NOVEMBER 2020

UNDERSTANDING THE ROLE OF CLIMATE RISK TRANSPARENCY ON CAPITAL PRICING FOR DEVELOPING COUNTRIES

FINDINGS REPORT
Limitations

This report has been prepared by Climate Finance Advisors, Benefit LLC (CFA) with the assistance of the Foreign, Commonwealth and Development Office (FCDO) contracted through the Expert Advisory Call Down Service, Lot C, managed by IMC Worldwide. This report has been prepared in accordance with the usual care and thoroughness of the consulting profession for the use of FCDO and only these third parties who have been authorised in writing by IMC to rely on the report. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

The views expressed in the report are entirely those of the author and do not necessarily represent FCDO’s own views or policies, or those of IMC Worldwide. Comments and discussion on items related to content and opinion should be addressed to the author, via eacslotc@imcworldwide.com.

Your feedback helps us ensure the quality and usefulness of all knowledge products. Please email eacslotc@imcworldwide.com and let us know whether or not you have found this material useful; in what ways it has helped build your knowledge base and informed your work; or how it could be improved.

FUNDING

This is an independent report commissioned by the Department for International Development (DFID), now part of the Foreign, Commonwealth and Development Office (FCDO). The views expressed do not necessarily reflect the UK Government’s opinions and policies.

CONFLICTS OF INTEREST

There were no conflicts of interest in the writing of this report.

PICTURE

The cover picture of this report has been made available for commercial and non-commercial reuse by FCDO under the Pixabay Licence. The picture can be found at https://pixabay.com/photos/recco-camogli-genoa-city-sea-4217428/

CITATION

This report should be cited as: Climate Finance Advisors, Benefit LLC (2020) Understanding the Role of Climate Risk Transparency on Capital Pricing for Developing Countries. Findings Report. Washington DC.
Acknowledgements and Contributions

Authors
This report was prepared by Climate Finance Advisors, Benefit LLC (CFA). Contributing authors to this report include senior experts Stacy Swann, Darius Nassiry, James O’Connor, Karen Piñeros, and Marta Simonetti, and analysts Sheldon Cheng and Tim Kasckow.

Special Contributions
We thank the following Expert Panel members for their invaluable contributions: Aditi Maheshwari (UN Executive Office of the Secretary General), Adrian Stone (FCDO), Alan Gómez (CitiBanamex), Carter Brandon (World Resource Institute - WRI), David Carlin (UNEP-Fi), Gabriel Acuña (Financial Market Commission of Chile, CMF), Jeremy Gorelick (Green Finance Institute - GFI), Mervyn Tang (Fitch Ratings), Namita Vikas (auctusESG LLP), Pepukaye Bardouille (International Finance Corporation - IFC) and Ulrich Volz (SOAS University of London). We also appreciate the insights of Alan Miller (CFA), Cor Marijs (Vivid Economics), Greg Lowe (AON), Michael Hugman (Children’s Investment Fund Foundation - CIFF), and Steve Dreyer (Ostrich Advisors, LLC and SwissThink SAS).

We are grateful for the helpful feedback received from the UK Government on the findings of this report.

Special Support
We appreciate the insights from the following investment coalitions, including their support disseminating surveys to their members: Coalition for Climate Resilient Investment (CCRI), Emerging Markets Private Equity Association (EMPEA), Equator Principles Association (EPA), Institute of International Finance (IIF), Institutional Investors Group on Climate Change (IIGCC), The Investment Association, UN Principles for Responsible Banking (UN-PRB) and the Principles for Responsible Investment (UNPRI).
## Acronym List

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
</tr>
<tr>
<td>AfDB</td>
<td>African Development Bank</td>
</tr>
<tr>
<td>APAC</td>
<td>Asia-Pacific</td>
</tr>
<tr>
<td>ARC</td>
<td>African Risk Capacity</td>
</tr>
<tr>
<td>ASAP</td>
<td>Adaptation SME Accelerator Project</td>
</tr>
<tr>
<td>AUM</td>
<td>Assets Under Management</td>
</tr>
<tr>
<td>BIS</td>
<td>Bank for International Settlements</td>
</tr>
<tr>
<td>BoE</td>
<td>Bank of England</td>
</tr>
<tr>
<td>CAPEX</td>
<td>Capital Expenditure</td>
</tr>
<tr>
<td>CBA</td>
<td>Cost-Benefit Analysis</td>
</tr>
<tr>
<td>CBI</td>
<td>Climate Bonds Initiative</td>
</tr>
<tr>
<td>CCADI</td>
<td>Colombian Climate Asset Disclosure Initiative</td>
</tr>
<tr>
<td>CCFI</td>
<td>Coalition for Climate Resilient Investment</td>
</tr>
<tr>
<td>CCRIF</td>
<td>Caribbean Catastrophe Risk Insurance Facility</td>
</tr>
<tr>
<td>CDP</td>
<td>CDP (formerly Carbon Disclosure Project)</td>
</tr>
<tr>
<td>CFA</td>
<td>Climate Finance Advisors, Benefit LLC</td>
</tr>
<tr>
<td>CFRF</td>
<td>Climate Financial Risk Forum</td>
</tr>
<tr>
<td>CIFF</td>
<td>Children's Investment Fund Foundation</td>
</tr>
<tr>
<td>CMF</td>
<td>Financial Market Commission of Chile</td>
</tr>
<tr>
<td>CO2</td>
<td>Carbon Dioxide</td>
</tr>
<tr>
<td>COVID-19</td>
<td>Coronavirus Disease</td>
</tr>
<tr>
<td>CRA</td>
<td>Credit Rating Agency</td>
</tr>
<tr>
<td>CRMA</td>
<td>Climate Risk Management and Adaptation</td>
</tr>
<tr>
<td>CRPP</td>
<td>Climate Risk Project Process</td>
</tr>
<tr>
<td>CSR</td>
<td>Corporate Social Responsibility</td>
</tr>
<tr>
<td>CSS</td>
<td>Climate Safeguards System</td>
</tr>
<tr>
<td>CVF</td>
<td>Climate Vulnerable Forum</td>
</tr>
<tr>
<td>DCCRAM</td>
<td>Disaster and Climate Change Risk Assessment Methodology</td>
</tr>
<tr>
<td>DFI</td>
<td>Development Finance Institution</td>
</tr>
<tr>
<td>DFID</td>
<td>UK Department for International Development</td>
</tr>
<tr>
<td>DM</td>
<td>Developed Market</td>
</tr>
<tr>
<td>DRMP</td>
<td>Disaster Risk Management Policy</td>
</tr>
<tr>
<td>EBRD</td>
<td>European Bank for Reconstruction and Development</td>
</tr>
<tr>
<td>ECB</td>
<td>European Central Bank</td>
</tr>
<tr>
<td>EM</td>
<td>Emerging Market</td>
</tr>
<tr>
<td>EMPEA</td>
<td>Emerging Market Private Equity Association</td>
</tr>
<tr>
<td>EPA</td>
<td>Equator Principles Association</td>
</tr>
<tr>
<td>ESG</td>
<td>Environmental, Social and Corporate Governance</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>EU TEG</td>
<td>European Union Technical Group on Sustainable Finance</td>
</tr>
<tr>
<td>EUR</td>
<td>Euro</td>
</tr>
<tr>
<td>EURIBOR</td>
<td>Euro Interbank Offered Rate</td>
</tr>
<tr>
<td>FCA</td>
<td>Financial Conduct Authority</td>
</tr>
<tr>
<td>FCA</td>
<td>Financial Conduct Authority</td>
</tr>
<tr>
<td>FCED</td>
<td>Foreign, Commonwealth and Development Office</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
</tr>
<tr>
<td>FI</td>
<td>Financial Institutions</td>
</tr>
<tr>
<td>GARP</td>
<td>Global Association of Risk Professionals</td>
</tr>
<tr>
<td>GCA</td>
<td>Global Commission on Adaptation</td>
</tr>
<tr>
<td>GCF</td>
<td>Green Climate Fund</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GFI</td>
<td>Green Finance Institute</td>
</tr>
<tr>
<td>GHG</td>
<td>Greenhouse Gases</td>
</tr>
<tr>
<td>GRI</td>
<td>Global Reporting Initiative</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communications Technology</td>
</tr>
<tr>
<td>IDB</td>
<td>Interamerican Development Bank</td>
</tr>
<tr>
<td>IDF</td>
<td>Insurance Development Forum</td>
</tr>
<tr>
<td>IDFC</td>
<td>International Development Finance Club</td>
</tr>
<tr>
<td>IFC</td>
<td>International Finance Corporation</td>
</tr>
<tr>
<td>IFI</td>
<td>International Financial Institution</td>
</tr>
<tr>
<td>IIF</td>
<td>Institute of International Finance</td>
</tr>
<tr>
<td>IIIGCC</td>
<td>Institutional Investors Group on Climate Change</td>
</tr>
<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
</tr>
<tr>
<td>IOSCO</td>
<td>International Organisation of Securities Commissions</td>
</tr>
<tr>
<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
</tr>
<tr>
<td>ISS</td>
<td>Institutional Shareholder Services group of companies</td>
</tr>
<tr>
<td>LatAm</td>
<td>Latin America</td>
</tr>
<tr>
<td>MDB</td>
<td>Multilateral Development Bank</td>
</tr>
<tr>
<td>MENA</td>
<td>Middle East and North Africa</td>
</tr>
<tr>
<td>NAP</td>
<td>National Adaptation Programme</td>
</tr>
<tr>
<td>NDC</td>
<td>Nationally Determined Contribution</td>
</tr>
<tr>
<td>ND-ECI</td>
<td>Notre Dame's Environmental Change Initiative</td>
</tr>
<tr>
<td>ND-GAIN</td>
<td>Notre Dame Global Adaptation Initiative</td>
</tr>
<tr>
<td>NGFS</td>
<td>Network for Greening the Financial System</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organisation</td>
</tr>
<tr>
<td>NPV</td>
<td>Net Present Value</td>
</tr>
<tr>
<td>ODA</td>
<td>Official Development Assistance</td>
</tr>
<tr>
<td>OEC</td>
<td>Organization for Economic Co-operation and Development</td>
</tr>
<tr>
<td>OMFIF</td>
<td>Official Monetary and Financial Institutions Forum</td>
</tr>
<tr>
<td>OPEX</td>
<td>Operating Expense</td>
</tr>
</tbody>
</table>
# Table of Contents

**Limitations** ........................................................................................................................................... i

**Acknowledgements and Contributions** ................................................................................................. ii

**Acronym List** .......................................................................................................................................... iii

**Executive Summary** .................................................................................................................................. 1

1. **Background and Introduction** .................................................................................................................. 4

2. **Approach and Methodology** ................................................................................................................... 7

3. **Summary of this Study’s Findings** ............................................................................................................. 16

4. **Detailed Findings by Question and Associated Hypotheses** .................................................................. 23
   4.1 **Investor Interest and Awareness about Climate Risks** ..................................................................... 25
   4.2 **Capital Flows and Capital Requirements** ....................................................................................... 43
   4.3 **COVID-19 and Climate Risk** ........................................................................................................... 61

5. **Policy Implications and Recommendations** ........................................................................................... 64

6. **Areas of Further Research** ..................................................................................................................... 69

Endnotes ......................................................................................................................................................... 74
## Exhibits

### BOXES

<table>
<thead>
<tr>
<th>Box</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Box 1. Active and ongoing efforts to address challenges for adopting climate-risk management practices and disclosure</td>
</tr>
<tr>
<td>22</td>
<td>Box 2. Recent research on the connection between climate change and the cost of capital in developing countries</td>
</tr>
<tr>
<td>27</td>
<td>Box 3. Recent surveys of investors and risk managers on climate risk management and disclosure</td>
</tr>
<tr>
<td>28</td>
<td>Box 4. Financial regulatory associations on climate risk management and related disclosure</td>
</tr>
<tr>
<td>29</td>
<td>Box 5. Surveys conducted by rating agencies on topics relevant for disclosure or climate risk management since 2019</td>
</tr>
<tr>
<td>33</td>
<td>Box 6. How do climate considerations integrate into investment decision processes?</td>
</tr>
<tr>
<td>37</td>
<td>Box 7. Climate risk can lead to financial value at risk. But when?</td>
</tr>
<tr>
<td>39</td>
<td>Box 8. Are ESG ratings useful as a means to understand climate risk?</td>
</tr>
<tr>
<td>40</td>
<td>Box 9. ESG and climate-risk frameworks: Useful for different purposes</td>
</tr>
<tr>
<td>42</td>
<td>Box 10. CRAs as a sources of climate-related information</td>
</tr>
<tr>
<td>53</td>
<td>Box 11. Current MDBs approaches to assessing climate risk</td>
</tr>
<tr>
<td>55</td>
<td>Box 12. Can you incentivise resilience through pricing or other structuring mechanisms?</td>
</tr>
<tr>
<td>60</td>
<td>Box 13. Insurance Development Forum – Building frameworks for insuring climate resilience</td>
</tr>
<tr>
<td>66</td>
<td>Box 14. Connection between the Coronavirus pandemic and climate risk – A view from CRAs</td>
</tr>
</tbody>
</table>

### CASE STUDIES

<table>
<thead>
<tr>
<th>Case Study</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>Case Study 1. Can climate considerations be isolated from other factors in investment decision?</td>
</tr>
<tr>
<td>49</td>
<td>Case Study 2. Emerging approaches to integrate climate risk into investment decision making</td>
</tr>
<tr>
<td>51</td>
<td>Case Study 3. Is &quot;building-in&quot; resilience more costly?</td>
</tr>
<tr>
<td>58</td>
<td>Case Study 4. Re-evaluation of investments and financial sector participation</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY
Executive Summary

Emerging research is showing that climate-related risks can have an impact on the cost of capital paid by vulnerable developing countries. Vulnerability to climate change does have a cost and it is starting to show. At the same time, while awareness of climate-risks among investors is growing rapidly, there is little evidence that investors have, to date, avoided geographies with perceived but unknown climate risks. This is good news for now, although awareness is not the same as active management.

FCDO commissioned the study Understanding the Role of Climate Risk Transparency on Capital Pricing for Developing Countries to assess if (and how) climate risks were impacting investor behaviour and cost of capital for developing countries. In particular, FCDO was interested in understanding whether existing disclosures practices or greater knowledge of climate-related risks influence investor behaviour, and if so what policy makers could do to ensure that climate risks did not have an impact on the cost of capital for developing countries.

Given the potential challenges that may arise for developing countries from changes in the cost of capital from climate change, the findings of this study are in support of policy recommendations included in the Policy Brief titled Understanding the Role of Climate Risk Transparency on Capital Pricing for Developing Countries (hereinafter, Policy Brief), and are focused specifically to achieve two specific outcomes that require the support by donors and developed country partners and that complement other ongoing international efforts. These outcomes are illustrated in Figure 1.

STATE OF PLAY

At the moment investors engaged for this study seem to pay little attention to climate change risks in their investment practice. Investors do recognize some types of investment carry financial exposure from climate impacts, including in terms of damages, but this awareness is shaped primarily by events that obviously come with financial exposure, such as costs from extreme weather events (physical risk), and in the case of coal, the financial value at risk of specific fossil-related stranded assets (transition risk), namely coal.

Aside from these clearly obvious examples, investors seem unprepared to assess climate-related financial risks, or view the potential for other financial impacts from climate risks as either too intangible to ascertain in terms of direct financial implications today, or manageable in the context of their overall portfolio exposure. As a result, those engaged for this study do not seem to have made the explicit connection in practice between the full range of climate-related risks and the pricing of their capital in a broad or comprehensive way.
However, investors are not a monolith, and these views seem highly dependent on what information they use to understand climate risk, whether and how investors are assessing and quantifying climate-related financial risks, and importantly the information, tools and methodologies they use to do so. Investors use a wide range of sources of climate-related information, including ESG reports, specialist data providers, and in some cases, climate-related disclosures. The role of climate-related financial disclosures seems limited, and seen to be uneven, incomplete and hard to compare, and as a result not seen as useful (or even usable) in investment decision-making at this point in time. In some ways, disclosure is viewed as a 'chicken-and-egg' problem: the analysis and decision-making process up and down the value chain for managing climate risk is not nearly as nuanced as it should be because the data, metrics, taxonomies and information (through disclosure or otherwise) is not there in sufficient volume, quality or comparability. This seems true for investors in both developed and developing economies.

**FUTURE CHALLENGE**

Nonetheless, the absence of evidence is not the same as evidence of absence, and climate-related financial risks can and will increase for developing countries. The good news is that while emerging research is showing that vulnerability to climate change has a cost (particularly for sovereign borrowing), early evidence also suggests that investing in resilience can reduce that cost.

Furthermore, and by contrast, failure to invest in resilience will most certainly make countries more vulnerable to climate impacts – and the costs associated with those impacts – reducing their adaptive capacity, impacting economic growth and reducing capital flows of all types. This in turn could increase poverty and inequality, and for many countries may undermine development gains made in the last several decades. In the absence of good risk management and mitigation measures by governments, asset developers, and investors, complemented with cost effective insurance options to help risk share and transfer residual risks, investors may start pricing climate risk for those investments most vulnerable to climate risks as more information about the financial impact of those risks becomes more known (and knowable, through data and analytics).

Today’s policy and investment choices will influence the severity of climate risks in the future, and by extension the costs of those risks. Investors engaged for this study support strong and consistent and mandatory disclosure requirements, but recognize the significant challenges with an imperfect disclosure environment.

While we do not know the magnitude of future financial risks from climate change today, we do know that accelerating action in developing countries can allow us to manage and potentially minimize many climate-related financial risks. Given the findings of this study, it seems imperative to invest in a country's resilience to climate change. Research cited in this study also implies that by investing (and increasing) the resilience of developing countries, we may help keep capital of all types flowing to those countries, and perhaps simultaneously close the current gap between those countries with better systems to absorb climate-related shocks, and those more vulnerable countries that are less able to do so (physically and economically).

The following sections outline the background for the study, the methodology employed to undertake this review, and the questions and hypotheses explored on questions related to impact of climate risk disclosure on (i) investor interest; (ii) capital flows; (iii) capital requirements; and (iv) potential opportunities. Areas for further research are identified in Chapter 7, and a list of sources, research and literature reviewed, and investors interviewed (along with questions asked) can be found in the Annexes to this report.1
1. BACKGROUND AND INTRODUCTION
1. Background and Introduction

1.1 PURPOSE, SCOPE, AND OBJECTIVE
Awareness that climate change presents risks and opportunities continues to grow, but whether
and how investors are integrating climate knowledge, information, data, and other factors into
their investment decision-making processes remains unclear. It is also unclear whether investors
are acting on a detailed assessment of climate risk, or whether they are acting on the perceptions
of climate risk.

This study was undertaken between May 2020 and August 2020, and explores the impact of
climate risk disclosure on (i) investor interest; (ii) capital flows; (iii) capital requirements; and (iv)
potential opportunities, with the aim to provide additional analysis and provide evidence to help
assess whether and how climate-related knowledge, information, and disclosures affect investor
decision-making. The findings from this study provide insights into existing investor views on these
issues and are primarily derived from interviews and surveys with investors and complemented
by relevant research. These findings from this study are meant to inform the policy response by
governments in order to mitigate any unintended consequences of greater disclosure around
climate-related risks, such as capital flight, and in particular for developing countries.
CORE QUESTIONS
For this study, FCDO posed seven core questions that cover several dimensions of investor appetite to gauge if and how decision-making is impacted by greater climate risk knowledge and/or increased disclosure. CFA included two further core questions to (i) assess common data sources used by investors to inform climate risk analysis, and (ii) to understand whether investors believed that COVID-19 has influenced their views on the risks from climate change, for a total of nine core questions. Figure 2 summarizes these core questions.

![Figure 2. Core nine questions of this study](image-url)

1. Is there evidence of investors being reluctant to engage in areas of perceived but unknown climate risk?
2. What are the climate-related data sources investors are relying on to inform their investment decisions?
3. How does greater knowledge, transparency and disclosure of climate risks affect (a) the quantum of capital required, (b) the availability and (c) the cost of capital paid by developing countries?
4. Is there evidence as to whether the investment has been deterred by the additional capex required to make the activity more resilient or because of the higher risk itself?
5. Are investor project modelling assumptions around higher capex costs to increase resiliency accompanied by assumptions of resulting lower maintenance costs for the life of the asset?
6. Where climate risks are better understood, are costs of capital lower to reflect greater confidence? Are these effects equally felt in the developed and developing world? Are there interventions (e.g., insurance) which can encourage this?
7. Does greater transparency and disclosure of climate risks affect existing investment flows to developing countries and/or developed countries?
8. What mitigation actions could governments and donors take to maintain investment attractiveness?
9. How has the experience with COVID-19 changed/not changed how you assess risk and how will this carry into your thinking on climate risk?
2. APPROACH AND METHODOLOGY
2. Approach and Methodology

To answer the above questions, CFA undertook (i) a literature review, (ii) interviews with different categories of investors, (iii) surveys through investor associations on the topic and iv) development of case studies.

The literature review focused on recent studies and analyses in the extant academic and grey literature on the broad question of the relationship between improved climate information and investor behaviour and decision-making.

The survey and interviews related to two main themes which the nine questions cover, namely:

- **Changes in Investor Behaviour** - Are investors changing their behaviour or investment decisions because of climate risk knowledge and/or awareness, or disclosure of climate risks?

- **Changes in Cost of Capital** - Is the cost of capital changing, whether upwards or downwards, because of climate risk, climate risk disclosure, and/or the inclusion of climate-resilience components in investments?

Overall, Table 1 below provides a summary of the nine core questions and their relationship to these themes, a list of the hypotheses that each question tested, and the general approach taken in interviews. These questions also gauge how influential, if at all, existing climate-related financial disclosures (along the lines of the Task Force on Climate-related Financial Disclosures (TCFD)) are on either investor behaviour and/or cost of capital. A full list of questions developed for both (i) the interviews and (ii) the surveys is presented in Annexes 1 and 2.
### Table 1: Summarised Core Questions and Approach

<table>
<thead>
<tr>
<th>Summarised Core Question</th>
<th>Hypotheses Tested</th>
<th>Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 1. Is there evidence of reluctance to engage in areas of perceived but unknown climate risk?</td>
<td></td>
<td>Gather insights, and where possible, collect evidence from interviews showing if/how investors are changing investment behaviour based on perceptions of risk. Determine whether investors believe climate risk can be isolated.</td>
</tr>
<tr>
<td>Question 2. What are the climate-related data sources investors are relying on to inform their investment decisions?</td>
<td>No hypotheses formed to encourage open discussion</td>
<td></td>
</tr>
<tr>
<td>Question 3. How does greater knowledge, transparency, and disclosure of climate risks affect a) the quantum of capital required b) the availability and c) the cost of capital paid by developing countries?</td>
<td>H1 - Greater knowledge, transparency, and disclosure of climate risks affect the amount of capital required to address the climate risks perceived. H2 - Greater knowledge of climate risks also shapes the availability of capital for developing countries. H3 - Greater knowledge of climate risks also affects the cost of capital for developing countries.</td>
<td>Gather insights, and where possible, collect evidence of where and how organisations obtain and process climate-related information.</td>
</tr>
<tr>
<td>Question 4. Is there evidence as to whether the investment has been deterred by the additional capex required to make the activity more resilient or because of the higher risk itself?</td>
<td>H6.1 - There is a growing body of evidence that shows that investment has been deterred by the additional capex required to make the activity more resilient because of the higher climate-related risks.</td>
<td>Collect information on whether investors have walked away from climate-resilient investments due to higher CAPEX resulting from the resilience measures, and/or overall levels of climate risk.</td>
</tr>
<tr>
<td>Question 5. Are project modelling assumptions taking into account both higher CAPEX costs and lower maintenance costs?</td>
<td>H1 - Investors’ project modelling assumptions around higher capex costs to increase resiliency are accompanied by assumptions of resulting lower maintenance costs for the life of the asset. H2 - All measures to address climate risk in project modelling result in higher CAPEX and lower OPEX/maintenance costs.</td>
<td>Collect information on current project finance modelling practices for projects that incorporate resilience measures.</td>
</tr>
<tr>
<td>Question 6. Where climate risks are better understood, are costs of capital lower to reflect greater confidence? Are these effects equally felt in the developed and developing world? Are there interventions (e.g. insurance) which can encourage this?</td>
<td>H7.1 - There is evidence of lower costs of capital reducing to reflect better information (i.e. greater confidence and certainty) about climate risks. H7.2 - These effects are equally felt in the developed and developing world.</td>
<td>Collect information on current experience of decreased cost-of-capital for sponsors making investments resilient/resilience investments; and will also gather information on investor perception of these costs.</td>
</tr>
<tr>
<td>Question 7. Does greater transparency and disclosure of climate risks affect existing investment flows to developing countries (and/or developed countries)?</td>
<td>NS.1 - There is a growing evidence base that greater transparency and disclosure of climate risks have affected existing investment flows to developing countries, relative to the counterfactual of limited transparency and disclosure.</td>
<td>Gather insights, and where possible, collect evidence of specific investor decisions to shift investments away from developing countries due to greater knowledge or understanding of climate risks.</td>
</tr>
<tr>
<td>Question 8. What mitigation actions could governments and donors take to maintain investment attractiveness?</td>
<td>No hypotheses formed to encourage open discussion</td>
<td>Gather investor feedback and input to inform policy recommendations for mitigating unintended consequences of greater climate risk knowledge and/or awareness.</td>
</tr>
<tr>
<td>Question 9. How has the experience with COVID-19 changed/not changed how you assess risk and how will this carry into your thinking on climate risk?</td>
<td>No hypotheses formed to encourage open discussion</td>
<td>Gather data on how investors’ experience with the COVID-19 pandemic has affected its views on climate risk.</td>
</tr>
</tbody>
</table>
These questions and hypotheses follow the logical flow as illustrated in Figure 3 below.

**FIGURE 3.**
Diagram of questions and hypotheses

**CHANGES IN INVESTOR BEHAVIOUR**
Are investors changing behavior/investment decisions because of climate risk knowledge/awareness?

**Q7** - Does greater transparency and disclosure of climate risks affect existing investment flows to developing countries and/or developed countries?
H1 - There is a growing evidence base that greater transparency and disclosure of climate risks have affected existing investment flows to developing countries, relative to the counterfactual of limited transparency and disclosure.

**Q8** - What mitigation actions could governments and donors take to maintain investment attractiveness?
H1 - There is a growing body of evidence that shows that investments have been deterred by the additional CAPEX required to make the activities more resilient because of the higher climate-related risks.

**H2** - There is evidence of lower costs of capital reducing to reflect better information (i.e. greater confidence and certainty) about climate risks.

**H3** - These effects are equally felt in the developed and developing world.

**CHANGES IN COST OF CAPITAL**
Is the cost of capital changing because of climate risk/resilience?

**Q1** - Is there evidence of reluctance to engage in areas of perceived but unknown climate risk?
H1 - Investors are increasingly aware of climate risk.

**Q2** - How does greater knowledge, transparency and disclosure of climate risks affect the quantum of capital required to address the climate risks perceived?
H2 - Greater knowledge of climate risks also shapes the availability of capital for developing countries.

**Q3** - How does greater knowledge, transparency and disclosure of climate risks affect the amount of capital required to address the climate risks perceived?
H3 - Greater knowledge of climate risks also affects the cost of capital for developing countries.

**Q5** - Are investor project modelling assumptions around higher CAPEX costs to increase resiliency accompanied by assumptions of resulting lower maintenance costs for the life of the asset?
H1 - Investors’ project modelling assumptions around higher capital costs to increase resiliency are accompanied by assumptions of resulting lower maintenance costs for the life of the asset.

**Q4** - Is there evidence as to whether the investment has been deterred by the additional CAPEX required to make the activity more resilient or because of the higher risk itself?
H1 - There is a growing body of evidence that shows that investments have been deterred by the additional CAPEX required to make the activity more resilient because of the higher climate-related risks.

**Q6** - Where climate risks are better understood, are costs of capital lower to reflect greater confidence? Are these effects equally felt in the developed and developing world? Are there interventions (e.g. insurance) which can encourage this?
H1 - There is evidence of lower costs of capital reducing to reflect better information (i.e. greater confidence and certainty) about climate risks.

**H2** - These effects are equally felt in the developed and developing world.

**DATA**

**COVID-19 AND CLIMATE RISK**

**Q9** - How has the experience with COVID-19 changed/not changed how you assess risk and how will this carry into your thinking on climate risk?

**Key Parameters for all Questions:**
- Type of Investors/Investment Horizon
- Maturity of the market/risk pricing
- Cost of debt/equity
- Individual vs aggregate flows
- Developing / Developed Countries

**Executive Summary**

1. Background and Introduction
2. Approach and Methodology
3. Summary of this Study’s Findings
4. Detailed Findings by Question and Associated Hypotheses
5. Policy Implications and Recommendations
6. Areas of Further Research

**Endnotes**
Figure 4 depicts the four stages of this research process conducted for this study. A detailed description of this stages is provided in the following section.

**FIGURE 4.**
Four-part research process

<table>
<thead>
<tr>
<th>Review of available literature and research</th>
<th>Interviews with investors and key stakeholders</th>
<th>Surveys investor associations and groups</th>
<th>Case studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>To provide key findings from sources and current research</td>
<td>To test assumptions and hypotheses, provide evidence to support conclusions, and identify case studies</td>
<td>To further develop our analyses and to provide evidence for any findings</td>
<td>To further provide evidence and support of the study conclusions and findings</td>
</tr>
</tbody>
</table>

### 2.1 LITERATURE REVIEW

CFA conducted a review of recent research relevant to the topic of whether and how greater climate knowledge, information, and disclosure impacts financial investments and decision-making. The literature review for this study attempted to capture key insights through three types of sources:

- **Publications, guidance notes, and research issued by coalitions, associations and others working on tangible climate risk management practices, which in turn promote disclosure:** publications and reports related to disclosure practices, and from financial and policy coalitions working on developing decision-useful, tangible and practical methodologies, approaches and tools for investors and financial firms.

- **Recent surveys measuring investor views around the topic of climate-related risks:** In 2019 and 2020, several financial industry associations have surveyed their membership or client base on topics related to the questions posed in this study, including disclosure, climate risk or climate risk management which highlight important investor views from a broad range of financial actors. These surveys are informative and are part of the literature reviewed to support this study.  

- **Emerging data and research illustrating the impact of climate-risk on cost-of-capital and capital flows:** research and studies that attempt to quantify and evidence the relationship(s) between climate-related risks and cost-of-capital, capital flows and investor behaviour.

This review complemented and contributed to the development of both (i) the interview questions, and (ii) the survey. Findings from this research and review are included in Section 4 of this report. A detailed summary of the findings of the literature reviewed is included in Annex 3.

### 2.2 INTERVIEWS

CFA conducted 23 interviews with a range of financial actors, including development finance institutions, asset managers, private equity investors, commercial private sector banks, as well as credit rating agencies (CRAs). Among those interviewed were staff in a broad range of functions within their firms including investment managers/officers, portfolio managers, heads of sustainability departments, and other senior staff.

CFA developed the interview list in coordination with FCDO. Figure 5 illustrates the breakdown of the geographical distribution of investors, Figure 6 shows the breakdown of interviewees by type, and Figure 7 reveals their presence in developing market. Table 2 depicts their support to TCFD and other climate-related initiatives.
2.3 SURVEYS
In consultation with FCDO, CFA engaged several investor associations to survey their membership on questions of this study to complement interviews. To ensure a large breadth of investor representation, CFA included investor associations with a membership base of asset owners, private equity, and infrastructure investors, among others. Table 3 shows a list of investor associations whose members were surveyed as part of this study. Figure 8 provides a snapshot of the investors type that participated in the survey surveyed; 31 survey responses were received.

Notably, many of these investor associations have also undertaken surveys of their membership on topics related to areas of climate risk management approaches, investor views on disclosure and policy and regulatory approaches for addressing climate-related financial risks.

2.4 CASE STUDIES
This study includes a select number of case studies that are highlighted to illustrate and support key findings. In particular, CFA prepared cases that illustrate or provide evidence of relevant hypothesis tested in this study, including whether investor behaviour has changed because of greater awareness or knowledge of climate risk (either through disclosure or otherwise), or whether the cost of capital has changed as a result of climate risk. Cases include examples of how organisations have approached climate risks and disclosure in investment decision-making and are included in the findings in Chapter 5.

2.5 CHALLENGES AND LIMITATIONS OF THE STUDY
This study included a qualitative assessment drawing from investor views and responses through surveys and interviews, coupled with an assessment of recent research and literature on the topics relevant for the study, namely the effects of climate risk on investor behaviour and capital flows to developing countries.

The findings presented in this report are limited by the number and type of investors engaged (both for interviews and for surveys), and by the diversity of investor-types interviewed for this study which may not allow for a full understanding of differing perspectives depending on how and where those investors invest. The emerging research which complemented these interviews and surveys on the key questions of the study may be showing early evidence between climate-related risks and changes in the cost of capital, capital flows or other measures of investor behaviour, but may also have limitations due to the sample size of countries reviewed, the data source(s) used to assess the relationships between cost-of-capital and climate-related vulnerabilities and resilience measures, and the timeframe for which such analysis was performed.

Given that the interviews and surveys that support this study are primarily qualitative in nature, many of the questions are measuring elements of existing “investor sentiment” around climate-related risks, and the effects of this sentiment on current investor behaviour. Measuring investor sentiment can be inherently complex and fluid as the conditions which shape this sentiment change. Understanding the impact of such views may be particularly challenging with regard to climate change, which involves non-linear changes in the earth system, and by extension the impacts on economic and financial systems (and investor behaviour). While the emerging research signals some evidence related to the impact of climate-related risks on costs of capital, these are often observed in retrospect (e.g., in terms of investment decisions that are taken), and as a result, such research may lag existing investor behaviour as it relates to these questions.
Also, this study included a question related to the ongoing COVID-19 pandemic, which may have an influence on investor views around climate risk. To more fully understand how investor behaviour towards climate-related risks and opportunities may be influenced by the pandemic, a larger sample size will be necessary, and while there are a number of ongoing efforts to gauge the impact of the pandemic on investor sentiment, few are focused on the same questions related to climate risk and opportunities.

For policymakers to form a sound view on the key questions which motivated this report, it may be of value to consider additional efforts to measure investor views and sentiment specifically as these relate to impacts of climate-related risks and opportunities on a much more frequent basis. Such an approach would allow policymakers to better track changes in investor behaviour as they are occurring and thereby enable policymakers and other stakeholders to respond to a changing climate in line with policy goals.

**INTERVIEWS AND SURVEYS IN NUMBERS**

Interviews with organisations with presence in developed and developing countries

**FIGURE 5.**
Geographical distribution of interviewees

- North America/Western Europe: 58% have presence in North America and/or Western Europe
- Central Asia and Eastern Europe: 68% are active in Central Asia
- Middle East and North Africa: 53% have presence in MENA
- Asia-Pacific, South and Southeast Asia: 74% are active in Asia
- Sub-Saharan Africa: 58% have presence in SSA
- Latin America and the Caribbean: 68% have presence in LatAm

**FIGURE 6.**
Interviewees by type

- 17% Asset Manager
- 4% Climate Change Advisory and Investment Firm
- 26% Development Financial Institution (DFI)
- 4% Impact Investor
- 13% International Commercial Bank
- 9% National Financial Institution
- 9% Pension Fund/Insurer
- 4% Private Equity Fund
- 13% Rating Agency
TABLE 2. Interviewees' support to climate-related initiatives (See Endnote 3)

<table>
<thead>
<tr>
<th>INVESTOR TYPE</th>
<th>TCFD SUPPORTER</th>
<th>TCFD DISCLOSURE</th>
<th>PRI</th>
<th>NET ZERO ALLIANCE</th>
<th>PRB</th>
<th>MAINSTREAMING INITIATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Managers</td>
<td>100%</td>
<td>75%</td>
<td>100%</td>
<td>0%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Development Financial Institutions</td>
<td>50%</td>
<td>33%</td>
<td>33%</td>
<td>N/A</td>
<td>17%</td>
<td>83%</td>
</tr>
<tr>
<td>Investment Firms</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Impact Investors</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>International Commercial Banks</td>
<td>100%</td>
<td>100%</td>
<td>67%</td>
<td>0%</td>
<td>67%</td>
<td>67%</td>
</tr>
<tr>
<td>National Financial Institutions</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>N/A</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Pension Funds/ Insurers</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Private Equity Funds</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Surveys disseminated by different investor associations with global outreach

TABLE 3.
Investor associations that distributed surveys

<table>
<thead>
<tr>
<th>INVESTOR ASSOCIATION/COALITION</th>
<th>MEMBERSHIP BASE</th>
<th>ACTIVE IN</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA – Equator Principles Association</td>
<td>Banks</td>
<td>✓</td>
</tr>
<tr>
<td>PRB – UN Principles for Responsible Banking</td>
<td>Banks</td>
<td>✓</td>
</tr>
<tr>
<td>CCRI – Coalition for Climate Resilient Investment</td>
<td>Institutional Investors</td>
<td>✓</td>
</tr>
<tr>
<td>IIGCC – Institutional Investors Group on Climate Change</td>
<td>Institutional Investors</td>
<td>✓</td>
</tr>
<tr>
<td>PRI – UN Principles for Responsible Investment</td>
<td>Institutional Investors</td>
<td>✓</td>
</tr>
<tr>
<td>The Investment Association</td>
<td>Institutional Investors</td>
<td>✓</td>
</tr>
<tr>
<td>EMPEA – Emerging Markets Private Equity Association</td>
<td>Private Equity</td>
<td>✓</td>
</tr>
<tr>
<td>IIF – Institute of International Finance</td>
<td>Various</td>
<td>✓</td>
</tr>
</tbody>
</table>

FIGURE 8.
Survey respondents by investor type

- 16% Banks
- 48% Institutional Investors
- 13% Infrastructure Investors
- 10% Private Equity Funds
- 13% Other
3. SUMMARY OF THIS STUDY’S FINDINGS
3. Summary of this Study’s Findings

This section summarises the findings of this report and complements Chapter 5 which presents the detailed analysis of each of the nine core questions and the hypotheses which were tested within each of those questions.

Taken together, the interviews, surveys, and the literature review paints an interesting picture. Figure 9 illustrates the relationship between current investor awareness, investor behaviour, and the cost-of-capital in relation to climate risks of developing countries identified from this research.

Figure 9.
Summary of research findings

INVESTOR AWARENESS | COST OF CAPITAL | DISCLOSURE
--- | --- | ---
Investor awareness is high, but action on that awareness is nascent. | Research is beginning to show impacts on cost-of-capital from climate risk, although many investors have not fully internalised this outcome. | Because it is ad-hoc and/or inconsistent, disclosure is not currently deemed useful or usable for investment decision-making, but there is strong support for not only voluntary but mandatory disclosure.

Investors interviewed recognise on the one hand that greater disclosure and awareness of climate-related risks will affect investment flows and cost of capital, but (with only a couple of exceptions) they themselves have not yet observed enough first-hand evidence of such changes across investment practices that connect general financial risk with climate change. Importantly, capital flight is seen as a potential - and significant - risk of an imperfect climate-risk disclosure environment, but it does not obviate the need for prudent – thorough – climate risk management practices among all financial actors. Furthermore, investors noted that in the absence of mandatory disclosure requirements, investors may be slower to adopt climate risk management practices.

In terms of investor action on climate-related risks, those interviewed for this study are only beginning to put in place internal mechanisms that might allow them to begin to assess and manage climate-related risks, including whether and how to price-in such risks or make adjustments to capital allocation. This is consistent with results from investor surveys, and in particular surveys from the Global Association of Risk Professionals (GARP) which show that investors are beginning to integrate climate-related issues into their risk management processes (Paisley, J., Nelson, M, 2020). Almost all engaged for this study cited a lack of common approaches, methodologies, and metrics as the most significant barrier for addressing climate risks. In fact, few interviewees or survey respondents expressly stated their approaches to assess, quantify, or otherwise manage climate-related risks were resulting in either (i) changes to capital allocation or (ii) changes in their pricing approaches.

The disconnect between the practical application of climate-risk management approaches and capital pricing or investment valuation is consistent with the International Monetary Fund (IMF) research which shows that there is little evidence to date that awareness of climate risks has translated into equity valuations. IMF concludes that this is due to “significant informational challenges in pricing in the anticipated increase in climate risks into portfolios” (Delghi,A., Feng, A., et al.,2020).
These informational and capacity challenges seem to be the most consistent hurdle across investor types and market participants and is the largest challenge for understanding the impact of climate risk disclosure on investor interest, capital flows and cost of capital for developing countries. Investors are aware of the capacity and methodology gaps that they themselves have, and the capacity and methodology gaps that exist in the market, irrespective of the growing number of consulting firms and data providers that are supporting climate risk analysis. Fundamentally, they note that the system linking corporates, financiers and investors continues to lack the necessary tools and approaches to fully assess, quantify and manage financial risks from climate change. Further, they emphasised this is of particular importance for developing countries, where such capacity is often limited.

That said, while the challenges in information and tools are apparent, overall investors interviewed and surveyed seek more disclosure to help them better understand and act on climate risks, and they view policy measures to require mandatory disclosures as helpful. They also believe that there are significant challenges with partial, or incomplete disclosure, where only some may be required to disclose but where for others it may be voluntary, or where disclosures are not comparable and therefore not usable for certain types of assessments. In fact, capital flight is seen as a potential risk of an imperfect climate-risk disclosure environment, but it does not obviate the need for prudent – thorough – climate risk management practices among all financial actors.

The following provides a summary of the key findings by each of the nine core questions asked as part of this study. Findings are organised as follows:

- Investor Interest and Awareness about Climate Risks
- Capital Flows and Capital Requirements
- Recommended Policy Action for Developing Countries
- COVID-19 and Climate Risk
SUMMARY OF FINDINGS BY QUESTION

The following is a summary of the key findings from the literature review, interviews and surveys around the nine questions included in this study:

INVESTOR INTEREST AND AWARENESS ABOUT CLIMATE RISKS

Q1 - Is there evidence of reluctance to engage in areas of perceived but unknown climate risk?

There is mixed evidence from this study to show that investors are reluctant to engage in areas of perceived but unknown climate risk. Climate risk is an increasingly important factor in investment decision, but this is not yet a driver deterring investment behaviour. Most investors consider climate risk as embedded with other risks (e.g. market, political, credit). Of survey respondents 32% consider climate risk as a stand-alone factor while 59% consider climate risk as part of other types of risks.

Q2 - What are the climate-related data sources investors are relying on to inform their investment decisions?

A variety of data sources are used to inform climate-risk analysis. The study suggests investors use a mix of information and data that come from numerous sources. While 65% of survey respondents noted they use climate-related disclosures, this information was characterised by many as inconsistent, non-standard, and not easily "usable" for investment decision-making. The number and variety of data sources available seems to drive uncertainty about how to use climate-related information in decision-making.

CAPITAL FLOWS AND CAPITAL REQUIREMENTS

Q3 - How does greater knowledge, transparency and disclosure of climate risks affect a) the quantum of capital required b) the availability and c) the cost of capital paid by developing countries?

Research is showing that climate risk is beginning to impact the cost of capital paid by developing countries but there is no evidence on its effects on the quantum or availability of capital. Investors interviewed showed low levels of awareness about the research and do not (themselves) currently observe these changes to the cost or availability of their capital for developing countries. Climate risk seems to be affecting sovereign borrowing costs for vulnerable developing countries, and early research may signal benefits (in terms of a reduction of those costs) as a result of a country’s investment in resilience. Further, investor views on cost or availability of capital can be driven by the lack of depth/specialisation in their own climate-risk management practices. More research may be needed on both items.

Q4 - Is there evidence as to whether the investment has been deterred by the additional CAPEX required to make the activity more resilient or because of the higher risk itself?

There is no evidence from this study to conclude that investments were deterred because of higher CAPEX for resilience measures. Some investors questioned whether addressing climate risk would be more costly, while others, this question was not directly relevant to their investment approach.

Q5 - Are investor project modelling assumptions around higher CAPEX costs to increase resilience accompanied by assumptions of resiliency of CAPEX costs for the life of the asset?

Few investors actively employ a project modelling approach that incorporates an assumption of higher CAPEX being offset by lower maintenance costs for the life of the asset. Where this approach was relevant (e.g., infrastructure investors) many are actively developing approaches like a CBA or CAPEX/OPEX offset analysis (e.g., CCRI methodology) to consider the additional capital required to make an investment resilient. However, notably not all investors supported the assumption that CAPEX resilience measures require additional quantum of capital and some felt that this assumption warranted further research.

Q6 - Where climate risks are better understood, are costs of capital lower to reflect greater confidence? Are these effects equally felt in the developed and developing world? Are there interventions (e.g. insurance) which can encourage this?

Investors support the hypothesis that better information and disclosure would lead to more accurate risk-adjusted pricing (both positive and negative). Research suggests negative effects of information and disclosure may be felt greater in developing countries if not managed well. Investors were not aware that climate-risk information or disclosure was impacting costs of capital, or that (according to recent research) this was already occurring. Investors did perceive innovative insurance mechanisms to address climate-related risks (e.g. CIRF, AIC) to be working well and support the expanding the application of those mechanisms.

COVID-19 AND CLIMATE RISK

Q7 - Does greater transparency and disclosure of climate risks affect existing investment flows to developing countries and/or developed countries?

Evidence was mixed whether greater transparency and disclosure is currently affecting existing investment flows to developing or developed countries. All engaged for this study noted that climate-related disclosures today were not entirely useful or usable for climate risk management, and there was no consensus about whether greater disclosure would impact capital flows to developing countries, and many thought such transparency may help flows. 14% of survey respondents cite portfolio reallocation between developing and developed countries as one of the potential consequences when they integrate climate risk into their investment decision processes. More research is needed to further examine the changes in the wider market as compared with investor perception and sentiment.

Q8 - What mitigation actions could governments and donors take to maintain investment attractiveness?

Investors recognise that disclosures are a crucial mechanism for better climate risk management but highlight the tools, skills and capacity are a necessary condition for disclosure and that significant gaps exist in this area. Investors also support the view that the absence of good climate risk management and information could have significant unintended consequences for developing countries ability to become resilient and adapt to climate change. – Two main types of outcomes manifested by investors include: i) Build the climate risk management systems in developing countries ii) Incentivize the acceleration of investment in resilience in developing countries

Q9 - How has the experience with COVID-19 changed/not changed how you assess risk and how will this carry into your thinking on climate risk?

Evidence was mixed whether COVID-19 impacted investor thinking about climate risk. Many investors viewed the pandemic as having accelerated a closer focus on sustainability and responsibility. 63% of survey respondents declared that their experiences with COVID-19 have not impacted their thinking on climate risk.
SPECIFIC BARRIERS HIGHLIGHTED BY INVESTORS

This study shows that these differences in awareness and knowledge depend inter alia upon the different type of investor and lender interviewed, their location, coverage, and scope, as well as upon the information they currently capture or use to assess climate-related risks (both as those risks exist today, or in the future). Highlighted the lack of standardisation in the methodologies and approaches to quantify climate-related risks particularly for physical climate risk. The plethora of data/analytics approaches provided by consulting and analytics firms also seems to be causing greater confusion among users. Many interviewed expressed a general sense that undertaking climate-related risk assessment especially for physical risk is simply too complex and difficult. Specifically, those interviewed cited the following most common barriers preventing them from fully addressing climate-related risks:

1. **Sources of climate-related information.** Information and data come from numerous sources, is inconsistent and non-standard, and is often provided in a form which is not easily "usable" for many investor needs. Climate-related financial disclosures (either based on TCFD and/or Sustainability Accounting Standards Board (SASB)) currently do not provide enough sufficient information for investors interviewed to fully understand climate-related risks. ESG ratings were cited as an important source of climate-risk information (through their ESG scores), but several noted that these were imperfect, and many recognised that a larger share of climate risk issues are distinct from and thus not adequately captured in current ESG ratings.

2. **Tools for understanding, assessing and quantifying climate-related information.** Of those interviewed and surveyed, key challenges still remain in terms of the definitions, metrics, data, as well as the methodologies and approaches for assessing and quantifying climate-related risks. More specifically:

   a. **Definitions, metrics, and data.** Several interviewees noted recent taxonomies (e.g. the European Union Technical Expert Group on Sustainable Finance (EU TEG), MDB Climate Finance definitions, International Development Finance Club (IDFC)/ Multilateral Development Bank (MDB) Principles for Climate Resilient Metrics, Adaptation SME Accelerator Project (ASAP) and others) as being helpful in guiding their understanding of definitions, but that the metrics associated with these taxonomies continued to be unclear. In terms of the data around climate-related risks, many expressed a lack of standardisation, harmonisation, and usability as key challenges.

   b. **Methodologies and approaches for quantifying climate-related risks.** Those interviewed provided a range of views on how they currently or may in the future approach quantifying climate-related risks, but importantly these approaches varied and were dependant on the type of investor and their investment processes. Specifically:

      - **Scenario analysis.** Investors interviewed understand conceptually the need to include scenario analysis but expressed confusion about integrating various scenarios across relevant time horizons for their specific investment approaches.

      - **Quantifying financial implications from climate risk.** Questions related to integrating climate risk/resilience into CAPEX/OPEX were not relevant for some investors, nor were questions related to cost-of-capital. Many of those interviewed noted the need for an approach to quantify the impacts of climate risk on return-on-investment. Finally, several interviews revealed a greater concern for understanding impacts from climate change on market risk and political risk, versus credit risk.

3. **Lack of policy guidance.** Some investors noted that the TCFD framework has been important in raising awareness and giving them the language for engaging with their investees around climate-related risks; however, several noted that the lack of mandatory requirements for climate-related financial risk disclosure prevented more widespread adoption of climate-related risk management practices, both among corporates as well as their own institutions.
ONGOING EFFORTS TO ADDRESS BARRIERS FOR BETTER CLIMATE RISK MANAGEMENT PRACTICES

Many of the barriers cited above are not new, and those engaged for this study served for further reinforce the presence of these barriers, particularly for developing countries. Furthermore, it is clear that policymakers understand these barriers stand in the way of greater climate-risk management and disclosures. Publications and reports related to helping to build the necessary conditions for useful climate-related disclosure practices, and those from financial policy coalitions, such as NGFS and EU highlights a significant level of awareness by policymakers around the challenges for operationalising climate-related risk management practices among all actors, including financial policymakers and the investors they govern. These coalitions are working to provide tangible solutions and guidance to increase the sophistication of climate-risk management practices (and consequently disclosure practices) (See Box 1). Many investors interviewed acknowledged these efforts, and felt their adoption should be accelerated to developing countries, but perceived them to be too nascent to be fully implemented yet.

Moreover, recent research on the financial implications of climate risk reinforces a key question that this study asks, namely whether climate-related risks will have an impact on capital flows or cost-of-capital for developing countries. Several recent research studies support the hypotheses and show in particular that for developing countries there seems to be a correlation between climate risks and sovereign ratings, with possible consequences for both sovereign borrowing costs, and borrowing costs of those firms in countries where sovereign risk is affected by climate change. Box 2 highlights important key findings from these reports.

**BOX 1.**
Active and ongoing efforts to address challenges for adopting climate-risk management practices and disclosure

Challenges to fully integrating climate-risk management practices into investment decision-making (and thus disclosure) are well known. A number of coalitions and initiatives are attempting to address these by developing approaches which can be widely adopted. For example:

**Climate risk and financial policy:**

Network for Greening the Financial System (NGFS) - NGFS issued guidelines in June 2020 for the application of scenario analysis by regulators and integrating climate-considerations into monetary policy.

**Climate risk and financial institutions:**

The Climate Financial Risk Forum (CFRF) – CFRF is a coalition established by the Bank of England Prudential Regulatory Authority (PRA) and the UK Financial Conduct Authority (FCA). It is actively curating best practices and tangible approaches for financial firms to integrate into climate considerations (both risks and opportunities) into their risk management, strategy and decision-making processes, and issued the output of its first year’s work in June 2020.

UK PACT – Colombian Climate Asset Disclosure - CCADI has designed and is piloting an asset-owner information disclosure project that will promote transparency and the inclusion of climate-related risks and opportunities within the investing strategies of the financial sector in Colombia. This initiative aims to facilitate behavioural change of institutional investors to increase the size and scale of climate change investment projects.

This project released a ‘Barriers Report’ detailing the 10 key barriers for climate-smart investment in Colombia for institutional investors. It also became the basis for the development of an anonymous investors ranking, which compared 23 institutional investors across five key categories: i) general knowledge of climate related risks, ii) governance, iii) strategy, iv) risk management, and v) metrics and targets. The ranking allowed investors to identify and compare themselves with the rest of the market, greatly improving transparency.


Moreover, recent research on the financial implications of climate risk reinforces a key question that this study asks, namely whether climate-related risks will have an impact on capital flows or cost-of-capital for developing countries. Several recent research studies support the hypotheses and show in particular that for developing countries there seems to be a correlation between climate risks and sovereign ratings, with possible consequences for both sovereign borrowing costs, and borrowing costs of those firms in countries where sovereign risk is affected by climate change. Box 2 highlights important key findings from these reports.
BOX 2.
Active and ongoing efforts to address challenges for adopting climate-risk management practices and disclosure

Recent research conducted indicates that climate change is having a measurable impact on the cost of capital for both countries and companies, particularly in developing economies. This research relates to both debt and equity, as summarized below.

**Climate Change and the Cost of Capital in Developing Countries:** Assessing the impact of climate risks on sovereign borrowing costs, UN Environment Program, Imperial College Business School, and SOAS University of London, Buhr et al. (2018). Examines whether risks associated with climate change – specifically physical climate risks such as extreme weather shocks and severe climatic trends – have an impact on borrowing costs and sovereign credit ratings of developing countries. The analysis considered 46 countries, including member countries of the Climate Vulnerable Forum (CVF) and Vulnerable 20 (V20) countries. The study used data from 1996-2016 and econometric modelling. Key findings include:

- Climate vulnerability – the level of sensitivity as well as the capacity to cope and adapt – has already raised the average cost of debt in a sample of developing countries by 117 basis points in absolute terms, the equivalent of USD40 billion in additional interest payments over the past 10 years on government debt. Climate vulnerability has cost these countries an estimated USD62 billion in higher interest payments across the public and private sectors. Based on this analysis, the additional interest payments attributable to climate vulnerability are projected to increase to between USD146-168 billion over the next decade.

- Investments in social preparedness – in areas such as social inequality, Information and communications technology (ICT) infrastructure, education, and innovation – can partially mitigate the impacts of climate vulnerability on sovereign borrowing rates by increasing adaptation capacity and the social and economic resilience of countries.

**The Impact of Climate Vulnerability on Firms’ Cost of Capital and Access to Finance:** SOAS, Kling et al. (2019): Investigates how climate-related risks on firm-level costs of capital and access to finance. The analysis included over 63,000 firms in 80 countries over 1993-2017. Key findings include:

- On average the cost of debt for firms in high-risk countries was 0.83 percentage points higher than in low-risk countries because of climate vulnerability. Advanced economies see less of this effect. Analysis of country groups shows that “the magnitude and statistical significance of these effects are greater in developing countries with weaker capacity to adapt and to mitigate the consequences of climate change.”

This Changes Everything: Climate Shocks and Sovereign Bonds, IMF, Cevik and Jalies (2020): Investigates how vulnerability and resilience to climate change affect the cost of sovereign borrowing in 98 advanced and developing countries over the period 1995-2017. Key findings include:

- Vulnerability and resilience to climate change has a significant impact on government borrowing after controlling for other determinants of sovereign risk.

- Vulnerability and resilience affect the cost of capital for countries in opposite ways. "Countries with greater vulnerability to climate change pay a higher rate on government bonds." Climate resilience "has a similarly significant negative impact on the cost of borrowing." More climate resilient countries have lower bond yields and spreads relative to more climate vulnerable countries. Analysis of country groups shows that "the magnitude and statistical significance of these effects are greater in developing countries with weaker capacity to adapt to and mitigate the consequences of climate change."

Targeted investments can make a difference. "Although climate vulnerability is inevitable, the negative coefficient on climate resilience shows that enhancing structural resilience through mitigation and adaptation, strengthening financial resilience through fiscal buffers, insurance schemes, improving economic diversification and policy management can help cope with the consequences of climate change.”

**Feeling the Heat: Climate Risks and the Cost of Sovereign Borrowing, Asian Development Bank Institute, Beirne, Renzi and Volz (2020):** Examines the link between the cost of sovereign borrowing and climate risk for 40 advanced and emerging economies, and tested empirically the link between climate vulnerability and resilience to climate risk and sovereign bond yields. Key findings include:

- Climate vulnerability "has significant implications for sovereign borrowing costs, and the direct effects of climate change matter substantially more than more climate risk resilience. Furthermore, the magnitude of the effect on bond yields is larger for countries deemed highly vulnerable to climate change:" in particular, higher climate risk vulnerability and, to a lesser extent, lower climate risk resilience, lead to significant risks in the cost of sovereign borrowing.

- Analysis suggests "the reaction of bond yields to shocks imposed on climate vulnerability and resilience become permanent after around 12 quarters, and that high-risk economies experience larger permanent effects on yields than other country groups."

- Adaptation investments "that help to mitigate climate risks would contribute to a lowering of the cost of sovereign debt, and this would provide much-needed fiscal space to those countries particularly affected by climate change."

**Global Financial Stability Report: Markets in the Time of COVID-19. Chapter 5: Physical Risk and Equity Prices. International Monetary Fund (2020):** Analyses 68 countries – 34 advanced and 34 emerging and developing countries – over the past 50 years to assess the financial stability implications of the anticipated increase in the frequency and severity of climate hazards (e.g., storms, floods, heatwaves and droughts). The authors focused on the impact of large climatic disasters on equity prices. These data provide readily available high-frequency information on investors' beliefs about physical risk and their perceptions of the impact of a shock on the future performance of financial and non-financial firms. The dataset includes 6,000 disasters, with floods and storms constituting about 80% of the sample. Key findings include:

- In many countries, stocks with the highest sensitivity to temperature earn lower returns than other stocks, after controlling for standard risk factors, suggesting mispricing and lack of attention by investors to temperature related variables.

- Climate change physical risks does not appear to be reflected in global equity valuations and evidence suggests that equity investors in most economies have not paid attention to climate change.

- More granular, firm-specific information on current and future exposure and vulnerability to climate change would help reduce investors’ informational gaps and facilitate risk pricing.

Based on the above studies, further research may be needed to understand how the connection between climate-related risks and cost of capital may vary for different types of economies, different types of companies, and different types of investors.

4. DETAILED FINDINGS BY QUESTION AND ASSOCIATED HYPOTHESES
4. **Detailed Findings by Question and Associated Hypotheses**

This section provides the detailed findings from the literature review, interviews and surveys around the three main areas of this study and the associated core questions: (i) investor interest; (ii) capital flows; and, (iii) cost-of-capital. Findings are organised as follows:

Section 5.1 - Investor Interest and Awareness about Climate Risks  
Section 5.2 - Capital Flows and Capital Requirements  
Section 5.3 - COVID-19 and Climate Risk

Each of the sections mentioned above provides insights gathered on the questions and hypotheses tested described in the 'Approach and Methodology' chapter of this report. For each hypothesis whether findings enable to (i) Support the hypothesis, or (ii) Mixed or no evidence to support the hypothesis.

- **Support for the hypothesis**
- **Mixed or no evidence for the hypothesis**

Findings from the literature review, interviews, and surveys provide evidence to support the hypothesis.

Mixed or no evidence to support the hypothesis. Possible reasons include the small sample size of interviews and survey responses, reluctance from survey respondents to answer questions, or where findings from different sources are conflicting.
4.1 INVESTOR INTEREST AND AWARENESS ABOUT CLIMATE RISKS

Findings outlined in this section cover three main categories that inform views on how investors are currently understanding climate risk, namely:

i. Investors' interest and understanding, knowledge, and awareness of climate risk

ii. If/how they have integrated these considerations, views, awareness into their investment decision-making, and

iii. Sources to inform climate-related analysis

As noted in the 'Approach and Methodology' section, most of the core questions tested a series of hypotheses. Below are the hypotheses tested by Q1 and Q2 and are relevant for the findings related to this section, Investor Interest and Awareness about Climate Risks.

Q1 - Is there evidence of reluctance to engage in areas of perceived but unknown climate risk?

There is mixed evidence from this study to show that investors are reluctant to engage in areas of perceived but unknown climate risk. Climate risk is an increasingly important factor in investment decision, but this is not yet a driver deterring investment behaviour. Most investors consider climate risk as embedded with other risks (e.g. market, political, credit): Of survey respondents, 32% consider climate risk as a stand-alone factor while 59% consider climate risk as part of other types of risks.

<table>
<thead>
<tr>
<th>HYPOTHESIS</th>
<th>FINDINGS /REASONING</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Investors are increasingly aware of climate risk.</td>
<td>Interviews support this hypothesis. 90% of survey respondents confirm climate risk is part of their decision making for new investments.</td>
</tr>
<tr>
<td>H2: Investors are increasingly cautious about engaging in areas of perceived but unknown climate risk.</td>
<td>The responses obtained from interviews and surveys were diverse, and evidence was mixed from literature review.</td>
</tr>
<tr>
<td>H3: Climate risk is an increasingly important factor in investment decision making vis a vis other risks evaluated.</td>
<td>Interviews support this hypothesis, but with some caveats (e.g. data/information not being readily available).</td>
</tr>
<tr>
<td>H4: It is possible to consider climate risk in isolation of other risks.</td>
<td>Evidence was mixed given the diverse roles interviewees play within their organisations. From surveys only 32% of survey respondents consider climate risk in isolation. Mixed evidence was also found from literature review.</td>
</tr>
</tbody>
</table>

Q2 - What are the climate-related data sources investors are relying on to inform their investment decisions?

A variety of data sources are used to inform climate-risk analysis. The study suggests investors use a mix of information and data that come from numerous sources. While 65% of survey respondents noted they use climate-related disclosures, this information was characterised by many as inconsistent, non-standard, and not easily 'usable' for investment decision-making. The number and variety of data sources available seems to drive uncertainty about how to use climate-related information in decision-making.
SUMMARY OF FINDINGS: INVESTOR INTEREST AND AWARENESS ABOUT CLIMATE RISKS

The literature review, interviews with investors and surveys show that investors are increasingly aware that climate change has the potential to pose financial risks, although it is not clear that this level of awareness is translating into either caution about engaging in areas of perceived climate risk or actual changes in investment behaviour to date. This could change rapidly as those interviewed noted that climate risk is becoming an increasingly important factor in investment decision making, despite the gaps or lack of readily usable information for an investor’s particular credit, market, underwriting, or operational risk assessment. Investors currently obtain information from a wide variety of sources, and the plethora of available options seem to drive uncertainty about how to use climate-related information in their decision-making. This includes ESG frameworks and tools which may have limited ability to cover all aspects of climate-related financial risks.

However, investors are increasingly asking for climate-risk information from their investees, and in these instances, the TCFD framework provides useful guidance for areas of inquiry, such as an organisation’s governance around climate risk, their strategies to address climate risks and opportunities, their approach to climate-related risk management, and the metrics and targets used by an organisation to address climate change. In this regard, TCFD’s framework seems to be becoming the most common language used for climate-related due diligence, notwithstanding that investors are not currently seeing the value in disclosures themselves as a source of information.

In recent years investor associations and CRAs have conducted surveys to assess the investor interest on climate-related issues, their level of awareness of climate-related risks, and the degree and ways investors and companies are integrating climate-related considerations into their investment and risk management processes.

While this study was limited in the number of interviews, surveys and duration, the findings contained in this study are consistent with the findings of many other surveys on climate-related risk issues in terms of gauging the level of interest and awareness. Surveys conducted by GARP, HSBC and IIF, in particular, show a higher level of integration of climate considerations into investors’ risk management processes than this study was able to determine with its limited sample size and diverse type(s) of investors interviewed. Further, the HSBC study highlights a growing interest by both issuers and investors in integrating climate-related considerations into their investment appraisal processes, should confidence increase in the information sources, as well as the data, tools, and approaches for quantifying such risks. Boxes 3 and 4 provide a summary of some of the results of surveys conducted by investor associations and financial regulatory associations in the last 2 years, respectively. Box 5 includes a summary of survey results from CRAs in the same time frame.
Recent surveys of investors and risk managers on climate risk management and disclosure

In 2019 and 2020, several financial industry associations have surveyed their membership or client base on topics relevant for disclosure, climate risk or climate risk management which highlight important investor views from a broad range of financial actors. Below is a summary of the findings from a select number of these surveys.

2020 – Second Annual Global Survey of Climate Risk Management at Financial Firms (Membership Base: Banks, Asset Managers, Insurers, and Financial Market Infrastructure Companies): The Global Association of Risk Professionals (GARP) surveyed 71 financial institutions (45 banks and 28 other financial institutions, comprising asset managers, insurers and financial market infrastructure companies) to assess their incorporation of climate risk considerations. Key findings from this survey include:

- Climate-risk management is increasing, but the biggest challenges for investors and financial risk professionals to address climate risk (i) the availability of reliable models and (ii) regulatory uncertainty.
- The relative importance of physical and transition risks differs across the types of firms.
- Getting internal alignment on a climate risk strategy in the short term is a challenge, and most firms do not have a dedicated team for managing climate-related risks. Yet, Board-level governance exists at 90% of firms, and engagement (by boards on the topic of climate change) is increasing.
- Climate-risk is widely seen by many surveyed as improperly priced.

2020 – Global Climate Finance Survey (Member Base: Commercial Banks, Investment Banks, Asset Managers, Insurance Companies, Sovereign Wealth Funds, Hedge Funds, Central Banks, Multilateral Agencies, and Development Banks): The Institute of International Finance (IIF) and the European Banking Federation surveyed 70 firms with total assets of nearly USD40 trillion. Surveyed firms are in Europe, emerging and other mature economies. Key findings from this survey include:

- Most financial firms surveyed are at least partially following TCFD recommendations, but adoption of the TCFD recommendations varies widely across geographies. 60% of respondents in mature economies are already implementing recommendations compared to 37% in emerging economies.
- Better processes are needed for risk management. Over 45% of participants stated their risk management framework includes a process for identifying and assessing climate-related risks and opportunities, but only 17% have fully integrated the process into their overall risk management frameworks. Only 18% of firms reported having a framework to track financed emissions.
- Shadow carbon pricing on the rise. Over 20% of respondents reported using internal (shadow) carbon pricing in planning or decision making, while a further 14% reported plans to do so.

2019 – HSBC Sustainable Finance and Investing Survey 2019 (Participants Surveyed: capital market participants, including asset managers, asset owners, banks, and other investors, and issuers, including corporates and others): HSBC surveyed 1,000 issuers and investors (500 each) from 15 core markets across four regions. The survey compares views of both issuers and investors alongside each other to reveal how the needs of each group interact. On issues of sustainability, approximately the same number of both groups see issues of sustainability as a prominent theme and important and growing area. Concerning climate change in particular, findings of this survey include:

- Climate change is impacting business today. More than 30% of issuers say it is already impacting their business or activities, with another 30% saying they expect climate change to impact business within the next 10 years.
- Shifts in capital allocation by companies/issuers are happening. Only 6% of those issuers surveyed said they expect no changes to their capital allocations over the next 5 years, while two-thirds foresee making “substantial or noticeable changes” in capital allocations towards ESG and climate change. No similar analysis was undertaken for the investors surveyed.
- 67% of shareholders care “a great deal” about environmental performance. Of the three major categories of investors (banks, bondholders and shareholders), shareholders are seen as the “investor” that cares the most about sustainability and climate change.
- Investors are open to sustainability-linked products. Financial products that link reductions in interest margin paid by the issuer if certain environmental and social targets are met (or increases in interest margin if they are not) are catching on, with 75% of those surveyed viewing these products as “very” or “potentially” interesting.

Box 4.
Financial regulatory associations on climate risk management and related disclosure

Integrating climate considerations into the main elements of financial governance (e.g., prudential disclosure, standards/metrics, and monetary policy) can help transform the financial system in ways that catalyse financing for adaptation and resilience. Different associations of financial governance actors have begun to coordinate among their members (which include both developed and developing countries) on issues related to addressing climate-related risks within specific financial system governance functions. It is important to note that countries vary in their approaches to financial governance, with some having clear and delineated agency roles and functions for prudential regulation, monetary policy, securities regulations, consumer protections and tax and budgetary policies. The following includes key findings from recent surveys undertaken by these associations.

2020 – Climate-related Financial Risks: A Survey on Current Initiatives (Member Base: Central Banks): As part of the Basel Committee’s high-level Task Force on Climate-related Financial Risks (TCFR), the Bank for International Settlements (BIS) surveyed 27 members of the Basel Committee on Banking Supervision, which include central banks and other national authorities responsible for domestic banking supervision. Key findings of this survey include:

- The majority of members consider it appropriate to address climate-related financial risks within their existing regulatory and supervisory frameworks.
- More than two-thirds have or are in the process of issuing principle-based guidance regarding climate-related financial risks, but most are not factoring such risks into prudential capital frameworks.
- Challenges in developing a climate risk framework include data availability, difficulties in mapping transmission channels, a lack of capacity, time horizon misalignments, a lack of a credit rating regime, a lack of internationally-coordinated actions on risk management and a lack of clear taxonomy.

2020 – Sustainable Finance and the Role of Securities Regulators and IOSCO: The Sustainable Finance Network (SFN), of the International Organisation of Securities Commissions (IOSCO) was established in 2018 to provide IOSCO members a forum to exchange views on sustainability issues facing securities regulators, and in particular its Principles regarding disclosure of material information, of which climate-related risks are increasingly considered. In April 2020, IOSCO published findings related to sustainability (including climate risks) from its recent survey of members surveyed securities regulators and market participants. Key findings of this survey include:

- A role for securities regulators on climate-related issues. While most securities regulators do not have explicitly remit to promote sustainability issues, most believe that climate-related issues pose important challenges in meeting the core objectives of regulators – investor protections, market efficiency and mitigation of systemic risks.
- Need for improved disclosures. Lack of consistency and comparability across third-party frameworks could create obstacles to cross border financial activities and raise investor protection concerns.
- Increasing and active participation in efforts to promote sustainability issues. About 75% of regulators responded that they are participating in domestic, private sector, public sector or public-private initiatives relating to sustainable finance and see an important role for regulators in these discussions.

2020 – Tackling climate change: the role of banking regulation and supervision (Participants Surveyed: Central Banks, Regulatory Authorities, Commercial Banks): Mazars, the international audit and advisory firm and the Official Monetary and Financial Institutions Forum (OMFIF), an independent think tank for central banking, economic policy and public investment, surveyed 33 central banks and regulatory authorities, as well as 50 of the world’s largest banks, on four key areas relevant for climate change: governance, risk management, scenario analysis and disclosure. Key findings of this survey include:

- Governance: Regulators believe that roles and responsibilities for managing climate-related financial risks shall be clearly distributed on the board, its relevant sub-committees and the holders of senior management functions; More than 60% of banks currently allocate responsibility to corporate social responsibility (CSR) related functions.
- Risk Management: 70% of regulators see climate-risk as a potential systemic risk. Nearly all banks in the study recognise the materiality of climate-related risks – both physical and transition. However, their main focus remains on measuring the impact of transition risks on credit risk.
- Scenario Analysis: With regulators working on scenarios for climate-related stress tests at both the international (NGFS, European Central Bank (ECB)) and national levels banks (PRA, Banque de France, Deutsche Bundesbank), will need to strengthen their scenario analysis capabilities.
- Disclosure: Support for TCFD is widespread, but climate-related information is not yet disclosed in a comparable manner. Significant gaps exist between the largest and smaller banks. Current disclosures lack detail on risk management.

BOX 5.
Surveys conducted by rating agencies on topics relevant for disclosure or climate risk management since
2019

Credit ratings agencies play a particularly unique role in providing risk information to the market. Much of this information is derived from internal analysis, but also from market information and feedback, including public disclosures and information reported by covered entities. Over the last year, the CRAs have conducted market surveys related to disclosure and climate-risk management of corporations and financial institutions. An interesting element of all three reports is that financial institutions as well as credit ratings agencies continue to face difficulties in separating environmental and climate-related risks. Below is a selection of findings from these surveys.

**MOODY’S – 2020 – Big banks’ climate risk disclosures have room for improvement:** Moody’s surveyed 28 rated banks with a combined USD47 trillion in assets. Findings include:

- Climate change is increasingly being considered as a risk element. 79% of surveyed banks have implemented financing exclusion policies for carbon-intensive industries with high transition risks. However, less than 53% have adopted climate considerations at all stages of the credit risk process or describe their climate risk methodologies.
- Pledges to disclose climate risks are increasing. 86% of banks surveyed have committed to follow TCFD guidelines.
- Qualitative, not quantitative. Climate risk disclosures at the world’s largest banks continue to detail climate-related risks and opportunities but fall short in estimated financial impacts. Only 52% of large banks even partially disclose how climate risk would affect their performance under climate stress scenarios.
- Methodology for stress testing unclear. Less than 50% of banks have disclosed the climate-risk stress-testing methodology they apply to their loan books.

**FITCH RATINGS – 2019 – Bank’s Risk Management Embraces ESG:** Fitch Ratings surveyed 182 banks to assess how they planned to meet TCFD’s recommendations, and in particular how they manage climate-related risks. This report refers to climate change and ESG interchangeably. Findings from the survey include:

- Climate change is increasingly becoming part of bank’s risk analysis. More than half of the banks surveyed incorporate ESG considerations “always” or “most of the time” into their risk management processes. But these actions are not liked with pricing of their products. Large banks are most likely to incorporate climate considerations in their risk analysis. 73% of large banks, 38% of medium-sized banks and 32% of small banks (41% total) claimed to have done so.
- Climate risk integration varies by region. More emerging market banks say climate-change is part of their risk frameworks than European or North American Banks. Banks in sub-Saharan Africa and the APAC region are most likely to incorporate climate-related considerations into their risk frameworks. 77% of African banks, 45% of banks in the APAC region, 31% of Eastern European and Central Asian banks, 33% of Latin American banks, 18% of North American banks and 38% of Western European banks claimed to have done so. Moreover, only 10% of the global sample declared they were explicitly capturing climate risks into their borrower-level credit rating process, with the larger proportion of these being African and Latin American banks. The disparity between regions could be attributed to differences in interpreting what “implementing ESG” means.
- Banks in developed markets (DM) are more likely to use scenario analysis than those in emerging markets (EM). 48% of large DM banks, 20% of medium-sized DM banks, 17% of medium-sized EM banks, 9% of small DM banks and 8% of small EM banks claimed to use climate scenario analysis.

**S&P GLOBAL RATINGS – 2020 – In ESG risk management, measuring the ‘E’ remains elusive – survey:** S&P surveyed 194 credit risk and portfolio management professionals around the world about their ESG strategies – in which S&P Global Market Intelligence’s Credit Risk Solutions team included (some) climate-related risks. Findings from the survey include:

- ESG is becoming more mainstream. More than 25% of organisations said ESG is integral to their risk analysis, and 57% said it plays an increasing role. More than 90% expect it to become more important in the future.
- There are challenges for assessing ESG, notably with the “E”. Environmental risks, and in particular climate change, are cited as the most difficult to integrate into credit analysis.
- ESG tools and models are used, but a lack of robust data for scenario analysis is challenging. More than 75% of respondents said they have internal tools and models to incorporate ESG into their credit risk analysis, and another 21% said they are looking at this now or in the next few months.

The following section provides additional insights into key topics covered under the general heading of Investor Interest and Awareness around Climate Risks and includes findings associated with hypotheses tested for Q1 and Q2, and relate to (i) where investors are obtaining their climate-related information, and (ii) how this information is used or integrated into investment decision-making. This section is organised into the following sub-headings:

- Approaches to integrating climate risk considerations into the decision-making process
- Sectors where investors believe climate-risk is most relevant
- Sources of climate-related information (broadly)
- Types of climate-related information gathered from clients/investees
- Credit Rating Agencies as a source of climate-risk information

APPRAOCHES TO INTEGRATING CLIMATE RISK CONSIDERATIONS IN THEIR DECISION-MAKING PROCESS

Investors are aware that integrating climate risks in financial analysis is a crucial component of assessing the value of investments and almost all are in the process of building their capacity to do so. As climate-related financial risks have become increasingly tangible and material to investment returns in recent years, there is a growing awareness that the evaluation of these risks requires a different and more sophisticated approach to integrating climate risk considerations into investment decision-making. Investors interviewed and surveyed clearly recognised that these two broad categories of risk analysis (e.g. ESG and climate risk) require different data sets, require a different approach to analyse (with one being focused on corporate behaviour and associate impact on the environment, and the other an exogenous risk to be managed), thus have different financial implications, and will manifest in different ways more broadly for certain sectors/industries and geographies. Furthermore climate-related information corporates provide should be along common metrics in order to make it comparable for investors and stronger basis for informed decisions. Figure 10 highlights that 90% of survey respondents noted that their organisation does identify, assess or quantify climate-related risks in investment decision making, and 64% noted that the approach to integrating climate risk considerations into an investment decision-making process is the same for both developed and developing countries.

FIGURE 10.
Survey results on the integration of climate risk considerations in decision making

Does your organisation identify, assess or quantify climate risk in its investment decision making process for new investments?

- 90% Yes
- 10% No

Does the integration of climate risk in your organisation’s investment decision-making process differ for investments in developing and developed countries?

- 36% Yes
- 64% No
Results from interviews and surveys suggest that the degree of integration of climate-risk into an investment decision-making process – meaning how much these organisations analysed and quantified climate-related financial risks as part of the process varied greatly, and is highly dependent on the typology and location of the investor or lender. Among those interviewed and surveyed, some noted that early screening processes are more widely used to disqualify investments, rather than detailed analysis on the impacts of climate change on credit risk, return on investment or value at risk of an investment deep into an investment due diligence process. While many claimed that they were beginning to integrate climate-related assessments more diligently into their investment decision process for new investments, some still relied on ESG practices to help screen and understand climate-related risks and opportunities, which may only partially cover the full range of climate-related financial risks.

Findings from interviews and surveys suggests that climate risk is not always treated as a standalone risk and is rather considered part of other risks already assessed. Many of the investors interviewed noted that they currently use ESG approaches, performance standards and frameworks to assist them in assessing climate-related risk in their investment decision making, and thus are not uniformly considering climate change as a standalone risk. As shown in Figure 11. Results from surveys on this matter are mixed; 32% of investors treat climate risk as a standalone/principal risk while 59% indicate they embed it as part of other risks, while 9% of respondents indicated they consider this risk as both a standalone and as part of other types of risks.

---

**FIGURE 11.**
Survey results on climate risk vis a vis other risk

In your organisation, is climate change considered a principal or stand-alone risk, or is it embedded in other types of risks considered as part of your investment decision?^{12}

<table>
<thead>
<tr>
<th>Option</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consider climate risk a principal or stand alone risk</td>
<td>32%</td>
</tr>
<tr>
<td>Consider climate risk a principal or stand alone risk while also embedding it in other types of risk</td>
<td>9%</td>
</tr>
<tr>
<td>Embed climate risk in other types of risks</td>
<td>59%</td>
</tr>
</tbody>
</table>

...screening for climate risk happens early in the due diligence process...discovering that climate risks are too high after several months of work is costly and time-consuming”

Anonymous quotes from interviews
Investors interviewed highlighted the uneven capacity within organisations across sectors and countries to assess climate information in a comprehensive and standalone issue. Larger, more established organisations have the financial capacity, technical knowledge and processes to collect and interpret data internally. Smaller organisations tend to be more reliant on off-the-shelf data. This is a capacity issue that has been discussed widely in the interviews and surveys. Greater climate risk disclosure and analysis can only take place once this capacity gap has been filled.

The integration of climate risks into financial decision-making has several interlocking components across the risk management process, each of which has important components which enable comprehensive risk assessment and are also important for disclosure. As mentioned in other sections of this study, investors cited challenges with integrating climate risk assessments into each stage of the risk management process, be they data and informational challenges or methodological challenges. Box 6 illustrates how investors’ might integrate climate risk considerations across a risk management process and where sources information and methodological challenges are relevant across this process. Further it shows the connection with this process and disclosure, and how disclosure may be an important informational input into climate-risk management.
Integrating climate risks into financial decision-making has several interlocking components and can support an organisation’s overall disclosure efforts. Most risk management processes involve the following general stages/ phases:

**FIGURE 12.**
Risk Management Process

### IDENTIFY & ASSESS
- What risks do I face?
- What are my sources of information on climate risks?
- Do they impact my operations?
- Time horizon?

### QUANTIFY
- What is the financial value of the identified climate risks?
  - in terms of revenue, assets, costs?
  - Time horizon?

### MANAGE
- What are my risk management/mitigation options?
  - Financial
  - Physical
  - Strategic
  - Operational
  - Time Horizon?

### DISCLOSE
- What do I tell investors, financiers?
- When should I disclose?
- How does disclosure affect my ability to manage risk?
- Challenges in identifying, assessing, quantifying and managing risks result in challenges for disclosure.

**BOX 6.**
How do climate considerations integrate into investment decision processes?

1. **Identify and Assess Risks:** This process typically includes (i) the identification of climate hazards that may be present, and (ii) the potential “vulnerability” and “exposure” of an investment to those hazards, and how it may impact returns. Defining risks and using data and other information to understand and assess climate-risks are important at this stage. Sources of information include, among others: weather and climate data, ESG assessments, credit ratings, and climate-related disclosures. Understanding such risks on relevant time horizons is important across all stages of the risk management process and applying appropriate scenario analysis is also relevant for both assessing and quantifying climate-related risks.

2. **Quantify Risks:** This stage involves estimating the financial value of those risks in terms of their impacts on returns (e.g., revenues, assets and costs) or borrowing costs, and across time horizons that are meaningful for understanding value at risk for the investment. Most investors seek to understand the implications for return-on-investment (ROI) as a primary driver of an internal investment decision; this is different from a more granular assessment of operational implications (CAPEX/OPEX), although they are connected. Different approaches used during this stage include Cost Benefit Analysis (CBA) and Value-at-Risk (VaR).

3. **Management of Risks:** Information and outputs garnered from assessing and quantifying climate-related risks is important for developing strategies for managing those risks, and can involve a firm or investor employing a combination of risk-transfer (e.g., insurance), risk-sharing approaches, pricing-in risk premia, accepting risks, mitigating risks or otherwise controlling risks.

4. **Disclosure:** For most organisations, this stage comes after having well-thought-out processes to identify, assess and ideally quantify climate-related risks and opportunities, and having an approach and strategy for managing climate-related risks. In the absence of mandatory requirements, climate-related disclosure is a strategic decision for an organisation and involves revealing to stakeholders how the entity is responding and has integrated climate-related risks and opportunities into their policies, processes, procedures, strategies, and decision making. TCFD guidance encourages entities to disclose four core elements: (i) governance, (ii) strategy, (iii) risk management and (iv) metrics and targets.

The stages of risk management pictured above feed into one another: the outcome of one stage determines the process and quality results of the subsequent stage. Consequently, good disclosures are the result of a strong and robust identification process, qualitative and quantitative assessments informed by good quality data, and internal knowledge and capacity for risk managing. While disclosure is a product of these stages, it is also relevant information in itself, which feeds into the first stage of the cycle; therefore, instead of being perceived as an output of the cycle, disclosure should be seen as an input to help reduce uncertainty about how to use climate-related information in investors’ decision-making.
From the interviews, it appears that the practice, approach and method of integrating climate risk considerations into investment decisions is distinctly more advanced among national and multilateral development banks, and that these institutions are further along in applying approaches, methodologies and metrics to help them integrate climate-related financial risks assessment into their operations, even if they have yet to do so universally across all sectors. This may be related to the particular nature of their dual mandate to function as sound financial institutions as well as to support sustainable economic development. All stated that climate risk is a serious development issue for their clients, but also could undermine their own development objectives of economic growth, reducing poverty and boosting prosperity. However, even these institutions face challenges when evaluating climate considerations in isolation, especially in vulnerable areas where different factors might highly drive investment decisions. Case Study 1 below illustrates some of the challenges faced by Development Financial Institutions (DFIs) to isolate climate-risk from other risks commonly assessed by these institutions.

CASE STUDY 1.
Can climate considerations be isolated from other factors in investment decision?

**CAN CLIMATE CONSIDERATIONS BE ISOLATED FROM OTHER FACTORS IN INVESTMENT DECISION? THE CASE OF THE PORT OF NAURU**

**ACTOR TYPE:** DFI  
**REGION:** OCEANIA/PACIFIC  
**DATE:** 2017  
**SECTOR:** TRANSPORT  

<table>
<thead>
<tr>
<th>Core Question - Q1. Is there evidence of investors being reluctant to engage in areas of perceived but unknown climate risk? To what extent is climate a factor in these decisions, vis a vis other factors (such as political risk, uneconomic returns or limited market), and is it possible to consider climate risk in isolation?</th>
</tr>
</thead>
</table>

**CONTEXT**
In 2017, Nauru approached the Green Climate Fund (GCF) with a request to finance a new climate-resistant port. The small island state with a landmass of just 22 km² is vulnerable to sea level rise and extreme weather patterns borne by global warming, such as storm surges and increased wave heights. Waves and swells were already disrupting the port’s operations for a period of days and weeks, and as climate change is likely to increase their size and unpredictability, improvements to the port that could make it operable year-round were urgently needed. Nauru imports 95% of its goods, including food and fuel, via its port; therefore, the port was a cornerstone of Nauru’s vulnerability to climate risk. The new port is also expected to reduce Nauru’s carbon footprint by 30%.

**Figure 13. Nauru project funding sources, USD million**
Source: Green Climate Fund, 2017/Asian Development Bank, 2017

![Graph showing funding sources for the Nauru project](../../images/graph.png)
CASE STUDY 1. (cont.)
Can climate considerations be isolated from other factors in investment decision?

INVESTOR INTERVENTION

The GCF was asked to contribute USD26.9 million, the largest tranche in the USD65.2 million project. The GCF Board was concerned about the size of the investment and the nature of the project.

Below are some of the considerations that played into the decision to finance the port:

Quantifying the impacts of climate change on infrastructure: the project team used an evidence-based approach to determine project feasibility and design, including detailed climate and wave pattern modeling, and navigation simulations. The final project design was selected using an economic rate of return model. However, as climate models have large sensitivity ranges and climate projections are uncertain, the final project model had to be selected using somewhat subjective assumptions.

While the port of Nauru was designed for climate resilience, distinguishing the “green” portion of the economic benefits was difficult to do in an objective way, e.g. in the cost-benefit analysis. The standard environmental analysis as part of the ESG assessment focused on analysing the harm to the immediate port environment rather than long-term environmental benefits.

Considering climate benefits: The climate portion of the project’s benefits was difficult to calculate accurately. Discerning the “green” portion of the economic benefits was difficult to do in an objective way, e.g. in the cost-benefit analysis. Meanwhile, the standard environmental analysis as part of the ESG assessment focused on analysing the harm to the immediate port environment rather than long-term environmental benefits.

The project’s direct impact on climate mitigation lowering CO2 emissions by 535,400 tons over the port’s lifetime was just 15% of the project’s net benefit, with the bulk of the benefits accruing to Nauru’s economy. Per Figure 14, other benefits included efficiency improvements to the port and operational cost savings. This raised a policy dilemma: to what extent is it appropriate for funding earmarked for climate interventions to finance projects with indirect climate impacts and benefits?

Figure 14. Projected benefits of the Port of Nauru (net present value - NPV)
Source: Asian Development Bank, 2017

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port operation savings</td>
<td>25%</td>
</tr>
<tr>
<td>Incremental port call benefits</td>
<td>20%</td>
</tr>
<tr>
<td>Savings from reduced greenhouse gas emissions</td>
<td>15%</td>
</tr>
<tr>
<td>Real call savings</td>
<td>10%</td>
</tr>
<tr>
<td>Pusher large cost savings</td>
<td>5%</td>
</tr>
<tr>
<td>Avoiding use of charter vessels</td>
<td>10%</td>
</tr>
</tbody>
</table>

Evaluating climate considerations separately from other factors: as the direct climate impact of the project was less than the proportion of financing requested from GCF, they had to decide whether financing the project using funds earmarked for climate change was appropriate. Alongside climate impacts, the institution decided to weigh the economic impacts of the project — such as Nauru’s improved connectivity with the outside world or the efficiency of port operations in harsh weather conditions — that would be threatened by climate change if the port were not built. Ultimately, the GCF decided that the project was essential to the climate resilience of Nauru’s economy and society, even if it did not have a large direct climate benefit.

IN SUMMARY

This case highlights many of the data challenges investors face when evaluating climate projects, whether in quantifying the economic benefits of climate resilience or identifying the amount that needs to be spent to ensure resilience in the future. The lack of data and tools that could be used to objectively assess the impact of greening the port was a clear obstacle to generating an accurate risk-return profile for the investment, which complicated GCF’s decision to invest.

In this case, the GCF had to directly confront whether the indirect economic benefits of climate resilience were sufficient justification for the use of public funds earmarked for climate. GCF’s financing decision suggests that climate benefits and costs cannot be considered separately from other salient factors.

SECTORS WHERE INVESTORS BELIEVE CLIMATE-RISK IS MOST RELEVANT

Investor understanding of sectors most affected by climate risks (both physical and transition) is evolving rapidly and is no longer concentrated on energy and industrials. Surveys conducted for this study, as well as other surveys, show that investors and financial firms do understand that climate-related issues are relevant for all sectors and finding from surveys show that although there are some sectors, such as energy, with a high correlation with transition risk concerns, physical risks seems to be to most relevant for agriculture, real state, and water (Morrow Sodali, 2020). However, investors surveyed rank transition risk as the climate risk most likely to impact their investment returns. Figure 15 shows sectors where climate risks are considered most relevant to those surveyed.

FIGURE 15.
Survey results on the relevance of climate-related risks by sector

For which sectors does your organisation consider climate risk most relevant?13

Figure 16 shows how investors surveyed view the importance of different types of climate risk (transition, physical including both acute and chronic) for their returns. Of note, 82% of investors seem concerned that physical risks which are chronic have at least some potential impact on their organisation’s long-term returns, and 90% of investors see transition risk as having the potential to impact returns.

FIGURE 16.
Survey results on the impact of climate-related risks on investment return by risk type

Please rank in order of importance the following risks that typically have the greatest potential impact on your organisation’s investment returns14

1. Background and Introduction
2. Approach and Methodology
3. Summary of this Study’s Findings
4. Detailed Findings by Question and Associated Hypotheses
5. Policy Implications and Recommendations
6. Areas of Further Research
Endnotes

FIGURE 15.
Survey results on the relevance of climate-related risks by sector

For which sectors does your organisation consider climate risk most relevant?13

FIGURE 16.
Survey results on the impact of climate-related risks on investment return by risk type

Please rank in order of importance the following risks that typically have the greatest potential impact on your organisation’s investment returns14

Transition Risk
Chronic Physical Risk
Acute Physical Risk
Liability Risk

<table>
<thead>
<tr>
<th>Risk Type</th>
<th>Most Important</th>
<th>Less Important</th>
<th>Not Applicable</th>
<th>Some Important</th>
<th>Least Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transition Risk</td>
<td>36%</td>
<td>18%</td>
<td>9%</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>Chronic Physical Risk</td>
<td>23%</td>
<td>41%</td>
<td>18%</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>Acute Physical Risk</td>
<td>18%</td>
<td>27%</td>
<td>32%</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>Liability Risk</td>
<td>14%</td>
<td>9%</td>
<td>64%</td>
<td></td>
<td>9%</td>
</tr>
</tbody>
</table>
Investors interviewed and surveyed broadly recognise that climate risk can lead to financial value at risk but have different views on the time horizons for such effects. These views are also different depending on sectors, and in some regard depend on a combination of both (i) investors having the capacity and capability to understand and assess climate risks, and (ii) the ability to price in those risks. Both investor surveys and research have attempted to better understand investor perception on the time frame (e.g. "time horizon") investors believe climate-risk may manifest into significant financial risk; for example, the IMF research on equity valuations suggests that differing perceptions of when climate risk might manifest drive the inaccurate integration of climate risk into asset values and prices. Box 7 provides an overview of recent research showing how climate risks are impacting in real estate, and may provide useful insights for the timing of climate risk manifesting as financial risks for other sectors.

**BOX 7.**
Climate risk can lead to financial value at risk. But when?

Mark Carney’s assertions that climate-risk has the potential to pose systemic risks to the global financial system due to an abrupt re-pricing of assets or a loss of access to long-term capital for some sectors underpins global and local efforts to integrate climate-risk considerations into investment processes of all types of financial actors, private and public. Such a climate "Minsky moment" might occur if a significant number of market participants were to come to believe they have not adequately factored in transition or physical climate risks which could lead to a sudden depreciation of asset values. The question where there is most debate on this issue is the time horizon (Woetzel, J et al., 2020).

However, as climate risks are currently not fully integrated into the decision making of the majority of financial actors, it is difficult to both parse the impact of climate risk on asset values in most asset classes, and to value assets appropriately with respect to their climate risk. While a significant amount of economic research exists on "when" climate risk may become a financial risk for the energy industry, there are other sectors which are experiencing the impacts of climate-risks on asset values and prices which may provide important lessons for "when" climate risk becomes a financial risk. The following summarised recent studies on the impact of real estate values from physical climate risk.

---


Bakken and Barrage design a model of housing prices under heterogeneous expectations of climate risk and estimate it using data from a household survey of climate risk perceptions in Rhode Island. They find that:

- Residents have heterogeneous perceptions of climate risk, which, along with preferences for coastal amenities, drive self-selection into and away from flooding zones.
- Residents with inaccurate climate risk perceptions bid up the value of coastal real estate to a level that is 10% higher than the benchmark that takes into account an accurate picture of flood risk, e.g. damages.

Two Harvard studies consider the relationship between sea level elevation and price appreciation in Miami-Dade County, Florida:


- There is a positive relationship between elevation above sea level and housing prices, as well as evidence of a divergent trend between appreciation of real estate located at a low elevation and that located at higher elevations. The author argues that the privileging of elevated lots will, as sea levels rise, lead to "Climate Gentrification", wherein wealthier residents move further inland from unprotected coasts and displace current residents of poorer, but elevated neighbourhoods.


- Complementing the findings above via a hedonic analysis and further analyses how household risk perceptions interact with climate adaptation measures taken in the area, the author finds that natural green infrastructure adaptation projects, structural elevation, and adapting for storm surges increase nearby real estate prices by 9.7%, 6.6%, and 15.8% respectively.
SOURCES OF CLIMATE-RELATED INFORMATION (BROADLY)
The organisations interviewed or consulted through the survey state they use a mix of information and data, including publicly available information as well as information and analysis from specialised or proprietary firms. Interviewees and those surveyed cited some data sources of climate-related information, as shown in Table 5.

TABLE 5.
Interviewees’ and survey recipients’ sources of climate-related information

<table>
<thead>
<tr>
<th>Sources of Climate-Related Information for Investors</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather and climate data, including government derived data</td>
<td>70%</td>
</tr>
<tr>
<td>ESG reports, including MSCI, Sustainalytics and others</td>
<td>65%</td>
</tr>
<tr>
<td>Voluntary disclosures (e.g. TCFD, but also Global Reporting Initiative (GRI) and CDP(^1))</td>
<td>65%</td>
</tr>
<tr>
<td>Corporate sustainability reports</td>
<td>40%</td>
</tr>
<tr>
<td>CDP research reports</td>
<td>40%</td>
</tr>
<tr>
<td>Insurance information, including information gathered during underwriting processes</td>
<td>70%</td>
</tr>
<tr>
<td>Questionnaires and surveys during due diligence processes</td>
<td>70%</td>
</tr>
</tbody>
</table>

Among the investors surveyed, publicly available information seems to be the most commonly used source for knowledge and data, while climate-related predictive tools appear to currently remain among the least used source of climate-related information. Importantly, Banks rely more on climate-risk information gathered from a variety of sources including information in the public domain, information gathered in the due diligence process and ratings agencies, while institutional investors seem to access the widest range of climate-related information to understand climate-related risks. Almost all interviewees noted a general challenge with using climate data and information for their investment decision making. Many interviewees indicate scarce and/or unreliable information as well as frequent mismatches between primary and secondary data as an impediment to their ability to quantify these risks in ways that are relevant to integrate into investment decision-making. There was broadly held view that data were not standard enough to ensure robust comparability and financial quantification. See Figure 17.

FIGURE 17.
Survey results on sources of climate-related information

**In your organisation, what sources are used to gather climate-related information?**

- Information in public domain: 70% of respondents
- Information gathered through due diligence process: 65% of respondents
- Investor’s climate-related disclosures: 65% of respondents
- Rating agencies: 40% of respondents
- Climate-related information from predictive tools: 40% of respondents
Beyond the sources of information, investors and lenders frequently cited a lack of climate risk data as a barrier to better climate risk evaluation. Although many investors and lenders claim to be incorporating risk evaluations, some stated that there is often no “comprehensive or consistent methodology” in analysis and assessments, and many noted that because they do not have the internal capacity to undertake these assessments, many currently rely heavily on consultants, who often have their own unique process to quantify these risks.

To complicate these issues, investors interviewed noted the diversity in climate-related or ESG-related disclosures (e.g. CDP, GRI, SASB, TCFD) is itself a challenge. See Box 8 and 9 for a discussion on the challenges that some ESG frameworks pose for understanding climate-risks, and further for the differences in the various types of frameworks.

**BOX 8.**
Are ESG ratings useful as a means to understand climate risk?

A growing majority of investors believe that environmental and social issues are ‘very important’, and investors are increasing their integration of ESG factors in investment decision-making through the application of a variety of ESG data, scorecards and other analytical tools. Today, ESG rating tools commonly used by investors to understand ESG risks include: FTSE Russell, MSCI, ISS ESG, RobecoSAM, Refinitiv, State Street’s R-Factor, and Sustainalytics, among others.

But are ESG ratings useful as a means to understand climate risk? In some cases they are, but to understand the full implication of climate change, many of these tools are not comprehensive enough to cover all climate-related financial risks and may dilute information specific to climate risks and opportunities. In general, ESG ratings tools utilise the following approach to deliver an ESG score of a company:

- **Risk identification.** ESG-related risks are identified and assigned to each sector, industry, or company.
- **Materiality.** Ratings are undertaken only on items deemed to pose a material risk. Determination of the materiality usually depends on sector/industry expert analysis.
- **Sector or industry-specific weights.** Each identified risk is weighted depending on the sector, industry, and in some cases, down to specific company or business model. Regional or geographical weights are usually included as well.
- **Scoring.** Each factor is analysed and ranked according to the magnitude and likelihood of its impact on the company’s business value drivers and financial performance over time.

Challenges remain even with ESG rating tools as a source of both ESG information broadly and climate-related information specifically, including:

- **No consistent methodology.** While these ESG ratings and scores are important for investors to differentiate between companies, the wide range of ESG data available and the application of different frameworks (SASB, GRI, TCFD) makes it difficult for investors to meaningfully evaluate and compare companies’ ESG practices and risks, and reduces the value of such disclosures.
- **Weighting among E, S and G can dilute or obscure information about climate risks.** ESG rating providers can have varying approaches, opinions, and weighting for indicators at each stage, resulting in significant variability in the scores and ratings on a particular company. Further, some ratings may be better at capturing an organisation how businesses address climate-related issues (e.g. through governance or strategy), but less able to capture operational data on impacts from climate change, or how organisations might manage those external risks.

On a related note, both research and feedback from interviews and surveys show that ESG considerations are beginning to influence the availability and cost of capital, particularly as larger investors begin to adopt public positions on sustainability. For many of these investors, ESG ratings which are based upon commonly accepted ESG frameworks are becoming an important component of investment decisions for many large investors.

**BOX 9.**

ESG and climate-risk frameworks: Useful for different purposes

Table 6. Examples of reporting frameworks

<table>
<thead>
<tr>
<th>FRAMEWORK</th>
<th>FOCUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SASB</td>
<td>Sustainability Accounting Standards Board (&quot;SASB&quot;) - sector-specific guidance on a broad range of ESG topics</td>
</tr>
<tr>
<td>TCFD</td>
<td>Task Force on Climate-Related Financial Disclosures (&quot;TCFD&quot;) - both general and sector-specific guidance, but only on climate-related topics</td>
</tr>
<tr>
<td>GRI</td>
<td>Global Reporting Initiative (&quot;GRI&quot;) – general guidance, as well as topic-specific (economic, environmental, or social) standards</td>
</tr>
<tr>
<td>CDP</td>
<td>CDP (formerly the Carbon Disclosure Project) – disclosures on environmental topics only, such as climate, forests, and water</td>
</tr>
<tr>
<td>EU Taxonomy</td>
<td>EU Taxonomy - Adopted by the Council of the European Union in April 2020 and sets mandatory EU-wide criteria for classifying sustainable economic activities. Likely to become a reporting framework under EU Taxonomy Regulation and Disclosure Regulation (est. 2021).</td>
</tr>
</tbody>
</table>

Disclosure frameworks for ESG and climate change are important for investors of all types insofar as they help define and classify what counts as environmentally sustainable economic activities, and give issuers and investors a clear understanding as to what can qualify as sustainable or climate finance. They also help investors and others avoid greenwashing and can be important for promoting investment activities that align with a low- and net-zero transition.

An increasing number of institutional investors are calling for companies to provide both ESG and climate-related disclosures. Today, companies are increasingly providing disclosures using a combination of different frameworks to meet internal and external demands. These different reporting frameworks have different purposes, and each standard-maker will have different approaches towards materiality as illustrated in Table 6:

Due to the differences in approach, frameworks vary, have different focuses, and thus are useful for different purposes and stakeholders. For example, SASB and GRI may be more appropriate to ESG-related disclosures, but TCFD and CDP may provide more information on climate-related risks. However, both SASB and TCFD frameworks provide guidance on disclosures on the financial implications of risks they cover (either ESG or climate), and both may be important for certain stakeholders and investors. The EU Taxonomy is an ESG framework with heavy focus on climate and environmentally friendly investments that support the transition to a circular economy, the protection of ecosystems and social safeguards. The Taxonomy regulation will be considered by the European Parliament may be implemented as early as late 2021.

The variety of disclosure frameworks and the lack of standardisation and comparability are possible factors in driving the confusion in understanding climate-related risks for investors, particularly given the greater adoption of ESG disclosure frameworks.

TYPE OF CLIMATE-RELATED INFORMATION FROM CLIENTS/INVESTEES

Increasingly investors are seeking information on both physical and transition risks from their clients/investees, and findings from interviews and surveys suggest that investors are using the TCFD framework to guide their due diligence process. Surveyed investors sought to collect information related to impacts of both physical and transition risk and on the capacity of investees to manage these risks. See Figure 18.

FIGURE 18.
Survey results on climate-related data most commonly gathered for appraisal processes

What kind of climate-related information does your organisation gather in its appraisal process?17

- Information related to impacts from physical changes: 78%
- Information related to the capacity of the company/investee to manage climate risks: 65%
- Information related to impacts from a transition to a low-carbon economy: 57%

CREDIT RATING AGENCIES AS A SOURCE OF CLIMATE-RISK INFORMATION

Among investors, banks, and institutional investors were most aware that CRAs were a key source of climate risk information. Box 10 provides an overview of CRAs as a source of climate-risk information. While CRAs are an important source of climate-risk information for investors, they also require quality and reliable climate information from which to develop their risk analysis. The three major CRAs were interviewed as part of this study, and each noted that they also gather climate-related information from a wide range of sources, including TCFD disclosures as well as public and non-public information. Each recognise that carbon transition and physical risks will have increasing relevance for credit analysis, and as a result, are actively taking steps to develop internal climate-related analytic capabilities to help them better assess and quantify climate-related physical risk and transition risks.

CRAs interviewed recognise that more consistent and comparable climate-related disclosure could impact ratings through the financial channels, particularly insofar as TCFD reporting changed the rating agencies’ understanding of the ability of rated entities’ (e.g., sovereigns or corporates) credit quality under future climate scenarios.
CRAs are considered a key credible source of risk information related to the credit quality of a company or investment. Credit ratings provide investors a snapshot of credit worthiness, and can be forward looking (in some cases several years out) but are not meant to be a recommendation to investors to buy, sell or hold any investment, and are not meant to themselves signal the suitability of an investment.

For CRAs a clear difference should be made between ESG information/data and ESG analysis: they use the former to provide the latter. Investors use credit ratings to help assess risk and compare different issuers risks against their own appetites for risk; Intermediaries – such as investment banks, use credit ratings to benchmark relative credit risk and set pricing for debt products.

CRAs integrate into their assessment a number of factors and are increasingly signalling that they are integrating both ESG and climate-related information as part of their product offerings. Recently, CRAs have been expanding their services to provide ESG products and analytics to investors, and in doing so have been actively incorporating climate risk analyses into the “E” portion of their ESG services. As part of these efforts, several of the major CRAs have taken steps to build out their analytical offerings provided to clients alongside their credit analysis, including:

- FITCH RATINGS ESG Relevance Scores – Launched in 2019, these are observations of the relevance and materiality of ESG issues to credit ratings of individual entities, programs and transactions, rather than an assessment of ESG performance. ESG issues are assessed on a sector-specific basis, across five environmental, five social, and four or five governance general categories. There are almost 100 unique ESG sector templates that assist in identifying sector specific ESG credit issues. Climate-related risks, specifically climate policy risk, is integrated into Fitch’s ESG framework; however, Fitch deems that “Climate regulations have been relevant to credit ratings for only a handful of sectors, with existing policies often lacking financial impact or immediacy.”

- S&P GLOBAL RATINGS ESG Evaluation – Assesses a company’s ESG strategy, including the exposure of an entity’s operations to observable ESG risks and opportunities, and combines the resulting ESG Profile with a Preparedness assessment to obtain a final ESG Score. This ESG Score allows comparison with other entities globally, including sector peers. S&P acquired Trucost in 2016, to build on S&P’s ESG offerings. This was followed by the acquisition of the SAM ESG Ratings and Benchmarking business from RobecoSAM in 2020, which will be incorporated into the ESG Evaluation methodology. Evaluation of a firm’s climate strategy is a part of the RobecoSAM ESG Ratings process, and at the end of 2019, S&P Trucost launched a new physical risk dataset and portfolio analysis to support and inform TCFD reporting for investors and corporates.

- MOODY’S Credit Analyses and Analytics – in an effort to become a global, integrated risk assessment firm, Moody’s Investors Service is integrating ESG into its credit ratings and research, while Moody’s Analytics is providing risk management solutions that include climate change risk modelling, scenarios, and green stress testing. ESG assessments are also available. These suite of services have been facilitated by Moody’s acquisitions of Vigeo Eiris (a global provider of ESG research and services), Four Twenty Seven (a leading provider of climate risk assessments and tools), and Syn Tao Green Finance (a leading service provider in green finance and responsible investment in China). Furthermore, in May 2016, the UN PRI launched the ESG in Credit Risk and Ratings Initiative, which aims to enhance the transparent and systematic integration of ESG factors in credit risk analysis, and brings together investors and CRAs to promote understanding of existing practices for integrating ESG factors into risk analysis, identify gaps in the consideration of ESG factors in credit risk analysis, and find ways to address those gaps. To date, it has been supported by over 160 investors (with more than USD30 trillion in collective assets under management (AUM)) and 23 CRAs globally. Since its launch, the initiative has facilitated multiple dialogues between CRAs and investors from both developed and developing countries and has also provided quarterly updates on the CRAs’ progress in enhancing the transparent and systematic integration of ESG factors in credit risk analysis.

4.2 CAPITAL FLOWS AND CAPITAL REQUIREMENTS

This section provides insights on investors' opinions and experiences on i) how increased disclosures around climate risk would/are affecting investment flows to developing countries, ii) the impacts of climate risk disclosure on capital expenditure (CAPEX) and iii) any unintended consequences for developing countries. This section provides insights gathered on the following questions and hypotheses tested:

- **Q3**: How does greater knowledge, transparency, and disclosure of climate risks affect a) the quantum of capital required (e.g. extra CAPEX to build the project with more resiliency) b) the availability and c) the cost of capital paid by developing countries?

- **Q4**: Is there evidence as to whether the investment has been deterred by the additional CAPEX required to make the activity more resilient or because of the higher risk itself?

- **Q5**: Are investor project modelling assumptions around higher CAPEX costs to increase resiliency accompanied by assumptions of resulting lower maintenance costs for the life of the asset?

- **Q6**: Where climate risks are better understood, is there any evidence of the costs of capital reducing to reflect greater confidence? Are there interventions (e.g. insurance) that can encourage this?

- **Q7**: Does greater transparency and disclosure of climate risks affect existing investment flows to developing countries and/or developed countries?

As noted above (see Approach), most of the core questions tested a series of hypotheses. Below are the hypotheses tested by Q3, Q4, Q5, Q6, and Q7, and are relevant for the findings related to this section, Capital Flows, and Capital Requirements.

<table>
<thead>
<tr>
<th>HYPOTHESIS</th>
<th>FINDINGS /REASONING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H1</strong>: Greater knowledge, transparency, and disclosure of climate risks affect the amount of capital required to address the climate risks perceived.</td>
<td>Interviews showed both (i) distinctions around knowledge, transparency, and disclosure, and (ii) differences in support for this hypothesis among investor type. More research likely needed.</td>
</tr>
<tr>
<td><strong>H2</strong>: Greater knowledge of climate risks shapes the availability of capital for developing countries.</td>
<td>Mixed findings from interviews and responses from surveys.</td>
</tr>
<tr>
<td><strong>H3</strong>: Greater knowledge of climate risks also affects the cost-of-capital for developing countries.</td>
<td>Supported by some evidence from interviews, particularly from rating agencies. Also supported by research (SOAS).</td>
</tr>
</tbody>
</table>

Research is showing that climate risk is beginning to impact the cost of capital paid by developing countries but there is no evidence on its effects on the quantum or availability of capital. Investors interviewed showed low levels of awareness about the research and do not (themselves) currently observe these changes to the cost or availability of their capital for developing countries. Climate risk seems to be affecting sovereign borrowing costs for vulnerable developing countries, and early research may signal benefits (in terms of a reduction of those costs) as a result of a country's investment in resilience. Further, investor views on cost or availability of capital may be driven by the lack of depth/sophistication in their own climate-risk management practices. More research may be needed on both items.
Q4 - Is there evidence as to whether the investment has been deterred by the additional CAPEX required to make the activity more resilient or because of the higher risk itself?

There is no evidence from this study to conclude that investments were deterred because of higher CAPEX for resilience measures. Some investors questioned whether addressing climate risk would be more costly, while for others, this question was not directly relevant to their investment approach.

### TABLE 8
Question 4 and hypotheses tested

<table>
<thead>
<tr>
<th>HYPOTHESIS</th>
<th>FINDINGS / REASONING</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: There is a growing body of evidence that shows investment has been deterred by the additional CAPEX required to make the activity resilient because of higher climate-related risks.</td>
<td>This was only a relevant question for investors that engage in project finance. As a result, the sample size to test this question was smaller than the overall sample. From those, some are more attuned to this potential than others. More research likely needed.</td>
</tr>
</tbody>
</table>

Q5 - Are investor project modelling assumptions around higher CAPEX costs to increase resiliency accompanied by assumptions of resulting lower maintenance costs for the life of the asset?

Few investors actively employ a project modelling approach that incorporates an assumption of higher CAPEX being offset by lower maintenance costs for the life of the asset. Where this approach was relevant (DFIs, infrastructure investors) many are actively developing approaches like a CBA or CAPEX/OPEX offset analysis (e.g. CCRI methodology) to consider the additional capital required to make an investment resilient. However, notably not all investors supported the assumption that ex-ante resilience measures require additional quantum of capital and some felt that this assumption warranted further research.

### TABLE 9
Question 5 and hypotheses tested

<table>
<thead>
<tr>
<th>HYPOTHESIS</th>
<th>FINDINGS / REASONING</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Investors project modelling assumptions around higher CAPEX costs to increase resiliency are accompanied by assumptions of lower maintenance costs for the life of the asset.</td>
<td>This did not seem to be a relevant question for all investors. As a result, the sample size to test this question was smaller than the overall sample. More research likely needed for a more focused set of investors who include CAPEX/OPEX and CBA approaches into their investment appraisal processes.</td>
</tr>
<tr>
<td>H2: All measures to address climate risk in project modelling result in higher CAPEX and lower OPEX/maintenance costs.</td>
<td>The sample size to test this question was smaller than the overall sample. No extensive research found on this subject, although recent studies might be suggesting upfront costs increasing resilience might be compensated by lower maintenance and repair expenditures (See case study 3).</td>
</tr>
</tbody>
</table>
Q6 - Where climate risks are better understood, are costs of capital lower to reflect greater confidence? Are these effects equally felt in the developed and developing world? Are there interventions (e.g. insurance) which can encourage this?

Investors support the hypothesis that better information and disclosure would lead to more accurate risk-adjusted pricing (both positive and negative). Research suggests negative effects of information and disclosure may be felt greater in developing countries if not managed well. Investors were not aware that climate-risk information or disclosure was impacting costs of capital, or that (according to recent research) this was already occurring. Investors did perceive innovative insurance mechanisms to address climate-related risks (e.g. CCRIF, ARC) to be working well and support the expanding the application of those mechanisms.

<table>
<thead>
<tr>
<th>HYPOTHESIS</th>
<th>FINDINGS /REASONING</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Is there evidence of lower cost of capital to reflect better information (i.e. greater confidence and certainty) about climate risk.</td>
<td>Research and literature review provide some initial support that this is true for some types of capital (e.g. sovereign lending). More research likely needed.</td>
</tr>
<tr>
<td>H2: These effects are equally felt in the developed and developing world.</td>
<td>While all investors interviewed actively engage in investing in developing countries, the level to which they do so varied significantly, with some investing in only limited ways, while others investing in developing countries by mandate (DFIs). Research and literature review provide some initial support that this is true. More research likely needed, in particular to determine differences by investor-type.</td>
</tr>
</tbody>
</table>

Q7 - Does greater transparency and disclosure of climate risks affect existing investment flows to developing countries and/or developed countries?

Evidence was mixed whether greater transparency and disclosure is currently affecting existing investment flows to developing or developed countries. All engaged for this study noted that climate-related disclosures today were not entirely useful or usable for climate risk management, and there was no consensus about whether greater disclosure would impact capital flows to developing countries, and many thought such transparency may help flows. 14% of survey respondents cite portfolio reallocation between developing and developed countries as one of the potential consequences when they integrate climate risk into their investment decision processes. More research is needed to further examine the changes in the wider market as compared with investor perception and sentiment.

<table>
<thead>
<tr>
<th>HYPOTHESIS</th>
<th>FINDINGS /REASONING</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Is there growing evidence base that greater transparency and disclosure of climate risks have affected existing investment flows relative to the counterfactual of limited transparency and disclosure.</td>
<td>Only 14% of survey respondents cite portfolio reallocation between developing and developed countries as one of the main consequences (See Figure 21). More research likely needed.</td>
</tr>
</tbody>
</table>
SUMMARY OF FINDINGS: CAPITAL FLOWS AND CAPITAL REQUIREMENTS

Findings related to capital flows, capital requirements, and cost of capital show an interesting distinction between observed changes in the market, and investor perception. Through the literature review and research, markets seem to be beginning to price in climate-related risks, and in particular where such risks are so evident that they cannot be ignored, such as certain sectors exposed to climate-related transition risks (e.g. coal), and certain geographies where evidence of climate-related physical risks from (a perception that) increased storms may result in unsustainable and frequent damage events (e.g. certain island states). Furthermore, the growing body of research from academics, CRAs and the IMF is showing some evidence of a connection between climate risks and the costs of capital paid by developing countries (Buhr, B., et al., 2018; Delghi, A., Feng, A., et al., 2020; Kling, G et al., 2019; Woetzel, J., D. et al. (2020).

However, interviews with investors and surveys show that while awareness and knowledge of climate risks is rising rapidly, they themselves are not yet perceiving or observing a widespread impact on the availability of capital for developing countries, nor has a greater awareness or knowledge of climate risks driven them to price climate-risk into their investments or directly shift capital away from developing countries.

On the question of whether investors were deterred because of higher CAPEX for resilience measures, the findings of this study highlight the diversity of investor approaches to quantify resilience measures. Some investors questioned the underlying assumption that addressing climate risk could be more costly, and for some investors this question was not directly relevant to their investment approach. Having said that, as noted in Section 4.1, investors are accessing a range sources to understand climate-risks.

Finally, on the question of whether greater transparency and disclosure of climate risks affect existing investment flows to developing countries, research supports that this could begin to happen (even if investors more broadly do not perceive these shifts) in relation to sovereign borrowing, and likely to accelerate given the analytical approaches to quantify climate-related financial risks that are being undertaken within CRAs, as well as emerging efforts among regulatory bodies to promote approaches for stress-testing regulated financial institutions and disclosure (Bank of England. n.d.; IOSCO, 2020; NGFS, 2020).

“We are not sure that a climate resilient project will necessarily enjoy from a lower cost of capital, but a non-resilient project should find its cost of capital increasing.”

“Other factors can impact the cost of capital independently from climate risk such as having a detailed risk management plan or broader governance and social issues”

“Physical risk and resilience are context and location specific which makes it harder to mobilise capital.”

Anonymous quotes from interviews
Notwithstanding the absence of observed changes in capital flows and cost of capital, investors do believe that greater transparency and disclosure has the potential to affect investment flows to developing countries, as well as vulnerable communities across developed countries, even if they themselves have not observed enough instances of this yet to confirm that this will occur.

The following provides additional insights into key topics covered under the general heading of Capital Flows and Capital Requirements and includes findings associated with hypotheses tested for Q3, Q4, Q5, Q6, and Q7, and additional insights from research, interviews, and surveys on these issues as they relate to developing countries. This section is organised into the following sub-headings:

- Impacts in the quantum, availability, and cost of capital because of climate risk
- Approaches to project modelling (CAPEX/OPEX offset) and the impact of CAPEX deterring investment
- Views on opportunities to invest in resilience
- Views from credit rating agencies

**IMPACTS IN THE QUANTUM, AVAILABILITY, AND COST OF CAPITAL BECAUSE OF CLIMATE RISK**

Evidence suggests that investors believe that increased climate risk disclosure will lead to changes in the quantum and availability and cost of capital, but not all agree that these changes will be negative; some believe that greater disclosure would facilitate better risk-based pricing mechanisms and ultimately bake-in certain implicit incentives for more robust climate risk management. They are uncertain about when this will happen. However, many interviewees believe that haphazard, inconsistent or unevenly applied mandatory disclosure may have more negative consequences for financial flows and costs-of-capital than might otherwise be the case if everyone were disclosing simultaneously and in similar ways (allowing for differences in industry, sector, organisation, etc.).

Regarding the impact in developing countries, and possibly some more vulnerable and/or highly exposed communities, there is no consensus among investors whether greater climate risk disclosure will ultimately increase or decrease cost of capital. Interviewees recognise that developing countries likely needed particular attention and support for those projects, companies, and countries to have the capacity and tools to assess, quantify and manage climate-related risks in such a way that capital (particularly foreign investment) does not perceive greater overall risk (whether fair or unfair) due to climate change challenges, and thus result in higher cost of capital for those countries.

Climate risk is becoming a core topic of interest for funding recipients (i.e. countries). Regions that are highly vulnerable to climate events are beginning to take action to strengthen their climate risk management skills and capacity to better identify and assess these risks and increase transparency for investors.
APPROACHES TO PROJECT MODELLING (CAPEX/OPEX OFFSET) AND THE IMPACT OF CAPEX DETERRING INVESTMENT

With regard to the questions around (i), higher CAPEX to increase resiliency, (ii) impacts of modelling assumptions of CAPEX and OPEX over the life of the investment (a CBA approach), or (iii) resulting cost-of-capital, literature, and research highlights important movements on this front in the categories of both transition and physical risk. Regarding physical risk, several important findings emerged from the research:

1. CBA or approaches that involve modelling CAPEX or operating costs over the life of investments may not be relevant for all investors due to differences in due diligence and approaches to quantify return on investment. As such the CAPEX and CBA questions were addressed by direct investors in assets (such as infrastructure), including infrastructure investors and development finance institutions,

2. Investor behaviour and decision-making do not always benefit from detailed modelling approaches, or other methods to “quantify” climate risks. Two distinct circumstances of investor-decision making were noted:

   a. In circumstances where investors are making high level, “go/no-go” decisions about an investment around the perceived level of climate risk for a project, they often are not undertaking an in-depth modelling analysis to quantify climate risk, but rather making decisions based on a view that a project falls so far outside an investors’ risk appetite altogether that further analysis is not warranted. In these instances, there is typically no exercise to quantify the impacts on CAPEX for resiliency measures to address climate risks, no cost-benefit analysis (which may illustrate an offset of CAPEX/OPEX over time), and thus no impacts on cost-of-capital/pricing of investments (because investors do not get to the point of pricing debt/investment). Case Study 2 describes the approach Coalition for Climate Resilient Investment (CCRI) is leading to develop a methodology to help investors identify cost-effective investments in resilient infrastructure and price risk accurately.

   b. In circumstances where investors could integrate modelling approaches to assess climate risk and/or resilience measures, including an analysis of CAPEX, CBA or other approaches, many investors (with the exception of DFIs) are challenged by inconsistencies in input data (sources of climate-related information) and methodological approaches (how to integrate climate-related data and information into investment decision-making) and as a result note difficulties in fully appraising climate risk at a level that is useful for decision making. Thus, given the lack of fully integrating into the decision-making process, to pricing it into cost of capital or simply better informing an investment decision to invest (or not) given the climate risk profile of that investment. Case Study 3 illustrates how cost-benefit analysis can support financial modelling of climate-related risks.
CASE STUDY 2.
Emerging approaches to integrate climate risk into investment decision making

EMERGING APPROACHES TO INTEGRATE CLIMATE RISK INTO INVESTMENT DECISION MAKING
THE COALITION FOR CLIMATE RESILIENT INVESTMENT (CCRI)

ACTOR TYPE: PRIVATE SECTOR-LED INITIATIVE
REGION: GLOBAL
DATE: 2019
SECTOR: INFRASTRUCTURE

Core Question - Q5. Are investor project modelling assumptions around higher capex costs to increase resiliency accompanied by assumptions of resulting lower maintenance costs for the life of the asset?

CONTEXT

Launched at the UN General Assembly’s Climate Action Summit (UNCAS) in September 2019, the CCRI is a private sector-led initiative committed to fostering efficient pricing of physical climate risks in investment decision-making. The Coalition aims to define the right balance between investment and risk transfer solutions to support resilient economies and communities worldwide and help investors identify cost-effective investments in resilient infrastructure.

Conceptualised by Willis Towers Watson, the World Economic Forum, the Global Commission on Adaptation (GCA), and the Government of the United Kingdom, the Coalition brings over 50 members, including institutional investors, lending and multilateral institutions, governments and inter-governmental bodies, data providers, insurers, and other coalitions and initiatives, among others, that collectively manage more than USD10 trillion in assets. CCRI is led by Carlos Sanchez, Director of Climate Resilience Investment at Willis Towers Watson.

<table>
<thead>
<tr>
<th>CCRI KEY CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Start date:</strong> September 2019</td>
</tr>
<tr>
<td><strong>Members:</strong> 51 members and $10tn in assets</td>
</tr>
<tr>
<td><strong>Scope:</strong> Physical climate risk in infrastructure</td>
</tr>
<tr>
<td><strong>Outreach:</strong> Global with a focus on vulnerable regions</td>
</tr>
</tbody>
</table>

THE CHALLENGE

According to CCRI, research shows that the world’s biggest companies have valued USD1 trillion in losses from climate impacts over the next five years alone to their businesses. The lack of consistent analytical approaches for assessing both current and future exposure impedes the appropriate integration of physical risks pricing in decision-making processes. Current approaches to assess physical risk in time horizons relevant to investment decision-making provide imperfect information and represent a market failure.

CCRI focuses on infrastructure. An estimated USD9 trillion in infrastructure investment will be needed globally between now and 2030 to achieve global growth expectations. Due to the economic and social benefits that infrastructure represents for economic development, these investments will be crucial in low- and middle-income countries, where approximately 70% of this infrastructure investment will be built.

As climate change impacts grow both in frequency and in magnitude, CCRI recognises the urgency for capital to reach the most vulnerable communities and the risk of capital flight from those regions. On the premise that resilient assets outperform non-resilient assets financially, CCRI envisions that the benefits of well-functioning infrastructure assets and a corresponding improved financial performance will outweigh the extra costs in developing resilient infrastructure.

“Against conventional wisdom, resilient assets are not more expensive assets, but instead more efficient, reliable sources of long-term secure cash flows to investors. Most critically, these assets are certified to fulfil their function of sustaining social and economic activity in the face of growing incidence of climate risks.”

Carlos Sánchez, CCRI’s Director
Emerging approaches to integrate climate risk into investment decision making

However, today there is neither a standardised approach to integrating physical climate risks in the design and structuring of projects nor a clear and common way to quantify resilience benefits in investment appraisal. Hence, it is imperative to develop a methodology to quantify the economic and financial benefits that help incentivise the financial markets to embed resilience upfront.

ACHIEVING THE GOAL

CCRI is developing a methodology to quantify the economic and financial benefits for infrastructure projects. The Coalition will employ a risk-pricing approach with a global scope, on both developed and developing economies. However, its work will be focused on the most vulnerable regions and communities, as it aims to support a virtuous circle of reducing climate-related uncertainty on projects that will face risks associated with these geographies.

CCRI argues that although investing in infrastructure that is resilient may result in extra costs; such extra costs are typically outweighed by the benefits of a well-functioning infrastructure asset and improved financial performance. CCRI aims to deliver solutions to enable investors to identify the compensating benefits of resilient infrastructure and address key challenges in the investment value chain. Key deliverables from CCR include:

1. National decision-making – by facilitating an understanding of the economic and social value at risk associated to physical climate risks
2. Project valuation and investment appraisal – by providing investors with greater predictability of longer-term cash flows
3. Financial innovation – by identifying innovative taxonomies for financial instruments capable of guiding a more efficient allocation of capital.

LOOKING FORWARD

The pandemic has clarified the need for systemic resilience to shocks, emphasising the importance and urgency of the Coalition’s work.

CCRI is the first of its kind in bringing together different industries to develop practical solutions to advance climate change resilience. While previous initiatives have tended to focus on climate change mitigation, CCRI aims to build the economic and financial case for climate-resilient investment and avoid inconsistencies in climate-related input data and decision-making. If successful, this will foster (i) capital mobilisation into resilient infrastructure, (ii) a more resilient financial industry, and (iii) a sustainable development of vulnerable regions and communities.

“COVID also constitutes a unique opportunity to ensure that climate risk is embedded in stimulus plans and decision making more broadly. Our ultimate goal is that, by advancing more efficient investment decision-making practices, we will see lives and economies in developing and developed regions become more resilient.”

John Haley, CCRI’s Chair

Sources: Coalition for Climate Resilient Investment (CCRI), n.d. Concept Note; UNDP Climate Change Adaptation. (n.d.). Coalition for Climate Resilient Investment (CCRI); CCRI. (n.d.) Website
CASE STUDY 3.
Is "building-in" resilience more costly?

IS "BUILDING-IN" RESILIENCE MORE COSTLY?
A COST-BENEFIT ANALYSIS OF RESILIENT INFRASTRUCTURE

Core Question - Q5. Are investor project modelling assumptions around higher capex costs to increase resiliency accompanied by assumptions of resulting lower maintenance costs for the life of the asset?

CONTEXT
Climate change events are expected to exacerbate both in frequency and in magnitude, especially in low-income countries. However, in many disaster-vulnerable countries, there is substantial underinvestment in resilience-building efforts. This is derived in part, from the preconception that building resilience does not make a business case. Recent research is demonstrating that resilience infrastructure in low- and middle-income countries is robust and cost-effective. In fact, the cost of building resilient infrastructure assets in these countries is small compared with total infrastructure needs and increasing resilient measures could result in significant risk reductions in most cases.18

A 2019 World Bank report (Lifelines: The Resilient Infrastructure Opportunity) presents good evidence to suggests that when referring to building resilient infrastructure, the extra costs that may be required at the initial stages to mitigate climate-related impacts could be offset by lower maintenance and repair costs in the long-term.

IMPACT ON THE LIFE-CYCLE COSTS OF THE ASSETS
More resilient systems would reduce life-cycle costs; in fact, the additional CAPEX incurred upfront to create resilient structures could be offset by lower maintenance costs, but moreover by repair costs should climate events manifest. According to the World Bank, some resilience-building interventions and maintenance improvement can even lower the cost of assets. In fact, due to technological innovation, some low-cost technologies perform better than other traditional approaches; therefore, advanced materials and methods are making infrastructure both less expensive and more climate-resilient. Below are two examples that illustrate this premise:

Energy System in Bangladesh
In 2017, the World Bank conducted an assessment of the impact of climate risks on the planned energy system expansion in Bangladesh. The analysis determined that accounting for climate change in the design increases capital requirements by USD560 million for additional flood protection but could save up to USD1.6 billion.

Road Maintenance in Island States and Organization for Economic Co-operation and Development (OECD) Countries
In 2017, the World Bank also found that improved road maintenance could reduce asset losses by 12% and 18% in Belize and Tonga, respectively. A similar analysis of member countries of the OECD performed in 2019 suggested that every additional USD1 spent on road maintenance could save on average USD1.50 in new investments, making better maintenance a very cost-effective option.

IMPACT ON RETURNS ON INVESTMENTS WHEN BUILDING RESILIENCE
An analysis performed the World Bank as part of the 2019 study explored the benefit-cost ratio in infrastructure investment in low- and middle-income countries. The study was conducted over 3,000 scenarios and combined different variables, including i) the cost of the technical options to increase resilience, ii) the current and future exposure of infrastructure assets to natural hazards, iii) the current and future role of these hazards in infrastructure disruptions, and iv) the full social costs to firms and households. Results in terms of cost-benefit and NPV suggests that increasing infrastructure resilient to natural hazards is a very robust investment case. Table 13, depicts some of the main findings:

Table 13. Findings from 2019 World Bank analysis

<table>
<thead>
<tr>
<th>COST-BENEFIT RATIO</th>
<th>MEDIAN COST, BENEFIT RATIO</th>
<th>NET PRESENT VALUE</th>
<th>MEDIAN COST OF DELAYING RESILIENT INFRASTRUCTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher than 1 in 96% of scenarios</td>
<td>Higher than 2 in 77% of scenarios</td>
<td>Higher than USD2 trillion in 75% of the scenarios</td>
<td>USD1 trillion to 2030; it was costly to delay climate action from 2020 to 2030 in 95% of the scenarios</td>
</tr>
<tr>
<td>Higher than 6 in 25% of scenarios</td>
<td>4 with climate change considerations</td>
<td>Higher than USD4 trillion in 10% of the scenarios</td>
<td></td>
</tr>
</tbody>
</table>
Notably, almost all the development finance institutions interviewed and surveyed for the study stated that they are actively developing approaches to assess, quantify climate risks (See Box 11) and further are actively structuring financing solutions for investments which may require additional CAPEX to make an investment resilient to future climate change. It should be noted that not all investors supported the assumption that ex-ante resilience measures would require additional CAPEX and some felt that this assumption warranted further research.

**CASE STUDY 3. (cont.)**

Is "building-in" resilience more costly?

**BEING STRATEGIC**

Although increasing climate resilience brings social and financial benefits, in some cases the costs of making assets more resilient can be significant, which makes it important to target strengthening infrastructure to areas where exposure to natural disasters is high. According to the World Bank, the cost of making assets more resilient is incremental and depends on the hazard and the type of asset. The study concluded that for example, increasing the flood resilience of a road through drainage pipes or trenches requires a small percentage of the road’s construction cost, while increasing the flood resilience of a railway by elevating might requires 50% of its costs.

**IN SUMMARY**

The uncertainty pertaining to input data and methodological approaches makes estimating the real cost-benefit from increasing climate resilience of infrastructure assets a challenge which in turn makes it difficult to appraise climate risk at a level that is useful for decision making. Quantitative results from recent studies are suggesting that resilient infrastructure seems to be a robust and attractive investment from a cost-benefit and return on investment analysis. It is likely to be cost-effective, reduce the life-cycle costs of assets, presents a high likelihood of generating very large benefits, and even in the worst-case scenarios might not generate massive losses. Overall, this might be signaling that "building-in" resilience is perhaps not more costly.
Multilateral Development Banks (MDBs) have recently begun to incorporate climate risk assessments and management of climate risk in their investment decision cycles for both sovereign and private sector investments. Most of the approaches MDBs employ include a combination of both qualitative and quantitative assessment, as well as a scoring system (in some cases aligned with ESG scoring methods, e.g. high risk, medium risk, and low risk) which drive the depth and specificity of the climate risk assessment. Such assessments help MDBs understand the full range of risks present in the project and can facilitate additional MDB support including technical assistance and/or additional funding to integrate resilience measures as warranted. No MDB currently integrates such assessment into pricing approaches, and it is unclear whether and how MDBs are integrating these approaches into portfolio management.

European Bank for Reconstruction and Development (EBRD): has established a Climate Risk Management Framework in line with the Climate Bond Initiative's Climate Resilience Principles published in September 2019. These CRPP criteria enable assessment of alignment of activities with a climate resilient economy, and consist of three main steps:

1. Set out the climate vulnerability context of the project - There must be a clear context of climate vulnerability – good practice involves using existing authoritative analyses or reports such as academic journals, communications and/or reports from the UNFCCC, IPCC, or country NDCs. These sources may be combined with climate change modelling and projections, and any uncertainties should be openly laid out. The timescale of the project climate impacts should match the intended lifespan of the project.

2. Make an explicit statement of intent to address climate vulnerability - The project should have the explicit intention to address the vulnerabilities identified in part 1. The rationale for each adaptation-related element should have a clear link to each of the vulnerabilities previously identified.

3. Articulate a clear and direct link between the climate vulnerability context and the specific project activities - Adaptation finance in EBRD's 2016 Green Economy Transition approach is aligned with the overall MDB climate finance tracking methodology, and is thus based on finance allocated specifically for activities that address a project's identified climate vulnerabilities.

As climate risks result in physical impacts, the EBRD regards climate resilience responses also in physical terms. The EBRD has also noted that with the clear definition of the climate risks and vulnerabilities for each project, ongoing monitoring is required to maintain the resilience benefits.

Other approaches followed by selected MDBs include:

Asian Development Bank (ADB): In 2014 the bank, integrated Climate Risk Management Framework (CRMF) in line with the Climate Bond Initiative’s Climate Resilience Project Process (CRPP) in line with the Climate Bond Initiative’s Climate Resilience Principles published in September 2019. These CRPP criteria enable assessment of alignment of activities with a climate resilient economy, and consist of three main steps:

1. Set out the climate vulnerability context of the project - There must be a clear context of climate vulnerability – good practice involves using existing authoritative analyses or reports such as academic journals, communications and/or reports from the UNFCCC, IPCC, or country NDCs. These sources may be combined with climate change modelling and projections, and any uncertainties should be openly laid out. The timescale of the project climate impacts should match the intended lifespan of the project.

2. Make an explicit statement of intent to address climate vulnerability - The project should have the explicit intention to address the vulnerabilities identified in part 1. The rationale for each adaptation-related element should have a clear link to each of the vulnerabilities previously identified.

3. Articulate a clear and direct link between the climate vulnerability context and the specific project activities - Adaptation finance in EBRD's 2016 Green Economy Transition approach is aligned with the overall MDB climate finance tracking methodology, and is thus based on finance allocated specifically for activities that address a project's identified climate vulnerabilities.

As climate risks result in physical impacts, the EBRD regards climate resilience responses also in physical terms. The EBRD has also noted that with the clear definition of the climate risks and vulnerabilities for each project, ongoing monitoring is required to maintain the resilience benefits.

Other approaches followed by selected MDBs include:

Asian Development Bank (ADB): In 2014 the bank, integrated Climate Risk Management Framework throughout Operations. Projects financed by the ADB’s sovereign guarantee loans (SGL) operations must be accompanied by a risk management and Risk Assessment Plan (RAMP), which also includes AWARE, an online climate-risk screening tool for projects. Adaptation options for projects deemed to have medium to high climate risk are assessed on both technical feasibility and economic viability. For complex investment, the climate risk assessment will also be accompanied by additional data-set guidance for interpretation and use, as well as dedicated high-level scientific support.

African Development Bank (AfDB): AfDB uses Climate Safeguards System (CSS) and Climate Risk Management and Adaptation (CRMA) strategy since 2009 to reduce vulnerabilities and strengthen projects with climate considerations. AfDB’s Climate Screening Manual/Tool involves the use of scorecards to classify projects, with the key aims to climate-proof investments, support legal and regulatory reforms as well as enhance capacity in the specific area of climate risk assessments to build climate resilient pipelines.

InterAmerican Development Bank (IDB): In line with the disaster and climate change risk assessment approach of other MDBs, in 2017 the IDB developed the Disaster and Climate Change Risk Assessment Methodology (DCCRAM). The DCCRAM encourages the consistent application of the IDB’s Disaster Risk Management Policy (DRMP) and provides guidance to develop disaster and climate change risk assessments for projects. Based on their location and a criticality assessment, all IDB Sovereign Guarantee Loan Operations (SGLO) projects are screened for a set of eleven potential climate-related hazards that enables the IDB to evaluate the materiality of these hazards for the project’s finances. The DCCRAM includes a screening, qualitative and quantitative stages.

A small number of interviewee investors noted that climate risks are already affecting investment decisions, but the drivers were not related to additional CAPEX deterring investment – most investors simply cited higher climate risk as the deterring reason. On the other hand, DFIs did recognise and support efforts to model (and thereby quantify) the CAPEX/OPEX offset for building-in resilience measures, and generally believed that extra costs that may be required at the initial stages to mitigate climate-related impacts would be offset by lower maintenance costs in the long-term.

**VIEWS ON OPPORTUNITIES TO INVEST IN RESILIENCE**

While the primary focus of the study centered around current views around the impact of climate risks on investor behaviour, the topic of opportunities to invest in resilience was touched upon by many investors engaged for this study. In general, those interviewed had a high level of awareness about climate change but struggled to see the investment opportunities at a scale that would develop as a result of a greater understanding or disclosure of climate-related risks. Many noted that they were keen to expand their pipeline of climate-resilient investments, but where sought greater clarity on the definitions and metrics for what would count as resilient, notwithstanding several recent taxonomies which provide guidelines on climate-resilient opportunities (e.g. EU Taxonomy, ASAP). Several noted that investing in resilience in developing countries may require a greater involvement by public balance sheets and development banks than might otherwise be needed in other markets. That said, many investors were aware of emerging financial instruments that promote or incentivise resilience, such as resilience bonds and green loans. Box 12 outlines several examples of these instruments.

Anonymous quotes from interviews

"A system-wide approach to resilient infrastructure investment hasn’t been developed yet, because there are often many different owners"  

"There are definitely opportunities, but they are mostly relatively small-scale, or they have a different risk-return profile and require partnerships with DFIs"  

"We are looking to define a new climate adaptation asset class. But before investing in resilience in developing countries, you have to first prove the resilient/resilience model in an OECD country, and it is challenging to find those opportunities."

"To build resilient infrastructure, you need a revenue line to pay for it," and "finding the revenue line is the biggest obstacle faced right now. The most pressing need is to find ways to organise revenue streams (which could come through policy) that pay for resilience investments."

Anonymous quotes from interviews
There are growing opportunities for investors to align with climate solutions including for adaptation and resilience, and an emerging number of innovative financial products are beginning to integrate measures that incentivise borrowers and investees to achieve specific sustainable and resilient goals. Resilience bonds, sustainability-linked loans and green bonds are examples of instruments that reduce the cost of capital for borrowers wishing to improve their climate resilience. Below is a description of these instruments and some examples of how they integrate incentives for resilience through pricing or other structuring mechanisms.

**Resilience bonds:** Resilience bonds are an emerging instrument that provides lower-cost capital earmarked for projects that increase resilience to climate change. Resilience bonds could also include a coupon reduction mechanism that would trigger after the bond issuer completes a resilience project, to reflect the resultant lower climate risk.

In 2019, EBRD issued the world’s first climate resilience bond. The USD700 million for a 5-year term, at a 1.625% coupon, was issued followed the release of the Climate Bonds Initiative’s (CBI) Climate Resilience Principles, which govern the data collection, analysis and monitoring that underpin project design. It was purchased by 40 investors from 15 countries, with the majority of interest coming from asset managers and central banks. The bond provides triple-A rated capital to developing countries that invest in climate resilience. Its proceeds are earmarked for the Climate Resistance Project Portfolio (CRPP), which contains projects in the infrastructure, business and operations, agriculture and ecological systems sectors. The CRPP has strict exclusion and inclusion conditions for projects that pertain to their environmental impact and adaptation focus, and the portfolio is monitored by the EBRD to ensure that climate benefits are maintained. Some of the largest total CRPP commitments are in countries such as Azerbaijan and Bosnia and Herzegovina, which benefit not only from the cheap loan capital but from the incentive it provides to invest in climate resilience.

**Sustainability-linked loans (SLLs):** SLLs are credit instruments where the cost of capital according to the borrower’s performance against ESG metrics. Globally, the volume of sustainability-linked loans grew by 178% between 2018 and 2019 (at USD48.1 billion and USD135.4 billion respectively). SLLs links the borrower’s interest rate to the achievement of predetermined sustainability performance objectives, often tied to ESG frameworks, metrics and scores, thus incentivising sustainable improvements over time. Unlike most other green finance instruments, SLLs’ proceeds can be used a general corporate debt, and unlike a green loan, is not entirely defined by the use of its proceeds.

In 2018, Danone created a 5-year revolving credit facility for EUR2 billion at EURIBOR plus margin with BNP Paribas. The interest premium could be discounted based on achievements in three targets: reducing gas emissions, developing nutrition education programs, and deploying a program for a sustainable dairy upstream sector. Danone’s performance would be evaluated against two sustainability metrics: ESG scores and Corporate Certification. Two independent evaluators, Sustainalytics and Vigeo-Eiris, would perform the ESG evaluations.

**Green Loans:** The proceeds of a green loan can only be used to finance or refinance a “green” project. Green loans are governed by the Green Loan Principles, which set out 10 categories of applicable projects, from renewable energy to pollution prevention. The Principles likewise set out criteria for selection and evaluation of projects, the management of funds and reporting standards.

As Vietnam’s power demand is projected to increase by 8% over this decade, modernising the country’s energy sector is a government priority. In this context, multiple Vietnamese banks – such as HSBC Vietnam and HDBank – have created green consumer facilities for SMEs, utility companies or households wishing to convert to solar power. For instance, HSBC provides a consumer green loan facility wherein SMEs and utilities who will install solar power systems in factories and warehouses can access loans that cover up to 70% of project costs, as well as preferential lending rates and flexible repayment conditions.

Investors interviewed and surveyed noted that they were seeing internal organisational changes as a result of greater awareness of climate-related issues, and pressures around TCFD disclosures. More than 70% noted changes in how they were communicating with external stakeholders on issues related to climate change, and only 53% noted that increased awareness about climate change as an issue has resulted in impacts on their investment decisions. See Figure 19.

**FIGURE 19.**
Survey results on the main changes in investors' processes from climate risk disclosure

**In what areas is your organisation changing as a result of climate risk disclosure?**

<table>
<thead>
<tr>
<th>Area</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disclosure and/or communication with external audiences</td>
<td>74%</td>
</tr>
<tr>
<td>Changes in risk management practices</td>
<td>68%</td>
</tr>
<tr>
<td>Governance and/or business strategy</td>
<td>53%</td>
</tr>
<tr>
<td>Investment decisions</td>
<td>53%</td>
</tr>
<tr>
<td>We have not yet changes, but we expect to in the future</td>
<td>5%</td>
</tr>
<tr>
<td>Other</td>
<td>5%</td>
</tr>
</tbody>
</table>

Although investors did not have consensus on whether climate change alone could or would drive capital reallocation or flight per se, 87% of surveyed respondents believe greater disclosure of climate risks and opportunities has or will impact investments in these regions. However, when asked about the main consequences of integrating climate risk into investment decision processes, respondents do not cite portfolio reallocation between developing and developed countries as one of the main changes. Further, a number of those interviewed noted that isolating climate risks from other risks in developing countries – such as political risk, regulatory risk or market risk was difficult at this stage, and thus difficult to attribute any shifts in flows or cost of capital solely to climate risk. See Figures 20 and 21.

**FIGURE 20.**
Survey results on the main impact of climate risk disclosure on has impacted or will impact investments in developing countries

**Does your organisation believe greater disclosure of climate risks and opportunities has impacted or will impact investments in developing countries?**

<table>
<thead>
<tr>
<th>Type</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banks</td>
<td>100%</td>
</tr>
<tr>
<td>Institutional Investors</td>
<td>100%</td>
</tr>
<tr>
<td>Infrastructure Investors</td>
<td>50%</td>
</tr>
<tr>
<td>Private Equity Funds</td>
<td>100%</td>
</tr>
<tr>
<td>Other</td>
<td>50%</td>
</tr>
</tbody>
</table>

The chart shows the percentage of respondents who believe that greater disclosure of climate risks and opportunities has or will impact investments in developing countries.
As mentioned previously, investors are increasingly aware that climate-related risks may have financial implications, but their knowledge base is shaped by events so significant that they are hard to ignore, such as financial impacts and losses from extreme weather events (physical risk), and in the case of coal, the financial implications of stranded assets (transition risk). In the case of coal, the transition risks are driven not only by regulatory uncertainty but also by some reputational concerns by investors. Case study 4 illustrates how investors' behavior is shifting as the transition risks associated with investments in coal.

**FIGURE 21.**
Survey results on the consequences investors have experienced from integrating climate risk into their investment decision processes

<table>
<thead>
<tr>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in request for climate information</td>
</tr>
<tr>
<td>Impacts to internal decisions</td>
</tr>
<tr>
<td>More potential opportunities for increased returns</td>
</tr>
<tr>
<td>Changing portfolio in developing and developed markets</td>
</tr>
<tr>
<td>Our organisation has not integrated climate risk</td>
</tr>
</tbody>
</table>

As mentioned previously, investors are increasingly aware that climate-related risks may have financial implications, but their knowledge base is shaped by events so significant that they are hard to ignore, such as financial impacts and losses from extreme weather events (physical risk), and in the case of coal, the financial implications of stranded assets (transition risk). In the case of coal, the transition risks are driven not only by regulatory uncertainty but also by some reputational concerns by investors. Case study 4 illustrates how investors' behavior is shifting as the transition risks associated with investments in coal.
CASE STUDY 4.
Re-evaluation of investments and financial sector participation

### Re-evaluation of Investments and Financial Sector Participation
**Coal Mines in Australia**

**Actor Type:** Asset Manager and Insurance Underwriter  
**Region:** Australia/Pacific  
**Date:** 2020  
**Sector:** Energy/Minning

**Core Questions - Q1 and Q7:** Is there evidence of investors being reluctant to engage in areas of perceived but unknown climate risk? Does greater transparency and disclosure of climate risks affect existing investment flows to developing countries and/or developed countries?

#### A Change in Financial Actors’ Behaviour
Peabody Energy, a U.S. company involved in the production and distribution of coal, has been cited as an early signal of the financial impacts of exposure to climate risks associated with the transition to a low carbon economy. Following concerns over predicted coal prices coupled with the high fixed cost of servicing more than USD10.1 billion of debt, both credit ratings agencies and equity sell-side analysts downgraded Peabody in 2014. By 2016, Peabody’s share price collapsed, the company fell out of the S&P 500 index, filed for chapter 11 bankruptcy protection and ceased to be publicly traded.

Although Peabody’s bankruptcy was caused both by the increase in supply of natural gas as well as longer-term uncertainty about coal demand, this trend in the coal industry continues and has become more pronounced because of energy demand and price uncertainty due to the COVID-19 pandemic. Recently, Peabody Energy declared an impairment of USD1.42 billion to the value of North Antelope Rochelle mine, the largest coal mine in the United States, accounting for 12% of U.S. coal production in 2019.

The EU’s shift away from coal use in electricity generation has rapidly stranded coal assets and led to massive decline in coal investment. Australia, the world’s largest coal exporter and one of the three largest fossil fuel exporters, remains exposed.

“Australia can continue ‘investing’ in yet more coal … capacity and can build more stranded assets … alternatively, Australia could pivot towards the low-emissions industries of the future,” Dr Alan Finkel, Australia’s Chief Scientist D

Considering the outlook for coal prices and demand due to a low carbon transition and resulting downward valuations of coal assets and contractions in investment in exploration, the industry points to potential financial impacts of transition risk on financial institutions and investor decisions.

Transition risk impairs the market value of coal deposits and the assets associated with its production and use. Compounding and interrelated the financial impacts of these transition risks, insurance companies are withdrawing from underwriting these projects. Both the capital flight and inability to insure projects also have impacts on the economic structure of Australia as coal accounts for 25% of the country’s resource exports over the decade to 2019 and 3.5% of GDP (2018).

#### The Asset Manager Angle
Blackrock’s announcement in January 2020 to divest from thermal coal adversely impacted investment flows to coal companies, leading many to halt projects in Australia. The announcement to divest from debt and equity in mining firms materially exposed to thermal coal (Defined as >25% of revenue) had immediate effects on Australian coal companies including Whitehaven Coal, Yancoal Australia, New Hope Corporation, Australian Pacific Coal, TerraCom, and Wollongong Coal as well as numerous other Australian exploration projects of non-Australian companies.

An asset management firm active in investment worldwide cited the example of a mining company specialising in developing and excavating coal that was part of one of their managed investment funds. The coal mining company recently made significant investments, roughly AUD7 million in the exploration of a new coal mine in Australia. Further exploration will be required as well as investment in the mine operations once the expected coal deposits are confirmed. The fund’s portfolio manager expressed reservations about the mining company’s continued investment in this project due to the high potential that the value of the coal deposit would be significantly lower than expected.

Due to climate risk associated with the transition to a low carbon economy, the portfolio manager foresees that the value of mine and the coal it contains will not justify the investment needed by the time it comes online. The estimated financial impairment associated with transition risk is, by this portfolio manager’s estimate, too great to justify further investment in exploration. As a result, the portfolio manager has advised the company to abandon this particular project or they will reconsider the fund’s holdings of this company’s common stock. The reconsideration of this investment is currently in process within the asset management group.
Other examples also illustrate deterrence from private financial actors in coal-related projects in Australia. Of particular note is the Adani Carmichael coal mine and rail project in Queensland. Carmichael has come under pressure due to questions about its financial viability, government subsidies, and environmental impact, including the emissions from the coal that would be mined. Over two dozen international financial firms have ruled out financing. In June 2020, global insurers AXA XL, Liberty Mutual, and HDI, who previously provided insurance for Adani’s Carmichael mine project, announced they will no longer underwrite cover policies for this construction.

The insurers have cited different reasons for this decision, ranging from changes of internal policies on coal, their support of a fully decarbonised economy, and the recognition of the financial risk (i.e. transition risks) of climate change. Moreover, an overarching rationale seems to involve the heightened reputational risk associated with large fossil-related projects, such as Carmichael. The insurers declared their intent to embed these considerations into their decision-making processes through their responsible investment and risk management policies.

Investors’ and insurers’ incorporation of the transition climate risks associated with Carmichael is more likely to affect this investment than ESG risks. While Adani Power scores highly (94th percentile) on CSR/ESG metrics and is not “affected by coal exclusion criteria from some large, global investors,” because many exclusion lists are based on coal production (done by affiliated companies in the Adani Group), not burning (the role of Adani Power). Adani Australia, a subsidiary, could produce (extract) the coal without affecting Adani Power’s ESG rating. Viewing this investment through an ESG lens may miss the emissions picture as these could be transferred to a separate subsidiary under the Adani Group. However, the value impairment of the coal deposit would likely expose Carmichael as an unattractive investment due to the climate transition risks associated with the project.

Investors interviewed noted that insurance is an important risk transfer mechanism for investors to manage climate risks by transferring risks (for a limited period of time, and for a cost). Some suggested that already existing insurance-based mechanisms such as the CCRIF be expanded, although several recognized the limits of insurance in fully addressing climate risks. Both research and interviewees reinforced the importance of insurance particularly as it helps strengthen financial resilience, enables economic diversification and when such mechanisms exist (at the sovereign, or among consumers) allows public finance to more efficiently and quickly address post-disaster reconstruction, and therefor is an important contributing factor for a developing country's overall resilience to climate risks. Box 13 discusses ongoing efforts by the Insurance Development Forum (IDF) to address climate change and resilience.

**BOX 13.** Insurance Development Forum – Building frameworks for insuring climate resilience

The Insurance Development Forum (IDF) is a public-private partnership involving over 200 experts and practitioners from industry, government, international organisations, Non-Governmental Organisation (NGOs), and academia. First announced at the COP21 Paris Climate summit in 2015, the IDF supports the critical role that insurance plays in building natural disaster resilience and in helping meet the UN's 2030 Sustainable Development Goals (SDGs). Since 2015, the IDF has begun to optimise and extend the use of insurance and its related risk management capabilities to build greater resilience and protection for people, communities, businesses, and public institutions that are vulnerable to disasters and their associated economic shocks.

The IDF has continued to convene thought leadership on this important topic. In July 2020, the IDF convened a roundtable on 'Insuring Systemic Resilience: Mobilising Public-Private Insurance Action to Deliver Pandemic and Climate Resilience', where public and private sector leaders and experts exchanged views on the intersection of climate risk, pandemic risk, financial resilience, and the role of resilience. Four key insights stood out in terms of collective actions needed for resilience:

- **Resilience and financing gaps extend beyond debt** – Small island states struggle to cope with COVID-19, economic, and climate impacts simultaneously. There is an urgent need to address the global development financing gap for vulnerable countries, especially financing mechanisms that go beyond just loans.
- **Insurers have to be part of the solution** – Compared to the financial sector, the insurance industry brings a unique combination of large balance sheets, deep risk management expertise, and quantified long-term perspectives on risk to the table. These activities can be applied to support the financial resilience of households, communities, cities, organisations, and governments, to name a few.
- **Need for public-private action to drive scale and innovation** – Collaboration between private and public actors offers a channel through which governments can be better informed and carefully consider the risk financing tools and options available to them.
- **Collective political will is needed to spark action** – Political will and leadership will be central in tackle COVID-19, the climate crises, and the economic fallout.

Recognising the exposure and vulnerability of some regions to climate change, the IDF is currently partnering with initiatives to help countries to manage these potential impacts. For instance, it is an associated partner of the CCRIF. Together, both parties are working to eliminate “wipe out risks” for constrained small island states that pre-COVID-19 were already struggling to address climate change while contending with high debt levels.

VIEWS FROM CREDIT RATING AGENCIES

Among credit ratings interviewed, there seems to be consensus that entities in developing countries are behind developed markets in terms of climate risk assessment, information, and disclosure. Additional capacity and skills would be needed in these markets to see responsive changes to the projected impacts of in the cost of capital and investment flows to and for these countries. However, none of the credit ratings agencies felt that the potential for additional capital expenditure (CAPEX) to address climate risks and/or build-in resilience represented a key driver in this analysis or the ratings themselves.

4.3 COVID-19 AND CLIMATE RISK

This section provides current insights on the impact of COVID-19 on investors’ views about climate risk, and specifically whether the experience of COVID-19 has changed how climate risk is perceived, and thus may provide insights into how it may be managed in the future. This section provides insights gathered on the following question:

Q9 - How has the experience with COVID-19 changed/not changed how you assess risk and how will this carry into your thinking on climate risk?

Evidence was mixed whether COVID-19 impacted investor thinking about climate risk. Some interviewees said they view the pandemic as having accelerated a closer focus on sustainability and responsibility. 63% of survey respondents declared that their experiences with COVID-19 have not impacted their thinking on climate risk.

Throughout interviews and surveys, investors expressed a range of views on the impacts of COVID-19 and climate risk. In general, investors perceive linkages between COVID-19 and climate change in that the two crises represent threats to human well-being as well as economic activity, but their views varied as to immediate lessons that may be drawn.

Some investors see linkages between the economic impacts of the pandemic in the near-term and risks related to climate change over the longer term, though others interviewed saw no direct link between COVID-19 and climate risk. While a minority of investors held this position, investors seemed comfortable speaking about climate risks without reference to COVID-19 unless prompted.

While some investors said they view the pandemic as having accelerated a closer focus on sustainability and responsibility, a majority (63%) of survey respondents declare that their experiences with COVID-19 have not impacted their thinking on climate risk. See Figure 22.
Investors recognise the potential emissions benefits that COVID-19 provides due to reduced fossil fuel-related activity (e.g., transportation, air travel) may be short-lived following eventual economic recovery. The pandemic has highlighted the need for and benefits of investment in economic and societal resilience, especially in how COVID-19 has exposed the vulnerability of particular sectors and segments of underserved populations and weaknesses in governance and international cooperation.

Investors see COVID-19 stimulus spending as a good opportunity to address imminent climate risks, e.g. through investment in a green recovery that emphasises investment in low carbon, climate-resilient infrastructure, and other sectors of the economy which hold the promise of long-term job creation. The pandemic has had an impact on investors' views of climate risk, and several governments and financial policymakers have signalled the increased importance of the sustainable finance agenda in helping to accelerate a post-COVID-19 recovery.

CRAs are also examining the impact of COVID-19, and the post-COVID-19 policy response in the context of sustainability, climate change, and especially transition risks. Box 14 illustrates some of the main views of CRAs.
The follow provides examples of recent analysis of CRA on connection between the Coronavirus pandemic and climate risk:

**MOODY’S - COVID effects likely to accelerate the energy transition**
- The economic downturn associated with COVID-19 has combined with existing behavioural shifts and decarbonisation trends to increase the challenge of forecasting oil demand. Due to these existing demand trends, slow economic recovery will cause oil demand to take a long time, if ever, to recover to 2019.
- Power markets show a preference for cleaner generation as power demand falls. The uncertainty in the demand forecasts, and thus future oil price, has undermined the investment case for new exploration for fossil fuels. Renewables make up the majority of recent capacity additions, which continue to displace thermal generation, especially with lower power demand.
- In addition, many countries, including Germany, France, the UK, and Canada have added low carbon conditions to COVID-19 related economic stimulus which will further strengthen these existing trends away from carbon-intensive energy production.

**Coronavirus pandemic will sharpen focus on ESG risks, with increased relevance to credit**
- The pandemic has highlighted variations in institutional frameworks and collective action at state, national and international levels to prepare for global risks with potential for high impact. Recent experience with COVID-19 may thus result in a greater governmental, corporate and investor focus being placed on institutional preparedness for other identified global risks, including climate change and other environmental issues.
- Higher government interest in macro-risks like climate change adds to behaviour changes already underway and have likely led to an accelerated tipping point for transition risk, increasing the credit risk for companies in the most carbon-intensive industries.
- Shareholders are most often cited as a key driver for corporate sustainability efforts. The pandemic may accelerate a shift at companies away from the perspective that shareholders are their leading constituency to a broader view of multiple stakeholders, including clients, employees and their communities.

**S&P GLOBAL RATINGS - Stepping Up to A Sustainable Future Post COVID-19**
- Many governments are using economic stimulus for sustainable growth objectives and for accelerating the transition to a low-carbon economy.
- Companies are also including a decoupling of growth and their emissions. The drop off of global trade due to the pandemic led to deep cuts in transportation emissions; many of these cuts are likely to remain as companies evaluate their supply chains for business continuity as well as relocate their production bases to reduce disruption risks.
- Emissions from commuting and business travel also experienced similar drops due to telework and travel cancellations; many of these effects are also likely to continue post-pandemic. Steep drops (e.g. a decrease in motor vehicle journeys of 60% in the UK between February and April, and 8.2% y-o-y decline in petrol sales in Washington State in March) are temporary extremes, however longer-term behavioural changes are likely. A 3-day work-from-home policy in the professional services sector would align emissions from passenger transport over the next 5 years.

**FITCH RATINGS - Climate risk and the Coronavirus Pandemic**
- Renewable energy generators may have some advantages over other power sources. Low or negative interest rates could support new, capital-intensive capacity buildouts although new investment is likely to fall before recovering.
- The fall in energy demand resulting from the pandemic may further exacerbate vulnerabilities in the coal sector, with many projects dealing with weak cash flows before the crisis, while financing has been constrained as financial institutions increasingly take ESG factors into account and banks divert liquidity elsewhere.

**Fitch Ratings’ ESG Framework and Coronavirus**
- Climate-related conditions attached to government support packages have been discussed by policymakers. Regardless, it is likely that companies that receive public support will face greater societal scrutiny over emissions regardless of formal conditions.
- On top of existing ESG scrutiny of supply chains (particularly around labour rights and emissions reporting) the disruptions to supply chains caused by the pandemic has highlighted the scope 1 emissions that are produced in these chains. The temporary decline in these emissions highlighted their presence and will likely lead to greater scrutiny of supply chain related emissions in the future.

Sources: Bullock, S. (2020). Stepping Up to A Sustainable Future, Post COVID-19; Fitch Ratings (2020); Climate Risk and the Coronavirus Pandemic; Fitch Ratings (2020); Fitch Ratings’ ESG Framework and Coronavirus; Moody’s Investor Services. COVID effects likely to accelerate the energy transition; Moody’s Investor Services. (2020). Coronavirus pandemic will sharpen focus on ESG risks, with increased relevance to credit.
5. POLICY IMPLICATIONS AND RECOMMENDATIONS
5. Policy Implications and Recommendations

At a high level, this study serves as both an assessment of emerging research and a snapshot of current investor views around the impact of climate risks on investor behaviour, and many of the findings provide relevant insights for policy makers from both developed and developing economies.

The questions included covered a range of important issues including actions that investors take to identify, assess, quantify, and manage climate-related financial risks, and in doing so how those actions influence capital allocation, pricing of capital, including the risk-based premium charged for their investments (i.e. the cost of capital for an investment), and overall investor behaviour.

Some of the questions were specifically focused on issues related to disclosure in the context of TCFD, and others were focused on areas more relevant for integrating climate-related considerations into investment appraisal and risk management practices, many of which are necessary activities for an investor to undertake its own disclosures around climate-related risks and opportunities.

Each of the core questions are connected to these high-level issues around the relationship between climate risk and investor behaviour, but many deserve much further research to fully assess in terms of their specific implications on capital flows.

This is particularly true for the impacts on these issues for capital flows and the cost of capital for developing countries. Emerging research points to clear and quantifiable connections between a country’s vulnerability and resilience to climate change, and its own sovereign borrowing costs (Buhr et al., 2018; Beirne et al., 2020; Delghi, Feng, et al., 2020; Kling et al., 2019; and UNEP-FI and Climate Finance Advisors, 2019), notably for this study, the borrowing costs of developing countries. Early research shows that investing in resilience (a country’s capacity to apply economic investments and convert them to adaptation actions – economic, governance and social readiness), is connected with reductions in the negative impacts that vulnerability to physical climate risks may have on bond yields (Delghi, Feng, et al., 2020). While these studies are specific around the relationship between climate-risk and certain types borrowing, they are important early signals of the impact of climate-risk to capital costs. Notably, recent research has not shown that there is an equivalent association between vulnerability and the quantum and availability of capital for developing economies yet.

However, it is important to acknowledge that far more quantified research is needed to understand if and how climate risks may be a driver of capital costs and flows, particularly for investments developing countries, and particularly for private capital flowing to those investments. While existing research has been promising in showing these connections for sovereign borrowing costs, there are significant analytical challenges in isolating climate-related drivers of risk premia from other drivers, or other market-specific issues, such lending in local currency, and the impact of COVID-19 on overall investment flows.

"Investing in adaptation and mitigation helps improve climate change resilience and lowers government bond spreads. Countries that are more resilient to climate change have lower bond yields and spreads relative to countries with greater vulnerability to risks associated with climate change."

International Monetary Fund (2020)
Nonetheless, existing published research indicates climate-risks are having an impact on cost of capital for sovereigns, and this stands in contrast with the findings from interviews and surveys undertaken for this study. On the one hand, those interviewed and surveyed are aware that climate change can cause increased value at risk on the one hand, but on the other hand are not yet themselves actively pricing-in such risk for their own investments in developing countries. This disconnect may point to diversity of views across a range of investor-types, versus those that primarily invest in developing countries, such as infrastructure investors and development finance institutions. Nonetheless, this disconnect highlights that investors may not (yet) be paying sufficient attention in their investment practices to the connection between climate risk and returns, even though awareness of the general issues around climate-risk are rising rapidly.

As investor awareness grows, this study points to TCFD and disclosure mechanisms being a key driver – but not necessarily because investors are using disclosures as a key source of information used in climate-risk management processes today. Investors note that disclosure alone is not yet a driver for investor behaviour (and thus capital allocation and cost of capital); today climate-related financial disclosures were not in and of themselves sufficiently robust or comparable to be influential in decision-making, but rather where available are used in combination with other sources.

However – and importantly – the TCFD framework seems to be becoming the most common language used for climate-related due diligence. Notwithstanding the current challenges with disclosure, many investors support mandatory disclosure in principle, in part because they see climate-risk disclosure as being valuable for their own ability to identify, assess, quantify and manage climate-related financial risks.

And, while it may be too early to tell whether disclosures themselves are driving financing costs or flows (positively or negatively), it seems that many investors recognise the significant downside risks of incomplete, inconsistent and incomparable disclosures, and many investors do believe these risks may disproportionately impact the more vulnerable, less resilient communities, including developing economies. **Capital flight is seen as a potential risk of an imperfect climate-risk disclosure environment, but it does not obviate the need for prudent thorough climate risk management practices among all financial actors.** Greater application of the TCFD framework in climate-risk assessment and due diligence shows important progress, if only because they see climate-risk disclosure as being valuable for their own ability to identify, assess, quantify and manage climate-related financial risks.

The data, metrics, taxonomies and informational challenges that underpin today’s problems with disclosure exist in both developed and developing economies. These same challenges affect the ability to properly undertake and execute a climate-risk management approach across all types of investment. Beyond the informational challenges, capacity challenges also exist, and those interviewed for this study highlighted that both public and private financial decision-makers lack climate-risk management capacity and technical skills, but that these gaps are more acute in developing countries, precisely where they are needed most.
The policy implications of these findings also underscore the important role that the international development finance architecture, including the MDBs, bi-lateral aid agencies and the IMF, can play in helping developing countries overcome these challenges. Indeed, these institutions will be essential in helping developing countries address all aspects of climate change, including helping build the climate-risk management capacity while simultaneously accelerating investment in resilience. The following section provides a series of policy, technical assistance and investment recommendations specifically focusing on efforts to support developing countries address these challenges. These recommendations are derived from the study's interviews, surveys and research, and include tangible actions that simultaneously help (i) a country to increase its capacity for resilience and (ii) accelerate their investment in resilience. Critical to delivering these recommendations are the institutions that are best placed to execute on these actions and provide the conduit to ensuring such policy, capacity and investment to developing countries is delivered. It is in the interests of donors and development finance institutions alike to facilitate these efforts through all means possible.

This study also included one question which sought recommendations for policymakers on approaches to mitigate the potential unintended consequences of climate risk on investments in developing countries.

**Q8 - What mitigation actions could governments and donors take to maintain investment attractiveness?**

Investors recognise that disclosures are a crucial mechanism for better climate risk management but highlight the tools, skills and capacity are a necessary condition for disclosure and that significant gaps exist in this area. Investors also support the view that the absence of good climate risk management and information could have significant unintended consequences for developing countries ability to become resilient and adapt to climate change. – Two main types of outcomes manifested by investors include:

i) Build the climate risk management systems in developing countries

ii) Incentivise the acceleration of investment in resilience in developing countries

The Policy Brief, includes a series of policy recommendations that emerged from the study (i.e. literature review, interviews and surveys) and are specifically focused on two outcomes to be supported by donors and developed country partners and complement other ongoing international efforts as illustrated in Figure 1.

**These outcomes are not exclusive of other international efforts to build approaches, tools, methodologies or policies to accelerate climate-risk management, or other global actions to accelerate investment in resilience.** Rather these are meant to complement those efforts but recognise that specific attention needs to be given for developing the same, or greater, level of sophistication and capacity in developing countries to accelerate their resilience to climate change.

Figure 23 illustrates four recommendations and how these relate to the two types of interventions identified above. Additionally, it identifies illustrative actions deemed important to achieve the goals within these interventions and are not exhaustive. Note, some illustrative actions may be useful to achieve the objective of multiple recommendations (e.g. building capacity among developing country policymakers).
**FIGURE 23.**
Four policy recommendations to help developing countries in the race for resilience

<table>
<thead>
<tr>
<th>Desired Outcomes</th>
<th>Build the Climate-Risk Management Systems in Developing Countries</th>
<th>Incentivise the Acceleration of Investment in Resilience in Developing Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Recommendations</strong></td>
<td><strong>Illustrative Actions</strong></td>
<td><strong>Barriers</strong></td>
</tr>
<tr>
<td><strong>Recommendation #1:</strong> Climate risk management systems and skills</td>
<td>1.1. Efforts to accelerate the identification and assessment of climate-related risks</td>
<td>• Climate-related information and sources too varied and inconsistent</td>
</tr>
<tr>
<td></td>
<td>1.2. Efforts to implement methods and approaches that help quantify and enable better risk pricing of climate-related risks</td>
<td>• Lack of tools for understanding, quantifying climate risk</td>
</tr>
<tr>
<td></td>
<td>1.3. Efforts to enhance capacity of regulators, policymakers, companies, and financial sector actors to incorporate financial aspects of predicted climate change</td>
<td>• Lack of skills, capacity within public and private investors to develop robust analyses</td>
</tr>
<tr>
<td><strong>Recommendation #2:</strong> Domestic policy</td>
<td>2.1. Integrate climate risk management into financial policy and regulation in developing countries (prudential, fiscal, monetary, and standard setting)</td>
<td>• Lack of clear policy guidance and requirements related to climate-risk management (including disclosure, stress testing, etc.)</td>
</tr>
<tr>
<td></td>
<td>2.2. Integrate climate-resilience objectives into economic and sector-based policies aligned with Paris and country’s NDC goals</td>
<td>• Insufficient application of public development finance to accelerate climate-related resilient investments</td>
</tr>
<tr>
<td><strong>Recommendation #3:</strong> Financial instruments</td>
<td>3.1. Scaling-up risk sharing mechanisms</td>
<td>• Insufficient scale/availability of climate-related risk/resilience instruments available for developing countries to address climate risk</td>
</tr>
<tr>
<td></td>
<td>3.2. Scaling-up risk transfer mechanisms</td>
<td>• Insufficient scale/availability of climate-related risk/resilience instruments available for developing countries to address climate risk</td>
</tr>
<tr>
<td></td>
<td>3.3. Scaling-up incentives tied to resilience/adaptation outcomes</td>
<td>• Insufficient scale/availability of climate-related risk/resilience instruments available for developing countries to address climate risk</td>
</tr>
<tr>
<td><strong>Recommendation #4:</strong> Public financing</td>
<td>4.1. Policy Support: Ensure the post-COVID-19 stimulus is green and climate-resilient</td>
<td>• Lack of sufficient scale/availability of climate-related risk/resilience instruments available for developing countries to address climate risk</td>
</tr>
<tr>
<td></td>
<td>4.2. Funding/Financing: Create financing vehicles for investment in climate resilience</td>
<td>• Insufficient scale/availability of climate-related risk/resilience instruments available for developing countries to address climate risk</td>
</tr>
<tr>
<td></td>
<td>4.3. Funding/Financing: Address common risks investors face to help unlock capital for resilience management tools to lower overall risk in developing countries facing softening investment flows due to climate risks</td>
<td></td>
</tr>
</tbody>
</table>
6. AREAS OF FURTHER RESEARCH
6. Areas of Further Research

Because of the limited nature of this study, more research is likely needed to further examine the changes in market overall as compared with investor perception and sentiment, and it may be important to develop an approach or method to closely track how markets and investors (of different types) are evolving their thinking and acting on measures of climate risk or how investor behaviour may differ from investor opinion, particularly as it relates to capital flows and cost of capital.

The following lists several of the questions where hypotheses tested resulted in mixed findings. More research is likely needed to understand more fully the implications of existing investor behaviour on the specific questions asked. In some specific cases, such as those questions related to CAPEX/OPEX, it would be important to explore these issues with a focused group of infrastructure investors, and in particular, those for whom these approaches are specifically relevant to their investment appraisal and decision-making process.

**Q3 - How does greater knowledge, transparency and disclosure of climate risks affect a) the quantum of capital required b) the availability and c) the cost of capital paid by developing countries?**

<table>
<thead>
<tr>
<th>HYPOTHESIS</th>
<th>FINDINGS /REASONING</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Greater knowledge, transparency, and disclosure of climate risks affect the amount of capital required to address the climate risks perceived.</td>
<td>Interviews showed both (i) distinctions around knowledge, transparency, and disclosure, and (ii) differences in support for this hypothesis among investor type. More research is likely needed.</td>
</tr>
</tbody>
</table>

**Q4 - Is there evidence as to whether the investment has been deterred by the additional CAPEX required to make the activity more resilient or because of the higher risk itself?**

<table>
<thead>
<tr>
<th>HYPOTHESIS</th>
<th>FINDINGS /REASONING</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: There is a growing body of evidence that shows investment has been deterred by the additional CAPEX required to make the activity resilient because of higher climate-related risks.</td>
<td>This was only a relevant question for investors that engage in project finance. As a result, the sample size to test this question was smaller than the overall sample. From those, some are more attuned to this potential than others. More research likely needed. More research is likely needed.</td>
</tr>
</tbody>
</table>
Q5 - Are investor project modelling assumptions around higher CAPEX costs to increase resiliency accompanied by assumptions of resulting lower maintenance costs for the life of the asset?

TABLE 16.
Area for further research Q5

<table>
<thead>
<tr>
<th>HYPOTHESIS</th>
<th>FINDINGS /REASONING</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Investors project modelling assumptions around higher CAPEX costs to increase resiliency are accompanied by assumptions of lower maintenance costs for the life of the asset.</td>
<td>This did not seem to be a relevant question for all investors. As a result, the sample size to test this question was smaller than the overall sample. More research likely needed for a more focused set of investors who include CAPEX/OPEX and CBA approaches into their investment appraisal processes.</td>
</tr>
</tbody>
</table>

Q6 - Where climate risks are better understood, are costs of capital lower to reflect greater confidence? Are these effects equally felt in the developed and developing world? Are there interventions (e.g. insurance) which can encourage this?

TABLE 17.
Area for further research Q6

<table>
<thead>
<tr>
<th>HYPOTHESIS</th>
<th>FINDINGS /REASONING</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Is there evidence of lower cost of capital to reflect better information (i.e. greater confidence and certainty) about climate risk.</td>
<td>Research and literature review provide some initial support that this is true for some types of capital (e.g. sovereign lending) More research is likely needed.</td>
</tr>
<tr>
<td>H2: These effects are equally felt in the developed and developing world.</td>
<td>While all investors interviewed actively engage in investing in developing countries, the level to which they do so varied significantly, with some investing in only limited ways, while others investing in developing countries by mandate (DFIs). Research and literature review provide some initial support that this is true. More research is likely needed, in particular to determine differences by investor-type</td>
</tr>
</tbody>
</table>

Q7 - Does greater transparency and disclosure of climate risks affect existing investment flows to developing countries and/or developed countries?

TABLE 18.
Area for further research Q7

<table>
<thead>
<tr>
<th>HYPOTHESIS</th>
<th>FINDINGS /REASONING</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Is there growing evidence base that greater transparency and disclosure of climate risks have affected existing investment flows relative to the counterfactual of limited transparency and disclosure.</td>
<td>Only 14% of survey respondents cite portfolio reallocation between developing and developed countries as one of the main consequences (See Figure 21). More research likely needed.</td>
</tr>
</tbody>
</table>
In light of the findings above, there are several areas that would merit further research with respect to the impact of perceptions and disclosure of climate physical and transition risk on different types of capital flows (both cost of capital and availability of capital) for developing economies. Experts consulted in the process of preparing this report have underscored the value of the following areas of further inquiry:

1. **Capital flows and transition risk, particularly for economies reliant on fossil industry.** With respect to the potential impact of transition risk on economies where a limited number of large fossil fuel-exposed companies play a dominant role, it would be worthwhile to check the effect of the prospects of those companies on the larger economy in which it operates. An example of this could be Eskom, South Africa’s beleaguered coal-fired electric utility; another example would be Pemex, in Mexico, another major company whose primary product, heavy crude oil, leaves it exposed to stranded asset risk. In these cases, and possibly others, the impact of transition risk may be sufficiently systemic that these state-owned companies’ exposure affects their respective sovereigns’ credit profiles and access to capital. Other countries may face similar challenges.

2. **Non-public foreign direct investment.** It would be worthwhile to look at FDI capital flows, including country level data on cross border portfolio flows into emerging bonds and equities. This kind of study would explore the impact of climate-related transition and physical risks on capital flows between and among countries, with a focus on publicly listed debt and equities, with the aim to estimate how these flows might be affected by changes in approaches to transition risks (potential positive/negative) or chronic or acute climate events (more likely negative except in specific sectors).

3. **Impact of credit risk and term premia from expected climate risk.** Given the timing of climate impacts, it may be worth exploring the impact of climate change on term premia for developing countries with debt which may be exposed to physical and transition risk. Investors require the term premium as compensation for holding a long-term bond compared to rolling over a series of short-term bonds with lower maturity. Premia over the short-term indicate the investors’ expectations for the risk-free rate and a premium for the longer holding period. It should be possible to deploy quantitative methods to start to measure the potential impact on required credit risk and term premia, at least on a preliminary basis, which would then reflect the implied additional cost of capital over the short-term risk free rate; if the risk premium jumped after a physical climate-related event, it may be possible to analyse the impact of climate change on the risk premium (though other factors would also play a role in this change in premia). In relatively liquid/open markets, if the market does price these longer-term climate risks, it may be through higher term premia.
Finally, while the above is specific to the questions included in this study, additional research might be warranted in the following areas:

1. **Development of an “investor sentiment” survey specific to issues related to climate risk, climate risk management, and with a focus on how these impact developing countries**: As investors begin to become more broadly aware of climate risks, and as these risks manifest in the form of climate-related disasters, it would be helpful to track changes in investor sentiment more frequently (like tracking consumer confidence metrics). This type of survey might also build from existing efforts that track financial flows into developing countries and could more specifically define the set of investors most important to track for these questions. Such a regular and frequent survey on investor sentiment would be particularly helpful for policymakers with responsibilities involving the cost of capital and access to finance for developing countries.

2. **The role of insurance mechanisms on investor views of climate risk.** There is more understanding of the role that credit rating agencies may potentially play in providing a price-signal for climate risk, but investors’ understanding of the role that insurance can play as both a price signal for risk and a risk transfer (not risk reduction) mechanism varies. Research to gauge investor views on how insurance can help in their understanding and climate-risk management approaches may be helpful to more fully address gaps in understanding, and important financial management options to address climate risks.

3. **Analysis of the limits of risk tolerance as they relate to investment in resilience measures as an input into other critical policy efforts in developing countries.** As climate change accelerates, it may be important to more fully understand the limits of risk tolerance by various types of investors, including public financing. Such research will be critical for developing country governments to prioritize different types of interventions, including those that may require moving communities, key sectors, or assets. It would be useful to explore deeper on: (i) What projects risk cannot be mitigated? (ii) What geographies are investors avoiding due to climate-related risks? and (iii) What kind of financial structures seek to mitigate inevitable exposure.
Endnotes

1 Annexes are presented in a separate document: Understanding the Role of Climate Risk Transparency on Capital Pricing for Developing Countries. Annexes to Findings Report

2 Key findings from this area are presented in Box 3.

3 Figure 5 excludes the climate change advisory firm and rating agencies. Figures 7 and Table 2 exclude rating agencies. Table 2 depicts: TCFD Supporter: Entities that have publicly endorsed the TCFD framework; TCFD Disclosure: Entities that have issued a TCFD report; PRI: Signatories of the UN Principles for Responsible Investment (UN-PRI); Net Zero Alliance: Signatories of The Net Zero Asset Owner Alliance; PRB: Signatories of the UN Principles for Responsible Banking (UN-PRB); and Mainstreaming Initiative: Signatories of the 2015 Climate Action in Financial Institutions Initiative.

4 Two clear examples where investors see evidence of climate risk impacting returns are: (i) the transition risk (both regulatory and market) related to coal investment, and (ii) certain limited geographies where perceptions of costs of physical risk from climate-related intense storms result in some measure of investor hesitancy.

5 The financial sector is exposed to climate risk through two channels. First through current risks which may affect credit, underwriting, market, operational and liquidity risks; and second through shifts in future returns because of climate risks (either physical or transition). IMF Global Financial Stability Report 2020, Chapter 5: Climate Change: Physical Risks and Equity Prices, April 2020

6 No hypothesis tested in this question.

7 Surveys listed are a sample and do not represent all surveys undertaken in the same period.

8 Insights on this topic are closely related to insights gathers on the topic of CAPEX and methodologies investors use to quantify climate-related risks. See Section 5.2 for further information on this item.

9 Percentages are presented over the number of respondents for each question (i.e. investors who provided an answer = Answered)

10 Answered: 97% | Skipped: 3%

11 Answered: 71% | Skipped: 29%

12 Answered: 71% | Skipped: 29%

13 Answered: 71% | Skipped: 29%. Physical and transition risks could be selected for each sector.

14 Answered: 71% | Skipped: 29%. Original question was asked to provide a scale between 1 and 4 (being 1: Most Important | 4: Least Important). Non Applicable was also an option.

15 Formerly Carbon Disclosure Project.

16 Answered: 65% | Skipped: 35%.

17 Answered: 74% | Skipped: 26%. All graphics only shows results with data entries.

18 Many of the questions in this section apply to investor behaviour relative to investing in both developed and developing countries. While all investors interviewed were active in developing countries, many provided views more generally around climate-risk information, approaches to quantifying climate-related financial impacts and disclosure broadly.

19 Estimates and premises presented are based on the findings and analysis reflected by Hallegatte, S., Rentschler, J., and Rozenberg J. in the 2019 Report. Lifelines: The Resilient Infrastructure Opportunity

20 Investment in resilience includes “a country’s capacity to apply economic investments and convert them to adaptation actions”, and includes hard infrastructure, social systems and nature-based solutions. (Cevik, S. and Jalles, J. T, 2020)

21 Answered: 61% | Skipped: 39%

22 This proportion excludes respondents that skipped this question.

23 Answered: 74% | Skipped: 26%. All graphics only show results with data entries.

24 Answered: 71% | Skipped: 29%. More than option applicable.

25 Answered: 52% | Skipped: 48%