UK Government

RAF015/2526 Climate Transition and Global Financial Stability

Literature Review

Department for Energy Security and Net Zero (2026)

Acknowledgements

The authors gratefully acknowledge the contributions of experts and stakeholders consulted during the preparation of the literature review. Insights shared during interviews and peer discussions and in written form, from government ministries, central banks, international regulators and standard setters, financial institutions, investment consultants, universities and research organisations, multilateral development banks and development agencies have grounded the review in current knowledge and practice and emerging debates.

We thank officials from the UK Department for Energy Security and Net Zero, Foreign, Commonwealth and Development Office, HM Treasury, Bank of England and members of the industry-led EMDE Investor Taskforce for their guidance and feedback throughout the review.

The analyses and conclusions expressed herein are solely those of the authors and should not be attributed to individuals and institutions consulted. They accept no responsibility for any inaccuracies, errors and omissions or for the use of information in this review. The findings and interpretations presented do not necessarily reflect the views of HM Government, the Columbia Centre on Sustainable Investment, other members of the consortium or consulted experts.

The literature review was prepared by (in alphabetical order by organisation and surname): at Adam Smith International, Annika Burke (Lead Analyst), Nicholas Haslam (Research Director), Celia Mitchell (Analyst), Darius Nassiry (Technical Team Leader), Aakarshi Srivastava (Analyst) and Astrid Van de Voorde (Analyst); at the Columbia Centre on Sustainable Investment: Ana Maria Camelo Vega (Analyst), Perrine Toledano (Lead Analyst) and Tucker Wilke (Analyst); and in The Carbon Trust, Pietro Rocco Lead Analyst), Daniela Semanova (Analyst) and Fred Stace Smith (Analyst).

The contributions of our expert panel (alphabetical by surname) have been invaluable: Mark Campanale – Founder, Carbon Tracker Initiative; Dr. Mark Cliffe – Visiting Professor, London Institute of Banking and Finance and Visiting Fellow, Global Systems Institute, University of Exeter; Prof. Lisa Sachs – Director, Columbia Centre on Sustainable Investment; and Tara Schmidt – Scotland Director, Green Finance Institute.

The following individuals generously shared their time and expertise in interviews and consultations (alphabetical by surname):

Ayaan Adam – Senior Director, Africa Finance Corporation and CEO, AFC Capital Partners

Teju Akande – Climate Change Manager, Border to Coast Pensions Partnership

Geraldine Ang – Team Lead, Clean Energy Finance and Investment Mobilisation, Organization for Economic Cooperation and Development

Sophie Brodie – Associate Director, Sustainable Investing, Fidelity International

Creon Butler – Research Director, Chatham House

Edd Denbee – Executive Director for Public Policy, Glasgow Financial Alliance for Net Zero

Rowan Douglas – CEO Climate Risk and Resilience, Howden Group Holdings

Dr. Linda Eling-Lee – Founding Director and Head of the MSCI Institute

Tony English – Head of LGPS Investment, Marsh McLennan (formerly Mercer)

Ronan Hodge – Technical Lead, Glasgow Financial Alliance for Net Zero

Dr. Gregory Jobome – Executive Director, Risk Management, Access Bank

Prof. Tim Lenton – Founding Director of the Global Systems Institute and Chair in Climate Change and Earth System Science, University of Exeter

Luz Martinez – Head of Sustainability, ILX Fund

Justin Mundy – Chair, SLM Partners

Mark Napier – CEO, Financial Sector Deepening Africa

Prof. Nicola Ranger – Executive Director of the Earth Capital Nexus and Professor in Practice, London School of Economics and co-lead for Nature, LSE Global School of Sustainability

Tim Rawlings – Co-head, Climate Hub, Bank of England

Prof. Nick Robins – Professor in Practice for Sustainable Finance, Grantham Research Institute on Climate Change and the Environment, London School of Economics

Madeleine Ronquest – Independent Consultant

Tony Rooke – Executive Director, Head of Transition Advisory, Howden Group Holdings

Mohammed Saffar – Associate Fellow, Chatham House

Dr. Nina Seega – Director of Centre for Sustainable Finance, Cambridge Institute of Sustainable Leadership

Manfred Schepers – CEO, ILX Fund

Dr. Caspar Siegert – Head of Climate Risk, Bank of England

Daisy Streatfeild – Chief Sustainability Officer, NinetyOne

Sandy Trust – Council Member, Institute and Faculty of Actuaries

Sofia Vega – Head of Communications, ILX Fund

Prof. Gernot Wagner – Climate Economist at Columbia Business School

Victoria Walker – Sustainability Officer, ILX Fund

Dr. Steve Waygood – Chief Responsible Investment Officer, Aviva Investors

Contents

Acronyms

ADB	Asian Development Bank
AMOC	Atlantic Meridional Overturning Circulation
AUM	Assets Under Management
BCBS	Basel Committee on Banking Supervision
BIS	Bank for International Settlements
BoE	Bank of England
PRA	Prudential Regulation Authority
CBES	Climate Biennial Exploratory Scenario
CCSI	Columbia Centre on Sustainable Investment
CFMCA	Coalition of Finance Ministers for Climate Action
CPI	Climate Policy Initiative
CRA	Credit Rating Agency
CVaR	Climate Value at Risk
DFI	Development Finance Institution
DESNZ	Department for Energy Security and Net Zero
ECB	European Central Bank
EMDE	Emerging Markets and Developing Economies
ESG	Environmental, Social and Governance
FCA	Financial Conduct Authority
FCDO	Foreign, Commonwealth and Development Office
FSB	Financial Stability Board
FX	Foreign Exchange
GEMs	Global Emerging Markets Risk Database
GFANZ	Glasgow Financial Alliance for Net Zero
GFI	Green Finance Institute
GSSS+	Green, Social, Sustainability, and Sustainability-linked (bonds)

HMT	HM Treasury
IAIS	International Association of Insurance Supervisors
IEA	International Energy Agency
IFA	International Financial Architecture
IFC	International Finance Corporation
IFoA	Institute and Faculty of Actuaries
IIGCC	Institutional Investors Group on Climate Change
IMF	International Monetary Fund
IOSCO	International Organization of Securities Commissions
IPCC	Intergovernmental Panel on Climate Change
ISSB	International Sustainability Standards Board
MDB	Multilateral Development Bank
NGFS	Network for Greening the Financial System
OECD	Organisation for Economic Co-operation and Development
PRA	Prudential Regulation Authority
RAG	Red-Amber-Green (rating system)
SCALED	Scaling Capital for Sustainable Development
SDG	Sustainable Development Goal
TCFD	Task Force on Climate-related Financial Disclosures
TCX	The Currency Exchange Fund
UKEF	UK Export Finance
UNCTAD	United Nations Conference on Trade and Development

Executive Summary

This review forms the basis of the *Scoping Study on Climate Transitions and Global Financial Stability* commissioned by the Department for Energy Security and Net Zero (DESNZ) with the support of a cross-Whitehall group of the Foreign, Commonwealth and Development Office, HM Treasury and the Bank of England, as well as the industry-led EMDE Investor Taskforce. It summarises and assesses the state of evidence on how delayed, failed, or twin-track climate transitions could affect economic and financial stability in the UK and globally, and assesses the economic opportunities for UK and global investment in emerging market and developing economy (EMDE) transitions. The review draws on over 300 sources, supported by over 30 expert interviews and focus group discussions. Its findings provide the foundation for prioritising knowledge gaps and debates that could be the focus of future research.

The review finds strong consensus that climate risks are intensifying across planetary, economic and financial tiers. GHG emissions from EMDEs are now a pivotal factor in the global carbon budget and, with over 50 percent of emissions forecast to be emitted by EMDEs other than China by 2030, raise the risk of breaching critical climate thresholds outlined in the Paris Agreement. As a result, the impact of delayed or failed EMDE transitions is not peripheral but fundamental to global systemic risk.

The literature indicates that the transmission from physical and transition risks to financial instability is complex and multi-layered, contains multiple feedback loops, and is not yet fully understood. We find strong agreement that physical and transition risks – whether acute climate shocks, tipping points in ecosystems, or disorderly policy and technological adjustments – are intensifying, with rising probabilities of compounding shocks, tipping points and tail risks, yet these non-linear dynamics remain under-represented in most economic and financial models (Chapter 1). The literature on economic impacts finds clear causal chains, through productivity losses, stranded assets, fiscal stress, trade disruption and GDP damage but there are persistent gaps in quantifying feedback loops and amplification, particularly in EMDEs where data are weakest. We find economic losses can translate into financial system exposure via three interlinked mechanisms: the mispricing of climate risk, the interconnectedness of markets and institutions, and the cross-border spillovers that transmit risks globally (Chapter 2). Importantly, risks can amplify and rebound within the economic and financial tiers, i.e. transmission flows both ways, and can combine with socio-economic and geopolitical risk.

While the nature and transmission channels of climate risk are well established, its magnitude remains uncertain because of scenario limitations, modelling assumptions, incomplete disclosure, and sparse data. Scenario estimates of global GDP effects by 2100 vary widely, from a 2% decline from business-as-usual growth to 50% GDP destruction, factoring in non-linearities, compound effects and feedback loops, both estimates under current policies leading to 3°C of warming. We find that although UK and other advanced market portfolios hold relatively modest direct EMDE exposures, indirect and contingent linkages – for example across banking, trade, and supply chain channels – create possible channels for contagion and one of the most obvious routes through which a delayed EMDE transition threatens global financial stability is by sustaining higher emissions that drive greater global warming, thereby amplifying all other climate-related risks and transmission channels (Chapter 3). Current models underrepresent these interconnections and the potential for asymmetric transition shocks to propagate losses through global portfolios.

The literature indicates that transmission from planetary disruption to financial instability is neither linear nor automatic: transmission could unfold in the near-term through the insurance and banking sector or sudden asset repricing leading to a 'climate Minsky moment', compounded by both economic and geopolitical shocks. Alternatively, transmission could be limited by government action, for example by policy buffers, fiscal measures and monetary mechanisms, until the planetary consequences are severe and potentially irreversible.

We find that the international financial architecture (IFA) response to these complex and cascading risks has been partial and shaped by differing institutional mandates and priorities. The review depicts the IFA as a diverse set of actors and reviews how they have begun to incorporate climate-related financial risks and address systemic and compound shocks (Chapter 4). Institutions such as central banks, supervisors, ministries of finance, and multilateral development banks (MDBs) have integrated climate risk considerations into their mandates, but mainly through incremental adjustments in reporting and disclosure rather than comprehensive structural reforms. Disclosure and reporting frameworks, including the Taskforce on Climate-related Financial Disclosures and International Sustainability Standards Board, have advanced most rapidly. Scenario analysis and stress-testing by both IFA actors and financial institutions remain limited and often fail to capture non-linear progression, indirect transmission or planetary risks. Prudential regulation responsible for financial stability is focused on banks and insurers rather than pension funds, asset managers and private market actors. leading to a fragmented regulatory landscape that can complicates EMDE capital flows.

Further, we find that mobilising private capital for EMDE energy and climate transitions is both necessary and feasible but that it is hampered by persistent market factors and structural constraints (Chapters 5 and 6). The literature shows that while EMDEs will drive most future energy demand and GHG emissions, they still attract less than a quarter of global climate finance. Although many projects offer competitive returns, investment remains constrained by data gaps, conservative allocation norms, and the limited use of risk-sharing tools such as guarantees, FX hedging, and project preparation facilities. Structural factors including currency volatility, debt sustainability, EMDE governance, credit rating conservatism, and prudential rules under Basel 3 and Solvency 2 (evolved into Solvency UK) sustain a cost-of-capital gap, deterring private investment.

The UK can play a catalytic role, due to its global reach and comparative advantages in insurance and capital markets, in scaling guarantees, credit enhancement and blended finance structures, and in advancing data standardisation and financial instruments that can channel private capital into EMDE transitions. The review finds that current IFA reform tracks (e.g. Bridgetown Initiative, G20 Triple Agenda) have led MDB balance sheet reforms and expanded MDB toolkits but overlook upstream drivers of high capital costs. Evidence points to the need for modernised capital adequacy frameworks, forward-looking rating methodologies that account for resilient growth, more effective debt restructuring (including climate-linked clauses), and interpretations of prudential regulations that do not penalise EMDEs and recognise de-risking. Amidst shifting geopolitical and macroeconomic conditions (a gradual shift toward a more multipolar financial system, China's dominance in clean technology, higher global interest rates and tighter fiscal space) there are strategic openings for the UK as a global financial hub to bridge standards, capital and pipelines.

In our conclusions we identify three cross-cutting themes, knowledge gaps and debates in the literature.

1. **Gaps in scenario planning, modelling and assessment of systemic climate risks**. The literature finds broad consensus that climate change poses systemic, cascading risks, yet the models and data used to assess them remain incomplete and may underestimate the risk faced by the UK and global economy and financial system. Current scenarios and stress tests rely on linear assumptions and underrepresent tipping points, tail risks, feedback loops, and compounding shocks. Exercises by the Network for Greening the Financial System, Bank of International Settlements, and Bank of England have modelled linear climate change and constant GDP growth, used limited damage functions, and overlooked non-linear climate sensitivities, tail risks, and the interaction of climate, economic, financial and geopolitical systems, producing divergent estimates on the scale of losses. Data gaps persist across firm-level financials, collateral values, and cross-sector exposures, especially in EMDEs. As a result, systemic risks are recognised but may remain poorly quantified and integrated into economic and financial analysis.
2. **Conflation between climate risk management and investment mobilisation:** We find that that much of the current discourse on climate finance conflates climate risk management with climate transitions and investment, creating perceptions of blurred mandates within the IFA and unrealistic expectations of what managing financial risk alone can achieve (Sachs et al, 2025). The IFA has advanced supervisory and prudential integration of climate risk in the financial system through scenarios, disclosure and stress-testing, which helps preserve stability. However, its influence on driving large-scale capital reallocation, especially to EMDEs, is overstated (Oxford University Smith School, 2025; CCSI, 2024). We find that credible transition pathways, investable pipelines, supportive policy environments and de-risking approaches are the levers to boost investment in the real economy. Without them heightened risk awareness can increase caution rather than mobilise capital.
3. **Despite strong fundamentals and investor appetite, EMDE financing costs remain elevated due to structural barriers and market factors**. Borrowers pay 300 to 500 basis points more than advanced economies, restricting private capital for climate transitions. Data gaps, transparency issues, and fragmented performance metrics inflate perceived risk and due diligence costs, while institutional norms and home bias obscure opportunities. Weak project preparation and bankability gaps

persist, especially in renewables. Structural challenges – currency volatility, underdeveloped local markets, governance weaknesses, high sovereign debt, and conservative credit ratings – widen the cost-of-capital gap. Prudential regulations impose higher charges and overlook blended finance and guarantees, reinforcing systemic risk aversion. Notable IFA reform efforts like the G20 Triple Agenda and Bridgetown Initiative prioritise MDB reform but neglect these deeper structural issues. Addressing these barriers is critical to unlock EMDE investment, reduce mispriced risk, and prevent transition failure – and is an opportunity for the UK, positioning London as a hub for sustainable finance and innovation.

Introduction

This literature review forms the basis of the *Scoping Study on Climate Transitions and Global Financial Stability* commissioned by the Department for Energy Security and Net Zero (DESNZ) with support of a cross-Whitehall group of the Foreign, Commonwealth and Development Office, HM Treasury, and the Bank of England, as well as the industry-led EMDE Investor Taskforce. It assesses the current state of knowledge on the financial system risks and investment implications of delayed or failed climate transitions, with a focus on emerging markets and developing economies (EMDEs).[1]

The review addresses four research topics:

- The risk that a failed or delayed global climate transition poses to the UK and global financial stability over the period to 2100, including the risk posed by a twin-track transition in which a climate transition in developed countries is accompanied by a failed or delayed EMDE transition.
- The potential impact of a delayed or failed transition in EMDEs on portfolios held in developed markets, including the UK.
- The extent to which the risks posed by cascading and accelerating geopolitical and environmental risks arising from potential climate impacts out to 2100 are currently considered or addressed by the international financial architecture (IFA).
- The economic opportunities for private sector investors, including the City of London, in making investments that support sustainable low-carbon climate-resilient development in EMDEs, and the appetite among such investors for doing so.

The review synthesises published, grey, and selected unpublished literature, complemented by interviews and focus group discussions with UK policymakers, IFA institutions, and academics. It therefore reflects (to the extent possible) the current state of thinking, analysis and policy on the subjects covered. This offers the advantage of positioning the UK Government, financial sector and academia to respond to and act on knowledge gaps, debates and uncertainties identified. It also unavoidably reflects current limitations and misconceptions in the literature in matters of climate risk, financial stability and EMDE transitions and investment, which the review seeks to clarify.

The primary audience for this study comprises policymakers and regulatory authorities, with the aim of informing how governments and regulators can work with market actors and IFA stakeholders to address critical knowledge and methodological gaps concerning the financial stability implications of climate change. A secondary audience includes financial institutions, industry associations, multilateral organisations, and academic researchers. For these groups, the review aims to provide a consolidated and critical assessment of the existing evidence base, contributing to a shared understanding of how

[1] In line with *The UK as a Climate Finance Hub* (IIGCC, 2025) we define EMDEs as lower and upper middle income countries in the OECD DAC (2025).

climate transition risks in EMDEs connect to the stability and performance of the global financial system.

The review does not seek to produce new quantitative modelling or original scenario analysis, nor does it provide policy recommendations or assess specific institutional performance. It focuses on synthesising existing evidence rather than evaluating ongoing UK or international initiatives. The review also does not cover the full spectrum of environmental risks – such as nature risk, biodiversity loss or oceanic tipping points – except where these intersect directly with climate transition dynamics and financial stability. Broader social, political, and technological drivers of the transition are referenced only insofar as they inform the economic and financial risk pathways examined.

Methodology

The literature review is anchored in a Rapid Evidence Assessment methodology, complemented by expert elicitation. Literature was sourced through systematic searches of academic and grey sources, supplemented by 'snowballing' and outreach to institutional networks. All sources were screened against relevance and quality criteria, with grey literature assessed using a RAG rating system. The evidence library collated for this review contains over 300 sources.

Stakeholder engagement included over 30 semi-structured interviews and focus group discussions with financial institutions, regulators, and development finance actors. These were used to validate emerging findings, highlight key sources of evidence, and identify knowledge gaps and areas for future research. AI tools were selectively used to accelerate literature screening, following UK Government guidance on ethical and secure use. All AI outputs were subject to human verification and cross-checking against original sources. A technical annex provides further detail on the methodology, quality assurance processes, and search log.

Analytical Framework

The analytical framework used in this report (Figure 1.1) illustrates a) how failures in global climate ambition and transition pathways could translate into economic and financial risks; b) the opportunity for investment in EMDE transitions; and c) the role of the IFA in both climate risk management and EMDE transitions and finance mobilisation. The framework synthesises insights from UK and IFA actors and wider academic literature on climate risk transmission channels and investment flows, providing the analytical foundation for the literature review.

Read from left to right, the diagram (Figure 1, page 17) shows how constraints to global ambition – such as fiscal limitations, regulatory gaps, political short-termism, and high EMDE costs of capital – can lead to three broad modes of transition (discussed further in Chapter 1):

- Delayed transition, where late and abrupt action drives disorderly adjustment;
- Failed transition, where mitigation falters and physical risks dominate; and
- Twin-track transition, where advanced economies decarbonise while EMDEs diverge, creating macro and microeconomic and financial spillovers.

The framework traces how these transition outcomes could generate physical and transition risks that propagate through the real economy and financial system via the transmission channels identified by the Network for Greening the Financial System (NGFS). It shows how climate risks translate into micro- and macro-economic losses (Chapter 1) and subsequently into financial risks that affect portfolios (Chapter 3) and systemic stability (Chapter 2). Feedback loops reinforce these dynamics: financial instability can constrain macro-economic responses, while rising perceptions of EMDE risk can further deter climate investment.

The diagram aims to avoid conflation between IFA efforts to manage climate risk on the one hand and actions needed to transition the real economy and address the root causes of climate change on the other. Across the top of the diagram, the IFA is depicted as both a stabilising and enabling force, addressing climate-related financial risks through prudential and supervisory measures on the right (Chapters 2–3), while shaping the conditions and opportunities for climate investment and transition on the left (Chapters 5–6). Whilst two distinct roles are identified, these are not intended to be hierarchical – as set out in Chapter 4, different parts of the IFA will prioritise these roles to varying degrees depending on their mandate.

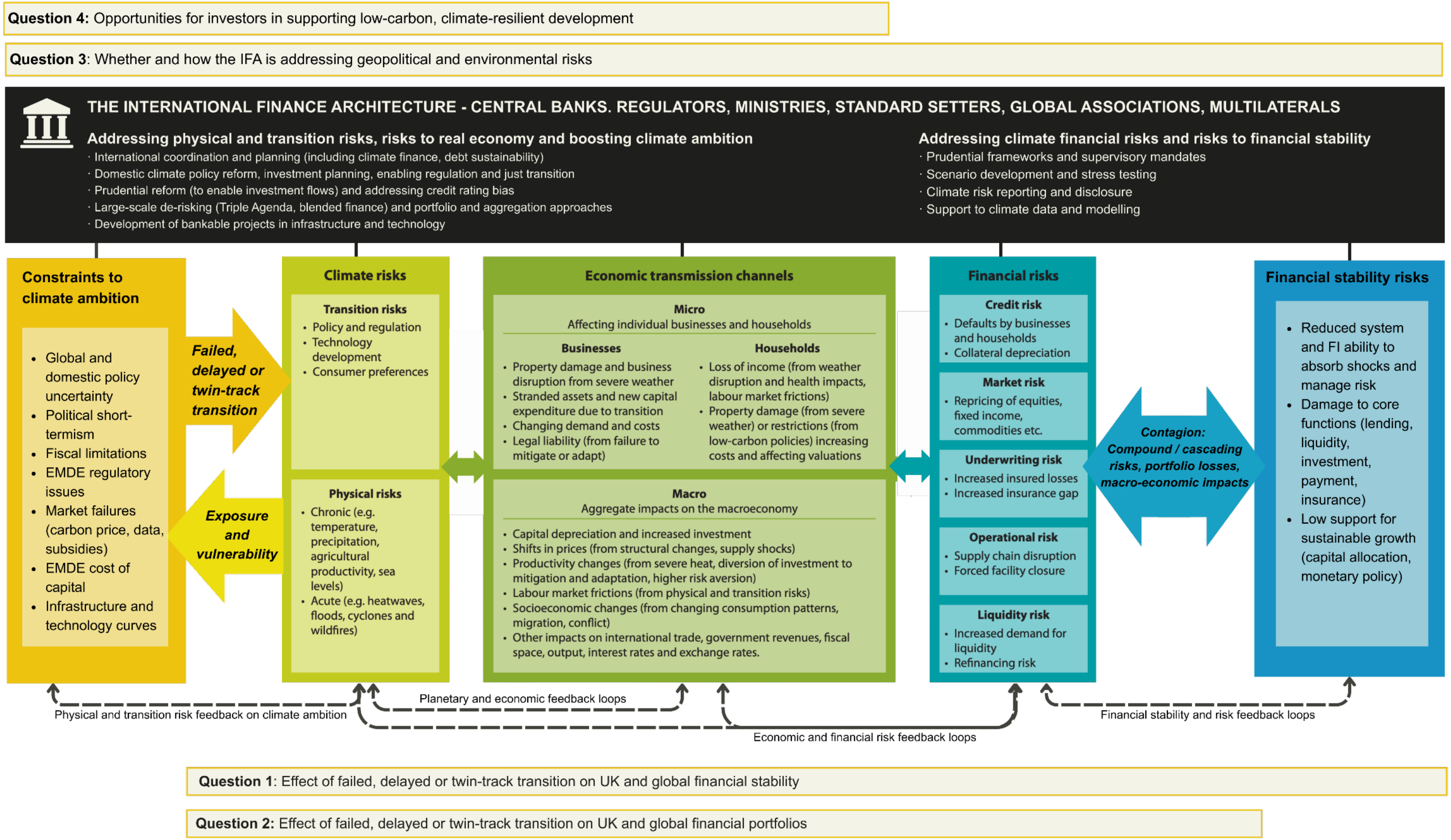
Report Structure

The report follows the four core research topics set by DESNZ and is sequenced to mirror the logic of the analytical framework. Each chapter examines one part of the system shown in Figure 1a, moving from planetary and economic dynamics through to financial-system behaviour and institutional responses. Together, they synthesise existing evidence, identify knowledge gaps, and draw implications for financial stability, portfolio exposure, and climate investment in EMDEs.

- **Chapter 1** examines how escalating climate risks translate into macroeconomic and financial instability. It reviews evidence on rising physical and transition risks, the growing likelihood of tipping points and cascading effects, and the economic consequences of failed, delayed, and twin-track transitions. The chapter establishes the analytical foundation for understanding how climate inaction and uneven transition progress generate systemic financial risk.
- **Chapter 2** assesses the implications of failed, delayed, and twin-track transitions for global and UK financial stability, synthesising evidence on mispricing, contagion, and macro-financial feedback loops.

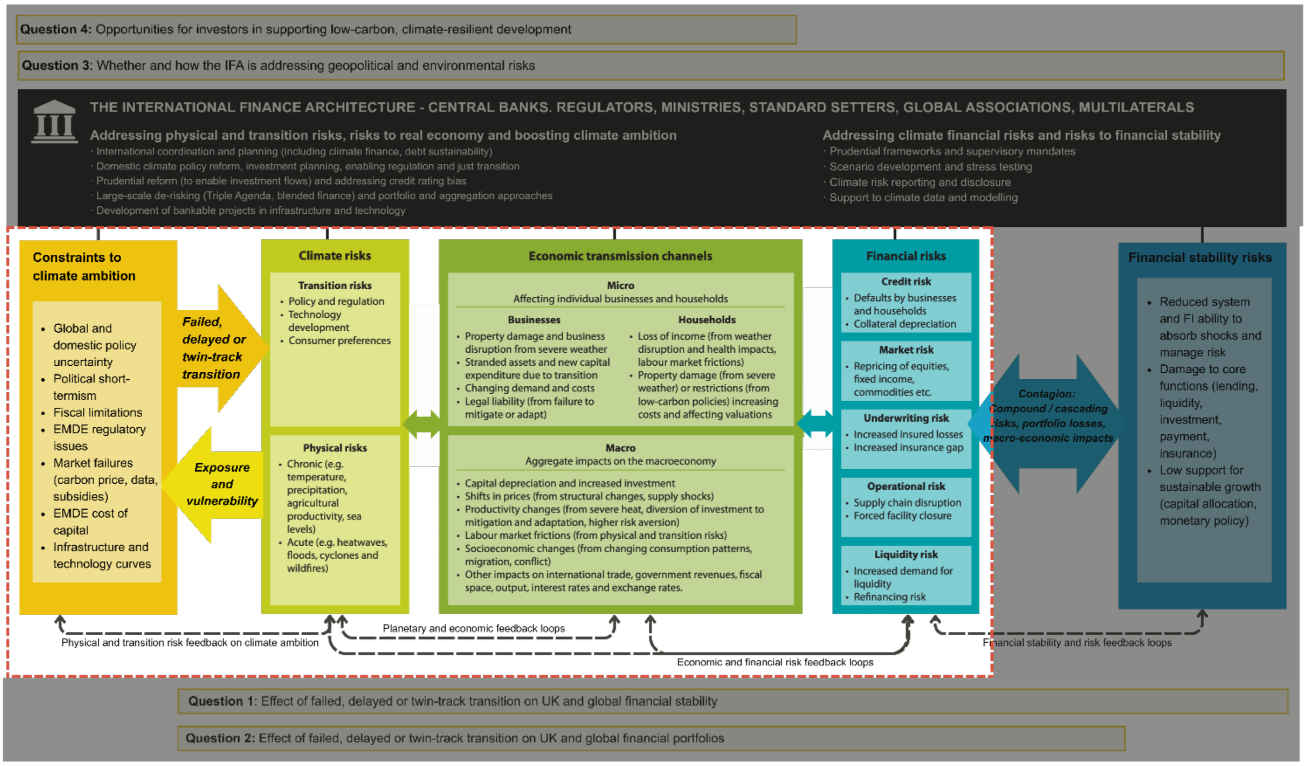
- **Chapter 3** analyses how EMDE transition failure affects investment portfolios held in advanced economies, reviewing cross-border exposure channels, modelling approaches, and the adequacy of current risk-assessment tools.
- **Chapter 4** examines how the IFA currently addresses cascading geopolitical and environmental risks, evaluating mandates, coordination mechanisms, and surveillance and financing tools, and identifying gaps in crisis response and financial governance.
- **Chapter 5** explores economic opportunities and investor appetite for scaling private capital into EMDE climate transitions, focusing on barriers to investment, innovation pathways, and the role of UK-based financial actors in mobilising and de-risking capital.
- **Chapter 6** analyses EMDE climate transitions, investment frameworks, and the IFA, exploring how structural and prudential factors – such as cost-of-capital differentials, credit-rating practices, and multilateral development bank (MDB) or regulatory mandates – shape climate-finance flows and potential reform options to better align investment mobilisation with financial stability objectives.

Figure 1a. Analytical Framework for the Literature Review[2]



[2] Note: this framework does not explicitly capture how non-climate macroeconomic or financial crises could arise within the real economy or financial system and interact with climate transmission channels to reinforce climate-related risks, by, for example, causing banking distress, constraining capital flows or supply chain challenges. Non-climate risks remain beyond the scope of this review.

1. Economic and Financial Impacts of Failed, Delayed or Twin Track Transition



1.1 Introduction

This chapter examines how escalating climate-related physical and transition risks translate into economic and financial risks. It focuses on the mechanisms through which physical and transition risks propagate from planetary and economic systems into the financial system, establishing the evidential foundation for the chapters that follow.

To interpret how climate-related risks evolve across systems, it is necessary to distinguish between two complementary ways the literature defines and classifies risk. Box 1.1 summarises these frameworks. The first, developed by Sachs et al. (2025), differentiates planetary, economic, and financial risks as qualitatively distinct categories operating at different system levels and under different institutional mandates. The second, established by Taskforce for Climate Related Financial Disclosures (TCFD) (2017) and NGFS (2024) distinguishes physical and transition risks as the principal sources through which climate change and the global transition propagate into economic and financial outcomes. Together, these frameworks clarify how climate-related risks are conceptualised, where responsibilities for managing them lie, and why financial risk management alone cannot address the underlying planetary causes of climate change.

This chapter is structured around three layers of transmission, moving from physical and transition risks to economic risks and, finally, to financial risks. It first reviews the escalation of planetary risks, drawing on evidence of intensifying hazards, rising probabilities of tail risks and tipping points, and the potential for cascading effects and feedback loops across regions and sectors. It then examines how physical and transition risks translate into economic losses, at both micro- and macro-levels, and how those losses can generate financial risks that affect credit markets, asset values, and sovereign balance sheets. It should be noted that the impacts in these three layers of transmission are not linear, as feedback loops may amplify risks back into financial system, the economy, and the planetary system itself. This analysis links global climate risk and transitions to the financial stability risks addressed assessed in Chapter 2, the cross-border portfolio implications explored in Chapter 3, and the IFA and EMDE investment mobilisation responses discussed in Chapters 4 to 6.

The evidence base for this chapter is strong and convergent across disciplines. It draws on sources including the Network for Greening the Financial System (NGFS), International Monetary Fund (IMF), Bank for International Settlements (BIS), Institute and Faculty of Actuaries (IFoA), and the Intergovernmental Panel on Climate Change's Sixth Assessment Report (IPCC AR6), alongside a growing academic literature linking transition dynamics to non-linear economic and financial outcomes. Collectively, this body of work shows that climate risks are increasing in both frequency and intensity and that their economic and financial impacts are likely to be compounding, cascading and mutually reinforcing. Yet significant uncertainties remain regarding the trajectory of the global transition, the interaction of 'tail risks', tipping points, and feedback loops, the magnitude of their potential economic and financial consequences, and quantitative and empirical assessments of impacts. The divergence in scenarios and models within the IFA, financial sector and academia represents a material source of uncertainty.

Box 1.1 – Frameworks for Classifying Climate-Related Risk

The literature uses two distinct but complementary frameworks to describe climate-related risk, which are often conflated in policy and analytical debates.

Planetary, Economic, and Financial Risks – Sachs et al. (2025)

This framework distinguishes types of risk according to the system level in which they operate and the institutional mandates relevant for managing them.

- Planetary risks describe large-scale changes in the Earth system itself, such as warming, biodiversity loss, ocean acidification, and other ecological disruptions. These are physical realities, not financial phenomena.
- Economic risks arise when planetary changes and the responses to them affect the real economy – reducing productivity, damaging assets and infrastructure, and straining fiscal capacity.
- Financial risks capture how these economic effects manifest within financial systems – through credit deterioration, market repricing, liquidity stress, or insurance losses.

These categories are nested but qualitatively distinct, operating on different temporal scales and requiring different institutional responses. Sachs et al. (2025) notes that conflating them blurs mandates and can lead to misapplied policy – such as expecting financial regulators to drive decarbonisation or relying on financial-risk metrics as a precondition for climate action.

Physical and Transition Risks – TCFD (2017) and NGFS (2024)

In contrast, the TCFD and NGFS frameworks classify sources of climate-related risk:

- Physical risks arise from the physical manifestations of climate change – acute events like floods or droughts, and long-term chronic shifts like rising temperatures – and their socioeconomic and financial consequences. They capture the damages and disruptions to assets, infrastructure, supply chains, and livelihoods that result when planetary changes intersect with human, economic, and financial systems.
- Transition risks stem from the socioeconomic and policy adjustments of moving toward a low-carbon economy, including regulatory change, technological disruption, shifts in market preference, and litigation exposure.

Physical and transition risks describe the channels through which climate change and the global transition propagate into the economy and financial system. They are therefore best understood as operating within the economic and financial domains, rather than as parallel categories to planetary risk.

Together, these frameworks help clarify how acute and chronic climate changes and transition dynamics give rise to measurable economic and financial risks – underscoring that managing financial risk can limit exposure to climate impacts but cannot, by itself, address the underlying planetary causes.

1.2 Escalating Planetary Risks

The literature reflects a growing consensus that planetary level risks are intensifying, with increasing evidence that the Earth system is approaching multiple critical thresholds. The Intergovernmental Panel on Climate Change's Sixth Assessment Report (2023) (IPCC AR6) concludes with very high confidence that each additional degree of global warming leads to steep increases in losses and damages. There is broad and enduring scientific agreement on the patterns and drivers of climate change, which is now a long-term and international consensus (IPCC, 2023; Lynas et al., 2021). However, uncertainty persists regarding the specific timing and scale of its impact (Brunetti et al., 2021). Recent assessments (IPCC AR6 2023; Lenton et al., 2008, 2023, 2025; Armstrong McKay et al., 2022) highlight the rising probability of non-linear change, 'tipping points', where incremental increases in global temperature could trigger abrupt and potentially irreversible shifts in major biophysical systems. These include polar and glacial ice-sheet melt, dieback of warm-water coral reefs, Amazon rainforest dieback, and the collapse of the Atlantic Meridional Overturning Circulation (AMOC).

Although the exact temperature thresholds for specific tipping points remain uncertain, scientists are making progress in developing methods to assess their proximity (IFoA and University of Exeter, 2024). The latest Global Tipping Points Report by Lenton et al. (2025) finds that the risk of triggering tipping points is already present at current warming levels and rises with each additional 0.1°C of heating and every year that global temperatures remain more than 1.5°C above pre-industrial temperatures. The central estimate for the tipping point of warm-water coral reefs has already been exceeded, and even if global warming stabilises at 1.5°C without overshoot, this tipping point is almost certain to be reached. Crossing such thresholds would have cascading consequences across ecosystems, agriculture, and infrastructure, producing global macroeconomic effects far greater than those captured by linear climate-damage models and affecting global trade, commodities, and sovereign stability (ibid.; Expert Interviews, 2025).

A second strand of evidence concerns compounding and cascading risks. Bolton et al. (2020) describe climate risks as a new type of systemic risk, driven by complex interactions across environmental, social, economic and geopolitical systems, irreversibly shaped by rising GHG emission concentrations. Studies reviewed in this chapter show how climate-induced events can amplify other sources of fragility, including food insecurity, migration pressures, and geopolitical tensions (Lenton et al. 2023; IFoA and University of Exeter, 2024; expert interviews, 2025). The literature identifies a growing potential for systemic rather than sector-specific disruption, one where risk transmission channels interact and climate impacts can propagate rapidly through second-round effects (FSB 2020; BSBC, 2021; IFoA and University of Exeter, 2024; BoE PRA, 2024). Considerable uncertainty persists around the ways in which cascading physical climate impacts will unfold, interact, and amplify each other, as well as pathways into social, political, geopolitical, economic and financial consequences – but the literature is consistent on the severity of the risk (Chatham House, 2025; IFoA and University of Exeter, 2024).

These non-linear and compounding dynamics also introduce tail risk behaviour into climate and economic outcomes. Both physical and transition risks feature 'fat-tailed' distributions, meaning that extreme outcomes carry more weight in the aggregate risk profile than a normal distribution would suggest (Weitzman, 2011; Bolton et al., 2020). Because they involve deep uncertainty and non-linearity, their likelihood cannot be inferred from historical data and extreme outcomes cannot be ruled out (Bolton et al., 2020; expert interview, 2025). Tail risks and compound scenarios can multiply risks, are potentially systemic and are not well understood through static, short-term time horizons (Ranger, 2025). The most extreme and worst-case scenarios, with the potential to trigger economic and societal collapse, remain especially poorly understood (Kemp et al., 2022).

At the same time, the literature and expert interviews (2025) recognise significant uncertainty in modelling and attribution, particularly under 3°C or more of warming. Integrated assessment models (IAMs) remain central to scenario design but tend to understate uncertainty, tipping points and feedback effects between physical, social and financial systems (CGFI, 2023; Carbon Tracker, 2022, 2025; IMF, 2025). Expert interviews (2025) expressed the view that models may mislead as much they inform and that they can give a false sense of precision and certainty. Rare but catastrophic outcomes such as tail risks are often underestimated by conventional economic and financial models that focus on average or central estimates (IFoA and University of Exeter, 2024). Assumptions about linear climate change may contribute to the under-valuation of both short- and long-term damages and the benefits of timely action (Exeter University and USS, 2023). Assuming constant GDP growth and underestimating damage functions may also obscure the extent of risk transmission. Recent studies call for more dynamic approaches that capture inter-sectoral feedback, tipping points and uncertainty (ibid.).

Together, this body of evidence suggests that climate change presents deeply uncertain and non-linear risks, that are underrepresented in conventional economic and financial models. As the earth system approaches multiple critical thresholds, the probability of abrupt, non-linear and compounding events is rising. These planetary dynamics form the backdrop against which different transition pathways – delayed, failed and twin track – can unfold. The following section therefore examines how such scenarios interact with physical and transition risk to shape economic outcomes.

1.3 Transition Pathways and Risk Configurations

Emissions from EMDEs are now a pivotal factor in the global carbon budget and driving the risk of breaching critical climate system thresholds. EMDEs other than China are projected to contribute over 50 percent of global emissions by 2030, meaning that the trajectory of global warming – and the feasibility of limiting it to 1.5-2°C – now depends on the pace and scale of EMDE transitions (IHLEG, 2024). This centrality is not just a matter of emissions accounting: Recent scientific evidence shows that multiple climate tipping points become likely within the 1.5–2°C range (OECD, 2022; Armstrong, McKay et al., 2022), and that the risks of abrupt, cascading, and irreversible impacts are rising. The latest NGFS scenarios reinforce that, without ambitious and coordinated action across both advanced and emerging economies, physical risks rapidly outweigh transition risks and the Paris temperature goals become unattainable (NGFS, 2024). As a result, the impact of EMDE emissions is not peripheral but fundamental to global systemic risk.

The literature distinguishes between several possible pathways through which the global transition to a low-carbon, resilient economy could unfold. These pathways, which capture different configurations of transition and physical risk, are often characterised as orderly, delayed, and no additional action, depending on whether policy measures are introduced early and predictably, postponed and implemented abruptly, or with no additional policy introduced at all. Scenario frameworks developed by the Network for Greening the Financial System provide a common framework for assessing transition and physical risks under different temperature and policy trajectories (NGFS, 2024). They have become a reference point for climate scenario analysis and stress testing in the financial system, with institutions such as the Bank of England (2022), the European Central Bank (2022), and the

US Federal Reserve (2024) using NGFS scenarios as the foundation for assessing macro-financial and sectoral risks associated with different transition pathways.

In line with the NGFS framework, this report focuses on three modes of transition: delayed, failed, and twin-track, each reflecting a different way in which physical and transition risks unfold and interact over time.

- A delayed transition entails postponed policy implementation, followed by abrupt tightening and increased transition risk (BoE, 2022; NGFS, 2024). The NGFS delayed transition scenario assumes annual emissions do not decrease until 2030, with strong policies needed to limit warming below 2°C.
- A failed transition implies that global emissions continue to rise, leading to escalating physical damage, a loss of adaptive capacity and increased physical risk (IPCC, 2022; NGFS, 2024). This corresponds to the NGFS Hot House World scenario, in which global warming reaches around 2.3-3°C by 2100 under the implementation of pledged or current policies, respectively.
- A twin-track transition describes a global decarbonisation pathway in which advanced economies broadly achieve transition trajectories consistent with Paris Agreement goals, whilst EMDEs lag behind due to asymmetric access to finance and technology and institutional capacity (NGFS, 2024; IMF, 2023). This can be associated with the NGFS Fragmented World scenario, where a delayed and divergent policy response amongst countries leads to high physical and transition risks. This divergence can also reflect different starting positions and structural barriers: EMDEs typically have newer, fossil-based capital stocks, lower per capita emissions, higher marginal abatement costs and more limited fiscal and financial capacity for green investment (IMF, 2023; World Bank, 2024). A twin-track transition is observable in business and industry as listed companies in advanced markets have decarbonised at roughly 7 percent per year since 2015 whereas EMDE corporate emissions continue to rise (Expert Interviews, 2025).

1.4 How Physical and Transition Risks Generate Economic Impacts

The literature identifies multiple channels through which physical and transition risks propagate into economic outcomes. These channels operate at both the micro and macro levels, shaping household welfare, firm performance and national growth trajectories. The economic and financial systems are not passive absorbers of these shocks, but actively amplify and generate risks (Expert Interview, 2025). As a result, economic risks can intensify and reverberate within the real economy and form the mechanisms through which physical and transition risks can evolve into financial risk.

Physical risks materialise within firms and households as disruptions to productivity, income and investment capacity. There is strong evidence that gradual changes in temperature and humidity can lead to productivity losses, health impacts and migration (Dunz and Power, 2021; Carbon Tracker, 2022; WHO, 2023). Climate shocks can accelerate the depreciation of machinery, buildings, and infrastructure, with annual global direct damages from climate-related hazards more than doubling since the start of the century and reaching USD 275 billion in 2022 (Oesterreichische Nationalbank, 2019; Swiss Re, 2023). At the firm level, these losses constrain output, cashflow and resources available for reinvestment and innovation (Oesterreichische Nationalbank, 2019). S&P Global (2025) estimates that, under a 2.7°C warming scenario, climate hazard exposure could cost S&P Global 2100 companies a cumulative USD 25 trillion by 2050 – equivalent to 74 percent of total revenue or 31 percent of 2024 market capitalisation. This includes USD 4.5 trillion in lost revenue from business interruption, USD 3.8 trillion in higher operating costs, and USD 16.5 trillion in property damage and additional capital expenditure. These costs in turn weaken firms' ability to generate revenue, reduces households' repayment capacity, and erodes sovereign tax bases (ibid.).

Policy, technology and market forces reshape the viability of existing assets and industries in a climate transition. To limit warming below 2°C, more than 80 percent of coal, half of gas, and one-third of oil reserves would need to remain unextracted, leaving large volumes of assets stranded (McGlade and Elkins, 2015). Estimates of global wealth losses from stranded assets vary widely: from USD 1 to USD 4 trillion – just below 3 percent of managed financial assets – when considering the energy sector alone, to as much as USD 20 trillion when broader sectoral impacts are included (Mercure et al., 2018; NGFS, 2019). Carbon Tracker (2022) estimates that over USD 1 trillion in oil and gas assets risk becoming stranded, and are concentrated in the financial centres of New York, Moscow, London and Toronto. Policy adjustments such as carbon taxes can increase costs for energy-intensive sectors and generate distributional impacts, with broader macroeconomic effects amplified by global trade and commodity-price shifts (IMF, 2023; NGFS, 2024; Dunz and Power, 2021). However, their overall economic impact depends on country context, time horizon, and policy design, such as the use of revenue recycling (Parry et al., 2012; Shang, 2021; Fugazza, 2024). As set out in further detail below, policy-related costs are outweighed by benefits (in avoided climate losses) in early and coordinated transitions.

Climate risks can generate macroeconomic and fiscal pressures by disrupting supply chains, trade and public finances. Physical impacts can constrain commodity production and distribution, thereby disrupting whole supply chains and generating inflationary or even stag-flationary effects (Banque de France, 2019; NGFS, 2024). Transition shocks can influence current account balances and government revenue, particularly for EMDEs reliant on fossil fuel exports without diversified revenue bases and robust financial buffers (NGFS, 2024; World Bank, 2021). Advanced economy implementation of climate policies such as the EU border carbon adjustment mechanism will affect EMDEs that have yet to implement carbon pricing (ibid.).

Both physical and transition risks can also undermine debt sustainability by increasing public expenditure on recovery and transition, whilst eroding tax revenues as climate impacts weaken economic activity (Dunz and Power, 2021; BoE, 2022; ECB, 2023). Reduced fiscal space and rising debt increase vulnerability to credit downgrades and higher borrowing costs, with empirical evidence linking these trends to greater debt distress and sovereign risk premia (Anyfantaki et al., 2025). These dynamics can trigger feedback loops of macroeconomic volatility and political instability, thereby reducing policy predictability and further affecting sovereign creditworthiness (Dunz and Power, 2021). As outlined in 1,3 above, Investments in adaptation and resilience reduce vulnerability to physical risks, but can entail considerable upfront costs – which remain largely unmet in EMDEs (UNEP, 2024; Duffy, 2025; Global Commission on Adaptation, 2019).

The economic consequences of climate change are unlikely to be evenly distributed between advanced economies and EMDEs. Studies highlight that EMDEs bear a disproportionate share of losses because of geographic exposure and vulnerability, dependence on climate-sensitive sectors, less diversified economies, limited fiscal space and additional barriers to investment (NGFS, 2024). A recent EIB (2025) report finds that EMDEs are the most exposed to physical risks due to adaptive capacity constraints, whilst advanced countries are more exposed to transition risks linked to decarbonisation policy developments, technological shifts and changing market preference. Many EMDEs, including most African countries, face comparatively light risk from stranded assets – energy access issues are instead a greater challenge (Expert Interviews, 2025). Exceptions lie in countries with heavily coal dependent power systems like South Africa, Indonesia and Vietnam where resource dependency combined with policy uncertainty and resistance from industry raises transition risk. Many EMDEs face underlying macroeconomic vulnerabilities, such as weak fiscal buffers, higher borrowing costs, and weak exchange rates, which render them exposed to both global trends and acute shocks (WWF and UCL IIPP, 2025). This means that sovereign stress and potential default are more likely outcomes under increased frequency of extreme weather events for EMDEs (BIS, 2025).

Adaptation and resilience mediate how physical hazards translate into economic and financial losses: the magnitude of damage depends on baseline resilience – such as infrastructure quality, land-use planning, and institutional capacity (Zhou et al., 2023; CCRI, 2021). Where economic resilience is robust, the effect of acute or chronic physical risks on businesses and households can be better absorbed, reducing strain on fiscal resources (via disaster recovery and response and social support) and protecting fiscal resilience. Conversely, Pakistan's floods in 2022 generated household-level losses, damaged rural businesses, and reduced government revenue (World Bank and UNDP, 2022). Resilient infrastructure such as flood defences, transport and power systems lowers the exposure and vulnerability to physical risks, mitigating economic losses and inflationary pressures that destabilize monetary and financial systems (IMF, 2023).

Across the literature, evidence converges on a clear finding: climate risks transmit through multiple and mutually reinforcing channels. Physical and transition risks can undermine productivity, reduce capital and investment, and weaken fiscal positions. The economic impacts are unlikely to be evenly distributed, with disproportionate effects in climate- and transition-exposed countries and sectors. These economic stresses form the foundation for financial-system exposure, as discussed in the following section.

1.5 Transmission of Economic Risks to the Financial System

The literature shows that economic losses from physical climate and transition risks can be transmitted into the financial system through multiple, often interacting, channels. These include credit, market, underwriting, liquidity and operational risks. Together, they form the basis for financial system exposure examined in Chapters 2 and 3. Across sources, there is a broad consensus that financial risks are both a consequence of and a feedback mechanism for real economy stress, amplifying risks and linking climate risks to wider financial instability.

Credit risk is amongst the most well-documented transmission channels linking economic and financial impacts. Climate and transition risks weaken borrowers' repayment capacity through income loss, asset damage and declining collateral values (BCBS, 2021; FSB, 2020). Firms exposed to physical hazards such as floods, storms, and droughts face higher borrowing costs, and tighter credit conditions (Kling et al., 2021). Carbon-intensive firms experience similar pressures under transition scenarios, reflected in lower credit ratings and wider bond spreads among firms operating in jurisdictions with stricter environmental regulation (EBRD, 2019; Seltzer et al., 2025). These effects erode collateral values, constrain credit supply, and can shift household financial behaviour and risk preferences (Bolton et al., 2020). They constrain investment in resilience and adaptation, reinforcing exposure to future shocks. As vulnerable firms and households face weaker cashflows and depreciating assets, defaults propagate through supply chains and financial networks, amplifying systemic credit risk (Dunz and Power, 2021).

Market risk arises as physical and transition risks drive asset price volatility and devaluation. Physical and transition risks can trigger abrupt price corrections across asset classes, particularly where exposures are correlated and not fully priced in (BCBS, 2021). Sudden revaluations of carbon-intensive or climate-exposed firms leading to write-downs, balance sheet impairments and losses in credit quality can cause market volatility and systemic losses where there are correlated breakdowns (BCBS, 2021). Physical shocks such as floods and sea-level rise are reflected in asset markets to a certain extent, with heightened volatility observed in bond and equity markets and properties in high-risk areas trading at discounts (Bunten and Kahn, 2014; Bernstein et al., 2019; Keys and Mulder, 2020; Kruttli et al., 2019). Transition risk drivers, such as climate policy shifts, disruptive technological breakthroughs or rapid shifts in consumer sentiment, can alter perceptions of profitability and asset value in carbon-intensive industries (ibid.). These adjustments can be amplified by litigation, reputational risk and derivates exposure, triggering sharp declines in securities linked to stranded assets and amplifying systemic market volatility (Bolton et al., 2020; ECB, 2020). The extent of these effects depends on how far such risks are priced into markets – a question for which empirical evidence remains mixed (BCBS, 2021).

Insurance and underwriting risk link physical losses directly to financial sector exposure. Climate risk is a first-order issue for insurance markets and insurers are structurally well-placed, pricing in 1-in-200-year events and sophisticated risk modelling and data (Expert Interviews, 2025). However, rising frequency and severity of extreme weather events have driven insurance claims beyond historical norms and raise concerns about insurance sector fragility (Expert Interviews, 2025). Insured losses have increased by 3.9 percent annually over the past 15 years, reaching record levels of around USD 154 billion in 2024 (Gallagher Re, 2025). Higher-than-expected payouts from physical risks and potential under-pricing of new green technology products such as carbon capture and storage, batteries and hydrogen can further amplify underwriting risk (Bolton et al., 2020; Cleary et al., 2019). Although most non-life insurance contracts are repriced annually, growing climate volatility makes accurate risk assessment increasingly difficult, which can erode insurers' capital buffers and potentially undermine insurers' solvency where losses are underestimated (FSB, 2020).

Rising premiums and reduced coverage are widening the protection gap and increasing uninsured losses, which may threaten the solvency of households, firms and governments. As natural catastrophes become more frequent and severe, insurers face mounting claims and higher capital costs, prompting withdrawals from high-risk regions and premium hikes elsewhere (IAIS and BIS, 2025). Uninsured losses now account for around 63 percent of total weather-related damages, and up to 95 percent in EMDEs (Gallagher Re, 2025). This growing gap hits supply chains and trade and exposes households and firms to greater financial losses, weakens loan repayment capacity and raises non-performing assets. The effects spill across mortgage and credit markets and damage bank liquidity (IAIS and BIS, 2025; Expert Interviews, 2025). Data gaps in most countries on what assets are and are not insured means insurers and regulators cannot assess insurance penetration across the real economy and raises uncertainty about where insurance withdrawal could trigger compound effects. Insurance withdrawal can equally increase fiscal pressure on governments, requiring public funds to cover uninsured losses following climate-related disasters (BIS, 2023). For example, the Government of Pakistan (2022) estimates indicate that the 2022 Pakistan floods caused roughly USD 14.9 billion in damages, reduced GDP by 2.2 percent and pushed an additional 8.4 to 9.1 million people into poverty. Roughly 90 percent of the loss was uninsured. The implications of these spillovers for financial stability are examined in greater detail in section 2.4, which considers the interconnectedness of financial institutions and markets.

Liquidity risk arises when climate or transition risks trigger sudden shifts in customer confidence or capital flows. Climate risks can affect financial institutions' liquidity both directly, by limiting access to stable funding, and indirectly, as households and firms withdraw deposits or credit lines (BCBS, 2021). Empirical evidence shows that physical risks can have tangible liquidity impacts: following the 2011 Great East Japan Earthquake, the Bank of Japan injected a record JPY 21.8 trillion to stabilise markets (BoJ, 2011), whilst German banks exposed to the 2013 Elbe floods faced sustained liquidity declines over two years (Koetter et al., 2020). Although transition risk could also generate liquidity stress – such as through the fire sales of high-carbon assets – empirical evidence on this channel remains limited (BCBS, 2021; Bank of Canada, 2023; Lang et al., 2023).

Operational, legal and reputational risk are less well documented in the literature and appear to pose lower systemic risk than other financial channels. These risks arise when climate hazards and evolving regulatory demands disrupt financial operations, raise compliance costs, and expose firms to litigation and reputational damage. Physical events such as floods and wildfires can affect financial institutions' infrastructure and raise input costs, though impacts remain limited (Bolton et al., 2020; Miller and Dikau, 2022). Stricter disclosure and mitigation requirements have raised compliance burdens, whilst inadequate climate risk management has led to lawsuits and reputational harm (BoE PRA, 2024). Climate-related litigation is increasing, with over 3,000 cases recorded globally, including 136 in the UK (Sabin Centre for Climate Change Law, 2025). Setzer and Higham (2024) outline seven types of litigation, based on their legal objectives, including seeking damages from major emitters, targeting inadequate adaptation measures by governments or firms, and addressing poor management of low-carbon transition risks.

These individual risk types do not operate in isolation. Credit losses can feed into market repricing, insurance shortfalls can lead to credit risk, and fiscal deterioration feeds back into sovereign and banking stress. The Financial Stability Board (FSB) (2020) and BCBS (2021) identify second-round effects in which market volatility and financial stress amplify macroeconomic downturns. Feedback loops can also arise from the potential response itself: prudential tightening or risk aversion can curtail credit precisely when economies need it the most (Dunz and Power, 2021). As these risks accumulate, the financial system becomes both a transmitter and amplifier of climate risks, as discussed in Chapter 2.

1.6 Scale of Losses Under Different Scenarios

The literature provides a wide range of qualitative channels and quantitative estimates for the potential economic and financial costs of climate change and transition risks. Differences in model design, assumptions and the time horizon mean that absolute figures vary, but the direction of effect is consistent: economic and financial losses are greater under more delayed and disorderly transitions. Scenario exercises undertaken by the NGFS (2024), IMF (2022) and BIS (2025) converge on the finding that a failed, delayed and disorderly transition imposes substantially higher long-term costs than an orderly transition, even when accounting for short-term adjustment pressures.

The scale of losses differs across modelling approaches. Estimates of economic losses vary widely due to differences in modelling methods, assumptions, data, sectoral coverage and time horizons, complicating cross-study comparisons and global stability assessments (FSB and NGFS, 2022). As climate scenario analysis remains uncertain, modelling results from NGFS (2024), Bank of England (2022) and BIS (2021) should be seen as exploratory exercises to test system resilience under a range of uncertain futures and assumptions, rather than as forecasts or predictions of specific outcomes. Engagement with financial institutions confirms that, in practice, climate models are used to show trends, raise awareness inform broad strategic decisions, rather than to assess precise values and investment allocations (Expert Interviews, 2025).

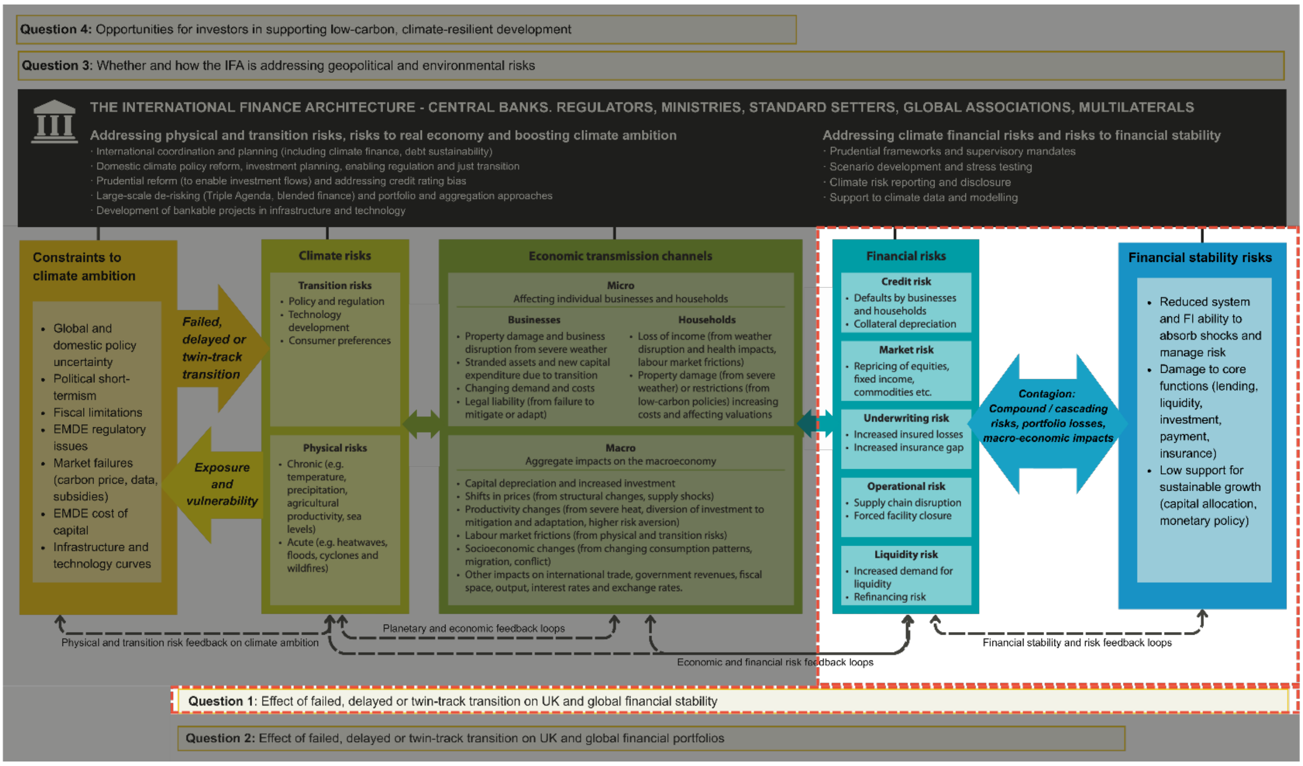
Scenario analyses show that early and coordinated transitions, whilst involving short-term adjustment costs, deliver lower long-term losses. Delayed transitions increase macroeconomic costs, by compressing adjustment into a shorter window and potentially triggering abrupt market repricing, according to analysis by IMF (2022), NGFS, (2024, 2025), and BIS (2025). Intensifying physical climate impacts add to these transition challenges, leading to greater economic losses and higher inflation (IMF, 2022). The IPCC AR6 (2022) finds that delayed mitigation amplifies physical risk intensity, leading to projected GDP losses of up to 7 percent annually in vulnerable EMDEs by 2100. NGFS (2025) finds that a gradual transition would result in limited but negative GDP impacts by 2030, yet economic costs are higher under a delayed, disorderly transition. BIS (2025) finds that orderly transitions initially raise financial crisis probabilities to around 3 percent per year but subsequently reduce them to 1.4 percent under full abatement, compared with 2 percent without climate policy. Similarly, the Bank of England’s (2022) Climate Biennial Exploratory Scenario (CBES) finds that bank losses nearly double under a Late Action Scenario – an additional GBP 110 billion compared to an Early Action Scenario, with around 40 percent realised in the first five years. Nevertheless, the CBES analysis notes that the projected impacts under a delayed transition are not expected to generate systemic stress whilst acknowledging data limitations and exclusion of cascading climate and geopolitical risks.

‘Hot House World’ scenarios, where no additional climate action is taken, result in sharply higher physical risks and severe economic losses, though estimate still vary widely. NGFS (2024) presents scenarios of global GDP decline varying from around 2 percent to 44 percent by 2100 under a 3°C warming trajectory consistent with current policies (NGFS, 2024; Nordhaus and Boyer, 2017; Bilal and Kanzig, 2024). Analysis by Exeter University and the Institute and Faculty of Actuaries (2023) using alternative modelling techniques suggests possible GDP destruction of up to 50 percent between 2070 and 2090 under current policies leading to 3°C or more of warming. By contract NGFS’s own analysis presents damaging but more modest outcomes. NGFS Phase V Scenarios (2024) model that with end-of-century warming of about 3°C, global GDP would fall by roughly 15 percent by 2050 and 30 percent by 2100 relative to a no-climate-change baseline in which GDP is assumed to continue growing throughout the century. So too the Bank of England’s CBES (2022) 'No Additional Action' scenario, in which global temperatures rise by 3.3°C by 2050 and 4.1°C by 2100 and which factors in GDP effects from physical damage but not non-linear climate change, projects bank impairment rates more than 50 percent above normal by mid-century, and insurance losses 50-70 percent higher than average, up to four times firms’ own estimates. These findings highlight the substantial economic and financial risks and uncertainties of an unmitigated warming pathway, which may be underestimated by financial institutions’ current methodologies.

Scenario analysis explicitly examining the economic impact of twin-track transitions remains limited. The NGFS (2024) Phase V introduced the *Fragmented World* scenario to capture a delayed and divergent policy response, where some countries only achieve 80 percent of their net zero targets whilst others continue on current policy pathways, resulting in end-century warming of about 2.3°C. Burke et al. (2024) estimate average GDP losses of around 9 percent by 2050 for this scenario. This is slightly higher than under the ‘Disorderly and NDCs’ scenarios, though this could partly reflect differences in assumed temperature outcomes (CRIEPI, 2024). Looking at shorter-term scenarios up to 2030, the NGFS (2025) ‘Diverging Realities’ scenario assumes that advanced economies pursue net zero transition whilst the rest of the world experiences a series of extreme weather events, with impacts transmitted globally through trade and financial linkages. This scenario results in the highest global GDP losses amongst the NGFS short-term scenarios, with losses of up to 2.8 percent. Overall the scenarios show that an early, ambitious, and globally coordinated green transition leads to lower economic losses. To date, most supervisory stress tests, such as the Bank of England's CBES (2022) and European Central Bank (ECB) (2021) exercises, have not explicitly modelled the asymmetric dynamics of a twin-track transition.

Scenario analyses consistently show that the economic and financial costs of climate change are higher under delayed and failed transitions, compared to an orderly transition. Whilst estimates vary, early and coordinated action seems to deliver lower long-term losses than delayed or unmitigated pathways (Expert Interviews, 2025). There is early evidence that fragmented and divergent policy can result in significant economic losses, yet further analysis is needed on the economic impact of twin-track transitions specifically. Building on these findings, the following chapter examines how such economic impacts and transition failures can translate into financial instability. It explores the mechanisms through which physical and transition risks propagate through the financial system, amplifying losses and potentially disrupting core financial functions.

2. Implications for UK and Global Financial Stability to 2100



2.1 Introduction

Building on the analysis of physical, transition, economic and financial risks in Chapter 1, this chapter examines how climate transition dynamics can evolve into system-wide financial instability. Whereas the previous chapter traced how physical and transition risks affect firms, households, sovereigns, and financial institutions, this chapter focuses on how those channels interact across institutions and markets, potentially amplifying losses and disrupting the core functions of the financial system.

This report adopts a functional definition of *financial stability,* focused on the system's ability to deliver essential services under stress. In this report, financial stability is understood as the ability of the financial system to provide essential services – such as payments, savings, credit allocation, risk management, and liquidity provision – without large-scale institutional failure or severe disruption to intermediation. A stable system has sufficient resilience to maintain these vital services in a way that absorbs rather than amplifies shocks (IMF, 2007; Bank of England, 2024). This chapter focuses on implications for both UK and global financial stability, recognising that cross-border linkages and spillovers mean that these systems interact.

The chapter reviews evidence on how climate-related risks can compromise financial stability through three interconnected mechanisms. The first is systemic mispricing of risk, where data gaps, model limitations, and unrealistic assumptions such as smooth damage functions and constant growth rates obscure the true scale of potential losses. This underestimation raises the likelihood of abrupt market corrections or liquidity shocks once risks are re-evaluated. The second is financial interconnectedness, as common exposures, correlated market behaviour, and the withdrawal of insurance coverage increase the risk of local shocks cascading through the financial system. These dynamics can amplify losses across sectors and institutions, particularly in EMDEs where fiscal and financial buffers are weaker and sovereign-bank feedback loops could intensify stress. The third is cross-border spillovers, transmitted through global banking, reinsurance, supply-chain, and trade networks. Risks originating in small or peripheral markets can propagate rapidly through these linkages, amplifying volatility and undermining financial stability in advanced economies.

Whilst the past decade has seen an increased recognition that climate-related financial risk may impact financial instability, research on the precise relationship remains nascent. Major institutions, such as the Financial Stability Board (2020) and the Basel Committee on Banking Supervision (2021), have identified a range of amplification mechanisms and feedback loops that could transmit and intensify climate risks across the financial system. These include the high interconnectedness of financial institutions, markets and regions, as well as potential contagion effects through asset repricing and funding channels. These factors relate to the overlapping nature of climate transmission channels, where multiple economic and financial risks can occur simultaneously, interact with one another, and create interdependent feedback loops – amplifying the combined impact of climate risk drivers across several channels and potentially turning into a vicious cycle (Dunz and Power, 2021; BCBS, 2021).

Significant uncertainty remains around the nature and materiality of climate-related amplification mechanisms, as well as the scale and timing of both physical and transition risks. Quantitative evidence on how these risks affect economic and financial outcomes – and when such impacts might escalate into systemic stress – remains limited (Battiston et al., 2021; Expert Interviews, 2025). This uncertainty is compounded by the variable pathways that climate change and policy will take, and by the limited understanding of how they will interact with the wider economy through complex transmission channels (Bolton et al., 2020). There is equally no consensus on how or when these risks may materialise (Financial Times, 2025; Expert Interviews, 2025).

Studies and expert views differ on whether, how and how soon financial instability may emerge. Shifts in global energy markets or transition data could cause sudden market corrections as carbon-intensive assets are repriced. Rising physical risks under business-as-usual GHG emissions could lead to rising insurance withdrawal, make the insurance model unviable, reducing investment and undermining the structural integrity of financial markets once the (Bank of England, 2021; IMF, 2022; Financial Times, 2025; Expert Interviews, 2025). A ‘climate Minsky Moment’ could materialise before planetary consequences become apparent through the rapid repricing of expected risk (Expert Interviews, 2025). Under an alternative scenario, governments and markets could sustain economic and financial stability through fiscal transfers, monetary policy, financial and prudential regulation, insurance mechanisms, and social protection measures – until planetary risks become severe and potentially irreversible (Expert Interviews, 2025). While transition risks were once viewed as the primary threat to financial stability, rapidly intensifying physical risks are increasingly recognised as potential sources of systemic stress (Financial Times, 2025).

Across this literature, the direction of risk is clear, but its magnitude remains uncertain. Empirical evidence on how these mechanisms interact – for example, through compounding or non-linear feedback mechanisms – is limited, underscoring the need for more robust data, modelling, and coordinated stress-testing frameworks. A number of papers also highlight the importance of considering extreme outcomes and tail risks, as scenarios focused on probably outcomes may underestimate the likelihood and impact of ‘fat tail’ events (IFoA and University of Exeter, 2024; Kemp et al, 2022). The findings illustrate how transition delay or divergence could escalate from localised shocks into systemic instability, setting the stage for analysis in Chapter 3 of portfolio-level exposures and Chapter 4 on institutional and policy responses to climate risk within the IFA.

2.2 Mispricing of Climate-Related Risks

Mispricing of physical and transition risks may pose a threat to financial stability, as gaps in scenarios, data, modelling and valuation methodologies obscure the true scale of potential losses and heighten the risk of abrupt market corrections. Whilst empirical results from scenario testing by central banks demonstrate manageable climate impacts, these results have been challenged on the basis of model limitations (Carbon Tracker, 2022; Bolton et al., 2020). The literature points to the inherent uncertainty and non-linear nature of climate change and the role of tipping points and tail risks, which complicate the modelling of potential economic and financial impacts and can lead to the systemic mispricing of climate risks. Evidence on whether financial institutions accurately account for climate risk remains mixed, yet the limitations to the economic models and scenarios are widely recognised (Battiston et al., 2021).

These limitations hinder the accurate assessment and pricing of physical and transition risks, potentially leading to systemic market valuation errors that, when corrected, could trigger abrupt adjustments at the asset, insurance, banking and system levels (BIS, 2025). This can give rise to a climate ‘Minsky Moment’, where a sharp drop in liquidity or asset values sparks fears that financial intermediaries cannot meet depositor obligations, potentially setting off a financing crisis (ibid.). Equally the rising exposure and vulnerability of assets to climate risks threatens insurance market stability and can lead to the withdrawal of insurance, with knock-on effects on mortgage viability, property market values, and banking system stability (Financial Times, 2025).

The literature identifies three distinct but related challenges for the pricing of climate-related risk: the adequacy of scenarios and modelling frameworks; the availability and quality of underlying data; and the degree to which markets internalise known climate-related risks.

Climate scenario analysis is complex and debate exists as to the most effective and accurate methods and assumptions. The divergence between mainstream economic projections with climate-science literature indicates that the timing and scale of economic and financial damages may be under-estimated (Carbon Tracker, 2022; Expert Interviews, 2025). Carbon Tracker (2022, 2025) note improvements in NGFS and FSB scenarios compared to earlier iterations, whilst criticising gaps and failings, in particular damage functions that do not address non-linear changes and cascading and accelerating risks in climate systems, notably around tipping points and fat tails. Exeter University and USS (2023) also note that NGFS pathways miss critical real-world features, such as acute weather shocks, economic volatility, financial market dynamics, stranded assets, labour dynamics, unemployment, and behavioural shifts, which can understate downside risks and the benefits of timely action. Expert interviews (2025) highlight the role of geopolitical factors such as migration, global cooperation, state fragility and conflict in particular, which are currently not accounted for in climate scenarios. Divergence also stems from differences in scenario assumptions about carbon price trajectories, technology adoption rates and sectoral coverage (NGFS, 2022). Scenario narratives fail to capture how sudden shifts in investor expectations are a potential cause as much as a consequence of the transition risks facing exposed financial assets, which makes financial risk endogenous (Exeter University and USS, 2023; BIS, 2025).

There is ongoing debate about the assumptions linking climate change and economic activity. NGFS Phase V scenarios are based on the assumption of a constant 2.5 percent annual growth rate through 2050, drawn from the IPCC's Shared Socio-economic Pathway 2 (SSP2). The failure to address the critical role of economic volatility as a cause, not just a consequence of climate change, has been widely criticised (Expert Interviews, 2025; Exeter University and USS, 2023). The NGFS (2020) itself notes that results are highly sensitive to how economies and financial systems are assumed to respond to shocks. Broader literature questions the realism of stable growth assumptions, as recent econometric studies find that climate change not only affects GDP levels but also growth rates, implying compounding losses and larger long-term impacts than business-as-usual growth would offset (Kahn et al., 2021; Kotz et al., 2024; IMF, 2025). NGFS (2024) scenarios also do not account for long-term adaptation measures, which can misrepresent risk exposure.

At the institutional level, financial institutions have limited visibility into their climate-related exposures. Data availability is widely recognised as a key constraint to developing robust climate risk measurement frameworks, with firms lacking both forward-looking climate projections and the information needed to link these to their asset and lending portfolios (BCBS, 2021; BoE, 2025). Some of these data gaps are especially acute in EMDEs (FSB, 2021). Data on exposures to physical risks often lack consistency and granularity, as the locations of counterparties, supply chains and collateral are rarely disclosed or standardised (FSB, 2021; Brunetti et al., 2021; BoE, 2025). Information on transition risk is also incomplete: classification systems for low- and high-carbon assets are inconsistent and proxy data remain widely used (FSB, 2021; Alvarez and Marsal, 2022; Brunetti et al., 2021). For instance, proxies accounted for over 80 percent of emission Scope 3 estimates in the European Central Bank's 2021 climate stress test (Alvarez and Marsal, 2022). More forward-looking data is needed, as the non-linear nature of climate change means that historical data are a poor guide to future risk (FSB, 2021; NGFS, 2021). Additionally, it is important to note that even companies with modest carbon footprints or low emissions intensity may for these reasons face material transition risks (Carbon Trust, 2024).

Underpriced damages and smooth damage functions can mask systemic risks until shocks emerge, triggering abrupt shifts in risk perception and disorderly repricing. Climate shocks, such as physical hazards and abrupt changes in policy, technology or market sentiment, may lead to a collapse in asset prices. Such correlated market corrections can trigger fire sales of carbon-intensive assets and transmit stress across the financial system (FSB, 2020; Barnett, 2024; BIS, 2025). Lenton et al. (2025) note that financial markets may experience a 'Minsky Moment' as investors react to the prospect of future tipping point risks, potentially triggering instability even before physical thresholds are reached. Empirical analysis of financial actors' and markets' reaction to climate change, and the pricing of climate change risk considerations in investment decisions, are still at an early stage (Battiston et al., 2021).

The literature suggests that physical and transition risks are partly priced in credit and equity markets, but evidence is mixed and primarily focused on advanced markets (BIS, 2022). Nevertheless, there is some early evidence that indicates the possibility of a climate Minsky Moment. The Bank of England (2024) finds that for high-yield bonds with maturities over eight years, only about half of the transition risks expected under an orderly transition scenario are priced in across most sectors. In the energy sector, less than 35 percent of transition risk impacts are priced in (ibid.). The NGFS (2025) short term scenario, which features an abrupt shift in investor preferences leading to a Minsky Moment, indicates increased economic costs, with global GDP in 2030 being 1.3 percent below the current climate policy baseline. This decline is larger than under an orderly transition, which is associated with a 0.5 percent GDP reduction. However, by relying on a single GDP baseline, NGFS short-term scenarios may understate the transition risks from economic volatility, which could trigger more severe repricing of climate-related financial assets (Cliffe, 2025). Using a new non-linear macroeconomic model, BIS (2025) finds that climate policy in line with the Paris Agreement initially heightens financial fragility risks, with the probability of a financial crisis increasing to almost 3 percent compared to 2.1 percent in the current policy trajectory.

Climate scenario models that do account for extreme cases or second-round effects demonstrate more significant economic impacts that could threaten financial stability. This risk of tipping points is increasingly recognised by global institutions. For example, the Organisation for Economic Cooperation and Development (OECD), ECB and IMF note that the collapse of globally important biomes could have systemic and likely irreversible impacts (OMFIF, 2025). As noted in chapter 1, with current policies leading to circa 3°C of warming there could be a 44 percent decline in GDP by 2100 from a baseline rate of growth or, using alternative methods, a 50 percent destruction of GDP between 2070 and 2090 (Bilal and Kanzig, 2024; IFoA, 2023). Some scenarios in the IFA show more variance. The FSB (2020) recognises that whilst their central estimate of asset price declines from 2.5°C warming is relatively modest at 1 to 1.8 percent by the year 2105, there is a 5 percent probability of losses exceeding 4.8 percent and a 1 percent probability of losses exceeding 16.9 percent. In more extreme cases, the most severe reduction in asset prices could reach 30.1 percent, occurring with a 3 percent probability by 2105, highlighting the potential scale of financial system shocks.

The ECB's Fit-for-55 exercise (2024) models the 2022-2030 period assuming full implementation of the EU's 55 percent emission reduction target by 2030. It estimates losses equivalent to 3.9 percent of total exposure in scope (EUR 945 billion) under an orderly transition, compared to nearly 6 percent (EUR 1.46 trillion) for a transition that features a sudden market repricing of carbon intensive assets. When this abrupt repricing is combined with a global economic downturn and geopolitical tensions, losses could go up to 15.8 percent of total exposures, or even 20.7 percent when second-round contagion and amplification effects are taken into account.

2.3 Interconnected Financial Institutions and Markets

The interconnectedness amongst financial institutions and markets means that climate risks can propagate rapidly across the financial system through indirect exposures, feedback loops and market spillovers. Whilst the manifestation of climate-related risks may initially be concentrated within certain sectors, they can synchronise under stress, amplifying systemic vulnerabilities and warranting a macroprudential perspective.

One such amplifier of financial instability could be the withdrawal or unavailability of insurance coverage, which can set off a feedback loop of reduced bank lending, culminating in a mortgage and real estate stress. As physical risks materialise under business-as-usual emission trajectories, rising correlated losses could render the insurance model unsustainable, undermining the structural integrity of financial markets (Financial Times, 2025). Reduced insurability could constrain access to credit, as uninsured properties may no longer qualify as collateral (BIS, 2023; Nevitt and Pappas, 2024; IAIS, 2021). It can also cause risks to translate directly into economic losses (via operational or supply chain failures) for households, firms, and governments – and consequently financial institutions – rather than being absorbed by insurance (BIS, 2021; IAIS and World Bank, 2025; Expert Interviews, 2025). Diminishing access to credit and a higher likelihood of default from uninsured losses both heighten banks' credit risk and loan portfolio vulnerability (BIS, 2023). Whilst EMDEs are particularly vulnerable due to low insurance coverage and high exposure to climate hazards, similar dynamics could emerge in advanced markets such as the UK and the USA (BoE, 2024; Financial Times, 2025). These effects may also spill over globally and to the UK through the reinsurance market, as large climate-related losses drive up premiums and reduce coverage, rendering assets uninsurable and spreading financial stress to other parts of the system (IAIS, 2021; BIS, 2021; FSB, 2025; IAIS and World Bank, 2025; Expert Interviews; 2025).

Although we did not find a study that quantified the systemic likelihood of such crisis, there is growing evidence supporting its core dynamics. Research on the US market shows that higher insurance premiums after natural disasters worsen borrowers' creditworthiness, and lead to higher delinquency rates (Ge et al., 2025; Kousky et al., 2020). Meanwhile, banks are beginning to adjust their lending behaviour, with several institutions – including UK's Nationwide – ceasing to issue mortgages on properties located in high flood-risk areas (IAIS and BIS, 2025; Bloomberg, 2024). Interviews indicate that financial institutions and industry experts increasingly view this risk as near-term and significant, whilst acknowledging that its impacts may be underestimated by current models (Expert Interviews, 2025). A recent

Financial Times (2025) article highlights growing concerns that escalating climate-related disasters can have significant effects on insurers and financial institutions, potentially destabilising property markets and posing systemic risks. Nevertheless, there remains no clear consensus in the literature we reviewed that climate-induced insurance withdrawal alone will directly trigger a systemic, global financial crisis (ibid.).

Climate risks can trigger pro-cyclical behaviour amongst market participants, amplifying financial instability through widespread increases in risk premia and correlated asset sell-offs. Shocks or a sudden realisation of the gradual accumulation of risks – including shifts in policy, technology and market sentiment, or physical climate events – can trigger abrupt revaluations of perceived climate risks (Expert Interviews, 2025). This may lead to sharp repricing of climate-sensitive assets and, in turn, large-scale withdrawals and fire sales (FSB, 2020). This is particularly likely if climate shocks prove more extensive and correlated across assets than anticipated, for example through common exposures across financial institutions (ibid.). Such common exposures can be pronounced among non-bank financial institutions, where cross-holdings and overlapping portfolios can serve as channels for contagion. An ECB (2022) report finds that when funds either own shares in one another or hold large portions of the same assets, physical shocks are harder to absorb and tend to propagate more strongly. Whilst FSB (2025) notes that EMDEs are less exposed given the smaller size of the non-banking financial institutions sector, this risk could still manifest through large-scale withdrawal of funding from foreign investors (FSB, 2020). Empirical evidence from Fecht and Goldberg (2025) further shows that non-bank intermediaries can transmit liquidity shocks across borders, indicating that cross-holdings can propagate instability across financial systems.

Interlinkages between financial institutions and sovereigns can heighten systemic fragility through a two-way feedback loop known as the sovereign-bank nexus. Sovereign creditworthiness affects financial institutions via channels such as direct losses on government bond holdings, reduced collateral and funding access, weaker state support capacity, and contractionary fiscal impacts (Caruana and Avdjiev, 2012). Conversely, financial institutions can undermine the government's fiscal position through bailout costs, reduced tax revenues, and contingent liabilities during crises (ibid.). Accordingly, climate risks can simultaneously weaken banks' balance sheets and erode sovereign fiscal positions, creating reinforcing negative feedback loops (World Bank, 2024; Bernhofen et al., 2024). These feedback mechanisms have historically undermined financial stability, as seen during the 2008 global financial crisis (Caruana and Avdjiev, 2012).

Research on the links between climate change and sovereign risk was limited until recently but has been growing in recent years. Climate change is increasingly recognised as a driver of deteriorating sovereign credit ratings through both physical and transition risks (Boehm, 2020; Cevik and Jalles, 2020; Klusak et al., 2023; Burke et al., 2024). Klusak et al. (2023) developed the first climate-adjusted sovereign credit rating, projecting that over 50 countries could face climate-induced downgrades by 2030, and nearly three-quarters of all 109 sampled countries by 2100. Burke et al. (2024) and Holden et al. (2024) assess how alternative transition pathways affect sovereign credit ratings, with results indicating that all NGFS scenarios, including an orderly *Net Zero 2050* scenario, lead to credit rating downgrades. Burke et al. (2024) find that the *Fragmented World* scenario, featuring high regional variation in climate policy, has the most severe impact on sovereign creditworthiness, leading to an average downgrade of around 3.9 notches. Holden et al. (2024) link their analysis to measurable market impacts, with a disorderly transition leading to abrupt repricing and short-term portfolio losses of around 10 to 20 percent in G7 sovereign bonds.

EMDEs are especially exposed, as weaker institutions and constrained fiscal capacity heighten the risk of sovereign stress and potential default (BIS, 2025). EMDEs are likely to face an adaptation trap, where high sovereign risk and limited fiscal space constrain adaptation investment, increasing vulnerability to disasters and further elevating default risk and borrowing cost (Duffy, 2025). Financial institutions in EMDEs have high exposures to sovereign debt, averaging 35 percent in EDMEs and exceeding 50 percent in debt-distressed countries (World Bank, 2024). A loss of just 5 percent on sovereign holdings could leave one-fifth of banks in debt-distressed EMDEs undercapitalised, increasing the risk of a joint banking-sovereign crisis (ibid.). Expert interviews (2025) noted that current models overlook potential spillovers to advanced markets – for instance, simultaneous climate shocks could drive multiple EMDEs into debt distress, spark capital flight and dollar surges, and ultimately transmit financial stress to advanced economies.

2.4 Cross-Border Spillovers

The interconnectedness of global financial markets and supply chains allows climate risks to spread across borders, transmitting and amplifying financial risks from one region to another. It is well established that the transmission of climate-related risks varies widely across regions, sectors and financial systems, with impacts often concentrated in particular industries or geographies (ECB and ESRB, 2021; BCBS, 2021; BIS, 2020). However, the literature also highlights that risks initially confined to specific sectors or locations can escalate into systemic shocks, posing broader threats to financial stability and long-term economic growth (Dunz and Power, 2021). Historical crises, such as the 2008 financial crisis, demonstrate that globally interconnected financial systems can propagate financial instability (Caruana and Adjiev, 2012).

The severity and materiality of climate risks vary widely across countries, reflecting differences in exposure, vulnerability and structural resilience. These disparities are shaped by several factors: the likelihood and intensity of climate hazards themselves and whether they are acute or chronic, the structural characteristics of economies and markets that influence how shocks are transmitted, the differences in financial system depth and composition, and institutional capacity to raise investment and implement policy (BCBS, 2021; BIS, 2020; Dunz and Power, 2021; Bolton et al., 2024). Empirical evidence highlights these disparities: EMDEs have borne a disproportionate burden from climate catastrophes, suffering almost twice the economic damage relative to the size of their economies in recent decades (IMF, 2020). The macroeconomic fragility of many EMDEs amplifies climate risks, as weak fiscal buffers, high borrowing costs, currency volatility and large foreign-denominated debts leave these economies highly exposed to both global shocks and local crises (WWF and UCL IIPP, 2025).

Whilst initial risk and shocks might be contained within sectors or geographies, they can propagate across borders through deeply interconnected financial and real-economy linkages. The FSB (2020) identifies several cross-border transmission channels, noting that global financial interconnectedness can both mitigate and amplify climate-related risks. On the one hand, cross-border investments and globally diversified capital pools, such as those managed by insurers, can help absorb losses from large climate events and reduce risk concentration within a single economy. On the other hand, this same interconnectedness creates pathways for contagion, as climate shocks in one country can alter market expectations and global risk premia elsewhere, or lead to divestment from vulnerable markets.

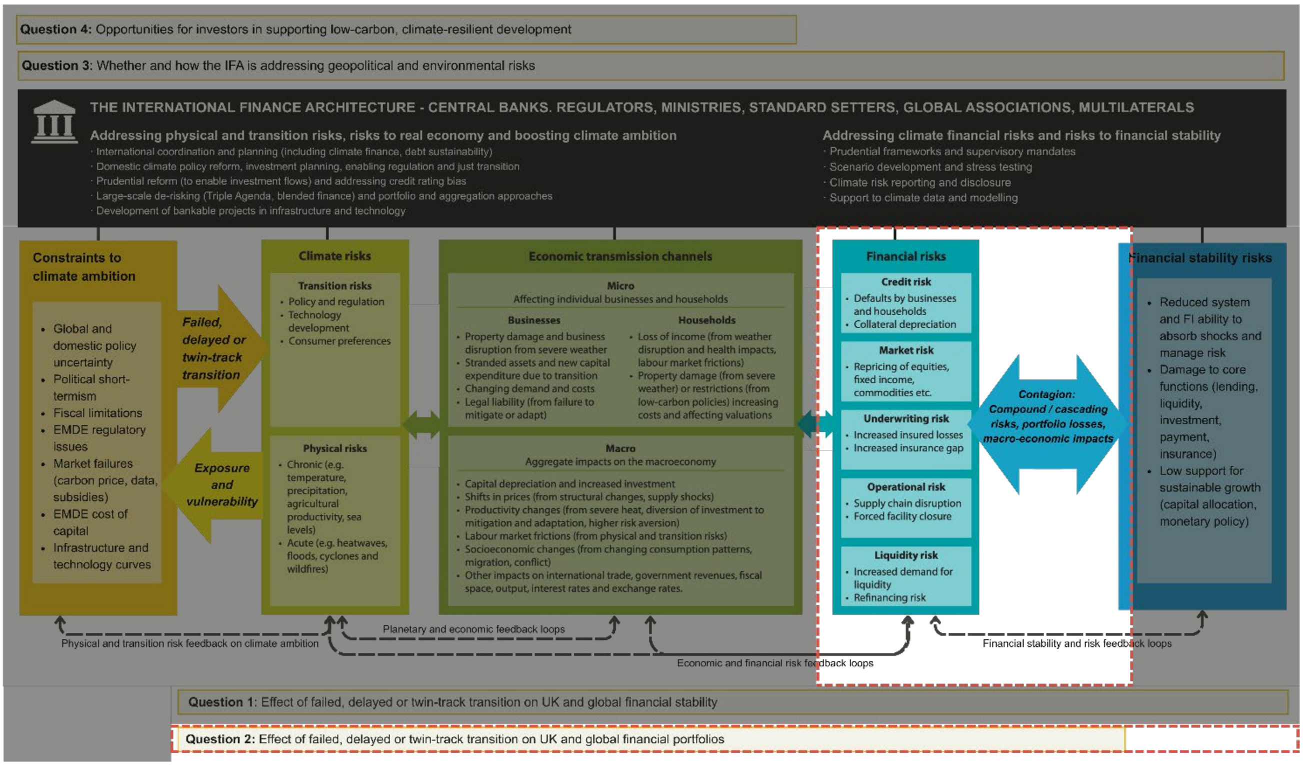
Cross-border spillovers through networked financial and trade linkages represent a key channel through which twin-track transitions can affect financial stability in advanced markets. Cross-border bank exposures, reinsurance concentration, and global supply chain dependencies are amongst the principal network pathways (BIS, 2020; BoE, 2022). Banks operating across both EMDE and advanced markets may seek to rebalance risk across their balance sheets, transferring stress from emerging market portfolios to advanced market holdings. Whilst this may stabilise operations in EMDEs, it does not reduce overall risk levels and can heighten instability in advanced markets. Similarly, global reinsurance and catastrophe pools, whilst designed to distribute losses, can become vectors of contagion: concentrated climate-related losses in one EMDE region can generate liquidity and capital pressures throughout the global insurance sector. E3G (2024, 2025) also finds that sovereign fiscal stress in disaster-affected and emerging economies can generate cross-border spillovers, affecting both creditor countries and neighbouring countries.

Supply chain and trade linkages present an additional vulnerability, as production shocks in EMDEs – particularly food, energy, commodities or critical minerals – can reverberate through multinational companies. Where financial institutions have significant equity or stock holdings in such companies, this could lead to financial downturns across developed portfolios. Yin and Cao (2024) explore global equity contagion patterns that show evidence of short-term propagation of climate shocks, with risks spreading rapidly through interconnected financial systems. They find that physical climate risks, such as drought, precipitation and temperature changes, propagate across global stock markets in a contagion-like process, starting in Asian markets and moving to European and American markets. Rapid land devaluation linked to tipping points and ecosystem collapse can further undermine collateral values and disrupt land-based industries in EMDEs, with subsequent impacts on supply chains and company activities (WWF and UCL IPP, 2025).

There is limited evidence on the significance of network effects from local shocks spreading through financial and trade linkages. While a delayed or failed transition in EMDEs could indirectly affect global economic and financial systems by driving higher global temperatures, the extent of indirect network effects depends on the structure of global supply chains (ECB, 2021). Although cross-border investment and lending in developing economies have increased, progress has been uneven and remains modest compared with advanced economies, where trade and financial linkages are deeper (McKinsey, 2024; BIS, 2025). As a result, there is little empirical evidence on whether physical or transition shocks in developing economies could propagate and trigger financial instability in advanced economies. Whilst expert interviews (2025) with financial institutions and industry experts underscore the role of supply chains, commodity shocks and sovereign defaults in shaping UK and global financial risk – and suggest that indirect effects could be substantial for financial stability in advanced economies – more research is needed. The next chapter examines this further, focusing on the direct and indirect EMDE exposures of UK financial institutions and portfolios.

The evidence shows that climate shocks can transmit from firm- and sector-level losses to system-wide fragility. A growing body of literature highlights that climate risks are correlated, compounding and insufficiently captured by conventional models, creating conditions for systemic mispricing and underestimation of risk. The interconnectedness of financial institutions and cross-border networks further amplifies these dynamics. This also applies to twin-track transitions, which transmit stress from EMDEs to advanced markets through banking, reinsurance and supply chain channels. The following chapter builds on this analysis, examining how a delayed or failed EMDE transition could erode portfolio and asset values, increase funding costs, and alter risk-return profiles across global portfolios.

3. Impact of a Delayed or Failed EMDE Transition on Financial Portfolios



3.1 Introduction

Building on the discussion of systemic financial risks in Chapter 2, this chapter examines how climate risks and transition dynamics translate into portfolio-level exposures. While Chapter 2 considered how climate risks propagate through financial systems, this chapter focuses on how those dynamics materialise within the asset holdings of banks, insurers, and institutional investors. It bridges the firm-level and systemic analyses by showing how indirect linkages with EMDEs might amplify losses even when direct exposures are small.

The chapter draws together evidence on the composition of EMDE exposures within UK and other advanced market portfolios, the channels through which transition divergence and delayed action transmit financial stress, and the distribution of losses across financial actors. It also reviews the performance and limitations of current climate risk models and scenarios in capturing portfolio-level, compounding, and tipping point effects. Inconsistent methodological assumptions across modelling frameworks produce wide dispersion in loss estimates.

Across academic studies, supervisory exercises, and modelling analyses, the evidence base is substantial but uneven. Most sources agree that indirect and contingent exposures are systemically relevant, yet significant analytical and empirical gaps remain. Data on portfolio-level EMDE exposures are fragmented, with limited granularity on cross-holdings by asset class or sector. Disclosure gaps in EMDE financial data continue to hinder accurate estimation of default probabilities and credit losses, while existing scenario models under-represent compound feedback and cross-border contagion. Empirical research on investor behaviour and adaptive portfolio responses is also sparse. These limitations mean that while the direction of risk is well-established, the magnitude of potential portfolio impacts remains highly uncertain.

3.2 UK and Developed Market Portfolio Exposure

UK portfolios have limited direct exposure to emerging markets and developing economies, but indirect and contingent exposures remain significant. UK institutional investors – including pension funds, insurers, and asset managers – hold relatively low shares of assets in EMDEs, either directly or through pooled vehicles (ONS, 2019; Expert Interviews, 2025). For example, UK pension funds' direct EMDE allocations totalled approximately £14.2 billion in 2022 (around 0.5 percent of assets under management (AUM)), equivalent to 2.6 percent of overseas holdings, with a strong preference for the US and other developed markets (Attridge, 2024; Reuters, 2025). This underweighting reflects a combination of behavioural, institutional, and regulatory factors (BIS, 2023). While regulatory frameworks such as Solvency 2 and Prudential Regulation Authority (PRA) rules impose prudential limits – particularly for insurers – investor decisions are also shaped by internal risk limits and the fundamental risk-return characteristics of EMDE assets (Expert Interviews, 2025). In many cases, EMDE investments are perceived as offering insufficient compensation for higher volatility and credit risk, especially when compared to advanced economy benchmarks (Expert Interviews, 2025). These considerations are grounded in empirical differences in risk-adjusted returns, which can constrain allocations even in the absence of formal regulatory barriers (BoE, 2025; Expert Interviews, 2025). Nevertheless, both the pension and insurance sectors retain substantial capacity to increase exposure, provided that behavioural biases, institutional constraints, and regulatory frictions are addressed and that the risk-return profile of EMDE investments becomes better understood (Expert Interviews, 2025) – as chapters 5 and 6 explore.

Although direct EMDE allocations are small, UK and other advanced market portfolios are indirectly exposed through sovereign, banking, corporate, and supply chain channels (BoE, 2022). Indirect risks arise from EMDE sovereign bond devaluations, cross-border lending, and supply-chain disruptions in critical materials and commodities (Expert Interviews, 2025). These channels are often under-reported in portfolio statistics, implying that true exposure to potential shocks may be understated. Transition policy shifts can also transmit financial stress, for example through higher carbon prices or subsidy withdrawals that raise input costs and reduce profitability in energy-intensive industries. In EMDEs, where credit and insurance markets are shallower, such effects can amplify quickly across the informal economy (BoE, 2022; CBES, 2022). At the sovereign level, transition shocks can raise public debt ratios and constrain fiscal space, while commodity price and trade disruptions propagate through global markets (BoE, 2022; NGFS, 2024).

Cross-country evidence confirms that while direct exposures remain limited, the associated systemic risk is non-negligible. Institutional investors in advanced economies collectively hold around USD 2.3 trillion in EMDE sovereign and corporate debt – about 7 percent of total cross-border holdings (OECD, 2023). UK-domiciled banks' consolidated exposures to EMDE borrowers total roughly USD 600 billion, around 6 percent of global bank assets (BIS, 2024). Over 70 percent of UK defined-benefit pension schemes hold no direct EMDE assets, but passive index exposure through vehicles such as MSCI Emerging Markets averages 4-6 percent of fund value (Pensions Policy Institute, 2023). The IMF (2023) similarly finds that advanced-economy investors are indirectly exposed to EMDE transition shocks through euro- and dollar-denominated sovereign and corporate debt that could reprice sharply under disorderly transition scenarios. These figures highlight the systemic relevance of indirect and networked exposures, even where direct holdings are relatively modest.

The literature highlights a consistent set of barriers limiting institutional investment in EMDEs, discussed further in Chapters 5 and 6. Pension schemes often lack dedicated teams, local market knowledge, and due diligence capacity to assess smaller or non-standardised projects (OECD, 2023; Expert Interviews, 2025). Insurance companies face prudential capital requirements that further restrict investment in higher-risk assets or perceived pressure from government to invest more domestically (Expert Interviews, 2025). Addressing these barriers – through pooled investment vehicles, blended finance structures, and partnerships with development finance institutions – could enable greater mobilisation of long-term capital for EMDE transitions.

Tables 3a to 3f summarise the main sources of direct and indirect EMDE exposure across key UK financial actors. It highlights persistent data fragmentation and inconsistent reporting across asset classes, which constrain the ability to assess aggregate portfolio risk. These exposure patterns provide the empirical foundation for following section, which examines how twin-track transition dynamics can transmit through financial channels.

Table 3a: Estimated EMDE exposures of pension funds and similar

Direct Exposure	Indirect Exposure	Gaps
UK pension funds hold about 12 percent of overseas long-term debt securities in EMDEs. The data is similar for overseas equities where UK pension funds held about 9 percent in EMDEs (ONS, 2019).	UK pension funds have indirect exposures via funds and other pooled investment vehicles, including alternative investments such as private equity and infrastructure (ONS, 2019).	Cross-country data on institutional investors' climate-related and EMDE exposures remain fragmented and inconsistent. Most OECD and partner economies do not report comparable, up-to-date statistics on pension and insurance portfolios (OECD, 2023). Comprehensive, consolidated data on pooled structures is unavailable (see asset managers).

Table 3b: Estimated EMDE exposures of asset managers (public markets)

Direct Exposure	Indirect Exposure	Gaps
Estimates put UK asset managers' direct exposures to EMDE public equity at under 10 percent and public debt (sovereign and corporate) at 6 to 8 percent (Investment Association, 2025). These figures are likely higher among ESG or impact funds but represent a small portion of the ecosystem (Capital Group, 2024; John, 2025).	Indirect exposures are primarily via supply chains, commodities and sovereign/multinational exposures (Investment Association, 2025).	Comprehensive and comparable data on asset managers' climate-related and EMDE exposures remain unavailable, with global monitoring constrained by fragmented disclosures, inconsistent reporting standards, and the absence of harmonised datasets across jurisdictions (FSB, 2023; IOSCO, 2023; OECD, 2023).

Table 3c: Estimated EMDE exposures of asset managers (private markets)

Direct Exposure	Indirect Exposure	Gaps
Estimates of UK AUM in EMDE private equity ranges from £15-20bn and £10-12bn for private debt, with key concentrations in real assets and infrastructure (Investment Association, 2025).	Indirect exposures are primarily via supply chains, commodities and sovereign and multinational exposures (Investment Association, 2025).	Comprehensive, comparable data on asset managers' climate and EMDE exposures are unavailable, with global monitoring constrained by fragmented disclosures, inconsistent reporting standards, and lack of harmonised datasets across jurisdictions (FSB, 2023; IOSCO, 2023; OECD, 2023).

Table 3d: Estimated EMDE exposures of banks

Direct Exposure	Indirect Exposure	Gaps
UK banking sector EMDE exposures are concentrated in trade finance and syndicated lending and represent a limited 2 to 3 percent of total UK bank assets. (TheBanks.eu, n.d.) Additionally, the distribution is not smooth, with organisations such as HSBC and Standard Chartered accounting for the majority (Bank of England, n.d.).	In addition to facing similar indirect exposures to asset managers, UK banks also face EMDE counterparty risk through correspondent banks (Financial Action Task Force, 2016).	Comprehensive, consolidated data on banks, insurers, and sovereign institutions remain limited, with disclosures fragmented across jurisdictions and no harmonised global datasets capturing their climate-related or EMDE exposures (BIS, 2023; FSB, 2023; IMF, 2023; OECD, 2023).

Table 3e: Estimated EMDE exposures of insurers

Direct Exposure	Indirect Exposure	Gaps
Premium volumes from EMDEs are not broken out in public UK insurance statistics but are estimated to be under 5 percent of total gross written premiums (GWP) for UK insurers (BOE, 2024; Fidelity, 2025). For insurers as asset owners, see above under asset managers.	UK reinsurance sector exhibits a core-periphery structure, meaning EMDE risks can be dispersed across the network even if not directly underwritten (BOE, 2022).	Comprehensive, consolidated data on banks, insurers, and sovereign institutions remain limited, with disclosures fragmented across jurisdictions and no harmonised global datasets capturing their climate-related or EMDE exposures (BIS, 2023; FSB, 2023; IMF, 2023; OECD, 2023).

Table 3f: Estimated EMDE exposure of sovereign institutions

Direct Exposure	Indirect Exposure	Gaps
British sovereign institutions have direct exposures to EMDEs through UK reserves and development finance (BII, n.d.).	Indirect exposure via global financial stability and macroeconomic spillovers (Dunz, Masetti, Feyen and Stewart, 2024; Heibert and Monnin, 2023).	Comprehensive, consolidated data on banks, insurers, and sovereign institutions remain limited, with disclosures fragmented across jurisdictions and no harmonised global datasets capturing their climate-related or EMDE exposures (BIS, 2023; FSB, 2023; IMF, 2023; OECD, 2023).

Sources: ONS (2019); OECD (2023); BIS (2024); Investment Association (2025); BoE (2022); IMF (2023).

3.3 Portfolio Transmission Under Delayed and Twin-Track Transitions

Structural differences between advanced and developing economies can generate asymmetric portfolio risks through uneven asset revaluation and credit exposure. As outlined in Chapter 1, a twin-track transition describes a pathway in which advanced economies decarbonise broadly in line with the Paris Agreement while many EMDEs progress more slowly because of limited access to finance, technology, and institutional capacity (NGFS, 2024; IMF, 2023). Under a twin-track transition, advanced economies reduce emissions more rapidly, while EMDEs remain constrained by younger fossil-based capital stocks, higher marginal abatement costs, and weaker fiscal and financial buffers (IMF 2023; World Bank 2024; NGFS 2024). These conditions delay decarbonisation in EMDEs and raise the probability of asset stranding, sovereign downgrades, and capital losses across global holdings. Even investors with limited direct EMDE allocations are affected, since these divergences reshape risk-return profiles and propagate volatility through cross-border portfolios.

The literature identifies three primary, interlinked channels through which transition divergence can transmit financial stress to portfolio holdings.

- The first is asset repricing, where abrupt or uneven policy action devalues carbon-intensive assets and impairs credit in exposed sectors (IMF 2023; BIS 2023) and where asymmetry in transition across jurisdictions can trigger sudden repricing as markets anticipate eventual convergence (IMF 2023; BIS 2023).
- The second is macro-economic and financial contagion, as slower EMDE transitions trigger sovereign stress, trade shocks, and commodity-price swings that trigger capital flight and reprice sovereign and corporate debt held by advanced economy investors (NGFS 2024; World Bank 2024; Expert Interviews, 2025).
- The third is market amplification, where liquidity squeezes, margin calls, and correlated sell-offs cascade through cross-border banking and investment networks (BoE, 2025). As an example, advanced economies may ease policy faster, while EMDEs maintain tighter stances to manage inflation or currency stability. This creates yield differentials, prompting capital flows out of EMDE assets into advanced economy markets, reducing liquidity in EMDEs. Thin liquidity amplifies price moves, making even small sell orders trigger sharp declines. Collectively, these channels have the potential to convert local transition asymmetries into portfolio-wide losses across asset classes and geographies. Compound shocks also amplify losses via simultaneous impacts on production, demand, investment, credit access, and government revenues/expenditures (Ranger, Mahul and Monasterolo, 2021).

These channels materialise in portfolios through both physical risk and policy-driven repricing. Physical hazards such as flooding, wildfires, and heat stress can erode the value of collateral and physical assets, while regulatory or fiscal measures, including carbon taxes, the removal of fossil-fuel subsidies, or stricter disclosure rules, can alter company valuations and capital requirements (Cormack and Shrimali 2023; IPCC 2022). Delayed transition in EMDEs can exacerbate these dynamics by increasing the overall level of physical risk globally, meaning that advanced economies also face heightened exposure to climate-related hazards. These mechanisms determine how transition divergence becomes a source of realised losses within financial portfolios, shaping both near-term volatility and long-horizon investment returns. Compounding hazards are also pervasive, with the majority of assets facing two or more hazards at the same time (MSCI, 2025).

3.4 Scale of Impact and Losses on Financial Actors

Scenario analyses consistently indicate that delayed or disorderly transitions are associated with higher near-term portfolio losses across the global financial system. Although projections vary across models, scenarios, and data inputs, most studies find that such transitions generate substantially greater financial stress and sizeable potential losses (BoE, 2022; IMF, 2023; BIS, 2021). EMDEs face amplified risks both in the event of a global transition failure – reflecting higher carbon intensity and fiscal constraints – and when the global transition proceeds but these economies remain dependent on fossil-based systems (BoE, 2022; IMF, 2023; NGFS). These vulnerabilities are further reinforced by the behaviour of financial institutions, which can exacerbate short-term market stress. By contrast, long-horizon investors such as pension and sovereign wealth funds appear better positioned to absorb sustained losses, provided they can avoid forced deleveraging (BoE, 2022).

Empirical and scenario-based evidence confirms that disorderly or delayed transitions could amplify portfolio losses across banking, insurance, and investment sectors. The Bank of England's Climate Biennial Exploratory Scenario finds that UK banks could face credit impairment increases of up to 30 percent and insurers' underwriting losses of 10-15 percent under a 'late action' pathway relative to orderly scenarios (BoE, 2022). The IMF (2023) reports heightened clustering of sovereign and corporate credit risk in EMDEs, raising contagion potential for developed-market portfolios. Similarly, NGFS (2024, 2025) modelling shows that delayed and abrupt policy adjustments drive the largest losses across both advanced and emerging economies, particularly through commodity-price volatility and capital flow reversals. These findings underscore that portfolio stability depends not only on heterogenous domestic transition progress across EMDEs but also on the pace and coherence of global decarbonisation.

Modelling and empirical studies suggest that potential losses are material across asset classes and time horizons. Scenario analyses on climate risk, including the Bank of England's (2022) Climate Biennial Exploratory Scenario, consistently show higher financial risk and credit losses – up to 30 percent for UK banks – under delayed transition pathways compared to early or orderly action. Beyond modelled outcomes, real-world climate impacts such as extreme weather events and ecosystem degradation are projected to intensify under delayed action (IPCC, 2022). Bongiorno et al. (2022) estimate that where Paris Agreement targets are not met, cumulative global equity returns could be around 50 percent lower over 2020-2060 relative to a baseline without climate effects. For pathways where the targets are achieved, the corresponding reductions are 15 percent and 25 percent under orderly and disorderly transitions respectively. Norges Bank Investment Management (NBIM, 2024) estimates that its global equity portfolio could decline by 2-10 percent under bottom-up, conditional climate value-at-risk (CVaR) and NGFS scenarios, and by 19-27 percent under broader, top-down in-house modelling, noting that both approaches likely underestimate physical climate risk. NGFS (2025) long-term scenarios show similar patterns, with global equity portfolios potentially losing 10-15 percent of value under delayed transition by 2050, compared with around 5 percent under an orderly transition.

Despite advances in climate risk modelling, significant uncertainties remain in estimating portfolio-level climate value-at-risk and the effects of non-linear tipping dynamics. Existing scenario frameworks rarely capture long-term portfolio exposures, tail-risk interactions, or compounding feedback loops, instead concentrating on sector- or firm-level impacts over typical 30-year horizons (Expert Interviews, 2025). Given IPCC AR6 (2022) findings that non-linear climate processes such as extreme weather and ecosystem collapse may heighten systemic financial risk, these omissions represent an important methodological gap for assessing investment exposure. Supervisory exercises, including the CBES (BoE, 2022), suggest that UK banks could experience multi-decade increases in credit impairments under late-action transition scenarios, with loss magnitudes varying widely by scenario scope and time horizon. This is reinforced by analyses from sources such as MSCI that estimate business interruption losses will dwarf losses from asset damage in the coming years under delayed or twin-track transitions (MSCI, 2025). Complementary analyses by the IMF (2023) and multilateral development banks identify multi-trillion-dollar annual financing gaps in EMDEs, where persistent underinvestment increases sovereign and corporate default probabilities and amplifies potential losses for developed-market investors. Nonetheless, substantial dispersion across models – even when applying similar assumptions – creates high model risk, indicating that quantitative loss estimates should be interpreted with caution.

Pension funds, asset managers and banks recognise that despite rising climate risk it is not their role to drive EMDE decarbonisation (Expert Interviews, 2025). Financial institutions show growing awareness of climate risk and CVaR. They address risk exposure and vulnerability in their portfolios and boost capital flows to climate-aligned sectors. Some boards adopt the responsibility to not only to deepen risk management but to direct investment flows with the climate transition. But they lack the mandate and tools to transition faster than real economy actors and government policy and targets allow (CCSI, 2025; NBIM, 2024; Expert Interviews, 2025).

3.5 Distribution of Impacts Across Financial Actors

Banks and leveraged funds face elevated short-term exposure to climate-related shocks, primarily due to their structural characteristics – namely high leverage and the maturity mismatch between assets and liabilities. These features can amplify vulnerability during periods of market stress. While the use of collateral in banking is designed to mitigate such risks, acute physical events – such as flooding or wildfires – can rapidly devalue collateral assets, potentially impairing loans and mortgages (Carbon Tracker, 2023; Expert Interviews, 2025). In parallel, commercial banks may encounter localised liquidity pressures, and the NGFS (2024) highlights that liquidity amplification through margin calls and funding stress remains a key contagion channel for both banks and hedge funds. Importantly, shorter investment horizons do not necessarily increase vulnerability; in some cases, they may insulate institutions from long-term climate risks if exposures are regularly refreshed (Expert Interviews, 2025). UK investors and savers are also indirectly exposed through fossil fuel holdings, with stranded assets projected to represent around 6 percent of global totals – equivalent to USD 141 billion – by 2040 (UKSIF, 2025). This places the UK ninth globally and second among OECD countries on a per capita basis (UKSIF, 2025). Within domestic portfolios, approximately GBP 88 billion of pension assets are linked to fossil fuels, with GBP 15–19 billion at risk of stranding by 2040 (UKSIF, 2025).

Regulatory stress testing has primarily focused on banks, reflecting their central role in financial systems and their potential to transmit shocks across markets (IMF, 2025). Climate risk is now integrated into comprehensive stress tests led by the Bank of England. Existing exercises and related literature largely concentrate on mapping near-term transition risk drivers into counterparty and portfolio exposures. Key areas of emphasis include modelling the effect of multiple climate shocks intertwined with GDP downturn, assessing the carbon intensity of portfolios and sectoral concentrations, developing internal climate risk ratings and scoring frameworks, and estimating the potential effects of more stringent climate regulation (Expert Interviews, 2025).

However, while climate risk transmission channels have been mapped extensively, progress has been more limited in empirically capturing banks' exposure to physical risks. This may be at least partly attributable to considerable additional non-standard data requirements associated with quantifying physical climate impacts, or confidence in the ability to insure against prospective losses (BIS, 2021; Expert Interviews, 2025). BIS (2024) highlights that systemic exposure arises primarily not from direct EMDE lending but rather indirectly through global liquidity transmission, commodity price shocks, and bank funding costs. This finding was reinforced through expert interviews (2025).

Insurers remain heavily exposed to both asset-side and underwriting risks linked to climate sensitive sectors. IAIS (2023) estimates that climate-related assets (i.e. assets affected negatively by climate risk or positively by climate investment) account for around 37 percent of global insurers' reported portfolios. Within equity, corporate bond, loan, and mortgage holdings, the share of assets most exposed to transition risks ranges from 29 percent in Europe and Africa to 42 percent in Latin America, with North America and Asia-Oceania lying between these bounds (ibid.). These figures indicate that insurers continue to allocate substantial portions of their portfolios to climate-relevant sectors, leaving transition risk persistent. On the underwriting side, rising physical risks pose additional challenges, particularly in property and casualty business lines. As climate impacts intensify, insurers face growing difficulty in pricing or maintaining coverage in high-risk regions. The concentration of global reinsurance markets further heightens the potential for capital stress transmission across jurisdictions following EMDE catastrophes. European Insurance and Occupational Pensions Authority (2023) finds that insurer solvency ratios could decline by up to 20 percent under severe physical risk scenarios.

Pension funds and sovereign wealth investors are generally more resilient to short-term shocks but remain exposed to system-wide devaluation. Compared with other financial actors, long-term asset owners – such as pension funds, life insurers, and insurance-owned asset managers – typically hold diversified portfolios and are structurally better positioned to absorb sustained losses (OECD, 2023). Their long-dated liabilities and larger fund sizes allow greater tolerance for risk and enable them to act as stabilising forces during periods of market stress. However, these institutions often lack granular EMDE risk analytics and may still be vulnerable to broad-based financial crises or the rapid devaluation of assets in companies affected by physical climate impacts or regulatory changes (OECD, 2023; Expert Interviews, 2025). Empirical evidence supports this differentiated pattern of resilience. BIS (2022) finds that mutual fund redemptions during climate-related drawdowns can act as short-term amplifiers of systemic stress, while long-horizon institutional investors, including pension and sovereign funds, may serve as stabilisers when unlevered (Jourde et al., 2023).

3.6 Current Climate Risk Models, Scenarios and Approaches

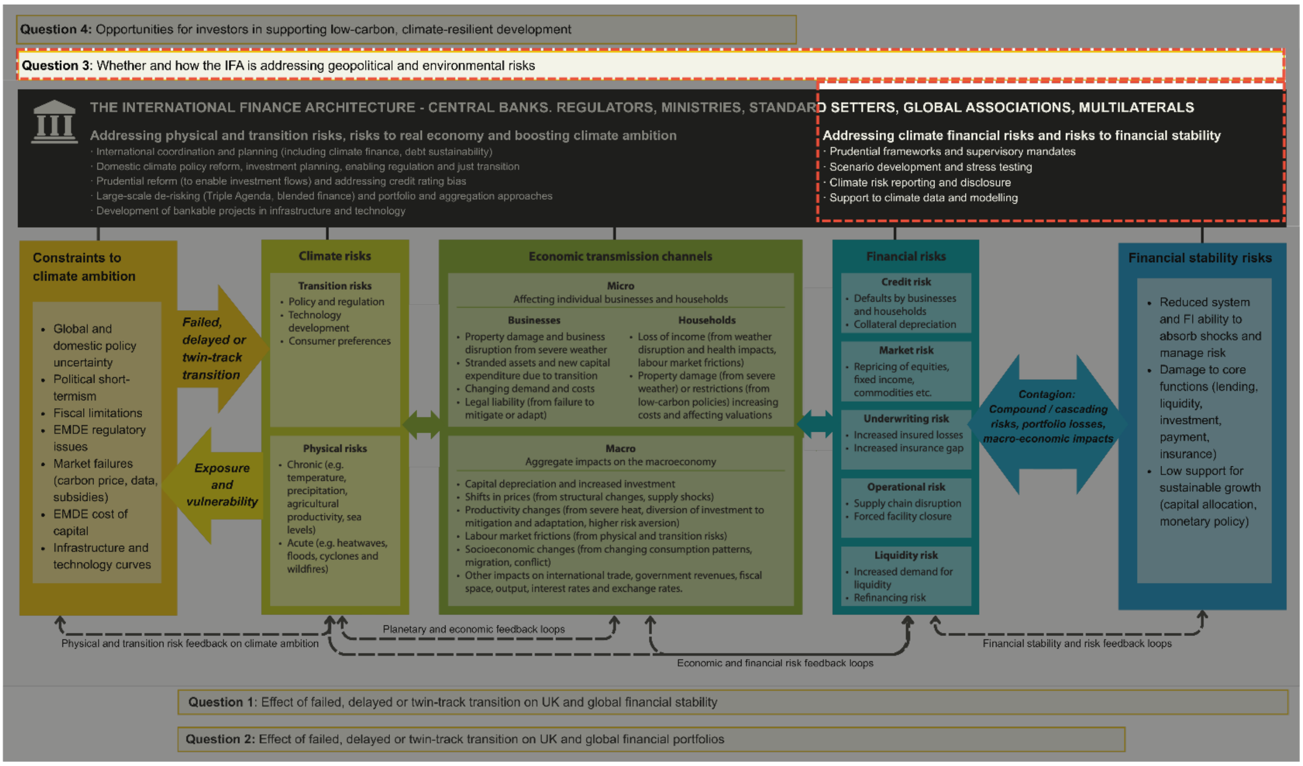
Current models and scenarios within the IFA as well as available in the market provide an essential foundation for supervisory stress testing but remain incomplete for assessing both financial system and portfolio-and asset-level risks. All major UK banks and investors now model climate scenarios and carry out internal stress-testing, often overlaying non-climate related shocks and causes of stress with physical and transition effects. UK pension funds and asset managers rely on NGFS scenarios and modelling in the market to understand risk transmission to portfolios, using the outcomes to raise awareness and judge probabilities rather than relying on precision. Expert interviews (2025) indicated the assumption by some financial institutions of a disorderly transition and a ‘Hot House World’. In many EMDEs and in Africa especially banks and asset managers display varying levels of understanding and integration of climate risk into governance and portfolio risk management. Qualitative analysis in banking systems may assess the vulnerability of top borrowers by considering the location of their assets and markets and adjusting probability of default estimates based on exposure to localised climate hazards and the ability to relocate or diversify (Expert Interviews, 2025). On the other hand, limited regulatory impetus, data limitations and the predominantly voluntary nature of climate disclosures, the absence of modelling, and a lack of clear definition across climate reporting and disclosure mean that climate financial risk management is nascent.

Persistent data limitations and constraints concerning non-linear climate change continue to reduce the accuracy of climate risk models, particularly for long-term portfolio analysis (Expert Interviews, 2025). Supervisory stress tests and top-down CVaR techniques are advancing, yet most still omit compound feedback loops – for example, climate shocks that trigger sovereign stress and cascade into banking crises – and often fail to capture non-linear tipping dynamics and variables such as trade disruption, migration and commodity price spikes (CGFI, 2023; Expert Interviews, 2025). Models also translate macroeconomic outputs only loosely into credit risk metrics such as probability of default, loss given default, and market price effects (BIS, 2020; NGFS, 2021). Data gaps and reporting complexity remain significant challenges across most frameworks (FCA, 2025). Data gaps in both EMDEs and advanced economies, including missing firm-level exposures, collateral valuations, and foreign exchange mismatches, undermine the accuracy of probability of default and loss given default estimation and market price mapping at portfolio scale.

While sufficient for short-term baseline supervisory purposes, these approaches remain limited in their capacity to quantify cross-border portfolio losses, to represent network contagion effects, or to understand compound risks over time. The typical time horizon for climate risk models ranges from around 30 years, focusing on outcomes to 2050, for example Bank of England's CBES or short-term NGFS scenarios, to longer-term projections extending to 2100, for example IPCC climate models, integrated assessment models, and long-term NGFS scenarios. While long-term models are essential for exploring tipping points and cascading risks, their reliability declines markedly over extended timeframes, constraining the credibility of projections to 2100.

Despite recent progress, methodologies continue to limit the comparability and practical application of climate scenarios and risk models onto portfolio values. Scenario sets such as NGFS (2023/2024) provide macroeconomic and sectoral pathways that can be downscaled to portfolios, yet their methodologies often require adaptation for granular risk estimation. The latest NGFS (2025) scenarios offer hazard and policy trajectories that investors and asset managers can use for valuation-impact analysis under divergent transition pathways. Similarly, the Bank of England PRA (2024) propose a physical risk assessment framework based on stakeholder, scenario, and impact dimensions, which – while lacking metre-level spatial precision for hazards such as flooding – could nonetheless be downscaled for portfolio-level application. A Bank of England Financial Conduct Authority (FCA) (2023) review of CBES participants found widespread challenges in translating scenario outputs into portfolio-level credit metrics such as probability of default and loss given default. As a potential solution, IMF (2024) recommends coupling climate IAMs with financial simulations for sovereign and banking sector stress testing.

4. Cascading Geopolitical and Environmental Risks and the IFA



4.1 Introduction

This chapter reviews the literature on how the IFA approaches, addresses and manages climate financial risk and how suited it is to addressing the compound and cascading risks of climate change. It builds on the analytical foundations established in Chapters 1 to 3. Chapter 1 set the context of climate scenarios, the transmission of climate physical and transition risks through the economy and financial sector, and pathways of a failed, delayed, or twin-track transition. Chapter 2 examined how these dynamics could generate financial stability risks through global interlinkages and feedback loops, while Chapter 3 traced how those risks manifest in portfolio-level exposures.

The IFA comprises central banks and supervisors, ministries, standard-setting bodies and associations, and multilateral institutions. The chapter focuses on those parts of the IFA mandated to address and manage climate financial risk and maintain financial stability – distinguishing from IFA actors focused in EMDE transitions and investment mobilisation. It charts available evidence on how financial risks have been incorporated across IFA bodies and their respective functions and reviews the widespread but flawed premise that the integration of climate financial risk into reporting and decision-making would drive transitions and investment. It reviews research on the evolution of global disclosure and reporting standards, including the handover of TCFD into International Sustainability Standards Board (ISSB), under the IFRS Foundation, and related initiatives under NGFS, FSB and the International Organization of Securities Commissions (IOSCO). It then examines studies of how central banks, prudential regulators, and supervisors are embedding climate considerations into capital regulation, stress-testing, and risk management. The literature on international financing and liquidity mechanisms is also reviewed, focusing on the role of the IMF and MDBs in managing climate risks and shocks and on domestic actions within EMDEs to integrate climate risk into fiscal and supervisory systems.

The chapter draws on academic, policy and institutional sources, including supervisory exercises, reports by international organisations, and empirical and conceptual studies. The evidence base is strongest for regulatory and disclosure developments, where extensive documentation exists on institutional mandates and implementation progress. It is comparatively thinner for evaluations of coordination between institutions and of EMDE domestic actions.

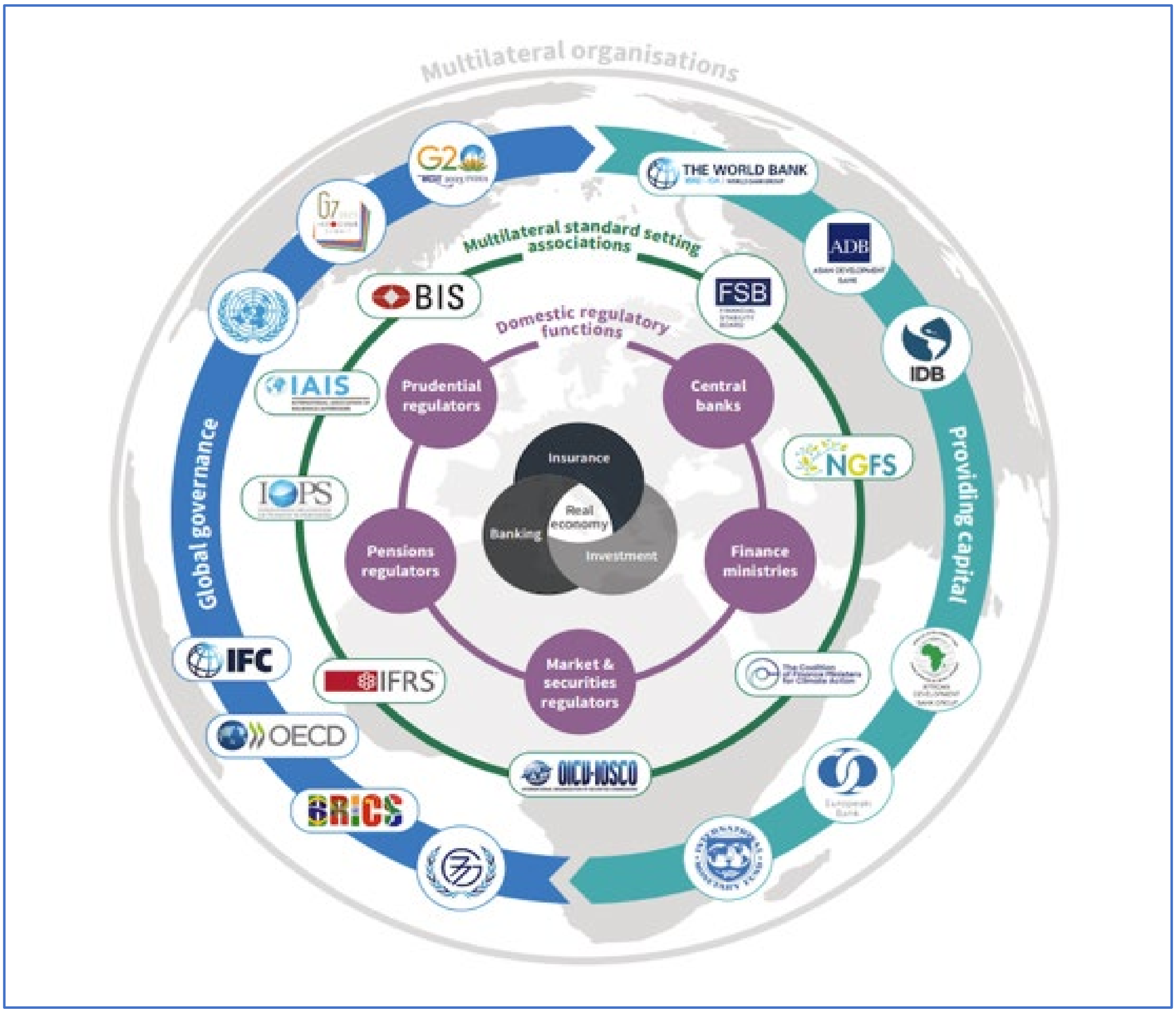
4.2 Defining the International Financial Architecture

In defining the IFA, this chapter refers to the network of global, regional, and national institutions that collectively promote financial stability, surveillance, and crisis response across the global economy. In the literature, the IFA is commonly described as comprising central banks and supervisors, ministries, the International Monetary Fund (IMF), standard setting bodies and associations such as IFRS, NGFS, Financial Stability Board (FSB), Bank for International Settlements (BIS), and International Organization of Securities Commissions (IOSCO), and multilateral organisations such as the IMF and World Bank. These actors form the collective mechanism through which financial stability systemic risks linked to climate change and geopolitics are identified, managed, and, where possible, mitigated.

The literature varies in how broadly the IFA is defined. Some sources take a narrow view, focusing primarily on surveillance, liquidity provision, and crisis management functions led by the IMF and central banks. Others such as UNCTAD and some academic sources (Reid-Henry, 2022; Gallagher, 2025) adopt a wider conception that includes prudential regulators, MDBs, credit rating agencies, and the emerging ecosystem of disclosure, reporting, and taxonomy standards that shape capital allocation and financial behaviour. Figure 4a illustrates the main institutions and their linkages within the IFA.

Across this literature, the IFA is generally understood to perform four interlinked functions: surveillance, regulation, crisis response, and long-term financing (IATF, 2025). Surveillance encompasses macro-financial monitoring and early-warning systems led by the IMF, BIS, and financial stability bodies including FSB. Regulation and supervision refer to the prudential standards and disclosure frameworks developed by entities such as the Basel Committee on Banking Supervision (BCBS), IOSCO, and national authorities. Crisis response and liquidity management fall within the remit of the IMF and major central banks, while long-term financing is channelled through MDBs, development finance institutions (DFIs), and global climate funds. These institutions form the backbone of global financial governance.

Figure 4a: Actors in the International Financial Architecture



Source: AVIVA Investors, 2023

4.3 Institutional Mandates and Coordination Within the IFA

Institutional mandates across the IFA increasingly intersect in addressing climate financial risks but coverage and coordination are uneven. The IFA covers a wide range of actors with an equally wide range of mandates and roles. For example, the IMF focuses on macroeconomic surveillance and liquidity support through rapid financing windows. Prudential, supervisory and systemic guidance is offered by bodies such as the BIS, FSB, and BCBS. The literature suggests that mandate overlap and weak coordination hinder their collective capacity to manage systemic risks such as climate change .

The literature traces a gradual broadening of institutional mandates since the Paris Agreement, as climate risk has broadened from an economic to a financial stability concern. The IMF has progressively integrated climate considerations into its surveillance and lending operations, including through Article IV consultations, Financial Sector Assessment Programmes, and the establishment of the Resilience and Sustainability Trust. Prudential bodies such as the BIS and BCBS have broadened their focus to include climate-related risks within financial stability oversight, issuing guidance on scenario analysis, disclosure, and capital adequacy. The NGFS have adopted climate risk frameworks that link transition and physical shocks to systemic vulnerabilities. Multilateral development banks and development finance institutions have also incorporated climate objectives into their mandates, mainstreaming climate finance across portfolios and expanding the use of guarantees and blended finance mechanisms to de-risk private investment. However, the literature notes that these adjustments have occurred through incremental interpretation of existing mandates rather than through formal reform, leaving the integration of climate risk partial and uneven across institutions (Lombardi and Momani, 2010; Niedermayer and Ryfisch, 2024).

4.4 Regulation, Standards, and Supervisory Integration

Climate-related financial regulation and supervisory standards have expanded rapidly over the past decade, becoming one of the most active areas of reform within the international financial architecture. Mark Carney's influential speech *Breaking the Tragedy of the Horizon* (2015) framed climate change as a systemic risk to financial stability and raised the need for financial risk management tools to drive an orderly rather than disorderly transition. Since then the IFA has made significant progress in establishing reporting and disclosure, stress-testing, and prudential supervision in national and global regulatory systems. Regulation and standards continue expanding, particularly through disclosure mandates and supervisory scenario work, but remain fragmented across jurisdictions and asset classes (NGFS, 2021; FCA, 2025). The literature agrees that these frameworks represent meaningful progress in embedding climate considerations within financial governance but that their coverage, consistency, and capacity to capture systemic interactions remain limited (NGFS, 2023; FSB, 2023).

Disclosure and reporting standards form the backbone of regulatory alignment on climate risk, evolving from voluntary principles to internationally recognised frameworks. In 2019, the Bank of England set supervisory expectations on climate financial risks for banks, enacted through core frameworks including Prudential Regulatory Authority standards, the Bank of England's Capital Framework, FCA's TCFD-based disclosure requirements, and industry-led initiatives such as the Climate Financial Risk Forum (CFRF). These frameworks impose varying requirements across asset classes, spanning insurance liabilities, equities, bonds, and credit portfolios, and reflect the complexity of climate risk integration. In 2023 the ISSB fully adopted the TCFD recommendations into its IFRS S1 and S2 climate-related disclosure standard, establishing a global baseline for sustainability reporting that central banks and regulators draw on (IFRS, 2025). The FCA (2025) reports that TCFD disclosure rules have had a positive impact, with better information flows in the market and firms increasingly embedding climate considerations into governance and strategy. However, key challenges remain, including gaps in banks' and investors' risk management practices, inconsistent application of scenario analysis and a persistent lack of granular, standardized data both across and within sectors (FCA, 2025).

Central banks and prudential regulators have become key actors in operationalising climate risk supervision, though practices remain uneven across sectors and jurisdictions. Global regulatory bodies and standards setters such as the NGFS, Basel Committee on Banking Supervision, and numerous central banks have issued climate-related scenarios and guidance; and while financial institution-level practices are improving, significant gaps in data comparability and coverage remain. The Network for Greening the Financial System has provided the leading international platform for sharing scenario methodologies, mostly recently with its Short-term Climate Scenarios and Phase V Long-term Climate Scenarios (NGFS, 2024; NGFS, 2025). NGFS scenarios and the models behind them are utilised by central banks and supervisors globally as well as by financial institutions to develop regional, national and institutional scenarios and stress-tests (Expert Interviews, 2025). The Bank of England's Climate Biennial Exploratory Scenario and similar initiatives in the EU and Asia demonstrate increasing depth of supervisory testing (BoE 2022; ECB, 2023). UK supervisory practice is among the most advanced in the world

The literature notes that scenarios analysis in the UK and in bodies such as NGFS and FSB remains limited in capturing non-linear, cascading, correlated, cross-border and indirect channels, risks and shocks. The assumptions used to model macroeconomic effects and assess economic and financial loss and may not be accurate (BoE and FCA, 2023; NGFS, 2025; Expert Interviews, 2025). Their applicability to EMDEs as well as advanced economies has been questioned (Expert Interviews, 2025). Financial institution-level scenarios and stress-testing, which help the Bank of England understand aggregate risks to the financial system by capturing interactions between firms and estimating system-level vulnerabilities, also remains experimental and early-stage.

The coverage and depth of climate risk regulation differ markedly across financial sectors, creating uneven incentives and potential blind spots. Supervisory attention and prudential regulation are more developed for banks and insurers than for pension funds, asset managers and private markets, leading to a fragmented regulatory landscape that can complicates cross-border capital flows, particularly for emerging markets and developing economies. OECD (2023) and IMF (2024) reviews highlight that pension funds and asset managers often lack mandatory stress-testing requirements or climate risk analytics, resulting in weaker integration of transition and physical risk into portfolio valuation.

4.5 Conflation of Climate Risk with Climate Investment

The influence of climate financial risk management in driving climate transitions in and investment flows to EMDEs has been overstated. *Breaking the Tragedy of the Horizon* (2025) was instrumental in linking the integration of climate risk into the financial system to unlocking investment in low-carbon, resilient sectors. This view has been embedded in progress by central banks and regulators in supervision, regulation, standard-setting and transition planning of the past decade – that these measures are not only beneficial for financial stability and system resilience but can direct the financial system towards channelling greater volumes of finance to climate transitions. The FSB (2022, 2025) states that robust risk management can support transition finance by improving data, disclosures, and comparability, thereby enabling investment flows into sustainable activities. BCBS (2021) recommends integrating climate risk into prudential supervision, scenario analysis, and stress testing, which can drive banks to reallocate capital and support transition investments. The Climate Financial Risk Forum (2023) further supports the view that robust risk management and disclosure frameworks can shift capital towards transition.

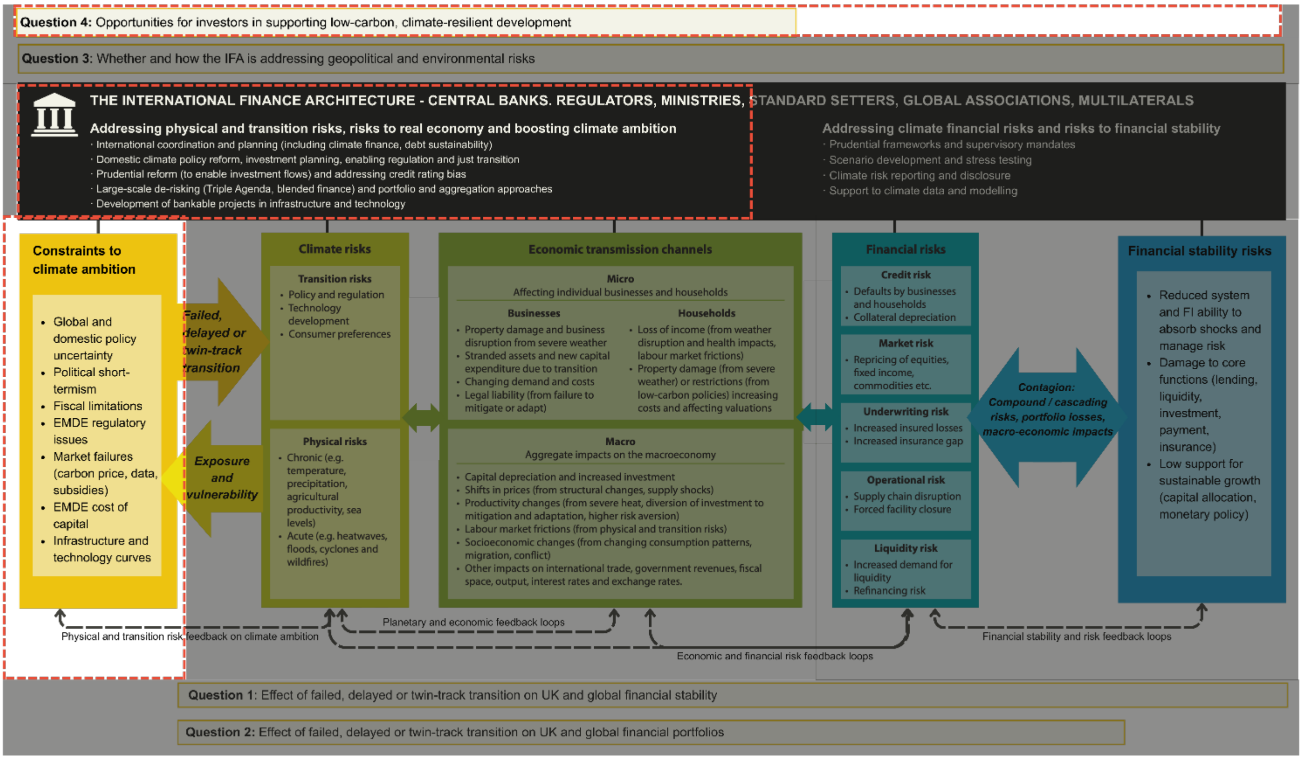
Recent literature has questioned the assumed causality between climate financial risk management and investment flows. This literature argues that climate financial risk management is valuable in its own right as a means of preserving portfolio values and system stability but that it cannot substitute for public policy needed to reduce planetary and economic risks (Sachs et al, 2025). Conflating risk management with investment mobilisation can be counterproductive, notably in deterring investment from climate vulnerable regions and in distracting attention from efforts to drive investment in the real economy. Financial risk management alone is not sufficient to drive investment where it is needed. The link with investment flows is often overstated, based on flawed models, and disconnected from factors affecting the real economy and markets (Oxford University Smith School, 2023). Central banks and financial regulators can influence climate investment flows through regulation and supervisory mandates but the link to actual investment mobilisation is not automatic and can be overstated (Campiglio et al., 2018). At portfolio level climate risk is increasingly integrated in risk management and decision-making but there is limited evidence that this has led to new capital allocations, which depends moreover on policy and market conditions (CCSI, 2024).

4.6 EMDE Domestic Action and Interaction with the IFA

EMDEs are adopting disclosure, stress testing and climate budgeting, but capacity, data and fiscal constraints limit implementation and scale (Coalition of Finance Ministers, 2025; IMF, 2023). In recognition of the enhanced financial risk stemming from a delayed climate transition, many finance ministries and central banks in EMDEs are integrating climate considerations into debt sustainability analysis and contingency planning. EMDE financial sectors and economies will be the most immediately and severely affected by climate risk, and their domestic action and capabilities will be the primary line of mitigation against risks and spillover effects (Expert Interview, 2025).

However, monitoring, reporting and institutional capacity gaps remain. Disclosure and reporting requirements are becoming more prevalent across EMDEs, often drawing on TCFD and ISSB recommendations. To date 13 EMDEs have committed to adopt either S1, S2 or both standards (IFRS, 2025). While these can be climate and financial risk specific, they are also taking the form of more general sustainability disclosure rules, aiming to improve transparency. EMDE regulators and central banks are also embedding climate risk into supervisory frameworks, issuing guidelines for assessing physical and transition risk (ICC, 2025). Similarly, the development of green and sustainability taxonomies has become popular to guide capital allocation in line with sustainable and green principles. Such taxonomies can improve market clarity and confidence, and bring assurance to investors (OECD, 2020).

5. Economic Opportunities and Investor Appetite in EMDE Transitions



5.1 Introduction

This chapter examines how, and under what conditions, private capital can be mobilised at scale to finance energy and climate transitions in EMDEs. Building on Chapters 1 to 3, which traced the macro pathways, systemic risk channels, and portfolio exposures shaping EMDE investment flows, and complementing Chapter 4's review of the international financial architecture, this chapter shifts vantage point to the investor. It examines what makes EMDE climate transitions investable at scale and where the main frictions lie, and how UK market strengths and policy levers can help close the gap. It also lays the analytical foundation for Chapter 6, which turns to system-level reforms needed to align global financial rules, instruments, and incentives with long horizon transition finance.

The chapter firstly outlines the investment case – why EMDE transitions are indispensable to global decarbonisation and present structural diversification and growth opportunities for institutional portfolios – drawing on evidence from both public and private markets. It assesses the role of private finance in meeting aggregate needs and shows the under-deployment of key mobilisation instruments, including guarantees, blended vehicles, and FX hedging facilities. It analyses market-level frictions – information asymmetries, data gaps, limited standardisation, pipeline readiness, and behavioural biases – that constrain capital allocation. It turns to structural barriers shaping the cost of capital, such as currency mismatches, debt overhangs, credit ratings, prudential treatment, and climate vulnerability. Finally, it identifies six UK-relevant ‘strategic plays’ drawn from the literature, through which policy, regulation, and market infrastructure could unlock scale.

The analysis draws on academic, policy, and market sources. The evidence base is robust on the scale of the financing gap, the risk-return characteristics of selected instruments, and the main investment barriers at market and structural levels. It is thinner on outcomes of risk mitigation strategies, for example on the additionality and pricing of guarantees of blended structures, and on comparable performance data across EMDE sectors and asset classes. Persistent gaps include the absence of standardised datasets on private capital mobilised and on deal structures, particularly for blended finance; limited evaluations of EMDE climate investments in institutional portfolios; and underdeveloped coverage of private sector opportunities to invest in climate transitions, particularly in nature and adaptation. These limitations are flagged throughout the chapter and revisited in Chapter 6, alongside proposals to strengthen the global evidence base and improve data transparency.

5.2 EMDEs as an Opportunity and Necessity for UK Investors

EMDEs are the defining growth frontier of the global climate transition. These markets will account for more than two-thirds of future energy demand and without intervention, the majority of global GHG emissions. They host the most dynamic potential for clean energy deployment, urban infrastructure, and adaptation investment (IEA, 2023). Rapid population growth, industrialisation, declining renewable energy costs, and abundant renewable potential are creating unprecedented opportunities for investors seeking scale and diversification of risk and opportunity (IEA, 2023). According to IMF stakeholder consultations (2024), the financial sector is shifting its view on adaptation from a cost to an opportunity. For instance**,** 75 percent of banks, asset managers, and investors expect adaptation to become a core part of finance soon while roughly 70 percent of major financial firms already cite adaptation as a strategic focus, with many actively developing related strategies (IMF, 2024).

Yet actual investment flows remain far below potential (IEA, 2023). In 2023, private actors provided only about 22 percent of international climate flows to EMDEs, amounting to around USD 43 million, against annual needs in the range of USD 450 billion for EMDEs excluding China (encompassing both mitigation and adaptation) (CPI, 2025; ICC, 2025).

The literature emphasises that the cost of capital has become the single most consequential fault line in the global financial system (CCSI, 2025). It is particularly problematic for climate-related investments (e.g. renewable energy infrastructure) with much higher upfront cost than fossil fuel-related investments (CCSI, 2025). The expected internal rate of return of a solar PV project is much higher in Africa than in Europe despite the former’s stronger solar potential (Expert Interviews, 2025). For equivalent investments, EMDE borrowers routinely face financing costs 300 to 500 basis points higher than those in advanced economies (IEA, 2023; IMF, 2023). Multiple studies suggest EMDE, especially African, sovereigns can face an additional borrowing-cost premium of roughly 150 to 300 basis points (Olabisi and Stein 2015; UNDP 2023).

Investing in EMDE transitions and overcoming the cost-of-capital constraint are necessities for global decarbonisation while presenting growth and diversification opportunities for investors. Over the past decade, EMDEs contributed 66 percent of global GDP expansion and are projected to remain the dominant source of incremental demand for clean energy, sustainable industry, water management, circular economy solutions, and climate-resilient land use (World Bank, 2025).

For investors, this trajectory defines a generational opportunity. Recent literature emphasizes that, from a portfolio perspective, EMDE assets offer distinct structural diversification (Nurminen et al. 2024) and untapped growth markets (IEA and IFC, 2023; ODI, 2023). Renewable energy and infrastructure projects in these markets often deliver cash flows uncorrelated with those of advanced economies, helping reduce long-term portfolio risk (Kapoor, 2024). In several EMDEs, renewable and resilience investments already generate competitive or superior risk-adjusted returns compared to developed-market equivalents (IRENA, 2024). Beyond diversification benefits and growth investments, EMDE investments increasingly align with the interests of investors with sustainability mandates, offering environmental and social impact alongside financial performance, beyond typical ESG risk integration (GFANZ, 2024).

One practical set of instruments that illustrates the growing depth of EMDE capital markets are green, social, sustainability, and sustainability-linked (GSSS+) bonds. For several years, sovereign and corporate issuance rose steadily in EMDEs (IFC and Amundi, 2024). Investor demand continues to strengthen. For instance, Nigeria's 2025 sovereign green bond issuance was 183 percent oversubscribed (Nairametrics, 2025). Colombia's inaugural sovereign green bond in October 2021 was issued as a "twin bond" alongside a conventional sovereign bond of the same maturity; the green tranche was about 4.6 times oversubscribed and priced with an estimated 7 basis point 'greenium' versus conventional bonds, indicating stronger demand for the labelled instrument (Responsible Investor, 2021; Environmental Finance, 2022; World Bank 2022). Sustainability-linked bond issuance, particularly those tied to social inclusion, water infrastructure, and adaptation, is also rising (IFC and Amundi, 2024). Beyond the labelled bonds, between 2017 and 2022, EMDE allocations to public debt and equity nearly doubled from 6.4 percent to 13.4 percent, illustrating growing investor confidence in scalable EMDE products (Mobilist, 2025).

Beyond bonds, private credit funds, blended vehicles, and guarantee-backed instruments are increasingly channelling capital toward EMDE climate and resilience assets (Convergence, 2024; CPI, 2025). These instruments complement public debt markets by offering flexible risk-sharing structures, earlier-stage capital, and exposure to unlisted assets that are often critical for infrastructure and industrial transitions (CCSI, 2025). Together, they reflect a maturing investment ecosystem that extends well beyond sovereign issuance, one that can match institutional portfolios' search for yield, diversification, and measurable impact (Climate Bonds Initiative, 2025; IFC and Amundi, 2024).

Yet recent data reveals that current climate investment mitigation flows remain profoundly insufficient to meet climate goals and are imbalanced among regions, as shown in Table 5a (CPI, 2025). Total climate finance reached roughly USD 1.9 trillion in 2023, likely exceeding USD 2 trillion in 2024, still far below the USD 7 trillion-plus required annually by 2030 (CPI, 2025). Even slightly more conservative estimates place the annual need at USD 6.3-6.7 trillion by 2030 (IHLEG, 2024). Moreover, flows remain geographically concentrated: East Asia, Europe, and North America absorb the vast majority, leaving Africa, South Asia, and Latin America and the Caribbean together receiving less than 10 percent (CPI, 2025). Nearly 90 percent of finance comes from market-rate debt and equity, while concessional resources, around 9 percent of the total, remain catalytic but insufficient for scale (CPI, 2025).

Adaptation finance remains a small share of total climate finance, averaging about USD 60-70 billion per year in 2022–2023, less than 10 percent of flows directed to mitigation. The adaptation finance gap remains stark: developing countries (excluding China) require an estimated USD 400 billion annually by 2035 for adaptation and resilience. CPI's *Global Landscape of Climate Finance 2024* shows that most adaptation funding goes to Sub-Saharan Africa, South Asia, and Latin America, yet in absolute terms these amounts are modest compared to mitigation investments. Nearly two-thirds of EMDE banks allocate less than 5% of lending to climate finance, further constraining the mobilisation of resources for adaptation (World Bank, 2024). The main sectors supported are agriculture, water, disaster risk management, and infrastructure, but attribution is often blurred because many projects have cross-cutting mitigation and adaptation components. Data gaps are especially acute for private finance, where reporting is inconsistent, leaving an incomplete picture of actual flows. Overall, the evidence highlights both the regional disparities in adaptation funding and the urgent need for better tracking and scaling of resources to meet growing climate resilience needs (CPI, 2024).

Adaptation's lower share of climate finance is due in part to perceptions around its less direct investment case but the wider economic benefits are sizeable. Investment in adaptation within corporates, industry and infrastructure often creates value through avoided losses and greater stability, benefits that are economically large but more difficult to monetize than the bankable energy projects that characterise mitigation investment. At the same time, strong institutions improve economic planning and public financial management, ensuring efficient allocation of adaptation and resilience investment, and enhancing policy predictability, which reduces sovereign risk and lowers the cost of capital for climate projects (World Bank, 2022). The IMF (2023) notes that resilient infrastructure planning is essential to safeguard fiscal sustainability and attract private investment for adaptation in EMDEs. The World Bank (2022) notes that inadequate adaptation financing and weak institutional frameworks amplify vulnerability, while scaling up resilient infrastructure and governance can stabilise financial systems and foster inclusive growth.

Table 5a Current Assessment of Climate Finance Flows in 2023

Region	Total Climate Mitigation Finance 2023 (USD billion)	Total Climate Adaptation and Dual Benefit Finance (USD billion)	Share of Global Total	Ratio of Private: Public Climate Finance	Ratio of Domestic: International Sources	Annual Climate Mitigation Finance Needs, 2024-2030, (USD billion)
East Asia and Pacific	70	12	~4%	57: 43	95: 5	210
Latin America and the Caribbean	92	13	~5%	57:43	61:39	248
Middle East and North Africa	35	10	~2%	66:34	57:43	202
South Asia	58	13	~4%	53:47	57:43	200
Sub-Saharan Africa	28	18	~2%	30:70	23:77	211

Source: CPI, 2025 (Source: ADB due to missing CPI data)*

Each of these regions includes significant opportunities for investors. Africa contains about 60 percent of the globe's best solar resources yet received less than 2 percent of clean energy investment in 2023 (IHLEG, 2024)**.** Solar PV and mini-grid deployment are accelerating on the continent, driven in large part by competitive auctions in South and East Africa (IRENA, 2018; World Bank, 2023). The continent's vast hydropower also remains untapped, with only 11 percent of potential currently utilized (IFC, 2023). Solar and wind projects typically achieve equity internal rates of return between 10 to 12 percent, reflecting higher political and currency risk but robust fundamentals and rising policy support (Fitch, 2022).

Climate finance flows to South Asia have been concentrated in India and Bangladesh, who accounted for 84 percent of total flows to the region in 2023 (CPI, 2025). Technological competitiveness further strengthens the region's appeal: the levelised cost of electricity for solar PV fell to approximately USD 0.049 per kWh in 2022 and onshore wind to USD 0.033 per kWh, confirming its global cost advantage (IRENA, 2024).

The Latin America and the Caribbean region is seen by experts as representing a dynamic frontier for climate investment. The region combines a mature renewable base with emerging green hydrogen clusters, growing urban resilience programs, and substantial potential for nature-based solutions linked to the Amazon (World Bank, 2023). Their comparatively high proportion of private climate finance, as shown in Table 5a, demonstrates deep domestic institutional-investor interest.

Investment opportunities in climate adaptation and resilience span sectors and can offer long-term value creation. These include companies implementing adaptation measures such as climate-proofing supply chains and assets, which enhance operational continuity and shareholder value (IFC, 2024). There is also growing potential in early-stage technologies that improve climate risk management, including weather analytics, resilient crop varieties, and water efficiency solutions (IMF, 2024). Upstream integration of adaptation considerations into infrastructure planning, covering transport networks, power systems, flood defences, and urban development, can reduce systemic vulnerabilities and attract blended finance at scale (World Bank, 2025; UNDRR, 2024). Mobilising private capital for these opportunities requires clear investment frameworks, risk-sharing mechanisms, and supportive policy environments to overcome barriers and scale adaptation finance (IMF, 2024; World Bank, 2025).

Beyond financial opportunity, the literature stresses the strategic case for EMDE investment as it relates to global economic and financial stability. EMDEs are projected to account for about 40 percent of global energy investment and emissions reduction by 2030 (IEA, 2023). Failure to bridge their financing gap will risk locking in high-carbon infrastructure, undermining global decarbonisation efforts and, ultimately, financial stability (IEA, 2023). Investors' alliances have recognized this too: Recent market intelligence underscores growing investor focus on EMDE transitions while GFANZ (2024) prioritizes mobilizing capital to EMDEs (GI Hub, 2024; Preqin 2024). Persistent adaptation and resilience finance gaps are widely recognised as structural risk amplifiers across climate scenarios in EMDEs. On the other hand, investment in adaptation and resilience can buffer the transmission of physical risks into economic and financial losses via better infrastructure quality, land-use planning, and institutional capacity can improve investment risk perceptions and analysis (Zhou et al., 2023; CCRI, 2021).

5.3 Private Finance Bridging the Investment Gap

More than 60 percent of required EMDE external finance must come from private sources in order to meet global climate goals (IEA, 2023). A simple reason is that the capacity of public institutions is modest in comparison with global private balance sheets. The IFC's total assets are on the order of just over USD 100 billion, whereas a single international bank reports asset totals close to USD 850 billion (IFC, 2023; Standard Chartered, 2025). For investors, the implication is straightforward: unlocking even a small, well-structured reallocation of private portfolios toward EMDE climate assets would dwarf the incremental headroom available through MDB balance sheets alone (WRI, 2023).

Current mobilisation remains far from this potential. In 2023, private actors provided only about 22 percent of international climate flows to EMDEs, amounting to around USD 43 million, against annual needs in the range of USD 450 billion for EMDEs excluding China (CPI, 2025; ICC, 2025). According to the OECD, official development interventions reported mobilising around USD 70 billion of private finance in 2023 (OECD, 2025). Each estimate has limitations, but the overall trend is clear: the gap is an order of magnitude.

This gap is persistent despite an increasingly robust set of literature suggesting that EMDE project finance is substantially less risky than commonly perceived. Project finance default rates in EMDEs are only marginally higher than in advanced economies, while recovery rates in low-income countries frequently exceed those observed in higher-income peers (Moody's, 2022). Lending to private borrowers from the EBRD shows default rates of 4.1 percent for lower-middle income countries in Eastern Europe, while Global Emerging Markets Risk Database (GEMs) data based on investing alongside DFIs shows default rates for lower-middle income countries at 4.4 and 6.3 percent for low- income countries. While these are higher than advanced economies, they are significantly lower than the implied defaults based on sovereign ratings in those regions, which are 14.6 percent for lower-middle income countries and 14.2 percent for low-income countries, suggesting a significant gap between real and perceived risk (EBRD, 2024; IFC and GEMs 2024). Trade finance in Africa shows even more favourable outcomes: default rates are lower than in parts of Europe (ICC, 2024).

The results of political risk guarantees show a similar pattern of conservatism: expected losses are estimated to be 7 to 20 times higher than actual claims (Blended Finance Taskforce, 2023). Recent analysis of African credit data further challenges market perceptions: one-year default rates average only 0.11 percent for BBB-rated entities and 1.25 percent for B-rated issuers, with three-year cumulative defaults below 0.3 percent for BBB (GCR, 2025). These findings indicate that investors are often pricing in double-digit default probabilities where the data do not necessarily support them. While each of these data points has limitations, and none is conclusive on its own, when taken together they point towards an overall trend of EMDE investments being less risky than commonly perceived. The mispricing of EMDE credit risk therefore represents not just a developmental constraint but a missed market opportunity – one that could be unlocked through better data transparency, risk-sharing mechanisms, and recalibrated credit-rating methodologies (CCSI, 2025).

To overcome investment risk – real and perceived – instruments exist to bridge the risk-return divide between public and private capital and mobilise private finance. Evidence shows concessional and first-loss tranches can play an important role: each dollar of concessional junior capital can mobilise up to five dollars of senior private capital when structured transparently (Blended Finance Taskforce, 2023). In banking operations, concessional debt from DFIs is often deployed through co-lending or guarantee structures to enhance project bankability and lower the weighted cost of capital (OECD, 2021; World Bank, 2023).

EMDE funds, such as ILX Fund, Emerging Market Climate Action Fund (EMCAF), and AFC Capital Partners follow distinct capital structures and investment strategies to blend institutional and concessional capital. ILX Fund currently manages two funds with a value of EUR 1.7 billion, primarily from pension funds. Its experience demonstrates that pension funds can take credit, maturity, and liquidity risks that investors such as banks or insurance firms may be restricted by regulation from taking. It thus provides additionality rather than concessionality (Expert Interviews, 2025). It co-finances alongside DFIs, leveraging their origination, due diligence, climate risk, and monitoring capabilities but without concessional features. AFC Capital Partners attracts long-term investors such as sovereign wealth, pension and insurance funds alongside DFIs, which allows for a 15-20 year investment horizon. Long-term investors are better suited to absorb long-dated risks (including those resulting from climate change) and provide stable capital for infrastructure assets (Expert Interviews, 2025). EMCAF deploys blended finance structures, using first-loss or mezzanine tranches to absorb early losses and crowd in private capital.

Collectively, these mechanisms expand institutional exposure to emerging markets through different models of risk allocation and intermediation (ILX Fund, 2025; Allianz GI, 2025; Convergence, 2023). These channels have proven effective under the right conditions: Blended portfolio funds anchored by DFIs have delivered 6-8 percent risk-adjusted returns. This demonstrates commercial viability even with only moderate concessional support as well as competitiveness with or even superior returns to investment-grade corporate bonds, whose index shows a yield of 4.71 percent. Corporate bonds may also display higher volatility than guaranteed returns due to the presence of first loss layers in blended finance schemes (IFC, 2023; Street Stats, 2025). In the case of the ILX Fund, performance data from the GEMS database shows that its risk-return profile is comparable or superior to high-yield bonds and leveraged loans (Expert Interviews, 2025).

The average annual blended finance deal volume between 2019 and 2024 was just USD 10-15 billion per year, reaching about USD 18 billion in 2024 (Convergence, 2025). Conventional blended finance instruments absorbing the majority of flows are concessional debt (the most prominent at 67 percent), concessional equity, catalytic funds and result-based financing (Convergence, 2025).

In scaling blended finance volumes, the literature highlights the potential underuse of guarantees: while multilateral and bilateral institutions have mobilised over USD 2 billion of private finance since COP29 (World Bank/MIGA, 2019), guarantees account for just 4 percent of MDB commitments, despite evidence that they can crowd in up to five times more private capital than standard loans (CPI, 2025). UK Export Finance (UKEF) supported GBP 6.5 billion in climate-aligned projects in 2023-24, demonstrating how export credit and climate objectives can be integrated (UKEF, 2024). The London-based Private Infrastructure Development Group provides guarantees to elevate EMDE climate projects through its subsidiaries GuarantCo, InfraCredit (in Nigeria) and InfraZamin (in Pakistan) to investment-grade ratings, thereby enabling institutional investment at scale. Since 2005 GuarantCo has issued USD 1.5 billion in guarantees raising USD 5 billion in private finance (PIDG, 2023). Green Guarantee Company, established in the UK in 2024, also provides guarantees (Green Guarantee Company, 2024).

Evidence further demonstrates unrealised potential of other risk mitigation instruments. Currency volatility adds 200 to 400 basis points to EMDE project costs, yet scalable hedging solutions remain limited (IMF, 2024). The Currency Exchange Fund (TCX) has hedged more than USD 16 billion in development-loan exposure (TCX, 2025), but this remains marginal relative to overall need (WAPPP, 2025). In Brazil for instance, forward and swap contracts are dominated by a few large banks, with limited long-tenor instruments available, which drives up costs well beyond the realized volatility of the real. High interest rate differentials and inflation expectations further inflate forward pricing, meaning investors pay a persistent “hedging premium” that erodes project returns. This illustrates the acute need for public FX guarantee mechanism beyond current commercial solutions (CPI, 2023). Separately, securitisation, which could recycle MDB and DFI balance sheets by transferring de-risked assets to private investors, has yet to gain traction despite explicit endorsement by the G20’s review of MDB capital-adequacy frameworks (Mobilist, 2023).

A persistent bottleneck remains at the start of the investment cycle: limited funding for project preparation. Early-stage development costs are rarely covered, despite being decisive for bankability (Convergence, 2024). Without dedicated preparation facilities, even high-potential projects struggle to reach financial close, reinforcing the perception of weak pipelines and compounding the mobilisation challenge (Convergence, 2024).

5.4 Market Factors and Causes of EMDE Under-investment

Notwithstanding compelling fundamentals and resource advantages, investor allocations to EMDEs remain low. Recent literature provides several explanations for this trend. This section discusses the market factors, while the following section discusses the structural ones.

Information and data: An underlying obstacle highlighted in the literature is the chronic absence of transparent, high-quality performance data. Across EMDEs, project- and corporate-level data remain scarce and inconsistent (CCSI, 2025; *The Economist,* 2024). The absence of reliable benchmarks compels investors to treat opacity as risk, inflating required returns and reinforcing conservative portfolio strategies. Consequently, EMDE equity allocations tend to be tactical rather than strategic, motivated by short-term valuation or currency swings rather than sustained growth exposure (*Financial Times,* 2025). This lack of data is also a factor explaining the lack of standardisation. Each bespoke structure demands costly due diligence, raising the required return threshold for investors (Convergence, 2020; IRENA, 2024). Lastly, the lack of data may constrain prudential regulation reforms. While multiple quantitative studies already demonstrate the misalignment between prudential regulations and the track record of EMDE investments (Jobst 2018; IHLEG 2024), a more robust data set of EMDE investments would make the case more persuasive, particularly in distinguishing the performance of green investments (Columbia SIPA, 2024).

Institutional attitudes: Among market factors, institutional investors remain constrained by conservative allocation norms that prioritise familiarity over opportunity. Evidence suggests, for example, that investors tend to prioritise markets that are geographically close and culturally familiar, even at the cost of greater opportunity elsewhere, an effect known as home-bias (Symbiotics, 2024; Expert Interviews, 2025). Despite EMDEs being projected to drive global growth in the coming decade, investors continue to overweigh macroeconomic, political, and geopolitical risks relative to underlying fundamentals (Natixis Investment Managers, 2024; PGIM, 2024; HSBC, 2025). This conservatism is reinforced by herding behaviour, particularly visible in African bond markets, where data shows that investors cluster around a narrow set of sovereign issuers, heightening volatility and mispricing (AfDB, 2020). Such behaviour masks the heterogeneity of EMDE performance; many economies maintain dollar-pegged currencies, substantial reserves, or commodity-based foreign-exchange buffers that mitigate exposure to external shocks (CCSI, 2025). Lack of institutional investor appetite for long -term value is revealed by the one-year update of the Mansion House Compact (City of London, 2023): a voluntary, industry-led initiative in the UK pensions sector, launched in 2023, aiming at improving long-term outcomes for pension savers by increasing investment into unlisted equities via defined contribution (DC) default funds. As of 2024, signatories hold around 0.36 percent in unlisted equity in DC default funds, still far from the 2030 5 percent target (ABI, 2024). While these investments might not be in EMDEs, they share similarities with EMDEs: illiquidity, longer term value, short term transaction costs (for being different from the usual and familiar investments).

Investor awareness: Investor hesitation is also rooted in limited awareness of the diversity of investment opportunities and financial instruments available. Interviews show that many institutional investors remain unfamiliar with the full range of risk-mitigation tools and blended-finance structures that can offset EMDE exposure (CCSI, 2025; Expert Interviews, 2025). Moreover, the under-communication of demonstration effects by MDBs and DFIs, and the absence of standardized templates, prevents replication at scale. Deal terms are often bespoke and fragmented, raising transaction costs, creating a “complexity premium” and deterring institutional participation (CCSI, 2025; Convergence, 2024).

Project pipeline and project risks: Many projects fail to reach bankability because of gaps in preparation, including incomplete feasibility studies, weakly structured contracts, limited technical expertise, misalignment with investor requirements, and permitting challenges. Ambiguities in stakeholder roles can further delay financing decisions. Among renewable energy projects deemed non-bankable, 45 percent suffer from insufficient project readiness, 25 percent from an inadequate financial structure, 12 percent due to project size, 10 percent because of limited alignment with SDGs, and 8 percent from a lack of track record (IRENA 2024).

5.5 Structural Constraints Limiting Private Finance

Several structural factors, including macroeconomic volatility, debt overhangs, and conservative prudential and credit rating regulations, create a persistent wedge between investment potential and reality.

The drivers of EMDEs' elevated cost of capital are specific and structural while exacerbated by global financial rules and practices. Unique structural barriers faced by EMDEs, including currency volatility, climate vulnerability, and unstable domestic governance, increase risk for otherwise viable projects. These real risks are amplified by a conservative IFA, including procyclical credit ratings and debt sustainability analysis as well as risk-averse prudential regulation, that sustain a risk premium beyond what the fundamentals justify. These factors are discussed in turn below.

Currency volatility: Currency volatility remains one of the most salient risks for investors in EMDE infrastructure and renewable energy projects (CCSI, 2025; Expert Interviews, 2025). Project revenues are often denominated in local currency, while debt is issued in hard currency, exposing borrowers to large valuation swings. FX risk can add 200 to 400 basis points to project costs, an increase large enough to render otherwise viable projects unbankable (World Bank, 2024). Access to affordable hedging tools remains limited, particularly for long maturities. Local capital markets are shallow, and international hedging instruments are often prohibitively expensive (CCSI, 2025). Despite innovative solutions such as The Currency Exchange Fund (TCX) and regional guarantee facilities, the scale of protection remains insufficient to close this structural gap, as mentioned above.

Climate exposure and vulnerability: In parallel, studies show that climate exposure adds an estimated 100 to 200 basis points to EMDE sovereign borrowing costs (Buhr et al., 2018; Volz et al., 2020; IMF, 2022). Rising transition and physical risks are discouraging international lenders, who remain uncertain about how these risks will be priced under prudential frameworks (FSB, 2025; UNEP, 2025). Reporting and disclosure frameworks such as TCFD can deter EMDE investment as climate risk within corporates and finance becomes clearer (Expert Interviews, 2025). The result is a paradox: economies most in need of investment to reduce climate risk face the highest cost of capital precisely because of that risk. Credit ratings agencies (CRAs) nonetheless note that physical risks account for about 1% of a country or corporate rating (Expert Interviews, 2025). Given the importance of resilient infrastructure in a context of rising EMDE climate vulnerability, the methodologies and scientific data used to assess and manage physical and transition risks (such as changes in precipitation, sea level rise, wind patterns, and pace of energy transition) and integrate risk management into project planning and oversight will be increasingly important in attracting investment (Expert Interviews, 2025).

Domestic governance: Domestic governance and regulatory predictability further influence capital costs. The IMF (2023), for example, finds that weak regulatory quality and non-transparent budget processes significantly explain the risk premium at issuance for Sub-Saharan African debt. These factors feed into credit assessments and investor models, elevating spreads and reducing appetite for multi-decade commitments. Given the reliance of infrastructure on government contracts and off-takers, regulatory uncertainty can deter investors. Conversely, infrastructure's reliable performance amidst economic headwinds makes it attractive when regulatory stability is in place, as each improvement in the regulatory environment can unlock up to USD 450 million in new investment (World Bank, 2025).

Credit rating agencies: CRAs play a central role in translating perception into price. A robust set of literature reveals that CRAs, following the 2008 financial crisis and resulting reputational damage from overly generous ratings as well as regulations passed in the aftermath, shifted towards more conservative ratings. Researchers documented this effect observed among US corporates, European financial institutions, and EMDE sovereigns, suggesting a system wide depression of ratings (Dimitrov et al 2015; Jones et al 2022; Uslu 2017; Expert Interviews, 2025). The COVID-19 pandemic caused further downward shift, but with sharp regional disparities. In 2020, advanced economies received just six total downgrades from Moody's, S&P Global and Fitch, compared to 125 in EMDEs (UN DESA, 2021). Some gap is expected since advanced economies are typically more resilient to shocks, yet the scale is striking given that advanced economies contracted twice as fast as EMDEs and saw debt burdens rise by 11 percent more (UN DESA 2021). Recent evidence highlights that their sovereign and corporate methodologies are structurally conservative with respect to EMDEs (CCSI, 2025; UNCTAD, 2025). Sovereign ratings frequently cap corporate and project ratings, mechanically elevating the cost of private borrowing (Borensztein et al., 2013; S&P Global, 2024). From expert interviews (2025) the OECD's framework for country risk classification that is often used by export credit agencies and that is less conservative doesn't meaningfully influence CRA ratings (OECD, 2025). The procyclical nature of rating adjustments, rapid downgrades during periods of volatility and slow upgrades after recovery, amplifies market swings and prolongs elevated spreads (BIS, 2003).

CRAs resist the argument that ratings block EMDE capital (Expert Interviews, 2025). They point to CRA data that shows low default rates and high recoveries, especially where guarantees and insurance are present. One-year and three-year probabilities of default at the same rating grade can be similar between EMDEs and advanced market, for example the Philippines and USA (ibid.) Volatility is not inherently higher in EMDE project finance once long-run recoveries are accounted for. Expert interviews (2025) drew attention to efforts over the past decade to increase transparency, publish methodologies, and expand sustainable finance research, cautioning that CRAs cannot dictate financial decision-making or regulation.

Prudential regulations: Prudential regulations such as Basel 3 for banks and Solvency 2 for insurance in the EU shape how financial institutions assess and allocate risk (CCSI, 2025). A robust set of literature, however, shows that these frameworks impose higher capital charges on EMDE exposures, particularly in infrastructure and long-duration assets, than is justified based on their performance (IHLEG et al., 2024; CCSI, 2025; Expert Interviews. 2025). Strict operational requirements and conservative risk-weighting approaches also frequently prevent MDB or DFI guarantees from qualifying as eligible credit risk mitigation, reducing potential capital relief (ICC, 2025). Similarly, wider use of blended instruments is discouraged by not recognising their credit risk mitigation impact which would warrant capital relief necessary to incentivise investments in EMDE markets. Under current interpretations, the same asset may carry up to twice the capital requirement if located in a developing rather than advanced economy (EC, 2021). Similarly, because Basel and Solvency frameworks require banks and insurers to rely on CRA ratings when determining capital charges, conservative methodologies become intertwined into financial decision-making (BIS, 2023). While these regulations enable large, sophisticated firms to use their own internal risk models, Basel 3 limits the capital relief provided by these internal models relative to the standard approach (BIS, 2023). Since the limit is most salient in areas where ratings are most conservative, expert interviews (2025) expressed the view that prudential regulations can have damaging impact on infrastructure investment and project finance in EMDEs (CCSI, 2025).

Since late 2024, the UK and other jurisdictions have committed to implement reforms under Basel 3.1 aimed at improving the accuracy and comparability of risk-weighted assets (RWAs) and strengthening bank resilience. Basel 3.1 represents the final set of Basel 3 post-financial crisis reforms. These include revised credit risk frameworks (both standardised and internal), an output floor limiting how much banks can reduce RWAs using internal models (set at 72.5% of RWAs calculated under the standardised approach, phased in through 2030), a revised operational risk framework, and enhanced disclosure rules. Whilst Basel 3.1 does not explicitly integrate climate risk, lower capital requirements for certain infrastructure exposures (as seen in UK approaches) could support green and sustainable projects. However, banks may still face constraints if climate investment is perceived as high-risk under standardised approaches (PRA, 2024). The output floor could constrain lending to EMDEs, where internal models typically yield lower RWAs. Divergent timelines and national adjustments across jurisdictions risk further creating an uneven playing field.

Recent work by IIF (2025) and GFANZ (2024) has provided an important foundation for understanding how current capital requirements align with observed performance, drawing on bank reported data and extensive consultation with industry. However, these analyses have not yet been translated into a consolidated, cross jurisdictional assessment of what these findings mean specifically for climate aligned investment flows in EMDEs. These assessments remain largely absent from the datasets used in supervisory analyses, and MDB and DFI performance data are not systematically incorporated into global discussions on calibration.

Together, these barriers sustain a persistent and multifaceted cost-of-capital gap. FX volatility imposes a direct financial penalty; rating conservatism embeds a systemic markup; prudential rules raise risk premiums; and governance uncertainty heightens perceived instability. Correcting these distortions requires an integrated reform agenda that addresses financial rules, market norms, and the underlying debt architecture – issues to which the next section turns.

5.6 How the UK Can Bridge the Gap

The UK, with its global financial reach, deep capital markets, and longstanding expertise in structuring complex financial products, is well positioned to strengthen its role as a hub for sustainable finance. By focusing on pragmatic, investor-aligned products and services that can channel capital into real economy transitions in EMDEs, the UK could define a distinctive leadership role. As the world's second-largest asset-management hub and a global centre for insurance and sustainable finance innovation, London combines financial depth, technical expertise, and convening power unmatched by any other market (City of London Corporation, 2023). The relevant literature provides six mechanisms through which the UK can expand opportunities for its investors and catalyse capital flows into EMDE transitions.

Firstly, the industry-led EMDE Investor Taskforce, convened by HM Treasury and FCDO, and backed by major UK asset owners and managers, serves as a platform to coordinate investor action, identify investable EMDE opportunities, and align capital-allocation strategies with emerging blended-finance and guarantee mechanisms. Its workstreams – which include work on data transparency, credit ratings, and prudential regulation – provide a direct bridge between London-based institutional investors and EMDE climate opportunities, reinforcing the UK's leadership in sustainable finance (IIGCC, 2024).

Secondly, guarantees remain one of the most effective tools for mobilising institutional capital into EMDEs by improving credit quality and aligning risk-return profiles. UK Export Finance (UKEF) demonstrates how export credit and climate objectives can be integrated (UKEF, 2024). The Private Infrastructure Development Group and Green Guarantee Company provide guarantees to elevate EMDE climate projects to investment-grade ratings, thereby enabling institutional investment at scale. Expanding the scope and interoperability of such facilities would enable London to become a global hub for climate credit enhancement.

Thirdly, the UK insurance market, anchored by Lloyd's and the Insurance Development Forum (IDF), is advancing innovative risk-transfer solutions for climate resilience. Parametric products and resilience bonds are being piloted to help governments and corporates in EMDEs manage disaster and climate risks (Lloyd's, 2022; IDF, 2024). These models build on the City's long-standing expertise in catastrophe and specialty insurance, offering scalable templates that link resilience outcomes with investable returns. The UK's leadership in insurance-linked securities can further catalyse private participation in adaptation and loss-prevention finance, provided it is underpinned by deep work to ensure that resilience measures translate into lower premiums through higher-resolution actuarial models and robust verification systems (Climate Finance Risk Forum, 2023). On the asset side, the Insurance Development Forum and Aegon (2025) have outlined blueprints for mobilising insurer balance sheets into resilient EMDE infrastructure and for insuring MDB and DFI exposures to create AAA-like 'double recourse' structures.

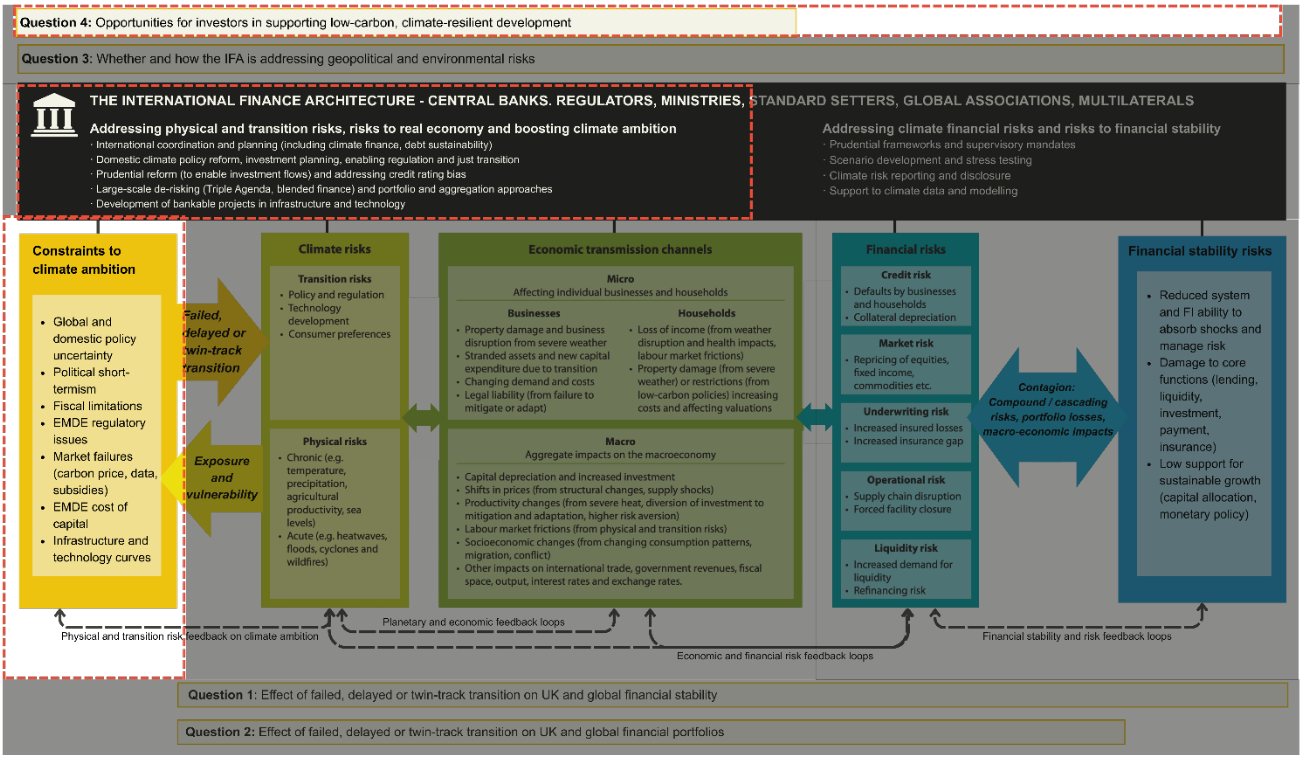
Fourthly, London's global financial networks give the UK exceptional influence in shaping norms, standards, instruments and coalitions for sustainable investment. The Glasgow Financial Alliance for Net Zero (GFANZ), headquartered in London, while changing direction due to political headwinds, has been a driving force behind capital mobilisation frameworks, de-risking, transition planning, and reporting and disclosure and has a dedicated workstream on EMDE investment (GFANZ, 2025). The Green Finance Institute (GFI) serves as a bridge between public institutions and private investors, having co-developed effective blended solutions that channel capital into sustainable agriculture in emerging markets (GFI, 2024). The Transition Finance Council was co-launched by the UK government and the City of London Corporation to drive forward the recommendations set out in the Transition Finance Market Review and to establish the UK as the global hub for raising and deploying transition finance. Through coordinated efforts across the FCDO, HM Treasury, and UK regulators, London can strengthen its position as the primary convening venue for MDBs, DFIs, and private investors seeking alignment on metrics, pipelines, and standards.

Fifth, the UK demonstrated how policy and investment interventions can reshape market behaviour. The CLEAR Fund is a USD 200 million Africa-focused vehicle launched with support from FCDO and BII and managed by Helios Investment Partners. MOBILIST, backed by the FCDO, is sponsoring an ambitious programme of research to inform and influence financial markets actors, with one aim to expand EMDE investment in public markets. The UK has supported Africa-focused funds, such as the African Renewable Energy Fund II, through partnerships between British International Investment (BII) and the FCDO (BII, 2025). BII has launched a mobilisation facility that deploys concessional capital to crowd in private investors (BII, 2024). These vehicles illustrate how government-backed catalytic capital can create commercially viable EMDE investment tracks within global portfolios.

Sixth, the UK can lead through public commitment and international coordination. The UK Government's International Climate Finance commitment of £11.6 billion for 2021-26 positions it as a leading bilateral climate donor. The FCDO and DESNZ support key bilateral programmes such as the Climate Finance Accelerator and the Green Cities, Infrastructure and Energy Programme and multilateral initiatives like the Climate Investment Funds and its Capital Markets Mechanism, which strengthen local enabling environments and raise investment.

By deploying its capital market and insurance depth, backing pooled blended vehicles and aggregation platforms such as CLEAR, scaling UKEF's climate instruments, leveraging BII, and harnessing its policymaking and convening power, the UK can demonstrate substantial catalytic potential as a sustainable finance centre.

6. EMDE Climate Transitions, Investment Frameworks and the IFA



6.1 Introduction

This chapter examines how reform of the IFA could reduce the cost of capital for EMDEs and better align global finance with climate and development goals. The IFA in question in this chapter concerns those institutions – notably ministries of finance, national and international regulators, MDBs and DFIs – that are mandated to drive and incentivise EMDE transitions and financial flows. Building on Chapter 5's analysis of private capital mobilisation constraints, it shifts focus to the structural rules, mandates, and incentive systems that determine how risk is perceived, priced, and distributed across the global economy. These system-level features – spanning liquidity frameworks, sovereign risk assessments, and prudential regulations – directly shape sovereign borrowing costs, investor risk appetite, and ultimately the bankability of climate projects.

The discussion situates current reform efforts within the broader context of geopolitical fragmentation, tightening financial conditions, and accelerating technological change. It assesses where the literature finds persistent misalignments between the IFA's design and the financing needs of EMDE transitions and explores where reforms – led by the UK and other global financial hubs – could catalyse more systemic change.

The chapter proceeds in three parts. It firstly reviews current reform initiatives across the IFA, including efforts to strengthen liquidity and crisis-response mechanisms, modernise multilateral development bank mandates, and improve coordination between global and national institutions. It highlights uneven progress and the persistent neglect of core cost-of-capital drivers such as regulatory frameworks, credit-rating methodologies, and prudential treatment. Secondly it examines the financial and geopolitical forces reshaping the reform landscape, identifying strategic openings for the UK as a global financial hub to support a more development- and climate-aligned architecture. Thirdly it concludes by highlighting the literature's shared recognition that structural constraints must be addressed through reform.

The analysis draws on academic, policy, and institutional sources. The evidence base is strongest on MDB capital adequacy reform, debt sustainability, and the emerging consensus that the current IFA remains misaligned with EMDE investment needs. However, the literature remains thin on the actual design and feasibility of structural reforms. Gaps persist in empirical assessments of how specific prudential regulatory or credit rating changes could affect capital costs. Overall, while the reform direction is increasingly well recognised, the pathways to implementation, and their potential impact on EMDE financing conditions, remain only partially understood.

6.2 Current IFA Reforms and Opportunities

Although multiple IFA reform efforts are underway, current literature remains bearish on their progress in reshaping the IFA. Recent initiatives commonly labelled as 'IFA reform' operate at different layers of the IFA. The Bridgetown Initiative (2022) advances system-level liquidity and crisis-response ideas to unlock climate and SDG investment (Engel et al. 2025; Parliamentary Network, 2023). It proposes measures such as revising IMF lending criteria, expanding catastrophe and rapid financing windows, and creating a universal contingent finance facility. The G20 International Expert Group Triple Agenda centres on MDB mandates and balance-sheet mobilisation (G20 IEG, 2023). Country platforms such as Just Energy Transition Partnerships seek national-level coordination across donors and investors, though progress has been slow and variable across countries (Rockefeller Foundation, 2024; MDB Climate Action Group, 2024). The Coalition of Finance Ministers for Climate Action advances fiscal instruments in an advisory forum (CFMCA, 2025). The IIGCC (2025), moreover, advocates for reforms to the IFA to enhance resilience and reduce risk stacking against EMDEs.

Whilst these efforts have expanded toolkits and raised the profile of reform, many upstream drivers of EMDE capital costs lie outside current proposals (CCSI, 2025; Expert Interviews, 2025). The result is an uneven reform landscape. MDB balance sheet adjustments absorb most attention, while the regulatory, prudential, and credit rating dimensions of the IFA – the very levers shaping private sector capital costs – remain largely unexamined as instruments of leverage. Within IFA circles they are discussed at too high level to be turned into definitive action. Thus existing initiatives reflect increased political will and mark progress in discourse but have not made enough systemic impact in tackling the roots of higher costs of capital (UNCTAD 2023; Global Policy Forum, 2024; Germanwatch Policy Brief, 2023).

6.3 Strategic Opportunities and Geopolitical Trends

The context for IFA reform is being reshaped by powerful economic, financial and geopolitical shifts. Higher global interest rates, shrinking aid budgets, China's growing dominance in green technology, and uncertainty over the long-term role of the US dollar are all altering the incentives and constraints for capital mobilisation. These pressures expose structural weaknesses in the IFA but also create openings for countries like the UK to position themselves as reform leaders.

As literature shows, the post-COVID monetary tightening cycle has left EMDEs facing the highest real borrowing costs in over a decade (IMF, 2023). Public debt has reached unprecedented levels worldwide, with particularly severe impacts on developing economies. According to UNCTAD (2025), global public debt rose to approximately USD 102 trillion in 2024, of which developing countries account for around USD 31 trillion. These countries collectively paid about USD 921 billion in interest alone, leaving limited fiscal space for essential priorities such as health, education, and climate action.

Renewable energy and infrastructure projects, typically front-loaded in capital expenditure, have been hit hardest, as rising discount rates erode viability (IEA, 2023). Simultaneously, fiscal pressures within advanced economies are curbing official development assistance: higher military and social spending in the UK and EU have reduced available concessional finance (BBC, 2025). This reality underscores the need to stretch limited public resources through blended finance instruments and to mobilize market-rate capital to fill the gap.

China's leadership in green technology manufacturing has transformed global supply chains (RMI, 2024). Rapid cost declines in solar, battery, and electric-vehicle technologies (RMI, 2024) are accelerating the energy transition but also consolidating China's strategic influence across EMDEs (ODI Global, 2025). For the UK, this dynamic presents both a challenge and an opportunity. By positioning itself as a provider of high-integrity, market-based finance for countries suffering from high financing costs, the UK can fill a structural gap that concessional and Chinese policy lending alone cannot close. Rather than competing head-on, the UK could leverage its financial ecosystem to co-finance climate transition and resilience projects, aligning with China in areas of complementarity and reducing the polarisation of global capital flows (Chatham House, 2025).

The literature also points to an evolving global currency landscape with potential implications for climate finance and EMDE investment. While predictions of de-dollarisation have circulated for decades, recent experimentation with BRICS payment mechanisms and regional currency arrangements has revived debate about the long-term configuration of global liquidity (Gerding and Hartley, 2023; JP Morgan, 2025). Most studies view these shifts as gradual rather than transformative, signalling a move toward a more multipolar financial order rather than a sudden break from the US dollar system. Yet the implications for climate finance flows and risk pricing remain under-examined. New BRICS initiatives and digital payment systems raise questions about future denomination patterns, liquidity access, and the stability of reserve-currency arrangements. Disentangling signal from noise and assessing how alternative reserve or settlement systems could affect EMDE financing costs and capital mobility emerge as key research priorities. For the UK, positioned as a major financial centre outside the US monetary zone, this transition presents both a strategic challenge and an opportunity to act as a bridge between financial poles, ensuring that evolving currency dynamics support rather than constrain capital flows into EMDE transitions.

6.4 A New IFA Reform Agenda

The literature recognises that considering these geopolitical shifts and the limitations of current IFA reform efforts, a more ambitious agenda is essential to align global finance with climate and development goals. It is crucial that the new IFA reform not only expands MDB lending but also address structural constraints and lowers EMDE capital costs with the aim of accelerating the global energy transition and aligning with the Paris Agreement.

MDB reform remains a priority but must extend beyond incremental balance sheet optimisation. Proposals to modernise capital adequacy frameworks, unlock callable capital, and expand guarantee capacity are critical (Germanwatch, 2023; RMI, 2023). Recent literature argues that in markets where blended finance is most appropriate – those with solid economic fundamentals, manageable risk levels, and significant potential to accelerate climate-related investment flows – MDBs should recalibrate their incentives away from maximising disbursements toward maximising private capital mobilisation, supported by transparent performance metrics and targeted credit enhancement instruments (CCSI, 2025; Expert Interviews, 2025).

The literature highlights that credit rating reform is central to the evolution of the IFA. Current methodologies overweight short-term macroeconomic indicators such as GDP per capita and external balances, while underweighting resilience, diversification, and sustainability investments that enhance long-term solvency (CSIS, 2024). Credit rating agencies have shown growing engagement in the debate on EMDE finance and have welcomed initiatives such as the database as important developments (CCSI, 2025; S&P Global, 2025). However, they remain reluctant to pursue deeper reform, continuing to rely on backward-looking ratios rather than forward-looking analyses that incorporate climate resilience and SDG-related spending, as recommended by the UN and others (UNDP, 2023). Despite broad recognition of systemic conservatism in rating methodologies, there is little agreement on how to adapt them without undermining market confidence. Concrete reforms, such as adjusting sovereign ceilings or integrating resilience indicators, are often dismissed by agencies as incompatible with their mandates (CCSI, 2025). The literature therefore calls for a clearer articulation of reforms that are both technically feasible and regulatorily acceptable, bridging the gap between analytical consensus and practical implementation.

Debt sustainability is also crucial, as the current global architecture for public debt is increasingly judged to be inadequate. The UK's Climate Resilient Debt Clauses, introduced by UKEF (2023), offer a replicable template for embedding flexibility into sovereign contracts. The Sustainable Sovereign Debt Hub advocates the IFA to integrate climate change into sovereign debt via debt clauses and sustainability-linked bonds. There have in addition been efforts at refinancing debt in support of with climate action. The Common Framework, a 2020 initiative of the Group of 20 to streamline debt restructurings (Paris Club 2025) is seen as ineffective at tackling the emerging debt crisis (UNCTAD, 2025). Refinancing has occurred in some cases, using debt-for-nature or debt-for-climate swaps, but these have so far shown limited effectiveness in addressing debt sustainability. While these instruments can theoretically mobilise their resources for environmental protection, they are criticised for having significant design and monitoring challenges (IMF, 2022; Financial Times 2024), and for delivering debt reduction at much smaller magnitude than conventional restructuring (Debt Justice 2023). As such, with limited progress in improving debt restructuring programs, many developing countries face shrinking fiscal space available for enabling climate-related investment and domestic governance reform, further compounding the debt-climate trap (UNCTAD 2023). More recent innovations, such as Côte d'Ivoire's 2025 sustainability-linked debt swap supported by the World Bank, attempt to scale up impact by refinancing expensive commercial debt and tying loan pricing to measurable climate and environmental targets (World Bank, 2024). While this model may prove more efficient and replicable than earlier debt-for-nature swaps, it still leaves untouched the deeper structural drivers of high capital costs in EMDEs, meaning its systemic effect on the debt-climate trap remains limited.

Finally, prudential regulation reform deserves greater attention. While prudential frameworks formally recognise guarantees as risk mitigants, the operational criteria, maturity matching, documentation, and counterparty eligibility, render many blended finance projects relying on guarantees ineligible for capital relief. The problem is not compliance but design: Basel 3 and Solvency 2 rules were built for stability in advanced markets, not capital scarcity in emerging ones. Jurisdictions such as the UK and EU have begun adopting more flexible interpretations: for example, the EU has reduced capital charges for insurers investing in long-term infrastructure and sustainable assets and is considering lowering capital and liquidity charges on high-quality securitised assets, a commonly utilised method of investing in EMDEs (European Commission, 2025; Ashurst, 2025). But these remain exceptions, underscoring a deeper asymmetry in the system (ICC, 2025).

Conclusions

This literature review has examined how climate risks, transition dynamics, transmission channels and EMDE investment flows interact, with particular attention to their implications and opportunities for the UK and other advanced financial systems. Drawing on over 230 academic, institutional, and policy sources, it mapped the state of evidence across six interlinked chapters: the economic and financial impacts of failed, delayed or twin track transition; the implications for UK and global financial stability; the impact of a failed or delayed EMDE transition on financial portfolios; cascading risks and the IFA; economic opportunities and investor appetite in EMDE transitions; and EMDE climate transitions, investment frameworks and the IFA.

Key knowledge gaps identified across each chapter are outlined in the table 7a below.

Table 7a: Knowledge gaps by chapter

Chapter		Knowledge Gap / Uncertainty
1A	Ch.1	Under-representation of tipping points, tail risks and climate-nature interactions in climate, economic and financial scenarios and models
1B	Ch.1	Limited quantitative or qualitative evidence of how risks, including socio-economic and geopolitical risks, can cascade and compound each other and how feedback loops will materialise
1C	Ch.1	Limited quantitative evidence on twin-track or fragmented transition scenarios – current models treat global transitions as uniform
1D	Ch.1	Wide range of assumptions in long-term climate scenarios, e.g. concerning GDP growth and damage functions
2A	Ch.2	Limited understanding of the scale and timing of physical and transition risks, the materiality and interaction of amplification mechanisms, and when they may escalate into systemic financial instability
2B	Ch.2	Limited empirical validation of how financial institutions and markets price in climate risks, and the potential for a Climate Minsky moment in response to abrupt repricing or shocks
2C	Ch.2	Sovereign-bank nexus under climate stress not yet quantified and joint crises and thresholds poorly modelled
2D	Ch.2	Insurance information and protection gap and loss of insurability are unmodelled as feedback loops in scenarios and stress tests
2E	Ch.2	Non-bank financial intermediation contagion channels under-analysed

2F	Ch.2	Cross-border spillovers via trade, supply chains, and commodities remain weakly modelled in stress tests
2G	Ch.2	Limited empirical validation of compound and cascading shock scenarios in supervisory frameworks.
3A	Ch.3	Climate financial risk models in the market under-represent compound feedbacks, cascading risks, tipping dynamics
3B	Ch.3	Limited granular data on portfolio-level EMDE exposures by asset class and sector; indirect holdings poorly captured
3C	Ch.3	Persistent EMDE data gaps on hazards, carbon pricing, technology, asset vulnerability, and socio-economic drivers
3D	Ch.3	Investor behaviour and adaptive response data scarce
4A	Ch.4	IFA mandates for climate risk remain fragmented within and between financial stability focus and transition and finance focus
4B	Ch.4	Incomplete scenarios, early-warning and surveillance systems for compound, cross-border climate shocks across IFA
4C	Ch.4	Prudential and liquidity tools calibrated for short-term crises
5A	Ch.5	Absence of a standardised, public EMDE dataset on corporate and sovereign performance, deal structures, concessionality, mobilisation, defaults, and risk-sharing
5B	Ch.5	Mismatch between EMDE credit ratings and actual sovereign and corporate performance
5C	Ch.5	Limited understanding of investor appetite and mandate constraints for long-term EMDE exposure
6A	Ch.6	Conflation between climate risk and climate transitions and investment
6B	Ch.6	Comparative neglect of structural factors preventing EMDE investment vs. attention on MDB reform and blended finance

Across the review, the literature shows that recognition of climate-related financial risk has advanced rapidly across regulation and supervisory practice, scenarios and stress-testing and reporting and disclosure. Yet the ability of these approaches and frameworks to manage systemic risk is uncertain and their influence on climate transition and investment at best partial and overstated.

Taken together, the findings highlight three cross-cutting themes that underpin the knowledge gaps identified across chapters: the persistent conflation between climate risk management and investment mobilisation; the current limitations and uncertainties in credible scenarios and modelling of systemic risk; and the structural and institutional constraints that continue to raise the cost of capital and impede large-scale investment in EMDE climate transitions.

1: Gaps in Scenarios, Modelling and Assessment of Systemic Climate Risks

The literature shows broad agreement that climate change poses systemic, interconnected, and destabilising risks to the global economy and financial system but that scenarios and analytical frameworks within the UK and the wider IFA may be under-estimating the risk. Mainstream climate scenarios and stress-testing models may rely on flawed assumptions about growth and damage functions dynamics and underrepresent tipping points, tail risks, feedback loops, and the compounding nature of physical, transition and nature-related risks as well as migration and geopolitical trends (University of Exeter, 2025; BIS, 2020, 2025; Expert Interviews, 2025). Exercises such as those by the NGFS (2024), BIS (2021), and Bank of England (2022) have modelled linear climate change and constant GDP growth, used limited damage functions, and overlooked non-linear climate sensitivities, tail risks, and the interaction of climate, economic, financial and geopolitical systems. Methodological variance produces widely diverging macro and microeconomic and financial outcomes across scenarios – for example under current policies leading to 3°C of warming models range from a 2 percent GDP decline from business-as-usual growth to 50 percent GDP destruction when factoring in non-linearities, compound risks and feedback effects (IFoA, 2025). This uncertainty limits their usefulness for assessing systemic risk and suggests that the scenarios most deployed in the IFA and financial system may not be adequately representing real economy and financial outcomes.

Persistent data gaps further constrain the accuracy of climate risk measurement and pricing. Across public, private, and supervisory frameworks, the data needed to translate physical and transition risks into asset- and portfolio-level metrics remain incomplete, inconsistent, and unevenly distributed, especially across EMDEs (BCBS, 2021; BoE, 2025; FSB, 2021). Firm-level financials and probability of default, collateral valuations, technology performance, and climate exposure data are often missing, while cross-holdings by asset class and sector are rarely disclosed in a standardised format (BIS, 2021; NGFS, 2021). Understanding of indirect transmission channels – via trade, supply chains, commodities, cross-border banking and reinsurance – are even less visible, meaning the financial system cannot capture the full network of contagion and feedback effects. The result is an environment in which climate risks are acknowledged but not accurately quantified, and where the probability and scale of abrupt repricing, banking and liquidity stress, or correlated asset losses remain inadequately understood.

The literature depicts an IFA that recognises the complexity of climate risk but continues to be uncoordinated and to measure risk through overly static and incomplete scenarios, models and tools. While institutions such as central banks, the IMF, MDBs and global regulators and standard setters have begun integrating climate risk into their mandates, progress is fragmented and largely confined to incremental reforms and scenario analysis is at an early stage (Bolton et al., 2020; Lombardi and Momani, 2010; Niedermayer and Ryfisch, 2024; Bank of England, 2022).

Given IFA mandates for managing climate financial risk and maintaining financial stability, there is need for more in-depth and comprehensive climate scenario planning and modelling (Expert Interviews, 2025). This is distinct from objectives to mobilise capita for EMDEs. Without integrated, empirically grounded models that capture non-linear change, the full range of risks, compounding transmission channels and EMDE transition dynamics, IFA actors – and as a result investors – will remain unable to gauge the true exposure of the economy and financial system or to design credible strategies and actions in response.

2: Structural and Institutional Constraints to Financing the Transition

Despite strong fundamentals and rising investor appetite, the literature review finds that financing costs remain high, reflecting market factors, structural barriers, and inflated risk perceptions relative to reality. The scale of the EMDE investment opportunity is widely acknowledged in the literature (IHLEG, 2024; CPI, 2025). This notwithstanding, a variety of factors result in EMDE borrowers pay 300 to 500 basis points more than in advanced economies for equivalent projects and thus restrict private capital flows into climate transitions and investments.

Market factors act as barriers to EMDE investment. Sovereign and corporate data gaps and lack of transparency inflate perceived risk, drive conservative strategies, and raise due diligence costs (CCSI, 2025). Persistent information gaps reinforce distortions: transaction-level data on investment performance, especially in private (as opposed to development) finance, remain fragmented, preventing accurate pricing and replication of successful models. Climate resilience information is hard to access. Institutional norms favour familiarity, reinforced by home bias and masking EMDE opportunity (Natixis Investment Managers, 2024; HSBC, 2025). Weak project preparation and bankability gaps remain major barriers, notably in renewables infrastructure (IRENA 2024).

Investor allocations to EMDEs are furthermore constrained by structural factors that widen the cost-of-capital gap (CCSI, 2025). Currency volatility adds to project costs, hedging tools remain scarce and expensive and local financial markets are underdeveloped (World Bank, 2024). Climate exposure raises sovereign borrowing costs, meaning that those most in need pay most. Domestic governance weaknesses and debt sustainability concerns amplify risk premiums whilst regulatory improvements can unlock significant investment (IMF, 2023). Credit rating agencies embed systemic conservatism; EMDEs face disproportionate downgrades and procyclical adjustments (CCSI, 2025; UNCTAD, 2025). Ratings cap corporate and project scores, inflating private borrowing costs and prolonging elevated spreads. Prudential regulations impose higher capital charges on EMDE assets and mostly do not recognise blended finance risk mitigation, including many guarantees (IHLEG et al., 2024; BIS, 2023). All this unfolds amid a global rebalancing of power and a deepening debt-climate trap, making structural reforms urgent to address climate risk, while presenting an opportunity for the UK to show leadership in reversing institutionalised risk aversion.

UK and IFA can take advantage of the investment opportunities presented by EMDE transitions by addressing structural barriers to investment. In mobilising finance for EMDE transition, most attention is centred on the G20 Triple Agenda covering MDB reform and efforts such as the Bridgetown Initiative and the Coalition of Finance Ministers for Climate Action. These are essential for derisking and leveraging private finance through blended approaches. They also overlook more structural factors such as data limitations, credit ratings and prudential regulations. Reform efforts to date have focused less on the structural barriers that shape investment behaviour (CCSI, 2025). These continue to inflate the cost of capital in EMDEs, misprice risk, and limit the flow of private finance, reinforcing the cycle of underinvestment and increasing the probability of transition failure. The EMDE Investor Taskforce has the potential to address elements of these structural constraints through Workstream 2 on data and Workstream 4 on the enabling regulatory environment.

3: Conflation Between Climate Risk Management and Investment Mobilisation

A conclusion of the literature review is that much of the current discourse on climate finance conflates risk management with transitions and investment, creating blurred mandates within the IFA and unrealistic expectations of what managing financial risk alone can achieve (Sachs et al, 2025). The IFA has advanced supervisory and prudential integration of climate risk in the financial system through scenarios, disclosure and stress-testing, which helps preserve stability. However, its influence on driving large-scale capital reallocation, especially to EMDEs, is overstated (Oxford University Smith School, 2025; CCSI, 2024). Without credible transition pathways, investable pipelines, supportive policy environments and de-risking approaches, heightened risk awareness can increase caution rather than mobilise capital.

The responsibility for directing global climate transitions and decarbonising economies lies with governments, the IMF, MDBs and DFIs, which have the resources to shape national and sectoral transition pathways and investments (Bhattacharya et al., 2024; OECD, 2022). This is not the lead responsibility of central banks and regulators, which are primarily mandated to uphold financial stability by managing systemic climate risks (Bolton et al., 2020; FSB, 2025).

Climate risks must be understood as nested but distinct across three tiers: planetary (physical and ecological disruption), economic (real-economy damage and fiscal strain) and financial (repricing, credit, liquidity and insurance stresses) (CCSI, 2025; NGFS, 2024). Each operates over different timescales and requires different policy tools and institutional mandates. Conflating these tiers has blurred accountability and inflated expectations of regulation (NGFS, 2025; BIS and BCBS, 2024).

The transmission chain from planetary to financial risk is complex, hard to predict and influenced by policy. Evidence from IMF, BIS and NGFS shows that physical impacts do not necessarily trigger systemic financial stress: governments can cushion economic and financial losses through fiscal transfers, insurance and monetary and prudential responses (IMF, 2023; BIS, 2024; IAIS, 2023). But this is also not certain: instability may arise before planetary consequences become severe via insurance withdrawal, credit crises or abrupt asset repricing

(Exeter University and USS, 2023; Financial Times, 2025; Expert Interviews, 2025). Financial stability indicators can thus be misleading proxies for underlying climate risk.

The most powerful levers for climate risk reduction lie in the real economy. Regulatory improvements, investment planning, credible transitions, enabling infrastructure and blended finance instruments are essential for capital flows (World Bank, 2024; NGFS, 2025; Nassiry et al., 2025). EMDEs, driving future growth yet highly vulnerable, face structural constraints that cause high capital costs and climate risk management alone cannot solve. Addressing these is both a global imperative and a UK opportunity, positioning London as a hub for sustainable finance and innovation.

References

Chapter 1

Anyfantaki, S., Grimaldi, M. B., Madeira, C., Malovana, S., Papdopoulos, G. (2025). *Decoding climate-related risks in sovereign bond pricing: a global perspective.* BIS Working Papers No. 1275. Available at: https://www.bis.org/publ/work1275.pdf

Armstrong McKay, D.I., Staal, A., Abrams, J.F., Winkelmann, R., Sakschewski, B., Loriani, S., Fetzer, I., Cornell, S.E., Rockström, J. and Lenton, T.M. (2022). *Exceeding 1.5 °C global warming could trigger multiple climate tipping points*. Science, 377(6611), pp. 1170–1173. Available at: DOI: 10.1126/science.abn7950

Bank for International Settlements (BIS) (2025) – Kaldorf, M. and Rottner, M. (2025). *Climate Minsky moments and endogenous financial crises.* BIS Working Papers No. 1248. Available at: https://www.bis.org/publ/work1248.htm

Bank for International Settlements (BIS) (2022). *Statistical release: BIS international banking statistics and global liquidity indicators at end-June 2025*. Available at: https://www.bis.org/statistics/rppb2510.pdf

Bank of Canada (2023) – Bruneau, G., Oiea-Ferreiro, J., Plummer, A., Tremblav, M.C., Witt, A. (2023). *Understanding the Systemic Implications of Climate Transition Risk: Applying a Framework Using Canadian Financial System Data.* Available at: https://www.bankofcanada.ca/2023/12/staff-discussion-paper-2023-32/

Bank of England (2022). *Results of the 2021 Climate Biennial Exploratory Scenario (CBES).* Available at: https://www.bankofengland.co.uk/stress-testing/2022/results-of-the-2021-climate-biennial-exploratory-scenario

Bank of England Prudential Regulation Authority (BoE PRA) (2024). *Supervisory Statement, SS3/19: Enhancing banks' and insurers' approaches to managing the financial risks from climate change. (Updating April 2019).* Available at: https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/supervisory-statement/2024/ss319-november-2024-update.pdf

Bank of Japan (BoJ) (2011). *Responses to the Great East Japan Earthquake by Payment and Settlement Systems and Financial Institutions in Japan.* Available at: https://www.boj.or.jp/en/research/brp/ron_2011/data/ron111027a.pdf

Banque de France (2019) – Villeroy de Galhau, F. (2019). *Climate Change: Central Banks Are Taking Action.* Banque de France Financial Stability Review, no. 23: 7–16. Available at: https://publications.banque-france.fr/sites/default/files/media/2019/06/12/fsr_villeroy.pdf

Basel Committee on Banking Supervision (2021). *Climate-related risk drivers and their transmission channels.* BIS, April 2021. Available at: https://www.bis.org/bcbs/publ/d517.pdf

Batten, Sandra, Rhiannon Sowerbutts, and Misa Tanaka (2016). *Let's Talk about the Weather: the Impact of Climate Change on Central Banks.* Bank of England Staff Working Paper no. 603. Available at: https://www.bankofengland.co.uk/working-paper/2016/lets-talk-about-the-weather-the-impact-of-climate-change-on-central-banks

Bernstein, A., Gustafson, M., Lewis, R. (2019). *Disaster on the horizon: The price effect of sea level rise.* Journal of Financial Economics, 134(2), 253–272. Available at: https://doi.org/10.1016/j.jfineco.2019.03.013

Bolton, P., Despres, M., Pereira da Silva, L., Samama, F., Svartzman, R. (2020). *The green swan: Central banking and financial stability in the age of climate change*. BIS and Banque de France. Available at: https://www.bis.org/publ/othp31.pdf

Brunetti, C., Dennis, B., Gates, D., Hancock, D., Ignell, D., Kiser, E.K., Kotta, G., Kovner, A., Rosen, R.J. and Tabor, N.K. (2021) *Climate change and financial stability*. FEDS Notes, 19 March. Board of Governors of the Federal Reserve System. Available at: https://www.federalreserve.gov/econres/notes/feds-notes/climate-change-and-financial-stability-20210319.html

Bunten, D. and Kahn, M. (2014). *The Impact of Emerging Climate Risks on Urban Real Estate Price Dynamics.* NBER Working Paper Series No. 20018. Available at: https://www.nber.org/papers/w20018

Burke, M., Agarwala, M., Klusak, P., Mohaddes, K. (2024). *Climate Policy and Sovereign Debt: The Impact of Transition Scenarios on Sovereign Creditworthiness.* University of Cambridge and Janeway Institute Cambridge. Available at: https://www.janeway.econ.cam.ac.uk/publication/jiwp2430

Carbon Tracker (2022) - Abrams et al. (2022). *Challenging systemic under-pricing of climate damages within the global financial system.* Available at: https://carbontracker.org/reports/systemic-under-pricing-of-climate-damages/

Carbon Tracker (2022) - Allen, T., Coffin, M. (2022). *Unburnable Carbon: Ten Years On*. Available at: https://carbontracker.org/reports/unburnable-carbon-ten-years-on/

Carbon Tracker (2025) – Benjamin, J. (2025). *NGFS Scenarios and the Damage Done*. Available at: https://carbontracker.org/ngfs-scenarios-and-the-damage-done/

Coalition for Climate Resilient Investment (CCRI) (2021). *Risk & Resilience: Addressing Physical Climate Risks in Infrastructure Investment*. Available at: https://storage.googleapis.com/wp-static/wp_ccri/055c14a1-ccri_riskresilience-report_final.pdf

Central Research Institute of Electric Power Industry (CRIEPI) (2024). *Study of the Use of the Network for Greening the Financial Systems (NGFS) Scenario*. Available at: https://www.fsa.go.jp/en/news/2024/20240625/01.pdf

Cleary, P., Harding, W., McDaniels, J., Svoronos, J.P., Yong, J. (2019). *Turning up the Heat – Climate Risk Assessment in the Insurance Sector*. FSI Insights on policy implementation, No. 20. Available at: https://www.bis.org/fsi/publ/insights20.pdf

Columbia University's Sabin Center for Climate Change Law (2025). *The Climate Litigation Database.* Available at: https://www.climatecasechart.com/ [accessed 30 Sept 2025].

Climate Policy Initiative (CPI) (2025) *Global Landscape of Climate Finance 2025*. Available at: https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2025/

Duffy, S. (2025). *Climate Change, Adaptation and Sovereign Risk*. Available at: https://sarahwduffy.github.io/JMP.pdf

Dunz, N. and Power, S. (2021). *Climate-Related Risks for Ministries of Finance: An Overview.* The Coalition of Finance Ministers for Climate Action.

European Central Bank (ECB) (2020). *Guide on climate-related and environmental risks: Supervisory expectations relating to risk management and disclosure*. Available at: Guide on climate-related and environmental risks - Europa

European Central Bank (ECB) (2021). *ECB economy-wide climate stress test*. Occasional Paper Series.

European Central Bank (ECB) (2022). *2022 climate risk stress test*. Available at: https://www.econstor.eu/bitstream/10419/246212/1/ecb.op281.pdf

European Central Bank (ECB) (2022) - Gourdel, R., Sydow, M. (2022). *Non-banks contagion and the uneven mitigation of climate risk.* ECB Working Paper, No. 2757. Available at: https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2757~80ba1bf7dd.en.pdf?ce3db2acd6b153d220d7549c98e041de

European Central Bank (ECB) (2023) – Fahr, S., Giuzio, M., McSweeny Pourtalet, C., Spaggiari, M. and Vendrell Simón, J.M. (2023). *Climate Change and Sovereign Risk*. In: ECB Financial Stability Review, May 2023. Available at: Climate change and sovereign risk - European Central Bank

European Bank for Reconstruction and Development (EBRD) (2019) – Delis, M., de Greiff, K., Ongena, S. *Being Stranded with Fossil Fuel Reserves? Climate Policy Risk and the Pricing of Bank Loans.* Working Paper No. 231. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3451335

Financial Stability Board (FSB) (2020). *The Implications of Climate Change for Financial Stability.* Available at: https://www.fsb.org/uploads/P231120.pdf

Financial Stability Board (FSB) (2021). *The Availability of Data with Which to Monitor and Assess Climate-Related Risks to Financial Stability*. Available at: https://www.fsb.org/2021/07/the-availability-of-data-with-which-to-monitor-and-assess-climate-related-risks-to-financial-stability/

Financial Stability Board (FSB) (2025). *Assessment of Climate-related Vulnerabilities – Analytical framework and toolkit.* Available at: https://www.fsb.org/uploads/P160125.pdf

Financial Stability Board and Network for Greening the Financial System (FSB and NGFS) (2022). *Climate Scenario Analysis by Jurisdictions: Initial findings and lessons.* Available at: https://www.fsb.org/2022/11/climate-scenario-analysis-by-jurisdictions-initial-findings-and-lessons/

Gallagher Re (2025). *Natural Catastrophe and Climate Report: 2024.* Available at: https://www.ajg.com/gallagherre/-/media/files/gallagher/gallagherre/news-and-insights/2025/natural-catastrophe-and-climate-report-2025.pdf

Global Commission on Adaptation (2019). *Adapt now: A global call for leadership on climate resilience*. Available at: https://gca.org/wp-content/uploads/2019/09/GlobalCommission_Report_FINAL.pdf

Independent High-Level Expert Group (IHLEG) (2024) – Bhattacharya, A., Soubeyran, E., Songwe, V. and Stern, N., 2024. *Raising Ambition and Accelerating Delivery of Climate Finance*. In: Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science. Available at: https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2024/11/Raising-ambition-and-accelerating-delivery-of-climate-finance_Third-IHLEG-report.pdf

International Association of Insurance Provision and Bank for International Settlements (IAIS and BIS) (2025). *FSI Insights: Mind the climate-related protection gap: Reinsurance pricing and underwriting considerations.* Available at: https://www.bis.org/fsi/publ/insights65.htm

Institute and Faculty of Actuaries (IFoA) and University of Exeter (2023). Trust, S., Joshi, S., Lenton, T., Oliver, J. (2023). *The Emperor's New Climate Scenarios: Limitations and assumptions of commonly used climate-changed scenarios in financial services*. Available at: https://actuaries.org.uk/emperors-new-climate-scenarios

IFoA and University of Exeter (2024) – Trust, S., Bettis, O., Saye, L., Bedenham, G., Lenton, T. M., Abrams, J. F. and Kemp, L. (2024) *Climate Scorpion: The sting is in the tail*. Available at: https://actuaries.org.uk/media/g1qevrfa/climate-scorpion.pdf

Institute and Faculty of Actuaries (IFoA) and University of Exeter (2025) – Trust, S., Saye, L., Bettis, O., Bedenham, G., Hampshire, O., Lenton, T.M. and Abrams, J.F. (2025). *Planetary Solvency: Finding our balance with nature – Global risk management for human prosperity*. Available at: https://actuaries.org.uk/media/wqeftma1/planetary-solvency-finding-our-balance-with-nature.pdf

Intergovernmental Panel on Climate Change IPCC (2023) *Climate Change 2023: Synthesis Report*. Contribution of Working Groups I, II and III to AR6. Available at: https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_LongerReport.pdf

International Monetary Fund (IMF) (2022). *Near-Term Macroeconomic Impact of Decarbonization Policies*. World Economic Outlook. Available at: https://www.imf.org/-/media/Files/Publications/WEO/2022/October/English/ch3.ashx

International Monetary Fund (IMF) (2023). *Global Financial Stability Report: Financial and Climate Policies for a High-Interest-Rate Era*. Available at: https://www.imf.org/en/publications/gfsr

International Monetary Fund (2023). Fiscal monitor: Climate crossroads – Fiscal policies in a warming world. Available at: https://www.elibrary.imf.org/downloadpdf/display/book/9798400250286/front-1.pdf

International Monetary Fund (IMF) (2025). *Integrating Climate Change into Macroeconomic Analysis: A Review of Impact Channels, Data, Models, and Scenarios.* IMF Working Paper. Available at: https://www.imf.org/en/Publications/WP/Issues/2025/08/26/Integrating-Climate-Change-into-Macroeconomic-Analysis-A-Review-of-Impact-Channels-Data-569996

IPCC (2022). *Climate Change 2022: Impacts, Adaption and Vulnerability. Working Group II, AR6.* Available at: https://www.ipcc.ch/report/ar6/wg2/

Kahn, M.E., Mohaddes, K., Ryan, N.C., Pesaran, M.H., Raissi, M., Yang, J.C. (2021). *Long-term macroeconomic effects of climate change: A cross-country analysis*. Energy Economics, 104, 105624. Available at: https://doi.org/10.1016/j.eneco.2021.105624

Kemp, L., Xu, C., Depledge, J., Ebi, K.L., Gibbins, G., Kohler, T.A., Rockström, J., Scheffer, M., Schellnhuber, H.J., Steffen, W., and Lenton, T.M. (2022). *Climate Endgame: Exploring catastrophic climate change scenarios*. Available at: https://doi.org/10.1073/pnas.2108146119

Keys, B., Mulder, P. (2020). *Neglected No More: Housing Markets, Mortgage Lending, and Sea Level Rise.* NBER Working Paper No. 27930. Available at: https://www.nber.org/papers/w27930

Kling, G., Volz, U., Murinde, V. and Ayas, S. (2021). *The impact of climate vulnerability on firms' cost of capital and access to finance.* World Development, 137. Available at: https://www.sciencedirect.com/science/article/pii/S0305750X20302588

Koetter, M., Noth, F., Rehbein, O. (2020). *Borrowers under water! Rare disasters, regional banks, and recovery lending.* Journal of Financial Intermediation, Vol 43. Available at: https://doi.org/10.1016/j.jfi.2019.01.003

Krebel, L., Kryiakopoulou, D., Talbot, J. (2025). *The implications of severe weather events for the economy and monetary policy.* CEPR. Available at: https://cepr.org/voxeu/columns/implications-severe-weather-events-economy-and-monetary-policy

Kruttli, M., Tran, B., Watugala, S. (2019). *Pricing Poseidon: Extreme Weather Uncertainty and Firm Return Dynamics.*FEDS Working Paper No. 2019-54. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3423254

Lang, Q., Ma, F., Mirza, N., Umar, M. (2023). *The interaction of climate risk and bank liquidity: An emerging market perspective for transitions to low carbon energy*. Available at: https://doi.org/10.1016/j.techfore.2023.122480

Lenton, T. et al. (2023). *Global Tipping Points Report 2023: Summary Report.* University of Exeter. Available at: https://report-2023.global-tipping-points.org/download/5986/

Lenton, T.M., Held, H., Kriegler, E., Hall, J.W., Lucht, W., Rahmstorf, S. and Schellnhuber, H.J. (2008). *Tipping elements in the Earth's climate system*. PNAS, 105(6), pp. 1786–1793. Available at: https://doi.org/10.1073/pnas.0705414105

Lenton, T.M., Milkoreit, M., Willcock, S., Abrams, J. F., Armstrong McKay, D. I., Buxton, J. E., Donges, J. F., Loriani, S., Wunderling, N., Alkemade, F., Barrett, M., Constantino, S., Powell, T., Smith, S. R., Boulton, C. A., Pinho, P., Dijkstra, H. A. Pearce-Kelly, P., RomanCuesta, R. M., Dennis, D. (eds) (2025*). The Global Tipping Points Report 2025*. University of Exeter, Exeter, UK. Available at: https://global-tipping-points.org/download/1418/

Lynas, M., Houlton, B.Z. and Perry, S. (2021). *Greater than 99 percent consensus on human-caused climate change in the peer-reviewed scientific literature.* Environmental Research Letters*,* 16(11). IOP Publishing Ltd. Available at: https://iopscience.iop.org/article/10.1088/1748-9326/ac2966

McGlade, C. and P. Ekins (2015). *The geographical distribution of fossil fuels unused when limiting global warming to 2°C.* Nature, 517(7533), 187–90. Available at: pubmed.ncbi.nlm.nih.gov/25567285/

McKinsey (2024). *Geopolitics and the geometry of global trade*. McKinsey Global Institute Report. Available at: https://www.mckinsey.com/mgi/our-research/geopolitics-and-the-geometry-of-global-trade#/

Mercure, J.F., Pillitt, H., Vinuales, J.E., Edwards, N.R., Holden, P.B., Chewpreecha, U., Salas, P., Sognnaes, I., Lam, A., Knobloch, F. (2018). *Macroeconomic impact of stranded fossil fuel assets*. Nature Climate Change, 8, 588-593. Available at: https://www.nature.com/articles/s41558-018-0182-1

Miller, H., Dikau, S. (2022). *Preventing a 'climate Minsky moment': environmental financial risks and prudential exposure limits. Exploring the case study of the Bank of England's prudential regime.* Grantham Research Institute on Climate Change and the Environment. Available at: https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2022/03/Preventing-a-climate-Minsky-moment.pdf

Network for Greening the Financial System (NGFS) (2019). *First Comprehensive Report: A Call for Action: Climate Change as a Source of Financial Risk.* Available at: https://www.ngfs.net/system/files/import/ngfs/medias/documents/ngfs_first_comprehensive_report_-_17042019_0.pdf

Network for Greening the Financial System (NGFS) (2024). *Acute physical impacts from climate change and monetary policy.* Available at: https://www.ngfs.net/system/files/import/ngfs/medias/documents/ngfs_acute_physical_impacts_from_climate_change_and_monetary_policy.pdf

Network for Greening the Financial System (NGFS) (2024). *NGFS long-term scenarios for central banks and supervisors.* Available at: *https://www.ngfs.net/system/files/import/ngfs/medias/documents/ngfs_scenarios_main_presentation.pdf*

Network for Greening the Financial System (NGFS) (2024). *The green transition and the macroeconomy: a monetary policy perspective*. https://www.ngfs.net/system/files/import/ngfs/medias/documents/ngfs_the-green-transition-and-the-macroeconomy.pdf

Network for Greening the Financial System (NGFS) (2025). *NGFS Short-term Climate Scenarios for central banks and supervisors*. Available at: https://www.ngfs.net/en/publications-and-statistics/publications/ngfs-short-term-climate-scenarios-central-banks-and-supervisors

OECD (2022). *Climate Tipping Points.* Paris: OECD Environment Directorate. Available at: https://www.oecd.org/en/publications/climate-tipping-points_abc5a69e-en.html

Oesterreichische Nationalbank (2019) – Pointner, W. and Ritzberger-Grunwald, D. *Climate change as a risk to financial stability.* Financial Stability Report 38. Available at: https://www.oenb.at/en/Publications/Financial-Market/Financial-Stability-Report/2019/financial-stability-report-38.html

Ranger, N. (2025). *Enhancing banks' and insurers' approaches to managing climate-related risks – Update to SS3/19. Submission to Bank of England CP10/25.* Grantham Research Institute on Climate Change and the Environment, LSE. Available at: https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2025/08/CP10251.pdf

S&P Global (2025). *Climate costs are rising, but few companies have an adaptation plan.* Available at: https://www.spglobal.com/en/research-insights/special-reports/look-forward/climate-costs-are-rising-but-few-companies-have-an-adaptation-plan

Sachs, L.E., Hearn, D., Goldklang, M., and Toledano, P. (2025). *Distinguishing Among Climate Change-Related Risks.* Columbia Center on Sustainable Investment, Columbia University. Available at: https://scholarship.law.columbia.edu/sustainable_investment/53/

Seltzer, L., Starks, L.T., Zhu, Q. (2025). *Climate Regulatory Risks and Corporate Bonds.* Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3563271

Setzer, J., Higham, C. (2024). *Global Trends in Climate Change Litigation: 2024 Snapshot.* Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science. Available at: https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2024/06/Global-trends-in-climate-change-litigation-2024-snapshot.pdf

Swiss Re. (2023) – Banerjee, C., Bevere, L., Corti, T., Finucane, J. and Lechner, R. *Natural catastrophes and inflation in 2022: A perfect storm.* Sigma, Jan 2023. Available at: https://www.swissre.com/institute/research/sigma-research/sigma-2023-01.html

TCFD (2017). *Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures.* Available at: https://assets.bbhub.io/company/sites/60/2020/10/FINAL-2017-TCFD-Report-11052018.pdf

The Government of Pakistan (2022). *Pakistan Floods 2022: Post-Disaster Needs Assessment*. Main Report. Available at: https://www.undp.org/pakistan/publications/pakistan-floods-2022-post-disaster-needs-assessment-pdna

UK Centre for Greening Finance and Investment (CGFI) (2023). Cormack, C., Shrimali, G. (2023). *The Challenge of Climate Risk Modelling in Financial Institutions – Overview, Critique, and Guidance.* Available at: https://www.cgfi.ac.uk/2023/12/the-challenge-of-climate-risk-modelling-in-financial-institutions-overview-critique-and-guidance/

United Nations Environment Programme (UNEP) (2024). *Adaptation Gap Report 2024*. Available at: https://www.unep.org/resources/adaptation-gap-report-2024

University of Exeter and Universities Superannuation Scheme (USS) (2023) – Cliffe, M., Abrams, J. F., Barker, M., Branum-Burns, K., Campbell, R., Cordinale, M., Clark, M., Clark, N., Lalande, W., Laskey, T., Lenton, T. M., Matthews, L., Oliver, J., Picot, R. and Pilcher, S. (2023) *No Time To Lose: New Scenario Narratives for Action on Climate Change*. Available at: https://greenfuturessolutions.com/news/no-time-to-lose-report-uss-university-of-exeter/

US Federal Reserve (2024). *Pilot Climate Scenario Analysis Exercise*. Available at: https://www.federalreserve.gov/publications/climate-scenario-analysis-exercise-results.htm

Weitzman, M. L. (2011). *Fat-tailed uncertainty in the economics of catastrophic climate change*. Review of Environmental Economics and Policy, 5 (2), 275–292. Available at: https://scholar.harvard.edu/files/weitzman/files/fattaileduncertaintyeconomics.pdf

World Bank (2024). *Finance and Prosperity 2024*. Available at: https://www.worldbank.org/en/publication/finance-and-prosperity-2024

World Health Organisation (2023). *Newsroom/ Fact sheets/ Detail/ Climate Change.* Available at: https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health [accessed 26/09/2025].

WRI (2025) – Larsen, G., Alayza, N., and Caldwell, M. *How to Get Finance Flowing to Climate Adaptation*. Available at: https://www.wri.org/insights/scaling-adaptation-finance

WWF & UCL IIPP (2025). Policy Options for Financial Flows Contributing to Ecosystem Tipping Points. Available at: https://wwfint.awsassets.panda.org/downloads/wwf_gfri_ucl-iipp-tipping-point-2025.pdf

Zhou, F., Endendijk, T., and Woutzer Botzen, W.J. (2023). *A Review of the Financial Sector Impacts of Risks Associated with Climate Change*. Annual Review of Resource Economics. 15:233-56. Available at: https://doi.org/10.1146/annurev-resource-101822-105702

Chapter 2

Alvarez and Marsal (2022). *ECB Climate Stress Test 2022: Summary of Results*. Available at: https://www.alvarezandmarsal.com/insights/ecb-climate-stress-test-2022-summary-results

Bank for International Settlements (2022). Eren, E., Merten, F., Verhoeven, N. (2022). *Pricing of climate risks in financial markets: a summary of the literature*. Available at: https://www.bis.org/publ/bppdf/bispap130.htm

Bank for International Settlements (BIS) (2023) – Khoo, F. and Yong, J. *Too hot to insure – avoiding the insurability tipping point.* In: FSI Insights on policy implementation, No. 54, BIS. Available at: https://www.bis.org/fsi/publ/insights54.pdf

Bank for International Settlements (BIS) (2025). Kaldorf, M., Rottner, M. (2025). *Climate Minsky Moments and Endogenous Financial Crises*. Available at: https://www.bis.org/publ/work1248.htm

Bank of England (BoE) (2025). *Enhancing banks' and insurers' approaches to managing climate-related risks – update to SS3/19.* Consultation Paper 10/25. Available at: https://www.bankofengland.co.uk/prudential-regulation/publication/2025/april/enhancing-banks-and-insurers-approaches-to-managing-climate-related-risks-consultation-paper

Bank of England (BoE) (2024). *Financial Stability Report*. Financial Policy Committee. Available at: https://www.bankofengland.co.uk/-/media/boe/files/financial-stability-report/2024/financial-stability-report-november-2024.pdf

Bank of England (BoE) (2024) – Holden, L., Richards, H., Siegert, C., Krebel, L. (2024). *Measuring climate-related financial risks using scenario analysis.* Available at: https://www.bankofengland.co.uk/quarterly-bulletin/2024/2024/measuring-climate-related-financial-risks-using-scenario-analysis

Bank of England (BoE) (2022). *Results of the 2021 Climate Biennial Exploratory Scenario (CBES*). London: Bank of England. Available at: https://www.bankofengland.co.uk/stress-testing/2022/results-of-the-2021-climate-biennial-exploratory-scenario

Bank of England Prudential Regulation Authority (BoE PRA) (2024). *Supervisory Statement, SS3/19: Enhancing banks' and insurers' approaches to managing the financial risks from climate change. (Updating April 2019).* Available at: https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/supervisory-statement/2024/ss319-november-2024-update.pdf

Barnett, M. (2024). *A Run on Fossil Fuel? Climate Change and Transition Risk*. Available at: https://arxiv.org/pdf/2410.00902

Basel Committee on Banking Supervision (2021). *Climate-related risk drivers and their transmission channels.* In: BIS, April 2021. Available at: https://www.bis.org/bcbs/publ/d517.pdf

Battiston, S., Dafermos, Y., Monasterolo, I. (2021). *Climate risk and financial stability*. Journal of Financial Stability, 54, 100867. Available at: https://doi.org/10.1016/j.jfs.2021.100867

Bernhofen, M., Burke, M., Puranasamriddhi, A., Ranger, N., Shrimali, G. (2024). *The Impact of Physical Climate Risks and Adaptation on Sovereign Credit Ratings: Implications for financial resilience and fiscal policy at the sovereign-bank nexus.* Smith School of Enterprise and the Environment and Environmental Change Institute, University of Oxford. Available at: https://www.eci.ox.ac.uk/sites/default/files/2024-12/Impact percent20of percent20Physical percent20Climate percent20Risks percent20 percent28Nov24 percent29.pdf

Bloomberg (2024). *UK's Nationwide Won't Lend to Some Homes Over Flood Risk*. Available at: https://news.bloomberglaw.com/insurance/uks-second-biggest-mortgage-lender-pulls-offers-over-flood-risk

Boehm, H. (2020). *Physical climate change risks and the sovereign creditworthiness of emerging economies.* Halle Institute for Economic Research, Discussion Papers No. 8/2020. Available at: https://www.econstor.eu/handle/10419/221734

Bolton, P., Despres, M., Pereira da Silva, L., Samama, F., Svartzman, R. (2020). *The green swan: Central banking and financial stability in the age of climate change.* BIS and Banque de France. Available at : https://www.bis.org/publ/othp31.pdf

Bolton, P., Kleinnijenhuis, A.M., and Zettelmeyer, J. (2024). *The economic case for climate finance at scale.* Bruegel Policy Brief. Available at: https://www.bruegel.org/policy-brief/economic-case-climate-finance-scale

Brunetti, C., Dennis, B., Gates, D., Hancock, D., Ignell, D., Kiser, E.K., Kotta, G., Kovner, A., Rosen, R.J. and Tabor, N.K. (2021) *Climate change and financial stability*. FEDS Notes, 19 March. Board of Governors of the Federal Reserve System. Available at: https://www.federalreserve.gov/econres/notes/feds-notes/climate-change-and-financial-stability-20210319.html

Burke, M., Agarwala, M., Klusak, P., Mohaddes, K. (2024). *Climate Policy and Sovereign Debt: The Impact of Transition Scenarios on Sovereign Creditworthiness.* University of Cambridge and Janeway Institute Cambridge. Available at: https://www.janeway.econ.cam.ac.uk/publication/jiwp2430

Carbon Tracker (2022) - Abrams et al. (2022). *Challenging systemic under-pricing of climate damages within the global financial system.* Available at: https://carbontracker.org/reports/systemic-under-pricing-of-climate-damages/

Carbon Tracker (2025) – Benjamin, J. (2025) *NGFS Scenarios and the Damage Done.* Carbon Tracker Initiative. Available at: https://carbontracker.org/ngfs-scenarios-and-the-damage-done/

Caruana, J., Avdjiev, B. (2012). *Sovereign creditworthiness and financial stability: An international perspective.* Banque de France, issue 16, 71-85. Available at: https://publications.banque-france.fr/sites/default/files/medias/documents/financial-stability-review-16_2012-04.pdf

Cevik, S., Jalles, J.T. (2020). *This Changes Everything: Climate Shocks and Sovereign Bonds.* IMF Working Papers No. 2020/079. Available at: https://www.imf.org/en/Publications/WP/Issues/2020/06/05/This-Changes-Everything-Climate-Shocks-and-Sovereign-Bonds-49476

Cliffe, M. (2025). *NGFS Short Term Climate Scenarios Get Stuck in Model-land.* Available at: https://markcliffe.wordpress.com/2025/05/14/ngfs-short-term-climate-scenarios-get-stuck-in-model-land/

Dunz, N. and Power, S. (2021). *Climate-Related Risks for Ministries of Finance: An Overview.* Coalition of Finance Ministers for Climate Action.

E3G (2024). Palmer, R., Orozco, D., Benomar, I., Cecilio, C., Hayes, L., Smith, O. (2024). *Breaking the cycle of risk: Addressing resilience and debt for a new global financial architecture*. Available at: https://www.e3g.org/publications/breaking-the-cycle-of-risk/

E3G (2025). Decitre, C.P., Serravalle, S. (2025). *Climate change as a macroeconomic risk multiplier: why climate change is central to the IMF's mandate*. Available at: https://www.e3g.org/publications/climate-change-as-a-macroeconomic-risk-multiplier/

European Central Bank (ECB) (2022). Gourdel, R., Sydow, M. (2022). *Non-banks contagion and the uneven mitigation of climate risk.* ECB Working Paper, No. 2757. Available at: https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2757~80ba1bf7dd.en.pdf?ce3db2acd6b153d220d7549c98e041de

ECB and ESRB (2021). *Climate-related risk and financial stability.* Available at: https://www.ecb.europa.eu/pub/pdf/other/ecb.climateriskfinancialstability202107~87822fae81.en.pdf?d38340433f58fb658f73574755835661

European Central Bank (ECB) (2024). *Fit-for-55 climate scenario analysis.* Available at: https://www.ecb.europa.eu/pub/pdf/other/ecb.report_fit-for-55_stress_test_exercise~7fec18f3a8.en.pdf?4ac4d9871ed7c8e8eaa9cde5c3452dcf

Fecht, F., Goldberg, L.S. (2025). *Transmission of liquidity shocks through non-bank financial intermediaries: Evidence from the International Banking Research Network*. The Centre for Economic Policy Research, VoxEU Columns. Available at: https://cepr.org/voxeu/columns/transmission-liquidity-shocks-through-non-bank-financial-intermediaries-evidence

Financial Stability Board (FSB) (2020). *The Implications of Climate Change for Financial Stability.* Available at: https://www.fsb.org/uploads/P231120.pdf

Financial Stability Board (FSB) (2021). *The Availability of Data with Which to Monitor and Assess Climate-Related Risks to Financial Stability.* Available at: https://www.fsb.org/2021/07/the-availability-of-data-with-which-to-monitor-and-assess-climate-related-risks-to-financial-stability/

Financial Stability Board (FSB) (2025). *Assessment of Climate-related Vulnerabilities – Analytical framework and toolkit* Available at: https://www.fsb.org/uploads/P160125.pdf

Ge, S., Johnson, S., Tzur-Ilan, N. (2025). *Climate Risk, Insurance Premiums, and the Effects of Mortgage and Credit Outcomes.* Federal Reserve Bank of Dallas. Available at: https://www.dallasfed.org/~/media/documents/research/papers/2025/wp2505.pdf

International Association of Insurance Supervisors and Bank for International Settlements (IAIS and BIS) (2025). *FSI Insights: Mind the climate-related protection gap: Reinsurance pricing and underwriting considerations.* Available at: https://www.bis.org/fsi/publ/insights65.htm

International Monetary Fund (IMF) (2020). *Global Financial Stability Report: Markets in the Time of COVID-19.* Available at: https://www.imf.org/en/Publications/GFSR/Issues/2020/04/14/global-financial-stability-report-april-2020

International Association of Insurance Supervisors (IAIS) (2021). *Global Insurance Market Report (GIMAR)*. Available at: https://www.iais.org/activities-topics/financial-stability/gimar/

International Association of Insurance Supervisors (IAIS) and World Bank (2025). *G20 Sustainable Finance Working Group input paper: Identify and address insurance protection gaps.* Available at: https://www.iais.org/uploads/2025/07/G20-SFWG-input-paper-Identify-and-address-insurance-protection-gaps.pdf

International Monetary Fund (IMF) (2025). *Integrating Climate Change into Macroeconomic Analysis: A Review of Impact Channels, Data, Models, and Scenarios*. IMF Working Paper. Available at: https://www.imf.org/en/Publications/WP/Issues/2025/08/26/Integrating-Climate-Change-into-Macroeconomic-Analysis-A-Review-of-Impact-Channels-Data-569996

Kahn, M.E., Mohaddes, K., Ryan, N.C., Pesaran, M.H., Raissi, M., Yang, J.C. (2021). *Long-term macroeconomic effects of climate change: A cross-country analysis.* Energy Economics, 104, 105624. Available at: https://doi.org/10.1016/j.eneco.2021.105624

Klusak, P., Agarwala, M., Burke, M., Kraemer, M., Mohaddes, K. (2023). *Rising Temperatures, Falling Rates: The Effect of Climate Change on Sovereign Creditworthiness*. Management Science, 69(12), 7468-7491. Available at: https://doi.org/10.1287/mnsc.2023.4869

Kotz, M., Levermann, A., Wenz, L. (2024). *The Economic Commitment of Climate Change*. Nature, 628(8008), 551-557. Available at: https://www.nature.com/articles/s41586-024-07219-0

Kousky, C., Palim, M., Pan, Y. (2020). *Flood Damage and Mortgage Credit Risk: A Case Study of Hurricane Harvey.* Journal of Housing Research, 29, 86-120. Available at: https://doi.org/10.1080/10527001.2020.1840131

Lenton, T.M., Milkoreit, M., Willcock, S., Abrams, J. F., Armstrong McKay, D. I., Buxton, J. E., Donges, J. F., Loriani, S., Wunderling, N., Alkemade, F., Barrett, M., Constantino, S., Powell, T., Smith, S. R., Boulton, C. A., Pinho, P., Dijkstra, H. A. Pearce-Kelly, P., RomanCuesta, R. M., Dennis, D. (eds) (2025). *The Global Tipping Points Report 2025.* University of Exeter, Exeter, UK. Available at: https://global-tipping-points.org/download/1418/

Network for Greening the Financial System (NGFS) (2020). *Guide to climate scenario analysis for central banks and supervisors*. Available at: https://www.ngfs.net/system/files/import/ngfs/medias/documents/ngfs_guide_scenario_analysis_final.pdf

Network for Greening the Financial System (NGFS) (2021). *Progress report on bridging data gaps.* Available at: https://www.ngfs.net/en/publications-and-statistics/publications/progress-report-bridging-data-gaps

Network for Greening the Financial System (NGFS) (2024). *NGFS long-term scenarios for central banks and supervisors.* Available at: *https://www.ngfs.net/system/files/import/ngfs/medias/documents/ngfs_scenarios_main_presentation.pdf*

Network for Greening the Financial System (NGFS) (2025). *NGFS Short-term Climate Scenarios for central banks and supervisors*. Available at: https://www.ngfs.net/en/publications-and-statistics/publications/ngfs-short-term-climate-scenarios-central-banks-and-supervisors

Nevitt, M., Pappas, M. (2024). *Climate Risk, Insurance Retreat, and State Response*. Georgia Law Review, 58(4), Article 4. Available at: https://digitalcommons.law.uga.edu/cgi/viewcontent.cgi?article=1556andcontext=glr

OMFIF (2025) – Marsden, L. (2025). *Ecosystem collapse and the rising threat of systemic risk.* SPI Journal: July 2025. OMFIF. Available at: https://www.omfif.org/spi-journal_july25_wwf/

University of Exeter and Universities Superannuation Scheme (USS) (2023) – Cliffe, M., Abrams, J. F., Barker, M., Branum-Burns, K., Campbell, R., Cordinale, M., Clark, M., Clark, N., Lalande, W., Laskey, T., Lenton, T. M., Matthews, L., Oliver, J., Picot, R. and Pilcher, S. (2023) *No Time To Lose: New Scenario Narratives for Action on Climate Change*. Available at: https://greenfuturessolutions.com/news/no-time-to-lose-report-uss-university-of-exeter/

World Bank (2024). *Finance and Prosperity 2024.* Available at: https://www.worldbank.org/en/publication/finance-and-prosperity-2024

Yin, L. and Cao, H. (2024). *The propagation effect of climate risks on global stock markets: Evidence from the time and space domains*. *Energy Economics*, 132, Article 107445. Available at: https://doi.org/10.1016/j.eneco.2024.107445

Chapter 3

Attridge, S. (2024). *The cost of caution: Rethinking UK pension funds' approach to emerging markets.* ODI/Investor Forum Report.

Bank of England (2022). *Results of the 2021 Climate Biennial Exploratory Scenario (CBES)*. London: Bank of England. Available at: https://www.bankofengland.co.uk/stress-testing/2022/results-of-the-2021-climate-biennial-exploratory-scenario

Bank of England (2025). *Financial Stability Report. Financial Stability Report - July 2025*. https://www.bankofengland.co.uk/financial-stability-report/2025/july-2025

Bank for International Settlements (BIS) (2021). *The Green Swan: Central Banking and Financial Stability in the Age of Climate Change*. Basel: Bank for International Settlements. Available at: https://www.bis.org/publ/othp31.htm

Bank for International Settlements (BIS) (2021). *Annual Economic Report 2021.* Available at:. https://www.bis.org/publ/arpdf/ar2021e.htm

Bank for International Settlements (BIS) (2023). *Long-term debt propagation and real reversals.* BIS Working Paper No. 1098. Available at: https://www.bis.org/publ/work1098.htm

Bank for International Settlements (BIS) (2024) *BIS Quarterly Review, March 2024.* Basel: Bank for International Settlements. Available at: https://www.bis.org/publ/qtrpdf/r_qt2403.htm

Bank for International Settlements (BIS) (2025). *Central banks, macro-financial stability and the future of the financial system*. Available at: https://www.bis.org/publ/bppdf/bispap140.htm

Carbon Tracker (2025) *NGFS scenarios and the damage done*. Available at: https://carbontracker.org/ngfs-scenarios-and-the-damage-done/

Centre for Greening Finance and Investment (CGFI) (2023) *Learning from the CBES: Enhancing Climate Risk Assessment Tools*. Oxford: CGFI. Available at: https://www.cgfi.ac.uk/physical-risk/learning-from-the-climate-biennial-exploratory-scenario-cbes-exercise/

Centre for Greening Finance and Investment (CGFI) (2023) - Cormack, C,. Shrimali, G,. (2023). *The challenge of climate risk modelling in financial institutions - overview, critique, and guidance.* Discussion paper in UK Centre for Greening Finance and Investment. Available at: https://cgfi.ac.uk/wp-content/uploads/2023/12/Overview_and_Challenge_of_Climate_Risk_Models_Used_In_Finance_20231208.pdf

Curcio, D., Gianfrancesco, I., Vioto, D., (2023) *Climate change and financial systemic risk: Evidence from US banks and insurers.* Journal of Financial Stability. Available at: https://doi.org/10.1016/j.jfs.2023.101132

Dell, M., Jones, B.F. and Olken, B.A. (2012). *Temperature Shocks and Economic Growth: Evidence from the Last Half Century*. American Economic Journal: Macroeconomics, 4 (3), pp. 66–95. Available at: https://www.aeaweb.org/articles?id=10.1257/mac.4.3.66

Financial Conduct Authority (FCA) (2023) *Learning from the CBES: Scenario Analysis and Supervisory Insights.* London: Financial Conduct Authority. Available at: https://www.fca.org.uk/publication/corporate/cfrf-scenario-analysis-2023-learning-biennial-exploratory-scenario-cbes.pdf

Financial Conduct Authority (FCA) (2025). *Climate reporting by asset managers, insurers and FCA-regulated pension providers: Review findings*. FCA Report. Available at: https://www.fca.org.uk/publications/multi-firm-reviews/climate-reporting-asset-managers-life-insurers-fca-regulated-pension-providers

Hallegatte, S., Lipinsky, F., Morales, P., Oura, H., Ranger, N., Regelink, M. G. J., and Reinders, H. J. (2022). *Bank stress testing of physical risks under climate change macro scenarios: Typhoon risks to the Philippines* (IMF Working Paper No. 22/163). International Monetary Fund. Available at: https://ssrn.com/abstract=4210160

Intergovernmental Panel on Climate Change (IPCC) (2022). *Climate Change 2022: Impacts, Adaption and Vulnerability.* Working Group II, AR6. Available at: https://www.ipcc.ch/report/ar6/wg2/

Institute and Faculty of Actuaries (IFoA) and University of Exeter (2024) – Trust, S., Bettis, O., Saye, L., Bedenham, G., Lenton, T. M., Abrams, J. F. and Kemp, L. (2024) *Climate Scorpion: The sting is in the tail* Available at: https://actuaries.org.uk/media/g1qevrfa/climate-scorpion.pdf

International Monetary Fund (IMF) (2023). *Global Financial Stability Report: Financial and Climate Policies for a High-Interest-Rate Era*. Available at: https://www.imf.org/en/publications/gfsr/issues/2023/10/10/global-financial-stability-report-october-2023

International Monetary Fund (IMF) (2024). *Global Macro-Financial Model Simulations of Climate Transition Scenarios.* IMF Working Paper WP/24/122. Available at: https://www.imf.org/en/Publications/WP/Issues/2024/07/01/Climate-Transition-Macrofinancial-Simulations

Jourde, T., Moreau, Q., and Pires, A. (2023) *Systemic Climate Risk. Frankfurt: European Systemic Risk Board Systemic Climate Risk.* Available at: *https://www.banque-france.fr/en/publications-and-statistics/publications/systemic-climate-risk*

Mercer (2022). *Preparing portfolios for climate change Preparing portfolios for climate change*. Available at: https://www.mercer.com/en-gb/insights/investments/investing-sustainably/preparing-portfolios-for-climate-change/

MSCI. (2025). *Hidden in plain sight: Physical risk in asset owners' portfolios*. MSCI Sustainability and Climate Research Services. Available at: https://www.msci.com/research-and-insights/paper/hidden-in-plain-sight-physical-risk-in-asset-owners-portfolios

Norges Bank Investment Manager (NBIM) (2024). *Annual Report 2024*. Available at: https://www.nbim.no/en/news-and-insights/reports/2024/annual-report-2024/

Network for Greening the Financial System (NGFS) (2024) *Climate Scenarios Portal (V4). Paris: Network for Greening the Financial System.* https://www.ngfs.net/ngfs-scenarios-portal/

Network for Greening the Financial System (NGFS) (2024). *Tailoring Transition Plans for Emerging Market and Developing Economies.* Available at: https://www.ngfs.net/system/files/import/ngfs/media/2024/04/17/ngfs_tailoring_transition_plans.pdf

Network for Greening the Financial System (NGFS) (2025). *Phase V Long-Term Climate Scenarios: Technical Documentation. Paris: Network for Greening the Financial System*. Available at: https://www.ngfs.net/system/files/2025-01/NGFS percent20Climate percent20Scenarios percent20Technical percent20Documentation.pdf

Network for Greening the Financial System (NGFS) (2025) *Climate scenarios for central banks and supervisors. Phase V scenario document.* Available at: *https://www.ngfs.net/en/publications-and-statistics/publications/ngfs-climate-scenarios-central-banks-and-supervisors*

OECD (2023). *Global Institutional Investors and Emerging Market Portfolios*. Paris: Organisation for Economic Co-operation and Development. Mobilising institutional investors for financing sustainable development in developing countries | OECD.

OECD (2022). *Climate Tipping Points.* Paris: OECD Environment Directorate. Available at: https://www.oecd.org/en/publications/climate-tipping-points_abc5a69e-en.html

Ortec Finance (2024). Climate Risk Analysis for Pension Funds and Asset Managers. Ortec White Paper.

Ranger, N., Mahul, O., and Monasterolo, I. (2021). *Managing the financial risks of climate change and pandemics: What we know (and don't know)*. One Earth, 4(10), 1375–1385. Available at: https://doi.org/10.1016/j.oneear.2021.09.017

Reuters (2025). *Extreme weather could cause 5 percent drop in euro zone GDP, bank watchdogs find*. Available at: https://www.reuters.com/sustainability/cop/extreme-weather-could-cause-5-drop-euro-zone-gdp-bank-watchdogs-find-2025-07-09/

World Bank (2024) *Financial Sector at a Crossroads in Emerging Markets: Climate Risks and Financing Gaps Demand Action.* Washington, DC: World Bank. Available at: https://www.worldbank.org/en/news/press-release/2024/08/29/financial-sector-at-a-crossroads-in-emerging-markets-climate-risks-and-financing-gaps-demand-action

WWF and University College London Institute for Innovation and Public Purpose (IIPP) (2025) Policy Options for Financial Flows Contributing to Ecosystem Tipping Points. Available at: https://wwfint.awsassets.panda.org/downloads/wwf_gfri_ucl-iipp-tipping-point-2025.pdf

WWF and UCL IIPP (2025) Financial Stability at risk: Ecosystem tipping points and the global economy.

Chapter 4

Bank of England (BoE) (2022). *Results of the 2021 Climate Biennial Exploratory Scenario (CBES*). London: Bank of England. Available at: https://www.bankofengland.co.uk/stress-testing/2022/results-of-the-2021-climate-biennial-exploratory-scenario

Bridgetown Initiative (2024). *"Shock-Proofing" the IMF-World Bank: A Roadmap for Resilience and Sustainability.* Policy Brief.

Coalition of Finance Ministers for Climate Action (CFMCA) (2025). *Coalition of Finance Ministers for Climate Action: Overview*. Available at: https://www.financeministersforclimate.org/

Financial Stability Board (FSB) (2025*). Roadmap for Addressing Climate-related Financial Risks: 2025 Update*. FSB Report to G20. Available at: https://www.fsb.org/2025/07/fsb-roadmap-for-addressing-financial-risks-from-climate-change-2025-update/

Henning, C. R. (2020). *Regional Financial Arrangements and the International Monetary Fund: Sustaining Coherence in Global Financial Governance.* Centre for International Governance Innovation. Available at: https://www.cigionline.org/publications/regional-financial-arrangements-and-international-monetary-fund-sustaining-coherence/

International Monetary Fund (IMF) (2023). *Global Financial Stability Report, October 2023: Financial Risks from Climate Change.* IMF. Available at: https://www.imf.org/en/publications/gfsr/issues/2023/10/10/global-financial-stability-report-october-2023

Institutional Investors Group on Climate Change (IIGCC) (2025). *The UK as a Climate Finance Hub: Unlocking Capital from Institutional Investors towards EMDEs*. Available at: https://www.iigcc.org/resources/report-uk-climate-finance-hub-2025

Martinez, G., Schell-Smith, K., and Nirula, A. (2024). *Partnering to Finance Adaptation.* Climate Policy Initiative. Available at: https://www.climatepolicyinitiative.org/publication/partnering-to-finance-adaptation/

Network for Greening the Financial System (NGFS) (2021). *Annual Report 2021*. Available at: https://www.ngfs.net/en/publications-and-statistics/publications/annual-report-2021

Network for Greening the Financial System (NGFS) (2023). *Nature-related Financial Risks: A Conceptual Framework to Guide Action by Central Banks and Supervisors*. Available at:

https://www.ngfs.net/system/files/import/ngfs/medias/documents/ngfs_conceptual-framework-on-nature-related-risks.pdf

Network for Greening the Financial System (NGFS) (2024). Scaling Up Blended Finance for Climate in Emerging Markets and Developing Economies. NGFS Report (COP28). Available at: https://www.ngfs.net/system/files/import/ngfs/medias/documents/scaling-up-blended-finance-for-climate-mitigation-and-adaptation-in-emdes.pdf

Niedermayer, R., and Ryfisch, D. (2024). *IFA Reform and the NCQG – How Are They Interlinked?* Available at: https://www.germanwatch.org/sites/default/files/germanwatch_ifa_reform_and_the_ncqg_-_how_are_they_interlinked.pdf

OECD (2020). *Developing Sustainable Finance Definitions and Taxonomies.* OECD Publishing. Available at: https://www.oecd.org/en/publications/developing-sustainable-finance-definitions-and-taxonomies_134a2dbe-en.html

International Chamber of Commerce (ICC) (2025). *Enhancing Climate Finance in Emerging Markets and Developing Economies through Prudential Regulatory Clarification and Reform.* Available at: https://www.iccgermany.de/wp-content/uploads/2025/07/2025-ICC-Enhancing-climate-finance-in-emerging-market-developing-economies.pdf

O'Neill, D., Franklin, M., et al. (2023). *BRICS and Beyond: Blended Finance to Tackle Climate Change*. Global Infrastructure HUB report.

S. Securities and Exchange Commission (2024) *SEC Adopts Rules to Enhance and Standardize Climate-Related Disclosures for Investors*. Available at: https://www.sec.gov/newsroom/press-releases/2024-31

World Economic Forum (WEF) (2024) *Climate finance: What are debt-for-nature swaps and how can they help countries?* Available at:? https://www.weforum.org/stories/2024/04/climate-finance-debt-nature-swap/

Chapter 5

Asian Development Bank (ADB) (2023). *Southeast Asia Green Finance Hub*. In: ADB, 2023. Available at: https://www.adb.org/publications/adb-southeast-asia-green-finance-hub

Asian Development Bank (ADB) (2023). *Climate Finance Landscape of Asia and the Pacific*. In: ADB, August 2023. Available at: https://www.adb.org/sites/default/files/publication/901611/climate-finance-landscape-asia-pacific.pdf

Aegon Asset Management (2025). *Insured Credit Strategy: The Investment Opportunity*. Available at: https://www.aegonam.com/globalassets/documents/insurance/insured-credit-paper.pdf

African Development Bank (AfDB) (2020) – Morsy, H. and Moustafa, E., (2020). *Mispricing of sovereign risk and investor herding in African debt markets*. In: African Development Bank, Working Paper No. 331, June 2020. Available at: https://www.afdb.org/sites/default/files/documents/publications/wps_no_331_mispricing_of_sovereign_risk_and_investor_herding_in_african_debt_markets.pdf

Allianz Global Investors (2025). *Emerging Markets Climate Action Fund (EMCAF)*. In: Allianz Global Investors and European Investment Bank. Available at: https://emcaf.allianzgi.com/

Association of British Insurers (ABI) (2024) – *Mansion House Compact: One-Year Update*. Available at: https://www.abi.org.uk/globalassets/files/publications/public/lts/2024/abi-mansion-house-compact.pdf

Bank for International Settlements (BIS) (2003) – Amato, J.D. and Furfine, C.H., (2003). *Are credit ratings procyclical?* In: BIS Working Papers No. 129, February 2003. Available at: https://www.bis.org/publ/work129.pdf

Bank for International Settlements (2023) – Basel Committee on Banking Supervision, (2023). *Basel Framework*. In: Bank for International Settlements, Basel Committee on Banking Supervision. Available at: https://www.bis.org/basel_framework/

British International Investment (BII) (2024). *BII announces new initiative under Mobilisation Facility to scale up climate finance in emerging economies.* Available at: https://www.bii.co.uk/en/news-insight/news/bii-announces-new-initiative-under-mobilisation-facility-to-scale-up-climate-finance-in-emerging-economies/

British International Investment (BII) (2025). *Africa Renewable Energy Fund II – Investment 01*. Available at: https://www.bii.co.uk/en/our-impact/fund/africa-renewable-energy-fund-ii-investment-01/

Bank of England (2022). *Results of the 2021 Climate Biennial Exploratory Scenario*. Available at: https://www.bankofengland.co.uk/stress-testing/2022/results-of-the-2021-climate-biennial-exploratory-scenario

Blended Finance Taskforce (2023). *Better Guarantees, Better Finance*. Systemiq. Available at: https://www.systemiq.earth/wp-content/uploads/2023/06/Blended-Finance-Taskforce-2023-Better-Guarantees-Better-Finance-1.pdf

British International Investment (BII) (2024). BII announces new initiative under Mobilisation Facility to scale up climate finance in emerging economies." Available at: https://www.bii.co.uk/en/news-insight/news/bii-announces-new-initiative-under-mobilisation-facility-to-scale-up-climate-finance-in-emerging-economies/

British International Investment (BII) (2025). *Africa Renewable Energy Fund II – Investment 01*. Available at: https://www.bii.co.uk/en/our-impact/fund/africa-renewable-energy-fund-ii-investment-01/

Borensztein, E., Cowan, K., and Valenzuela, P., (2013). *Sovereign ceilings "lite"? The impact of sovereign ratings on corporate ratings*. Journal of Banking and Finance, 37(11), pp.4014–4024. https://doi.org/10.1016/j.jbankfin.2013.07.006

Buhr, B., Volz, U., Donovan, C., Kling, G., Lo, Y. C., Murinde, V., and Pullin, N. (2018). *Climate Change and the Cost of Capital in Developing Countries*. Imperial College London, SOAS University of London, UN Environment. Available at: https://soas-repository.worktribe.com/output/381483/climate-change-and-the-cost-of-capital-in-developing-countries

City of London Corporation (2023). *Climate Action Strategy – Third Year of Climate Action 2023/2024*. Available at: https://www.cityoflondon.gov.uk/assets/Services-Environment/CAS-Year-3-Action-Plan-2023-2024.pdf

City of London Corporation (2023). *Mansion House Compact: One-Year Update on Signatories*. Available at: https://www.theglobalcity.uk/PositiveWebsite/media/Research-reports/Mansion-House-Compact-Signatories-updated.pdf

Climate Bonds Initiative (2025) – Global State of the Market Report, May 2025. Available at: https://www.climatebonds.net/files/documents/publications/Climate-Bonds-Initiative_Global-State-of-the-Market-Report_May-2025_2025-06-18-123430_mejk.pdf

Climate Policy Initiative (CPI) (2025) *Global Landscape of Climate Finance 2025*. Available at: https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2025/

Climate Policy Initiative (CPI) (2023). *An FX Guarantee Mechanism for the Green Transformation in Developing Countries*. Available at: https://www.climatepolicyinitiative.org/wp-content/uploads/2023/06/An-FX-Guarantee-Mechanism-for-the-Green-Transformation-in-Developing-Countries.pdf

Columbia University School of International and Public Affairs (2024) – Sheehan, D., Shah, S.S.S.M., Koirala, B., Zhang, M., Wang, S. and Delalex, I., 2024. *Bridging the investment gap: The role of prudential regulation in advancing long-term, private-sector investment in sustainable development*. In: United Nations Department of Economic and Social Affairs, Capstone Report, December 2024. https://www.sipa.columbia.edu/sites/default/files/2025-01/Columbia percent20Report percent20on percent20Prudential percent20Regulation percent20and percent20Sustainable percent20Investing.pdf

Columbia Center on Sustainable Investment (CCSI) (2025). *From Promise to Performance: Reforming Blended Finance for Scale*. Available at: https://ccsi.columbia.edu/sites/ccsi.columbia.edu/files/content/docs/publications/CCSI-From-Promise-to-Performance-Reforming-Blended-Finance-for-Scale-Report.pdf

Columbia Center on Sustainable Investment (CCSI) (2025). *Lowering the Cost of Capital for Climate and SDG Finance in Emerging Markets and Developing Economies (EMDEs)*. Available at:

https://ccsi.columbia.edu/sites/ccsi.columbia.edu/files/content/docs/publications/CCSI-Cost-of-Capital-in-EMDEs.pdf

Convergence (2020). *Designing Blended Finance Vehicles: Learnings from Convergence's Design Funding Program*. In: Convergence, Report. Available at: https://www.convergence.finance/resource/designing-blended-finance-vehicles:-learnings-from-convergence percentE2 percent80 percent99s-design-funding-program/view

Convergence (2023). *State of Blended Finance 2023*. In: Convergence, Report. Available at: https://www.convergence.finance/resource/state-of-blended-finance-2023/view

Convergence Finance (2024) *State of Blended Finance 2024*. Available at: https://www.convergence.finance/resource/state-of-blended-finance-2024/view (Accessed: 2 October 2024).

Convergence (2025) – *State of Blended Finance 2025*. In: Convergence, 21 May 2025. Available at: https://www.convergence.finance/resource/state-of-blended-finance-2025/view

Dimitrov, V., Palia, D. and Tang, L., 2015. *Impact of the Dodd-Frank Act on Credit Ratings*. *Journal of Financial Economics*, 115, pp. 505–520. Available at: https://doi.org/10.1016/j.jfineco.2014.10.012

European Bank of Reconstruction and Development (EBRD) (2024). *Default and recovery rate analysis.* Available at: https://www.ebrd.com/content/dam/ebrd_dxp/assets/pdfs/communications-department/financial-report/2023/ebrd-default-and-recovery-rate-analysis-2024.pdf

European Commission (2021). *Proposal for a Regulation amending Regulation (EU) No 575/2013 as regards requirements for credit risk, credit valuation adjustment risk, operational risk, market risk, and the output floor*. In: European Commission, October 2021. Available at: https://www.astrid-online.it/static/upload/2110/211027-proposal-crr-2_en.pdf

European Commission (2025). *Commission proposes measures to revive the EU securitisation framework*. Available at: https://finance.ec.europa.eu/publications/commission-proposes-measures-revive-eu-securitisation-framework_en

European Commission (2025). *Questions and answers on the Solvency II delegated regulation.* Available at: https://finance.ec.europa.eu/news/questions-and-answers-solvency-ii-delegated-regulation-2025-10-29_en

Environmental Finance (2022). *Green Bond of the Year: Sovereign Republic of Colombia.* Available at: https://www.environmental-finance.com/content/awards/environmental-finances-bond-awards-2022/winners/green-bond-of-the-year-sovereign-republic-of-colombia.html

IIGCC (2025). *EMDE Investor Taskforce, 2025. Unlocking Long-Term Investment in EMDEs: Addressing Structural Challenges and Investor Appetite.* Available at: https://www.iigcc.org/our-work/investor-initiatives/emde-investor-taskforce

Financial Conduct Authority (FCA) (2025). *From Risk to Resilience: Integrating Adaptation into Finance*. Available at: https://www.fca.org.uk/publication/corporate/from-risk-resilience-integrating-adaptation-finance.pdf

Financial Times (2025). *Investors pile into 'cheap' emerging market stocks, BofA survey shows*. *Financial Times*, 11 August. Available at: https://www.ft.com/content/5e4aef8d-239d-4cad-bea3-53bff4279589

Fitch Ratings (2022) *EMEA Renewable Energy Project Finance Outlook 2023*. Available at: https://www.fitchratings.com/research/infrastructure-project-finance/emea-renewable-energy-project-finance-outlook-2023-05-12-2022

Financial Stability Board (FSB) (2025). *Assessment of Climate-related Vulnerabilities: Analytical Framework and Toolkit.* In: Financial Stability Board, Report. Available at: https://www.fsb.org/2025/01/assessment-of-climate-related-vulnerabilities-analytical-framework-and-toolkit/

Gautam, Deepali; Gratcheva, Ekaterina; Natalucci, Fabio M.; Prasad, Ananthakrishnan. (2024). *Unlocking Adaptation Finance in Emerging Market and Developing Economies.* IMF Staff Climate Notes No. 2024/007. International Monetary Fund, Washington, DC. DOI:10.5089/9798400293290.066.

Glasgow Financial Alliance for Net Zero (GFANZ) (2024). *Mobilizing capital for emerging markets and developing economies*. Available at: https://www.gfanzero.com/our-work/mobilizing-capital-for-emerging-markets-and-developing-economies/

Glasgow Financial Alliance for Net Zero (GFANZ) (2024). *Progress Report 2024*. Available at: https://assets.bbhub.io/company/sites/63/2024/11/GFANZ-Progress-Report-2024.pdf

Global Credit Ratings (GCR) (2025). *Transition and Default Statistics 2025 – Africa.* Available at: https://gcrratings.com/wp-content/uploads/2025/02/Transition-and-Default-statistics-2025-Africa.pdf

Global Infrastructure Hub (2024) – *Infrastructure Monitor 2024*. In: Global Infrastructure Hub, 2024. Available at: https://cdn.gihub.org/umbraco/media/5555/infrastructure-monitor-2024-report.pdf

Green Finance Institute (GFI), Green Technical Advisory Group (2024). *Developing a UK taxonomy adapted to the UK's needs in the short and medium term: Scope, coverage and reporting considerations*. Available at: https://www.greenfinanceinstitute.com/wp-content/uploads/2024/06/GTAG-Final-Report-on-Extended-Taxonomy.pdf

Green Guarantee Company (2024). Bridging the Climate Finance Gap. Available at: https://greenguarantee.co/green-guarantee-climate-finance/

HSBC (2025). *Emerging Market Outlook*. Available at: https://www.europe.business.hsbc.com/en-gb/insights/global-research/from-neutral-land-with-love

ICMA – International Capital Market Association (2024) *Transition Finance in the Debt Capital Market*. Available at: https://www.icmagroup.org/assets/Transition-Finance-in-the-Debt-CapitalMarket-paper-ICMA-14022024.pdf

International Chamber of Commerce (ICC) (2025). *Enhancing Climate Finance in EMDEs through Prudential Regulatory Clarification and Reform*. Available at: https://www.icc.se/wp-content/uploads/2025/05/ICC-Policy-Brief-Enhancing-Climate-Finance-in-EMDEs-through-Prudential-Regulatory-Clarification-and-Reform-Draft.pdf

International Chamber of Commerce (ICC) (2024). T*rade Register Report: Global Risks in Trade Finance*. https://iccwbo.org/news-publications/policies-reports/icc-trade-register-report/

International Finance Corporation (IFC) and Amundi (2025). *Emerging Market Green Bonds 2024*. Available at: https://www.ifc.org/en/insights-reports/2025/emerging-market-green-bonds-2024

International Finance Corporation (IFC) and GEMs (2024). *Reassessing Risk in Emerging Market Lending: Insights from GEMs Consortium Statistics.* Available at: https://openknowledge.worldbank.org/server/api/core/bitstreams/fa6c4c59-4962-412d-bbd2-5dfbc5495a07/content

International Monetary Fund (IMF) (2023). *Local Currency Bond Markets for Infrastructure Finance*. IMF Working Paper No. 2023/123. Available at: https://www.imf.org/en/Publications/WP/Issues/2023/05/19/Local-Currency-Bond-Markets-for-Infrastructure-Finance-533385

International Monetary Fund (IMF) (2022). *Swapping Debt for Climate or Nature Pledges Can Help Fund Resilience*. In: IMF, Policy Brief. Available at: https://www.imf.org/en/blogs/articles/2022/12/14/swapping-debt-for-climate-or-nature-pledges-can-help-fund-resilience

International Monetary Fund (IMF) (2023) – Gbohoui, W., Ouedraogo, R. and Some, Y.M. (2023). *Sub-Saharan Africa's Risk Perception Premium: In the Search of Missing Factors.* In: IMF, Working Paper No. 23/130. Available at: https://www.imf.org/en/Publications/WP/Issues/2023/06/23/Sub-Saharan-Africas-Risk-Perception-Premium-In-the-Search-of-Missing-Factors-534885

Independent High-Level Expert Group (IHLEG) (2024) – Bhattacharya, A., Soubeyran, E., Songwe, V. and Stern, N., 2024. *Raising Ambition and Accelerating Delivery of Climate Finance*. In: Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science. Available at: https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2024/11/Raising-ambition-and-accelerating-delivery-of-climate-finance_Third-IHLEG-report.pdf

Insurance Development Forum (IDF) (2024). *Insurance Development Forum Announces Plans to Facilitate Investments in Resilient Infrastructure in Developing/Emerging Markets*. Available at: https://www.insdevforum.org/press-release-insurance-development-forum-announces-plans-to-facilitate-investments-in-resilient-infrastructure-in-developing-emerging-markets/ (Accessed: 2 October 2025)

International Energy Agency (IEA) (2023). *World Energy Outlook 2023*. Paris: International Energy Agency. Available at: https://www.iea.org/reports/world-energy-outlook-2023

International Energy Agency (IEA) (2023). *Scaling Up Private Finance for Clean Energy in Emerging and Developing Economies.* Available at: https://www.iea.org/reports/scaling-up-private-finance-for-clean-energy-in-emerging-and-developing-economies

International Energy Agency (IEA) (2025). *World Energy Investment 2025: Africa*. Available at: https://www.iea.org/reports/world-energy-investment-2025/africa

International Finance Corporation (2023). *DFI Working Group on Blended Concessional Finance for Private Sector Projects, 2023*. Joint Report, March 2023 Update. In: International Finance Corporation and Partner DFIs. Available at: https://www.ifc.org/content/dam/ifc/doc/mgrt/2023-03-dfi-bcf-joint-report.pdf

International Finance Corporation (IFC) and Amundi (2025) *Emerging Market Green Bonds 2024*. Available at: https://www.ifc.org/content/dam/ifc/doc/2025/emerging-market-green-bonds-2024.pdf

International Renewable Energy Agency (IRENA) (2024). *Renewable power generation costs in 2023*. Abu Dhabi: International Renewable Energy Agency. Available at: https://www.irena.org/Publications/2024/Sep/Renewable-Power-Generation-Costs-in-2023

International Renewable Energy Agency (IRENA) (2018). *Renewable energy auctions: Cases from Sub-Saharan Africa*. Available at: https://www.gsb.uct.ac.za/files/IrenaAuctionsSubSaharanAfrica2018.pdf

International Renewable Energy Agency (IRENA) (2024) – Audu, H. and Duclos, A., (2024). *Five Pillars That Determine Commercial Renewables Projects' Bankability*. In: IRENA, Expert Insights. Available at: https://www.irena.org/News/expertinsights/2024/Apr/Five-Pillars-That-Determine-Commercial-Renewables-Projects-Bankability

ILX (2025) – *ILX Fund*. In: ILX, 2025. Available at: https://www.ilxfund.com.

Joseph, A. and Turhan, B. (2025). *Labeled Sustainable Bonds Market Update – July 2025*. World Bank Treasury Sustainable Finance Program. Available at: https://thedocs.worldbank.org/en/doc/9a258e226b80204053eabdd50ed1bc08-0340012025/original/Labeled-Bond-Quarterly-Newsletter-Issue-No-12.pdf (Accessed: 2 October 2025)

Jobst, A.A., 2018. *Credit Risk Dynamics of Infrastructure Investment: Considerations for Financial Regulators*. Washington, D.C.: World Bank Group. Available at: https://hdl.handle.net/10986/29540.

Jones, L., Alsakka, R., ap Gwilym, O. and Mantovan, N., 2022. *Regulating rating agencies: A Conservative Behavioural Change*. Journal of Financial Stability, 60, Article 100999. Available at: https://doi.org/10.1016/j.jfs.2022.100999.

Kapoor, S. (2024) *Higher returns and lower portfolio risks: Attracting institutional capital for development*. ECDPM Briefing Note 185. Maastricht: European Centre for Development Policy Management. Available at: https://ecdpm.org/application/files/8217/2961/0881/Higher-returns-lower-portfolio-risks-Attracting-institutional-capital-development-ECDPM-briefing-note-185-2024.pdf

KPMG (2024.) *Scaling renewables*. Available at: https://issuu.com/kpmg.de/docs/report_scaling_renewables_en_issuu_vorschau

Lloyd's (2024). *Lloyd's establishes first of its kind disaster resilience vehicle with United Nations Capital Development Fund*. Available at: https://www.lloyds.com/insights/media-centre/press-releases/lloyds-establishes-first-of-its-kind-disaster-resilience-vehicle-with-united-nations-capital-development-fund

Multilateral Investment Guarantee Agency (MIGA) (2024) *MIGA at COP29*. Available at: https://www.miga.org/miga-cop29

Mobilist (2025) *Investing with Impact in EMDE Public Markets: The Importance of Additionality*. Available at: https://www.mobilistglobal.com/research-data/investing-with-impact-in-emde-public-markets-the-importance-of-additionality/

Mobilist (2023). *Research Note: Securitisation for Sustainable Development – Accelerating Capital Velocity*. Available at: https://www.mobilistglobal.com/wp-content/uploads/2022/06/MOBILIST_Research-Note_Securitisation.pdf

Möhr, C., Yong, J. and Zweimueller, M. (2025). *Mind the climate-related protection gap – reinsurance pricing and underwriting considerations*. FSI Insights No. 65. Bank for International Settlements. Available at: https://www.bis.org/fsi/publ/insights65.pdf (Accessed: 3 October 2025).

Moody's Analytics Data Alliance (2022). *Default and Recovery Rates for Project Finance Bank Loans*. Moody's Corporation. Available at: https://dkf1ato8y5dsg.cloudfront.net/uploads/52/504/sector-in-depth-infrastructure-projectfinance-cross-region-15mar22.pdf

Moody's Analytics (2025). *Sustainable bond issuance drops sharply in third quarter amid broad-based decline*. https://www.moodys.com/web/resources/en/us/insights/data-stories/sustainable-finance-global-q3-2025.html

Money Marketing (2024) – Cooper, D., 30 July. *Pension firms making good progress on Mansion House Compact ambitions.* Available at: https://www.moneymarketing.co.uk/news/pension-firms-making-good-progress-on-mansion-house-compact

Natixis Investment Managers (2024). *Despite a Positive Outlook, Institutional Investors Still See Valuations and Interest Rates as Top Portfolio Risks in 2025*. Available at: https://www.im.natixis.com/en-intl/about/newsroom/press-releases/2024/despite-a-positive-outlook-institutional-investors-still-see-valuations-and-interest-rates-as-top-portfolio-risks-in-2025-finds-natixis-investment-managers

Nurminen, A (2023). *Infrastructure investment risks and performance in emerging markets.* University of Vaasa Repository. Available at: https://osuva.uwasa.fi/server/api/core/bitstreams/23451811-b5a6-4c3c-ac37-d7d4e8ba397e/content

Organisation for Economic Co-operation and Development (OECD) (2025). *Country risk classification*. Available at: https://www.oecd.org/en/topics/country-risk-classification.html

Olabisi, M. and Stein, H., 2015. *Sovereign bond issues: Do African countries pay more to borrow?* Journal of African Trade, 2(1), pp.87–109. Available at: https://doi.org/10.1016/j.joat.2015.08.003

Preqin (2024). *2024 Global Infrastructure Report*. In: Preqin, 2024. Available at: https://www.preqin.com/insights/global-reports/2024-infrastructure

OMFIF (2024). *Public Funds and Transition Finance*. Available at: https://pdf.omfif.org/global-public-funds-and-transition-finance

Organisation for Economic Co-operation and Development (OECD) (2025). *Tracking Private Finance Mobilisation.* Available at: https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/06/tracking-private-finance-mobilisation_96d38324/8d414cdb-en.pdf

Organisation for Economic Co-operation and Development (OECD) (2021). *The OECD DAC Blended Finance Guidance*. Available at: https://www.oecd.org/content/dam/oecd/en/publications/reports/2021/05/the-oecd-dac-blended-finance-guidance_42663a16/ded656b4-en.pdf

Overseas Development Institute (ODI) (2023). *Trillions or Billions? Reassessing the Potential for European Institutional Investment in Emerging Markets and Developing Economies.* Available at: https://odi.org/en/publications/trillions-or-billions-reassessing-the-potential-for-european-institutional-investment-in-emerging-markets-and-developing-economies/s

PGIM (2024). *PGIM Survey: Investors to Continue Risk Appetite in 2025, Despite Geopolitical Uncertainty*. Available at: https://www.pgim.com/us/en/institutional/about-us/newsroom/press-releases/2024/pgim-survey-investors-to-continue-risk-appetite-2025-despite-geopolitical-uncertainty

Responsible Investor (2022). *Colombia Issues Inaugural Green Bond While UK Gears Up for Second Green Gilt.* Available at: https://www.responsible-investor.com/bonds-and-loans-colombia-issues-inaugural-green-bond-while-uk-gears-up-for-second-green-gilt/

SCALED (2025) *About us*. Available at: https://scaledevelopment.org/about-us (Accessed: 3 October 2025).

S&P (2024). *Project Finance: Why Ratings Above The Sovereign Are Uncommon*. 4 July. Available at: https://www.spglobal.com/ratings/en/research/articles/240704-project-finance-why-ratings-above-the-sovereign-are-uncommon-13169028.

Standard Chartered PLC (2025). *Full-Year 2024 Results*. In: Standard Chartered, Press Release, 21 February 2025. Available at: https://www.sc.com/en/uploads/sites/66/content/docs/standard-chartered-plc-full-year-2024-press-release.pdf sc.com+1

StreetStats (2025). *Corporate and High Yield Bond Yields and Spreads*. In: StreetStats, 16 October 2025. Available at: https://streetstats.finance/rates/corporates

Symbiotics (2024). *Misperception of Risk in Emerging Markets*. Available at: https://symbioticsgroup.com/publications/misperception-risk-emerging-markets/

The Currency Exchange Fund (TCX) (2024) *Annual Report 2023*. Available at: https://www.tcxfund.com/wp-content/uploads/2024/05/2.2_The-Currency-Exchange-Fund-NV_2023-with-PWC-auditor-report.pdf

The Economist (2024). *To get more capital, Africa needs more data*. In: The Economist, 14 November 2024. Available at: https://www.economist.com/middle-east-and-africa/2024/11/14/to-get-more-capital-africa-needs-more-data

UK Export Finance (UKEF) (2024). *Annual Report and Accounts 2023/24*. Available at: https://assets.publishing.service.gov.uk/media/66a9fd2d49b9c0597fdb07fd/UK_Export_Finance_Annual_Report_and_Accounts_2023-24.pdf

United Nations Conference on Trade and Development (UNCTAD) (2025). *A World of Debt: It Is Time for Reform*. In: UNCTAD, Report. Available at: https://unctad.org/system/files/official-document/osgttinf2025d4_en.pdf

UNCTAD (2023). T*rade and Development Report 2023: Growth, Debt, and Climate – Realigning the Global Financial Architecture*. Available at: https://unctad.org/system/files/official-document/tdr2023ch4_en.pdf

UN DESA (2021). - Griffith-Jones, S. and Krraemer, M. (2021) *Credit rating agencies and developing economies*. In: UN DESA, Working Paper, No. 175. Available at https://www.un.org/en/desa/credit-rating-agencies-and-developing-economies

United Kingdom (2024). *Biennial Finance Communication 2024*. United Nations Framework Convention on Climate Change. Available at: https://www4.unfccc.int/sites/SubmissionsStaging/Documents/202501021215---United percent20Kingdom percent20Biennial percent20Finance percent20Communication percent202024.pdf

United Nations Development Programme (UNDP) (2023). *Lowering the Costs of Development Finance in Africa.* Available at: https://www.undp.org/sites/g/files/zskgke326/files/2023-04/Policy percent20Brief percent20- percent20Lowering percent20the percent20Costs percent20of percent20Development percent20Finance percent20in percent20Africa percent20- percent20UNDP percent20April percent202023.pdf

United Nations Development Programme (UNDP) (2024). *Parametric Insurance to Build Financial Resilience*. In: UNDP, October 2024. Available at: https://www.undp.org/sites/g/files/zskgke326/files/2024-10/undp_gcc_parametric_insurance_to_build_financial_resilience.pdf

UNEP Finance Initiative (2025). *Bridging Climate and Credit Risk: Current Approaches and Emerging Trends for Climate-Related Credit Risk Assessment Methodologies — Insights from a Global Survey. In: UNEP Finance Initiative, Report.* Available at: https://www.unepfi.org/wordpress/wp-content/uploads/2025/07/Bridging-Climate-and-Credit-Risk.pdf (Accessed: 3 October 2025).

Uslu, C.L. (2017). *Examining the behavior of credit rating agencies post 2008 economic turmoil.* International Journal of Management and Economics, 53(4). Available at: https://sciendo.com/article/10.1515/ijme-2017-0026

Volz, U., Beirne, J., Ambrosio Preudhomme, N., Fenton, A., Mazzacurati, E., Renzhi, N. and Stampe, J. (2020. *Climate Change and Sovereign Risk*. London, Tokyo, Singapore, and Berkeley, CA: SOAS University of London, Asian Development Bank Institute, World Wide Fund for Nature Singapore, and Four Twenty Seven.

World Association of PPP Units and Professionals (WAPPP) (2025) *Policy Brief PLBL042025: Local Currency Financing for PPPs*. Available at: https://wappp.net/wp-content/uploads/2025/07/Policy-Brief-PLBL042025.pdf

World Bank (2022). *Colombia: Leading the Path to Sustainability in Latin America.* Available at: https://www.worldbank.org/en/news/feature/2022/08/31/colombia-leading-the-path-to-sustainability-in-latin-america

World Bank (2023). *Solar mini-grids could sustainably power 380 million people in Africa by 2030 – if action is taken now*. Available at: https://www.worldbank.org/en/news/press-release/2023/02/26/solar-mini-grids-could-sustainably-power-380-million-people-in-afe-africa-by-2030-if-action-is-taken-now

World Bank (2024). Global Infrastructure Facility, 2024. *Addressing Exchange Rate Risk in Infrastructure Projects in EMDEs*. In: World Bank, Report. Available at: https://thedocs.worldbank.org/en/doc/0f9533593fd01402ff6f68c0cd74ed28-0360012024/original/Addressing-Exchange-Rate-Risk-in-Infrastructure-Projects-in-EMDEs.pdf (Accessed: 3 October 2025).

World Bank (2025). *World Development Indicators*. Available at: https://databank.worldbank.org/source/world-development-indicators

World Bank (2025) – Williams, A. (2025). *Private capital for infrastructure: Resilience amid uncertainty, urgency amid gaps*. In: World Bank, 14 August 2025. Available at: https://blogs.worldbank.org/en/ppps/private-capital-for-infrastructure--resilience-amid-uncertainty-

WRI (2023) – Choi, E. and Laxton, V. (2023). *Mobilizing Private Investment in Climate Solutions: De-risking Strategies of Multilateral Development Banks*. Available at: https://www.wri.org/research/mobilizing-private-investment-climate-solutions-mdbs

Chapter 6

Ashurst (2025) – Kasier, M., Demirbilek, S. – *European Commission Publishes Landmark Review and Reform Proposal for the EU Securitisation Framework*. Available At: https://www.ashurst.com/en/insights/european-commission-publishes-landmark-review-and-reform-proposal/

Bank for International Settlements (2023). *Basel Framework*. In: Bank for International Settlements, Basel Committee on Banking Supervision. Available at: https://www.bis.org/basel_framework/

Bank of England (2022). *Results of the 2021 Climate Biennial Exploratory Scenario.* Available at: https://www.bankofengland.co.uk/stress-testing/2022/results-of-the-2021-climate-biennial-exploratory-scenario

BBC (2025) – Nevett, J. and Francis, S. (2025). *Starmer cuts aid to fund increase in defence spending*. BBC News. Available at: https://www.bbc.com/news/articles/clyrkkv4gd7o

Blended Finance Taskforce (2023). *Better Guarantees, Better Finance.* Systemiq. Available at: https://www.systemiq.earth/wp-content/uploads/2023/06/Blended-Finance-Taskforce-2023-Better-Guarantees-Better-Finance-1.pdf

Bridgetown Initiative (2022). *The 2022 Bridgetown Initiative for the Reform of the Global Financial Architecture*. In: Bridgetown Initiative, Report. Available at: https://pmo.gov.bb/wp-content/uploads/2022/10/The-2022-Bridgetown-Initiative.pdf

Brookings Institution (2024). *Reforms for a 21st Century Global Financial Architecture*. In: Brookings Institution, Report. Available at: https://www.brookings.edu/articles/reforms-for-a-21st-century-global-financial-architecture/

CCSI (2025) – Sachs, J., Sachs, L., Camelo Vega, A. M. and Willis, B. M. (2025). *Lowering the Cost of Capital for Climate and SDG Finance in Emerging Markets and Developing Economies (EMDEs)*. Available at: https://ccsi.columbia.edu/sites/ccsi.columbia.edu/files/content/docs/publications/CCSI-Cost-of-Capital-in-EMDEs.pdf

CCSI (2025). *From Promise to Performance: Reforming Blended Finance for Scale*. Available at: https://ccsi.columbia.edu/sites/ccsi.columbia.edu/files/content/docs/publications/CCSI-From-Promise-to-Performance-Reforming-Blended-Finance-for-Scale-Report.pdf

Coalition of Finance Ministers for Climate Action (CFMCA) (2025). *Coalition of Finance Ministers for Climate Action: Overview*. Available at: https://www.financeministersforclimate.org/

Chatham House (2025). *An agenda for UK–China climate cooperation*. In: Chatham House, Report. Available at: https://www.chathamhouse.org/2025/01/agenda-uk-china-climate-cooperation/introduction

City of London Corporation (2023). *Climate Action Strategy – Third Year of Climate Action 2023/2024*. Available at: https://www.cityoflondon.gov.uk/assets/Services-Environment/CAS-Year-3-Action-Plan-2023-2024.pdf

CSIS (2024). *Sovereign Credit Rating Reform: Aligning Risk Assessment with Development Needs*. In: CSIS, Report. Available at: https://www.csis.org/analysis/reforming-reformers-seville-conference-must-upgrade-credit-rating-agencies

Debt Justice (2023). *Debt-for-nature swaps reduce debt seven times less than debt restructurings*. Available at: https://debtjustice.org.uk/press-release/debt-for-nature-swaps-reduce-debt-seven-times-less-than-debt-restructurings.

Ellmers, Bodo. (2024). I*nternational Financial Architecture Reform at the 2024 Spring Meetings of the IMF and World Bank.* In: Global Policy Forum, Available at: https://www.globalpolicy.org/en/news/2024-04-30/international-financial-architecture-reform-2024-spring-meetings-imf-and-world-bank

Engel, S. and Mabefam, M. (2024). *The Bretton Woods twins and reform agendas: from the NIEO to the Bridgetown Agenda.* New International Economic Order (NIEO) Journal. Available at: https://www.tandfonline.com/doi/full/10.1080/09614524.2024.2436498

European Commission (EC) (2025). *Solvency II Directive.* Available at: https://ec.europa.eu/finance/docs/level-2-measures/solvency2-delegated-regulation-2025-7206_en.pdf

Financial Stability Board (FSB) (2025). *Assessment of Climate-related Vulnerabilities: Analytical Framework and Toolkit*. In: Financial Stability Board, Report. Available at: https://www.fsb.org/2025/01/assessment-of-climate-related-vulnerabilities-analytical-framework-and-toolkit/

Financial Times (2024). *Debt restructuring should integrate climate and nature commitments*. In: Financial Times, Article. Available at: https://www.ft.com/content/96385d3c-e83c-4cb6-8d8b-a2d4a355c520

Financial Times (2025). *Investors pile into 'cheap' emerging market stocks, BofA survey shows*. Financial Times, 11 August. Available at: https://www.ft.com/content/5e4aef8d-239d-4cad-bea3-53bff4279589

G20 IEG (2023). *G20 Independent Expert Group, 2023. The Triple Agenda: Strengthening Multilateral Development Banks*. In: G20 Independent Expert Group, Report. Available at: https://www.cgdev.org/sites/default/files/The_Triple_Agenda_G20-IEG_Report_Volume1_2023.pdf (Accessed: 3 October 2025).

Germanwatch (2023). *Reform of the International Financial Architecture: A Primer*. In: Germanwatch, Report. Available at: https://www.germanwatch.org/sites/default/files/germanwatch_ifa_reform_2023.pdf

Gerding, F. and Hartley, J., 2023. *De-Dollarization? Not So Fast*. In: Social Science Research Network, Working Paper No. 4477009. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4477009 (Accessed: 3 October 2025).

Green Guarantee Company (2024). *Bridging the Climate Finance Gap.* Available at: https://greenguarantee.co/green-guarantee-climate-finance/

Heatmap News (2025) – Arun, A. (2025). *Decarbonization's Dollar Dilemma*. In: Heatmap News. Available at: https://heatmap.news/ideas/ira-global-decarbonization

HM Treasury and FCDO (2024). *Financial Services Growth and Competitiveness Strategy*. In: HM Treasury and FCDO, Report. Available at: https://www.gov.uk/government/calls-for-evidence/financial-services-growth-and-competitiveness-strategy/outcome/financial-services-growth-and-competitiveness-strategy-overview

Helleiner, E. and Kirshner, J. (eds.) (2009). *The Future of the Dollar.* Cornell University Press. Available at: http://www.jstor.org/stable/10.7591/j.ctt7v93w

HSBC (2025). *Emerging Market Outlook*. Available at: https://www.europe.business.hsbc.com/en-gb/insights/global-research/from-neutral-land-with-love

International Institute for Environment and Development (IIED) (2023). *Debt-for-Nature Swaps: Opportunities and Risks*. In: IIED, Report

IIGCC (2025). *EMDE Investor Taskforce, 2025. Unlocking Long-Term Investment in EMDEs: Addressing Structural Challenges and Investor Appetite*. Available at: https://www.iigcc.org/our-work/investor-initiatives/emde-investor-taskforce

International Monetary Fund (IMF) (2022) – Jung, Y., Tovar, C. E., Wu, Y. and Zheng, T. (2022). *Stress Testing the Global Economy to Climate Change-Related Shocks in Large and Interconnected Economies*. In: IMF, Working Paper No. 2022/189. Available at: https://www.imf.org/-/media/Files/Publications/WP/2022/English/wpiea2022189-print-pdf.ashx

International Monetary Fund (IMF) (2022). *Debt-for-Climate Swaps: Analysis, Design, and Implementation*. IMF Working Paper 2022/162. Available at: https://www.imf.org/en/Publications/WP/Issues/2022/08/11/Debt-for-Climate-Swaps-Analysis-Design-and-Implementation-522184

International Monetary Fund (IMF) (2023). *Higher-for-Longer Interest Rate Environment Is Squeezing More Borrowers*. Available at: https://www.imf.org/en/Blogs/Articles/2023/10/10/higher-for-longer-interest-rate-environment-is-squeezing-more-borrowers

International Monetary Fund (IMF) (2025). *Debt Vulnerabilities and Financing Challenges in Emerging Markets and Developing Economies—An Overview of Key Data*. In: IMF, Policy Paper No. 2025/002. Available at: https://www.imf.org/en/Publications/Policy-Papers/Issues/2025/02/19/Debt-Vulnerabilities-And-Financing-Challenges-In-Emerging-Markets-And-Developing-Economies-562218

International Capital Market Association (ICMA) (2024). Transition Finance in the Debt Capital Market. Available at: https://www.icmagroup.org/assets/Transition-Finance-in-the-Debt-CapitalMarket-paper-ICMA-14022024.pdf

International Chamber of Commerce (ICC) (2025). *Enhancing Climate Finance in Emerging Markets and Developing Economies through Prudential Regulatory Clarification and Reform*. In: ICC, Policy Brief. Available at: https://bd3753ba-1bb8-4160-a7de-64b127c2714d.usrfiles.com/ugd/bd3753_5a4df6f47f114fc3899c107e326960f4.pdf

Independent High-Level Expert Group (IHLEG) (2024) – Bhattacharya, A., Soubeyran, E., Songwe, V. and Stern, N. (2024). *Raising Ambition and Accelerating Delivery of Climate Finance*. In: Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science. Available at: https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2024/11/Raising-ambition-and-accelerating-delivery-of-climate-finance_Third-IHLEG-report.pdf

International Energy Agency (IEA) (2023). *World Energy Outlook 2023*. Paris: International Energy Agency. Available at: https://www.iea.org/reports/world-energy-outlook-2023 (Accessed: 2 October 2025)

International Energy Agency (IEA) (2024). *Reducing the Cost of Capital*. In: IEA, Report. Available at: https://www.iea.org/reports/reducing-the-cost-of-capital

International Finance Corporation (IFC) and Amundi (2025). *Emerging Market Green Bonds 2024*. Available at: https://www.ifc.org/content/dam/ifc/doc/2025/emerging-market-green-bonds-2024.pdf (Accessed: 2 October 2025)

International Renewable Energy Agency (IRENA) (2024) – Audu, H. and Duclos, A. (2024). *Five Pillars That Determine Commercial Renewables Projects' Bankability.* In: IRENA, Expert Insights. Available at: https://www.irena.org/News/expertinsights/2024/Apr/Five-Pillars-That-Determine-Commercial-Renewables-Projects-Bankability

International Renewable Energy Agency (IRENA) (2024). *Renewable power generation costs in 2023*. Abu Dhabi: IRENA. Available at: https://www.irena.org/Publications/2024/Sep/Renewable-Power-Generation-Costs-in-2023

Jobst, A.A., (2018). *Credit Risk Dynamics of Infrastructure Investment: Considerations for Financial Regulators*. Washington, D.C.: World Bank Group. Available at: https://hdl.handle.net/10986/29540.

J.P. Morgan (2025). *De-dollarization: The end of dollar dominance?.* In: J.P. Morgan, Global Research Report. Available at: https://www.jpmorgan.com/insights/global-research/currencies/de-dollarization

Joseph, A. and Turhan, B. (2025). *Labelled Sustainable Bonds Market Update – July 2025*. World Bank Treasury Sustainable Finance Program. Available at: https://thedocs.worldbank.org/en/doc/9a258e226b80204053eabdd50ed1bc08-0340012025/original/Labeled-Bond-Quarterly-Newsletter-Issue-No-12.pdf (Accessed: 2 October 2025)

MDB Climate Action Group. (2024). *Country Platforms for Climate Action: MDB Statement of Common Understanding and Way Forward.* Retrieved from https://documents1.worldbank.org/curated/en/099427511122436202/pdf/IDU-eb55cea2-53b2-4e2d-88cd-6a23e8b08a0a.pdf

Mobilist (2025). *Investing with Impact in EMDE Public Markets: The Importance of Additionality.* Available at: https://www.mobilistglobal.com/research-data/investing-with-impact-in-emde-public-markets-the-importance-of-additionality/

Multilateral Investment Guarantee Agency (MIGA) (2024). *MIGA at COP29*. Available at: https://www.miga.org/miga-cop29

Natixis Investment Managers (2024). *Despite a Positive Outlook, Institutional Investors Still See Valuations and Interest Rates as Top Portfolio Risks in 2025.* Available at: https://www.im.natixis.com/en-intl/about/newsroom/press-releases/2024/despite-a-positive-outlook-institutional-investors-still-see-valuations-and-interest-rates-as-top-portfolio-risks-in-2025-finds-natixis-investment-managers

ODI Global (2025). *China's evolving role in Africa's energy transition: overseas trade and investment in Kenya, Mozambique and South Africa*. In: ODI Global, Report. Available at: https://odi.org/en/publications/chinas-evolving-role-in-africas-energy-transition/

OMFIF (2024). *Global Public Funds and Transition Finance.* Available at: https://pdf.omfif.org/global-public-funds-and-transition-finance

Paris Club (2025, March 11). *Common Framework: Lessons Learned and Ways Forward*. Available at: https://clubdeparis.org/en/communications/page/common-framework-lessons-learned-and-ways-forward-11-03-2025

Parliamentary Network on the World Bank and IMF (2023). *Bridgetown Agenda – Memo GPF 2023*. In: Parliamentary Network on the World Bank and IMF, Report. Available at: https://www.parlnet.org/wp-content/uploads/2023/04/Memo-PN-Bridgetown-Agenda.pdf

PGIM (2024). *PGIM Survey: Investors to Continue Risk Appetite in 2025, Despite Geopolitical Uncertainty*. Available at: https://www.pgim.com/us/en/institutional/about-us/newsroom/press-releases/2024/pgim-survey-investors-to-continue-risk-appetite-2025-despite-geopolitical-uncertainty

Reeves, J. (2025). *China's expanding influence in the Middle East and North Africa. In: The Institute for Peace and Diplomacy, Report.* Available at: https://peacediplomacy.org/2025/02/24/chinas-expanding-influence-from-middle-east-and-north-africa

Ray, R. (2024). *From Vicious to Virtuous: Understanding and Re-imagining the Relationships between Debt, Climate, and Nature at COP16*. In: Boston University Global Development Policy Center (GDP), Article. Available at: https://www.bu.edu/gdp/2024/10/29/from-vicious-to-virtuous-understanding-and-re-imagining-the-

RMI (2023). *Private Finance Is Coming off the Sidelines on MDB Reform.* Available at: https://rmi.org/private-finance-is-coming-off-the-sidelines-on-mdb-reform/

RMI, 2024. *Powering Up the Global South: The Cleantech Path to Growth*. Rocky Mountain Institute. Available at: https://rmi.org/wp-content/uploads/dlm_uploads/2024/10/Powering_up_the_global_south.pdf (Accessed: 3 October 2025).

Rockefeller Foundation. (2024). *Scaling the JETP Model: Prospects and Pathways for Action*. Retrieved from https://www.rockefellerfoundation.org/wp-content/uploads/2024/02/Scaling-the-JETP-Model-Prospects-and-Pathways-for-Action.pdf

S&P Global Ratings. (2025, June 27). *GEMs' Recently Enhanced Data Is Consistent With Our Findings Yet Still Falls Short On Details*. Retrieved from https://www.spglobal.com/ratings/en/regulatory/article/gems-recently-enhanced-data-is-consistent-with-our-findings-yet-still-falls-short-on-details-s101632050

United Nations Development Programme (UNDP) (2023). *Lowering the Costs of Development Finance in Africa.* Available at: https://www.undp.org/sites/g/files/zskgke326/files/2023-04/Policy percent20Brief percent20- percent20Lowering percent20the percent20Costs percent20of percent20Development percent20Finance percent20in percent20Africa percent20-percent20UNDP percent20April percent202023.pdf

United Nations Conference on Trade and Development (UNCTAD) (2025). *A World of Debt: It Is Time for Reform*. In: UNCTAD, Report. Available at: https://unctad.org/system/files/official-document/osgttinf2025d4_en.pdf

United Nations Conference on Trade and Development, (UNCTAD) (2023). *Global debt and climate crises are intertwined: Here's* how to tackle both https://unctad.org/news/global-debt-and-climate-crises-are-intertwined-heres-how-tackle-both?utm_source=chatgpt.com

World Bank (2024). *Côte d'Ivoire's Debt-for-Development Swap, Enabled by the World Bank Group, Will Free up Funds for Education*. In: World Bank, Press Release 05 December 2024. Available at: https://www.worldbank.org/en/news/press-release/2024/12/05/c-te-d-ivoire-s-debt-for-development-swap-enabled-by-the-world-bank-group-will-free-up-funds-for-education

This publication is available from: www.gov.uk/government/publications/climate-transition-and-global-financial-stability-literature-review

Any enquiries regarding this publication should be sent to us at:
tommy.coyle2@energysecurity.gov.uk

If you need a version of this document in a more accessible format, please email alt.formats@energysecurity.gov.uk. Please tell us what format you need. It will help us if you say what assistive technology you use.