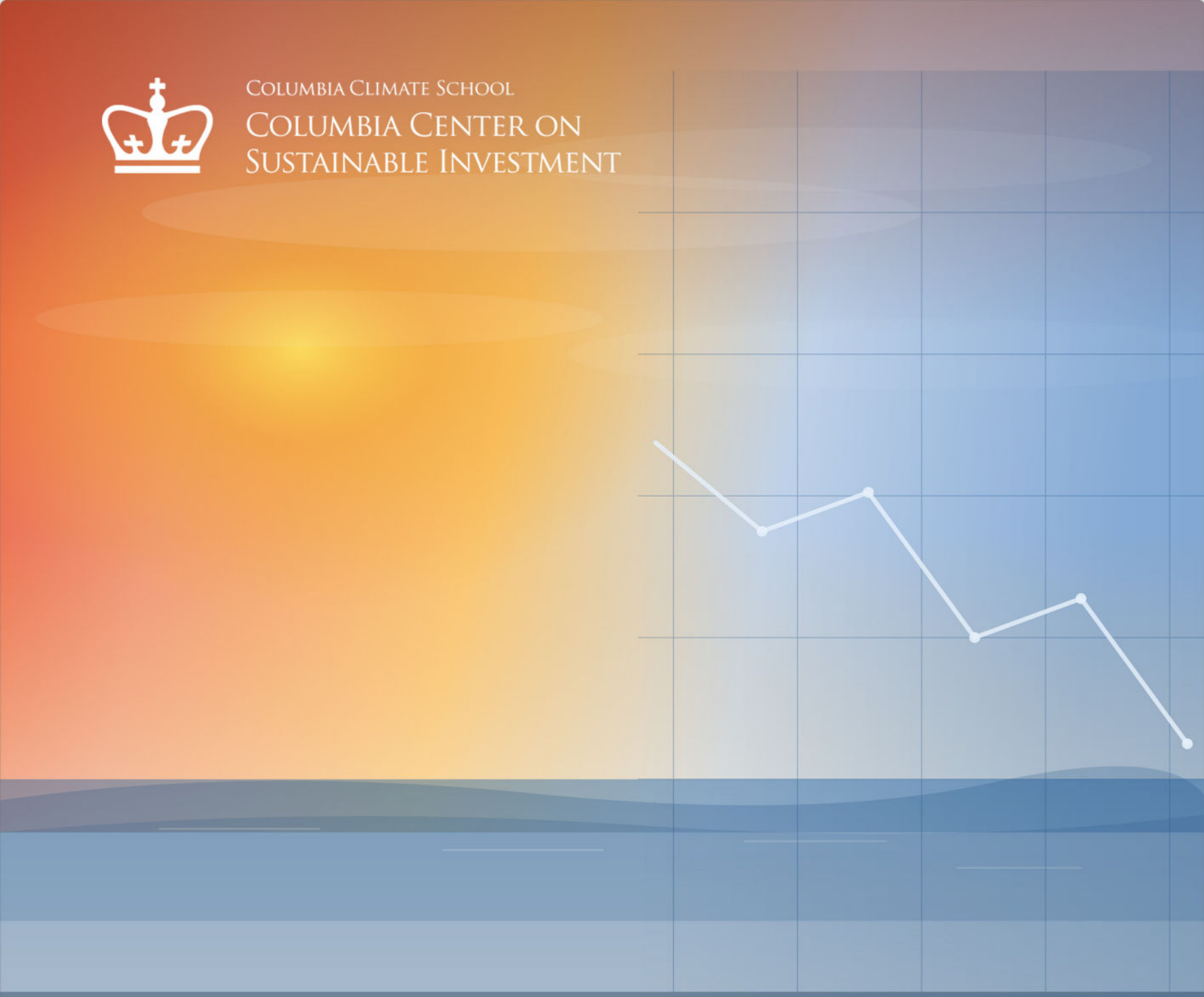

Columbia Climate School
Columbia Center on Sustainable Investment

From planetary hazard to financial stability

Disentangling climate risk and institutional responsibility

Lisa Sachs

with Danielle Fujimoto and Quentin Harel

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Executive Summary

Contemporary climate policy, finance, and governance discourse routinely collapses profoundly different categories of climate risk into a single notion of "climate risk," blurring the institutional mandates, tools, and authorities attached to each. This conflation produces real consequences:

- Institutions are pressed to deliver outcomes they do not control;
- Tools are deployed for purposes they were not designed to serve;
- Accountability becomes diffuse;
- Trade-offs multiply and go unmanaged;
- Prudential and technical functions become politicized; and
- Critical responses are crowded out by misplaced expectations.

Conflating distinct risks, responses, and mandates weakens both the management of growing climate risk and the financing of decarbonization, and leaves trade-offs to accumulate rather than be deliberately managed. It also leaves advocates and institutions talking past each other: advocates frustrated that institutions appear not to act, institutions frustrated by expectations misaligned with their mandates.

This paper responds by providing analytical clarity across three dimensions:

1. Three distinct types of climate-related risk;
2. Six distinct types of response required to address those risks; and
3. The distinct institutional mandates, tools, and authorities through which those responses must be delivered.

Getting each of these distinctions right is the precondition for coherent climate governance.

1. Three types of climate-related risk

Climate change generates three distinct categories of risk that must not be conflated.

Planetary risk is the physical hazard itself, including rising temperatures, sea levels, and extreme weather events, and the full range of human and ecological harm they cause, much of which will never appear in any economic or financial measure.

Economic risk is the subset of physical and transition impacts that reduce output, livelihoods, infrastructure, and public budgets.

Financial risk is the further subset that impairs credit quality, portfolio values, and balance sheets, and in severe cases threatens financial system stability.

Each category is real and important; each demands different responses from different institutions. Conflating them produces misplaced expectations, unmanaged vulnerabilities and trade-offs, accumulating liabilities, and perverse outcomes.

2. Six distinct responses

Six distinct responses address climate-related risk, each targeting a different layer of the problem:

- **Mitigation** reduces the underlying planetary hazard by decarbonizing energy, land-use, and industrial systems. Only this response reduces the scale of risk that all others must manage.
- **Resilience** reduces economic and social vulnerability to physical climate impacts through infrastructure, ecosystems, land-use planning, and social protection.
- **Risk sharing** absorbs and allocates financial losses once climate impacts occur, through insurance, reinsurance, capital markets, fiscal transfers, and public guarantee mechanisms.
- **Fiscal resilience** preserves governments' capacity to finance disaster response, reconstruction, and stabilization as climate costs compound over time.
- **Exposure management** limits foreseeable financial losses by adjusting underwriting standards, credit assessments, and portfolio allocation, protecting individual institutions, though often shifting burden elsewhere.
- **Financial system stability** prevents correlated failures and sustains credit flows and financial intermediation as climate-related shocks propagate through the economy.

The responses are interdependent in a hierarchical cascade. Mitigation, by reducing the scale of physical hazard, determines the trajectory of the other five responses that manage its consequences. Adequate resilience investment reduces the losses that risk-sharing mechanisms must absorb. Effective private risk sharing limits the contingent liabilities borne by individuals and public authorities. Fiscal resilience is the precondition for all downstream public responses. The financial system is exposed to residual losses that are not reduced, absorbed, or covered by those interventions.

3. Distinct institutional mandates

The paper examines six institutional actors, identifying their mandates and the tools and instruments they deploy:

- Banks
- Investors
- Insurers and risk-sharing mechanisms
- Central banks, in their macroeconomic role
- Supervisors
- Governments' fiscal authorities

The paper's argument is that climate advocacy and standard-setting frameworks have placed expectations on many institutions that exceed what their mandates and instruments can deliver, while institutions with the mandates and tools to advance societal objectives often lack the focus or capacity to deploy them effectively. The paper's conclusions include a summary table mapping, for each institution, where current frameworks and expectations are misaligned with what institutions are mandated and able to do, and what each can contribute to financing mitigation within its mandate.

What rational institutional behavior does and does not deliver

A recurring conflation runs through these mismatched expectations: that institutions acting rationally within their mandates will, in aggregate, produce outcomes relevant to reducing climate risk. Four distinctions clarify where this assumption breaks down, and a fifth follows from them:

Financial stability is not climate stability. Policy buffers, including insurance payouts, fiscal transfers, and central bank facilities, dampen the transmission of physical damage into financial distress. Markets can therefore appear stable while underlying risks escalate. Stable financial indicators should not be read as evidence that climate risks are low or well managed; they reflect the operation of buffers that are limited in scope, impact, and duration.

Risk pricing is not decarbonization. When banks raise spreads or shorten tenors in climate-exposed regions, and when investors reduce exposure to transition-sensitive assets, they are acting rationally within their mandates. These actions protect individual balance sheets; they do not reduce emissions or expand the set of financeable transition investments. Recognizing this is not a criticism; it clarifies where the remaining work lies.

Portfolio alignment is not real-economy decarbonization. Aligning a portfolio with modeled decarbonization pathways does not reduce fossil fuel demand or alter real-economy emissions trajectories. Frameworks that treat balance-sheet alignment as a primary mitigation mechanism mislocate both the leverage and the accountability for transition outcomes.

Disclosure is not capital reallocation. Disclosure may reduce information asymmetries but does not change behavior without the incentives or regulatory signals that disclosure alone cannot create. Frameworks that layer risk management, impact accountability, and capital reorientation into a single disclosure architecture impose substantial compliance burdens without delivering measurable benefit on any of those objectives.

Prudent exposure management can generate perverse climate outcomes. When banks raise the cost of credit or shorten loan tenors in climate-exposed regions, when insurers withdraw from high-risk areas, and when investors reduce exposure to transition-sensitive sectors, they are acting rationally within their mandates. Their cumulative effect is to concentrate financial stress in precisely the regions where mitigation and adaptation needs are most acute, shifting risk to less regulated parts of the financial system or to public balance sheets. Prudential risk management was never designed to address these tensions and trade-offs.

This paper's primary concern is that confused expectations and conflated mandates have delayed and distracted from global decarbonization, the only response that reduces the underlying hazard. Because every other response operates downstream of that hazard, the slower the transition, the greater the burden on each of them, and that burden is already accumulating. As individual institutions respond rationally to rising climate risks within their mandates, their cumulative effect is to transfer an expanding set of climate costs onto public balance sheets, generating obligations and trade-offs that current frameworks are neither designed to anticipate nor able to manage.

Reducing the underlying hazard and managing its downstream consequences coherently depends on aligning institutional mandates, tools, and objectives, across both public and private institutions, with the specific risks each is positioned to address. Analytical clarity also allows attention and resources to be directed toward the levers, public and private, that determine whether the transition is financeable, and toward the public institutions whose decisions determine how the risks and impacts of climate change, including tensions and trade-offs, are managed.

I. Introduction: the multi-layered conflation of climate risks

Climate change gives rise not to a single, undifferentiated 'climate risk,' but to a cascade of interconnected yet distinct risks. These risks are interrelated and all are important to understand and manage. Yet contemporary climate debates routinely collapse distinct categories of risk, and blur the institutional mandates attached to them, into a single notion of "climate risk." As a result, institutions are often expected to deliver outcomes they do not control, tools are deployed for purposes they were not designed to serve, and difficult trade-offs are displaced rather than confronted. The consequence is not only conceptual confusion but incoherent governance, perverse incentives, and unmanaged vulnerabilities.

Physical risks originate in planetary systems, as climate change alters temperatures, precipitation, sea levels, and ecosystems. These changes may propagate into economic and social systems, generating impacts on productivity, livelihoods, infrastructure, public budgets, and distributional outcomes. Only a subset of those economic effects, in turn, transmit into financial risk, impairing asset values, credit quality, liquidity conditions, and balance sheets.

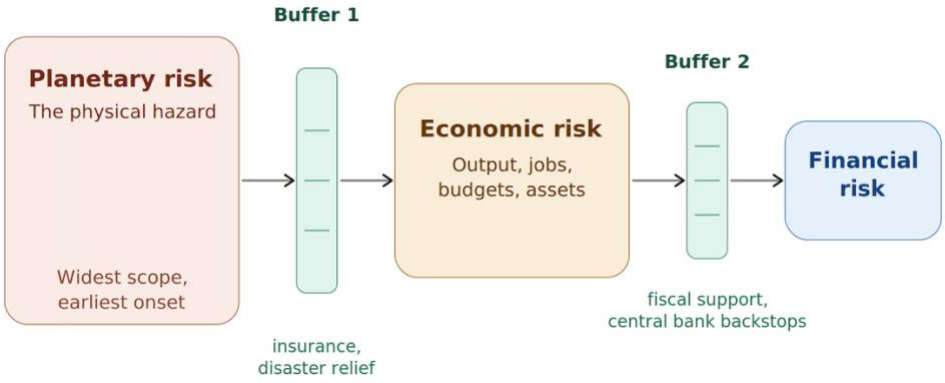

Figure 1. Three kinds of climate-related risk and the buffers that mediate transmission. Climate-related harms propagate from planetary hazards to economic impacts and, in some cases, to financial losses. Policy buffers, including insurance, fiscal transfers, and central bank interventions, shape how and when risks transmit across layers.

Policy, technological, and market adjustments undertaken in response to climate change generate transition risks, which similarly propagate through economic systems, via changes in regulation, demand, technology costs, and sectoral competitiveness, and transmit into financial risk when those economic effects impair asset values, earnings, credit quality, or liquidity.

Transmission from physical to economic to financial risk is neither automatic nor proportional. Policy buffers, adaptation investments, insurance and redistribution mechanisms, fiscal transfers, market expectations, and regulatory interventions actively shape how, when, and whether planetary shocks become economic losses and when those affect financial markets.

Financial stability can coexist with rising physical losses and unresolved transition conflict. Before climate risks have begun causing widespread losses, market stability may reflect that financial risk is low, that buffers are absorbing transmission, or that markets are not yet pricing risks that will later materialize. As physical losses accumulate and damage becomes undeniable, the third explanation recedes but buffering and redistribution mechanisms continue to operate and can substantially attenuate how that damage transmits into financial instability. This paper discusses those buffering mechanisms because conflating their operation with the resolution of underlying climate risk is consequential at any stage.

Planetary, economic, and financial risks engage different institutional mandates. Some actors are tasked with mitigating planetary risk; others with reducing economic exposure and vulnerability; others with stabilizing households and public budgets; and others with managing material financial risks. Each response relies on different institutions, tools, legal authorities, and political constraints. Some aim to prevent harm; others to buffer or redistribute it; others to preserve the soundness of individual institutions; and others to safeguard financial system stability. These objectives may be complementary, in tension, or mutually constraining.

When planetary, economic, and financial risks are conflated, so too are institutional mandates and capabilities. This conflation presses institutions to act beyond their authority, misallocates public resources, diffuses accountability, and obscures difficult trade-offs rather than allowing them to be deliberately managed.

The confusion has also shaped the development of analytical tools. Stress tests, risk models, and disclosure frameworks are misaligned with the mandate-specific decisions they are meant to inform: decades-long scenarios for financial institutions whose capital planning operates over shorter horizons; aggregated climate metrics for investors making asset-level allocation decisions; and macro-climate projections for treasuries that do not map onto concrete fiscal instruments. The result is weaker risk management and weaker capital mobilization.

The need for clearer distinctions extends to the broader ecosystem of NGOs, academics, and quasi-standard-setting bodies that shape norms and expectations in climate finance. These actors have elevated climate within financial markets through frameworks, targets, metrics, and disclosure initiatives. Yet many initiatives layer distinct objectives, including risk management, capital mobilization, mitigation, and resilience, within single architectures, asking institutions to deliver outcomes beyond their mandates or practical capacity. When objectives are conflated in this way, expectations become misaligned and attention shifts away from the structural determinants of decarbonization and resilience. Without greater clarity about which institutions can influence which outcomes, time, political capital, and financial resources are diverted toward approaches that cannot deliver their intended results.

This paper responds to that misalignment by disentangling risk categories, institutional mandates, and response types. Rather than treating ‘climate risk’ as a singular phenomenon, it examines how different categories of risk interact with institutional incentives, legal authorities, and practical constraints, and how institutions respond in practice. To clarify these distinctions, it differentiates among six distinct responses to climate-related risk (see II), each involving distinct institutions, instruments, and time horizons. The paper argues that effective climate governance depends on aligning each objective with the instruments capable of delivering it. By clarifying these distinctions, it aims to support more coherent policy design and institutional practice across prudential supervision, fiscal policy, insurance, capital allocation, and public investment, and to bring trade-offs and unintended consequences into view so they can be managed deliberately rather than obscured.

II. Six Distinct Responses to Climate-Related Risk

Climate-related risk does not transmit mechanically from planetary systems to economic outcomes and financial instability. Between each layer, policy responses, market mechanisms, and institutional buffers intervene to dampen, redirect, or absorb the propagation of harm. The six response types identified below are organized around this transmission logic: they are ordered from addressing the hazard at its source through to managing its consequences at successive layers of the economic and financial system. They operate through different combinations of private markets and public institutions, engage different legal authorities and fiscal capacities, and rely on distinct instruments and time horizons. Section III examines the specific institutional mandates through which these responses are pursued, the tools available to each institution, and the mismatches between expectations and authority that generate trade-offs and governance failures.

Of the six response types, only mitigation reduces underlying planetary risk and limits the scale of future economic and financial disruption. The remaining five operate downstream of the hazard itself, intervening at successive points in the transmission cascade to shape how planetary risk propagates into economic, fiscal, and financial consequences. The pace of mitigation therefore shapes the magnitude of the risks, fiscal burdens, and financial trade-offs that other institutions must manage. Understanding this structural linkage allows each institution to pursue its mandate with greater realism about how mitigation, resilience, and financial stability are interconnected over time.

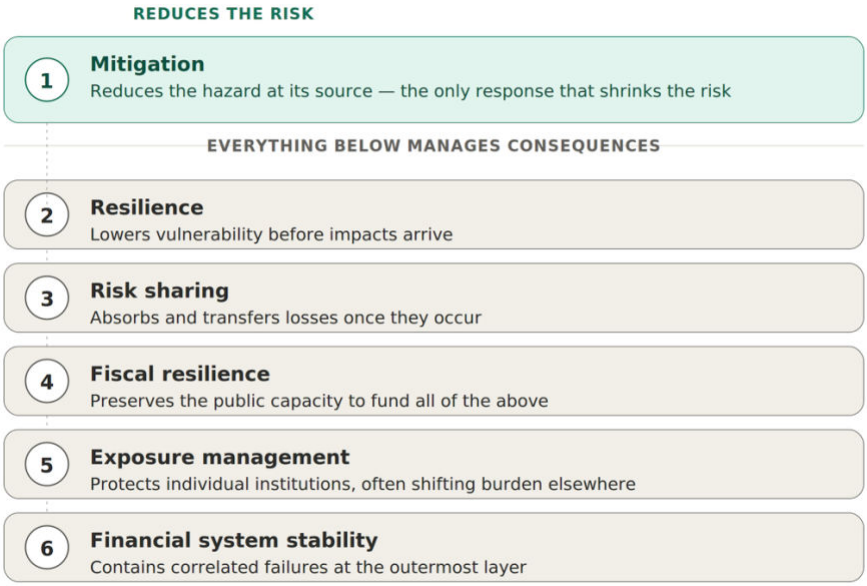

Figure 2. Six distinct responses to climate-related risk. Mitigation reduces the underlying planetary hazard; the remaining responses intervene downstream to reduce vulnerability, absorb losses, preserve fiscal capacity, manage institutional exposure, or maintain financial system stability.

1. Mitigating the underlying planetary risk

Mitigation reduces the underlying planetary hazard, before any potential transmission into economic and financial systems. Delayed mitigation compounds physical, economic, fiscal, and financial risks, increasing the magnitude of losses, fiscal burdens, and financial trade-offs that downstream institutions must manage, while narrowing the time available to do so and foreclosing options that cannot be recovered.

The imperative for mitigation extends beyond the economic and financial risks that are the focus of this paper. Many of the most severe consequences of climate change — biodiversity loss, ecosystem collapse, forced displacement, loss of territory and sovereignty, and the destruction of landscapes, cultures, and ways of life — do not translate into measurable economic losses or financial instability, yet are profoundly damaging to people, communities, and the natural world. Many of these impacts are irreversible: species lost, ecosystems destroyed, and communities displaced cannot be restored. Many impacts and losses cannot be avoided through resilience or adaptation measures, however well designed, and for others, there are physical and social thresholds beyond which adaptation is no longer possible. These considerations reinforce the primacy of mitigation independently of its economic and financial consequences.

Reducing emissions requires deep decarbonization of energy, land-use, and industrial systems. The pathways for achieving this are known: they require systems planning across interconnected sectors; coordinated action across the diverse ecosystem of public and private actors who shape investment, demand, and technology deployment; and the development and deployment of technological and infrastructural solutions at scale, designed from the outset to be financeable. The challenge is not a shortage of technology or known approaches, but ensuring that the specific structural and market barriers that prevent financeable investments from clearing institutional thresholds are identified and addressed, whether through standards, procurement, mandates, market design, guarantees, or other instruments that public and private actors can deploy within their existing authorities. While governments hold the unique mandate to define decarbonization pathways and ensure that the conditions necessary to achieve them are in place, the systems themselves are shaped in a variety of ways by the interplay of public and private actors and institutions.

2. Building resilience to physical and economic impacts

Resilience intervenes in the transmission from planetary damage to economic loss. It encompasses the measures through which societies, economies, and ecosystems reduce their exposure and vulnerability to physical climate impacts, lowering the damage that occurs when those impacts arrive. But resilience is not a single thing: the investments that build it differ enormously in who delivers them, who benefits, what they cost, and how they relate to markets. These differences matter fundamentally for how resilience policy is designed and financed.

Ecosystem and landscape resilience — mangrove restoration, wetland protection, watershed management, natural flood defenses and other landscape resilience investments reduce exposure at a societal level by preserving the ecological systems that buffer physical impacts. These investments generate broad public benefits, cannot easily be monetized, and will be systematically under-provided by markets. They require public investment, regulatory protection, and coordination across governments. They also tend to generate co-benefits for biodiversity, water quality, and local livelihoods that extend well beyond climate resilience. In limited cases, where private actors can capture sufficient returns (e.g. resort operators restoring reefs, developers investing in urban cooling, timber interests maintaining firebreaks), private investment does occur, but its distribution tracks revenue potential rather than aggregate vulnerability.

Built infrastructure — sea walls, flood defenses, drainage systems, climate-proofed transport and energy networks similarly generate broad public benefits that markets will not reliably produce. Where user fees or contracted revenues make projects financeable, private capital may contribute; where benefits are diffuse or users cannot pay, public financing is indispensable. Electricity transmission infrastructure illustrates the point: its climate resilience value is inseparable from broader public and economic functions, requiring coordinated planning and long-horizon public investment.

Agricultural and ecological adaptation — drought-resistant seeds, heat-tolerant crops, and ecosystem-based approaches to soil and water management occupy more mixed territory. Some innovations have commercial value and can attract private investment; others, particularly those needed by smallholder farmers in vulnerable regions, require public support or concessional finance to reach those who need them most. Without deliberate policy design, the benefits of agricultural adaptation tend to flow to those with the resources to access new technologies, not to those most exposed to climate risk.

Private and corporate resilience investment — facility hardening, supply chain diversification, operational adjustments are driven by firms and households responding to their own exposure. These measures reduce vulnerability at the entity level rather than the societal level. Private investment in deeper wells and groundwater storage illustrates the ambiguity: it secures water access for individual households or operations during drought and is a rational response to rising water stress, but accelerates aquifer depletion and concentrates remaining supply among those with the capital to drill deeper. Not all private resilience investment reduces aggregate vulnerability; some merely shifts exposure elsewhere or locks in resource-use patterns that compound long-term risk.

Social protection and community resilience — early warning systems, emergency preparedness, income support, and healthcare capacity reduce the human and economic costs of climate impacts across society, and matters most for populations with the least capacity to protect themselves privately. These are largely public goods whose adequacy depends directly on fiscal capacity and political will.

These categories differ not only in their logic, but in who bears the costs and who receives the benefits. Some resilience investments, such as public infrastructure, ecosystem restoration, social protection, benefit broad populations and reduce systemic vulnerability. Others, such as climate-controlled properties, storm shutters, and home generators primarily benefit those with the resources to access them. Some involve hard trade-offs: managed retreat from vulnerable areas reduces aggregate exposure but imposes concentrated costs on affected communities. Investments in nature-based solutions can stabilize watersheds and protect entire regions, but may also require changes in existing land uses. These are political choices, informed by technical analysis, and they cannot be resolved through financial engineering alone.

Resilience is also closely linked to the other response types. By reducing the economic losses that physical impacts generate, it reduces the demands placed on insurance markets, public guarantees and disaster recovery outlays, and financial system stabilization tools. Where resilience investment is inadequate, preventable losses cascade into insurance claims, fiscal expenditures, and in severe cases financial instability. And the scale of resilience investment required depends directly on the pace of mitigation: the slower the transition, the greater the physical impacts, and the greater the resilience needs that follow.

3. Absorbing and transferring financial losses

Risk sharing intervenes in the transmission from economic loss to household, firm, and public financial distress, allocating and absorbing the financial consequences of climate impacts by pooling, transferring, and managing losses once they occur. Like resilience, risk sharing is not a single thing: it encompasses a wide range of mechanisms that differ fundamentally in their institutional logic, scale, beneficiaries, and distributional consequences — and these differences matter for how risk-sharing policy is designed and evaluated.

Capital market risk transfer: including catastrophe bonds, insurance-linked securities, and other structured instruments distribute climate-related losses across global capital markets, providing liquidity and diversification for insurers and reinsurers. These instruments are sophisticated, efficient within their

domain, and largely invisible to the households and firms whose risks they ultimately underpin. They operate at the wholesale level and do not directly determine whether coverage is available or affordable at the retail level.

Private insurance and reinsurance: private insurance and reinsurance, the primary mechanisms through which households, firms, and assets are covered against climate-related losses, pool risks across policyholders and over time, providing financial predictability and loss recovery. Private insurance is most effective where risks are diversifiable, quantifiable, and not so severe or correlated that they exceed the capacity of the private market to absorb them. As climate impacts intensify, private insurers face increasing pressure on these conditions: risks become more correlated, loss distributions widen, and some areas or asset classes become difficult to insure profitably. Responses such as rising premiums, coverage exclusions, or market withdrawal are rational from an individual insurer's perspective but can reduce coverage availability precisely in the communities and regions facing the greatest climate exposure. This dynamic does not reflect failure or bad faith on the part of insurers; it reflects the structural limits of private risk pooling when the underlying risk distribution shifts. But it does mean that private insurance alone cannot guarantee universal coverage, and that its retreat has consequences that extend beyond the insurance market itself into mortgage markets, residual markets, property valuations, the fiscal base of exposed municipalities.

Public insurance, guarantee, and reinsurance mechanisms: public programs like national flood insurance programs, export credit agencies, public reinsurance facilities, and sovereign parametric instruments operate with a different logic. They extend coverage where private markets cannot or will not operate, absorb tail risks beyond private capacity, and preserve access for populations that would otherwise be uninsured. Their reach is itself bounded by fiscal capacity and the political legitimacy for redistribution. Public mechanisms involve explicit fiscal commitments and distributional choices: decisions about who is covered, at what premium, and on what terms are inherently political. Subsidized programs can preserve affordability and access, but they can also reduce incentives for resilience investment, discourage relocation from areas that are fiscally or environmentally unsustainable to insure, and divert attention from the underlying risk drivers that determine whether risks remain insurable over time. These trade-offs must be made deliberately and transparently rather than obscured within program design.

Fiscal transfers and disaster relief: transfers and disaster relief, through which governments redistribute losses across the population and over time following climate events, represent the most socialized form of risk sharing, with the broadest coverage and the most direct link to sovereign fiscal capacity. They provide a backstop where all other mechanisms have been exhausted or were never in place, but their availability depends on the fiscal space governments have preserved and the political legitimacy for redistribution that exists at the time of a crisis.

These mechanisms are interdependent in ways that matter for policy design. Private insurance retreat increases demand on public insurance mechanisms and fiscal transfers. Inadequate resilience investment (building resilience to physical and economic impacts) increases the losses that all risk-sharing mechanisms must absorb. And the cumulative adequacy of risk-sharing mechanisms shapes the demands placed on sovereign fiscal resilience and financial system stability — when losses exceed what private and public risk-sharing can absorb, the consequences propagate into public balance sheets and, in severe cases, into the stability of the financial system itself. Treating insurance as a single, undifferentiated category obscures these interdependencies and the very different policy choices they require.

4. Managing institutional exposure to material financial risks

Exposure management intervenes in the transmission from economic stress to individual institutional loss, as banks, investors, and insurers limit or avoid foreseeable, material losses arising from physical risks (e.g. asset damage, supply disruption) and transition risks (e.g. policy change, technology substitution, demand shifts). Institutions pursue this response through underwriting standards, pricing, credit assessments, and portfolio allocation, including adjustments in geographic or sectoral exposures and refined risk-selection practices.

Critically, the consequences of individual exposure management for others — for borrowers, communities, and the broader economy — are not fixed. They depend on a combination of institutional incentives, mandates, market structure, and the availability of complementary policy tools, and they can run in three directions.

In some cases, exposure management has no material effect on others. An institution that diversifies its portfolio across geographies or sectors, or that prices risk more accurately without changing the availability of credit, manages its own exposure without shifting burden elsewhere. The effect is largely contained within the institution's own balance sheet.

In a narrow but important set of cases, exposure management can generate positive effects beyond the institution itself. Where an insurer or lender uses its market position to incentivize resilience investment, through premium credits for flood-proofing, preferential pricing for climate-adapted assets, or covenant structures that require borrowers to manage physical risks, it can reduce underlying vulnerability as well as its own exposure. This effect is most powerful where the institution has significant market presence and where the resilience measures it incentivizes generate genuine reductions in loss, rather than merely transferring risk. These cases are real but relatively narrow: they require that the institution has both the incentive and the market position to make resilience investment financially attractive to counterparties, and that the underlying resilience measures are effective.

In many cases, however, individual exposure management shifts risk onto others. When banks raise the cost of credit or shorten loan tenors in climate-exposed regions, when insurers withdraw coverage from high-risk areas, or when investors divest from transition-exposed sectors, they protect their own balance sheets while increasing the financial burden on the households, firms, and communities that remain. This may reflect entirely rational responses to material risk within the institution's mandate, but the aggregate effect of many institutions managing their own exposures simultaneously can concentrate financial stress precisely where climate impacts and transition pressures are most acute. This dynamic is compounded by credit substitution: when regulated institutions withdraw from or reprice exposures, borrowers can substitute with private credit funds, non-bank intermediaries, or institutions from other jurisdictions facing lesser regulatory pressure. The result is not a reduction in aggregate financial exposure to climate-related risk but its migration to less regulated, less transparent parts of the financial system with potential financial stability implications that microprudential risk management was never designed to address. These systemic consequences are addressed under maintaining financial system stability, but they originate in the accumulated effect of individually rational exposure management decisions.

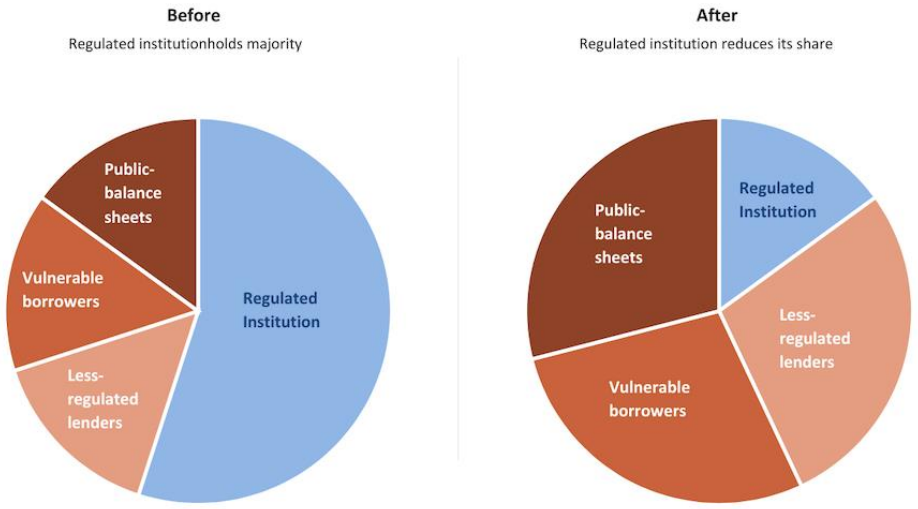

Figure 3. Exposure management can redistribute rather than reduce risk. When regulated institutions reduce climate exposure, aggregate risk may migrate toward less-regulated lenders, vulnerable borrowers, or public balance sheets rather than disappear.

Which outcome prevails is not determined by the risk management decision alone. It depends on institutional incentives, supervisory mandates, the availability of complementary public instruments, and market structure, which is why exposure management cannot be evaluated in isolation from the broader policy environment. The same risk management tool can produce very different aggregate outcomes depending on whether complementary public instruments are in place to address the underlying vulnerabilities that individual institutions are managing away from.

It is also important to distinguish between risk pricing and financial structuring within this response type. Pricing climate-related risk through spreads, maturities, or underwriting standards protects individual balance sheets but does not expand the set of financeable mitigation or resilience investments and may tighten financing conditions precisely where such investments are most needed. This reflects a structural feature of risk assessment: it directs an institution to manage its own exposure to climate-related loss, which is a different decision from financing the mitigation or resilience that would reduce the underlying risk.

Financial structuring, through guarantees, aggregation mechanisms, revenue stabilization tools, or tailored project finance structures, operates differently: it can help investments cross financeability thresholds by addressing discrete bottlenecks, once underlying policy and technological conditions are sufficiently credible. For instance, stacked guarantee structures have enabled renewable energy investment to clear sovereign and offtake risk thresholds in emerging markets, and aggregation and property-linked financing have made fragmented building retrofit programs bankable. Conflating risk pricing and de-risking projects obscures what institutional risk management can and cannot achieve.

5. Preserving fiscal resilience

Unlike private risk-sharing mechanisms that absorb discrete losses, fiscal resilience is concerned with sustaining governments' capacity to finance disaster response, reconstruction, social protection, insurance backstops, and resilience investments as climate impacts accumulate over time, expenditure demands compound, and fiscal space is progressively strained.

Fiscal resilience is a precondition for the functioning of other response types. Governments that lose fiscal space (or have limited fiscal space to begin with) lose the ability to buffer economic shocks, sustain the public investments that resilience requires, backstop private risk-sharing mechanisms when they retreat, and provide the stabilization mechanisms that financial system functioning depends on. The interdependencies run in both directions: adequate resilience investment reduces the fiscal costs of disaster response; effective private risk sharing limits the contingent liabilities governments must absorb when private insurance retreats; and the pace of mitigation determines the trajectory and scale of future fiscal obligations.

Preserving fiscal resilience therefore requires deliberate choices about the allocation of public resources across mitigation, resilience, recovery, and stabilization. Those choices involve inherent trade-offs across generations, income groups, and policy domains.

6. Maintaining financial system stability

Financial system stability intervenes at the outermost layer of the transmission cascade, preserving the aggregate functioning of credit markets, payment systems, and financial intermediation as climate-related shocks propagate through the economy. This objective is distinct from the prudential management of individual institutions' exposures and from the absorption of discrete losses through risk-sharing mechanisms. It is concerned with preventing correlated failures, systemic contagion, and breakdowns in financial intermediation that would amplify climate-related economic disruption into broader crises.

Macroprudential authorities and central banks pursue this objective through instruments that address systemic risk both before shocks materialize and in response to them once they occur. These tools cannot alter the underlying hazard or reduce real-economy vulnerability. Financial system stability therefore depends upstream on the effectiveness of mitigation, resilience investment, private risk sharing, and fiscal resilience; each of these response types reduces the scale and correlation of shocks that financial system stabilization tools must absorb.

These six response types engage different combinations of public authority, fiscal capacity, market mechanisms, and institutional mandates. Actors with regulatory and fiscal powers are uniquely positioned to reshape exposure and enable collective responses at economy-wide scale, while financial institutions are primarily confined to pricing, allocating, or redistributing risk within, rather than restructuring, the existing system. When these distinctions are obscured, for instance when financial institutions are expected to deliver mitigation outcomes, or when risk management tools are treated as substitutes for resilience investment or fiscal policy, objectives become misaligned with instruments, accountability becomes diffuse, and difficult trade-offs are displaced rather than confronted. Section III examines how specific institutions engage with these six response types, what mandates and tools they possess, and where rational response by different institutions generate trade-offs that require political choices and management.

III. Why analytical clarity matters for different policy objectives and institutional mandates

Different institutions engage with climate-related risk in fundamentally different ways: they operate under distinct legal mandates, deploy distinct instruments, face distinct time horizons, and are accountable to distinct constituencies. Analytical clarity about these distinctions is essential: it allows each institution to identify what it can realistically deliver, to deploy the tools suited to its mandate, and to recognize where its actions interact with or create trade-offs for others. It also guards against a recurring pattern in climate finance discourse, in which institutions are expected to deliver outcomes that exceed their authority or that can only be achieved through instruments they do not control.

A. Banking and credit provision: managing financial exposure

Banks' primary objective with respect to climate risk is to manage material risks to credit quality, asset valuation, and balance-sheet soundness over relevant time horizons, which for most banks often extend less than a decade. Accordingly, lending decisions are based on near- and medium-term indicators of risk, return, and creditworthiness rather than on long-term climate trajectories that banks cannot reliably price or control. This shorter horizon is not an artifact of short-termism: prudential risk management focuses on the window within which material loss could occur before an institution can take corrective action by raising capital, adjusting underwriting, or reducing concentrations. For risks that materialize gradually over decades, banks can respond before solvency is threatened, which is why such risks are managed primarily through portfolio and underwriting adjustments rather than capital provisioning against distant tail events. Analytical clarity helps distinguish between long-term climate trends and the financial risk horizons that govern banks' decisions today, including the role of policy buffers that can mediate how physical and transition shocks are transmitted into credit outcomes (see Box 1).

Box 1: How policy buffers mediate the translation of planetary climate risk into economic and financial risk

Because policy buffers and institutional shock absorbers dampen, redistribute, or delay losses at each layer of transmission, physical damages, economic impacts, and financial losses can diverge substantially. The non-exhaustive examples below illustrate how that mediation operates in practice.

From physical damage to economic impact

Physical damages become economic impacts when they reduce income, consumption, output, employment, fiscal revenues, or investment. Policy mechanisms attenuate this transmission.

Insurance redistributes concentrated losses across policyholders and over time, limiting sharp declines in measured income and spending, both for firms and households.

Fiscal transfers and disaster relief spread losses nationally and, when financed through borrowing, across time, supporting continued economic activity while increasing public debt.

Income support reduces multiplier effects that would otherwise amplify physical damage into deeper recession.

These mechanisms do not eliminate physical climate risk or its physical impacts; they limit the economic impacts that would occur without such intermediation.

From economic stress to banks, investors, and financial stability

Economic damage becomes financial risk when it leads to loan defaults, declining corporate earnings, falling asset prices, or systemic financial instability. But multiple layers of buffering, at the firm, market, and public sector level, attenuate this transmission. Consider default risk for banks resulting from physical climate impacts. First, firms absorb losses through depreciation, operating income, or equity capital. Insurance and reinsurance payouts and fiscal support, including income support programs, stabilize corporate revenues. Public programs, including reconstruction spending, government guarantees, and emergency lending programs sustain employment and business revenues and moderate declines in equity valuations, often financed through sovereign borrowing.

For banks, a credit loss arises only if the borrower defaults despite all of these buffers. Often defaults are far less than the scale of physical damage alone would suggest. Banks' capital buffers then absorb the residual losses that remain. Deposit insurance prevents panic-driven bank runs and contagion. Central bank liquidity facilities provide further stabilization.

The same cascade attenuates losses for equity and debt investors: corporate earnings and asset valuations reflect post-buffer outcomes rather than gross physical damage. Market discounting provides a further, more fundamental attenuation mechanism: because investors value near-term cash flows more heavily than distant ones, even large expected future losses have limited effect on asset valuations today. This reflects standard financial logic but it means that financial markets can appear stable in the face of severe long-run climate risk without that implying the risk is absent or well managed.

Together, these institutional buffers and the dampening effect of discounting mean that the financial system is structured to absorb and contain shocks, and to reflect future risks only partially, rather than mirror the full scale of macroeconomic or physical damage.

Implications

Policy buffers are indispensable to prevent economic and financial collapse. Financial institutions anticipate these stabilization mechanisms when assessing risk, so climate-related financial risk, as assessed by banks, investors, and financial sector supervisors, reflects residual exposure after buffering, not the full scale or immediacy of physical harm. However, buffers are not inexhaustible. When fiscal space narrows, insurers reduce coverage, sovereign borrowing costs rise, or political legitimacy for redistribution erodes, the ability of these mechanisms to absorb shocks can weaken, allowing transmission to accelerate. Of course, stabilizing GDP, credit flows, or asset prices is not the same as stabilizing the climate. Financial stability can coexist with rising public debt, widening inequality, declining productivity, and irreversible ecological damage. Confusing the resilience of financial markets with resolution of climate risk delays the structural mitigation and adaptation investments that ultimately determine long-term outcomes.

As noted above, pricing climate-related risk through spreads, maturities, or underwriting standards protects balance sheets but does not expand the set of financeable mitigation investments. Indeed, credit assessments can generate trade-offs between financial risk management and broader economic or social objectives, including reduced lending or higher financing costs in climate-vulnerable regions (see Box 2). In those cases, the appropriate response is public policy focused on reducing underlying exposure by supporting adaptation or relocation, strengthening social protection, or addressing the vulnerabilities that make those regions high-risk in the first place, not expecting banks to absorb or ignore the financial risks that follow from them.

Box 2: How banks respond to borrower-level climate risk in lending

Recent empirical studies show how prudent credit risk management operates when climate exposure becomes financially material. Across contexts, three consistent responses emerge:

1. Firms operating in areas with greater physical climate exposure, including localized flood risk or higher country-level climate vulnerability, face statistically significant increases in borrowing costs.
2. Loans to climate-exposed borrowers are more likely to be secured. This reflects standard loss-given-default management: when asset damage risk rises, lenders seek additional protection.

3. In more climate-vulnerable environments, loan tenors tend to shorten. Shorter maturities reduce uncertainty and allow lenders to reprice risk more frequently.

These responses reflect prudent risk management: pricing expected loss, managing uncertainty, and preserving balance-sheet resilience. However, when applied without complementary public policy, this prudent risk management can cumulatively tighten financing conditions in precisely those regions where mitigation and adaptation needs are rising, shifting risk onto more vulnerable actors and generating broader macroeconomic and social consequences. Post-2008 prudential reforms strengthened bank capital and liquidity requirements for legitimate reasons, but pushed riskier lending, including in EMDEs, toward non-bank intermediaries that transmit shocks more volatilely. The same dynamic would narrow the pool of stable capital available for transition if prudential frameworks were applied to reduce bank exposure to transition-relevant assets. Credit risk management and climate risk mitigation operate through different institutional logics. Prudential tools are designed to manage credit risk; expecting them to also deliver climate mitigation or resilience can produce perverse consequences for both.

Banks can, however, actively contribute to making projects financeable by working with project sponsors, other financial institutions, public authorities, and development institutions to resolve frictions such as tenor mismatches, offtake uncertainty, currency exposure in EMDEs, or first-of-a-kind technology risk. As underwriters and originators, particularly in project finance, banks occupy a coordination role at the point of transaction design, where financial structure, risk allocation, and investment viability are determined. Through syndication, risk-sharing arrangements, public or multilateral guarantees, and tailored project finance structures, they can help design transactions that are financeable within prudential constraints. This origination and structuring role also provides a direct nexus for client engagement: banks are positioned to influence corporate investment decisions at the point of capital deployment and to embed climate considerations into capex planning from the outset. This role differs fundamentally from risk pricing: it enables deployment by addressing discrete financial bottlenecks rather than by incorporating long-term planetary risk into credit spreads.

B. Investing: preserving asset and portfolio value

For investors, the central mandate is to preserve and enhance asset and portfolio value by allocating capital to opportunities that meet return, risk, liquidity, and mandate constraints. Unlike banks and insurers, whose constraints are largely shaped by prudential regulation, investors' operative limits flow from their fiduciary obligation to maximize risk-adjusted returns: investment-grade requirements, liquidity thresholds, benchmark structures, and allocation mandates define what is accessible in practice, and cannot be overridden by climate commitments without breaching that obligation.

Asset managers, more specifically, can only allocate capital to assets that already exist in investable form. For managers operating in public markets, this means listed equities, issued debt, or structured instruments; for those active in private markets, where private credit and infrastructure have grown substantially as asset classes, it means assets that have been sufficiently structured and de-risked to meet institutional thresholds, even if not yet publicly listed. Where projects remain pre-commercial, are held by SMEs, or lack the structuring needed to meet those thresholds, investors across both public and private markets have no mechanism for deployment regardless of their climate commitments.

Secondary market transactions, including divestment, simply shift exposure among investors without changing underlying emissions or directing new capital to decarbonization. Assets divested by climate-conscious investors are typically acquired by others with no equivalent commitment, leaving real-economy emissions trajectories unchanged. Stewardship and engagement can contribute to decarbonization outcomes in cases in which issuers have economically viable decarbonization options that improved

governance, capital allocation, or disclosure practices can help advance, and when those business decisions serve the financial interest of the investors' asset(s).

Rigorous climate risk analysis is inherent to prudent risk management for both asset owners and managers, but investors' responding to risk analysis will not create investable pathways or shift capital at scale without complementary structural reforms that expand financeable opportunities. Indeed, like with banks, as investors integrate climate-related risk into allocation decisions, financing may become unavailable or prohibitively costly in precisely the regions and sectors where mitigation and adaptation needs are greatest. Investors' more consequential contribution is therefore to work with other actors (public, private, and institutional) to resolve the structural constraints that limit capital flows to specific regions or projects so that critical investments become financeable.

Box 3: Portfolio alignment versus real-economy decarbonization

The SBTi Financial Institutions Net-Zero Standard operationalizes a broader conceptual confusion in contemporary climate finance: it embeds decarbonization objectives within portfolio architecture and treats balance-sheet alignment as a central mechanism of mitigation, while leaving largely unaddressed the structural and sectoral conditions that determine whether real-world decarbonization occurs.

1. Conflating alignment with decarbonization

In the SBTi framework, mitigation is advanced through portfolio alignment; institutions are evaluated on the consistency of their portfolios with modeled decarbonization pathways. Financed-emissions targets, financing targets, sector benchmarks, and fossil fuel phase-down provisions are presented as core transition levers. The SBTi framing collapses the distinction between portfolio decarbonization and system decarbonization. Fossil fuel restrictions and phase-downs are treated as alignment tools, implying that reducing exposure to high-emitting activities contributes directly to structural transition. Yet reducing portfolio exposure does not necessarily reduce fossil fuel demand or alter the underlying emissions trajectory, a pattern often described as 'paper decarbonization.'

2. Structural determinants of financeability and institutional constraints

The Standard does not centrally engage the structural constraints that determine whether capital can flow at scale:

- Divergent and elevated costs of capital
- Currency risk and hard-currency borrowing in EMDEs
- Tenor mismatch between long-lived infrastructure and short-term financing
- Sovereign credit rating ceilings
- Prudential penalties on long-duration exposures

These factors shape whether projects meet institutional thresholds for financeability. Financial institutions operate within binding mandates, capital rules, fiduciary duties, benchmark structures, and risk thresholds that constrain their discretion. Portfolio targets cannot substitute for the structural determinants of financeability that must be in place for institutions to finance within their mandates. The framework assumes that portfolio decisions and engagement can steer real-economy decarbonization, yet gives limited attention to the preconditions that determine whether investment is feasible in the first place: policy credibility, revenue visibility, coordinated market design, infrastructure interdependence, and the structural barriers facing EMDEs.

3. Institutionalizing an entity-level theory of change

The Standard builds its architecture around entity-level alignment. Financial institutions are expected to align portfolios and to require portfolio companies to adopt SBTi-aligned targets. System-level decarbonization is presumed to emerge from aggregated entity-level commitments. This creates a recursive ecosystem of alignment, validation, and reporting: companies align to SBTi standards; financial institutions align portfolios to modeled pathways; institutions evaluate one another against those same benchmarks. Over time, this produces a self-

> referential system in which institutions demonstrate progress by aligning with alignment standards, and companies demonstrate progress by aligning with entity-level targets, regardless of whether the structural determinants of emissions trajectories have shifted. The result is an expanding ecosystem of target-setting and reporting that risks becoming detached from the real-world conditions that determine whether decarbonization actually occurs.

C. Insurance and risk sharing: allocating and absorbing losses

The objective of insurance and risk-sharing mechanisms is to allocate and absorb financial losses once covered events occur, stabilizing households, firms, and public budgets. Insurance can distribute losses arising from physical climate impacts, but it cannot prevent physical damage, guarantee long-term coverage in uninsurable areas, or substitute for mitigation, resilience, or land-use decisions that ultimately determine whether risks remain insurable over time. Clarity about the complementary roles and limits of private insurance markets and public insurance or guarantee mechanisms, including export credit agencies and public reinsurance facilities, is therefore essential to informed discussion of how risk sharing can and cannot contribute to climate responses.

Like banks, insurers operate over time horizons shaped by regulatory and prudential constraints rather than by underestimation of long-term risk. Within these bounds, both public and private insurers can innovate where risks remain insurable: supporting public building standards through underwriting conditions and payout requirements to build back to higher standards, developing products that improve predictability and speed of payout, and signaling risk through underwriting and pricing differentials, though such signals translate into reduced exposure only where complementary land-use, building-code, and zoning instruments allow the signal to be acted on. Where risks exceed what private markets can price and absorb, insurance retreat through rising premiums, exclusions, or market withdrawal propagates into mortgage markets, property valuations, and the fiscal base of exposed municipalities. The appropriate response is public policy that reduces underlying exposure through resilience investment and relocation support, rather than expecting insurers to underwrite uninsurable risks. Where governments instead choose to share losses ex post through public mechanisms, the fiscal consequences and policy choices embedded in those interventions must be explicit.

D. Macroeconomic authorities: monetary and financial stability

In this section, central banks are considered in their macroeconomic role, primarily the conduct of monetary policy and, where it falls within their mandate, the maintenance of monetary and financial system stability, rather than in their supervisory capacity, which is discussed below. It is important to distinguish between protecting the safety and soundness of individual institutions, which is the domain of microprudential supervision, and preserving the functioning of the financial system as a whole, which falls to central banks and, where established, dedicated macroprudential authorities. Central banks in their macroeconomic role are tasked with maintaining aggregate stability: sustaining credit flows, anchoring inflation expectations, supporting market functioning, and, where mandated, stabilizing the financial system during periods of stress.

Identifying which economic and financial risks fall within the scope of central bank mandates, and distinguishing them from broader climate dynamics outside central banks' control, strengthens monetary

and financial stability policy. It allows central banks to trace how climate impacts affect growth, inflation, employment, and credit conditions.

By clarifying these transmission channels, central banks can deploy the instruments they control, such as liquidity facilities, emergency lending, and, where mandated, macroprudential tools, to absorb shocks and stabilize the financial system. These tools operate at two stages: macroprudential instruments can lean against the build-up of systemic risks before shocks materialize, while stabilization tools manage consequences once shocks occur. Neither alters the underlying climate hazard.

Central banks' monetary and financial stability tools can cushion volatility, preserve system functioning, and prevent crisis dynamics from amplifying climate-related disruptions. They cannot determine the trajectory or scale of underlying physical risks or the pace and character of transition dynamics.

Moreover, financial stability itself is not a proxy for climate risk being well managed: it reflects the operation of buffers, redistribution mechanisms, and delayed transmission rather than the resolution of underlying risks, and can coexist with rising public debt, widening inequality, degraded ecosystems, and increasing long-term physical and transition risk. Even where central banks have secondary mandates to support broader policy objectives, as with the Bank of England and the European Central Bank, those mandates shape how existing tools are implemented rather than what those tools can independently achieve. Recent analysis from Bank of England staff illustrates this: adjustments to collateral frameworks, asset purchase programs, and lending rates each operate through channels too narrow to materially redirect investment at the scale the transition requires.

Central banks' contribution to the transition — distinct from their role in managing climate-related financial risks — is to preserve the financial system functioning and monetary stability on which fiscal commitments, industrial policies, and public investments depend. The structural link between mitigation, resilience, and long-run macroeconomic stability directs attention to the public policy and investment decisions that ultimately determine these outcomes.

E. Supervisors: ensuring prudential safety and soundness

The objective of financial supervision is to ensure the safety and soundness of regulated institutions by addressing risks that plausibly affect capital adequacy, liquidity, or earnings. In some jurisdictions, notably within the EU, central banks and supervisory authorities are permitted to support broader policy objectives, including sustainability, where consistent with their primary mandates. The paper's argument applies regardless: where supervisory tools are directed toward outcomes they were not designed to achieve, the result weakens both prudential oversight and the broader policy goals those tools are being asked to serve.

This microprudential mandate is distinct from the macroprudential task of safeguarding financial system stability at the aggregate level, even where both functions sit within the same authority. The supervisory task is to isolate the subset of physical and transition risks that plausibly transmit into capital adequacy, liquidity, or earnings. For example, supervisors may assess concentrated mortgage exposures in regions with rising flood frequency or evaluate underwriting standards in disaster-prone areas.

Clear boundaries prevent these microprudential mandates from drifting into climate mitigation or resilience objectives that supervisors are neither empowered nor equipped to deliver. Prudential tools are designed to ensure institutional robustness under stress, not to reduce underlying physical risk or to steer real-economy investment patterns. By matching supervisory tools to appropriate risk types and time horizons, clarity

strengthens prudential oversight, supports financial stability, and avoids conflating supervision with climate policy (see Box 4).

Box 4: Stress testing: prudential mandate, transition expectations, and design discipline

Climate stress testing has become a focal point in debates about finance and climate change. Climate advocates discuss stress testing as if it were a tool for accelerating the low-carbon transition. That expectation risks obscuring what stress testing can realistically achieve and what, under supervisors' statutory mandate, it should be designed to achieve.

What supervisors are mandated to assess

Under their mandate, prudential supervisors are responsible for ensuring that regulated institutions remain resilient to financially material risks. In some jurisdictions, including the European Union, central banks operate under broader institutional frameworks that allow them to support general economic policies when consistent with their primary objectives. However, even in such cases, prudential supervision itself remains anchored in financial materiality, capital adequacy, liquidity sufficiency, and institutional resilience, and cannot effectively influence the pace or structure of the energy transition. Within a supervisory mandate, a stress test is intended to assess:

- whether institutions can withstand severe but plausible shocks
- potential losses under defined macroeconomic and financial conditions
- the adequacy of capital and liquidity under stress
- concentration exposures that could amplify losses
- weaknesses in governance, data, and risk management systems

Supervisory approaches to climate risk recognize that the physical risks, transition risks and liability risks related to climate change can have financial consequences. Incorporating those channels into supervisory analysis is consistent with prudential logic when the focus remains on financial transmission mechanisms and material balance-sheet impacts.

What stress testing can and cannot deliver

The Network for Greening the Financial System (NGFS) has played an important role in strengthening understanding of how climate-related risks can affect financial institutions and systems, and in developing reference scenarios for supervisory use. In policy and advocacy discourse, however, NGFS and climate stress testing are often perceived as tools of transition. Climate advocates focus on stress testing because it forces disclosure, embeds climate risk within core financial governance, and is seen as a mechanism through which improved risk recognition will lead to repricing and capital reallocation toward lower-carbon activities. However, stress testing is a diagnostic tool; it reveals potential losses under defined scenarios. It does not alter technology costs, create investable projects, provide revenue certainty, or resolve coordination failures. In many jurisdictions, supervisory stress tests feed into firm-specific capital requirements, making them more than purely informational exercises. But even where stress test outcomes shape capital buffers, this does not reliably redirect banks' credit allocation decisions: capital requirements constrain the scale of risk a bank can hold, but they do not determine where within that constraint lending flows.

Expecting stress testing to drive decarbonization can lead to inflated expectations, unintended consequences, and even perverse outcomes. A stress test identifies an institution's exposures so it can reduce or price them; where it reveals climate risk, the rational response is to withdraw, reprice, or shorten tenor. That response manages the institution's own exposure to climate-related loss, which is a different decision from financing the mitigation that would reduce the underlying risk or curtailing the activities that drive it. Assessing the long-term hazard does not, by itself, direct capital toward either, and can instead tighten finance in the regions and sectors where mitigation and adaptation are most needed, as Box 2 describes.

Organizational structure reinforces the point. Stress testing sits in risk management functions with no client-facing role, while financing decisions sit with the bankers who work with borrowers. Risk management can constrain what front-line teams write, but it does not direct origination toward particular sectors, and stress test outputs shape lending only when translated into actionable underwriting guidance at the time horizon on which those decisions are made. The fiduciary constraint binds throughout: every transaction must meet a financing hurdle regardless of its impact profile.

What climate stress testing should optimally do

To manage real prudential risks effectively, climate stress testing should:

- focus on financially material exposures within relevant supervisory horizons
- translate long-run climate dynamics into concrete financial transmission channels
- test correlated losses, sectoral and geographic concentrations, and liquidity pressures
- identify weaknesses in governance, data quality, and internal risk management
- inform supervisory dialogue and, where appropriate, targeted measures

When anchored in financial materiality and resilience, stress testing strengthens the capacity of the financial system to manage climate-related risks. However, when expectations extend beyond this mandate, design priorities can dilute its prudential focus. For example, some stress tests have emphasized long-horizon transition pathways extending decades into the future, with weaker linkage to near-term capital adequacy and liquidity management. Scenario design has at times centered on stylized transition narratives, alignment debates, or signaling effects, rather than disciplined assessment of near-term financial vulnerabilities, capital resilience, and liquidity risk.

When design priorities shift in this direction, stress testing becomes less precise as a tool of prudential oversight while remaining ineffective as a tool of transition planning. Maintaining clarity that stress testing is meant to deliver disciplined evaluation of financially material risks, and is not a core instrument of transition planning, strengthens both supervisory legitimacy and the broader climate policy debate.

Some argue that financial stability authorities could reduce financial stability risks more effectively by supporting mitigation or resilience upstream than by ensuring institutional resilience. Supervisors may have a legitimate preference for those upstream measures to reduce risk management, and some supervisory frameworks permit expression of such preferences. However, even when they have a legitimate preference, supervisory tools are too limited to act on such preferences effectively. The parallel with other systemic risks is instructive: a financial stability regulator concerned about risks from high house prices could in theory address them by supporting housing construction, but neither the tools nor the scale of impact would justify that extension of mandate.

Supervisors must also interpret financial risk signals carefully. Public policies attenuate and delay the transmission of underlying physical risks, and delayed or disorderly transition dynamics, into financial markets. As a result, financial risk indicators may not reflect the scale or immediacy of climate-related physical risks until buffers are strained or adjustment becomes abrupt. Clarity on this point helps avoid misplaced expectations that prudential supervision or financial stability mechanisms can substitute for mitigation or resilience policies, and guards against interpreting delayed financial distress as evidence that underlying climate risks are low or well managed.

F. Fiscal Authorities: Deploying Public Instruments and Managing Trade-offs

Governments bear unique responsibility for acting across the full range of climate responses: reducing the underlying planetary hazard, providing public goods such as resilience infrastructure and social protection,

absorbing and redistributing losses, and managing the trade-offs among these responsibilities that no other institution can resolve. Within that broader governmental mandate, fiscal authorities, including treasuries, finance ministries, and budget agencies, hold many of the specific instruments through which these responsibilities are discharged: public investment, carbon pricing, disaster funds, insurance backstops, sovereign guarantees, and fiscal buffers.

The demands on these instruments are rising and competing for limited fiscal space, and the longer the transition is delayed, the more acute the competition becomes. In emerging markets and in high-debt countries, these dynamics are compounded by the pro-cyclical structure of sovereign debt markets: delayed transition and climate vulnerability raise borrowing costs, constraining the fiscal space needed for both mitigation and resilience investment and deepening vulnerability precisely when demands on public finances are rising.

Decisions about how to allocate fiscal resources across these demands involve inevitable trade-offs that require deliberate analysis and transparent policy choices: how losses are socialized determines who bears climate risk; how public investment is prioritized between mitigation and resilience shapes the trajectory of future fiscal obligations. These choices cannot be delegated to financial institutions or resolved through financial risk frameworks.

Fiscal authorities are also uniquely positioned to shape the conditions that determine whether private capital can flow toward mitigation and resilience at scale. Public investment, guarantees, and concessional finance can crowd in private capital where policy and institutional conditions are sufficiently credible, but cannot substitute for the underlying framework that makes investments financeable.

Clear public understanding of these trade-offs is equally important. An informed public can support the fiscal and regulatory commitments that mitigation and resilience require, while engaging financial institutions in ways consistent with their mandates. Without such clarity, public pressure may inadvertently intensify trade-offs by demanding outcomes from institutions that lack the authority or instruments to deliver them.

Box 5: SFDR: Layering distinct objectives within a single framework

The EU sustainable finance architecture sought to advance multiple objectives through a single disclosure-centered framework. At the strategic level, the ambition was expansive:

- Reorient capital flows toward sustainability.
- Improve financial risk management.
- Increase corporate accountability for environmental and social impacts.
- Reduce greenwashing and enhance market transparency.

The chosen mechanism was transparency, grounded in a market-mediated theory of change: standardized sustainability disclosures would reduce information asymmetries, improve risk pricing, enable investor differentiation, and generate reputational and competitive pressures. Better-informed investors would shift capital toward more sustainable activities; companies would adjust behavior to preserve access to finance; and financial risks would be more clearly identified and managed. SFDR and CSRD operationalized this logic. SFDR required financial institutions to disclose how they integrate sustainability risks and consider adverse impacts in investment decisions. CSRD provided the corporate reporting foundation through standardized disclosures under double materiality, covering both financially material risks and environmental and social impacts.

The objectives embedded in this architecture, however, rest on fundamentally different institutional logics. A single framework that tries to serve capital allocation, financial risk management, and impact accountability

obscures tensions among these objectives and dilutes decision-usefulness. Disclosure-based frameworks rely on a market-mediated theory of change that is structurally limited regardless of design quality. Disclosure can reduce information asymmetries, but translating better information into changed behavior requires incentives or regulatory or pricing signals that disclosure alone cannot create. Accordingly, disclosure frameworks are rarely sufficient to influence real-economy outcomes. Moreover, SFDR primarily targets investment funds operating in listed equity markets. Even a well-functioning disclosure regime in this segment would have limited capacity to alter the real-economy investment flows that determine emissions trajectories. Policymakers could but have not systematically used disclosed information to design the regulatory or industrial interventions that could effect change in the real economy.

Within the risk management objective specifically, effective risk management requires focused, decision-relevant analysis of how specific risks affect cash flows, asset values, creditworthiness, and systemic exposure. CSRD's broad coverage produces expansive reporting that is not structured around financial risk transmission or financial decision-making. Pulling impact metrics and EU Taxonomy alignment into prudential assessment treats accountability measures and sustainability classifications as proxies for institutional risk exposure, despite the two serving different purposes.

In practice, CSRD and SFDR imposed substantial compliance obligations on the corporate and financial sectors while failing to deliver clear risk management benefits or measurable impact outcomes. Sustainability statements are assembled by reporting teams, legal and accounting departments, and external consultants because the obligation is standardized and audit-linked. Investors have often relied on ESG ratings and data aggregators rather than primary reports, further limiting the disclosures' influence on capital allocation and systemic risk management.

A framework that imposed substantial compliance burdens while failing to deliver clear benefits on either objective provided weak grounds for resisting rollback. The result was contested revision before effects could be assessed, generating regulatory uncertainty that further undermined intended outcomes.

Conclusions

Disentangling climate-related risks clarifies how different risks propagate through the economy and financial system, how distinct institutions respond to those risks, and the instruments that each institution must deploy. This allows for a more effective matching of institutional expectations and regulatory requirements with the institutional mandates and instruments.

Two concerns primarily motivate this analysis. The first is that the confusion has specifically impeded the financing of decarbonization: by loading financial institutions with expectations they are neither mandated nor able to meet, current frameworks divert attention and resources from the structural and policy conditions that determine whether mitigation investments are financeable. The second is that the same confusion is allowing fiscal liabilities to accumulate without coherent management. When individual financial institutions respond rationally to increasing risks, within their relevant institutional mandate, their cumulative effect is to shift an expanding set of climate costs onto public balance sheets and, ultimately, onto future generations. Without deliberate policy design that anticipates this cascade, governments will continue to face mounting obligations with progressively constrained fiscal space.

The table below maps, for each institutional actor, where current frameworks and expectations are misaligned with what institutions are mandated and able to do, and what each can contribute to financing mitigation within its mandate.

**Note: Examples in both columns are illustrative, not exhaustive. **

Institution	Misaligned expectations	Illustrative contributions to financing mitigation
Banks	Expected to redirect credit allocation toward low-carbon activities through risk pricing and stress testing; neither risk spreads nor capital requirements reliably determine where lending flows	Structure and originate transition finance; resolve discrete bottlenecks through project finance, syndication, and risk-sharing arrangements; embed climate considerations into capex planning through client engagement
Investors	Expected to shift real-economy emissions trajectories through divestment and portfolio alignment; secondary market transactions shift exposure among investors without directing new capital to decarbonization	Allocate capital to assets that meet return, liquidity, and mandate thresholds; support financeability architecture by working with other actors to resolve structural constraints
Insurers	Expected to guarantee long-term coverage in areas of rising physical risk; private insurance cannot insure against risks that exceed diversifiable capacity, and retreat is rational even as coverage gaps widen	Incentivize resilience investment through pricing and underwriting conditions; extend coverage where risks remain insurable and innovate on payout speed and predictability
Central banks	Expected to green the financial system and redirect investment toward low-carbon activities through monetary and collateral tools; those tools operate through channels too narrow to shift investment at transition-relevant scale	Preserve monetary and financial stability on which fiscal commitments and industrial policy depend; use macroprudential tools to limit systemic risk build-up
Supervisors	Expected to use prudential tools to steer real-economy investment patterns and accelerate the transition; stress testing is a diagnostic tool for capital adequacy, not an instrument of transition planning	Ensure institutional resilience to material climate-related financial risks within prudential horizons; identify concentrated exposures and governance weaknesses
Fiscal authorities	Climate policy formation has drifted to central banks, financial stability boards, and supervisory bodies — institutions without the mandate or instruments to deliver it — leaving fiscal authorities underdeployed on the decisions only they can make	Define decarbonization pathways; deploy public investment, guarantees, and concessional finance to crowd in private capital; manage trade-offs among competing fiscal demands

This paper also identifies but does not resolve a number of tensions that merit more explicit consideration among the institutions and public actors responsible for climate-related decision-making:

- As private insurance becomes harder to sustain in climate-exposed areas, who bears the cost of the resulting coverage gap, and on what terms?
- How should fiscal authorities prioritize among mitigation, resilience, loss-sharing, and recovery financing as demands rise and fiscal space narrows?
- How can the cost of capital be lowered in the emerging markets where transition needs are greatest and financing is hardest?

While financial institutions can help to inform these discussions, these are largely political choices, and they require decisions across local, national, and international levels. The longer they are deferred, the greater the cost.

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