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Why and How Should Development Banks Take Physical Climate Risks into Account?

Lessons learned from AFD's initial research work

The physical risks resulting from climate change are those related to the direct impact of both more extreme and frequent weather or climate events and gradual changes in climate patterns. As far as banks are concerned, exposure to physical risk is first and foremost linked to the exposure of their borrowers who are most vulnerable to these climate related hazards. AFD has analyzed the exposure of its loan portfolio to these risks and has worked to integrate them in its credit origination processes. This paper presents the lessons learned throughout this experience.

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Why should climate risks be taken into account?

Climate-related financial risks fall into three main classes: physical risks associated with the consequences of climate change, transition risks resulting from the transition dynamics towards less polluting and greener economies,[1] and liability risks.

Considering that these risks would pose a threat to global financial stability if they suddenly materialize, the G20 and the Financial Stability Board commissioned the Task Force on Climate-related Financial Disclosure (TCFD) to prepare a series of recommendations. These recommendations aimed to improve the uptake of these by the different players in the economy. In France, financial institutions are encouraged to do so by means of Article 173 of law for the Energy transition (No. 2015-992) of 17 August 2015. The French Prudential Supervision and Resolution Authority (ACPR) closely monitors the implementation of this law and regularly questions French banks on their progress in this area.

As such, like all banking establishments, AFD must incorporate this new paradigm in its risk analysis processes.

How can banks measure the exposure of their balance sheets to physical climate risks?

AFD started by mapping the exposure of its portfolio to physical climate risks in 2018. While other French banks started to work on transition risks, considering that physical risks were less significant in their portfolios and that they were are least partly covered by insurance mechanisms (ACPR, 2019), AFD considers that the climate vulnerability of the countries in which it operates justified giving priority to physical climate risk analysis.

[1] On the subject of transition risks, AFD has financed a study conducted by CPI on the financial implications of the transition towards a low-carbon economy in South Africa.

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The mapping of physical risks provided an assessment of their impact in two dimensions: extreme weather and climate events as well as gradual changes in the climate system. A cross-disciplinary team (risk, finance, research, and climate specialists) was put together for that purpose.

In order to carry out this pilot evaluation, AFD adopted the methodology of a climate data provider selected by a public tender. The method was applied to analyze the exposure a sample of 200 AFD clients representing around 80% of AFD's credit exposure, 60% of its balance sheet, and 20% of its borrowers, among which were represented a number of central governments, corporations, local authorities, financial institutions, and investment funds.[2] Each of these was assigned an exposure score to five climatic hazards: thermal stress, extreme precipitations, cyclones, sea level rise, and water stress. Each hazard, composed of sub-indicators[3] (see Figure 2), was chosen because they present significant economic risks for the borrowers.

Risk scores for each sub-indicator were estimated based on information about the type of borrower, the results of climate models relevant for the 2030–2040 period, as well as on precise geolocation data for borrowers, when available.[4] Risk scores were normalized on a scale from 0 to 100, then aggregated following methodologies adapted to each indicator. An initial physical risk mapping was obtained by assessing borrowers based on two inputs—their consolidated scores and AFD's credit exposure to the borrower. This mapping provided AFD with an overview of its exposure and helped it identify which of its borrowers were the most exposed to each climate hazard.

In total, 63% of the borrowers in the sample (116 counterparties) displayed at least one red flag, for a total of 62% of the overall credit exposure. This means that these borrowers have a score greater than or equal to the 90th percentile of each AFD subsample on at least one climate hazard (or, in other terms, 90% of the borrower class are less vulnerable than them). Furthermore, 47 counterparties amounting to 23.2% of all borrowers and 17.4% of credit exposure two red flags. A total of six counterparties representing 3.6% of all borrowers and 2.4% of credit exposure displayed three red flags. Nevertheless, it is important that mention that if only one of these borrowers is exposed to a single climate hazard that materializes, then some impact will follow.

Despite all the information collected, two types of difficulties were encountered during this pilot experience for the AFD:

- Geolocation data was not always readily available or of good quality despite being a key element in physical risk assessment methodologies: the higher the level of geographic detail, the more relevant and reliable the results of the risk indicators.
- The chosen methodology showed its limitations. Some are related to the intrinsic difficulties of such an approach: standardizing data resulting from heterogeneous climate models and aggregating scores on different types of risks led to a significant loss of information. Others call for additional developments in order to take into account the sectoral or individual specificity of each borrower, their exposure to risks through their value chain, and any risk mitigation measures already in place.

Box 1 – What are physical risks?

Physical risks are one of the three main classes of financial climate risk that can impact economic players. They result from damages that are directly caused by weather and climate hazards, such as more frequent and extreme events (such as cyclones, floods, heat waves or cold snaps, coastal flooding) or gradual changes in climate (such as changes in temperature, rising sea levels, and so on).

For instance, extreme precipitations could result in landslides weakening a dam under construction, thus putting in jeopardy a power generation company bound by a power purchase agreement. Another example: a drought could penalize farm businesses and industrial companies whose business models are dependent on water supply.

Gradual changes in the climate system (sea level rise, changes in rainfall, temperature increases) may also have significant economic and financial consequences. Hydroelectric plants could lack sufficient water to operate; agricultural crops could fail to adapt to temperature rise in certain locations and to changing rainfall patterns; sea level rise threatens airports, ports, real estate assets and hotels who must invest heavily to adapt, and so on.

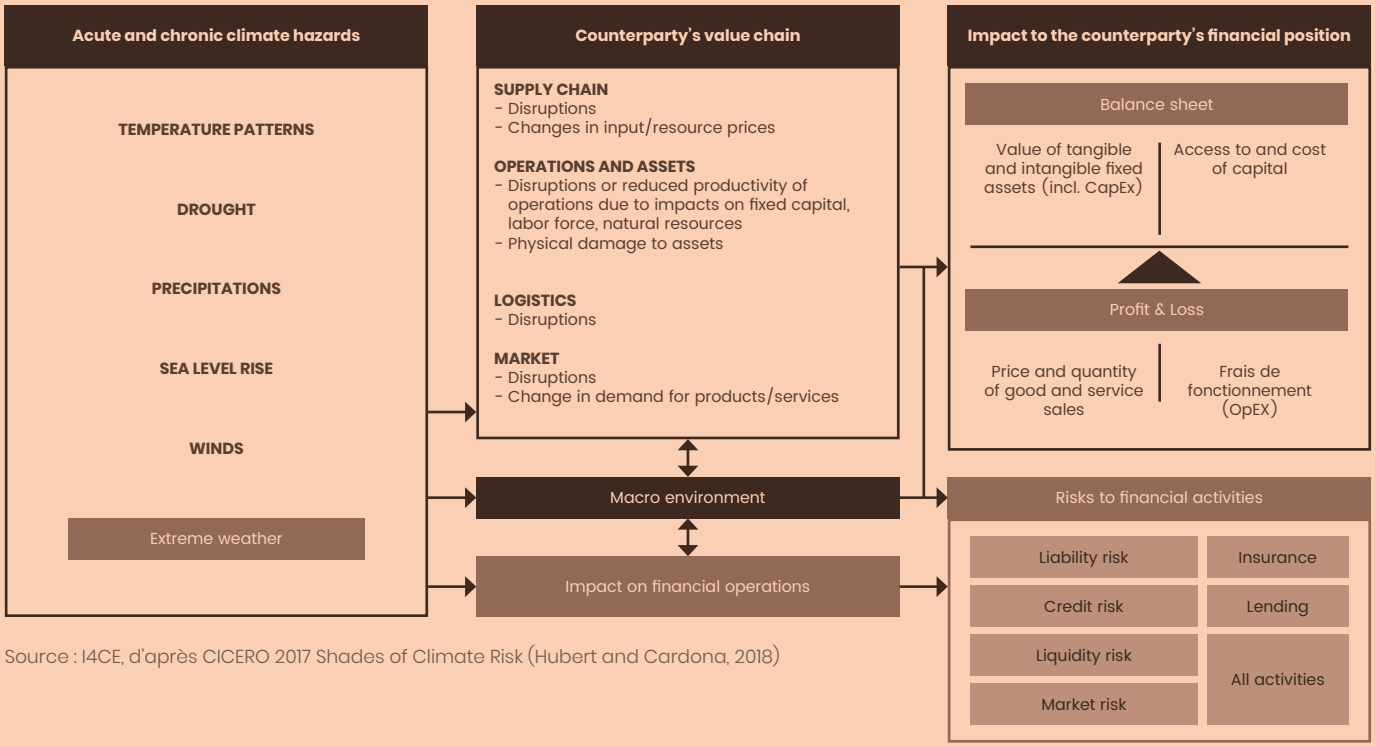
Economic actors are not only exposed to climate impacts via their production infrastructure, but also through their value chains. Climatic disturbances can affect supply chains, and cause an increase in the price of raw materials as well as interrupted distribution services (see Figure 1).

[2] National governments represented 20.5% of counterparties in the sample, local authorities 15%, corporations 32.5%, financial institutions 17.5%, and investment funds the remaining 14.5%.

[3] The sub-indicators are physical measurements of the risk under consideration based on climate models and other databases. For instance, the thermal stress indicator includes sub-indicators which measure the number of days per year above a certain temperature threshold and the maximum temperature projected for the hottest days.

[4] For the thermal stress indicator, the scale of analysis is 25 km by 25 km, which allows for considerable flexibility when geolocating assets. Regarding the sea level rise, water stress and cyclones, a much finer scale is necessary, and assets must be geolocated very precisely.

Figure 1 — Propagation channels of climate risks to counterparties and financial activities



Source : I4CE, d'après CICERO 2017 Shades of Climate Risk (Hubert and Cardona, 2018)

How can physical risks be incorporated in credit risk ratings?

An in-depth analysis was conducted on a smaller sample of borrowers in order to try to understand whether taking physical risks into account could lead teams to revise the credit ratings of these counterparties.

The analysis showed that some borrowers have already faced the materialization of physical risks which had an impact on their credit score. An African city experiencing water stress has, for example, seen its credit rating downgraded by rating agencies. The drought had indeed caused financial impacts both on its financial capacity, partly funded by a water taxes, and on its operational and capital expenditures, which increased dramatically during the episode. It is nevertheless difficult to assess the a priori relevance of credit rating changes for borrowers yet to be impacted by a major climate hazards. For the reasons above, and taking into account the limits of the methodology, AFD perceived that the risk score did not provide information on potential financial consequences for borrowers. In addition, it is important to recognize that climate models and financial analyses are difficult to reconcile for the following reasons:

- Credit rating methodologies tend to have a slight backward-looking bias. Climate risks, on the other hand, are disruptive by nature and are largely unpredictable: they cannot be observed in past data sets and are likely to follow a time horizon of their own.
- Climate models are very heterogeneous and invite the use of average values rather than a degraded climate scenario.
- In twenty years' time, considered a relevant time horizon for banking institutions, climate scenarios are only slightly divergent.

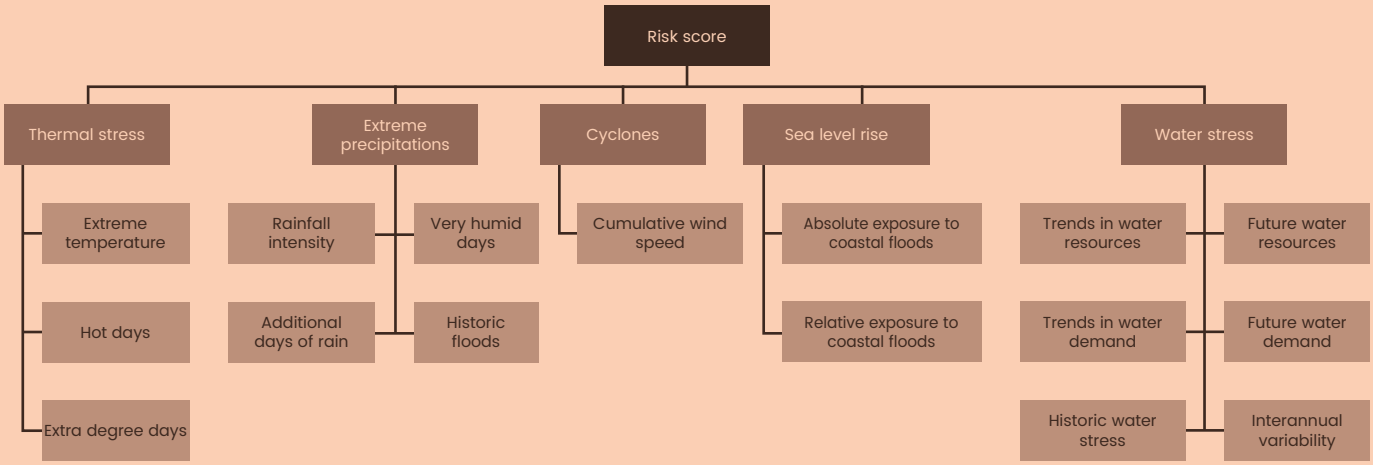
As a result, AFD chose not to include climate risks as a new dimension in its credit rating methodology and instead set up an independent scoring system for each physical risk more in line with its core development mandate. To help assessing those scores, AFD went on to develop two new sets of tools:

- a sector-country matrix that produces preliminary scores and warning flags for each client, based solely on 2 simple inputs: the country and the sector the client is operating in.
- a ready-made questionnaire intended to be used during the due diligence process for new projects in order to have more complete information on whether the client is aware of the identified risks and has elaborated potential adaptation strategies

Box 2 – In what ways can banks be exposed to physical risks?

The exposure of banks to physical risks is primarily related to the vulnerability of its borrowers. Banks are sensitive to the financial risks experienced by its customers as a result of the physical consequences of climate change. Climate change may increase credit risk, i.e., the probability of non-repayment of loans, but also loss given defaults. Physical risks can also have an impact on market risks as security portfolios may dramatically depreciate in the event that risk perceptions in a given geographic area or a particular sector are readjusted, as well as on liquidity risks, for the exact same reasons. Market risk can also have consequences on the refinancing of banks, as investors or lenders may deem it too risky to continue funding them.

Figure 2 — Composition of physical risk scores



Source: evaluation conducted for AFD by the climate data provider Four Twenty Seven.

This ensures a thorough understanding of the risk exposure of counterparties. When high risks are identified, AFD can suggest supporting them to define and implement an adaptation strategy.

The specific features of development banks

As a development agency, AFD considers that identifying climate risks is a way of identifying which borrowers are the most vulnerable and of financing their adaptation to climate change. Indeed, after identifying counterparties that are highly exposed to physical risks, AFD can initiate a dialogue, whether with national governments, local authorities, public enterprises or banks regarding adaptation strategies. As a result, AFD remains true to its core mandate and avoids penalizing its most climate-sensitive borrowers, and prioritizes helping them become more resilient.

Conclusion

The initiative offered many valuable insights and provided AFD with tools for identifying areas that are subject to physical climate risks in connection to its lending activity, while enabling it to expand the scope of its credit analyses. Much remains to be done however to take into account the physical impacts of climate change in credit risk ratings. These methodological developments will require joint efforts by finance and climate professionals, and AFD will take an active role in this process. Physical climate risk analyses in financial institutions contributes to raising awareness of the importance of identifying vulnerabilities and investing in adaptation. From this particular standpoint, development banks bear a special responsibility: they should not penalize their most exposed borrowers by remaining restrained to a risk-based approach, but instead should get to know their borrowers better and support them in progressing along adaptation trajectories in the long term.

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