role the financial system should play in accelerating the green transition. In fact, it recognized that finance could contribute to a swifter green transition provided that investors, financial institutions and other stakeholders would price in climate-related externalities. These externalities, which are at the root of the matter, are not yet consistently reflected in equilibrium prices. Because the current participants in the financial system that fund these activities do not necessarily suffer the losses and gains resulting from changes in physical or transition risks – most of which occur in the future – the financial system does not always internalize these losses and gains when making funding decisions. The green transition thus requires regulatory intervention that aims at internalizing climate-related externalities. By provoking the internalization of climate-related externalities such as GHG emissions – either directly through carbon taxes or other legislation affecting carbon-intensive industries – a market-based process of resource allocation can arise. This process is crucial to avoid market failure due to climate-related risks in the long run. Despite commitments already made, there is substantial uncertainty about when and how exactly such regulatory adjustments will take place, and whether decision makers are willing to take the potential short-term political costs. Such uncertainty makes particularly difficult to measure and rationally price in both types of climate risks.

## **2. A review of the empirical evidence**

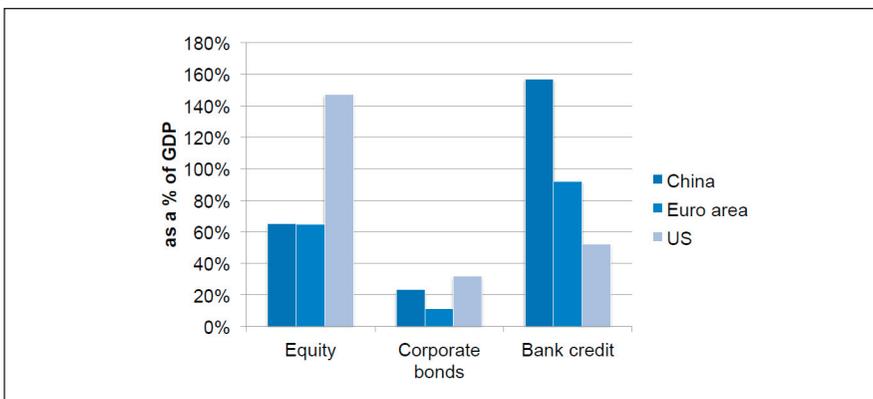
There is a growing body of evidence demonstrating that investors factor in environmental risk in their funding decisions, either because of their specific preferences (Riedl and Smeets, 2017) or because of the physical or transition costs that the risk entails (Krueger et al., 2020). There is empirical

evidence that environmental risks are priced in equity markets (Bolton and Kacperczyk, 2021), option markets (Ilhan et al., 2021), bond markets (Fatica et al., 2019), and real-estate markets (Bernstein et al., 2019).

At the same time, the evidence on bank lending is more fragmented. For example, firms with environmental risks pay a higher loan spread and obtain loans granted by syndicates with fewer banks (Chava, 2014). There is also a significant negative relationship between voluntary disclosure of CO<sub>2</sub> emissions and loan spreads for informationally opaque borrowers (Kleimeier and Viehs, 2018). Some further evidence indicates that environmental risks related to firms' direct emissions are priced, but studies do not find differential pricing of these risks by green banks (Ehlers et al., 2021). Delis et al. (2021), however, find that green banks started to impose higher costs on syndicated loans to fossil fuel firms exposed to climate policies after the acceptance of the Paris Climate Accord.

Studying aggregate market outcomes, De Haas and Popov (2019) show that countries relying more on equity financing relative to bank lending are associated with lower per capita emissions and more green innovations, because stock markets steer investment towards carbon-efficient sectors. This seems to suggest that credit markets are impeding the pace of the green transition. This observation might be particularly worrisome for Europe, because European firms are much more reliant on bank credit compared to U.S. firms, as shown in Figure 2.

Figure 2. Size of financial market segments, 2016.



Source: Schoenmaker & Schramade, "Principles of Sustainable Finance".

Relatedly, Degryse et al. (2020) demonstrate the existence of banking barriers to the green transition. In particular, banks' legacy positions might induce credit rationing barriers to entry for innovative firms in polluting industries with large exposures to green technology disruption. Banks might decide to ration firms when their projects threaten to devalue banks' legacy portfolio, either via collateral value drop or increase in probabilities of default. They further show that the banking market structure affects the rationing of new projects because firms face greater credit rationing when banks have homogeneous exposures to that industry.

### *When Green Meets Green*

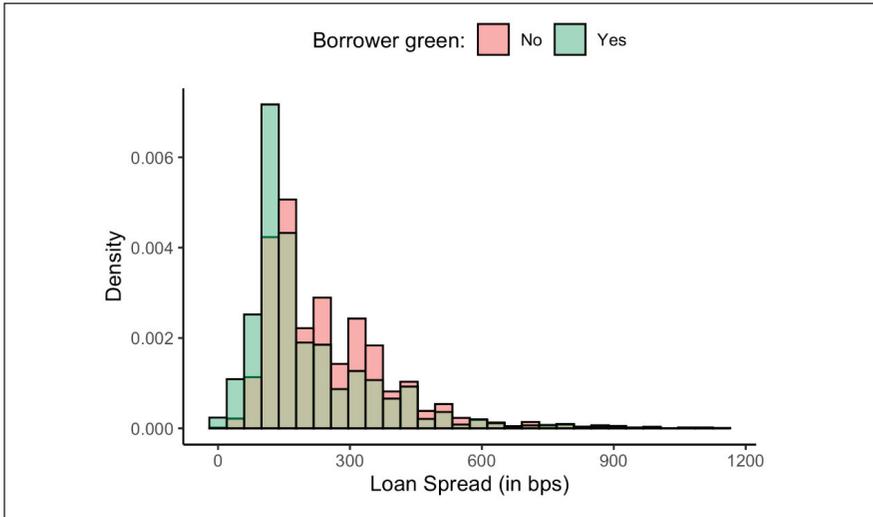
Yet, our recent paper shows that (at least a subset of) the banking system may be conducive to the green transition as banks are favourably pricing loans to firms exhibiting climate awareness (Degryse et al., 2021). In particular, we investigate whether and how the environmental consciousness ("greenness," for short) of both firms and banks is reflected in the pricing of bank credit. Using a large international sample of corporate syndicated loans, we find that firms are indeed rewarded for being green in the form of cheaper loans. However, this only holds when borrowing from green lenders and, moreover, only after the ratification of the Paris Agreement. Hence, we find that environmental attitudes matter when "green meets green".

Our empirical analysis requires proxies for the greenness of firms and banks. We classify a firm as green if it voluntarily reports to the Carbon Disclosure Project, an investor-oriented non-profit initiative to facilitate and standardize disclosure of a firm's environmental impact. Firms reporting to the Carbon Disclosure Project are expected to have better in-house capabilities to measure and manage their exposure to the green transition of the economy, which can be viewed as evidence of their environmental consciousness. While previous studies showed that environmental performance as proxied by environmental scores matters for lending decisions, we refrain from using such metrics as these are often inconsistent over time, across industries, and among different providers (Berg et al., 2019). As such, our employed metric for firm's greenness – which reflects a forward-looking measure of firm's management of the risks posed by the green transition – seems to be more adequate to steer clear of discretion in methodologies.

Banks are classified as green if they are members of the United Nations Environment Programme Finance Initiative (UNEP FI), which aims to “mobilize private sector finance for sustainable development”. Since its creation in 1991, more than 160 leading banks have joined the Initiative. By stating their adherence, banks align their corporate governance with the UN Principles of Responsible Banking. Beyond setting objectively measurable targets with regard to their business activities, signatory banks commit to larger transparency with regular public reporting. To demonstrate that UNEP FI membership is beyond an empty promise, there is evidence that the Initiative’s signatory banks can issue green bonds with a premium because they can more clearly signal their environmental attitudes in lending (Fatica et al., 2019).

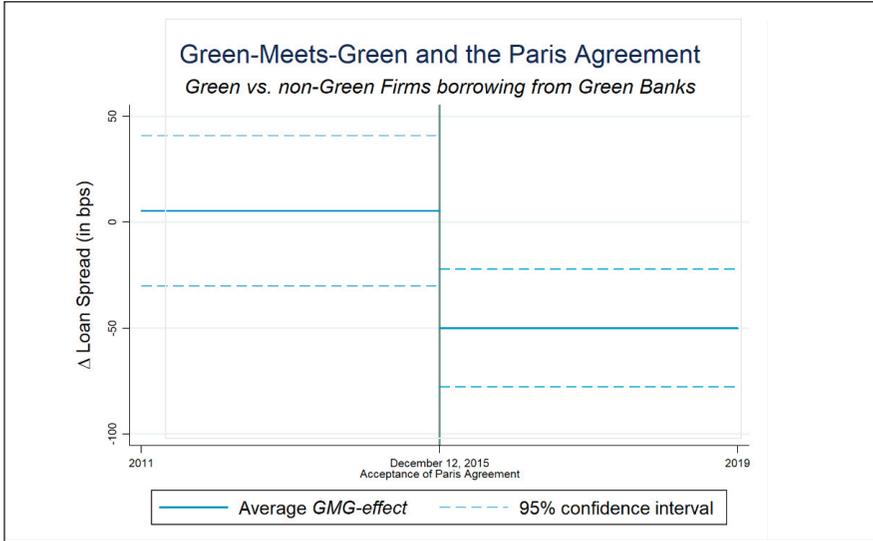
Using these proxies, we analyse the price information of corporate loans using a comprehensive international syndicated loans database for 2011–19. Figure 3 displays the loan spread density for both green and non-green firms in our sample. For green firms, the loan spread distribution is less right-skewed than for non-green firms. This already gives a first indication of a large unconditional green-effect and provides the basis for a more thorough econometric analysis. Unlike previous studies, we take a different tack by shedding light on the importance of lenders’ environmental attitudes in loan pricing decisions and examine whether the green-effect is stronger for loans given by green lenders in particular. We further investigate whether the Paris Agreement, which was reached on December 12, 2015, affected the relationship between firms’ and banks’ environmental attitudes and loan credit spreads.

Figure 3: Spread distribution of green vs. non-green borrowers.



Our results reveal the presence of a statistically and economically significant “green meets green” effect. To be specific, we estimate that *green* firms enjoy an average discount of approximately 50 basis points relative to non-green firms when borrowing from full *green* lender consortia. This effect is economically large as it is equivalent to a discount of one fifth of average loan spreads. Importantly, while the green-meets-green effect is insignificant before the Paris Agreement, as can be seen in Figure 4, it is statistically and economically significant after the agreement. This suggests that the green-meets-green effect is intimately linked to changes brought about by the Paris Agreement. We confirm this with a difference-in-difference-in-differences regression model. Moreover, we show that this effect survives different econometric analyses ruling out all sorts of selection issues and controlling for variables that may confound our results.

Figure 4. Visualization of estimated average coefficient that captures the green-meets-green effect on loan spreads using a sub-sample of loans with origination date preceding the Paris Agreement and a sub-sample of those originated after the acceptance date. The regression analysis controls for a rich set of relevant loan, borrower and lender characteristics and, moreover, exploits variation within firm's industry-country-year clusters.



Why would the Paris Agreement have such a large indirect impact on lending terms, and why is this restricted to green banks? There is no doubt that more intense public discourse of climate change raises awareness among market actors, but it is not immediately clear how awareness translates to a specific equilibrium pricing. We argue in the paper that the observed empirical pattern is consistent with third-degree price discrimination by green banks with respect to firm's greenness. First, we interpret the Paris Agreement as a shift in the perception of green transition risk, both by firms and by banks. Shifts in public opinion could lead to political pressure to strengthen environmental regulation, which could harm firms – and their lenders – that do not anticipate such shocks. Various interventions, previously unprecedented, are now on the table. For example, in May 2021 Royal Dutch Shell, a major player on the oil and gas market, was ordered by a Dutch court to cut its carbon emissions faster, overruling the firm's own transition plans. This signaled to the market an increased likelihood that the judiciary system would become involved in climate issues in the future.

When the realization of a risk event is more likely, it becomes more important and more profitable to screen borrowers with respect to their exposure to such risks. Our proxy for green bank, that is, costly commitments to engage in aligning the banks' business with climate objectives, means that such banks are necessarily more equipped to understand – as well as to systematically reflect in their pricing decisions – borrowing firms' climate risk exposure. Similarly, participation in CDP signals that the firm has invested prior effort in understanding and measuring its exposure to climate transition risk, so it is naturally in a position to better cope with an eventual realization of such risks. Building on their superior expertise, green banks will reward green firms and punish non-green firms more than non-green banks do so. Through this mechanism, the increased awareness induced by the Paris Agreement translates to our documented green-meets-green effect.

On balance, our findings indicate that a subset of banks (*viz.*, green banks) play a positive role in the green transition as they are favorably pricing loans to green firms relative to non-green firms. This holds when banks have a similar environmental consciousness — our “green-meets-green effect”. Putting climate change on the agenda through the Paris Agreement has fostered this attitude.

### **3. Regulatory implications**

The landmark 2015 Paris Climate Agreement sets out a global framework to mitigate dangerous climate change by limiting average global warming well below 2°C and pursue efforts to limit it to an aspirational 1.5°C. To achieve these objectives, it called its negotiators to work on all key areas including mitigation, adaptation, finance, technology development and transfer, transparency of action, and capacity building. This should strengthen countries' ability to deal with climate change and support them in making efforts. Improvement along these areas is essential to build resilience and decrease vulnerability to adverse climate change effects, the success of which will depend on the efficacy of the before-mentioned nationally-determined contributions (NDCs). Moreover, it will also depend on the commitment of non-party stakeholders in harnessing technological innovation and generating

a momentum for the wider economy to switch to a new, carbon-neutral production matrix. As such, the Paris Agreement lays out a bridge between today's policies and a sustainable future. In this section we talk to a number of ongoing policy debates.

### *Climate-related reporting*

Financial stakeholders can accelerate the green transition by supporting emission reducing strategies and promoting green technology development. However, to steer informed investment, disclosure of comparable and reliable climate-related data or metrics will be absolutely fundamental. Therefore, establishing best practices and mandating standards for high quality data is something we should put considerable effort into going forward. As a matter of fact, as we show in our paper, firms that manage climate-related risks and invest in climate-related disclosure will be rewarded for their efforts in terms of access to cheaper bank credit given by green lenders (Degryse et al., 2021).

This underscores the importance of global efforts such as the Task Force on Climate-Related Financial Disclosure (TCFD) Initiative which was established in 2015 in order to develop robust and internationally consistent climate-related disclosures. Increasing the amount of standardized and reliable disclosure will provide better access to data required to appropriately manage and identify the exposures to climate-related risks and opportunities, to compare across companies and industries, and ultimately facilitate the financing of the green transition. An international adoption of the TCFD recommendations, by both non-financial and financial companies, would allow financial stakeholders to assess the carbon footprint of their portfolios, and report on their commitments in a transparent, comparable and consistent manner. Moreover, it will greatly open up the scope for research in contributing to a greater understanding of climate risks, improving modelling practices in measuring risks related to climate change, and strengthening the stability of the financial system.

An encouraging trend in this regard is the speed with which central banks around the world are joining the Network of Central Banks and Supervisors for Greening the Financial System (NGFS) and taking steps towards TCFD-aligned financial disclosure. Cooperating under the NGFS-umbrella allows for deeper work on developing climate-related stress tests, integrating climate-related risks into financial stability monitoring and into monetary policy more generally.

### *Green Financial Institutions*

What about bank financing? Demonstrating the role of banks' legacy positions in their incentives to finance innovation, Degryse et al. (2020) stress the need for (public) *green* banks which are free from brown assets in order to promote the entry of innovative firms. As such, green bank initiatives could catalyse a swifter green transition by promoting competition and diversity among financial institutions and providing alternative funding sources for green technology innovation. Examples of such initiatives include the UK Green Investment Bank or the New York Green Bank. The introduction of legacy-free green banks would induce incumbent banks to counter-act the credit rationing of innovative firms.

In parallel, countries can take actions to counterbalance the tendency of credit markets in financing relatively carbon-intensive industries by introducing green credit guidelines that encourage banks to take environmental considerations into account in their lending decisions. For example, in 2014, the Brazilian central bank issued a number of resolutions on socio-environmental risk integration into banks' risk management on top of the traditional credit, market and operational risks. This should help steer sustainable investment and improve the resilience of the financial system.

Along a similar vein, our findings are supportive of the idea that climate awareness on the lender's side is a prerequisite for the greening of bank lending. This has been recognized in the public discourse on climate transition. For example, in 2021 *Euromoney*, a magazine on financial markets, selected BNP Paribas, who is a UNEP FI member, as winner of its "best bank for ESG data and technology 2021", and praises that "the French bank put data at the heart of its sustainable finance strategy and devoted substantial resources to developing its data collection and processing capabilities". This is a recognition of the fact that investment in technology, data and expertise on climate risk is an essential part of the transition process.

Lastly, countries with a bank-based financial system could stimulate the greening of their economy through further development of the conventional equity markets (De Haas and Popov, 2019). More broadly, the authors suggest that mandating an environmental objective for a European Capital Market Union might foster sustainable equity-based growth. Deepening stock markets by, for instance, re-assessing the tax shield on debt or by removing other

obstacles that hamper equity-based investment, might promote the funding of low-carbon infrastructure and other climate solutions, and ultimately scale-up green investment.

### *Coordinated climate policy action*

Climate change presents a global challenge and therefore requires a global coordinated policy response. While G20 leaders seek to strengthen their climate policies in support of the Paris Agreement, one issue that will undoubtedly come to play is the (lack of) coordination among policies implemented across different jurisdictions. For example, Benincasa et al. (2021) analyse whether banks exploit cross-country heterogeneity in climate policy stringency as a regulatory arbitrage tool. More specifically, investigating whether banks use cross-border lending to react to higher climate policy stringency in their home countries, the authors find that banks do indeed react to greater climate policy stringency in their home country by increasing their cross-border lending. This suggests that a lack of homogeneity and coordination in the regulations for climate change can reduce the effectiveness of such regulations through a bank lending channel.

Likewise, considering carbon taxes, Laeven and Popov (2021) show that after the introduction of a carbon tax, banks reallocate a large share of their fossil loan portfolio to countries without a carbon tax. This suggests that banks effectively shift carbon emissions across national borders to circumvent a negative impact of a carbon tax. This emphasizes the need for global policy coordination so as to mitigate the potential for regulatory arbitrage and improve the effectiveness of climate policy. Moreover, it acknowledges the need for policymakers to cooperate and assess the potential cross-border effects of policy measures adopted by national authorities in order to allow cross-border authorities to respond by adopting suitable reciprocating measures. Nevertheless, we should reiterate the high value in taking *coordinated* actions to accelerate *cooperative climate action* in line with the objectives of the Paris Agreement.

## **4. Conclusion**

Climate change risks are now in the focus of both public and political attention. The goals of the Paris Climate Agreement have provided governments,

regulators and financial institutions with a roadmap for climate actions that will reduce emissions and build climate resilience. By directing financial flows towards sustainable activities and integrating environmental considerations into the investment process, the financial sector has great potential to shape sustainable economic systems.

In our paper, we explore whether green attitudes by firms as well as banks are reflected in the pricing of (syndicated) bank credit. Our findings, both empirically and theoretically, confirm that green attitudes are considered in pricing conditions in a significant way, and this was largely emanated following the adoption of the Paris Agreement. Specifically, we find that firms showing environmental consciousness in the form of voluntary climate-related disclosure enjoy more favourable terms of about 50 bps compared to other firms when borrowing from a consortium of green banks. This suggests that green banks have incentives to pursue third-degree price discrimination between green firms and other firms when the awareness of green transition risks is sufficiently high. These findings indicate that mandating climate-related financial disclosure and stimulating green bank initiatives can stimulate a market-based process of sustainable resource allocation and set the world on a path that should eventually avoid dangerous climate change effects.

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## References

- Benincasa, E., Kabas, G., and Ongena, S. (2021). There is no planet B, but for banks there are countries B to Z: Domestic climate policy and cross-border bank lending. CEPR DP 16665.
- Berg, F., Koelbel, J.F., and Rigobon, R. (2019). Aggregate confusion: The divergence of ESG ratings. MIT Sloan School of Management.
- Bernstein, A., Gustafson, M. T., and Lewis, R. (2019). Disaster on the horizon: The price effect of sea level rise. *Journal of Financial Economics*, 134: 253–72.
- Bolton, P., and Kacperczyk, M. (2021). Do Investors Care About Carbon Risk? *Journal of Financial Economics*, 142(2): 517–549.
- Chava, S. (2014). Environmental Externalities and Cost of Capital. *Management Science*, 60 (9): 2223–2247.
- De Haas, R., and Popov, A. (2019). Finance and Carbon Emissions. ECB Working Paper Series No. 2318.
- Degryse, H., Goncharenko, R., Theunisz, C., and Vadasz, T. (2021). When Green Meets Green. CEPR Discussion Paper DP16536.
- Degryse, H., Roukny, T., and Tielens, J. (2020). Banking Barriers to the Green Economy. NBB Working Paper Research No. 391.

## ARTICLES

Delis, M., de Greiff, K., Iosifidi, M., and Ongena, S. (2021). Being Stranded with Fossil Fuel Reserves? Climate Policy Risk and the Pricing of Bank Loans. Swiss Finance Institute Research Paper Series No. 18-10.

Ehlers, T., Packer, F., and de Greiff, K. (2021). The Pricing of Carbon Risk in Syndicated Loans: Which Risks are Priced and Why? *Journal of Banking and Finance*, forthcoming.

Fatica, S., Panzica, R., and Rancan, M. (2019). The Pricing of Green Bonds: Are Financial Institutions Special? *JRC Working Papers in Economics and Finance*.

Ilhan, E., Sautner, Z., and Vilkov, G. (2021). Carbon Tail Risk. *Review of Financial Studies*, 34(3): 1540-1571.

Kleimeier, S., and Viehs, M. (2018). Carbon Disclosure, Emission Levels, and the Cost of Debt. SSRN Working Paper.

Krueger, P., Sautner, Z., and Starks, L. T. (2020). The Importance of Climate Risks for Institutional Investors. *Review of Financial Studies*, 33(3): 1067-111.

Laeven, L., and Popov, A. (2021). Carbon Taxes and the Geography of Fossil Lending. CEPR DP16745

Riedl, A., and Smeets, P. (2017). Why Do Investors Hold Socially Responsible Mutual Funds? *Journal of Finance*, 72(6): 2505-50.

# Disclosure of Bank Fossil Fuel Exposures

by Winta Beyene<sup>21</sup>, Manthos Delis<sup>22</sup> and Steven Ongena<sup>23, 24</sup>

## 1. Introduction

Climate change is set to dramatically impact both financial markets and the wider economy. Most immediate risks that stem from climate change, relate to the risk of physical changes such as extreme weather events or alteration of climate patterns and the implied risk of economic impact and damages from such events. However, the impact of the transition to a low carbon economy manifests itself also in an alteration of the financial viability of a part of the capital stock and business models, particularly impacted are fossil-fuel companies and other high-carbon projects.

To meet the Paris Agreement goal to limit global warming to 2C or less, a major fraction of existing world fossil fuel reserves must go unburned (McGlade and Ekins, 2015). They calculate that globally, a third of oil reserves, half of gas reserves and over 80% of current coal reserves should remain unused from 2010 to 2050 in order to meet the target of 2C. This would make obsolete billions of dollars of existing and planned investments in oil, gas and

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coal as these resources are stranded (Carbon Tracker Initiative, 2017). “Stranded assets” are assets at risk of becoming obsolete from unanticipated or premature write-offs, downward revaluation or being converted to liabilities due to regulatory or environmental changes. Ongoing policy initiatives to move to cleaner technology in the near future and increasing climate change awareness accelerate the process in which firms with fossil fuel reserves will lose economic value.

In this context, fossil fuel stranded assets - e.g., coal mines, oilfields, and gas reserves - are a cause of financial stability concern. As the world moves towards a target of net zero carbon emissions, energy companies may see that large parts of their oil, gas and coal reserves will never be extracted and hence lose value. The more ambitious the timeline to move towards net zero carbon emissions, the less fossil fuels will be extracted.

Many financial institutions have warned that an abrupt and coordinated increase in carbon prices could cause a major shock to fossil fuel valuation, with the potential for systemic risk. A carbon bubble is a hypothesized bubble in the valuation of firms that heavily depend on fossil fuels as inputs in their production processes, such as those active in the oil, gas, and coal industry (Delis, de Greiff, Iosifidi, and Ongena, 2021; Atanasova and Schwartz, 2019). Yet Beyene, De Greiff, Delis, and Ongena (2021) show that banks continue to provide financing to fossil fuel firms that the bond market would not finance as long as they do not price the risk of stranded assets. Hence stranded assets risks may have shifted to large banks.

Paramount in this whole setting is the possible lack of information on both firm and bank exposures to the risk that fossil fuel reserves may become stranded. Hence therefor in this paper we review the information sources and disclosure regime of firm and bank fossil fuel exposures.

## **2. Information Sources on banks’ fossil fuel exposure**

### *2.1. Disclosure of Fossil Fuel Exposure and Main Challenges*

It is widely acknowledged that the disclosure of climate risks is an important driver in curbing global greenhouse gas emissions and achieving the goals of the 2015 Paris Agreement. High-quality information on firms’

climate risk exposures is critical for informed investment decisions as well as the appropriate pricing and management of these risks (Daniel, Litterman, and Wagner, 2016; Krueger, Sautner, and Starks, 2020). There is considerable evidence that investors value and demand climate risk disclosures and that the environmental, social, and governance performance of firms is strongly influenced by disclosure (Ilhan, Krueger, Sautner, and Starks, 2021). Moreover, with climate change increasingly considered to be a danger to the financial system, regulators across the globe have become concerned with the need for sound and consistent climate-related disclosure to protect financial stability (Financial Stability Board, 2021).

This growing demand for reliable information on transition risks led in recent years to the establishment of several climate change-related disclosure initiatives such as the Task Force on Climate-related Financial Disclosures (TCFD) or the CDP Financial Services Questionnaire. These voluntary initiatives generally aim to provide consistent climate-related financial risk disclosures to stakeholders. Regulatory efforts encourage climate-risk disclosures as well, some of them directly addressing financial institutions. For example, the UK is to enforce mandatory TCFD reporting from April 2022 on for large companies. Other jurisdictions that have already undertaken steps as well towards government-mandated disclosure for financial institutions are France, New Zealand, and Switzerland (Financial Stability Board, 2021; Mésonnier and Nguyen, 2021). Further, central banks and monetary authorities have been intensifying quantitative work aimed at capturing climate-related risks to financial stability (Basel Committee on Banking Supervision, 2021).

Challenges related to lack of data and assessment methods complicate accurate monitoring and mapping of the financial system exposures stranded assets risks. From a general public, as well as regulatory, perspective, quantifying financial institutions' fossil fuel exposure is limited by a lack of publicly usable data. Stranded asset risks are almost invisible in corporate reports of financial institutions. The current sustainability reporting commonly focuses on greenhouse gas emissions and largely does not dictate any metrics that need to be reported with respect to the exposure to fossil fuel reserves and the fossil fuel sector. In principle, financial institutions themselves generate little or no greenhouse gas emissions in their day-to-day business, however, end-user scope 3 emissions from financing provided to

fossil fuel firms provide needed insights into the impact of the financed fossil fuel procurements. Particularly, a focus on scope 3 emissions reporting by financial institutions with regard to the fossil fuel sector is material in the context of assessing risk given that much of the global stock of carbon emissions can be traced to a small number of upstream fossil fuel firms (Ilhan, Sautner, and Vilkov, 2021).

To assess the underlying fossil fuel exposure on a transaction level for banks that lend to, insurers that underwrite, and asset managers that invest in fossil fuel businesses, relevant information includes the greenhouse gas emissions profile, type, location, expected lifetime, and cost of production of the underlying fossil fuel asset (Fulton and Weber, 2015). This data required to link financing to stranded assets risks are often not readily available and financial institutions may need to collect data from fossil fuel firms public information or client questionnaires in order to be able to assess these risks.

Mapping fossil fuel exposure to stranded assets risk is a complex task. A proxy metric for the risk of stranded assets based on underlying fossil fuel reserves needs to consider current and future public policies, potential technology changes, and customer sentiment. Most importantly, financial institutions' level of risk will depend on the regulatory and policy settings in a range of different jurisdictions. These assessment difficulties may exacerbate stranded assets risk and require particular guidance on how risk disclosure should be approached in this context. In any case, to achieve an assessment of stranded assets risk, the importance of effective disclosure from and monitoring of fossil fuel firms is immediate. Actual or expected changes in policy, technology, or the threat of litigation could prompt a rapid reassessment of the value of a large range of assets as changing costs and opportunities become apparent (Zenghelis and Stern, 2016). Overall, there is still not sufficient disclosure on unburnable carbon by the fossil fuel sector (Griffin and Myers Jaffe, 2018). For this reason, it appears that banks compared to other financiers are better suited to effectively assess stranded assets risks associated with debt or an investment portfolio. Nevertheless, Beyene et al. (2021) present evidence that banks in the syndicated loan market price the risk that assets held by fossil fuel firms strand less than the bond market.

Metrics for stranded assets, carbon footprint, or carbon intensity allow to better understand potential risks on a portfolio or firm level. Dedicated climate

stress tests may be applied to evaluate the impacts of plausible environmental scenarios on, portfolios, institutions, and even financial markets as a whole. Such stress tests would also contribute to the safety and soundness of the financial system as the outcome may ultimately inform supervisory actions. For example, the European Central Bank is running an economy-wide climate stress test, which has been developed to assess the resilience of non-financial corporates (NFCs) and euro area banks to climate risks, under various assumptions in terms of future climate policies (Alogoskoufis, Dunz, Emambakhsh, Hennig, Kaijser, Kouratzoglou, Muñoz, Parisi, and Salleo, 2021). However, climate-stress testing methods that look at the exposure of investors require data that are often absent or of too low a resolution, and hard to access for researchers outside financial regulatory bodies.

In the following subchapters, we provide an overview of what sources of information are available to gauge the exposure of banks and, if possible, that of other financial institutions towards fossil fuel companies, and to what extent can that information be extracted from sources of mandatory disclosure.

## ***2.2. Climate-Related Financial Disclosures***

### ***2.2.1. Voluntary Climate Action Initiatives and Fossil Fuel Exposure Disclosure Commitments***

The most prominent example of a climate change-related disclosure initiative is the Task Force for Climate-related Financial Disclosure (TCFD), a global initiative that has been first implemented by the G20's Financial Stability Board in 2015. A key element of the Task Force's mission was the development of climate-related disclosures that "would enable stakeholders to understand better the concentrations of carbon-related assets in the financial sector and the financial system's exposures to climate-related risks" (Financial Stability Board (2015)).

In 2017, the TCFD released for the first time its framework with a set of comprehensive recommendations and guidance on climate-related financial disclosures applicable to organizations across sectors and jurisdictions (Task Force on Climate-related Financial Disclosures, 2017; Task Force on Climate-related Financial Disclosures, 2020).

The Framework includes detailed recommendations on governance, strategy, risk management, and metrics and targets. In addition, the TCFD

offered supplemental guidance for the financial as well as certain other sectors. With regards to disclosures on carbon-risk-related metrics; financial institutions are asked to report on more than just greenhouse gas emissions. Task Force recommends **asset owners** and **asset managers** to report a weighted average carbon intensity metric, although some asset managers effectively may be able to report weighted average carbon intensity for only a portion of the assets they manage given data availability and methodological issues. The same holds for **insurance companies'** investment activities. **Banks** should provide the metrics used to assess the impact of (transition and physical) climate-related risks on their lending and other financial intermediary business activities in the short, medium, and long term and should also provide the amount and percentage of carbon-related assets relative to total assets as well as the amount of lending and other financing connected with climate-related opportunities (Task Force on Climate-related Financial Disclosures, 2017).

Today, the TCFD framework has somewhat become a global standard, having gained traction among public companies - over 2,300 non-financial and financial organizations officially support the TCFD. Moreover, governments have started to build on the TCFD to implement mandatory disclosure requirements. Recently, New Zealand, the United Kingdom, and Switzerland announced that TCFD reporting would become mandatory in their jurisdictions.

Bingler, Kraus, and Leippold (2021) explore whether voluntary reporting within the framework of the TCFD had a significant impact on disclosures of TCFD-supporting companies, or if it needs to be made mandatory. They come to the conclusion that firm's announcing TCFD support does not lead to an increase in disclosures as firms cherry-pick to report primarily non-material climate risk information, disclosures on strategy and metrics and targets are generally lower. It has become increasingly clear that the voluntary sustainable-finance mandates backed by financial intermediaries need to be significantly more stringent than they are today.

CDP (formerly the Carbon Disclosure Project) is a UK-based organization that polls investor-requested companies worldwide each year about their carbon footprint, climate risks, and climate protection strategies. Over 300 financial institutions have been already reporting to CDP as of 2021. Key takeaways from the 2020 CDP questionnaires for the finance industry are that

only about 25% of disclosing financial institutions report their financed emissions – 84 financial institutions worth US\$27. Furthermore, only about half of the responding banks and asset managers and only less than 30% of insurers are taking action to align lending portfolios with a net-zero carbon world. Overall, the disclosure made to CDP also hints that institutional investors may be underestimating their climate-related risks. (CDP, 2021))

Along with voluntary reporting initiatives, common standards have been emerging that quantify the emissions financed by financial institutions and the impact of climate change on the industry’s portfolios and may enable a standardized way to assess climate-related risks in line with the TCFD and other disclosure regimes. The **PCAF Global Greenhouse Gas Accounting and Reporting Standard for the Financial industry** provides detailed methodological guidance to measure and disclose emissions for specific asset classes.<sup>25</sup> The **Science Based Targets initiative (SBTi)** released its **Financial Sector Science-Based Targets Guidance** that aims to enable companies to set emission reduction targets in line with leading climate science. To date, more than 70 financial institutions have publicly committed to set emissions reduction targets through the SBTi (Science-Based Targets initiative (SBTi), 2021).

In recent years, new efforts have emerged within the financial sector to coordinate climate actions for financial institutions and commit to align their lending and investment portfolios with net-zero emissions by 2050. These high-profile initiatives have made it harder for financial institutions to escape inaction. Among other things members of Net-Zero Alliances commit to establish an emissions baseline and annually measure and report the emissions profile of their portfolios and investment. Signatories also commit to transparent and rigorous accountability. As of December 2021, the **Net-Zero Banking Alliance** counts 95 members from 39 countries,<sup>26</sup> representing 43% of global banking assets equivalent to US\$ 66trn. The **Net-Zero Insurer Alliance** is joined by 15 global insurers.<sup>27</sup> The **Net-Zero Asset Owner Alliance** currently consists of 69 institutional investors representing over \$10.4 trillion in assets under management. The **Net Zero Asset Managers**

25. <https://carbonaccountingfinancials.com/standard>

26. <https://www.unepfi.org/net-zero-banking/>

27. <https://www.unepfi.org/net-zero-insurance/>

Initiative counts 220 signatories and represents \$57 trillion in assets under management.<sup>28</sup> Signatories generally are supposed to support TCFD reporting and submit reports through the PRI and/or CDP platforms. The Glasgow Financial Alliance for Net Zero (GFANZ), chaired by Mark Carney, UN Special Envoy on Climate Action and Finance, unites financial institutions from the leading net-zero initiatives across the financial system. As of November 2021, GFANZ is joined by over 450 firms that are together responsible for assets in excess of US\$130 trillion.<sup>29</sup>In the context of these wide range commitments to net-zero across governments and financial institutions, Bolton, Kacperczyk, and Samama (2021) suggest that regulators could require that systemically important institutions estimate and report their carbon pathways to determine systemic execution risk associated with the necessary alignment of carbon emissions with global net-zero targets.

### *2.2.2. Mandatory Fossil Fuel Exposure Disclosure Commitments*

Regulators are increasingly considering implementing mandatory carbon risk-related disclosures for financial institutions. **Article 173-VI of French TECV law**, for Transition Énergétique et Croissance Verte (Energy Transition and Green Growth) that passed in 2015 and entered into force in January 2016 pioneered such government initiative.<sup>30</sup> **Article 173-VI** of the law imposes - although on a comply-or-explain basis - climate-change and more general ESG reporting requirements on institutional investors registered in France and concerns all asset classes. In particular, it requires investors to report in their annual reports information on how they integrate ESG into their investment processes, on the integration of climate change-related risks - hence including stranded asset risks, on the alignment of voluntary decarbonisation targets with national and international goals. Investors are generally free to choose their preferred evaluation methodologies.<sup>31</sup>

Mésonnier and Nguyen (2021) assess the effect of the introduction of Article 173-VI focusing on euro area investors' holdings of bonds and stock

28. <https://www.netzeroassetmanagers.org>

29. <https://www.gfanzero.com/progress-report/>

30. <https://www.legifrance.gouv.fr/eli/loi/2015/8/17/DEVX1413992L/jo#JORFARTI000031045547>, 17 August 2015

31. <https://www.unepfi.org/fileadmin/documents/PRI-FrenchEnergyTransitionLaw.pdf>

issued by firms in the fossil energy industry. They show that imposing climate-related disclosures on financial institutions actually leads them to divest themselves of these carbon-intensive securities. However, the comply-or-explain principle, provides investors with broad flexibility, resulting in many of the financial services companies to not meet expectations with regards to reporting changes.<sup>32</sup>

The UK government is the first of soon to be several governments to implement mandatory TCFD reporting. Financial Conduct Authority (FCA)-regulated asset managers and asset owners - including life insurers and pension providers - will have to disclose how they take climate-related risks and opportunities into account in managing investments. The implementation of the rule will be staggered, hence from 1 January 2022 the rule will come to effect for the largest firms with more than £50 billion in assets under management (or £25 billion assets under administration for asset owners) will, while it will be becoming into effect for smaller firms one year later.<sup>33</sup>

New Zealand's **Financial Sector (Climate-related Disclosures and Other Matters) Amendment Act 2021 (FSAA)** will prospectively require large financial organisations to disclose climate risks in line with TCFD recommendations. The new law will require around 200 large financial institutions covered by the FMC Act, including large registered banks, managers of registered investment schemes, licensed insurers, as well as most listed issuers, licensed insurers, and managers of investment schemes to start making climate-related disclosures for financial years commencing in 2023, with disclosures being made in 2024 at the earliest. A comply-or-explain approach creates exceptions from compliance.<sup>34</sup>

Switzerland is also gearing to implement binding TCFD reporting for large Swiss firms, including banks and insurance companies. The binding implementation of the TCFD recommendations is expected to take place from

32. <https://www.i4ce.org/download/article-173-overview-of-climate-related-financial-disclosure-after-two-years-of-implementation/>

33. <https://www.fca.org.uk/publication/policy/ps21-24.pdf>

34. <https://www.mbie.govt.nz/about/news/climate-related-disclosures-bill-passes-third-reading/>  
<https://environment.govt.nz/what-government-is-doing/areas-of-work/climate-change/mandatory-climate-related-financial-disclosures/>

2024 for the 2023 financial year; the Finance Ministry is set to prepare a legal text on mandatory reporting by the end of summer 2022.<sup>35</sup>

While New Zealand, the UK, and Switzerland have implemented or announced that they will implement mandatory TCFD reporting, the EU is expectedly also on track to align sustainability reporting with TCFD recommendation. In April 2021, the European Commission adopted a proposal for the new Corporate Sustainability Reporting Directive (CSRD), which would introduce more detailed sustainability reporting requirements that are to be developed in consideration of existing standards such as the TCFD.<sup>36</sup>

Table 1 provides an overview of the financial institutions' main fossil fuel disclosure commitments.

### *2.3. Information from Financial Databases*

In addition to the voluntary and binding disclosure discussed in the previous sections, investments in debt securities and stocks issued by fossil energy companies can be tracked via financial databases gathered by commercial data providers.

Equally important syndicated bank loans issued by fossil fuel firms can be tracked via DealScan from Refinitiv Loan Connector (in this context see for example their usage by Benincasa, Kabas, and Ongena (2021)). Other than banks, various types of institutional investors partake in syndicated bank loans despite having different costs and hence return expectations of providing debt capital. In contrast to traditional single-lender loans, syndicated loans are jointly extended by a group of lenders and are structured, arranged, and administered by one or several lead arrangers, that negotiate the key terms of the loans. As Figure 1 shows, this exposure to fossil fuel firms has not been decreasing much, an assessment that is consistent with more comprehensive credit data (in various ways) collected in Rainforest Action Network (2021) for example. To collect individual bilateral bank to firm credit exposures one needs access to the European Central Bank's AnaCredit and/or to national credit registers.

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35. <https://www.admin.ch/gov/en/start/documentation/media-releases.msg-id-84741.html>

36. [https://ec.europa.eu/info/business-economy-euro/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting\\_en](https://ec.europa.eu/info/business-economy-euro/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en)

While bank exposures to fossil fuel firms are one element of exposure to stranding risk, another one is the policy stringency of the countries where the fossil fuel reserves are located, the fossil firms are headquartered, and/or the fossil fuels are sold. To this end, Delis et al. (2021) and Beyene et al. (2021) measure climate policy risk with the Climate Change Performance Index by Germanwatch (see Burck, Marten, Bals, Hagen, Frisch, Höhne, and Nascimento, 2018) which is available for the period 2007-2017 for 58 countries. They both also use an alternative index called the Climate Change Cooperation Index by Bernauer and Böhmelt (2013) which evaluates countries' overall climate policy performance, as well as performance in terms of political behavior (output) and emissions (outcome). However, this index only covers the period 1996-2014 (for up to 172 countries). In their work they find these two indices to perform quite similarly.

### **3. Conclusion**

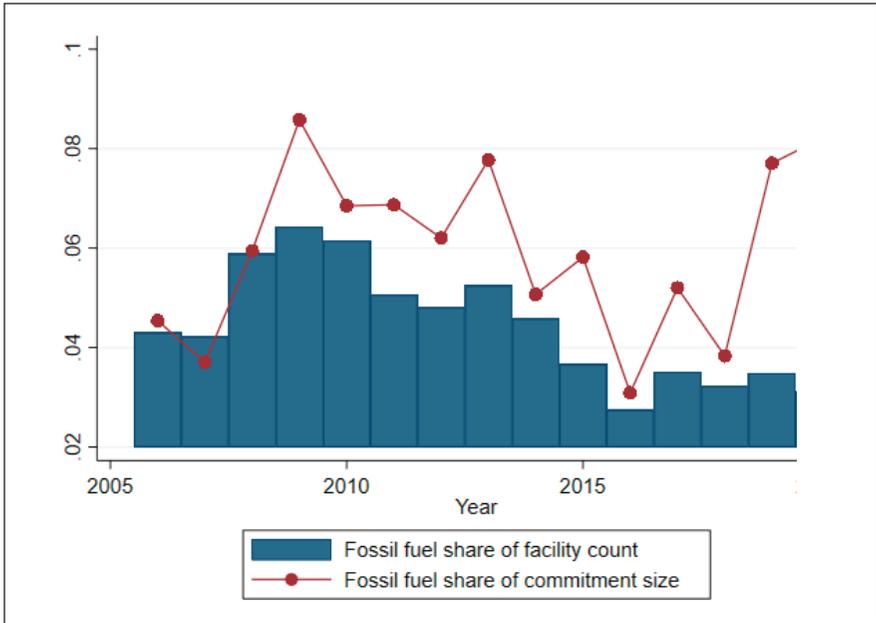
We think banks and other financial institutions may actually need enhanced international agreements on the proper accounting practices for carbon so that these institutions can all measure their progress towards net-zero the same way. At this stage unfortunately no institution can be entirely sure how much carbon the non-financial companies are producing because the data simply is not readily and universally available.

In this context it is promising to note that reporting on climate change risk under consideration of carbon risk is gaining traction, with ever more implementations triggered by voluntary disclosure commitments and recent government mandated reporting requirements. In this context, the Task Force on Climate-related Financial Disclosures (TCFD) recommendations are the first in line to become the much-needed global standards. Important to note however that there is first (somewhat worrying) evidence that voluntary commitments and comply-or explain approaches may not suffice to avoid climate cheap talk.

Stranded assets risk is complex to evaluate as it cannot be observed. Stranded assets risks are difficult to quantify; sound and consistent disclosure requirements are therefore essential to counteract jurisdictional differences/uncertainty as well

as for the oversight of cross-border risks by financial authorities to protect financial stability. The current disclosure initiatives do not dictate what needs to happen in the fossil-fuel sector and are inclined more towards target-setting, and corporate engagement; this reliance on corporate reporting may be contributing to the current inertia in the financial sector.

Figure 1. Commercial Bank Exposure to Fossil Fuel Firms in DealScan



Notes: Figure 1 shows the total share of facilities extended to the fossil fuel sector relative to the total count of facilities provided by loan syndicates with at least one commercial bank. Similarly, Figure 1 also shows the fossil fuel share of the total commitment size of DealScan facilities provided by loan syndicates with at least one commercial bank.

Table 1. Overview of Financial Institutions' Main Fossil Fuel Disclosure Commitments

	Financial institutions	Total FI assets under management	Disclosure Commitments	Starting Date	Type
<b>TCFD</b>	As of October 2021, 1'069 financial institutions have Supported TCFD	\$194 trn	Recommendations on reporting on climate-change risk related governance, strategy, risk management, and metrics and targets	2017	Voluntary disclosure
<b>CDP Financial Services Questionnaire</b>	Diverse group of 332 financial institutions (incl. asset managers, asset owners, insurers and banks)	\$109 trn	Self-reported data on climate performance (including financed emissions)	2002	Voluntary disclosure
<b>French Article 173 -VI of the TECV law</b>	Institutional investors (but not banks) registered in France <sup>i</sup>	€ 2.2 trn	Reporting on ESG criteria, climate change-related risks, and decarbonization targets	January 2016	Mandatory comply-or-explain
<b>UK FCA Rules on Climate-Related Disclosures</b>	Asset managers, life insurers and FCA-regulated pension providers	£ 12.1 trn	Disclosures in relation to climate-related risks and opportunities in line with TCFD recommendations	January 2022 (initially for largest firms)	Mandatory
<b>New Zealand's Financial Sector (Climate-related Disclosures and Other Matters) Amendment Act 2021 (FSAA)</b>	200 large financial institutions covered by the FMC Act	90% of assets under management in New Zealand	Disclosures in relation to climate-related risks and opportunities in line with TCFD recommendations	January 2023	Mandatory comply-or-explain
<b>Binding TCFD implementation for large Swiss companies</b>	Public and private companies with over 500 employees, over CHF20 million or CHF40 million in annual turnover	N/A	Disclosures in relation to climate-related risks and opportunities in line with TCFD recommendations	(expectedly) January 2023	(expectedly) Mandatory

Notes: <sup>i</sup> Smaller investors, defined as those with a total balance sheet (or belonging to a group with a total balance sheet) of less than €500m, only must provide a general overview of how they integrate ESG factors.

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**References**

- Atanasova, E., and Schwartz, S. (2019). Stranded fossil fuel reserves and firm value. National Bureau of Economic Research, Working paper.
- Alogoskoufis, S., Dunz, N., Emambakhsh, T., Hennig, T., Kaijser, M., Kouratzoglou, C., Muñoz, M.A., Parisi, L., and Salleo, C. (2021). ECB Economy-wide Climate Stress Test: Methodology and Results, European Central Bank, Occasional Paper No. 281.
- Basel Committee on Banking Supervision. (2021). Climate-related Risk Drivers and their Transmission Channels, Bank for International Settlements, Report.
- Benincasa, E., Kabas, G., and Ongena, S. (2021). «There Is No Planet B», but for Banks There Are «Countries B to Z»: Domestic Climate Policy and Cross-border Bank Lending, Centre for Economic Policy Research, Discussion Paper No. 16665.
- Bernauer, T., and Böhmelt, T. (2013). National Climate Policies in International Comparison: The Climate Change Cooperation Index. *Environmental Science and Policy*, 25: 196-206.
- Beyene, W., de Greiff, K., Delis, M., and Ongena, S. (2021). Too-Big-To-Strand: Bond to Bank Substitution in the Transition to a Low-carbon Economy, Swiss Finance Institute, Mimeo.
- Bingler, J. A., Kraus, M., and Leippold, M. (2021). Cheap Talk and Cherry-Picking: What ClimateBert Has to Say on Corporate Climate Risk Disclosures, University of Zürich, Mimeo.
- Bolton, P., Kacperczyk, M.T., and Samama, F. (2021). Net-Zero Carbon Portfolio Alignment. *Financial Analysts Journal*, Forthcoming.
- Burck, J., Marten, F., Bals, C., Hagen, U., Frisch, C., Höhne, N., and Nascimento, L. (2018). Climate Change Performance Index: Background and Methodology, Germanwatch e.V., Report.
- Carbon Tracker Initiative. 2017. 2 Degrees of Separation – Transition Risk for Oil and Gas in a Low Carbon World, Carbon Tracker, Report.
- CDP. 2021. The Time to Green Finance: CDP Financial Services Disclosure Report 2020, CDP, Report.
- Daniel, K. D., Litterman, R.B., and Wagner, G. (2016). Applying Asset Pricing Theory to Calibrate the Price of Climate Risk, National Bureau of Economic Research, Working Paper No. 22795.
- Delis, M. D., de Greiff, K., Iosifidi, M., and Ongena, S. (2021). Being Stranded with Fossil Fuel Reserves? Climate Policy Risk and the Pricing of Bank Loans, Swiss Finance Institute, Research Paper No. 18-10.
- Financial Stability Board. 2015. Proposal for a Disclosure Task Force on Climate-Related Risks, Financial Stability Board, Report.
- Financial Stability Board. 2021. Financial Stability Board Roadmap for Addressing Climate-Related Financial Risks, Financial Stability Board, Report.
- Fulton, M., and Weber, C. (2015). The Carbon Asset Risk Discussion Framework, WRI and UNEP-FI Portfolio Carbon Initiative, Report.
- Griffin, P. A., and Myers Jaffe, A. (2018). Are Fossil Fuel Firms Informing Investors well enough about the Risks of Climate Change? *Journal of Energy and Natural Resources Law*, 36: 381-410.
- Ilhan, E., Krueger, P., Sautner, Z., and Starks, L.T. (2021). Climate Risk Disclosure and Institutional Investors, Swiss Finance Institute, Research Paper No. 19-66.

- Ilhan, E., Sautner, Z., and Vilkov, G. (2021). Carbon Tail Risk. *Review of Financial Studies*, 34: 1540-71.
- Krueger, P., Sautner, Z., and Starks, L.T. (2020). The Importance of Climate Risks for Institutional Investors. *Review of Financial Studies*, 33: 1067-111.
- McGlade, C., and Ekins, P. (2015). The Geographical Distribution of Fossil Fuels Unused when Limiting Global Warming to 2 C. *Nature*, 517: 187-90.
- Mésonnier, J.-S., and Nguyen, B. (2021). Showing off Cleaner Hands: Mandatory Climate-Related Disclosure by Financial Institutions and the Financing of Fossil Energy, Banque de France, Working Paper No. 800.
- Rainforest Action Network. 2021. Banking on Climate Chaos: Fossil Fuel Finance Report 2021, Rainforest Action Network, Report.
- Science-Based Targets initiative (SBTi). 2021. Financial Sector Science-Based Targets Guidance Pilot Version 1.1, Science-Based Targets initiative (SBTi), Report.
- Task Force on Climate-related Financial Disclosures. 2017. Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures, Bank for International Settlements, Report.
- Task Force on Climate-related Financial Disclosures. 2020. Status Report of the Task Force on Climate-related Financial Disclosure, Bank for International Settlements, Report.
- Zenghelis, D., and Stern, N. (2016). The Importance of Looking Forward to Manage Risks: Submission to the Task Force on Climate-Related Financial Disclosures, ESRC Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment, Policy Paper.



# Finance and Firms on the Road to Net Zero

by Ralph De Haas<sup>37</sup>

## 1. Introduction

There now exists incontrovertible evidence that human activity, mainly in the form of carbon emissions from industrial production, is warming up the Earth at a rate that has been unprecedented for at least 2000 years (IPCC, 2021). The day-to-day impact of this global warming is becoming increasingly apparent. Extreme temperatures, droughts, floods, and storms are already causing substantial human, ecological, and economic losses.

In the absence of scalable technologies to remove carbon dioxide from the biosphere, mitigating climate change will require a drastic reduction of new carbon emissions. For this reason, and in line with the Paris Climate Agreement, many countries aim to produce zero net greenhouse gas emissions by 2050 at the latest (Millar et al., 2017). This green transition (that is, the road to net zero) will require massive public, private, and public-private investment to develop and then implement cleaner technologies. For example, several governments are currently investing heavily in the development of better lithium-ion batteries and electrolyzers to produce hydrogen. At the same time, some private enterprises are investing to make their production methods more energy efficient and to develop new, greener technologies from scratch.

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How can the financial system – banks, bonds, as well as public and private equity – facilitate this green transition? A well-established literature has by now shown convincingly that deeper financial systems can foster economic growth (Levine, 1997). An open question is whether the financial sector also influences the ‘greenness’ of economic growth? For example, large-scale investments to invent and then implement green technologies may only be possible if firms can access external finance. Moreover, some sources of finance may be better suited to fund green investment than others. The financial *structure* of a country may then co-determine how polluting its development path turns out to be.

This article discusses some emerging evidence on the nexus between the financial system, carbon emissions, and economic growth. I will make three main points. First, I will argue that bank credit can help firms to reduce toxic emissions and, to some extent, to improve the energy efficiency of their existing production processes. Second, I will also argue that other organisational constraints, in particular weak firm management, often hold back green investment more than credit constraints do. Third, I will claim that green innovation flourishes more where and when the financial sector is more equity-based and less bank-based.

## **2. Bank lending, toxic emissions, and investments in energy efficiency**

Especially during the early stages of the green transition, substantial emission reductions can be achieved by making corporate production (as well as buildings) more energy efficient. In fact, energy efficiency measures could take care of more than 40 percent of the carbon abatement required by 2040 to remain in line with the Paris Agreement (IEA, 2018). This means large-scale industrial investment is needed in cleaner technologies to reduce firms’ carbon footprint. Unfortunately, many firms – especially smaller ones – not only lack internal funding to invest in energy efficiency measures, they often also cannot access bank credit to do so. When credit constraints bite, climate investments may suffer.

An emerging literature shows that when firms get better access to bank loans, the amount of toxic pollution they emit locally often falls. This is

presumably because bank credit allows them to invest in, and hence clean up, their production processes. For example Levine, Lin, Wang, and Xi (2018) show how positive credit supply shocks in U.S. counties help to reduce local air pollution. Likewise, Götz (2019) finds that financially constrained firms reduced toxic emissions once their capital cost decreased as a result of the U.S. Maturity Extension Program. Xu and Kim (2022) also find that financial constraints increase firms' toxic releases. Their evidence suggests that firms trade off pollution abatement costs against potential legal liabilities: the impact of financial constraints on toxic releases is stronger when regulatory enforcement is weaker.

To what extent does access to bank credit not only allow firms to reduce their emission of locally-polluting toxins but also of globally-harmful carbon? Carbon emissions are less visibly harmful at the local level and hence tend to expose firms to less legal risk. Firms may therefore deprioritize investments to reduce such emissions. Recent evidence confirms that while access to bank loans can help firms to limit carbon emissions, credit constraints appear not to be the most binding organizational constraint. For example, a cross-country survey of firm managers shows that despite the potential environmental and efficiency benefits of green investments, many firms refrain from implementing such measures (EBRD, 2019). Close to 60 percent of all interviewed firms see investments in energy efficiency as low priority relative to other investments. A lack of financial resources is the second-most cited reason not to do so, but this answer is only given by about 15 percent of all interviewed managers.

De Haas, Martin, Muûls, and Schweiger (2021) investigate these data in more detail and focus in particular on the relative importance of credit constraints versus managerial constraints. They measure each firm's green management practices by using standardized data on firms' strategic objectives concerning the environment and climate change. This includes whether there is a manager with an explicit mandate to deal with environmental issues; and how the firm sets and monitors targets (if any) related to energy and water usage, carbon emissions, and other pollutants. In addition, they track which green investments firms made in the recent past. Green investments include machinery and vehicle upgrades; heating, cooling and lighting improvements; the on-site generation of green energy; waste

minimization, recycling and waste management; improvements in energy and water management; and measures to control air or other pollution.

Their analysis shows how both credit constraints and green management influence the likelihood of green investments. Credit constraints hinder capital-intensive green investments in particular, such as machinery and vehicle upgrades and improved heating, cooling or lighting. They do not significantly reduce the likelihood of investing in air and other pollution control, potentially due to the “low-hanging fruit” nature of such investments. Firms with good green management practices, on the other hand, are more likely to invest in *all* types of green investment, with the effect larger for those more typically thought of as green: waste and recycling; energy or water management; air and other pollution controls.

If credit constraints and weak green management reduce firms’ green investments, then this may eventually also hamper decarbonisation efforts. To investigate this, the authors use the European Pollutant Release and Transfer Register (E-PRTR) and focus on a sample of Eastern European countries. The E-PRTR contains data on pollutant emissions of a large number of industrial facilities. Their estimates indicate that, although there was a secular emission reduction during 2007-17, this decline was smaller in localities where banks had to deleverage more after the global financial crisis and where, as a result, more firms were credit constrained.

In sum, a growing body of evidence indicates that when firms have better access to bank credit, they may invest more in cleaner production technologies. This may not only reduce (local) toxic emissions but also (global) carbon emissions. At the same time, for many important energy-efficiency measures that firms can take, access to credit is less of a constraint than the quality of firms’ (green) management. Better-managed firms tend to produce more cleanly, and this is often unrelated to their ability to access bank credit.

### **3. Banks and green innovation**

The previous section shows that banks can help, to some extent, with funding investment in tried-and-tested technologies that enhance firms’ energy efficiency. Yet, the steep emission decline needed to achieve net zero

by 2050 also requires developing entirely new production technologies. There are at least three reasons to believe that banks may be less willing (or able) to finance R&D into such innovative, greener technologies.

First, many banks tend to be inherently technologically conservative. They fear that funding new (and possibly cleaner) technologies will erode the value of collateral that underpins their existing loans – and which firms used to finance older technologies (Minetti, 2011; Degryse, Roukny, and Tielens, 2020). Second, green innovation (as does any innovation) often involves assets that are intangible and highly firm-specific. Many banks would instead be more comfortable with funding tangible and easily collateralisable assets. Third, banks often have a shorter time horizon (the loan maturity) than equity investors and are hence less interested in whether assets will become less valuable (or even stranded) in the more distant future. For example, banks have only very recently started to price some of the climate risk related to firms with large fossil fuel reserves (Delis, De Greiff, and Ongena, 2018). Even then, many (large) banks continue to provide syndicated loans to fossil fuel firms at spreads that under-price the risk of stranded assets – as compared to bonds issued by those firms. As a result, carbon producers are gradually switching from bond to bank funding (Beyene, Delis, De Greiff, and Ongena, 2021).

#### **4. Equity and green innovation**

Stock markets may be better suited to fund innovative (and greener) technologies. By their nature, equity contracts are more appropriate to finance projects characterized by both high risks and high potential returns. To the extent that stock prices rationally discount future cash flows of polluting industries, equity investors may, in fact, be more sensitive to the costs and risks of pollution – even if these may only materialize in the future.

A key question is therefore to what extent equity investors take carbon emissions into account when assessing longer-term corporate risk. A growing body of evidence suggests that especially institutional investors are increasingly doing so. Survey evidence by Krueger, Sautner, and Starks (2020) shows that a large proportion of investment managers believe that climate risk is already affecting their portfolio companies. Almost 40 percent of the

surveyed investors are therefore aiming to reduce the carbon footprint of their portfolios, including through active engagement with management.<sup>38</sup> Such investors may also benefit from pushing companies to reduce carbon emissions because this helps to attract environmentally responsible investment clients (Ceccarelli, Ramelli and Wagner, 2020). Because institutional investors are taking carbon emissions into account when assessing corporate risk, Bolton and Kacperczyk (2021) find that stocks of U.S. firms with higher carbon emissions earn higher returns. Moreover, investors appear to shun carbon-intensive companies, although this effect is limited to direct emissions from production and to the most carbon-intensive industries. Recent evidence shows that also *private* equity providers can help to clean up production processes. Bellon (2020) find that private equity investors have helped to reduce pollution (both CO<sub>2</sub> and toxic chemicals) in the oil and gas industry.

## 5. Reducing carbon emissions: Banks versus equity

The above discussion raises the question whether in the aggregate, countries with deeper stock markets relative to banking sectors may in fact follow steeper decarbonisation trajectories. To help answer this question, De Haas and Popov (2021) compare the role of banks and equity markets as potential financiers of green growth. Using a 48-country, 16-industry, 26-year panel data set, they assess the impact of both the size and the structure of the financial system on industries with different levels of carbon intensity. In particular, they distinguish industries on the basis of their inherent, technological propensity to pollute, measured as the carbon dioxide emissions per unit of value added. The authors then investigate two channels through which financial development and financial structure (the relative size of equity markets relative to banking sectors) can affect pollution: between-industry reallocation and within-industry innovation.

Using this empirical framework, the authors derive three findings. First, industries that pollute more for technological reasons, start to emit relatively

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38. This not only holds for investors in developed markets but increasingly also for those investing in emerging market securities (EBRD, 2021).

less carbon dioxide where and when stock markets expand. Second, there are two distinct channels that underpin this result. Most importantly, stock markets facilitate the development of cleaner technologies within polluting industries. Using data on green patents, the authors show that deeper stock markets are associated with more green patenting in carbon-intensive industries. This patenting effect is strongest for inventions to increase the energy efficiency of industrial production. In line with this positive role of stock markets for green innovation, carbon emissions per unit of value added decline relatively more in carbon-intensive sectors when stock markets account for an increasing share of all corporate funding. There is also more tentative evidence for another channel: holding cross-industry differences in technology constant, stock markets appear to gradually reallocate investment towards more carbon-efficient sectors. This is in line with the aforementioned tendency of (some) institutional investors to avoid the most carbon-intensive sectors. Polluting firms in these sectors will then find it more difficult to access external finance, putting them at a competitive disadvantage compared with cleaner companies.

Third, the domestic green benefits of more developed stock markets ‘at home’ may be offset by more pollution abroad, for instance because equity-funded firms offshore the most carbon-intensive parts of their production to foreign pollution havens. Analysis shows that the reduction in emissions by carbon-intensive sectors due to domestic stock market development is indeed accompanied by an increase in carbon embedded in imports of the same sector. However, the domestic greening effect dominates the pollution outsourcing effect by a factor of ten. This means that stock markets may have a genuine cleansing effect on polluting industries and do not simply help such industries to shift carbon-intensive activities to foreign pollution havens.

## 6. Conclusions

This introductory article has discussed some emerging evidence on the nexus between the financial system, carbon emissions, and economic growth. The evidence shows that while bank lending can help firms to improve the energy efficiency of their current production processes, other organisational constraints, in particular weak firm management, often hold back green

investments more than credit constraints. While policy measures that ease access to bank credit may be useful (for example, credit lines that are contingent on the adoption of state-of-the-art energy efficiency technologies) this might just be one element of a broader policy mix to stimulate green investments to boost firms' energy efficiency.

Governments and development banks may also consider measures to directly help strengthen firms' green management practices. Advisory services, training programs, and other consultancy related firm-level interventions can help managers to become better "green managers". Such interventions effectively teach managers how to not leave money at the table by postponing much-needed investments in energy efficiency.

Efforts to increase green investments by reducing credit constraints and by enhancing firms' managerial skills, will only pay off when the broader institutional framework is supportive. This means in particular that highly distortionary fossil fuel subsidies need to be eradicated. Recent evidence reveals that better-managed firms tend to reduce the fossil-fuel intensity of their production *unless* they can exploit high fuel subsidies (Schweiger and Stepanov, 2022). Moreover, the introduction of carbon pricing – either through a carbon tax or through a cap-and-trade system – can incentivise firms to stop procrastinating and instead invest in measures to make their production more energy efficient. The role of the financial sector is then a complementary one: it mobilises the funding for investments in energy-efficiency improvements and new technologies as firms respond to prices signals coming from, for example, carbon taxes. It is up to politicians and policy makers to create a policy framework that sets the right incentives for firms to transition to net zero. The role of the financial system is then to help firms to achieve this transition in an efficient way.

A second lesson from recent research is that green innovation tends to flourish more where and when finance is more equity-based and less bank-based. Countries with a bank-based financial system that are on the transition path towards net zero carbon emissions, may therefore also consider measures to stimulate the development of conventional equity markets. This holds especially for middle-income countries where carbon dioxide emissions may have increased more or less linearly during the development process. There, stock markets could play an important role in making future growth greener,

in particular by stimulating innovation that leads to cleaner production processes within industries.

One way of doing so, especially in smaller economies, is through the regional integration of smaller equity markets. Such integration could target cross-border market infrastructure (such as links between stock exchanges and securities depositories); the harmonization of regulations; as well as capital market accelerator funds with regional mandates. An example is the successful consolidation of national stock markets in the Baltic region. Nasdaq Baltic operates the stock exchanges in Estonia, Latvia and Lithuania, as well as a common Central Securities Depository. It provides capital market infrastructure across the whole value chain, including listing, trading, and market data, as well as post-trade services including clearing, settlement and safe-keeping of securities. This makes it easier for investors to transact cross-border and, ultimately, for firms to raise equity. Similar efforts are ongoing to integrate several stock exchanges in the Balkans.

Another way to help develop equity markets that can provide firms with the equity needed for green innovation, is by levelling the playing field between the cost of equity and the cost of debt. Countries that want to limit the negative environmental externalities stemming from a financial system that is overly reliant on bank lending (and debt more generally) can reduce tax-code favouritism towards debt (such as the deductibility of interest payments and double taxation of dividends). An example is the notional interest deduction that Belgium introduced in 2006. Similarly, as part of the European Commission's work on the Capital Markets Union, a common corporate tax base has been proposed to address the current debt bias in corporate taxation. A so-called Allowance for Growth and Investment will give firms equivalent tax benefits for equity and debt.

In parallel, countries can take measures to counterbalance the tendency of banking sectors to (continue to) finance relatively "dirty" industries. Examples include the green credit guidelines and resolutions that China and Brazil introduced in 2012 and 2014, respectively, to encourage banks to improve their environmental and social performance and to lend more to firms that are part of the low-carbon economy. From an industry perspective, adherence to the so-called Carbon Principles, Climate Principles, Equator Principles, UN Principles for Responsible Banking, as well as the Collective Commitment to

Climate Action should also contribute to a greening of bank lending. Strict adherence to these principles can potentially make governmental climate change policies more effective by accelerating capital reallocation and investment towards low-carbon technologies.

To incentivize and enable banks to adhere to these Principles in a meaningful way, supervisory climate stress tests, such as currently being undertaken by the European Central Bank, can be useful. Moreover, a growing number of banking supervisors – as part of developing a Pillar 3 framework on ESG risks and in line with the Financial Stability Board’s Task Force on Climate-related Financial Disclosures – is moving towards mandatory disclosure of climate-related financial risks. The meaningful disclosure of climate risks will allow depositors, investors, and other stakeholders to make more informed decisions and hence to enhance market discipline. Relatedly, the meaningful disclosure of climate risks by companies is a precondition for banks and other providers of capital to understand and manage climate-related risks. This work is likely to be facilitated by that of recently announced International Sustainability Standards Board, which aims to create a global, comparable set of sustainability standards.

Lastly, the so-called Net-Zero Banking Alliance (NZBA), a United Nations initiative, brings together banks that are committed to align their portfolios with net-zero emissions by 2050. A useful aspect of this alliance is that it helps banks to set (and publicly commit to) an intermediate target for 2030 or sooner, thereby accelerating their decarbonisation strategies and making them more credible. Even then, voluntary commitments may not suffice, as evidenced by the fact that many global banks that signed up to the NZBA and similar initiatives continue to finance fossil-fuel extraction at scale. Banks looking for more credible decarbonisation strategies may choose to have their strategies validated by the Science Based Targets initiative (SBTi), an independent body that assesses whether banks strategies are aligned with the Paris goal of limiting global warming to 2° C.

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**References**

- Bellon, A. (2020). Does Private Equity Ownership Make Firms Cleaner? The Role of Environmental Liability Risks. Mimeo.
- Bolton, P., and Kacperczyk, M.T. (2021). Do Investors Care about Carbon Risk? *Journal of Financial Economics*, 142(2): 517-549.
- Ceccarelli, M., Ramelli, S., and Wagner, A. (2020). Low-Carbon Mutual Funds. mimeo.
- Degryse, H., Roukny, T., and Tielens, J. (2020). Banking Barriers to the Green Economy. Working Paper 391, National Bank of Belgium, Brussels.
- De Haas, R., Martin, R., Muûls, M., and Schweiger, H. (2021). Managerial and Financial Barriers to the Green Transition. CEPR Discussion Paper No. 15886, Centre for Economic Policy Research, London.
- De Haas, R., and Popov, A. (2021). Finance and Green Growth. CEPR Discussion Paper No. 14012, Center for Economic Policy Research, London.
- Delis, M.D., de Greiff, K., and Ongena, S. (2018). Being Stranded on the Carbon Bubble? Climate Policy Risk and the Pricing of Bank Loans. CEPR Discussion Paper No. 12928.
- EBRD (2019). Transition Report 2019-20: Better Governance, Better Economies. European Bank for Reconstruction and Development, London.
- EBRD (2021). The Investor Base of Securities Markets in the EBRD Regions, 3<sup>rd</sup> Edition, April, European Bank for Reconstruction and Development, London.
- IEA (2018). Energy Efficiency 2018. Analysis and Outlooks to 2040. International Energy Agency (IEA), Paris.
- IPCC (2021). Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), Cambridge University Press.
- Götz, M. (2019). Financing Conditions and Toxic Emissions. SAFE Working Paper No. 254, Frankfurt.
- Krueger, P., Sautner, Z., and Starks, L.T. (2020). The Importance of Climate Risks for Institutional Investors. *Review of Financial Studies*, 33(3): 1067-1111.
- Levine, R. (1997). Financial Development and Economic Growth: Views and Agenda, *Journal of Economic Literature*, 35(2): 688-726.
- Levine, R., Lin, C., Wang, Z., and Xie, W. (2018). Bank Liquidity, Credit Supply, and the Environment. NBER Discussion Paper No. 24375, National Bureau of Economic Research.
- Millar, R.J., Fuglestedt, J.S., and P. Friedlingstein et al. (2017). Emission Budgets and Pathways Consistent with Limiting Warming to 1.5°C. *Nature Geoscience*, 10: 741-747.
- Minetti, R. (2011). Informed Finance and Technological Conservatism. *Review of Finance*, 15(3): 633-692.
- Schweiger, H., and Stepanov, A. (2022). When Good Managers Face Bad Incentives: Management Quality and Fuel Intensity in the Presence of Price Distortions. *Energy Policy*, forthcoming.
- Xu, Q., and Kim, T. (2022). Financial Constraints and Corporate Environmental Policies. *Review of Financial Studies*, 35(2): 576-635.



# Financing the Environmental Transition in Europe

by Paolo Marullo Reedtz<sup>39</sup>

The European Union's commitment to a rapid and concrete transition towards environmental sustainability objectives has become progressively more pervasive and systematic in recent years after the ratification, in October 2016, of the Paris Agreement setting the goal to hold the average global temperature increase well below 2°C compared to pre-industrial levels and to pursue efforts to limit the increase to 1.5°C.

Political and legislative initiatives have touched highly significant moments with: *i*) the Communication on the European Green Deal officially adopted by the European Commission (EC) in December 2019 for a growth strategy consistent with the commitment to achieve no net emissions of greenhouse gas (GHG) in 2050<sup>40</sup>, *ii*) the political agreement reached by the European Council in November 2020 on a comprehensive financial package of €1,824.3 billion in which 30% of the total funds are earmarked for the fight against climate change; *iii*) the European Climate Law of 30 June 2021<sup>41</sup> which has changed to commitment to reach climate neutrality into legally binding obligation for the EU Institutions and Member States and has set the intermediate target of reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.

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39. Member of the Platform on Sustainable Finance.

40. Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, *The European Green Deal*, 11 December 2019.

41. Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021.

However, the amount of public funds allocated with such a huge financial package is not sufficient to achieve the objectives set by the EU Green Deal<sup>42</sup>. As a consequence, a substantial share of the financing flows has to come from the private sector. This, in turn, makes it essential to introduce incisive reforms in order to enrich the endowment of the financial markets in terms of information, instruments, products, and services, in order to allow private investors to rapidly reorient capital flows towards sustainable investments.

This article intends to review the legislative reforms launched in recent years with this aim and provide some tentative indications on upcoming needs.

## 1. The Action Plan for Financing Sustainable Growth

The overall strategy for boosting the role of private finance in pursuing environmental and social goals (The Action Plan for Financing Sustainable Growth) was presented by the EC in March 2018<sup>43</sup>. A set of additional complementary initiatives, the so-called Renewed Sustainable Finance Strategy (RSFS), was then announced in July 2021<sup>44</sup>.

Consistently with the analytical issues, the set of initiatives contained in the Action Plan aim to: 1) reorient capital flows towards sustainable investment in order to achieve sustainable and inclusive growth; 2) manage financial risks stemming from climate change, resource depletion, environmental degradation and social issues; 3) foster transparency on environmental factors in corporate communication and public information provided by financial operators and favour long-termism in financial and economic activity.

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42. According to the Commission's assessments, Europe will need an estimated EUR 350 billion in additional investment per year over this decade to meet its 2030 emissions-reduction target in energy systems alone, alongside the EUR 130 billion it will need for other environmental goals (Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *Strategy for Financing the Transition to a Sustainable Economy*, 6 July 2021).

43. Communication from the Commission to the European Parliament, the European Council, the Council, the European Central Bank, the European Economic and Social Committee and the Committee of the Regions, *Action Plan: Financing Sustainable Growth*, 8 March 2018.

44. Communication from the Commission to the European Parliament, the European Council, the Council, the European Central Bank, the European Economic and Social Committee and the Committee of the Regions, *Strategy for Financing the Transition to a Sustainable Economy*, 6 July 2021

Stakeholders need to make investment choices aligned with their appetite for sustainability and to assess the risks that environmental factors pose to the value of their investments. Thus, the Action Plan can be represented as a set of three lines of work centered on a European classification system of sustainable activities (the Taxonomy): (i) initiatives aimed at completing the financial market infrastructure in support of large investors; (ii) reforms aiming at expanding the set of investment opportunities in sustainable activities for retail investors; (iii) potential changes to the financial regulatory framework to increase the consideration of environmental factors in investment decisions and risk management processes of banks and institutional investors.

## **2. The EU Taxonomy of sustainable economic activities**

The Taxonomy Regulation<sup>45</sup> (TR) serves as the cornerstone of the entire Action Plan: establishing a classification system for economic activities that can be univocally defined environmentally “sustainable” provides companies and issuers of securities with a commonly accepted benchmark to demonstrate their current and future commitment in sustainable activities and to qualify the request for funds. Moreover, the Taxonomy makes it possible for financial market participants (FMPs) and retail savers to seize eco-sustainable investment opportunities without the risk of incurring into greenwashing.

The TR considers six environmental objectives; (a) climate change mitigation; (b) climate change adaptation; (c) the sustainable use and protection of water and marine resources; (d) the transition to a circular economy; (e) pollution prevention and control; (f) the protection and restoration of biodiversity and ecosystems.

An economic activity can be defined sustainable if it: 1) contributes substantially to one or more of the six environmental objectives; 2) does not significantly harm any of the remaining environmental objectives; 3) is carried

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45. Regulation (EU) 2020/852 of 18 June 2020.

out in compliance with the minimum safeguards<sup>46</sup> 4) complies with technical screening criteria (TSC) established by delegated acts adopted by the EC.

The TSC are meant to identify the conditions that determine both the substantial contribution (SC) and a significant harm (SH) to each environmental objective: they must be based on scientific evidence and the precautionary principle embedded into the European legislation; they must be quantitative and contain thresholds to the extent possible, and otherwise be qualitative; they have to be periodically reviewed to remain aligned with scientific and technological developments<sup>47</sup>.

In addition to economic activities that directly make a substantial contribution to one or more of the environmental objectives without causing significant harm to any of the other objectives, the Taxonomy qualifies as sustainable: a) the activities (*transitional activities*) which cannot yet be replaced by technologically and economically feasible low-carbon alternatives but support the transition to a climate-neutral economy by presenting the greenhouse gas emissions levels (GHG) corresponding to the best performance in the sector or industry, and; b) those (*enabling activities*) which do not substantially contribute to climate change mitigation through their own performance but by directly enabling other activities to make a substantial contribution to one or more of the six environmental objectives.

Parallel to the completion of the overall design of the Taxonomy with the definition of TSC, works are being carried out for the possible extension of its scope of application. Regulation (EU) 2020/852 itself requires the Commission to publish a report describing the provisions that would be required to extend the classification system to cover economic activities that do not have a significant impact on environmental sustainability (NSI) and economic activities that significantly harm environmental sustainability and to broaden the range of sustainability objectives to social objectives.

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46. As developed in the OECD Guidelines for Multinational Enterprises and the UN Guiding Principles on Business and Human Rights.

47. A first set of TSC has already entered into force: for a large number of economic activities, the conditions under which it can be said that a significant contribution to one of the two climate objectives (mitigation and adaptation) is made and a significant harm to any other environmental objective is caused are established (Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021). A second Taxonomy Complementary Climate Delegated Act on climate change mitigation and adaptation covering the natural gas and nuclear energy sectors has been presented by the EC on 2 February 2022 in order to be formally transmitted to the co-legislators for their scrutiny.

At the same time, the Regulation established a Platform on Sustainable Finance<sup>48</sup> with the mandate to provide advice to the Commission on the suitability and feasibility of these amendments; the TSC and the possible need to develop, update or revise those criteria and on their usability; the evaluation and development of sustainable finance policies.

### 3. Initiatives aiming at supporting large investors

#### 3.1. Corporate Communication

At the entry into force of the TR, the main source of company information on environmental factors was Directive 2014/95/EU (the Non-Financial Reporting Directive, NFRD) requiring large public-interest entities<sup>49</sup> with an average number of employees in excess of 500 to report both on how sustainability issues affect their performance, position and development (the ‘outside-in’ perspective), and on their impact on people and the environment (the ‘inside-out’ perspective) (*double materiality approach*). According to the TR (Art. 8) the entities that are in the scope of the NFRD have to disclose, in addition, information on how and to what extent their activities are Taxonomy compliant.

The key performance indicators to be disclosed by non-financial undertakings are specified directly in the Regulation: the proportion of their turnover derived from products or services associated with sustainable activities and the proportion of their capital expenditure and the proportion of their operating expenditure related to assets or processes associated with sustainable economic activities. The content and format of the disclosure obligations of financial undertakings have been defined by the Commission Delegated Regulation (EU) 2021/2178 of 6 July 2021, which applies from 1 January 2022. As for credit institutions, the key performance indicators show

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48. The Platform, which constitutes an independent Expert Group, includes representatives of European institutions, member chosen in the industrial and financial sectors, experts representing civil society, academics and researchers, and experts appointed in a personal capacity.

49. Public-interest entities in the EU include entities governed by the law of a Member State whose transferable securities are admitted to trading on a regulated market of any Member State, credit institutions, insurance undertakings, and entities designated by Member States as *public-interest entities, for instance due to the nature of their business, their size or the number of their employees* (Directive 2013/34/EU, the Accounting Directive, and Directive 2014/56/EU, the Audit Directive).

the share of the business related to Taxonomy-aligned economic activities separately for on-balance sheet assets (the green asset ratio for loans and advances/debt securities/ equity instruments); off-balance sheet items arising from holding assets under management and providing financial guarantees; fees and commission income derived from commercial services and activities; trading activity.

In the Action Plan, the EC announced forthcoming measures to meet the need to improve the quality of corporate communication on environmental issues. As also emerged from a public consultation launched in February 2020<sup>50</sup>, the information provided was considered lacking in terms of comparability, reliability and effective relevance; the plurality of possible communication channels hindered the joint finding and use of information released by different companies which, in addition, were rarely available in a machine-readable digital format; the limited number of reporting entities severely limited the scope of assessments by investors and other stakeholders.

The Proposal for a new Corporate Sustainability Reporting Directive (CSRD) published in April 2021 contains important changes: a) it extends the scope of the reporting requirements to all large companies and listed companies (from approximately 11,700 to nearly 50,000); b) it requires the audit of reported sustainability information; c) it specifies in more detail the information that companies should provide according to sustainability reporting standards to be developed by the European Financial Reporting Advisory Group (EFRAG) and consequently adopted by the EC; d) it requires that all information is published as part of companies' management reports, and disclosed in a digital, machine-readable format in order to be included in the European Single Access Point. According to a proportionate approach, no mandatory reporting requirements are imposed on small and medium-sized enterprises (SMEs), except those listed on EU regulated markets<sup>51</sup>. Moreover, the EC will adopt standards for large companies and separate, proportionate standards for listed SMEs to be used on a mandatory basis, while non-listed SMEs will decide whether to use them on a voluntary basis.

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50. European Commission (2020).

51. Moreover, listed micro-companies are exempted from mandatory reporting obligations.

### 3.2. EU Climate Benchmarks

In the Action Plan, the EC noted the increasing demand for benchmarks suitable for measuring the environmental performance of financial portfolios. In response, the market was offering a plethora of indices which, despite differences in objectives and methodologies, were proposed as low-carbon.

In order to increase the comparability between benchmarks, provide a tool to support climate-focused investments, and increase transparency with respect to the impacts of investments, Regulation (EU) 2019/2089 of 27 November 2019 introduced two types of climate benchmarks: the EU Climate Transition Benchmarks (EU CTB) and the EU Paris-Aligned Benchmarks (EU PAB) and established ESG disclosure requirements applicable to all registered benchmark administrators<sup>52</sup>.

The two new climate benchmarks incorporate specific targets of reducing greenhouse gas emissions, through the choice and weighting of the underlying assets. They entail different ambition levels: a) the EU PABs have stricter demands, including alignment with the Paris Climate Agreement global warming targets and a 50% lower weighted average GHG intensity than the investable universe, and they are designed for institutions actively pursuing the Paris climate goals; b) the EU CTBs require a 30% lower GHG intensity than the investable universe and are primarily intended for diversification strategies with a focus on climate risk mitigation.

For EU PABs and EUCTBs, benchmark administrators are requested to disclose in their benchmark statements details on whether or not and to what extent a degree of overall alignment with the target of reducing GHG emissions or the attainment of the objectives of the Paris Agreement is ensured and to publish the methodology used for the calculation of those benchmarks.

### 3.3. EU Green Bond Standard

At the time the Action Plan was prepared, the green bond market, although rapidly expanding, was not considered large enough to support the transition towards climate mitigation targets and appeared to be affected by

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52. ESG disclosure requirements are applicable to all investment benchmarks, with the exception of currency and interest rate indices whose underlying assets don't have any impact on climate change. Commission Delegated Regulation (EU) 2020/1817 of 17 July 2020 has defined the minimum content of the explanation of how the key elements of the benchmark methodology reflect ESG factors for each benchmark and a standard format to be used for such disclosure.

some barriers<sup>53</sup>: 1) uncertainty about the actual quality of the financed projects in terms of environmental performance; 2) high operating costs associated with the procedures necessary for the issue; 3) reputational risks for the issuers if the market doesn't consider the project to be financed sufficiently green or if the project fails to achieve the announced environmental objectives.

Building on such analysis, the EC has developed a Proposal for an EU Regulation on European green bonds which was presented on 6 July 2021 defining a robust EU Green Bond Standard (EUGBS) to be made available to issuers for voluntary adoption.

The overall proposed discipline comprises four components: (1) Taxonomy-alignment of use of proceeds: the proceeds shall be exclusively and fully allocated to economic activities that meet the taxonomy requirements currently or within a defined period of time<sup>54</sup>; (2) well defined issuing procedures: the issuers are required to publish a European green bond factsheet showing the intention to adhere to the EU GBS Regulation, information on how the bond aligns with the broader environmental strategy of the issuing entity, the environmental objectives pursued by the bond, a description of the processes by which the issuer will determine how projects align with the taxonomy requirements, the time schedule along which the proceeds will be allocated to the projects; (3) a reporting regime articulated into an 'allocation report' to be drawn up every year by the issuers demonstrating that the proceeds of the European green bonds have been actually allocated in accordance the Regulation and an 'impact report' on the environmental impact of the use of the bond proceeds to be published after the full allocation of the proceeds of the green bonds and at least once during the lifetime of the bond; (4) an external review requirement: all pre-issuance and post-issuance public information has to be 'certified' by external reviewers registered with ESMA and complying with a series of requirements regarding their governance, prevention of conflicts of interest, organisational structure, sound and prudent management, assessment methodologies and knowledge

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53. EU Technical Expert Group on Sustainable Finance (June 2019).

54. The period shall not exceed five years from bond issuance, unless a longer period of up to ten years is justified by the specific and documented features of the economic activities concerned, as foreseen in the Commission Delegated Regulation (EU) 2021/2178 of 6 July.

and experience of the analysts; (5) a supervisory system centered on ESMA, for which the supervisory and investigatory powers of the competent authorities and administrative sanctions and other administrative measures are provided in detail.

### 3.4. Sustainability in credit rating and ESG scoring services

The Action Plan noted the proliferation of services for the evaluation of companies' ESG performance. Lack of transparency on data sources and methodologies made it extremely difficult to assess which of the scores was more reliable<sup>55</sup>. On the other hand, there was no clarity on the extent to which sustainability factors were included in credit ratings and according to which methodologies.

Consequently, the EC made a commitment to carry out a comprehensive study on sustainability ratings and research and invited ESMA to assess the current practice within the credit rating market concerning sustainability considerations. ESMA was also invited to include environmental and social sustainability information in its guidelines on disclosure for credit rating agencies (CRA), and to consider additional guidelines or measures, if needed.

In the Technical Advice published on 18 July 2019 ESMA confirmed that ESG factors are included in the creditworthiness assessments with heterogeneous methodologies but expressed the opinion that credit ratings should remain distinct from sustainability assessments. Updating disclosure requirements on how ESG factors are treated by credit rating agencies (CRA) were considered preferable to mandating the consideration of sustainability characteristics in CRA's credit assessments. In this vein, ESMA published new guidelines requiring greater transparency around whether and why ESG factors are a key driver of the credit rating action<sup>56</sup>. As shown in a recent study<sup>57</sup>, although the overall level of disclosure has increased, significant divergencies remain in CRAs' disclosures even for rated entities that are highly exposed to ESG factors. As a consequence, ESMA expresses the commitment to continue analysing the underlying drivers of the observed

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55. Doubts arised from the low degree of correlation between the ESG scores available to investors, ranging from 0.4 to 0.7, vis a vis the correlation between credit ratings (above 0.9), see Berg F. et al. (2019).

56. See ESMA (2019).

57. See Amzallag et al. (2022).

heterogeneity and to consider the appropriate supervision and policy tools for further transparency.

As regards the ESG rating sector, in January 2021 ESMA signalled the need to ensure the quality and reliability of assessments and stem the risk of greenwashing<sup>58</sup>. A common definition of ESG ratings was considered a necessary prerequisite for a regulatory and supervisory framework including an authorization and registration discipline and minimum subjective requirements in terms of organization, transparency and prevention of conflict of interest that can be suitable for both large multi-national providers and smaller entities. ESMA declared to be ready to support possible future supervisory responsibilities in this area. Moreover, in order to gather information on the market structure for ESG rating providers in the EU, on 3 February 2022 ESMA launched a call for evidence addressed to ESG rating providers and users, and to entities subject to ESG assessments.

#### **4. Initiatives aiming at supporting retail investors**

##### **4.1. Sustainability-related disclosures in the financial services sector**

In the Action Plan it was noted that, although investors and asset managers are required to act in the best interest of the end-investors, they do not systemically consider sustainability factors and risks in their investment/advice decisions and disclosure processes.

In order to reduce information asymmetries in principal-agent relationships with regard to environmental factors and risks and to the impact of investment decisions on sustainability factors, Regulation (EU) 2019/2088 of 27 November 2019 (Sustainable Finance Disclosure Regulation, SFDR) introduced new requirements for financial product manufacturers and financial advisers both at entity level and at product level.

At the entity level, FMPs and financial advisers are required to disclose on their websites information on their policies to consider principal adverse impacts (PAIs) of investment decisions (made or suggested), for which the definition of content, methodologies and presentation is entrusted to the ESAs. In pre-contractual disclosures, FMPs/financial advisers must include

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58. See ESMA (2021).

descriptions of how sustainability risks are integrated into the investment decisions (made or suggested) and of the likely impacts of sustainability risks on the returns of the financial products they make available/advise on.

At product level, FMPs are required to explain whether and how a financial product considers PAIs on sustainability factors. For financial product promoting environmental and/or social characteristics, pre-contractual disclosure must include information on how those characteristics are met and, if an index has been designated as a reference benchmark, information on whether and how this index is consistent with those characteristics. Where a financial product has sustainable investment as its objective and an index has been designated as a reference benchmark, pre-contractual disclosure disclosed must contain information on how the designated index is aligned with that objective and an explanation as to why and how the designated index aligned with that objective differs from a broad market index. For both the promotion of environmental or social characteristics and sustainable investments, FMPs are required to publish on their websites a description of the environmental or social characteristics or the sustainable investment objective and information on the methodologies used to assess, measure and monitor the environmental or social characteristics or the impact of the sustainable investments selected for the financial product.

#### **4.2. Sustainability considerations in financial advice**

As observed in the Action Plan, investors' preferences regarding sustainability are often not sufficiently taken into account by investment firms and insurance distributors in the phase in which they assess clients' investment objectives and risk tolerance in order to recommend suitable financial instruments or insurance products. For this reason, changes to the Markets in Financial Instruments Directive (MiFID II) and to the Insurance Distribution Directive (IDD) delegated acts were announced.

In fact, on 21 April 2021 the EC amended existing delegated acts by introducing the assessment of client's sustainability preferences in the suitability assessment.

Insurance and investment advisers are required to obtain information not only about the client's financial expertise and ability to bear losses but also

about their sustainability preferences in order to assess the range of financial instruments and products to recommend. To prevent the risk of greenwashing, it is established that, in order to be recommended to customers as responding to any expressed sustainability preference, any financial instrument or insurance-based investment product *a)* must finance Taxonomy-aligned economic activities for a minimum proportion determined by the client; *b)* must finance sustainable investments as defined in the SFRD for a minimum proportion determined by the client; *c)* must consider PAIs on sustainability factors as defined in the SFRD where qualitative or quantitative elements demonstrating that consideration are determined by the client.

#### **4.3. The EU Ecolabel for retail financial products**

In order to facilitate retail investors to express their preferences in terms of sustainability and for an easier access to sustainable financial products, the Action Plan considered the potential merit of a voluntary labelling scheme for financial products unequivocally connected with sustainable activities.

Work carried out at the Joint Research Center of the EC has resulted in a set of proposals that have been refined over time. According to the document released in March 2021<sup>59</sup>, financial products can be labelled as sustainable if, among other requirements, they: invest in Taxonomy-aligned activities to an extent not lower than a certain threshold; do not finance companies that derive more than 5 percent of their turnover from a specific list of activities considered harmful to environmental objectives; do not finance companies that do not meet certain criteria relating to social aspects or are not in line with good corporate governance practices; are offered by fund managers engaging with financed entities in order to obtain improvements in their environmental performance. The preparation of a specific European regulation is currently underway.

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59. See Konstantas et al. (2021).

## 5. Sustainability in the prudential framework of credit institutions

At the time of the Action Plan, alarmed warnings had already been issued for the exposure of the financial system to the risks associated with climate change. Mark Carney had evoked the Tragedy of the horizon and had introduced the classification of climate risks (physical, transition, and liability risks) which has now become the common point of reference<sup>60</sup>.

The Action Plan showed concern that environmental risks were not adequately considered in business strategies and risk management systems of credit institutions and insurance companies and that capital requirements should better reflect the risk of sustainable assets. As a consequence, EIOPA and EBA were mandated to assess the potential inclusion of ESG risks in the prudential regulatory frameworks and to elaborate on how the institutions could better identify, assess and manage ESG risks<sup>61</sup>.

In compliance with the mandate, in June 2021 EBA Report issued a report<sup>62</sup> containing an overview of bank current practices and a set of recommendations aimed at integrating ESG risks<sup>63</sup> into the definition of bank business strategies, internal governance structures, and risk management systems<sup>64</sup>. As for business strategies, EBA pointed out the need of extending the time horizon for strategic planning (to at least 10 years) consistently with the materialisation horizon of ESG risks and of testing their outcomes under different scenarios. Setting, disclosing and implementing ESG risk-related strategic objectives and/or limits was also recommended, as well as engaging with borrowers and investee companies, if appropriate by referring to taxonomies. Regarding governance arrangements, special attention was given to the role of the management body in establishing an ESG risk culture, setting the risk appetite, ensuring that tasks and roles relating to

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60. See Carney (2015).

61. For EIOPA the mandate was given in the Action Plan; for EBA the mandate regarding credit institutions and investment firms (the institutions) was contained in Article 98(8) of Directive 2013/36/EU (Capital Requirements Directive - CRD) and in Article 35 of the Directive (EU) 2019/878.

62. See EBA (2021).

63. Defined as as risks that stem from the current or prospective impacts of ESG factors on bank counterparties or invested assets and fall into the traditional categories of financial risks (credit risk, market risk, operational and reputational risks, liquidity and funding risks).

64. On the same issues, in November 2021 the Basel Committee for Banking Supervision published a Consultation Document on *Principles for the effective management and supervision of climate-related financial risks*.

ESG risks are clearly and effectively allocated between internal structures. For risk management, the focus was on the operational and methodological challenges connected with the lack of data to identify and measure ESG risks, the difficulty of developing ESG risk metrics, in-house scoring system and risk models, scenario analysis and stress-testing tools, also due to the fact that a much longer time horizon becomes relevant than that currently considered. Despite these difficulties, credit institutions were recommended to include ESG risks in their risk appetite framework and describe their risk tolerance along with the resulting thresholds and limits in their ICCAP and ILAAP; collect information on the exposure of their counterparties to ESG risks, especially in the loan origination phase.

Integrating ESG risks into the Supervisory Review and Evaluation Process (SREP) performed by competent authorities under Pillar 2 of the prudential regulation encounters difficulties that are very similar to those experienced by credit institutions. Specific attention should be given to how ESG factors affect the business environment and the viability and sustainability of the business model and on whether institutions sufficiently test the resilience of their business model against the time horizon of the relevant public policies or broader transition trends. Scenario analysis and stress testing should be used to assess the long-term resilience of institutions and their vulnerabilities in terms of capital, liquidity, and funding.

The EBA recommendations to both credit institutions and supervisors have been widely taken into account by the EC in developing the Banking Package presented on 27 October 2021, that finalises the implementation of the Basel III agreement in the EU. New, formal requirements for institutions to systematically identify, measure and manage ESG risks are introduced and regular climate stress testing activity has to be implemented by both banks and supervisors. Pillar 3 disclosure requirements for ESG risks are expanded from only applying to large, listed institutions to all in the scope of the CRR, in such a way to respect the proportionality principle<sup>65</sup>.

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65. On 24 January 2022, EBA published draft implementing technical standards (ITS) on Pillar 3 disclosures on ESG risks, putting forward comparable disclosures to show how climate change may exacerbate other risks within institutions' balance sheets, how institutions are mitigating those risks, and their ratios on exposures financing taxonomy-aligned activities, including a green asset ratio and a banking book taxonomy alignment ratio.

In redefining and completing the prudential framework of banking activity, the EC took the opportunity to return to an issue already touched upon in the Action Plan and never abandoned: the potential calibration of capital requirements that could be justified from an ESG risk perspective. In the Proposal for amending CCR, EBA is mandated to deliver a report on the prudential treatment of bank exposures by 2023<sup>66</sup>.

While in the Action Plan the attention seemed to be put on sustainable activities deserving a supporting factor in relation to their lower exposure to ESG risks<sup>67</sup>, in the Proposal for amending CCR the assessment EBA is called upon to carry out regards “a targeted calibration of a risk weights for items associated with particularly high exposure to climate risk, including assets or activities in the fossil fuel sector and in high climate impact sectors”. In any case, the EC’s attitude seems to mainly reflect the objective of channeling funding flows towards environmental objectives, which could find support in the expected lower exposure of sustainable activities to environmental risks and in some empirical analyses showing that companies that focus on sustainability benefit from higher cash flows, greater earnings stability, better credit ratings, and lower market premia<sup>68</sup>.

However, as emerged from a survey conducted by the Basel Committee in 2020<sup>69</sup>, most members have not yet factored the mitigation of climate-related financial risks into their prudential capital framework. A series of considerations probably explain the reluctance of regulatory authorities and supervisors to adopt an ‘economic policy approach’. As for the green supporting factor, introducing a new source of risk is hardly consistent with reducing the capital charge, which for assets financing sustainable activities could at most remain unchanged. Moreover, there is no certainty that an advantage in terms of capital requirements would translate into an increase

66. In parallel, in the framework of a comprehensive review of EU insurance rules (“Solvency II”) on 23 September 2021, EIOPA has been mandated to explore by 2023 a dedicated prudential treatment of exposures related to assets or activities associated substantially with environmental and/or social objectives and to review regularly the scope and the calibration of parameters of the standard formula pertaining to natural catastrophe risk.

67. “the Commission will assess whether more appropriate capital requirements could be adopted to better reflect the risk of sustainable assets held by banks and insurance companies. Such a supporting factor would need to be progressively phased in, as the EU taxonomy develops” (p. 9).

68. Analytical arguments and empirical analyses are contained in Carney, M (2019a,b) and in Alessi et al. (2020).

69. See Basel Committee on Banking Supervision (2020).

in financing sustainable activities; the experience with the SME adjustment factor is not conclusive. A brown penalizing factor would align bank capital to higher transition risk of certain activities but could hit non financial companies which need funds to improve their ESG performance and amplify the risks in the long period. But, more importantly, in order to fully integrate ESG risks in banks' balance sheet, it is essential to accurately measure the ESG risks associated to each asset, not only to the green or the brown. However, at the present time measuring risk differentials stemming from a different impact of ESG factors on the various assets encounters the already mentioned difficulties in terms of data, risk metrics and forward-looking assessment models<sup>70</sup>.

## **6. An Extended Taxonomy for a strengthened Action Plan?**

As already mentioned, Art. 26 of the TR provides for the possibility of extending the scope to cover activities that do not have a significant impact on environmental sustainability and economic activities that significantly harm environmental sustainability and the newly created Platform for Sustainable Finance (Art. 20) has been mandated to advise the Commission on the possible need to amend the TR. The final Report of the Platform, published on 28 March 2022, contains both an analysis of the pros and cons of an Extended Taxonomy (ET) and a set of recommendations for a smooth and effective introduction of the two new categories activities in the TR<sup>71</sup>.

The main pro of an ET is that, once the TSC are completely defined, it would make it possible to classify all the economic activities carried out by a company, by a productive sector, by an entire economy with respect to environmental objectives and, consequently, the environmental performance of the assets in financial portfolios. At the same time, this would avoid a recurrent binary misinterpretation of the current Taxonomy, according to which activities unable to report as sustainable are considered unsustainable<sup>72</sup>,

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70. The debate between a risk approach and an economic policy approach is carefully reviewed in Berenguer et al. (2020).

71. See Platform on Sustainable Finance (2021).

72. See, for example, the statement in Carney, M. (2019).

which could distort the allocation of funds on the financial markets. Finally, an ET would also allow credit institutions and financial investors to recognize and support investment plans that put an end to harmful environmental performance and achieve a stable improvement in environmental performance.

The Platform notes that the building blocks of an ET are already contained in the current TR, given that for each environmental objective it is defined what is meant by significant harm (SH) (art. 17) and that TSC are required (Art. 10-15) that specify the conditions identifying SH (Art. 19(1)). As a consequence, failing such TSC is technically equivalent to causing SH.

While for activities violating the TSC for SH, technological solutions are available that allow to improve the environmental performance, there are other activities for which no such technological possibility of improving exists. The Platform recommends that the activities in such a situation be identified, in addition to the activity of power generation from fossil fuels mentioned in Art. 19 (2) of the TR. The whole set of harmful activities would therefore have two components which do not differ in terms of how harmful they are but in terms of future perspective: the activities for which no possibility of improvement exists can only be decommissioned while the others can be either decommissioned or undergo an investment plan for improving their environmental performance.

This implies that the TR technically defines three levels of environmental performance: 1) sustainable; 2) harmful; 3) intermediate (for activities doing no significant harm to environmental sustainability nor providing any SC). It is important to note that being in the intermediate area is not the same as having no (or low) significant impact (NSI) on environmental objectives and that proactively identifying a classification of NSI activities would support businesses to show that the activities they carry out are not harmful.

However, the classification of economic activities on three levels cannot be given regulatory power, for the fact that the scope of application of the TR, as defined in Art. 1(1), is limited to establishing “the criteria for determining whether an economic activity qualifies as environmentally sustainable for the purposes of establishing the degree to which an investment is environmentally sustainable”.

For this reason, the Platform recommends that the Taxonomy should be extended, with a priority given to the classification of significantly harmful

activities in order to timely identify the activities for which either the dismissal or transition plans towards better environmental performance, even if not yet sustainable ('intermediate transition'), are urgent and possible. If compliant with specific requirements in terms of credibility and science-based ambition of the improvement and framed in the long-term environmental strategy of the company, such 'intermediate transition investments' could be recognised in the EU legislation for sustainable finance in order to receive support by private financial investors.

According to the Platform, it would be essential that ET be part of a wider set of EU policy and legislative initiatives aimed at incentivizing finance for urgent transition away from environmentally significantly harmful activities. Indeed, due to its role as cornerstone, the ET would release strong synergies with legislation launched as part of the Action Plan amplifying their effects. Some examples can be provided for further reflection.

For large investors, the possibilities of channeling funds towards environment friendly projects would increase in relation to the wider set of information disclosed by non-financial undertakings which would also broaden the effects of the proposed CSRD. Corporate communication, no longer limited to sustainable activities, would allow to identify intermediate transition investments. Building on the ET and the extended reporting obligations, the forthcoming legislation on the EU GBS could be enriched by merely applying the use-of-proceeds approach to bonds issued to finance intermediate transition plans that have the necessary requirements. New forms of sustainability linked loans and bonds could be designed by aligning terms and conditions to the implementation of an intermediate transition plan.

Retail investors could have the possibility of expressing their preferences regarding sustainability in a more articulated way by making reference to supporting intermediate transition, which would establish significant synergies with the changes made in the Mifid II and IDD delegated regulations. The effects of the planned EU Ecolabel for environment friendly financial product could also be strengthened by introducing a specific label for retail financial products respecting specific thresholds defined considering the proportion of the underlying investments invested in intermediate transition plans. Financing intermediate transition investments could be considered under the SFDR for providing information on how and to what

extent the investment underlying a financial product can qualify as financing an intermediate transition plan. It could also be investigated the possibility of coordination between the concept of PAI and that of SH in the context of both the SFDR and the regulation on financial advice.

Credit institutions and supervisors would be given an important tool to qualify the assets that are more exposed to environmental risks to be used in defining business planning, credit policies, engagement policies with borrowers and investee companies, risk management systems, stress testing exercises, and governance arrangements, and, as a consequence, to be considered in supervisory reviews and in macroprudential analysis<sup>73</sup>.

Implementing the ET would require the need for further reflection, impact analyses, review of some published DNSH criteria, amendments to EU legislation both already in force and to be enacted, that is a series of steps whose complexity cannot be denied. However, to promote a voluntary use of ET concepts to submit transition investment plans to financial markets or to develop financial instruments specifically linked to intermediate transition objectives could accelerate the drive for better environmental performance in the EU.

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## References

Alessi, L., Ossola E. and Panzica, R. (2020). The Greenium matters: greenhouse gas emissions, environmental disclosures, and stock prices. Publications Office of the European Union, Luxembourg, April.

Amzallag, A., Levi, M., and Vasios, M. (2022). Text mining ESG disclosures in rating agency press releases, ESMA TRV, 10 February.

Basel Committee on Banking Supervision (2020), Climate-related financial risks: a survey on current initiatives, April.

Berenguer, M, Cardona, M, and Evain, J. (2020). Integrating Climate-related Risks into Banks' Capital Requirements, Institute for Climate Economica, March.

Berg F., Kölbel J., and Rigobon R. (2019). Aggregate Confusion: The Divergence of ESG Ratings, MIT Sloan Research Paper, Cambridge (Mass.).

Carney, M. (2015). Breaking the tragedy of the horizon – climate change and financial stability, speech at Lloyd's of London, London, 29 September.

Carney, M. (2019a), Fifty Shades of Green, Finance and Development, December Vol. 56 No 4.

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73. It is for this reason that the Network for Greening the Financial System was among the first to put forward the proposal for a taxonomy classifying not only green activities but also "brown" activities (NGFS, 2019).

## ARTICLES

Carney, M. (2019b). A New Horizon, speech at the European Commission Conference: A global approach to sustainable finance.

EBA (2021). Report on Management and Supervision of ESG Risks for Credit Institutions and Investment Firms, 23 June.

ESMA (2019), Final Report. Guidelines on Disclosure Requirements Applicable to Credit Ratings, 18 July.

ESMA (2021), Letter to the European Commission, 29 January.

EU Technical Expert Group on Sustainable Finance. (June 2019) Report on EU Green Bond Standard. Proposal for an EU Green Bond Standard.

European Commission (2020), Consultation Document: Review of the NFRD, 20 February.

Konstantas, and Antonios et al. (2021). Development of EU Ecolabel criteria for Retail Financial Products, Technical Report 4.0, JRC Technical Reports, March.

NGFS (2019), A Call for action. Climate change as a source of financial risk, April

Platform on Sustainable Finance (2021), Public Consultation Report on Taxonomy extension options linked to environmental objectives, July.

# Climate Change Regulation and Supervision in Europe and Implications for Commercial Banks

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In the last couple of years, banks have shown significant progress with respect to ESG (environmental social and governance) and climate change management, undertaking several actions: outlining ESG and net-zero strategies, setting up dedicated board-level governance and organizations, developing risk management frameworks which allow to estimate and mitigate climate risk, and reporting and disclosure frameworks which promote increasing transparency and comparability towards the markets.

Having set the basics on climate change management will allow banks to play a flywheel role in supporting climate transition, acting as a “multiplier” for the significant public funds allocated to green transition within the Next Generation EU and local recovery plans, and tackling significant business opportunities, both in terms of lending and funding (sustainable loans and green bonds) and in terms of sector-specific products to mitigate climate risks (e.g., insurances in agriculture) or commission-based services to facilitate the transition (e.g., to electric vehicles).

The acceleration of EU banks towards the green transition has been pushed by several forces: investors, regulators and supervisors, competitive pressure, general public, and think-tanks.

In this article, we will deep dive on the regulatory and supervisory

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initiatives which have significantly induced banks towards an acceleration in managing climate-change challenges: we will provide an overview of the most important regulations and supervisory expectations; outline respective implications for banks; focus on what still needs to happen for banks to support the transition at full potential, both in terms of enabling factors (e.g., skills, data) and remaining business challenges.

In line with the current status of the banking industry, although in this article we mostly focus on climate-change, in multiple instances we extend the discussion to ESG aspects more broadly (including the social and the governance ones), within the dimensions where banks are addressing them more comprehensively. Specifically, despite environmental risks include other factors beyond climate, so far banks have concentrated their actions on climate-related ones, while practices around other environmental factors (e.g., natural disasters or biodiversity) in Europe are just emerging as we speak.

## 1. Context

Climate change is no longer optional. The world is rapidly moving towards a resource efficient economy, with a global sustainability push driven mainly by a significant increase in climate-related policies, investments in renewable energy capacity and governmental sustainability-related financing.

In this evolving scenario, the European Union is acting as a first mover, especially because of the climate regulatory and supervisory pulse that has arisen in recent years. As a matter of fact, the EU is front running – among others – the process of setting global standards, for instance through the signing of the EU Green Deal that entails direct implications on more than 200 regulations with its aim for the European Union to become the world's first “climate-neutral bloc” by 2050 across different sectors. Moreover, the EU has launched a dedicated effort to finance sustainable projects through public funding with its €1.8 trillion of Next Generation EU Recovery Plan, including priority initiatives focused on energy efficiency and building requalification, green transition and sustainable local mobility, protection and enhancement of the territory and of water resources, green enterprises and circular economy. The European Union has also been the region mainly driving the

push towards clear commitments during COP26 (including the setting of the target for coal-fired power phase-out by 2030 for most countries and the launch of the Global Methane Pledge).

Moving to the rest of the world, the United States – committed to net zero emissions by 2050 and supporters of the Global Methane Pledge during COP26 – are riding the climate change momentum with an increased political focus and a strong local sentiment of sustainability accompanied by ambitious targets to reverse climate policies.

To conclude the quick snapshot of the worldwide panorama, China and India set their carbon neutrality objective by 2060 and 2070, respectively, and are making progress in climate targets leveraging a rigorous and efficient execution power, yet still with significant room for improvement.

Financial institutions have crucial roles to play in the transition to net zero, which requires about €28 trillion cumulative investments by 2050, spread across different industries, mostly transportation and aviation, construction, and power generation.

Although the road to net zero is far from clear and the “path to net-zero equation” is not solved yet, leaders in the financial industry are playing offense and are embarking on efforts to develop a full potential view on how to achieve net-zero emission targets while capturing growth opportunities, innovating on product development, and creating competitive distance.

Climate and ESG topics have become increasingly important. Four forces are converging to make climate change a top-of-mind topic for senior bank executives:

**1. Pressure from investors and other stakeholders.** Investors are factoring into their choices the risk deriving from environmental impacts linked to the activities of companies. There is a growing awareness that ESG factors have a strong influence on a company’s long-term performance. Investors and the public have pressured the largest banks to commit to net-zero portfolio alignment.

**2. Rapidly evolving competitive landscape and peer pressure.** Financial institutions are accelerating on public commitments to net zero and on the definition of financed emission targets. The creation of dedicated initiatives and alliances (e.g., Net-Zero Banking Alliance (NZBA), Net-Zero Asset

Managers Initiative (NZAMI)) has pushed financial players towards a new set of methodological standards and disclosures. As of January 31, 2022, more than 100 global banks have indeed made commitments since the creation of NZBA (April 2021) to realign their portfolios toward these goals. Over half of these are in Europe, with many more expected. Furthermore, new methodologies have been identified to scientifically measure financed emissions and set targets (e.g., SBTi – Science Based Targets initiative).

**3. Heightened regulatory requirements and supervisory expectations.** The current regulatory and supervisory context has been evolving rapidly, with tighter climate-specific expectations already issued by the European Commission (EC), the European Banking Authority (EBA), and the European Central Bank (ECB).

**4. Increased scrutiny by NGOs and more green activism events.** The continuous publication of dedicated reports focusing on emission reductions and climate-related topics, coupled with activists' events against banks (the Global Day for Climate Justice and Greta Thunberg's Fridays for Future Activists are just two examples) are pushing even further the level of awareness of the net zero imperative for credit institutions.

The accelerated pace of climate support actions posed by the four above-mentioned forces also stimulates the adoption of new business models and shapes new strategies, opportunities that banks can explore by renewing products and services supporting the transition (e.g., green sustainable lending, green bonds). In fact, banks have the occasion to act as a catalyst for corporates in the highest emitting sectors and for retail clients, whose consumers' and investment profiles are more and more ESG-driven.

As this article is focused on regulatory requirements and supervisory expectations related to climate change and, to some extent, more broadly to ESG, in Section 2 we outline the most significant regulatory and supervisory actions banks are subject to, while in Section 3 we assess the implications for the banking industry and what still needs to happen for banks to properly support the transition.

## 2. EU banking regulation and supervision on climate change

Regulatory and supervisory pressure on European banks is among the strongest anywhere in the world and has significantly increased over the past months through a series of new regulatory requirements and guidelines, as well as supervisory activities conducted by the European Commission, the European Banking Authority and the European Central Bank.

**Regulatory landscape: the pace of regulations and directives on climate has significantly accelerated.**

Authority	Time of effectiveness	Regulatory/supervisory requirements	Not exhaustive
 European Commission	● Mar. 2018	EU Commission Action plan on financing sustainable growth	
	● July 2019	Guidelines on reporting climate-related information, building on TCFD recommendations (NFRD supplement)	
	● June 2020	EU Taxonomy Regulation (first accompanying Delegated Acts in April 2021 and July 2021)	
	● Jan. 2022	Sustainable Finance Package (EU Taxonomy Del. Acts, 6 Amending Del. Acts, CSRD proposal)	
	● 2021-2023	EU Renewed Sustainable Finance Strategy setting out proposals for a multi-annual (non-) legislative agenda in sustainable finance	
 European Central Bank	● 2023-2025	EU Banking Package, including new ESG related requirements and mandates in the Draft CRR3 and CRD6	
	● Nov. 2020	Final supervisory expectations on business model & strategy, governance & risk appetite, risk management, and disclosures (Guide on C&E risks)	
	● Feb.-May 2021	ECB Guide on C&E risks Questionnaire A (gap assessment) and B (implementation plan) request	
	● Jan.-Sept. 2022	Preparation and Execution of the ECB Thematic Review on C&E Risks	
 European Banking Authority	● Mar.-July 2022	Execution of ECB Climate Stress test	
	● May 2019	Capital Requirements Regulation 2 / Capital Requirements Directive 5	
	● Dec. 2019	EBA Action Plan on Sustainable Finance	
	● June 2021	Application of Loan Origination and Monitoring, also including ESG risk considerations	
	● Jan. 2022	Final ITS on Pillar 3 disclosures of ESG risks	
	● June 2022	Pillar 3 disclosures of ESG risks (sequential approach, prioritizing environmental risks)	
● 2022-2023	Final report on potential inclusion of ESG risks in the regulatory and supervisory framework, including policy recommendations for arrangements, processes, mechanisms, and strategies		

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As an overall direction, there is a push towards additional and enhanced transparency, including reporting and disclosure regarding the broader climate and sustainability matters, covering the identification of ESG sustainable products, climate risk exposures and climate risk management.

### *ECB supervision on climate and environmental risks: supervisory guidelines, stress testing and thematic review*

In November 2020, the ECB published the *Guide on climate-related and environmental risks*, including 13 expectations that call for banks to rapidly step up their capabilities, dealing with several aspects of climate and environmental (C&E) business strategy, governance, and risk management. These expectations aim to increase the level of transparency and accuracy of all C&E domains for banks, in particular:

- Understand and integrate C&E risks within the business environment and develop a climate strategy, consistent with net-zero aspiration

- Include C&E risks within the risk appetite framework and the existing risk management framework by identifying, quantifying, managing, monitoring, and mitigating these risks
- Assign responsibilities for C&E risks management throughout the organization in accordance with the three lines of defense framework
- Consider C&E risks at all relevant stages of the credit underwriting and monitoring processes, as well as their impacts on the other types of risk (e.g., operational, reputational, market, strategic and legal risk)
- Establish internal reporting on material C&E risks and regulatory disclosures on climate-related practices
- Assess the impact of climate events on banks' portfolio, through scenario analysis and climate stress testing exercises.

### The ECB published far – reaching expectations on how banks should address climate risks

#### ECB final expectations on climate -related and environmental (C&E) risks

<b>Business model &amp; strategy</b>	<ul style="list-style-type: none"> <li>❶ <b>Business impact:</b> Comprehensive understanding of short/medium/long-term business implications</li> <li>❷ <b>Business strategy:</b> Resilience of business strategy against climate risks</li> </ul>
<b>Governance &amp; risk appetite</b>	<ul style="list-style-type: none"> <li>❸ <b>Management body:</b> Responsibility for development/review of business strategy and risk management framework and oversight of risks</li> <li>❹ <b>Risk appetite:</b> Inclusion in risk appetite framework and statement</li> <li>❺ <b>Organization:</b> Integration into organizational structure in line with good principles</li> <li>❻ <b>Reporting:</b> Aggregation and reporting of risk/exposure data</li> </ul>
<b>Risk management</b>	<ul style="list-style-type: none"> <li>❼ <b>Risk management framework:</b> Reflection as drivers of existing risk types</li> <li>❽ <b>Credit risk:</b> Consideration at all relevant stages of credit granting and monitoring</li> <li>❾ <b>Operational risk:</b> Consideration of effects on business continuity, reputational and liability risks</li> <li>❿ <b>Market risk:</b> Monitoring of impact on current market risk positions and future investments</li> <li>⓫ <b>Scenario analysis and stress testing:</b> Incorporation in baseline and adverse stress test scenarios</li> <li>⓬ <b>Liquidity risk:</b> Consideration in liquidity risk management, e.g., potential cash outflows depletion of liquidity buffers</li> </ul>
<b>Disclosure</b>	<ul style="list-style-type: none"> <li>⓭ <b>Public disclosures:</b> Publication of information and key metrics with due regard to EU NFRD supplement on reporting climate-related information</li> </ul>

1. Expectations in line with the EBA Guidelines on Loan Origination and Monitoring

Source: ECB Guide on climate-related and environmental risks November 2020; Public hearing, September 2020; "Dear CEO" letter, January 2021

#### Challenges for banks

**Aggressive timelines** as the ECB expectations became effective immediately in November; ECB requires banks to start implementation as soon as possible although giving time for full compliance

**Scope goes beyond credit risk** and requires banks to explicitly consider implications of C&E risks on operational, market and liquidity risk

**New expectations on how business processes** need to reflect C&E risks (e.g., in loan approval, pricing, remuneration) compared to earlier regulatory texts

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Following the release of the ECB *Guide on climate-related and environmental risks*, banks were requested to conduct a self-assessment in line with the 13 expectations outlined and to develop multi-annual implementation plans to advance C&E risk management (May 2021).

Additionally, since February 2022, the ECB has carried out a thematic review of banks' practices, verifying their progress against commitments taken through implementation plans. This exercise will act as forcing device

to make sure that even long-term climate commitments are turned into actions and timely delivered. In parallel to the thematic review, the ECB has conducted the first climate stress testing, which involves about 110 participating banks with different requirements, based on proportionality principle.

Both thematic review and stress testing outcomes will be gradually integrated into the SREP (Supervisory Review and Evaluation Process) assessment, initially only qualitatively and without resulting in additional capital buffer.

In the next years, also quantitative impacts will be assessed through SREP for C&E risks, in which case further measures would be required for mitigation (e.g., additional capital buffer).

The ECB has been neither the first nor the only supervisor conducting a climate stress test in Europe recently. For instance, other jurisdictions have seen national supervisors leading stress testing exercises even at earlier stages, such as Banco De España starting from transition risks in Spain, ACPR-Banque de France piloting both physical and transition risks for banks and insurers, De Nederlandsche Bank pioneering in 2018 an energy transition risk stress test for financial institutions in the Netherlands.

*Principles and regulations to enhance transparency on green activities – EU taxonomy, reporting, and disclosure*

«Increasing transparency makes markets more efficient and economies more stable and resilient.» As stated by Michael R. Bloomberg – Chair of the Task Force on Climate-related Financial Disclosures (TCFD) established by the Financial Stability Board (FSB) – climate-related financial risk disclosure has increasingly become a burning priority of multiple stakeholders, from regulators and supervisors to investors.

At the moment, more than 3,000 organizations in almost 90 countries are supporting this initiative, of which more than 1,000 financial institutions, with several banks already publishing their TCFD report, including almost all top tier EU banks.

Recently, in January 2022, the EBA has published its final draft of the Implementing Technical Standards (ITS) on Pillar 3 disclosures on ESG risks, focusing on some priority aspects, for example:

- Transition and physical risks, including information on exposures towards carbon-related assets and assets subject to chronic and acute climate change events
- Climate change connection with other “traditional” risks financial institutions are exposed to
- Mitigating actions to address those risks, including supporting counterparties in transitioning to a carbon-neutral economy and adapting to climate change
- “Greenness” of assets through relevant metrics, including Green Asset Ratio (GAR) and Banking Book Taxonomy Alignment Ratio (BTAR), to be disclosed from January and June 2024 respectively
- Qualitative information on how institutions are embedding ESG considerations in their governance, business model, strategy, and risk management framework.

Both TCFD standards and Pillar 3 package will significantly enhance comparability of external reporting on climate, currently quite fragmented and considerably different institution by institution.

As part of Pillar 3 disclosure and Non-Financial Reporting Disclosure (NFRD), the Green Asset Ratio (GAR) represents the main key performance indicator for credit institutions<sup>78</sup>, as the single metric creating transparency on the “greenness” of the bank’s balance sheet. The ratio allows investors and regulators to conduct peer-to-peer comparisons and foster policy directives towards green finance.

The European Commission and EBA have defined a gradual journey to reach the desired level of disclosure:

- Eligibility according to the EU Taxonomy to be disclosed in 2022 (reporting period 2021); the “eligibility” concept, however, only verifies the counterparties which can potentially play environmentally

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78. That are subject to the disclosure obligations laid down in Articles 19a and 29a of Directive 2013/34/EU

sustainable activities based on economic sector classification (e.g., afforestation, electricity generation from hydropower), without exploring the effective level of “greenness” of the company’s balance sheet, nor the “green” purpose of the operation to the specific client.

– Alignment according to the EU Taxonomy to be disclosed in 2023 by corporates and in 2024 (reporting period 2023) by financial institutions<sup>79</sup>. The “alignment” concept, more restrictive than the “eligibility” concept and at the basis of GAR computation, requires compliance with the so-called Technical Screening Criteria in terms of:

- Substantial contribution to at least one of the six environmental objectives<sup>80</sup> (climate change mitigation, climate change adaptation, transition to a circular economy, pollution prevention and control, sustainable use and protection of water and marine resources, protection and restoration of biodiversity and ecosystems), outlined by an extensive list of highly technical sector-specific conditions
- No Significant Harm (NSH) to the other environmental objectives
- Conformity to minimum safeguards, recognizing the relevance of international minimum human and labor rights and standards.

### Alignment means verifying Technical Screening Criteria...

Not exhaustive

#### Alignment assessment

Assessment of alignment means verifying compliance with the following Technical Screening Criteria (TSC) for each eligible activity:



**Substantial Contribution to at least one environmental objective**



**Do Not Significant Harm (DNSH) to other environmental objectives**



**Compliance with minimum safeguards**

1. Regulation generally provides the Technical Screening Criteria for Substantial Contribution to environmental objectives (out of six) Climate Change Mitigation and (ii) Climate Change Adaptation (see delegated Act Annexes I and II, June 2021)

Source: EU Taxonomy Technical Report, EU Taxonomy Annex

### Depending on six environmental objectives

Currently detailed in Regulation<sup>1</sup>



Climate change mitigation



Climate change adaptation



Sustainable use and protection of water and marine resources



Transition to a circular economy



Pollution prevention and control



Protection and restoration of biodiversity and ecosystems

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79. 2024 for Loans and advances and off-balance-sheet items (guarantees, assets under management), 2026 for trading book and other non-banking services (fees and commissions)

80. Laid down in Article 9 of Regulation (EU) 2020/852

As mentioned, the EU Taxonomy regulation for the purpose of calculating the bank's GAR applies only to corporates within the scope of the Non-Financial Reporting Directive (NFRD). However, the NFRD is currently implemented and applied differently across EU countries (e.g., different revenue thresholds, listed vs. non-listed companies), with EU systemic banks currently facing an unlevelled playing field. Going forward, regulatory changes are expected to move in the direction of increasing the pool of companies subject to disclosure obligations, which will also converge towards an enhanced level playing field at EU level. The EBA publication of its ITS on Pillar 3 Disclosures of ESG risks<sup>81</sup>, which introduces a new metric – the Banking Book Taxonomy Alignment Ratio (BTAR), complementing the GAR for smaller companies<sup>82</sup> not covered by the original EU Taxonomy – plays already in this direction.

### **3. Implications for banks, enablers, and key outstanding challenges**

Climate and ESG related regulatory and supervisory expectations have significantly accelerated banks' pace for addressing climate change and, to some extent, ESG-driven transformations more broadly. This acceleration has led to tangible results in multiple domains – e.g., strategy, governance and organization, risk management and credit – and has also revealed significant opportunities to support the energy transition.

In the following pages we outline the current status of the industry in this domain, the enablers banks need to put in place and the outstanding challenges to be overcome in order to effectively support the transition while preserving other holistic objectives (e.g., including social fabric support).

#### *ESG and climate strategy*

The definition of an ESG strategy is a board-level topic, which affects the majority if not all the activities of the bank. Banks are required to define their level of ambition across all ESG pillars, in which the “E” and climate change

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81. January 24, 2022

82. EU and non-EU non-financial corporations not subject to NFRD disclosure obligations

components represent just a fraction, despite the most prominent, of the overall picture.

Banks, in fact, are also expected to take into consideration the local economic specificities while setting their ESG strategy and targets. For example, for countries with a socio-economic fabric mainly driven by SMEs, the green transition is potentially slower and more complex due to scarcity of qualified skills and access to capital markets. In this context, banks not only could provide the financing to support the transition, but could also support the SMEs towards the transition and make sure, while setting a green strategy, to carefully handle the potential trade-off between climate targets and social implications: reducing financing to “brown” SMEs which are currently unprepared to the green transition could negatively affect regional economic “districts” (e.g., leather, chemical) or even national economies (e.g., forestry in Slovenia).

Sustainable corporate Governance (“G”) also plays a significant role: as many empirical studies have shown, both investment returns and credit losses are highly correlated to governance KPIs. Companies which are ranked high on “sustainable governance” KPIs have proved higher long-term returns and stronger resilience. Banks rating models to assess credit risk have incorporated governance assessment since quite a while and have recently been enhanced in line with ESG principles.

Back to green strategy to address climate change, one of the most successful climate initiatives which has so far involved more than 100 banks worldwide – and more than 50 banks in Europe – is the Net-Zero Banking Alliance. Banks adhering to the alliance commit to aligning their financed emissions to a net-zero pathway, i.e., deriving from lending to clients, on selected high-emitting sectors with intermediate 2030 targets to be set within 36 months from joining the alliance and own bank emission by 2050.



- Credit: ensure climate strategy operationalization through a credit underwriting and monitoring framework, which supports “green” products and operations, while also assessing and pricing climate risk properly
- Planning: ensure consistency of climate targets with the overall bank strategy and monitor progress against targets
- Risk management: ensure proper oversight of transition and physical risk related to climate targets and ambitions.

### *ESG and climate governance*

Organizations feel the need to equip themselves with a renovated set of competences as well as “dedicated venues” within which they can discuss sustainability and climate change. In fact, more and more boards of directors have created dedicated ESG risk committees, empowered by use of newly integrated ESG tools, to support development of sustainability strategies.

At managerial level, several organizational archetypes are emerging, with ESG and climate responsibility assigned to different organizational levels. Broadly speaking, organizations can either adopt: (i) A centralized model, where a Chief<sup>83</sup> or Head of Climate and Sustainability and central ESG teams are usually appointed (either creating a new dedicated role or embedding it within an existing role), whose primary focus is on overall aspiration, partnerships, and communication; or (ii) A more decentralized model, spread throughout the organization, where functional skills at business-unit level are enhanced and coordinated, and interactions among different functions are ensured through the designation of a focal point (for example, a sustainability ambassador) for each area. Hybrid models are also more and more popular, with centralized ESG units (normally CEO-2 level) playing a coordination role, above all on new project-based initiatives, and functional skills spread across the organization (as per decentralized) model, for the respective areas of competence.

Considering the high specificities of climate topics, which often require scientific skills and industrial expertise, many banks are creating a “climate center of excellence” to perform highly specialized services (e.g., climate

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83. Mandatory for UK banks

scenarios, modeling, energy transition plans assessment) in favor of different units of the bank.

Beyond “hard” skills, an increasing “climate change sensitivity” is perceived in most financial institutions at all level; however, while at a top-management and managerial level this is clearly reflected into daily operations, also through ESG-linked remuneration policies and performance management targets, at a more operational level climate change culture and climate risk awareness are still more scattered (multiple employees still look at “ESG and climate-friendly” actions as “marketing campaigns” and are not fully aware of the end-to-end concrete climate journey their organizations are undertaking). Climate culture dissemination and “ton from the top” will be crucial in the year to come, in order to turn recently introduced climate-related frameworks into real actions across the whole organization.

#### *Risk Management and Credit Framework (including pricing)*

Climate risks are becoming more and more evident. On the one hand, acute physical extreme events are becoming more frequent and severe (e.g., floods and droughts) and chronic impacts gradually more evident (e.g., temperature rises); on the other hand, transition risks are becoming even more concrete (e.g., methane pledge, oil price rises). As such, banks are facing increasing pressure to identify and manage climate risk in their portfolio. Banks should therefore include climate and environmental risk considerations within their risk management framework, to ensure a timely identification and monitoring of climate risk of their portfolios. As a prerequisite for climate risk inclusion into the overall Risk Management framework, a materiality assessment is performed. The materiality assessment aims to: (i) Identify the physical risk hazards and transition risk determinants which are relevant for the bank, based on sectors and geographies where the bank (and its clients) operates; (ii) Assess inter-dependencies and correlation of climate risk with the other risks the bank is facing, especially credit, operational, reputational, and legal risks in the long, medium, and short term.

On the basis of the materiality assessment outcome, banks are expected to develop unbiased methodologies to assess climate-risk impact on other “standard” risk types, both in terms of “qualitative relationships” (i.e., developing a narrative on how climate risk hazards and events drive other

risks) and quantitatively. Climate risk should therefore be fully integrated into the risk taxonomy and, as a consequence, embedded into the Internal Capital Adequacy Assessment Process (ICAAP).

ICAAP integration goes hand-in-hand with the setup of a stress testing framework, which not only assesses the impact of potential climate risk scenarios on the bank's portfolio, but is also fully integrated into the overall "general" stress testing framework, feeding highly strategic processes like the Risk Appetite Framework (RAF) and strategic planning. While banks, due to the ECB supervisory pressure, are significantly advancing on developing methodologies for granular climate risk impact estimation, they are all still facing significant challenges in integrating it into the overall "managerial" framework.

Beyond climate risk assessment and measurement, in order to steer the business towards "greener" or more "ESG-friendly" strategic objectives, banks should integrate climate and ESG considerations within the credit processes, also intervening in different elements of the credit framework, from the highly strategic ones (e.g., RAF), which steer the overall portfolio, to the more operational ones (e.g., single-name underwriting process).

Firstly, climate risks should be integrated into the set-up of the bank's risk appetite. Sectorial limits should be developed to steer the business towards the desired portfolio composition.

Secondly, a climate risk assessment (counterparty score) should be developed at a sector and counterparty level to differentiate clients within high climate risk sectors and identify those who committed to a transition path.

Thirdly, the climate risk assessment should be integrated within the underwriting process: clients exposed to high climate risk, who did not undertake solid transition paths could be subject to reinforced mechanisms of the underwriting process to be granted new lending (e.g., higher level of credit authorities, involvement of second LoD – Line of Defense). Moreover, green products and financing supporting companies into the transition towards greener activities could be encouraged also through pricing incentives.

In the Large Corporate market, green finance currently commands around 25-30 percent lower pricing compared to standard products, reducing commercial banks' margins. This impact on margins is particularly relevant for banks with higher cost of funding, for which being competitive in the green finance market is currently a significant challenge. Commercial banks are

currently requesting EU regulators and supervisors to reflect a “green finance premium” as part of lower cost of funding and lower capital absorption. European regulators and supervisors are already working along this direction, for example the ECB monetary policy review will include lower haircuts for “green assets” pledged to ECB; and a review of CRR regulation towards differentiated capital requirements for green asset is also expected in 2023. As represented in the paragraph related to EU Taxonomy and Green Asset Ratio, flagging “green exposures” according to homogeneous criteria and transparency on methodologies undertaken will be key to provide supervisors confidence for incentives recognition.

### *Business opportunities*

Governments and companies are increasingly committing to climate actions, yet significant challenges remain, not least the scale of economic transformation required to complete a net-zero transition entails the difficulty of balancing the substantial short-term risks of potentially less prepared and uncoordinated action with the longer-term risks of insufficient or delayed action.

The transition would be universal, significant, and front-loaded, with uneven effects on sectors, geographies, and communities. Even if climate change is oftentimes viewed only from a risk perspective (especially given the rapid development in prudential regulations and focus point of disclosure frameworks), it simultaneously holds plenty of growth opportunities for corporates and financial institutions, including banks, funds, and insurance companies.

Realizing climate-related business opportunities is a win-win situation for both business and risk: in terms of revenues and volumes, it allows to offset the selective deleveraging actions in certain sectors with extremely brown clients or mitigate the lower spreads applied to green finance. However, it also forms a risk mitigation. For example: funding projects which contribute to the energy transition or clients which aim to reduce the emissions-intensity of their business activities is typically associated with lower levels of transition risk being assumed; developing customized insurances for territories and sectors (e.g., agriculture products) subject to physical risk would also mitigate the risk position.

A growing number of leading banks and other financial institutions is focusing on new strategies to grow, revising their product offerings, setting strategic goals for green and sustainable financing volumes, and collecting earmarked funds through issuances of green and sustainable bonds.

Consequently, competition in the sector is intensifying, requiring financial institutions to double down on their positioning and find ways to differentiate themselves. Clients no longer seek only providers of finance, but rather partners in the transition. For banks, this may entail the development of dedicated sectoral expertise to be able to advise customers on technological solutions, project planning, and execution, or to provide perspectives on broader industry developments. Banks could strategically position themselves in certain sectors, in line with their business model and environment, and create ecosystem partnerships with fintech and industrial players to develop specialized products and services (e.g., in electricity vehicles markets).

**Several business opportunities can be explored by banks in the climate/ESG domain**

Focus on Retail, SME and Corporate – similar depth for CIB and AM

Not exhaustive	Illustrative	Construction	Energy <sup>1</sup>	Transport <sup>2</sup>	Agriculture
SME & Corporate	Real estate	<ul style="list-style-type: none"> <li>1 Transition asset finance (e.g., leasing of new green equipment and machinery)</li> <li>2 Project finance: hydrogen, renewables</li> </ul>			<ul style="list-style-type: none"> <li>3 Green agriculture supply chain</li> <li>4 Physical risk insurance</li> <li>5 Incentives to use green technologies</li> <li>6 Analytics: advisory for farmer ESG transformation</li> </ul>
		<ul style="list-style-type: none"> <li>1 "One Stop Shop" for any sustainability investment, partnering with leading expert consultants for project inception to offer advantageous financing rates</li> </ul>	<ul style="list-style-type: none"> <li>3 Carbon tracking app &amp; robo-advisory</li> <li>4 Carbon bank</li> </ul>		<ul style="list-style-type: none"> <li>3 EBA</li> <li>4 EZE Advisory on decarbonization (project assessment, deal setup, financing, project management services)</li> </ul>
			<ul style="list-style-type: none"> <li>1 Build Sustainability "data utility" as catalyst for Western European ESG transformation (e.g., data on rating counterparties, CO2 projections per sector, EPC ratings)</li> </ul>		
			<ul style="list-style-type: none"> <li>2 Decommissioning funds</li> </ul>		
CIB					
Retail	<ul style="list-style-type: none"> <li>1 Physical risk mitigation</li> <li>2 Retrofit lending</li> <li>3 Green mortgages</li> <li>4 "One Stop Shop" for Home Energy Upgrades (initial assessment, grants, project management, financing)</li> <li>5 Home green energy supply to buy energy at wholesale prices and boost renewables consumption</li> </ul>	<ul style="list-style-type: none"> <li>1 NatWest</li> <li>2 Barclays</li> </ul>	<ul style="list-style-type: none"> <li>1 Develop (and white label) Green credit cards</li> </ul>		<ul style="list-style-type: none"> <li>1 MasterCard</li> </ul>
				<ul style="list-style-type: none"> <li>1 Subscription-based mobility</li> </ul>	<ul style="list-style-type: none"> <li>1 Citrus Drive</li> </ul>
			<ul style="list-style-type: none"> <li>1 Build and rent "sustainable houses" in 300 housing offer</li> <li>2 (Co)develop "green" cryptocurrencies, as alternative to highly energy-consuming bitcoin</li> <li>3 Reverse leasing of Households' roofs to install solar panels</li> </ul>	<ul style="list-style-type: none"> <li>1 EV Charging partnership proposition for banking customers</li> </ul>	<ul style="list-style-type: none"> <li>1 Barclays</li> <li>2 Citrus Drive</li> <li>3 NatWest</li> </ul>
AM					

1. Oil & Gas, Power  
2. Road Transportation, Aviation, Shipping

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**Enablers**

The actions noted above should be supported by key enabling factors such as:

- **Data and data strategy.** Climate data are currently not available to banks in a comprehensive way. In particular, while climate science has extensive literature on climate scenarios, taxonomies, etc., almost no historical data is available on climate-related losses. In addition, data availability largely depends on the type of counterparty: large corporate clients in high emitting sectors are experiencing equivalent regulatory push, they are therefore starting producing and disclosing climate data, while SMEs are not. In order to face the data challenge, banks should consider the "ESG

and climate data requirements” landscape as a whole (i.e., including scenarios, hazards, counterparty data like scores, emissions) and develop a data strategy accordingly. In this context, several “make-or-buy” decisions need to be taken. Multiple data providers are available in the market and have significantly expanded their services over the last years; however, none of them cover the full spectrum of banks’ needs. Banks could therefore develop an ESG data strategy to ensure consistent and synergic coverage of all data needs.

- **Climate skills.** To face such a technical topic like the climate change, which requires to combine scientific knowledge, industrial sectors knowledge, and experience with banking processes to “make things happen”, banks should decide: (i) Which kind of capabilities they want to internalize vs. gather externally (e.g., for climate scenarios, the most of banks will still be willing to leverage external energy authorities projections without any in-house development); (ii) Which/Where capabilities need to be enhanced (e.g., stress testing, financed emissions measurement and portfolio alignment, transaction due diligence); (iii) How to develop internal capabilities (e.g., hiring of climate scientists or sector specialists, training and capability building) vs. outsource selected activities (e.g., transition plans reviews).

### *Key challenges for banks*

Despite significant progress made over the last couple of years in introducing ESG factors and setting up end-to-end framework to handle climate change and support climate transition, there are still significant challenges ahead:

- a. Banks are requested by regulators to steer their portfolios towards net zero at a certain accelerated pace, in some sectors commanding more ambitious trajectories than what current commitments from clients foresee, due to lack of technology (e.g., agriculture) or high conversion costs and slow conversions to renewables (oil & gas).
- b. Energy transition has been tackled by big industrial companies belonging to brown sectors, however smaller companies (e.g., SMEs) seem to lag behind. Despite selected “best in class” cases, an integrated value chain approach could be envisaged from big companies (and financial institutions) to enable SMEs to also converge towards green targets.

- c. There are significant cases where “ESG negative sectors or counterparties” are key drivers of national and local economies (e.g., coal in Eastern Europe, forestry in Slovenia, tobacco in Egypt, textile, or leather manufacturing in some industrial districts); in these cases, banks need to balance the trade-off between being “climate captain” and the mission of supporting local economies and people.
- d. Level playing field and alignment of incentives – while banks are committed to support the transition, policy makers and regulators are expected to put in place the necessary incentives, e.g., lower capital absorption and cost of funding for green activities, which banks can reflect into pricing to clients.

#### **4. Conclusion**

Financial institutions play a critical role in the field of sustainable development and are strongly committed to act as a flywheel towards the green transition and the goal of net-zero emissions by 2050.

The opportunity to change is concrete and Europe is paving the way with significant financing activities to support the transition. Along with this, governments, regulators, and supervisors are pushing financial institutions and all other relevant stakeholders to act now and ensure they are all meeting the mutually accepted standards and targets.

In this evolving scenario, banks are making a significant step-up creating the “foundations” to support and enable this transformation: by integrating ESG and climate components as key pillars in their business strategy and developing concrete sector-specific business opportunities; by defining new governance and organizational layouts to address the sustainability agenda; by developing a renovated set of dedicated skills and capabilities together while promoting an internal ESG and climate culture; by revising their risk management frameworks to better identify and tackle climate risk.

Nevertheless, there are still significant challenges: sensitive trade-off mainly connected to the social fabric (“S”) in specific countries or industrial districts and technological challenges on specific sectors (e.g., agriculture) still need to be sorted out to stand up to net-zero commitments and implement them across the board.

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