Embedding Environmental Factors In Strategy And Risk Management: For Banks, A Long Journey Just Begun

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Key Takeaways

- The financial sector is increasingly aware of the close correlation between environmental risks and financial risks. Addressing environmental risks is now a top priority for numerous bank CEOs.
- For most banks, however, the incorporation of environmental risk in strategic underwriting and risk management is still in its infancy.
- We therefore view positively regulatory authorities' efforts to encourage banks to embed climate-related and environmental risks and opportunities into business strategies and risk management.
- The quality of environmental disclosure is weak across the industry, but it is set to improve rapidly. We are increasingly incorporating environmental considerations and data into our credit rating analysis.

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Environmental factors are moving to the forefront of banks' business strategies across regions and are gaining more and more relevance when we analyze banks' creditworthiness. Financial institutions are striving to approach environmental risks as financial risks, not just reputational as they used to, but they are still at an early stage. Banks are currently being impeded by the availability of robust data. For financial analysts, the main difficulty lies in comparing exposure to environmental risks and being able to form a view as to whether those risks and opportunities are appropriately captured.

We view positively some financial regulators' efforts to provide banks with guidelines on how to better integrate environmental considerations into their risk management frameworks, and in strategic planning. Applying forward-looking approaches--for example using stress tests and scenario analysis--will definitively help banks in this new exercise. The availability of comparable data of unquestionable integrity, as well as robust methodologies to codify risk types and compare exposures, is still modest and creates some obstacles, however. As the financial industry adopts stronger analytical methodologies for understanding and managing environmental risks and opportunities, banks will become better positioned to withstand these evolving and emerging risks

in the long run. Ultimately this could benefit the financial system's stability.

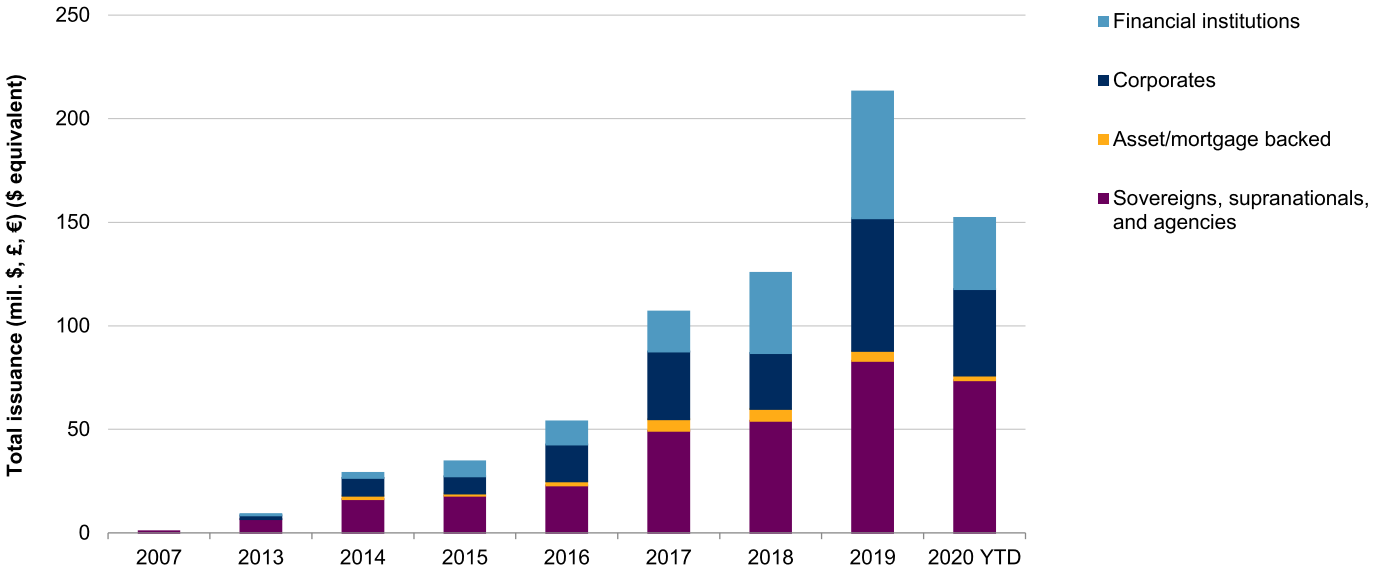
Banks Are Just Starting To Integrate Environmental Factors

Despite it being a strategic priority for most bank CEOs and financial leaders, few banks have really embedded environmental risks and opportunities into their strategy, in our view. But everything is changing, and fast. The industry increasingly understands the imminent credit, market, and operational risks that could arise from underestimating risks posed by energy transition. It also recognizes the business opportunities that could become available for banks that are at the forefront of energy transition. Indeed this transition will need a lot of money, mostly in the power generation sector, which banks will have to provide.

Most of the world's governments have set long-term objectives to be carbon neutral by 2050, in accord with the Paris Agreement. This has prompted business and financial communities to develop short- and medium-term actions toward a greener economy. Over the past few years, a growing number of banks have publicly announced commitments to environmental sustainability, such as exiting from coal financing or investing in renewable energy projects. Financial institutions globally have fueled the surge in green bonds since 2018, playing a key role as primary green bond issuers, second only to the corporate sector (see chart 1). Encouraged by a strong political consensus, most banks have been increasingly vocal about their sustainability strategies and have set their own targets.

Chart 1

The Momentum In Green And Sustainability Issuance By Financial Services Companies Is Set To Continue
Estimated green and sustainability bond issuance by sector



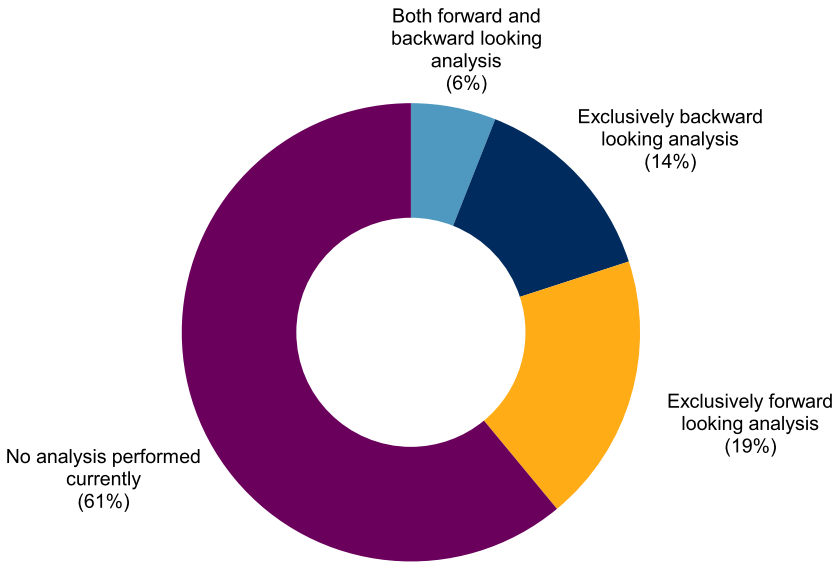
Source: Dealogic.

So far, most banks have tried to address environmental risks from a reputational, and not a financial, standpoint. This has meant self-imposing lending limits and sector-exclusion criteria in lending or investment activities, including those that have a large carbon footprint and are the focal point of green activists (coal mining, tar sands, artic drilling, and so on). Still, we consider the incorporation of climate-related and environmental risks and opportunities in banks' long-term growth strategies and risk practices is in its infancy. This is especially so in sectors that are generally less in the spotlight, but often comprise the majority of banks' exposures (at least, but not only, in Europe), such as real-estate lending (residential or commercial) or small business lending.

In May 2020, the Network for Greening the Financial System (NGFS; with member countries representing 44% of global GDP and 45% of global greenhouse gas emissions, and the related financial authorities supervising two-thirds of the world's systemically important banks and nonbank financial companies) published the results of its survey of 49 banks from Europe, China, Brazil, Japan, Morocco, Malaysia, and Thailand. Of the respondents, 57% were committed to greening their balance sheets, either by limiting their exposure to brown assets or by setting green or positive-impact targets. However, fewer than 20% of the banks in the sample performed forward-looking studies such as stress tests or scenario analyses to assess how different climate scenarios could affect their assets and business activities. And, even worse, a vast majority of respondents (about 60%) had never performed a dedicated analysis (see chart 2).

Chart 2

Banks' Analysis Of Climate And Environmental Risks Is Still At An Early Stage
Type of climate and environmental risk analysis performed by banks



Source: NGFS' Status Report on Financial Institutions' Experiences from working with green, non-green, and brown financial assets and a potential risk differential, May 2020. Note: scoring methodologies are considered to be forward looking analysis.

A Bank of Italy survey, published in February 2020, on 25 domestic banking groups, highlights

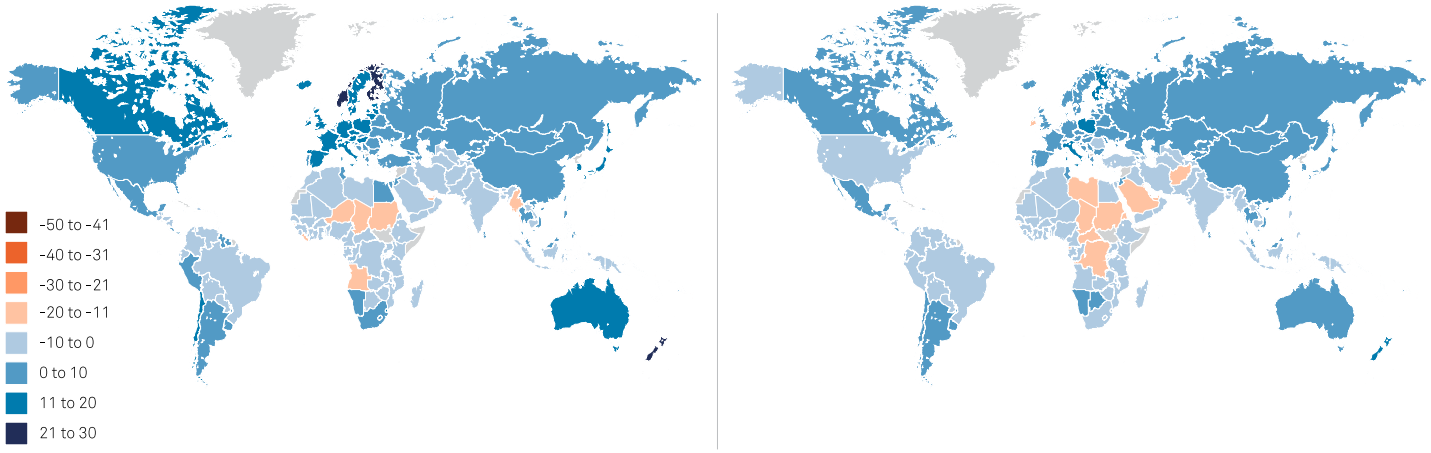
banks' poor track record of managing risks linked to the mitigation of, or adaptation to, climate change. More than three-quarters of respondents said they have no indicators to assess their assets' exposures to physical and transition risks.

In 2018, the Bank of England, after having examined how U.K. banks were responding to and managing environmental risks, found that 70% of banks are conscious that climate change poses financial risks, but only 10% managed these risks in a comprehensive manner. In a more recent analysis in March 2020, it disclosed that most U.K. mortgage lenders do not sufficiently account for extreme weather conditions, such as the severe floods that hit England in 2013-2014, and do not apply differentiated pricing depending on vulnerability to such risks in their lending policies and processes. Similarly, in 2019 the French Prudential Supervision and Resolution Authority published a report on French banks' preparedness to face climate change. The authority found that considerations of physical risk when making strategic decisions, and the monitoring of prudential risks, were still in the early stages of development.

Most banks have yet to acknowledge the materiality of environmental risks. This is because they are often concentrated in areas only modestly subject to physical events. In our view, however, banks globally would do well to hasten a more sophisticated analysis of climate change effects on their business. A country's vulnerability to climate risks can escalate rapidly. We are seeing this in the increased suddenness, brutality, and frequency of extreme weather events, and in trackers such as the Notre Dame-Global Adaptation Index (ND-GAIN; see chart 3).

Chart 3

World's Vulnerability To Climate Risks Is Increasing Rapidly
ND-GAIN Country Index, adjusted for GDP per capita in 1998 (left) versus 2018 (right)



The ND-GAIN Country Index summarizes a country's vulnerability to climate change and other global challenges, given the level of GDP per capita. The higher score, the lower the vulnerability. Source: Notre Dame University Indiana – Global Adaptation Initiative.

The main impediment we see is the absence of comparable environmental data and quantitative disclosures similarly codified--something like what the Basel framework does for credit or market exposures. This is one of the main objectives of the task force on Climate-Related Financial Disclosures (TCFD). Lead by former Bank of England governor Mark Carney, the TCFD aims at developing consistent climate-related financial risk disclosures for companies (including banks) to provide comparable data, in a comparable format. We believe the more banks move to full TCFD disclosures in sustainability reports, the higher the comparability standards and more confidence external parties can have in banks. TCFD disclosures will help banks assess risks and

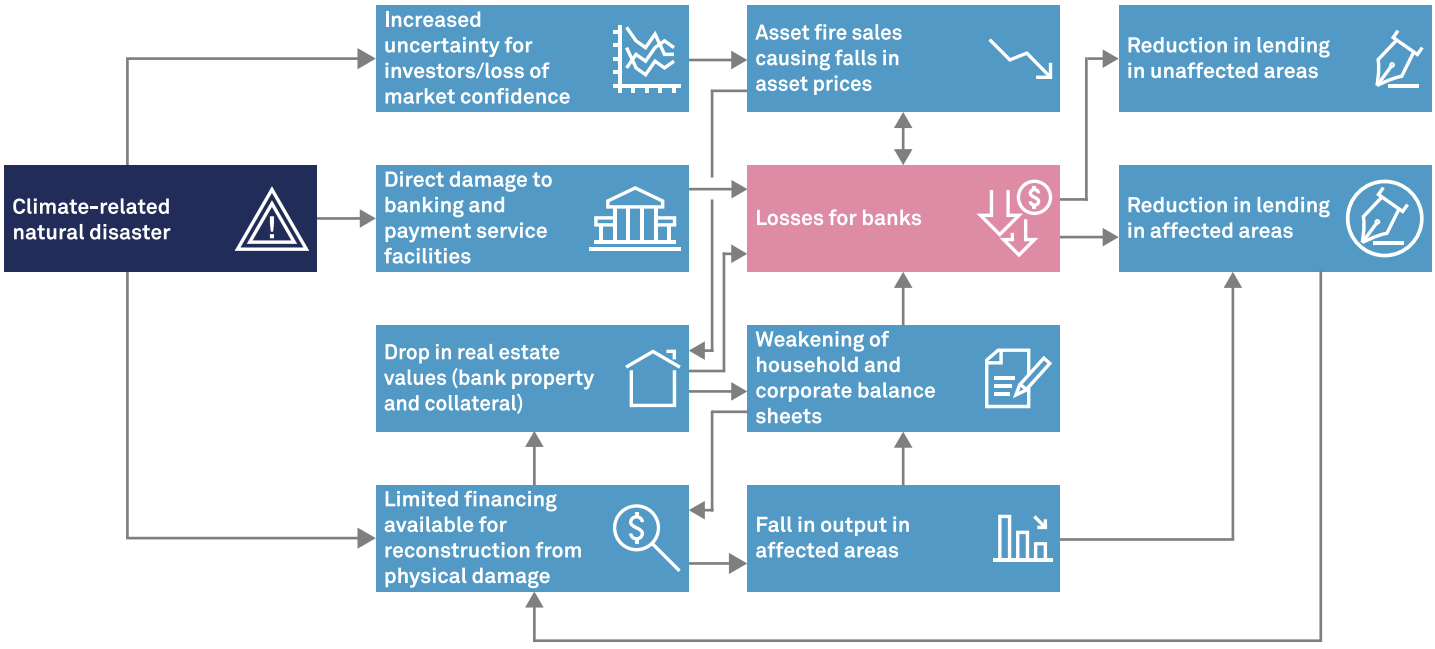
opportunities on their balance sheets, such as the size of stranded assets, as well as their exposures to sectors/counterparties vulnerable to energy transition, or the sensitivity of collateral (real estate) value to climate change.

We recognize some banks are moving faster than others. For example, French bank Natixis recently rolled out its innovative "green weighting factor" that enables it to allocate capital to deals based on their climate impact. This means that environmental considerations are increasingly embedded in the group's decision-making. Dutch bank ING has committed to steer its loan portfolio in line with the objectives of the Paris Agreement. As demonstrated by its Terra report, the bank has already assessed the sectors and companies that are the most exposed to accelerated transition risk, and its underwriting policies increasingly incorporate these risks. Since implementing a mapping exercise in 2018, BNP Paribas has also started taking into account environmental issues in its risk appetite framework. We expect to see more banks follow these (and other) pioneers in the coming years.

As environmental risks (not only climate change but also energy transition) could heavily influence the financial performance of financial institutions (see chart 4), banks will necessarily have to move faster to better assess their exposures and vulnerabilities to such risks. Further delays will only increase the likelihood of environmental events destabilizing the financial system and severely affecting the broader economy.

Chart 4

Examples Of The Effects Of Natural Disasters On The Financial System



Source: Batten (2016).

Regulatory Authorities Will Set The Path For Embedding Environmental Risks Into Banks' Credit Analysis

Several stakeholders, including investors, nongovernmental organizations, politicians, or others, have called for greater transparency regarding the financial system's exposures to climate and environmental risks to inform their investment decisions. Furthermore, several regulators globally have started to consider the implications that climate risks might have on the financial system's stability. As such, regulatory authorities' initiatives, to put more pressure on financial institutions to consider climate-related and environmental risks in their strategy and risk management practices, have flourished in the past few years (see box). We see this as just the beginning. Regulator-driven engagement in this field is likely to soar. Of course, not all regulators globally will move at the same pace. A regulator's degree of involvement often depends on the public perception of the importance of environmental risks in a country.

Some examples of regulatory initiatives to embed climate-related and environmental risks in banks' analysis

Several authorities have done, or plan to perform, a deep analysis of the banks they supervise to quantify their exposure to physical and transition risks. One of the first attempts was in 2017, when De Nederlandsche Bank (the central bank) published a study on the impact of flooding in the Netherlands on its financial system. The study included banks and insurers, and estimated total economic losses of €20 billion-€60 billion, depending on the severity of the scenario. The study explains that floods in the region could affect banks in three ways. First, they could damage commercial and residential buildings, resulting in credit losses ranging from €13.6 billion to €36 billion. Second, there could be a deterioration in the perceived credit quality of Dutch sovereign bonds (via direct impacts on public infrastructure and consequent remediation costs, and indirectly due to lower tax revenues). Third, economic conditions could weaken, seen in higher unemployment and lower economic growth. The analysis also estimates the exposure of Dutch banks to economic sectors that are suffering the most from transition risk, such as fossil fuels, at a contained 11% of their balance-sheets as of end-2016, but highlights that vulnerabilities vary considerably between banks.

In a more recent study (April 2020) the Bank of Italy proposed to measure banks' exposure to transition risk in terms of their lending to nonfinancial corporations with high CO2 emissions. This analysis found that Italian banks' exposures to carbon-intensive nonfinancial corporates was 8.0%-10.2% of their total assets in 2018. This exercise gave the Italian central bank a starting point to evaluate the vulnerability of the domestic banking sector to climate and environmental risks.

Other central bank proposals include adjusting banks' capital requirements based on their exposure to physical and transition risks by introducing different risk weightings to green and brown assets to determinate banks' capital absorption. For instance, in January 2020 the Hungarian central bank introduced preferential prudential treatment for domestic banks offering discounted interest rates on energy-efficient mortgages and collecting enough data on their green loans.

Regulators are also starting to assess banks' business models against future extreme weather events, for example by developing stress test scenarios that take into account climate change-related risk. The Bank of England (BoE) and Banque de France announced in late 2019 that they will include environmental risks among the variables used in their stress tests to apply to domestic banks. BoE has proposed three scenarios, assuming different timings in banks' actions to reduce global warming, and therefore different combinations of physical and transition risks. The results of these two exercises will be published in mid-2021.

In May 2020, the ECB published a consultation paper describing how it expects banks to consider climate-related risk in their strategy and risk management practices. It also expects banks to become more transparent about their exposure to climate and environmental risks. The consultation will conclude at end-September with the final agreed guidelines to potentially feed into the ECB's Supervisory Review and Evaluation Process (SREP) for 2021. While these guidelines are explicitly targeted at significant institutions directly supervised by the ECB, which are also invited to communicate eventual divergences, other institutions are also encouraged to consider them. The ECB is clear that the financial sector has a key role in the transition to a low-carbon and circular economy. Banks, in addition to identifying their exposure to these risks and determining their impact

on medium- to long-term strategy, are also being asked for robust governance frameworks to efficiently identify, manage, and monitor risks. They are then expected to report on progress made in reducing their vulnerability to such risks. The ECB suggests banks include climate-related considerations in their risk appetite frameworks to ensure capital adequacy, and in their lending practices through risk-adjusted lending pricing, for example.

The ECB proposal follows and aligns with the Network for Greening the Financial System (NGFS) guide for supervisors, which recommends the integration of climate risk in financial authorities' objectives and mandates to ensure the resilience of the financial system. Among its recommendations, NGFS invites supervisors to clarify how they expect financial institutions to address climate-related and environmental risks and opportunities within five main areas: strategy, governance, risk management, scenario analysis and stress testing, and disclosure.

We view favorably, from a credit analysis perspective, regulators' initiatives to address environmental risks and opportunities. Such steps will help banks clarify the treatment and approach they should take when considering such risks and opportunities in their risk appetite frameworks and, ultimately, in their business strategies. This includes adjusting pricing, updating the valuation of collateral, or using guarantees or other risk mitigation techniques.

Stress tests based on both static and dynamic assumptions are a good starting point to assess banks' vulnerability to these risks. Indeed, unlike backward-looking analysis based on previous data, forward-looking analysis--such as scenario analysis and stress tests--will better indicate banks' vulnerabilities and, therefore, how they may need to adjust their business models. This is because environmental risks and opportunities are constantly evolving and it is difficult to predict what scenarios banks will have to face in the medium term.

Financial authorities globally are moving at different paces in addressing the implications of climate-related financial risks for financial systems, and in requiring banks to analyze such risks as part of their strategic planning and risk frameworks. European regulators, including the ECB and national financial authorities, are leading the charge, while some other countries' authorities lag behind (albeit with rising awareness). For instance, China and the U.S., the world's largest and second-largest emitters of greenhouse gasses, have comparatively few regulations on climate risk disclosure. Even the Federal Reserve has no such requirements yet, though some state financial regulators, including New York, do. In both countries, however, cognizance of environmental risks and opportunities is growing fast.

Although we welcome regional and national regulators' initiatives to bolster the resilience of their financial systems, we believe a holistic approach, with common methodologies to measure these risks and opportunities, is the way forward. Globally comparable information would aid the accurate evaluation of climate risk and help limit the effects of extreme climate events on financial markets. A global standard setter, along the lines of the Basel Committee on Banking Supervision, could help, but setting up such a body and agreeing a common approach to embedding environmental risks and opportunities into banks' analysis and supervision could take years.

Despite Recent Advances, Obstacles To The Financial Analysis Of Environmental Risks Persist

Integrating climate and environmental risks into banks' risk management frameworks and business strategies calls for the ability to measure exposures and vulnerabilities to climate change. Both regulators and banks still face several challenges when trying to address environmental risk from a financial perspective. We see four main impediments:

1)A uniform definition of green and non-green assets is lacking.

At present, there is no unified global classification system for environmentally sustainable economic activities, the so-called green taxonomy, identifying the criteria an activity needs to meet to be labelled green. This deficiency makes it difficult for banks and regulators to measure exposures and vulnerabilities to environmental risks. Positively, in December 2019 the members of the European Union reached an agreement on a harmonized green taxonomy and proposed a framework to qualify economic activities as environmentally sustainable. The proposal aims to reduce fragmentation resulting from market-based initiatives and national practices and to help overcome "greenwashing", the practice of marketing financial products as green or sustainable when in fact they do not meet basic environmental standards. Once implemented, we believe that, in addition to giving investors a common language to screen investments, it could also help European banks and financial authorities inform their risk management practices and supervisory activities, respectively.

There are other relevant green taxonomies. China introduced one in 2013 to define green loans. The Climate Bonds Initiative, an international nonprofit organization, also developed one for labeling green bonds. In July 2020, the World Bank published a guide for emerging markets to develop a taxonomy based on the environmental objectives relevant to a country's sustainable development priorities. We view positively the development of national or market-based taxonomies--these could lay the groundwork for a global common definition of green economic activities.

2)There is a lack of sufficient disclosures on environmental exposures.

The financial community is strongly aware that there is insufficient data to analyze the influence of climate and environmental factors on certain activities. The poor level and quality of these disclosures largely results from the absence of a standard classification (like taxonomy) and of disclosure requirements. As such, for banks, regulators, and investors identifying the relevant KPIs is not obvious.

In the European Commission's (EC) public consultation launched in April 2020 on its renewed sustainable finance strategy, the EC recognized the need to improve the public disclosure of ESG information. In particular, the EC agreed to require large listed financial institutions to disclose ESG risks and called for a common database, publicly available, on nonfinancial data. We consider positively the launch of a public consultation on global carbon accounting standard for the financial sector by Partnership for Carbon Accounting Financials (PCAF) in August 2020. PCAF is an industry-led initiative aiming at helping banks to standardize carbon accounting for their lending and investment activities. PCAF currently embraces 77 financial institutions across North America, Latin America, Europe, Africa and Asia-Pacific, representing over US$13 trillion in assets. The paper proposes a methodology to measure and disclose greenhouse emissions related to

banks' loan and investment portfolios and provides guidance on data quality scoring per asset class, enhancing data transparency, and encouraging banks' assessment of climate-related risks in line with TCFD.

We believe the creation of harmonized ESG disclosure standards would help reduce information asymmetries, ease transparency, and improve comparative analysis on environmental data. TCFD disclosures will really boost the quality of quantitative disclosures for the latter.

3)The time horizon is a challenge.

Climate and environmental risks could take longer to materialize than the general timeframe of standard financial risks that banks, investors, and authorities are used to. As former Bank of England governor, Mark Carney, said in 2015: "We don't need an army of actuaries to tell us that the catastrophic impacts of climate change will be felt beyond the traditional horizons of most actors--imposing a cost on future generations that the current generation has no direct incentive to fix."

In recent years, the financial sector has experienced the impact of extreme weather and natural catastrophes, and has developed a framework, although evolving, to capture those physical risks. But the inevitable transition to a greener economy might exacerbate challenges for large parts of the economy, and not only the sectors with the highest greenhouse gas emissions. These challenges are financial (credit, market, operational), and reputational (liability risks) and call for banks to consider longer time horizons in their forward-looking analysis when defining strategic planning. This could be complex given the likelihood and severity of physical and transition risks are difficult to quantify. In this context, we believe scenario analysis could help banks, in particular when deciding what measures to implement to meet the 2°c rise in temperatures stipulated in the Paris Agreement based on the current portfolio structure.

Scenario analysis methodologies need to be compatible with a range of climate scenarios so that banks can test several plausible future "hypothetical constructs", and make strategic decisions based on this analysis. We see two ways of designing climate transition scenarios: temperature-based and event-based. Banks with advanced environmental strategic risk frameworks and disclosures can also model the financial effect of a change, or an amendment, of the carbon price, including the imposition of a carbon tax.

4)The prudential treatment of bank's green exposures remains a complex topic.

Although the effects of environmental risks on financial activities are no longer in doubt, universal proof that green assets carry a lower probability of default does not yet exist. Therefore one cannot draw a conclusion about the potential differences in the riskiness (in terms of pure probability of default) of green versus brown assets. This partly hinders banks in incorporating environmental factors in their credit processes and risk management frameworks. It also complicates the work of financial regulators when trying to apply different prudential measures to banks based on the greenness of their exposures. Indeed, while it is desirable for banks to have a discount on the capital absorption of green assets, it is important that risk weights are kept calibrated against the probability of default associated with the assets.

The above obstacles have so far prevented a uniform agreement on how climate change and environmental risks should be treated from a credit perspective. That said, we believe banks and regulatory authorities efforts will produce important results such as enhancing the disclosure of

environmental information and data; achieving a harmonized green taxonomy; measuring environmental risk through forward-looking stress tests and scenario analysis; defining prudential treatment in capital allocation; and ultimately applying environmentally adjusted pricing to credit activity.

Our Rating Analysis Will Benefit From Greater Disclosure

So far, only a few rating actions on banks have stemmed from climate and environmental risks. However, the relevance of these risks and opportunities is rising, as are the effects they might have on financial systems. Our ratings already incorporate environmental factors and risks associated with climate change, when material from a credit perspective and sufficiently measurable/predictable--even beyond our outlook horizon. However, environmental data is still poor from a quantitative perspective, and, as such, we must factor environmental risks and opportunities into our analysis in a qualitative way. Better and comparable disclosures of banks' exposures and vulnerabilities to climate and environmental risks would benefit our credit analysis and would help us further differentiate between banks.

The more data we have, the more we will incorporate environmental considerations into our bank ratings. Information on a sector's or industry's exposures to natural disasters or the transition to a low-carbon economy, if sufficiently relevant, can inform our assessment of the economic resilience of a country, and therefore of its banking sector. For instance, banks in regions that are highly vulnerable to hurricanes and earthquakes are structurally exposed to the consequences of such natural catastrophes for their business operations and financial performance. How much insight a country's regulatory authorities might have into financial institutions' exposures to environmental risk--and their capacity to monitor banks' vulnerabilities and ensure they proactively manage these risks and opportunities--are other important elements that we are starting to incorporate into our analysis of banking sectors' institutional frameworks. We include these two aspects in our Banking Industry Country Risk Assessment methodology and, specifically, in our analysis of systemwide economic and industry risks and, ultimately, in our bank ratings.

We factor in a bank's business position, capital and earnings, and/or risk position when we look at its exposure to climate-related and environmental risks and the effects on the bank's creditworthiness. This is because banks that are heavily exposed to sectors or countries vulnerable to these risks are likely to experience a volatile revenue stream, undermining their business stability. For instance, carbon-intensive sectors, such as autos, oil, gas, energy, transportation, and coal, are more vulnerable to changes in climate policies and are subject to gas-emission restrictions. Banks financing these industries might suffer the indirect consequences. Banks are also confidence sensitive. Their access to wholesale funding (at a reasonable cost) also depends on investors' perceptions (including large asset managers or sovereign funds) of their environmental commitment and the credibility of environmental targets. The consequences for a bank, or a group of banks, of being flagged by large institutional investors, and therefore placed on restricted lists for investments, would be severe from a funding perspective.

Furthermore, we consider a bank's higher-than-peers concentration in sectors and geographies vulnerable to climate change and environmental risks could generate comparatively higher credit losses or hamper the value of assets held as collateral and, therefore, internal capital generation. This would affect our assessment of its risk position and/or capitalization.

Conversely, banks' strong commitments to greener counterparties or sectors could benefit their competitive positions and earnings. We will only be able to assess this in the long term, however,

to see whether a bank's sustainable investment and underwriting approach has reduced its earnings and capital volatility, improved diversification, or acted as a differentiator in a competitive market, ultimately benefiting its credit quality.

Banks' disclosure of useful data is still modest, although gradually improving. Greater transparency about how banks are integrating climate and environmental considerations into their risk management frameworks--underwriting and business approval practices, for example--could further feed into our assessment of a bank's risk position. Stress testing and sensitivity analysis could provide an indication of the robustness of the techniques used in monitoring and managing these risks. Finally, if we had exhaustive information on risks associated with asset or geography mixes in banks' balance sheets we could eventually apply different risk weights in our measure of banks' capitalization (the risk-adjusted capital ratio) and, therefore, better assess banks' capital ability to absorb environmental risks--just as we can already do for traditional credit, market, and operational risks.

Overall, incorporating banks' capacity to assess vulnerabilities to climate and environmental risks, and to adapt their business models and ultimately lending policies, is necessary for our analysis of banks' creditworthiness. Climate and environmental risks are not abating any time soon, and are becoming crucial for global financial stability.

Related Research (S&P Global)

- Standardized Non-Financial Disclosures Will Clear The Path For Better ESG Analysis, June 19, 2020
- Led By Green Bonds, The Sustainable Debt Market Looks To Surge Ahead, Feb. 13, 2020
- Delays In Addressing Global Warming And The Longer-Term Ratings Implications, Dec. 3, 2019
- The Role Of Environmental, Social, And Governance Credit Factors In Our Ratings Analysis, Sept. 12, 2019
- The EU Green Taxonomy: What's In A Name?, Sept. 11, 2019

Related Research (External)

- The global carbon accounting standard for the financial industry, Draft version for public consultation, Partnership for Carbon Accounting Financials, August 2020
- Stocktake of Financial Authorities' Experience in Including Physical and Transition Climate Risks as Part of Their Financial Stability Monitoring, Financial Stability Board, July 22, 2020
- Guide on climate-related and environmental risks, ECB, May 2020
- A Status Report on Financial Institutions' Experiences from working with green, non green and brown financial assets and a potential risk differential, Network for Greening the Financial System, May 2020
- Guide for Supervisors Integrating climate-related and environmental risks into prudential supervision, Network for Greening the Financial System, May 2020
- Consultation on the renewed sustainable finance strategy, European Commission, Apr. 8, 2020
- The carbon footprint of Italian loans, Bank of Italy, April 2020
- High water, no marks? Biased lending after extreme weather, Bank of England, Working Paper

n° 856, March 2020

- Integrating Climate-related Risks into Banks' Capital Requirements, Institute for Climate Economics, March 2020
- The climate risk for finance in Italy, Bank of Italy, Feb. 2020
- Bank of England, Discussion Paper: The 2021 biennial exploratory scenario on the financial risks from climate change, December 2019
- French banking groups facing climate change-related risks, Autorité de Contrôle Prudentiel et de Résolution, n° 101-2019
- Transition in thinking: The impact of climate change on the UK banking sector, Bank of England, September 2018
- Waterproof? An exploration of climate-related risks for the Dutch Waterproof? financial sector, De Nederlandsche Bank, 2017
- Breaking the tragedy of the horizon - climate change and financial stability, Mark Carney, Sept. 29, 2015