Supervisory and Regulatory Approaches to Climate-related Risks

Industry Feedback to the 29 April Interim Report

Submitted by:

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Riskthinking.AI is a visionary risk management company. Led by Dr. Ron Dembo, former founder and CEO of Algorithmics Inc., we produce financial risk ratings that account for the full uncertainty of climate stress. Unlike climate risk companies that attempt to predict the future, we use sophisticated probability models, augmented by Artificial Intelligence and structured expert judgment, in a completely 'bottom-up' approach to create future estimates of the financial impact of climate change. Our approach can be used to measure and manage financial risks across any asset type, class, or sector, anywhere in the world, and across any future time horizon.

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Executive Summary

While we agree with the general tenor and intent of the April 2022 report, we think that the report is missing the most fundamental aspect of the challenge of measuring and managing climate-financial risk: it is a stochastic problem requiring a stochastic solution.

By 'stochastic' we mean to say that future uncertainty is so extreme that no single climate model, nor combination of models, will ever adequately capture how future geographies and socio-economies will be shaped by a changing climate. That is the reality facing authorities and firms around the world, and it is a key omission from the report.

A failure to acknowledge and embrace this reality means that critical insights about the possible positive and negative outcomes – upside opportunity and downside risk – that firms and nations might experience from climate stress may be missed. These insights are vital to taking informed decisions about strategic planning and risk management. The best way to deal with this reality is to address the challenge directly, and completely. This is where a stochastic approach enters the equation, and we describe its essential elements in this response.

The following thoughts and recommendations are based on climate assessment work our company has performed over the last three-plus years for major banks, asset managers, and multi-national corporations, as well as a long tenure in enterprise risk management. While the ideas presented here may seem theoretical or even far-fetched, the proof of their feasibility lies in the suite of capabilities we have built. We know the recommendations presented here are possible and practical because we implement them daily for our clients.

We appreciate the opportunity to submit these ideas for consideration by the FSB.

RESPONSES TO THE QUESTIONS POSED BY THE FSB

1. Does the report highlight the most important climate-related data (qualitative and quantitative) for supervisors' and regulators' identification of exposures and understanding of the impacts of climate-related risks of financial institutions and across financial sectors? Please provide examples of climate-related data deemed most relevant and that should be prioritised.

The report begins to identify some of the required data to further supervisors' and regulators' identification of climate-related exposures and impacts. In particular, we concur with the recommendation for firms to identify the "geographic location of [their] exposures to as high a level of granularity and completeness as possible."

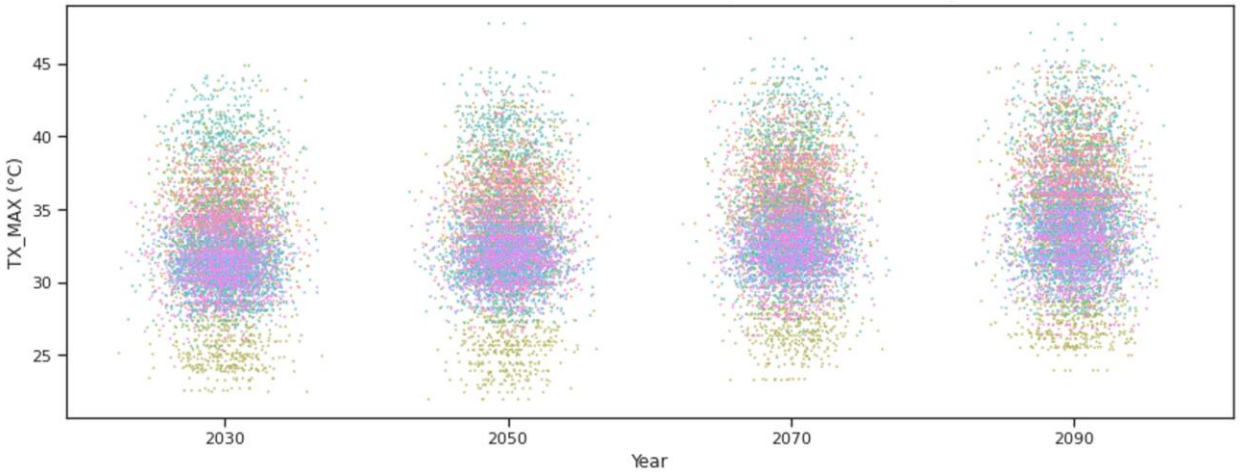
However, because of the stochastic nature of climate risk, the most important climate-related data that authorities need to understand relates to the future uncertainty of every risk factor, relevant to each asset, based on that asset's physical location. (By 'risk factor' we mean such variables as sea-level rise, drought, heat stress, and so on. By 'asset' we mean the distribution centers, manufacturing facilities, refineries, administrative and sales offices, etc., that are within a company's purview.)

The above requirement is based on two unique aspects of climate-financial risk that are acknowledged in the report but not fully explored/addressed.

The first is that the financial risk of an asset is intimately linked to the geography in which the asset is located, the type of asset being examined and, in some cases, its supply chain. This contrasts with the risk faced by a portfolio of financial instruments, which is related to a given market and is the same no matter where the instruments are located. As the old maxim states, "A bond is a bond is a bond," no matter where it is held. On the other hand, two identical cement plants may have different climate-financial risks depending on where they are located.

The second is that the uncertainty underlying the science of climate change, and how it may impact geographies and socio-economies of the future, is extreme. **Figure 1** shows a micro example of this extreme uncertainty. It depicts all views, from all available climate models (87), for the maximum temperature that one city (Portland, Oregon) could experience at multiple future time horizons. Each dot of a different colour represents a single prediction of a single model for the climatology's 2030, 2050, 2070, and 2090 maximum temperature projections for that city. This figure shows conclusively the radical uncertainty of climate science.

Figure 1: Maximum Temperature Projections for Portland, Oregon, USA. (source: ClimateWisdom™)



If we scale the above example across the entire surface area of the planet, and all 1,500+ variables contained within the average climate model or transition scenario, one begins to understand both the scope of the challenge and the tremendous uncertainty embedded in climate data.

Because of this extreme uncertainty, the data model that authorities should be seeking needs to be especially ambitious, and ideally cover the following parameters:

- All recorded historical climatology and associated impacts on socio-economic factors globally. This should cover the period 1850, when such data was first recorded, to the present. This data series establishes the baselines necessary for climate-financial risk analysis.
- All scientific projections of the same. This should cover the entire sweep of future climatology, from the present out to 2100, when most climate and socio-economic model projections end. These future projections contain the uncertainty at an individual risk factor level.

- The future-uncertainty distributions for every individual risk factor, which should reflect the latest scientific insight. These distributions form the core information from which climate-financial risk analyses can be conducted in a stochastic manner.

By 'future-uncertainty distributions,' we mean the fullest range of possibilities, from best case to worst case, for all of those variables. These distributions can be found in a combination of climate models and transition scenarios published by organizations like the Network for Greening the Financial System (NGFS) and the Intergovernmental Panel on Climate Change (IPCC), as well as in the reports and official writings of scientists and experts around the world.

While the scale of such a data solution is immense, it is feasible to build as evidenced by the data and analytics platform we have developed. The platform embodies all the characteristics discussed above and covers the entire earth's surface to an average resolution of $60m^2$ or, in some cases (data permitting), at even higher resolutions.

Once this data model is in place, authorities are in a much better position to understand possible exposures and impacts that firms may experience in the future from climate stress. Such a model allows them to generate consistent scores in a way that can be applied across assets, portfolios, companies, or entire sectors.

2. Does the report draw attention to the appropriate areas to increase the reliability of climate related data reported by financial institutions?

While the report rightly calls for increased granularity in firm-level disclosure, including information related to the physical location of assets, it is missing two essential requirements to increase the reliability of firm-level disclosures.

It is insufficient to disclose even granular information about the physical location of assets alone. Because of the stochastic nature of climate risk, asset-level physical location information needs to be paired with the future-uncertainty distributions at scale: for every risk factor relevant to each asset. A failure to do so guarantees that authorities and firms will lack the insight required to understand the full range of possibilities regarding how climate change might impact a given location, and a given asset, in the future.

This data pairing is predicated on authorities and firms having access to the entire scope of data – all climate models, all experiments on those models, all transition scenarios, etc., which introduces a further requirement for a common set of standards, organized around an agreed classification scheme, to be in place. Common standards and an agreed taxonomy at the global level would allow disparate data to be combined and permit full-scale modeling (i.e., examining the fullest range of possibilities, per risk factor), of the type recommended here, to take place.

3. Does the report appropriately identify the elements of a common high-level definition of climate-related risks (physical, transition and liability risks)?

The report does identify many of the central elements for common high-level definitions of each of those risks. However, absent a recognition of the stochastic nature of the problem, those common definitions will result in little material progress being made in authorities' and firms' understanding of either the future risk or opportunity they might experience from climate stress. We cannot emphasize enough how important this information is to informing risk management and strategic decisions of firms and governments, and to lending credibility to any regulatory requirements or supervisory actions.

4. Do the proposed recommendations help accelerate the identification of authorities' climate related information needs from financial institutions and work towards common regulatory reporting frameworks? Please elaborate on areas where the recommendations could be enhanced, if any.

To make material progress on both objectives referenced here, authorities need a fundamentally different type and level of disclosure from firms.

If authorities want to understand the future climate-financial risk to which firms may be exposed, they need to mandate firm-level disclosure of all assets under those firms' purview, including their supply chain; as well as the physical location of each of those assets. For the reasons cited in our response to Question 3, that disclosure needs to also be paired with relevant factor-level future-uncertainty distributions. As we describe in response to Question 7, these data points also need to be combined with a methodology that allows for multi-factor stress tests to be conducted at scale.

This is where climate-financial risk meets Scope 1, 2, and 3 disclosure requirements, yet these connections are missing from the report's recommendations.

5. Does the report identify relevant system-wide aspects that should be considered as part of supervisory and regulatory approaches to incorporate systemic risks arising from climate change? Please elaborate on other aspects that should be considered, if any.

The report partially identifies several of the relevant aspects of systemic and macroprudential risk that regulators and supervisors should consider. We highlight the following FSB recommendations as particularly important to understanding potential systemic risks: understanding second order effects, risk transfers between sectors, feedback loops between the financial sector and the real economy, as well as the interplay between geographical and sectoral risks.

To operationalize these recommendations, authorities and firms also need a method to systematically aggregate results, both at the firm level and across sectors and geographies. To ensure consistent results are generated, that aggregation should begin from a purely bottom-up approach and at the most granular level possible: each individual asset within a firm's purview.

If this style of bottom-up approach is taken, firms and authorities can combine results in whichever way is demanded by the assessment being conducted: by asset class, by portfolio, by industry sector, or even by national economic category. This capability sets the conditions for systemic and macroprudential risk to be evaluated efficiently.

However, this also requires a method to combine results in a way that is both rigorous and mathematically consistent. While we don't disclose the details in this public response for how such calculations can be executed, we note that multiple techniques are possible. One method is to align risk impacts / exposure scores using a consistent metric (e.g., USD) to measure the cost of insuring a given asset, portfolio, or sector, and determine how that price changes over time. This can be applied to both downside risk and upside opportunity.

6. Does the report accurately reflect the extent to which current supervisory and regulatory tools and policies address climate-related risks?

The report is a very accurate reflection of the current tools and policies used by authorities and firms to try and address climate-related risks. Because those tools and policies do not fully consider the stochastic nature of the challenge of climate-financial risk, we view those current efforts as insufficient for authorities or firms to adequately prepare for, let alone strategically manage, possible risks or opportunities.

7. Do the proposed recommendations on incorporating systemic risks into supervisory and regulatory approaches, including the expanded use of climate scenario analysis and stress testing for macroprudential purposes, address the appropriate areas? Please elaborate if there are any other features or tools that should be considered.

The proposed recommendations on incorporating systemic risks, and expanding the use of scenario analysis and stress testing, represent a step in the right direction and one of the most important contributions of the FSB report towards enhancing the rigor of climate-financial risk and opportunity assessments. In particular, we applaud authorities' increasing orientation towards examining "risks in the aggregate and factoring in system-wide aspects such as risk transfers between financial sectors and feedback loops between the financial system and the real economy."

However, whether applied top-down or bottom-up (as defined in the report), scenario analysis and stress testing tools need to be designed to achieve the objectives we have described in our response, i.e., use of a stochastic approach; systematic examination of factor-level uncertainty distributions at scale; use of a consistent, fully bottom-up method to aggregate results, etc.

One additional feature of such tools that authorities should consider is the multi-factor nature of climate-financial risk. Rarely will there be cases where an individual asset is subject to a single risk factor. Scenario analysis and stress tests need to reflect this reality, and an algorithm can be a particularly effective way to both systematize the scenario generation process and accommodate multiple risk factors in the process.

We have outlined this approach in other publications (see June 2020 risk.net article), describing how such a method, which involves use of a scenario tree, can create a set of 'spanning' scenarios, i.e., will include best and worst case outcomes among the set.

8. Are there other areas of work, literature or research being conducted on macroprudential tools and policies on climate-related risks that should be considered in the report?

The stochastic nature of climate risk has been chronicled in multiple articles and books. The most direct treatment of the topic can be found in *Risk Thinking In an Uncertain World*, which was written by our founder and CEO. The book details the radically uncertain nature of climate change, the limitations of traditional forecasting methods, and the requirements for a full stochastic solution.

We also cite the work of Lars Peter Hansen who has written extensively on methods to quantify uncertainty and assess the impacts on policy design, as well as the interaction between climate impacts and their economic consequences.

9. Are there any other issues that should be considered in future work of the FSB on supervisory and regulatory approaches to climate-related risks?

The most important issue that the FSB should consider as part of its future work on climate-related risks is how to integrate a stochastic approach into its work, and determine how such an approach should re-shape the disclosures required from firms as well as any other regulation to manage climate-related risks.

Final Thoughts

Should any of the ideas presented here pique the interest of the FSB, we would be willing to 'lift the hood' on our methodology in ways that this public response prevented, and share more detail about the approach we use but have only discussed in broad terms here.