

Distinguishing Among Climate Change-Related Risks

Planetary | Economic | Financial

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By: Lisa Sachs, Denise Hearn, Matt Goldklang, Perrine Toledano

Table of Contents

Introduction	03
Purpose of this Briefing	03
Understanding Varied Dimensions of Risk	04
Planetary Risk	05
Economic Risk	06
Financial Risk	07
Challenges of Conflation	08

Introduction

Understanding the diverse types of climate change-related risks is crucial for developing effective strategies to address the global climate crisis. A holistic yet disaggregated approach allows for a comprehensive view of the challenges while enabling targeted responses from various stakeholders. This document outlines three main categories of climate-related risks: planetary, economic, and financial, detailing their relevance to various stakeholders, timeframes, and potential response strategies.

This short brief aims to disentangle the complex nature of risk discussions for productive discourse and appropriate risk management approaches for different stakeholders. In practice, discussions related to assessing and responding to climate change risk have conflated categories of risk, confusing discussions and undermining the effectiveness of related strategies. We hope this brief can bring clarity and rigor to analyses of risk and support constructive discussion among policymakers, financial institutions, social sector actors, and the public. We plan to follow this short briefing with a longer report including more detailed analysis, integrating feedback to these initial ideas.

Purpose of this Briefing

The main purpose of this document is not to create a rigid or inflexible typology of various risks, but rather to identify which stakeholders are best positioned to address certain types of risks, anticipate how they are likely to do so, and explain the importance of this clarity to facilitate intended outcomes and avoid unintended consequence. It is divided into three sections:

- 1. Types of risk** (planetary, economic, and financial) and how they relate
- 2. High-level objectives and relevance of risk** for different actors. These objectives can be counter to one another, or involve trade-offs
- 3. The risks and challenges of conflation** among types of risks. Conflating risk categories can lead to confusion, mismanagement, and even perverse outcomes; for example, certain types of climate risk assessments may impede climate progress

Understanding Varied Dimensions of Risk

Risks are highly heterogeneous – they take different forms, over different time horizons, and affect stakeholders differently. Risks can be both acute and chronic: while some will have immediate effects, others will play out over longer-time horizons. Some risks may metastasize slowly at first and then quickly amplify in severity. These are known as tipping points, and when critical thresholds are surpassed, this can cause significant and irreversible systems transformation. Tipping points are often discussed in climate or ecological terms, but are inherent to complex systems, and are also observed in economic and financial systems.

Acute and chronic risks are interrelated, but their transmission time horizons can be distinct. For example, a wildfire which causes severe planetary or economic destruction may not impact financial markets at all, or not until many similar acute risks have occurred and are transferred through to forms of financial risk like credit, liquidity, or market risk. Sometimes the interconnections between risk categories (physical, economic, financial) can lead to compound risks which create non-linear dynamics. These risks can have second-order or spillover effects, which are harder to predict or accurately forecast.

For this reason, transmission channels of risk are not always clear, linear, or present between the three categories of risk we lay out below, and among various stakeholders. There are many ongoing efforts to delineate transmission pathways, create more accurate forecasting models, and to identify¹ vulnerabilities which can be more easily managed than directly managing risks.

However, it is important to recognize that various actors have different, and sometimes oppositional mandates and risk appetites when it comes to managing or mitigating risk. Financial markets have a mandate to seek risk-adjusted returns and manage financial risks, while managing planetary risks is primarily a common good responsibility for governments and social sector institutions. The insurance sector has a mandate to cover losses and to distribute risk, not necessarily to avoid the accumulation of risk. Understanding what different stakeholders are mandated to do, have the incentives to do, and are capable of doing with respect to mitigating the emissions that cause these risks, reducing the severity of the impacts, building resilience to these risks, or diversifying risk can facilitate strategic discussions within and among these institutions and their stakeholders.

¹ "A vulnerability is defined in the framework as a property of the financial system that: (i) reflects the accumulation of imbalances; (ii) may increase the likelihood of a shock; and (iii) when acted upon by a shock, may lead to systemic disruption." from "Assessment of Climate-related Vulnerabilities: Analytical framework and toolkit", Financial Stability Board, 16 January 2025, <https://www.fsb.org/uploads/P160125.pdf>



Planetary Risks

Planetary risks encompass the broad, systemic changes to Earth's ecosystems and human societies resulting from climate change, and their physical impacts on people, biodiversity, and ecosystems.

Scope:

- Planetary risks are both acute, including severe weather risks that cause serious and sudden damage to ecosystems and infrastructure, and chronic risks that can compound over time.

Such risks include:

- Rainforest and wetland wildfires
- Droughts affecting rivers & watersheds
- Cyclones and hurricanes
- Floods
- Sea level rise
- Biodiversity loss
- Melting ice sheets
- Heat waves
- Increased mortality rates
- Human migration
- Loss of livelihoods

Timeframe: Immediate and ongoing, with potential irreversible tipping points

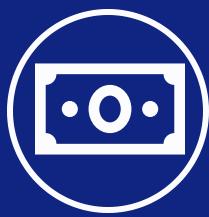
Responsibility:² Primarily concerns policymakers, national and subnational governments, and global institutions such as the United Nations Framework Convention on Climate Change (UNFCCC)

Response strategies:³

- Negotiation and adoption of international, regional, and sectoral agreements and strategies to decarbonize the global economy by mid-century
- Domestic public-sector led sectoral transitions (energy, industry, transport, etc.) at federal, state, and municipal levels
- Public investments in, and regulatory mandates related to, resilience and adaptation

² | We use "responsibility" here to mean stakeholders who have the responsibility, by institutional or organizational mandate, to understand and either respond to or manage the outlined risks. This does not include stakeholders who are impacted, which would be a wider set of constituents, including the public.

³ | What we mean by 'response strategies' is what we might expect responses to identified risks to be, based on the relevant stakeholders who bear responsibility and interest in understanding these risks. Response strategies can have a variety of impacts, including: mitigating the emissions that cause these risks, reducing the severity of impacts, building resilience to these risks, or diversifying risk.



Economic Risks

Economic risks relate to the costs of physical impacts of climate change on public and private assets that destroy or devalue those assets; to societal costs associated with physical impacts, such as the cost implications of migration; and to economic costs of the energy transition, such as displaced livelihoods. Economic risks are a subset of planetary risks, as not all planetary impacts will result in devalued assets.

Scope:

- Costs associated with loss and damage from extreme weather events
- Economic instability and disruptions
- Transition risks (economic consequences of policies, technological advancements, or shifting societal preferences)

Timeframe: Short to medium-term, with increasing severity over time

Responsibility: National and regional governments, macroeconomic supervisors (e.g., central banks), insurance and reinsurance companies, and public fund administrators (federal, state, or local agencies which manage a relevant public budget)

Stakeholder-specific response strategies:

- Insurance companies: Development of insurance mechanisms against economic losses; account for risks with premium adjustments and decreasing insurable properties and/or types of risks
- Central banks: Stress-tests for banks and other prudential measures to anticipate impacts to labor markets, price stability, and broader macroeconomic stability
- Public fund administrators: Adaptation strategies to decrease vulnerability to damages (i.e. incentivizing flood defenses, wildfire resistant buildings), disaster preparedness, and resources/strategies for covering losses and damages



Financial Market Risks

Financial risks pertain to fluctuations in financial asset and portfolio valuation in response to the planetary and economic impacts of climate change, as well as the effects of the transition and other societal responses. Financial market risks are a subset of economic costs, as financial markets are not (directly or otherwise) exposed to all economic costs.

Scope:

- Asset value fluctuations / increased volatility
- Increased unpredictability / black swan-type events
- Changes to capital market assumptions
- Damage to real assets
- Creation of stranded assets
- Increased credit default risk
- Fire sales of climate-exposed assets
- Litigation and legal liability risks

Timeframe: Variable, from near-term to long-term, depending on the manifestation of physical and economic impacts and the corresponding transmission to financial markets

Responsibility: Individual corporate entities, banks, investors, other financial institutions, and financial stability regulators (e.g. Financial Stability Board)

Response strategies:

- Corporate investments in adaptation
- Hedging strategies
- Climate risk-adjusted investment decisions
- Climate integration into strategic asset allocation
- Policy or corporate engagement to reduce risks
- Creation of regulatory and supervisory frameworks for managing climate-related financial risks (e.g. climate stress-testing)

Challenges of Conflation

Disaggregating the types of risks, understanding that financial risks are a subset of economic risks and economic risks are a subset of planetary risks, and clarifying which actors have responsibilities for addressing each type of risk and by what means, allows for a more nuanced and comprehensive response to the complex challenges posed by global climate change. By understanding these distinct yet interconnected risk categories, stakeholders can develop more effective, targeted strategies to address climate change impacts.

"Understanding what different stakeholders are mandated to do, have the incentives to do, and are capable of doing with respect to mitigating the emissions that cause these risks, reducing the severity of the impacts, building resilience to these risks, or diversifying risk can facilitate strategic discussions within and among these institutions and their stakeholders."

Importantly, conflating different risk categories, the responsible actors and their mandates, and associated response strategies can lead to:

- Confusion over appropriate data sources, risk assessment tools, and expected or appropriate responses from specific actors or institutions
- Ineffective or sub-optimal resource allocation or tools/policies/strategies, among institutions and advocates, and missed opportunities for more targeted interventions
- Lack of clear responsibility and accountability among different levels of government and sectors, as well as reduced effectiveness of climate services due to unclear stakeholder roles and responsibilities
- Exacerbated coordination challenges among diverse public and private stakeholders
- Inaccurate risk assessments and modeling, including potential overreliance on certain models or data sources, leading to blind spots in risk analysis, and difficulty in integrating diverse data sets and methodologies required for different risk types
- Unintentionally exacerbating planetary risks by disincentivizing investment in regions of particularly high risk or vulnerability

Clear delineation of risk types, stakeholder responsibilities, and appropriate toolkits, will lead to more effective climate change adaptation and mitigation response strategies, including more tailored risk management tools, climate advocacy campaigns, and public-private coordination around shared or complementary planetary or economic objectives.



ABOUT THE AUTHORS

Lisa Sachs is the Director of the Columbia Center on Sustainable Investment.

Denise Hearn is a Resident Senior Fellow at CCSI.

Matt Goldklang is a Climate Scientist and Climate Advisor at Man Group.

Perrine Toledano is Director of Research and Policy at CCSI.

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ABOUT THE COLUMBIA CENTER ON SUSTAINABLE INVESTMENT

The Columbia Center on Sustainable Investment, a joint Center of Columbia Law School and Columbia Climate School, is an applied research center that works to develop critical understanding, practical approaches, and governance tools for governments, investors, communities, and other stakeholders to maximize the benefits and minimize the potential harms of international investment for sustainable development.

