



**TASK FORCE ON CLIMATE, DEVELOPMENT
AND THE INTERNATIONAL MONETARY FUND**

MARCH 2023



The International Monetary Fund, Climate Change and Development

A PRELIMINARY ASSESSMENT



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**TASK FORCE ON CLIMATE, DEVELOPMENT
AND THE INTERNATIONAL MONETARY FUND**

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Abbreviations

BAU	Business as usual
CBAM	Carbon Border Adjustment Mechanism
CCPA	Climate Change Policy Assessment
CCRT	Catastrophe Containment and Relief Trust
CGE	Computable general equilibrium
CMAP	Climate Marco-Economic Assessment Program
COP26	26 th United Nations Climate Change Conference
COP27	27 th United Nations Climate Change Conference
CPAT	Carbon Pricing Assessment Tool
C-PIMA	Climate Public Investment Management Assessment
CSR	Comprehensive Surveillance Review
DIGNAD	Debt Investment Growth and Natural Resources (model)
DRS	Disaster resilience strategy
DSA	Debt sustainability analysis
DSGE	Dynamic stochastic general equilibrium (model)
EBA	External Balance Assessment
ECF	Extended Credit Facility
EDME	Emerging market and developing economy
EFF	Extended Fund Facility
EM-DAT	Emergency Events Database
ESG	Environmental, social and governance
FSAP	Finance Sector Assessment Program
GDP	Gross domestic product
GHG	Greenhouse gas
GIMF	Global Integrated Monetary and Fiscal (model)

GMMET	Global Macroeconomic Model for the Energy Transition
GRA	General Resource Account
G20	Group of 20
G7	Group of Seven
HH	Household
ICPF	International carbon price floor
IDA	International Development Association
IMF	International Monetary Fund
IMF-DSF	International Monetary Fund Debt Sustainability Framework
IPCC	Intergovernmental Panel on Climate Change
LAC	Latin America and the Caribbean
LIC DSF	Debt Sustainability Framework for Low-Income Countries
LND	Large Natural Disaster Window
MDB	Multilateral development bank
NDC	Nationally determined contribution
NGFS	Network for Greening the Financial System
OECD	Organisation for Economic Co-operation and Development
PEFA	Public Expenditure and Financial Accountability
PFM	Public financial management
PIMA	Public Investment Management Assessment
PRGT	Poverty Reduction and Growth Trust
RAM	Risk Assessment Matrix
RCF	Rapid Credit Facility
RFI	Rapid Finance Instrument
RSF	Resilience and Sustainability Facility
RST	Resilience and Sustainability Trust
SBA	Stand-by Arrangement
SDGs	UN 2030 Sustainable Development Goals
SDR	Special Drawing Right
SPLAT	Social Protection and Labor Assessment Tool
V20	Vulnerable 20 Group of Finance Ministers
WEO	World Economic Outlook



About the Task Force on Climate, Development and the International Monetary Fund

The Task Force on Climate, Development and the International Monetary Fund is a consortium of experts from around the world utilizing rigorous, empirical research to advance a development-centered approach to climate change at the IMF. The Task Force believes it is imperative that the global community support climate resilience and transitions to a low-carbon economy in a just manner. As the only multilateral, rules-based institution charged with promoting the stability of the international financial and monetary system, the IMF has a vital role to play in supporting a globally coordinated response.

MEMBER ORGANIZATIONS

- Intergovernmental Group of Twenty-Four (G24)
- Vulnerable Group of Twenty (V20) Ministers of Finance
- African Economic Research Consortium
- Boston University Global Development Policy Center
- Centre for Social and Economic Progress
- Financial Futures Center
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Cape Town, South Africa.
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Executive Summary

Climate change and climate change policies have significant “macro-critical” impacts nationally and across countries. The International Monetary Fund (IMF) has an important role to play in preventing and mitigating those impacts so member states, and in particular developing countries, can mobilize investment for structural transformation towards low-carbon, socially inclusive and resilient growth trajectories. In the past few years, the IMF has made important strides toward filling this role but is falling short of the leadership necessary to accelerate a global and just transition. This report by the Task Force on Climate, Development and the IMF identifies the strengths and shortcomings of the IMF’s new approach to climate change from a development perspective and offers concrete proposals for how it can correct course. There is no time to waste as the macroeconomic implications of climate change are causing acute stress amid multiple crises in the world economy.

The United Nations Intergovernmental Panel on Climate Change has said it is “now or never” to make the investments necessary to limit warming to 1.5 C — without which the world faces catastrophic human, ecological and economic costs. The Independent High-Level Expert Group on Climate Finance estimates that trillions of dollars per year are needed to support emerging market and developing economies deliver on climate change goals and achieve the UN 2030 Sustainable Development Goals (SDGs). This stepwise mobilization of resources is required for countries to chart growth paths that speed up the low-carbon transition, support adaptation and resilience, address loss and damage, build resilience to climate shocks, and protect and restore natural capital while ensuring a just transition within and across borders. Domestic resources, however, will simply not be sufficient, and international cooperation will be essential to addressing the asymmetry in financial capacity and resources between advanced and developing countries.

The global community is in the middle of one of the warmest decades on historical record, with recent extreme weather events jeopardizing livelihoods and economic prospects in Pakistan, Nigeria, South Africa, small island developing states and numerous other climate-vulnerable countries and populations. Loss and damage from these occurrences have cost the most climate vulnerable economies upwards of 20 percent of gross domestic product (GDP) in this century, yet climate finance and climate ambition continue to be lacking. At the same time, the global economy is under enormous stress due to the “polycrisis” of the COVID-19 pandemic, war, climate shocks, social unrest and its compounded repercussions in the lack of fiscal space, debt distress, higher capital costs, high energy and food prices and slower than expected economic growth.

In a very short period, the IMF has admirably come to see climate change and climate change policy as macro-critical, drafted and approved a Climate Change Strategy, began incorporating climate change into bilateral and multilateral surveillance, and established a new lending facility partly dedicated to climate change in the Resilience and Sustainability Facility (RSF). Despite these important steps forward, this preliminary assessment finds that the IMF needs to show more leadership in three key areas:

- **Multilateral surveillance activities are adopting a “one-size-fits-all” approach of carbon pricing as a panacea for climate action.** Moreover, the IMF expects this carbon pricing-led approach to generate enough revenue to meet a substantial portion of the investment needs, therefore discounting the imperative for massive international and domestic resource mobilization and the need to focus on climate change and climate policy spillovers across international borders. While regarded as the optimal option in theory, such an approach is too optimistic about the speed and orderliness of the transition and investment responses that carbon pricing will inspire. It also does not adequately reflect the reality of diverse national circumstances, partly a reflection of the narrow set of economic modeling approaches the IMF has deployed to analyze climate change.
- **Bilateral surveillance activities underestimate the macroeconomic implications of financing climate transitions in a financially stable manner.** Bilateral surveillance continues to press for carbon pricing as the core form of climate policy and as the main revenue source for resource mobilization rather than helping to orient macro-fiscal frameworks towards resource mobilization, investment, structural change and climate resilience.
- **The IMF lending toolkit lacks appropriate scale and overemphasizes short-term fiscal consolidation over long-run resource mobilization.** While the RSF has the potential to fill a major gap in the global climate finance architecture, it lacks the scale and design features necessary to trigger and sustain development-centered climate transformations. Moreover, the traditional IMF toolkit is developing a one-size-fits-all approach of “green fiscal consolidation” that is inconsistent with sustainable growth. The toolkit is not yet designed to help mitigate the balance of payments impacts of short-term climate shocks, loss and damage, and resilience in a manner that accelerates the intermediate and longer-term development paths necessary.

In October 2021, just following the release of the IMF’s official Climate Change Strategy, the Task Force on Climate, Development and the IMF was launched as a consortium of research institutes and experts from around world using rigorous, empirical research to advance a development-centered approach to climate change at the IMF. In its initial strategy report, the Task Force emphasized the role of the IMF in facilitating the investment mobilization needed for new green growth trajectories in a fiscally sound and financially stable manner by integrating climate change across the IMF’s three core functions: multilateral surveillance and global leadership, bilateral surveillance and capacity development, and a climate-aligned IMF lending toolkit. The Task Force thus advanced five principles to guide the IMF’s efforts: adopt the global role in addressing the macroeconomic implications of climate risk, climate action and asymmetries across countries related to impacts, capacities, needs and ambition; align short-term stability concerns with longer-term sustainable and resilient growth pathways; tailor policy advice to member country contexts and needs; empower national and stakeholder ownership of policy; and reconcile shared climate goals with equity and appropriate burden sharing.

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Based on these principles, this new report provides a preliminary assessment of the IMF's initial implementation of its Climate Change Strategy. The end of this executive summary provides a detailed set of policy recommendations that the IMF could implement to correct course on each of its three key activities. Broadly speaking, the IMF will need to do the following:

- **Broaden multilateral surveillance activities to strengthen focus on an investment-led approach to a resilient and just transition**, cross-border spillovers, loss and damage and the necessary global cooperation on resource mobilization.
- **Strengthen bilateral surveillance** by deploying better analytical tools to analyze climate risks and their macro-critical impacts as well as the resource mobilization needs of member states, and **support capacity building** in developing countries to strengthen climate policy analysis and the development of domestic markets for sustainable finance.
- **Scale and reform the IMF lending toolkit in line with the Paris Agreement on climate change**, including the RSF, to align short-term and longer-run financing horizons without jeopardizing debt sustainability and growth prospects.

POLICY RECOMMENDATIONS

Multilateral Surveillance

- Provide enhanced guidance on how to assess the impact of carbon pricing and non-pricing-based policies and measures that developing countries use to reduce greenhouse gas emissions.
- Expand analytical work on medium- and long-term cross-boundary spillovers arising from climate policies to better understand their impacts given diverse national circumstances.
- Devote more attention to climate-related debt issues and the need to support adaptation, loss and damage and state-contingent instruments to improve debt sustainability.
- Embrace the full implications of a just transition and intensify efforts to catalyze multilateral cooperation to deliver the climate finance needed for mitigation, adaptation, and loss and damage.

Macro-Financial Aspects

- Build on state-of-the-art existing tools and research approaches to assess climate risks for sovereign fiscal and financial stability.
- Ensure the comparability of climate scenarios for sovereign physical climate risk assessment with supervisory scenarios, such as the Network for Greening the Financial System.
- Better identify and analyze the full spectrum of climate-related risks (acute and chronic physical risks, transition risks and spillovers, and compounding risks) and their transmission channels to the agents and sectors of the economy and finance as well as identify how these risks are amplified.
- Analyze how current limitations, in terms of scenarios, metrics and macroeconomic models affect the outcomes of IMF risk assessment and policy recommendations (including trade-offs on inequality, environmental sustainability and financial stability).

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- Assess the impact of green financial sector interventions (such as green monetary and prudential policies, public finance and co-finance) and their complementarities with green fiscal policies.

Fiscal Aspects of Surveillance

- The transition to net-zero will substantially impact fiscal revenues for many countries and will require heavy upfront investments to implement policies to support the low-carbon transition. Macro-fiscal frameworks need to reflect the investments required for adaptation and mitigation as well as the revenue and expenditure impacts of the climate transition. These should recognize countries' diverse characteristics and circumstances.
- Retool debt sustainability analyses to incorporate revenues and expenditures associated with transitioning to a low-carbon, climate-resilient economy alongside climate shocks and spillovers.
- Incorporate investments associated with loss and damage into debt sustainability analyses, fiscal frameworks and programming. Estimates of adaptation and mitigation needs should be mapped out by country.

IMF Lending Toolkit

- Incorporate the increasing incidence of macro-critical climate shocks and transition spillovers into assessments of the adequacy of IMF resources and increase IMF resources accordingly through quotas and new issuances of Special Drawing Rights.
- Incorporate climate change and natural disaster clauses into all IMF lending instruments and debt restructurings.
- Scale up the Catastrophe Containment and Relief Trust and the RSF, make the RSF more affordable and enshrine member-state driven climate strategies.
- Consider using RSF funding as collateral and credit enhancement for restructured and new bonds to support development and climate change.
- Substitute green fiscal consolidation measures for investment-led growth stimulus programs with green multipliers.

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CHAPTER 1

Introduction

THE MOTIVATION

Climate change requires a transformation of the global economy toward low-carbon, climate-resilient pathways. However, this transformation poses macro-critical challenges for countries around the world. Countries need to accelerate the shift to low-carbon investments, build resilience to intensifying climate impacts and navigate the cross-border impacts of a low-carbon transition. Coordinated and ambitious climate policies are essential to meet global goals. As the International Monetary Fund (IMF) is the global body charged with promoting macroeconomic and financial stability, the macro-criticality of climate change requires the IMF to align short-term macroeconomic stability concerns with long-term sustainable and resilient growth pathways.

The IMF has taken important steps forward to incorporate climate change into its work. In July 2021, the IMF released its Climate Change Strategy (IMF 2021e). In the strategy document, the IMF highlights how “climate change is bound to affect macroeconomic and financial stability” and notes that the “ensuing policy challenges fall firmly within the realm of the IMF’s expertise.” The IMF states that its role is to “assist with the coordinating the macroeconomic and financial policy response [related to climate change]” (IMF 2021e). The IMF also enhanced its lending toolkit by establishing the Resilience and Sustainability Trust (RST), which has the mandate to focus on longer-term transformations needed for countries to pursue and maintain macroeconomic stability.

Established in 2021, the Task Force on Climate, Development and the IMF is a consortium of experts from around the world using rigorous, empirical research to advance a development-centered approach to climate change at the IMF. The member institutes and partners of the Task Force are the Africa Economic Research Consortium, the Boston University Global Development Policy Center, the Centre for Social and Economic Progress, the United Nations Economic Commission for Latin America and the Caribbean, the Financial Futures Center, the Intergovernmental Group of 24 on International Monetary Affairs and Development (G-24), and the Vulnerable 20 (V20) Group of Finance Ministers.

The Task Force believes that the IMF plays a vital role in supporting a globally coordinated response to climate change. As a rules-based global body charged with maintaining macroeconomic stability, the climate imperative requires the IMF’s close engagement. The goal of this report is to offer an objective and independent preliminary assessment of the IMF’s

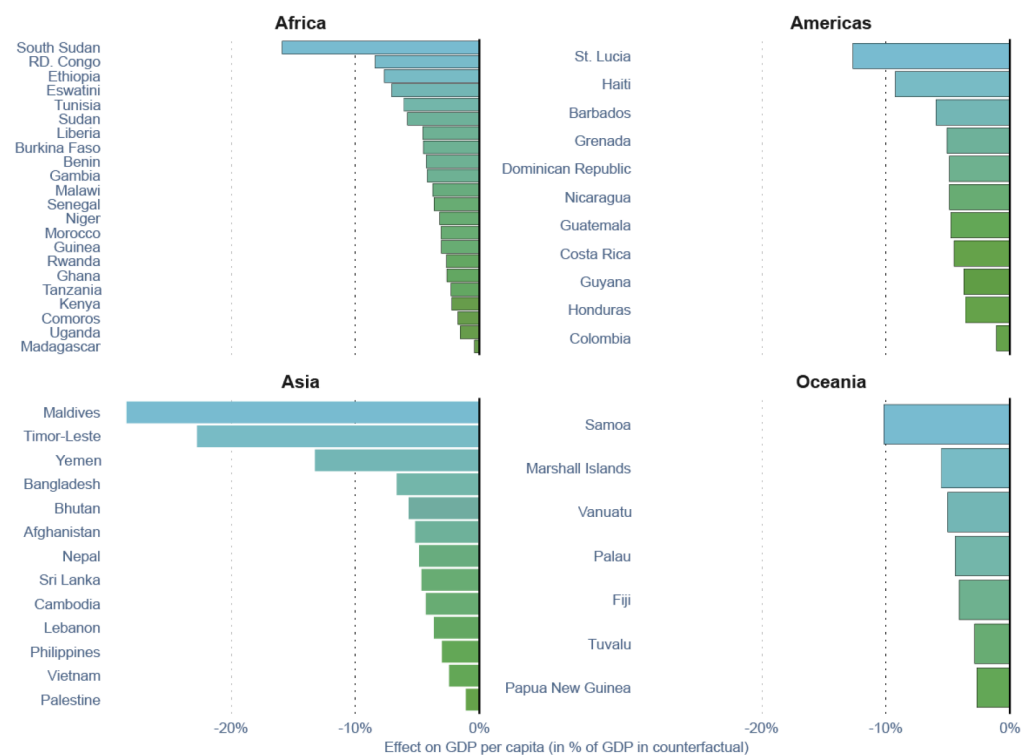
efforts to mainstream climate change using a development lens, with the objective of providing actionable policy recommendations to the IMF and its stakeholders.

THE URGENCY OF TACKLING CLIMATE CHANGE

The urgency of the climate crisis requires swift, concerted global action. As the Intergovernmental Panel on Climate Change (IPCC) has warned, it is “now or never” to significantly bend the greenhouse gas emissions curve (IPCC 2022b). To limit warming to 1.5 C, this decade will require a major transformation across countries to a low-carbon and resilient pathway (IPCC 2022). The IPCC’s report on impacts, adaptation and vulnerability underscores how climate change is already causing “substantial” damages and irreversible losses (IPCC 2022b). A V20 report estimates that V20 economies suffered losses amounting to approximately \$525 billion over the last two decades (Baarsch, Awal and Schaeffer 2022). Figure 1.1 shows economic losses attributable to climate change in V20 economies in terms of gross domestic product (GDP). In addition, new research shows how warming beyond 1.5 C would place the world at a higher risk of breaching tipping points that will lead to major, irreversible changes such as the melting of ice sheets and permafrost thaw (Armstrong McKay et al. 2022).

Existing national pledges to reduce carbon emissions are insufficient to limit warming to 1.5 C (Black et al. 2022; IPCC 2022a). While this ambition gap has narrowed over time, countries must intensify their efforts to reduce greenhouse gas emissions and switch to a low-carbon growth path. Doing so will also require the meaningful participation of all significant emitters. Broadening the base of participation for deep emissions cuts also means that developing

FIGURE 1.1 Attributable Climate Change Economic Losses in V20 Countries



Data: W5E5 v2.0 dataset - Lange et al., 2021

Source: Baarsch, Awal and Schaeffer 2022.

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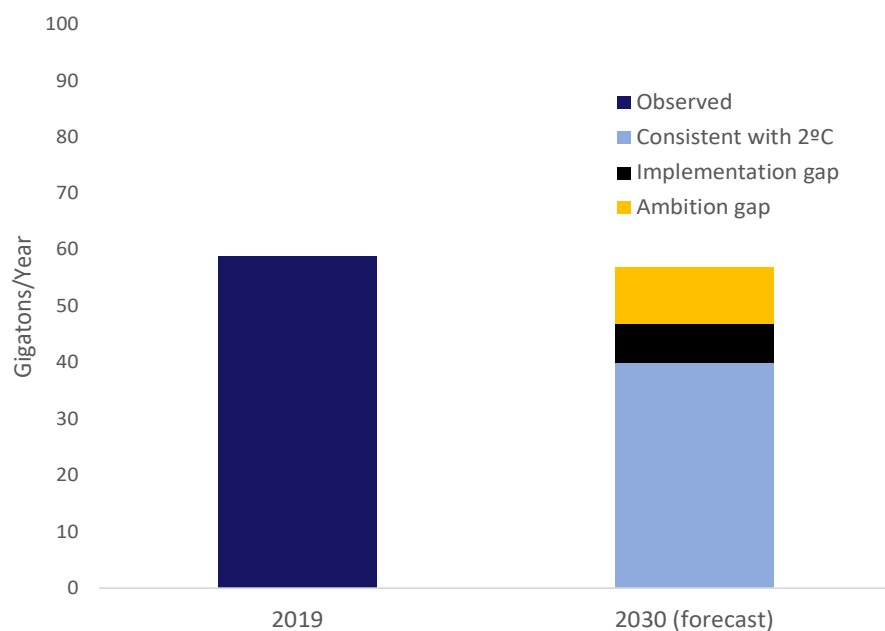
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economies need international support to transition away from carbon-intensive growth paths (IMF 2021d). Moreover, any delay on reducing greenhouse gas emissions will require deep and rapid cuts later in the future. A disorderly transition would lead to higher social and economic costs than an orderly transition would. As Figure 1.3 shows, increased warming disproportionately impacts developing countries, and delays in reducing greenhouse gas emissions will lead to more intensified impacts in the future.

The ambition gap also carries over to climate finance. Songwe et al. (2022) estimate the finance gap to be around \$2.4 trillion annually by 2030 to achieve climate change goals. Advanced economies have fallen short on their pledge to mobilize climate finance totaling \$100 billion a year by 2020. More generally, there is a shortfall in the financing available to implement the UN 2030 Sustainable Development Goals (SDGs). Countries need to mobilize finance in the context of ongoing macroeconomic headwinds for several reasons. First, tightening monetary policy in advanced economies has increased the cost of capital for emerging market and developing economies (EMDEs). As Figure 1.4 shows, between 2021 and 2022, EMDE sovereign spreads have considerably increased. Second, increase in cost of capital poses an additional barrier for scaling up investments in renewable energy given its capital-intensive nature (Egli, Steffen, and Schmidt 2018; Schmidt et al. 2019). Moreover, with EMDE currencies depreciating against the U.S. dollar, the EMDEs face higher borrowing costs.

Apart from the high cost of capital, many EMDEs are also experiencing greater fiscal constraints. Tighter fiscal spaces lead to difficult policy tradeoffs, including on investments to accelerate climate actions. The IMF estimate that two-thirds of low-income countries are at a high risk of being, or are actively, in debt distress (IMF 2022a). The United Nations Development Programme has identified 54 countries that need immediate debt relief (Jensen 2022).

FIGURE 1.2 Historical and Projected Global Emissions (Gigatons a year)



Source: IMF (2022) using IPCC estimates.

Note: The overhang of projected emissions in 2030 over the amount of compatible with 2C of warming consists of the ambition gap (the amount by which pledged emissions exceed the 2C-compatible amount) and the implementation gap (emissions pledged to be avoided but forecast to arise under current policies).

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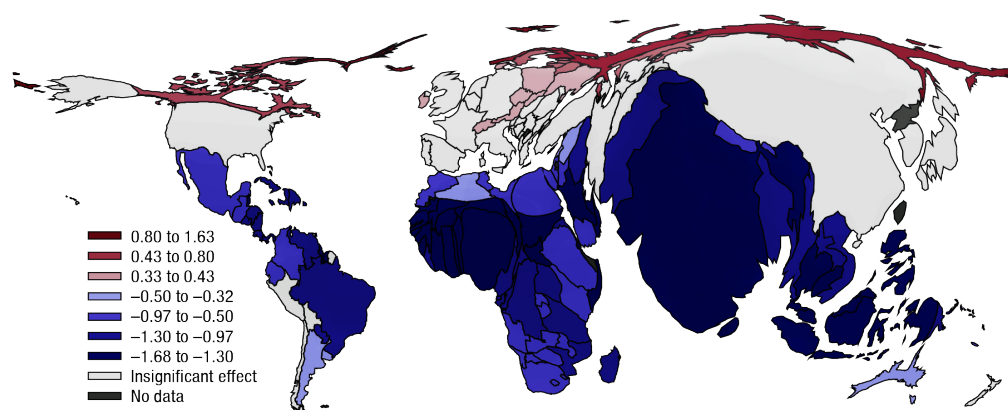
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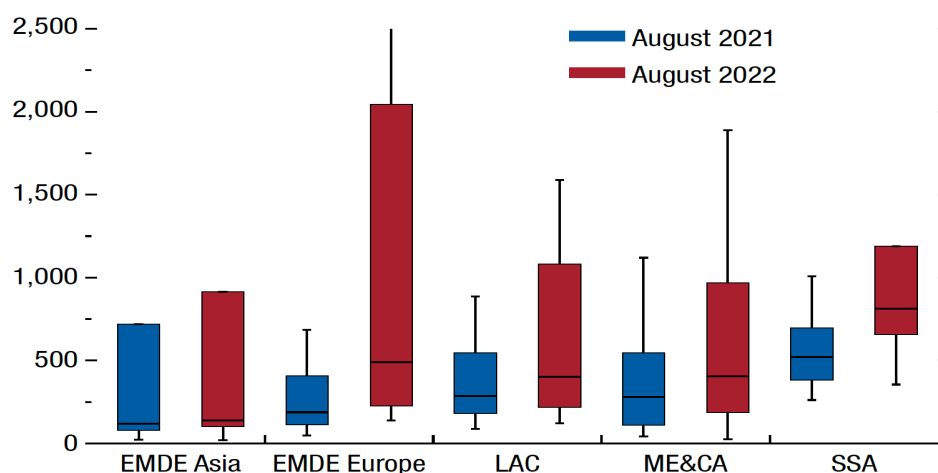
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FIGURE 1.3 Effect of a 1C Increase in Temperature on Real per Capita Output at the Country Level, with Countries Rescaled in Proportion to Their Population



Source: IMF 2017.

FIGURE 1.4 EMDE Sovereign Spreads (Basis Points)



Source: IMF *World Economic Outlook* 2022, <https://www.imf.org/en/Publications/WEO/Issues/2022/10/11/world-economic-outlook-october-2022>.

Note: For each region, box denotes upper quartile, median and lower quartile of the members, and whiskers show maximum and minimum values within the boundary of 1.5 times interquartile range from upper and lower quartiles. Y-axis is cut off at 2,500 basis points. EMDE = emerging market and developing economy; LAC = Latin America and the Caribbean; ME&CA = Middle East and Central Asia; SSA = Sub-Saharan Africa.

In addition, as illustrated by an IMF working paper, many low-income countries already have negative sovereign borrowing space (Chamon et al. 2022; Figure 1.5). When compared against climate investment needs, the paper finds that only seven of them had the fiscal space necessary to make the climate investments needed. Their high levels of indebtedness have eroded their ability to invest in climate action.

The emergence of a “polycrisis” precisely during a period that requires accelerated investments toward development and climate change goals demands more robust international cooperation. Deepening and accelerating emissions cuts around the world require advanced economies to support low-carbon investments in low- and middle-income countries. Climate-vulnerable countries also need international support to build resilience and pay for losses

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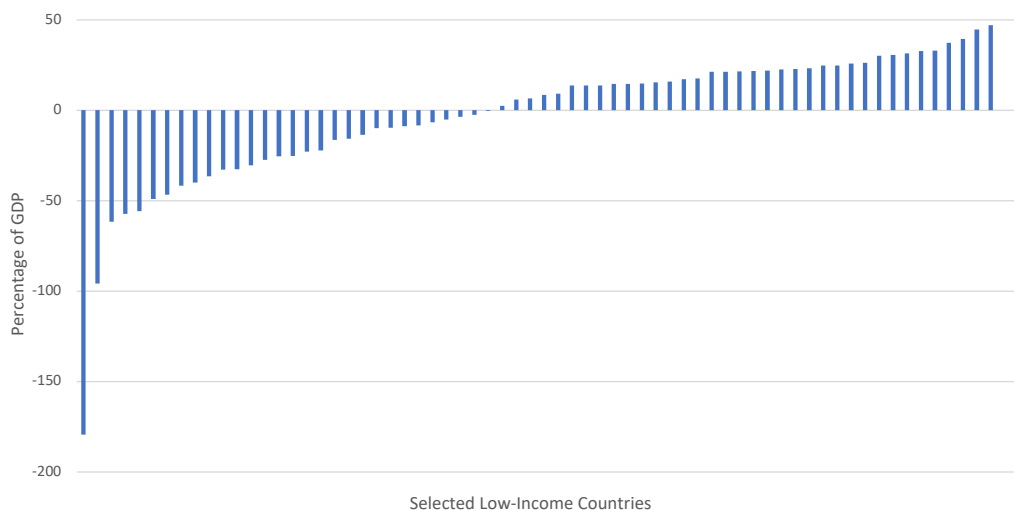
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FIGURE 1.5 Sovereign Borrowing Space in Low-Income Countries



Source: Chamon et al. 2022

and damages considering intensifying climate impacts. More broadly, a course correction is needed to address the divergent economic recovery trajectories across countries that threaten the achievement of the SDGs.

THE IMF'S CLIMATE CHANGE STRATEGY

The IMF has recognized the macro-critical nature of climate change, with its Climate Change Strategy describing climate change as “one of the most macro-critical policy challenges” (IMF 2021e). The organization’s 2012 Integrated Surveillance Decision provides the grounds for integrating climate change into its surveillance functions. In bilateral surveillance, the IMF can focus on policies that have a bearing on the “present or prospective balance of payments stability.” For multilateral surveillance, it may focus on the spillover effects of a member’s policies that impact the operation of the international monetary system (IMF 2021b).

The Comprehensive Surveillance Review (CSR), concluded in May 2021, is a key building block of the IMF’s approach to climate change (IMF 2021b) and builds on the Integrated Surveillance Decision. The review includes a background paper specifically on integrating climate change into Article IV consultations (IMF 2021a) and recognizes climate change as a “potentially existential threat with significant macroeconomic and financial implications” (IMF 2021a, p. 15).

The CSR affirms the IMF’s understanding that Integrated Surveillance Decision does indeed provide a mandate to the Fund to cover climate change in surveillance activities when climate change policy challenges are macro-critical (IMF 2021a). The CSR notes that adapting to climate impacts may require actions to “preserve present or prospective [balance of payments] and domestic stability” and that the transition to a low carbon economy may impact “present or prospective” balance of payments and domestic stability.

To operationalize the Integrated Surveillance Decision’s guidance on the coverage of climate change in the IMF’s surveillance activities, the review distinguishes between three aspects of

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climate change that the IMF Climate Change Strategy carries forward: mitigation, adaptation and transition management. The IMF considers adaptation and transition management to be domestic in scope, while mitigation is global in scope given the global public good nature of climate mitigation. Transition management includes the policy challenges arising out of implementing the country's own policies as well as the impact of the global transition toward clean energy.

The IMF's Climate Change Strategy identifies the core elements underpinning the strategy and charts out how the strategy will be made operational. Through direct country engagement, it also outlines how Article IV reports, Financial Sector Assessment Programs (FSAPs), IMF-supported programs and capacity development will include climate change. Moreover, the strategy identifies the Fund's approach to integrating climate change into multilateral surveillance activities, its analytics and policy guidance. Below, we discuss the IMF's Climate Change Strategy in the context of multilateral surveillance, bilateral surveillance and the lending toolkit.

TABLE 1.1 Direct Country Engagement and the IMF's Climate Change Strategy

Climate change mitigation in Article IVs	For the 20 largest emitters, every three years; In-depth coverage 6-7 per year (mitigation coverage falls under multilateral surveillance).
Transition management in Article IVs	All countries in a 5-6 year cycle; in-depth coverage 8-9 countries per year; standardized coverage 25 countries per year.
Adaptation and resilience building	For 60 countries most vulnerable to climate change, every three years; about half of consultations supported by the CMAP (10 per year); without a CMAP (10 per year).
Financial Sector Assessment Programs (FSAPs)	All FSAPs, depending on the assessment of the materiality of risks.

Source: Authors' compilation from IMF (2021a).

Note: CMAP = Climate Macroeconomic Assessment Program; FSAP = Financial Sector Assessment Program.

Multilateral Surveillance and Global Policy Coordination

In its strategy document, the IMF charts out how it will increasingly integrate climate change into its flagship reports. These outputs include the *World Economic Outlook (WEO)*, the *Global Financial Stability Report*, the *Fiscal Monitor*, *Regional Economic Outlook* reports, policy papers and staff climate notes.

The CSR noted that the IMF would "strongly encourage" the coverage of mitigation in the 20 largest emitters of greenhouse gases, for which Article IV consultations will be carried out at least every three years. These consultations will include mitigation policies and an assessment of their adequacy. As the composition of the largest 20 emitters will evolve over time, the IMF will update it every three years. For countries that are not the largest emitters, the organization will focus on "transition management" to help countries shift to low-carbon pathways.

The IMF will also produce guidance notes to support the treatment of climate change-related topics in bilateral country documents, and it aims to improve its coverage of climate change-related topics in its guidance documents, especially by expanding its work on adaptation and resilience. To support its surveillance work, the IMF is working on climate components of global macroeconomic models, debt sustainability analyses and toolkits such as the World Bank-IMF Climate Policy Action Tool.

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Bilateral Surveillance and Capacity Development

The IMF will include climate change in its Article IV consultations where climate change has macro-critical implications, and it expects to include climate-related aspects in 60 Article IV consultations per year. The organization aims to cover the most climate vulnerable and the largest emitter countries every three years; in 2019, it identified 60 countries that are particularly vulnerable to climate change (IMF 2019). The IMF's analysis will be underpinned by the Climate Macroeconomic Assessment Program (CMAP), which will allow for an assessment of country-specific dimensions such as climate policies, vulnerabilities and investment needs. It expects to conduct half of the assessments through standardized assessments and half through CMAPs tailored to each country.

When assessing climate mitigation policies among the 20 largest emitters, the IMF will focus on the effectiveness of policies, alternative policy packages (including and beyond carbon pricing) and benchmarking against peers. The domestic implications of those mitigation policies are matters pertaining to transition management (more below). The IMF defines transition management to include policy actions required to achieve domestic climate targets as well as the implications of the global transition to a low-carbon model. It expects to conduct 33 to 34 transition management-focused Article IVs every year, with three to nine being in depth. Unlike adaptation and mitigation, it doesn't define a set of countries but aims to cover the entire membership in a five- to six-year cycle. Given the difficulty of separating out climate mitigation and domestic transition management policies in practice, the IMF plans to address them together.

The IMF has been developing the CMAP as one its core analytical tools related to climate change. The CMAP is expected to help identify how economic growth, climate investments and financing needs, and climate policy implementation fit together. It also delves into country-specific physical and transition risks, identifies policies relevant to climate change, and estimates the financing implications of building resilience.¹ The IMF intends to complete ten CMAPs per year, and these CMAPs would directly inform the Article IV consultations. In 2022, the IMF released its first CMAP, which focuses on Samoa (Kinoshita et al. 2022).

FINANCIAL SECTOR ASSESSMENT PROGRAMS The IMF considers climate risks to be relevant for all FSAPs. A climate component of the program would include stress testing on both physical and transition risks as well as generating recommendations related to financial regulation and supervision. The IMF Climate Change Strategy outlines a three-step assessment process. The IMF will first run a climate finance diagnostic to determine coverage and then will design climate scenarios. As a final step, it will focus on risks that are material over a three- to five-year horizon. The IMF's short-term focus of three to five years is distinct from the longer time horizons often used by central banks and supervisors.

CAPACITY DEVELOPMENT For capacity development, the IMF expects to incorporate climate change across its work on fiscal issues, financial sector policies, modeling support and trainings, with its work on fiscal matters being the most advanced. In addition to its analytical work on carbon pricing, the IMF has developed the Climate Public Investment Management Assessment (C-PIMA) as a specific tool based on the PIMA framework. C-PIMA has five elements: climate-aware planning, coordination between entities, project appraisal and

¹ The CMAP builds on Climate Change Policy Assessments jointly conducted with the World Bank.

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selection, budgeting and portfolio management, and risk management. Finally, the IMF anticipates carrying out external trainings to support in-country units that are already focused on climate change.

Lending Toolkit

IMF-SUPPORTED PROGRAMS (REGULAR IMF LENDING) The IMF's Climate Change Strategy expects to include climate-relevant measures into IMF program design when such measures directly impact balance of payment stability. Examples of measures that have already been included in IMF programs include fossil fuel subsidy reform, carbon pricing and resilience building. The strategy also highlights the Rapid Financing Instrument and the Rapid Credit Facility as two instruments that can be deployed to help countries facing macroeconomic imbalances induced by large disasters. Moreover, the strategy mentions the Catastrophe Containment and Relief Trust as an additional option for the poorest and most vulnerable countries hit by natural disasters. While the IMF recognizes the need to develop further details about how climate change-related reform measures could be helpful to address macroeconomic stability challenges, the strategy does not articulate a framework for integrating climate change into program design.

RESILIENCE AND SUSTAINABILITY FACILITY In August 2021, the IMF issued \$650 billion in Special Drawing Rights (SDRs) to help countries tide through the COVID-19 pandemic (IMF 2021c). Since SDR allocations are determined by members' quota shares, advanced economies received around two-thirds of the total issuance. The Group of 20 (G20) agreed to rechannel SDRs through the IMF's Poverty Reduction and Growth Trust (PRGT) and asked the IMF to establish an RST as another instrument for SDR rechanneling (G20 2021). The IMF board agreed to establish the Resilience and Sustainability Facility, supported by the RST, in April 2022. The RSF's mandate is to help countries build economic resilience to shocks, such as climate change and pandemics, by offering longer-term and affordable financing (IMF 2022b). The RSF is the first lending instrument of the IMF that is dedicated to helping countries avoid prospective balance of payment crises by building resilience to climate change.²

ADVANCING A DEVELOPMENT-CENTERED APPROACH

In its initial strategy report, the Task Force emphasized the importance of investment mobilization for countries to pursue low-carbon, climate-resilient growth paths in a fiscally and financially sound manner. It also identified how the three major functions of the IMF — multilateral surveillance and global leadership, bilateral surveillance and capacity development, and the climate-aligned finance toolkit — need to incorporate climate change. The integration of climate change into the IMF's work should be guided by the following five principles:

- Adopt the global role in addressing the macroeconomic implications of climate risk, climate action and asymmetries.
- Align short-term stability concerns with longer-term sustainable and resilient growth pathways.
- Tailor policy advice to member country circumstances.

² Resilience and Sustainability Facility refers to the instrument. RST loans are accessed through the instrument.

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- Empower national and stakeholder ownership of policy.
- Reconcile shared climate goals with equity and appropriate burden sharing.

Countries require an urgent, stepwise mobilization of resources to invest in building resilience and accelerating the transition to a just and green economy. Investments will have to be geared toward accelerating a just, low-carbon energy transition, building resilience and adaptation to climate impacts, addressing loss and damage and responding to climate shocks, and protecting and restoring natural capital. Since the global temperature rise has already approached 1.2 C, any future development pathway needs to be climate resilient. Climate impacts can undermine development gains (World Bank Group 2022).

Enabling these investments will require a new macroeconomic framework. By calibrating the IMF's instruments to support this framework the IMF can play an important role in facilitating the pursuit of low-carbon, climate-resilient growth in a manner that fosters short-run macroeconomic stability while enabling policy frameworks and resource mobilization to achieve longer-run development goals.

THE INVESTMENT PUSH The shift to a climate-resilient, low-carbon model of development must be growth enhancing and improve the well-being of populations while respecting planetary boundaries (UNECA 2023; World Bank Group 2023). Climate-resilient, green growth opens opportunities for countries to achieve the structural transformation that they need to diversify their economies, enhance productivity and create jobs. The IMF estimates that investing in green sectors, as opposed to traditional sectors, can yield higher growth multipliers even without considering the benefits to reduced needs for adaptation due to avoided warming (Batini et al. 2021, 2022). For many low-income countries, investment in infrastructure is critical before the private sector can step in to play a catalytic role (Stern, Stiglitz and Taylor 2022).

The shift to a low-carbon economy, however, will have major fiscal impacts, especially for countries long reliant on fossil fuel generated revenue. Revenue from carbon-intensive sectors will fall precisely when governments need to accelerate climate investments. What is more, carbon pricing and fossil fuel subsidy removal will not be enough to meet the investment needs for a green transition. As previous Task Force technical papers have shown, the revenue generated via carbon pricing will not be sufficient against investment needs (Titelman et al. 2022; Dwivedi and Bhandari 2022). Furthermore, the pursuit of net-zero pathways is expected to lead to high levels of public debt.

There is growing recognition that carbon pricing alone will not generate sufficient incentives for the green transition alongside a more nuanced understanding of the conditions under which carbon pricing may be effective or feasible (Prasad et al. 2022). There needs to be an accompanying investment push to ensure that governments can steer their economies to a low-carbon, resilient pathways. In 2021, the IMF outlined an initial vision on how carbon pricing and a green investment push will need to go hand in hand (IMF 2021d), saying that this will require a suite of complementary policies alongside carbon pricing.

International cooperation will also be essential for an investment push. The IMF has recognized that a net-zero pathway will require increasing climate finance to ensure that the global transition is just and equitable. A globally coordinated carbon price floor may help to shift incentives, address competitiveness concerns and generate resources to pay for green investments. However, the green transition in low- and middle-income countries will require greater support

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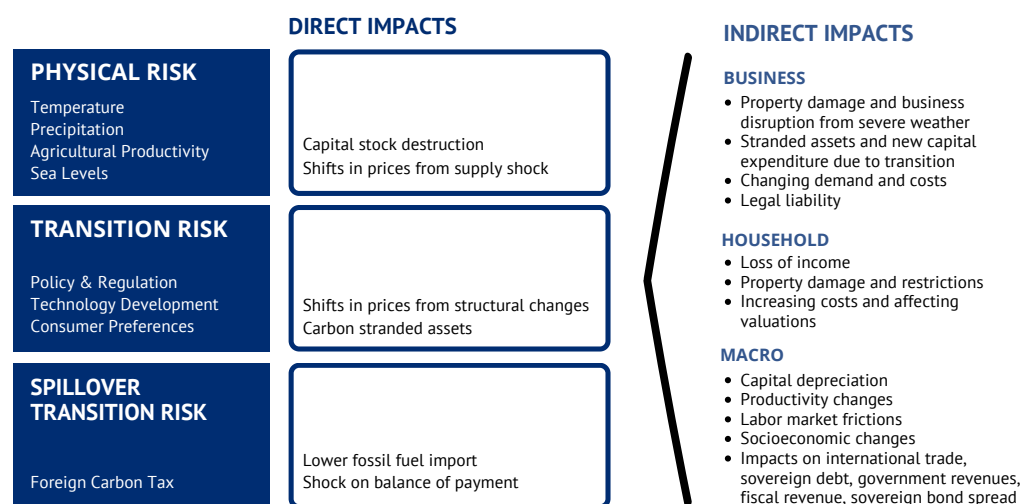
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from the international community. Climate vulnerable countries will need more financing to build resilience to climate impacts in the face of limited fiscal and capacity constraints.

TRANSITION AND TRANSITION SPILLOVER RISKS Not only are major investments needed to enable the transition to happen, but the shift to a low-carbon economy will also have to be orderly and minimize economic and social disruptions (Battiston et al. 2017). The risk posed by the shift away from carbon-intensive activity, or transition risk, has ramifications for the owners and managers of carbon-intensive assets and financial stability more generally. Transition risk transmission channels can be microeconomic or macroeconomic in nature (BIS 2021). According to a Bank of England estimate, if governments formulated policies in line with the Paris Climate Agreement on climate change, two-thirds of known fossil fuel reserves would be “unburnable.” This poses major risks to energy companies, banks, insurance companies and other actors. For hydrocarbon exporters and countries reliant on fossil fuel revenue, the shift to a low-carbon pathway will have significant macroeconomic effects. Figure 1.6 identifies the transmission channels by climate risk. (Chapter 3 explores climate risk mechanisms in further detail).

Moreover, the global move away from carbon-intensive economic activity will have cross-border implications for EMDEs; these are “transition spillover risks.” National decarbonization efforts are moving along distinct paces and levels of ambition. Domestic climate policy can generate salient spillover effects in other economies. For example, China’s climate policies to achieve net-zero emissions will have cascading impacts on coal exporters that have relied on China as a market (Maldonado and Gallagher 2022). Others are instituting policies to ensure that climate policy doesn’t erode domestic competitiveness and protects environmental integrity. For example, the EU has moved toward adopting a Carbon Border Adjustment Measure (CBAM), and the Group of Seven (G7) has actively considered forming a carbon club. These efforts to limit competitiveness impacts on domestic industry, however, directly impact trading partners that have carbon-intensive export profiles. At the broadest level of implementation of the EU CBAM, research by Task Force members shows that developed country welfare could fall by an annual \$106 billion, while developed country welfare gain would amount to annual \$141 billion (He, Fan and Ma 2022).

FIGURE 1.6 Risks and Transmission Channels



Source: Ramos et al. (2022).

Note: See Chapter 2 Annex Figure A1 for an elaborated version of the transition risk transmission channels.

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PHYSICAL CLIMATE RISKS Physical climate risks include the risks of climate impacts. Analogous to transition risks, physical climate risks can be micro- or macroeconomic. Physical climate hazards include rapid-onset events like hurricanes as well slow onset ones like ocean acidification and salt-water intrusion. Exposure to climate impacts can vary substantially. For states in the Caribbean and the Pacific, the economic impact of natural disasters regularly run an average annual damage of 2-3 percent of GDP. Major natural disasters can have devastating effects; for example, Dominica suffered losses amounting to 226 percent of its GDP in 2017 due to a tropical storm (IMF 2019). When climate impacts beyond disasters are included, the climate-related losses can be extremely significant.

The costs of climate impacts are uneven. Low-income countries see not only a higher death count but also higher losses, in terms of GDP, due to natural disasters (IMF 2019). These adaptation investments need to be made in the context of tight fiscal constraints. Figure 1.7 shows adaptation need requirements against fiscal space.

FIGURE 1.7 Adaptation Costs and Fiscal Space

	At least some fiscal space or moderate/low risk of debt distress	At-risk fiscal space or high risk of debt distress
Above-median strengthening costs	Azerbaijan, Bangladesh, Botswana, China, Colombia, Dominican Republic, Indonesia, Japan, Korea, Mexico, Netherlands, Peru, Philippines, Thailand, Vietnam, Uganda	Mauritius, Angola, Costa Rica, Fiji, India, Lao People's Democratic Republic, Malaysia, Pakistan
Below-median strengthening costs	Algeria, Australia, Canada, Chile, Czech Republic, Denmark, Estonia, France, Ireland, Israel, Kazakhstan, Latvia, Lithuania, Morocco, New Zealand, Poland, Qatar, Saudi Arabia, Singapore, Slovak Republic, Sweden, Switzerland, Russia, Turkey, United Kingdom, Germany, United States, Brazil, Jordan, Nigeria	Argentina, Egypt, Hungary, Italy, Oman, Slovenia, South Africa, Spain, Uruguay

Source: Aligishiev et al. 2022 with authors' updates.

Furthermore, climate-vulnerable countries also face a higher cost of capital, which constrains investments and thereby leaves countries more vulnerable to climate impacts because resilience-building activities do not occur as needed (Volz et al. 2020). The climate justice aspect for climate-vulnerable countries is particularly noteworthy — emissions from these countries account for a very small portion of total emissions. Not only do they face the brunt of climate change, but taking action to reduce the severity of impacts is also challenging due to the cost of capital.

Physical risks also have cross-border aspects (Benzie and Harris 2021). For example, when a prolonged period of drought impacts the coffee production of a major coffee-exporting state, it affects both the country's own economic health and supplies shocks through the value chain. Physical climate risks have mostly been understood in domestic or local terms, but the interconnected nature of supply chains, the globalized nature of investments and the displacement of people suggest a need for a cross-border lens as well.

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Climate-vulnerable countries have the dual challenge of building resilience to climate impacts while also diversifying their economies away to reduce transition risk. Compound risks — physical and transitional — can be highly material, especially for small islands. To gain an accurate understanding of climate risks, the drivers and transmission channels of both types of risks will have to be considered.

ORGANIZING FRAMEWORK

This preliminary assessment of the IMF's efforts to mainstream climate change includes chapters that span across the major functions of the IMF. Chapter 2 discusses the multilateral surveillance and global policy coordination. Chapters 3 and 4 focus on the IMF's surveillance functions with dedicated attention toward macro-financial aspects in the former and fiscal aspects in the latter. Chapter 5 delves into the IMF's lending toolkit.

Each chapter is an analysis that centers around the questions listed below, and each one identifies major policy recommendations. A synthesis of the policy recommendations from all the chapters can also be found in the executive summary.

- What are the IMF's ongoing efforts to mainstream climate change?
- What does the state-of-the art literature highlight?
- What are the strengths and limitations of what the IMF has done so far and how could the IMF better integrate climate change to advance shared development and climate change goals?

Taken together, these chapters provide a detailed look into how the IMF has made efforts to integrate climate change into its work. They shine the spotlight on how and where the IMF could better foster climate action and facilitate an orderly and just transition to a low-carbon, resilient economy while ensuring that development remains central to its efforts.

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CHAPTER 2

Climate and Development in Multilateral Surveillance

INTRODUCTION

Following its 2021 Climate Change Strategy, the IMF has increased the pace of mainstreaming climate change in its surveillance instruments. Its flagship publications regularly include analytical chapters on macro-critical spillover risks of climate change, while its research papers increasingly tackle climate-related issues. These publications consistently cover climate change policy issues that require multilateral cooperation to effectively contribute to global climate goals. The IMF's Article IV consultations with high-emitting countries inform multilateral surveillance, recognizing that collective action on mitigation policies will be needed to meet global targets. Moreover, regular reports to the G20 discuss the progress toward climate goals made in the implementation of nationally determined contributions (NDCs) and the need to lift the ambition of NDCs to levels needed to meet global emissions targets.

The IMF has emphasized the urgent need to strengthen global cooperation in accelerating climate mitigation and adaptation efforts and promoting a just transition globally. It has also urged the implementation of coordinated carbon pricing among countries as the main instrument for climate mitigation, along with complementary public expenditure reforms, support for technology research and enhanced social protection for managing the transition. In addition, the organization has called for multilateral cooperation to provide financing for developing countries to ensure a progressive climate transition. With policy coordination, there is a feasible progressive road to achieve net-zero emissions, but delays will only raise the cost of the climate transition. Global cooperation has fallen short, however, of the actions needed to both meet global climate targets and extend the adequate levels and quality of climate-related finance for developing countries.

There is scope for the IMF to strengthen the development orientation of its surveillance. For example, it could advance the understanding of the magnitude of cross-border macroeconomic spillovers of climate policies for developing countries. It could also advance policy and financing solutions that promote equitable burden sharing that would enable developing countries to manage the climate transition in various ways and at the same time boost inclusive growth. In this context, the Task Force provides the following recommendations for further work by the Fund in the following four areas critical to multilateral surveillance:

- **Price and non-price measures:** Provide better guidance on how to assess the greenhouse gas impacts of the complex sets of price and non-price regulations that developing countries use to reduce greenhouse gas emissions.

- **Cross-boundary spillovers:** Undertake more work on medium- and long-term cross-boundary spillovers from climate policies to better understand the extent of their impacts, particularly on developing countries with diverse circumstances.
- **Climate change and debt:** Devote more attention to climate-related debt issues to foster global cooperation to support adaptation investments, finance loss and damage, and devise state-contingent instruments that support debt sustainability.
- **Climate finance:** Embrace the full implications of a just transition and intensify efforts to catalyze multilateral cooperation to deliver the climate finance needed to support countries' efforts to mitigate, adapt, and cope with loss and damage due to climate change.

This chapter discusses these recommendations and draws on the Task Force's analytical work to strengthen the development focus of the IMF's multilateral surveillance.

MULTILATERAL SURVEILLANCE SINCE THE 2021 CLIMATE CHANGE STRATEGY

Climate change permeates the IMF's surveillance. The Fund has increasingly integrated analytical work on climate change in its global reports since 2008, when it published the first climate-focused analytical chapter in its WEO report. In its 2021 Climate Change Strategy, the Fund sets forth a road map to increase coverage of climate issues within multilateral surveillance and reshape its instruments to better understand the nature and extent of climate risks and global spillovers of climate actions (or inaction) as well as to convey its advice to the global community to strengthen collective action in critical areas. Surveillance reports to the G20 reflect the intensified coverage of climate change. The scope of multilateral surveillance includes issues around climate change mitigation since it has a public good character and its effectiveness "hinges on international policy coordination" (IMF 2021c).

The IMF has been developing analytical methodologies to understand the macro-critical spillover effects of climate actions and their aggregate impact on global growth and stability. It is recognized that aggregating country-level analyses of the impacts and spillovers of climate change for global surveillance is a particularly daunting analytical task (Orozco 2021). The IMF's Climate Change Strategy identifies flagship reports and policy papers as "especially important for topics with a multilateral component that require policy coordination, as for these topics, country-level documents allow only partial coverage" (IMF 2021a). Methodologies are being developed to track the progress of climate mitigation actions at both global and country levels, and analytical work is being expanded through the creation of Staff Climate Notes. The development of reliable and comparable data has already led to the creation of the Climate Change Indicator Dashboard.

Climate change mitigation extends beyond bilateral surveillance since its global public good nature requires collective action to meet global goals. The 2012 Integrated Surveillance Decision made Article IV consultations a vehicle for both bilateral and multilateral surveillance, therefore providing two perspectives. Regular Article IV consultations will be undertaken with the 20 largest greenhouse gas emitters, which account for 80 percent of global emissions. These consultations constitute a pragmatic approach for involving countries most relevant to global climate mitigation and assessing the spillover impacts of associated policies and

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contributions to global goals.³ Since 2021, 18 of these countries have had Article IV consultations that, to the extent possible, had stepped up coverage of climate change risks and policies. Climate mitigation policies are well covered in the Article IVs of advanced countries and tend to vary among developing countries. The latter may be related in part to the depth of national climate strategies and dialogue with national authorities. Going forward, more developing countries — e.g., Nigeria, Pakistan and Egypt — will rank among the top emitters based on their projected emissions between now and 2040 and are likely to face significant macroeconomic and development risks.

The IMF’s strategy document sets a yearly target on covering multilateral components of climate change in one to two chapters in flagship reports, one to three policy papers and three to seven research papers (IMF 2021c). Exceeding this target, flagship and regional surveillance reports have deepened their coverage of climate-related challenges, as shown in Table 2.1 (IMF 2021c).

TABLE 2.1 Coverage of Climate Change in IMF Flagship Reports Before and After the 2021 Strategy

Output	Before Climate Strategy	Since Climate Strategy
World Economic Outlook	2008 spring, 2016 fall, 2020 fall	2021 fall, 2022 spring, 2022 fall
Fiscal Monitor	2019 fall	2022 spring, 2022 fall
Global Financial Stability Report	2019 fall, 2020 spring, 2020 fall	2021 fall, 2022 spring, 2022 fall
Regional Economic Outlook	2019 spring	2021 fall, 2022 spring, 2022 fall

Source: Compiled by authors.

The flagship reports alongside research and policy papers from IMF staff have helped disseminate evolving policy positions on scaling up global ambition on climate, increasing cross-country cooperation, developing comprehensive transition strategies, strengthening the climate information architecture and showcasing newly developed analytical tools. Table 2.2 presents an overview of this coverage.

The IMF has since provided a stark picture of the shortfall in climate actions — the “ambition gap” — that seriously threatens the achievement of global goals. To contain the temperature rise to between 1.5 C and 2 C by 2050, greenhouse gas emissions will need to be cut by 25 to 50 percent below pre-2019 level by 2030 (Black et al. 2022). Staff analysis shows, however, that climate actions so far will deliver only an 11 percent reduction. The IMF has stressed the urgency for accelerated climate actions — particularly by G20 countries, covering 80 percent of global emissions — to bridge the massive gap between the required policy actions and global climate change goals. Further delays will put the 1.5 C goal beyond reach. The path forward should include accelerated climate actions by advanced countries, increased ambition by developing countries and enhanced climate finance to ensure that mitigation and adaptation burdens are progressively distributed.

The WEO discussed ideal climate policy packages in October 2020, October 2021 and October 2022. Figure 2.1 illustrates the three policy packages proposed in the most recent WEO

³ The IMF’s 2021 Background Note to Integrate Climate Change in Surveillance concludes that “climate change mitigation is an area of multilateral risk that should be discussed in the context of the ISD’s overall provision at the core of the proposals; with the revenues fully distributed to finance the approach given the difficulty of developing metrics to assess spillovers.”

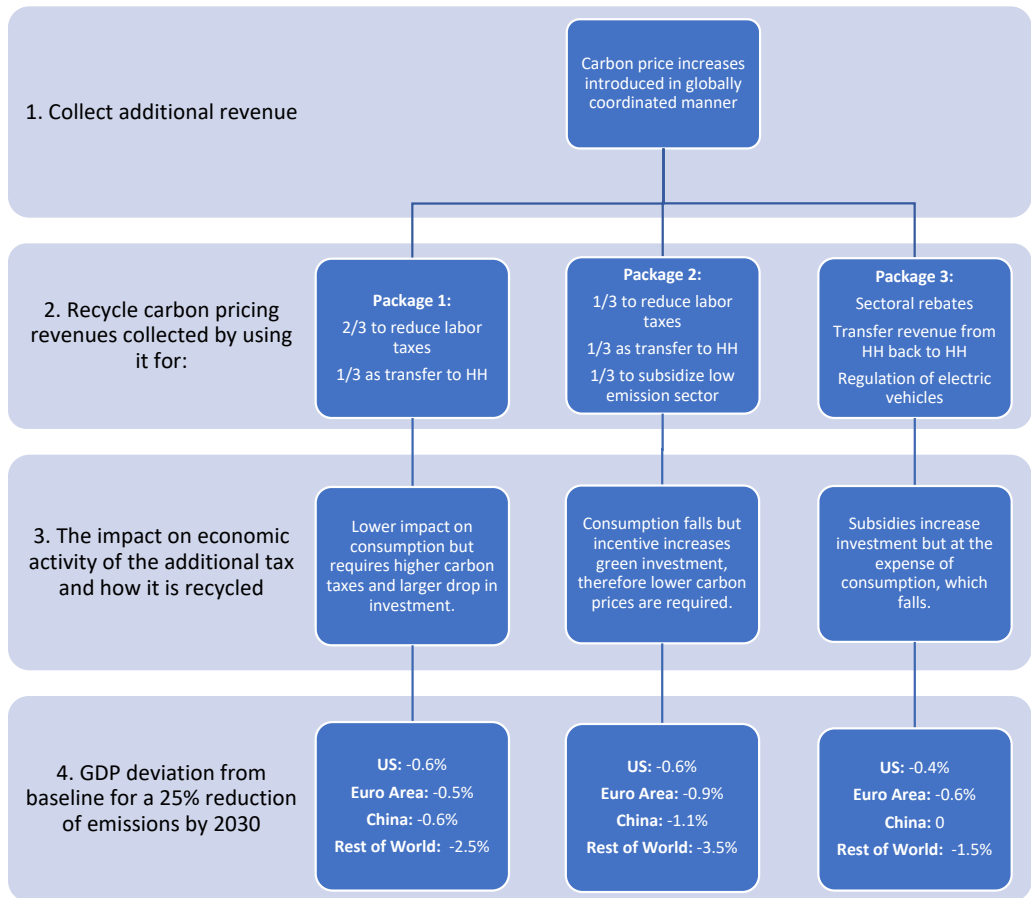
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TABLE 2.2 Coverage of Key Themes and Policy Proposals Since the 2021 Strategy

Theme	Overview of IMF Analysis and Findings	Literature
Scaling up mitigation efforts	<p>To achieve Paris Climate Agreement targets, mitigation ambition must increase.</p> <p>Comprehensive carbon pricing is most effective and the least costly strategy to reduce emissions (but politically challenging to implement); regulations and other non-price policies and approaches should be used if pricing is not feasible.</p> <p>A policy mix to advance a just transition redirects revenue from carbon taxes toward green investments, social transfers and other goals. Research to develop lower-cost green technologies should be supported.</p> <p>In terms of alternatives to carbon pricing, in sectors where technological substitution is possible, regulation and feebates are viable alternatives.</p>	<p>IMF (2021b,d, 2022b); Parry, Black and Zhunussova (2022); Black et al. (2021); Chateau, Jaumotte and Schwerhoff (2022b)</p>
Cross-country coordination and equitable burden sharing	<p>International policy coordination is needed to achieve mitigation targets, with emission reductions required in advanced economies and large emerging market and developing economies.</p> <p>To avoid leakage and loss of competitiveness for countries increasing their ambition, an international carbon price floor, with differentiated targets to improve burden sharing, is proposed.</p> <p>An international carbon price floor preempts the unilateral implementation of border carbon adjustments, which raises equity concerns without increasing mitigation.</p> <p>Efforts are underway to develop a methodology to enable coordination and comparisons between price and non-price mitigation policies given the limited take-up and implementation of carbon pricing globally.</p> <p>Multilateral support for developing countries via technology transfers and climate finance initiatives is needed for a just, global transition.</p>	<p>Parry, Black and Roaf (2021); IMF and OECD (2022); Chateau, Jaumotte and Schwerhoff (2022a); IMF (2021e); Black et al. (2021, 2022a,b); Keen, Parry and Roaf (2021, 2022b)</p>
Global transition risks	<p>Coordinated carbon taxes would likely impact external sector balances as they disproportionately impact fossil fuel-dependent regions.</p> <p>Climate policies generate international spillovers through trade and competitiveness, fossil fuel markets and technological advances, with a better understanding of the transmission channels needed.</p>	<p>IMF (2022f), IMF and OECD (2022)</p>
Adaptation, resilience and support for low-income countries	<p>Large investment needs for adaptation in some developing countries, not responsible for climate change, call for international support.</p> <p>Sustainable finance, innovative instruments and private investment are suggested as sources of climate finance, with developing countries encouraged to implement carbon prices and other reforms to mobilize investments.</p>	<p>IMF (2021d); Aligishiev, Bellon and Massetti (2022); Sakai et al. (2022); Prasad et al. (2022); IMF (2022c)</p>
Climate information architecture	<p>Unmitigated climate change, as well as transition policies, pose risks to the global economy and financial stability. There is a need for information and tools to assess climate risks and to encourage investment in adaptation and mitigation. The IMF Climate Data Dashboard is contributing to this effort.</p>	<p>Ferreira et al. (2021), IMF (2021f)</p>
Analytical tools	<p>The Climate Policy Assessment Tool is a spreadsheet-based model commonly used to estimate the impact of mitigation instruments on a country-by-country basis.</p> <p>IMF-ENV is a dynamic computable general equilibrium (CGE) model suitable to analyze shifts across the global economy.</p>	<p>Black et al. (2022); Chateau, Jaumotte and Schwerhoff (2022b)</p>

Source: Authors' elaboration.

FIGURE 2.1 Proposed Policy Mix for Climate Mitigation



Source: IMF (2022b).

households (HH). Depending on how the revenue is recycled, the impact on GDP differs. The IMF analysis looks at the impact for the U.S., the Euro Area, China and the rest of the world.

IMF research finds that there are feasible options to reach net zero that are progressive and carry manageable costs. With a coordinated implementation of the proposed policy mix — international carbon price floor (ICPF), green public investment programs and international transfers — the IMF estimates the net cost of moving to clean technology by 2030 would be around 0.5 percent of global GDP, which pales in comparison to the devastating cost of inaction (Black et al. 2022). That said, GDP costs will be larger for fossil fuel exporters and middle-income economies that use carbon intensively. Targeted transfers from advanced countries to middle- and low-income countries and sharing low-cost green technology will help ensure that the transition is equitable and extends beyond those that can afford mitigation policies. For climate-vulnerable countries, the IMF has stepped up its call for international assistance to support adaptation investments to build resilient economies.

TASK FORCE ANALYSIS ON KEY AREAS OF THE IMF’S MULTILATERAL SURVEILLANCE

Many developing countries are intensifying their climate ambitions, with some pledging net-zero goals within the next few decades in their NDCs. The approaches to, and costs of,

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transformation will differ across countries according to their individual economic structures, fiscal resources and political economy concerns. But an imperative for developing countries is to promote climate transitions that also boost their economies' prospects for inclusive growth. Achieving both goals will require a substantial investment push as a key essential element of the policy mix and the means to scale up investments while maintaining macroeconomic stability. Development-centered surveillance will need to consider these comprehensive development goals among countries with differing circumstances when formulating policy advice for global cooperation. Drawing on papers from the Task Force and external literature, this section discusses how development issues can be better integrated in four critical areas covered by the IMF's multilateral surveillance.

Recognizing the Contribution of Diverse Climate Mitigation Policies

An important centerpiece of the IMF's advice is an internationally coordinated carbon price floor, set at different levels according to each country's stage of development, as the ideal policy for mitigation. The IMF has strongly held the view that carbon pricing is the first-best instrument for climate change mitigation and that it "promotes a broader range of behavioral responses for reducing CO₂ emissions than non-pricing instruments" (IMF 2021c). International cooperation on carbon pricing will ensure that countries could accelerate the climate transition and be able to preserve their competitiveness (Chateau, Jaumotte and Schwerhoff 2022a).

This policy view lacks widespread buy-in, however, among advanced and developing countries. Both sets of countries already implement a combination of price and non-price regulations to reduce carbon emissions. To date, the World Bank's carbon price tracker reports that 33 advanced and developing countries have imposed national carbon taxes and 25 have put in place emissions trading systems (see Table 2.3). Carbon pricing initiatives, however, tend to have limited coverage and low prices (Parry, Black and Zhunussova 2022). Some developing countries have shown a preference for carbon market trading over carbon taxation. The IMF, however, expresses a preference for carbon taxation because it raises revenues, leads to more certainty in future price of emissions and is easier to administer.

TABLE 2.3 Total Number of Carbon Pricing Mechanisms Implemented at the National Level by Kind of Pricing Instrument

	Advanced Economies	Emerging Market Economies	Low-Income Developing Countries	Total
Carbon tax	22	11	1	33*
Emissions trading system	8	15	2	25
Undecided	0	1	0	1

Source: World Bank Carbon Pricing Dashboard. "ETS and Carbon Taxes." Last updated April 1, 2022; IMF Fiscal Monitor Country Classification. "Fiscal Assumption, Country Fiscal Coverage and Economy Groups." Last updated October 2022.

Note: *Includes countries with national carbon taxes; this includes Liechtenstein, which is not among the IMF Fiscal Monitor's country classification.

Article IV consultations with high emitting developing countries suggest a preference for non-price regulations in key sectors that reduce emissions efficiently in a politically acceptable way (see also Ahluwalia and Patel 2022). Among the main reasons for this preferred approach is the need to manage the social backlash from adverse distributional effects of increasing

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energy prices. In view of these concerns on carbon pricing, greater flexibility in advising on the mix of climate mitigation instruments could be a pragmatic way forward to engage policymakers more effectively and foster greater cooperation.

Recently, the IMF has softened its stance on carbon pricing and has begun to rethink the role of non-pricing instruments. In March 2022, IMF Managing Director Kristalina Georgieva said, “We recommend a steadily rising carbon price — including by equivalent non-pricing measures...to ensure a just transition across and within countries” (IMF 2022a). IMF staff are moving in the direction of considering “equivalency” of carbon pricing and non-pricing instruments. For example, in the Article IVs with China (2021) and India (2022), the IMF recognized the two countries’ efforts to curb carbon emissions using market-based sectoral policies, subsidies and taxes. On the methodological front, an IMF working paper (Black et al. 2022) attempts to measure the “economy-wide price equivalent” for major countries, defined as the carbon prices that would yield the same emissions reduction as non-pricing policies. Examples of non-pricing policies include emission standards, technology mandates and fuel efficiency regulators. An independent IMF/Organisation for Economic Co-operation and Development (OECD) report for the G7 (2022) lays out a road map for data and analytical work to take stock of various mitigation instruments and work toward a methodology to estimate and compare the impact of these policies on emissions. This initiative is intended to promote better global coordination to reduce emissions using a broad range of price and non-price policies.

There has been an extensive academic literature on the choices of price and quantitative (e.g., permits and quotas) instruments to address environmental problems since the seminal work by Weitzman (1974). In recent years, the role of non-pricing instruments has received wider recognition as economists develop a deeper understanding of market imperfections. Finon (2019) shows that non-pricing instruments and policies, such as efficiency standards, market-oriented regulation and subsidies for clean technologies, can deal with market and regulatory failures, which are more widespread in developing countries than in developed countries. The Stern-Stiglitz report (2017) and Stiglitz (2019) also recognize the importance of the second-best nature of economies and suggest that carbon prices may need to be complemented by other well-designed policies tackling various market and government failure. Stiglitz (2019) argues that carbon taxes are regressive, and distribution is the central reason for going beyond a single carbon price. He uses an analytical model to show that a more nuanced policy where carbon prices are supplemented by regulations and other non-price interventions can increase societal welfare, because regulations and other non-price interventions may reduce the general level of carbon prices to achieve a given reduction in emissions and therefore reduce the resulting adverse distribution.

Failure to recognize the role of non-pricing instruments foregoes opportunities to explore more realistic paths toward coordinated policies. As the Task Force paper of He et al. (2022b) point out, a key problem with the IMF’s proposal of an ICPF is that it implicitly assumes that carbon pricing is the only climate policy instrument adopted by each country, which underestimates the efforts made by many countries using non-price instruments to incentivize decarbonization. For example, China uses green fiscal, financial policies and sectoral regulations to reduce carbon emissions, and India has excise duty on petrol and diesel and other sectoral policies. Such efforts should be considered equivalent to price instruments and be included in the broadly defined carbon prices. He et al. (2022b) suggest that the IMF should estimate the price equivalents of non-price policy instruments and recalibrate the desirable floor prices for broadly defined carbon prices that are inclusive of observed carbon prices and the price

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equivalent of non-pricing instruments. Going forward, the development of robust and widely accepted methodologies to assess the price equivalence of non-price policies will be a critically important input to advance the global discussions.

Improving the Understanding of Climate Policy Spillovers

Understanding the spillovers of climate risks (both physical and transition) is essential in policymaking. On the one hand, the IMF plays an important role in identifying and addressing the cross-border spillover effects of climate policies, especially those on the balance of payments and growth trajectories of vulnerable countries. On the other hand, spillovers of coordinated and uncoordinated climate actions at a global level have a great impact on global growth and burden sharing.

The IMF is intensifying its work on developing analytical foundations to understand the macro-critical spillovers of coordinated and uncoordinated climate policies. A notable example of the discussion on “transition spillovers” of the EU’s CBAM is in the Article IV of Bangladesh. There is also scope for bilateral surveillance, such as for fossil fuel exporters, to include analyses of the impact of spillovers from climate transition (see Chapter 3). Regarding multilateral surveillance, IMF flagship reports are giving increased attention to climate spillovers. For example, the October 2017 WEO discusses the effects of “physical” spillovers from climate-vulnerable economies on neighboring countries and further to advanced economies through the transmission channels of depressed economic activity, migration flow and higher conflict.

Several reports discuss the spillovers of “coordinated” climate policies. The 2022 External Sector Report draws on a novel dynamic general equilibrium model developed by the IMF to show the impact of a coordinated carbon price on global external balances. The 2022 WEO uses a nonlinear dynamic general equilibrium model to assess the near-term macroeconomic impact of globally coordinated carbon prices (WEO 2022). Black et al. (2022b) estimate the GDP costs of global coordinated carbon policies to be equivalent to a 0.1 percentage point reduction of annual GDP growth between 2023 and 2030.

Three valuable efforts could be further extended to address the following research gaps. First, while existing studies by the IMF focus on either physical spillovers or transition spillovers, the aggregate impact of both physical and transition spillovers are less explored. More work needs to be done in this area because many small economies are vulnerable to these spillovers. Second, the IMF’s studies on “coordinated policies,” based on the mainstream macroeconomic models, are prone to systemically underestimating the spillover effects and global impacts of the policies. Ambitious policies lead to structural changes in the economies over the long run, and frictions in labor markets and financial markets may amplify the impact of policies in the short and medium run. But a common problem with mainstream macroeconomic models is that linear models are not equipped to capture structural changes, while nonlinear models are not rich enough to incorporate sectoral details and market frictions. Third, the IMF’s studies on coordinated policies are heavily focused on “first-best” global carbon prices, which are widely recognized as optimal policies in theory but are not realistic in practice. This distorts the understanding of global burden sharing. More research should be done to explore the spillovers of real-world relevant coordinated and uncoordinated climate actions.

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Several Task Force papers (see Chapter 2 Annex) provide useful inputs to recommendations to strengthen the IMF’s work on spillovers along the directions mentioned above. First, it is critically important for the IMF to have a consistent and robust modeling framework (e.g., for near- and long-term analyses) to form the basis for developing a “coordinated policy” proposal. The 2022 External Sector Report is a first attempt in this direction. The ideal model should be rich enough to consider both transition and physical spillovers and to explore the considerations of balance of payments, fiscal sustainability and economic growth in an integrated framework.

Two Task Force papers contribute to this effort and use state-of-the-art methodologies to analyze the spillovers on vulnerable countries’ balance of payment, fiscal sustainability and economic growth. Gourdel, Monasterolo and Gallagher (2022) use a tailored EIRIN Stock-Flow Consistent behavioral model to study the transition spillovers from a net-zero transition of a major emitter (China) on a major coal producer (Indonesia). Gourdel and Monasterolo (2022) use a similar methodology to study the spillovers of the global transition on a climate-vulnerable country (Barbados). In both studies, the authors find more sizable impacts of a systemic country’s climate policies and global climate policies than those found in the IMF studies, such as the October 2022 WEO and Black et al. (2022b). Task Force papers provide alternative modeling strategies for and views on the impact of climate policies.

Second, to inform the future design of international coordinated policies and recognizing the adverse distributional impacts of the theoretically first-best global carbon prices, more attention should be devoted to coordinated policies that have the potential to obtain buy-in from key stakeholders. As noted, the IMF strongly promotes a policy regime of ICPFs, with differentiated price floors for countries at different development stages, as an ideal policy to scale up mitigation globally (Parry, Black and Roaf 2021; Chateau, Jaumotte and Schwerhoff 2022b), and equity concerns are accounted for through differentiated carbon prices between developed and developing economies (Parry, Black and Zhunussova 2022). However, the policy proposal has not gained widespread buy-in, especially among developing countries.

The Task Force paper by He et al. (2022b) contributes to this discussion and shows that this proposal has fundamental problems. The authors conduct a quantitative analysis to show that the ICPF regime, even with differentiated price floors, has adverse distributional impacts and places additional burdens of emissions reductions fully on developing economies. The ICPFs, even if agreed upon only among the six big emitters (the U.S., the U.K., the EU, Canada, China and India), will also have significant spillover effects on nonacting countries and will widen the gap between developed and developing countries. In other words, although ICPFs with differentiated price floors improve burden sharing compared to a global uniform carbon price, they still have significantly adverse distributional effects, explaining in part, perhaps, why the policy proposal has not gained widespread buy-in, especially among developing countries.

In addition, an IMF working paper by Keen, Parry and Roaf (2021) suggests that if border carbon adjustments are used unilaterally, they might increase interest in the possibility of formal price coordination mechanisms. But as He et al. (2022b) show, if border carbon adjustments are implemented by the G7, they will have a limited impact on China and India and therefore will not provide sufficient incentives for those two countries to participate in the ICPF arrangement. The IMF needs more careful study in this area to advance its policy proposal.

Moreover, unlike in many other areas where this type of model failure can be observed from historical data, globally coordinated climate policies at the scale to achieve net zero have not been seen in history, and therefore, no historical data or empirical evidence can inform the

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magnitude of the policy impact. This is particularly the case when the policies are coordinated globally. In light of these challenges, the IMF should devote further efforts to develop analytical frameworks to better shape our understanding of the spillovers of climate policies from an aggregate perspective.

Devoting More Attention to Climate-Related Debt Issues

In the post-pandemic era, with the global public debt rising to historic highs, the issue of fiscal sustainability of climate-vulnerable countries has gained increasing attention. As underscored by the United Nations Conference on Trade and Development (2022), increasingly unsustainable debt burdens together with rising climate challenges are forming a vicious cycle of perpetual vulnerability in developing countries. The econometric analysis conducted by Kling et al. (2018) shows that climate risks lead to a significant increase — 120 basis points on average — in borrowing costs. Beirne, Renzhi and Volz (2021) show that climate vulnerability has significant impacts on credit spreads in developing countries but not on spreads in advanced economies. Recent work by IMF staff also arrives at similar conclusions. Cevik and Jalles (2020) show that a 1 percentage point increase in climate change vulnerability is associated with an increase of 0.58 percent in long-term government bond spreads. Their findings echo Beirne, Renzhi and Volz (2021) in that the impacts on the borrowing costs are asymmetric for developing economies and advanced economies.

Adaptation investments are needed to improve resilience, but they are expensive. According to Buchner et al. (2019), the estimated adaptation costs for 46 countries are about 1.5 percent of GDP annually from 2015 to 2030, with large variations across countries. The recent work of Aligishiev, Bellon and Massetti (2022) at the IMF show that annual adaptation costs exceed 1 percent of GDP for some developing countries and above 10 percent of GDP for some island economies.

While the existing research provides strong empirical evidence on the link between climate risks and fiscal sustainability, the coverage of climate-related debt issues in multilateral surveillance is limited. Thus, the discussion of measures to address climate-related debt problems that require multilateral cooperation could be given more attention. Such cooperation will be important in four areas. First, small developing countries that are likely to suffer from disproportionate and significant losses due to more frequent and intense climate disasters typically need to borrow to address losses and damages. Those countries are less able to afford adaptation investments, which exacerbates the situation. Keeping up borrowing every time a climate disaster hits is unsustainable, and relying solely on domestic resources and debt financing will simply not be sufficient nor fair. Financing loss and damage and adequate adaptation investments will require multilateral cooperation. However, the IMF's climate strategy considers adaptation to be an issue mainly for bilateral surveillance.

Second, mitigation policies by systemic countries can negatively affect the economic growth and fiscal sustainability of vulnerable countries. The Task Force papers of Gourdel, Monasterolo and Gallagher (2022) and Gourdel and Monasterolo (2022) find that transition spillover risks from systemic countries will increase the sovereign risks of vulnerable countries and may put their debt on an unsustainable path. Understanding the interactions between climate policies and sovereign debt sustainability, as well as the role of cross-border spillovers, is important for the IMF to improve its surveillance function.

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Third, the IMF has emphasized that the potential revenues from carbon taxes can be sizable and a major source of support for green investments that lead to economic growth. Assuming these revenues will materialize, especially in light of the experience on carbon taxation so far, may lead to underestimating the fiscal risks associated with climate mitigation. Studies by Task Force members provide analytical evidence that highlight such risk. Specifically, Titelman et al. (2022)'s study on Latin America and the Caribbean (LAC) find that carbon taxes provide little relief for most LAC countries that face plummeting fossil fuel revenues. The paper suggests that fossil fuel exporters and other countries that rely heavily on carbon-intensive industries will find it very challenging to maintain a sustainable debt path, even if carbon pricing policies are fully implemented. In other words, the global transition has great impact on these countries' debt sustainability.

Fourth, when debt restructurings become inevitable, there should be a global solution that can be replicated widely. Managing Director Georgieva and coauthors in an IMF blog argue that debt-for-climate swaps can help free up fiscal resources without triggering a fiscal crisis, citing the research by Chamon et al. (2022). But they also conclude that the swaps only work for a single creditor with small amount of debt reduction and the fiscal space from such reduction can then finance climate investments. Cohen et al. (2020), in an IMF staff discussion paper, point to the role that state-contingent debt instruments, including "natural disaster" clauses, can play in debt restructurings in climate-vulnerable countries, by allowing for maturity extensions and interest forbearance following severe shocks. These clauses can be increasingly relevant in future restructurings because of growing risks due to climate change. Bolton et al. (2022) in the 25th Geneva Report suggest the importance of enhancing countries' creditworthiness, and tools such as climate-conditional grants are likely to be efficient. This is because climate-conditional grants can strengthen (at least not worsen) a country's fiscal position while at the same time providing incentives for climate investments.

Against this background, it is recommended that the IMF's multilateral surveillance devotes more attention to addressing climate-related debt issues, particularly in climate-vulnerable countries. First, the IMF should consider including adaptation in its multilateral surveillance. As discussed above, finance for adaptation investments needs fiscal resources, which will be jeopardized if countries suffer from recurrent natural disasters or transition spillovers from other countries. Multilateral coordination is needed to help climate-vulnerable countries with limited fiscal space to tackle loss and damage and invest toward greater resilience.

Second, surveillance would benefit from further incorporating dynamics of sovereign debt in macroeconomic models. We note, for example, the impact of the high cost of climate transitions on debt sustainability trajectories of fossil fuel exporters. The current methodologies adopted by the IMF in studying the macroeconomic impact of climate policies typically abstract from the dynamics of sovereign risks and defaults and could therefore be prone to underestimate the risks associated with debt. Third, the IMF could further explore the role of contingent forms of financing, such as state-contingent debt instrument or climate-conditional grants. Debt instruments that are designed to alleviate financial burdens when climate-related disasters occur will help countries manage debt vulnerability, particularly as the frequency of climate-related disasters increases.

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Scaling Up Climate Finance to Support Investments and a Just Transition

The debate for a just transition in tackling climate change has focused strongly on multilateral cooperation to scale up climate financing to support the investment push in developing countries. To date, global cooperation to deliver adequate climate financing remains unresolved. The creation of the RST at the IMF and the agreement in the 27th UN Climate Conference (COP27) to establish funding arrangements for loss and damage including a fund are positive steps. But the annual \$100 billion financing that advanced countries pledged in 2009 and reaffirmed under the Paris Climate Agreement has yet to be fulfilled (United Nations Framework Convention on Climate Change 2022), and prospects for significantly scaling of climate financing to developing countries remain uncertain.

The IMF's analytical work on the road to net-zero emissions concludes that increasing climate finance will be needed to promote an equitable global transition. Implementing a globally coordinated carbon price floor will shift incentives toward low-carbon investments and raise revenues to pay for green investments. In addition, however, bilateral transfers to low- and middle-income countries will be needed to “ensure that the global distribution of mitigation burdens is progressive and supports the development needs of low-income countries” (Black et al. 2022, p. 4). IMF analysis also points to large adaptation costs in some climate-vulnerable countries, which are challenged by limited fiscal space and capacity,⁴ and therefore call for support from the international community (Aligishiev, Bellon and Massetti 2022).

More broadly, an IMF staff working paper by Wiegand (2021) provides an *equity* as well as an efficiency case for climate financing. There is an *equity* case for climate compensation from advanced countries, which have used up much of the atmosphere's carbon absorptive capacity, to the smaller developing economies.⁵ There also is an *efficiency* case to support larger developing countries with mutually agreed compensation conditioned on climate actions. Compensation for climate can take the form of grants, debt relief and concessional financing. Sharing improvements in clean energy technologies with developing countries should be an important complement to financial transfers.

Other prominent analytical work⁶ estimates the gaps in climate finance based on empirical projections of the volume of investments needed to transform key economic sectors in developing countries. According to the recent report of the Independent High-Level Expert Panel by Songwe, Stern and Bhattacharya (2022), developing countries other than China will require about \$1 trillion per year of external climate financing by 2030.⁷ This would finance the shift to low-carbon investments, support adaptation investments and pay for loss and damage. The panel urges global actions to implement a financing package, which includes providing more concessional finance, tripling financial flows from multilateral development banks

⁴ Chamon et al. (2022) further show that climate-vulnerable countries tend to face high levels of fiscal risks.

⁵ See also IMF (2019), which shows the disproportionate economic cost of climate disasters on small climate-vulnerable economies.

⁶ Some provide proposals to achieve fairness by changing the architecture of climate finance. Rajan (2021) proposes a global carbon initiative (GCI), in which countries that emit more than the global emissions average would pay into a global incentive fund: amounts would be based on their excess emissions multiplied by the GCI, and low emitters would receive payments. This initiative would therefore provide incentives to mitigate but also uphold fair burden sharing and the principle of differentiated responsibilities. Sachs (2021) also proposes a global formula to assign responsibility to rich countries in delivering climate finance. In this proposed approach, high- and middle-income countries pay a levy based on their emissions and proceeds are shared as grants to developing countries and/or are injected as capital in MDBs. Levies based on past emissions will be used to support loss and damage, thus recognizing historical responsibility.

⁷ See also Bhattacharya et al. (2022).

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(MDBs) and resolving debt and liquidity issues facing many developing countries. Expanding concessional finance requires not only more bilateral financing but also innovative sources of financing, such as through allocations or rechanneling SDRs,⁸ voluntary carbon markets and guarantees by international financial institutions. The recently launched G7-V20 Global Shield against climate risks aims to increase financial protection through parametric and trigger-based financing. The Bridgetown Initiative put forth by Barbados also proposed innovative instruments to increase the volume and lower the cost of capital for mitigation and adaptation (see Persaud 2022). In addition, it also catalyzed the creation of the Loss and Damage Facility, which could be funded by proceeds from taxing fossil fuel production and/or from carbon taxation in advanced countries.

Regional- and country-level analyses conducted by the Task Force show that the climate transition will give rise to significant fiscal risks, reflecting the importance of the availability of affordable long-term financing options to complement domestic resources. Titelman et al. (2022) show that the climate transition will lead to significant and mounting fiscal pressures and risks of explosive debt levels among the hydrocarbon-producing countries in Latin America. If physical risks from climate shocks are built into the IMF's debt sustainability assessment, simulations for two countries in Latin America show that public debt trajectories will rise and countries' debts will converge at higher levels (Gallagher and Maldonado 2022). A Task Force paper on Africa shows that if the current trend increase in the average temperature in the region persists, real GDP growth could decline by 2 percentage points by 2030, which will in turn worsen budget deficits and debt burdens (Asafu-Adjaye, Ndung'u and Shimeles 2022).

Multilateral cooperation on climate financing is an essential pillar of a globally just climate transition, and its success will create the fiscal space to accelerate climate-related investments in developing countries while also ensuring that other development priorities are attended to. Its failure could result in continued delays in climate mitigation as well as adaptation actions that pose risks to development prospects. The IMF has an important leadership role to play in catalyzing discussions around a new multilateral goal for climate finance that is better aligned with the estimated investment needs of developing countries. Alternative sources to increase external climate financing need to be considered since it is highly likely that coverage of national carbon pricing policies will remain limited in the foreseeable future. Developing countries will, therefore, need additional sources of scaled-up fiscal support for the investments needed to address climate change within their broader development agenda.

To enhance the quality and affordability of climate finance, the IMF should catalyze global cooperation to increase low-cost, concessional and grant climate financing from various sources. Financing should cover mitigation and adaptation requirements as well as support for countries to recover the loss and damage from climate disasters. The G20 has advanced proposals to scale up the lending capacities of MDBs by reforming their capital adequacy frameworks; consultations on feasible measures within each MDB are ongoing. This effort will complement future capital increases to further boost the MDBs' lending headroom.

The IMF is also well positioned to explore the potential for other funding sources. Proposals include using proceeds from carbon taxation and carbon border adjustment measures⁹ in

⁸ See also the V20 statement on opportunities for the RST, through which SDRs are channeled for on-lending, to support climate-vulnerable countries (V20 2021).

⁹ He et al. (2022a) propose that revenues from the carbon border adjustment measures be used to support climate actions of developing countries even while not providing specific steps to make this happen.

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advanced countries to support decarbonization efforts in developing countries. Another option is to use SDR reserves for climate financing beyond the RST. More could be done to enable international financial institutions beyond the IMF, such as MDBs and regional monetary institutions, to leverage idle SDRs (Plant 2022; Persaud 2022). More fundamental reforms of the SDR system to better align access to financing with liquidity needs of countries when crises occur could be considered for further discussion within the IMF's agenda.¹⁰

Enhancing the Development Orientation of Multilateral Surveillance

The IMF has been reshaping its approach to surveillance to better integrate the impact of climate change. It has been a prominent presence in calling for international coordination on climate policies, especially among major emitting countries, and for upgrading the ambition of their climate strategies to meet global climate targets. This chapter points to a number of areas where the macroeconomic implications of the global transition on developing countries could better inform approaches to policy formulation and financing and where coordination is essential to promote equitable burden sharing. Going forward, we recommend the following steps to improve the development orientation for multilateral surveillance.

First, to inform the design of a globally coordinated ICPF, it is essential for the IMF to develop a robust framework to assess the price equivalent of non-pricing instruments, which can be systematically applied across countries. Accordingly, the IMF will need to devote more attention to developing methodologies that can be *widely accepted* among developed and developing countries. Second, there needs to be an increase in efforts to develop analytical frameworks to improve understanding of the spillovers of climate policies from an aggregate perspective. This should better inform estimates of the cost of climate transitions and therefore the scale of the measures needed to ensure equitable burden sharing. Further analyses could also be done on spillovers (both physical and transition) from climate policies that pose risks to both growth prospects and macroeconomic stability.

Third, more attention needs to be devoted to addressing debt-related climate risks. There is good evidence linking high levels of debt vulnerabilities to unraveling physical risks of climate change. The IMF could catalyze multilateral cooperation to finance loss and damage and adaptation investments and to devise replicable instruments that could improve the debt sustainability of climate-vulnerable countries. Fourth, it is necessary to embrace the full implications of a just transition and strengthen the IMF's role in fostering multilateral cooperation to scale up climate financing to provide fiscal support for public investments and crowd in affordable private finance. The IMF can play an important role in exploring new sources of financing through its global leadership role and partnerships with other international institutions. Such cooperation should ensure that the level and quality of financing are better aligned with the enormous investment needs to achieve low-carbon and resilient economies.

¹⁰ See, e.g., Truman (2022) and Chmielewska and Slawinski (2021).

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CHAPTER 3

Climate Change Risks and IMF Article IV Consultations: Conceptual, Analytical and Operational Challenges

INTRODUCTION

In its 2021 CSR, the IMF identified climate change as a key risk for economic and financial stability. The CSR includes guidance for the development of not only the supervision activity itself but also the tools and models to use in this context for climate modeling (IMF 2021b). In the context of active experimentation and development by the IMF and other international financial institutions, it is thus key to develop a critical view of the work done so far to best guide the implementation of future tools for policymaking.

Regarding the FSAP, the review highlights the importance of extending the modeling toolkit used for climate risk analysis at the IMF (IMF 2021c). In this regard, the IMF identified the following priorities:

- to assess the financial stability risks at both a medium- (3–5 years) and a long-term (30–50 years) horizon;
- to consider both physical and transition risks, with collaboration on climate scientists for the former; and
- to cooperate with other international institutions.

As part of the CSR, the IMF examined cross-boundary spillovers, i.e., secondary effects from a policy in country A affecting the economy of country B (IMF 2021a). Further still, it provides neither detailed analysis nor surveillance guidance to deal with spillovers that would stem from the uncoordinated introduction of climate mitigation policies in a region. Nevertheless, recent research has shown that climate transition spillover risks could emerge from the unilateral introduction of climate policies (e.g., carbon pricing) in a country, such as decreasing its import of fossil fuels and high-carbon goods from a trading partner country, which would eventually affect the balance of payments and the fiscal and financial stability of the latter (Gourdel, Monasterolo and Gallagher 2022; Gourdel and Monasterolo 2022). The IMF has a crucial role to play in assessing cross-border spillover risks since they are relevant for its mandate and are not included in the supervisory climate scenarios codeveloped by the Network for Greening the Financial System (NGFS) (Bertram et al. 2021; NGFS 2021; Richters et al. 2021).

Recent research has shown that different drivers of transition spillover risk exist in EMDEs. For instance, in a fossil fuel-exporting country such as Indonesia, the spillover could materialize as reduced demand in fossil fuels from other countries. In addition, countries such as

Barbados are dependent on tourism, which is supported by air travel subsidies that transition policies would reverse. In both cases, transition risk spillovers need to be incorporated into country-level macro-financial risk assessments since they can significantly impact the balance of payments and thus, public finances. Ultimately, this may also negatively affect the capacity of countries to introduce climate mitigation policies, find fiscal space and access international markets to invest in adaptation. Thus, neglecting transition spillover risks can lead to large errors in the estimation of losses and incoherent investment and policy decisions.

OVERVIEW OF IMF CLIMATE-RELATED ANALYSES

In this section, we provide an overview of the climate-related analyses conducted at a global and country level by the IMF. We first analyze studies focusing on climate mitigation policies and transition risk and then on those concerned with physical risk. We consider transition and physical risks separately due to the lack of an integrated assessment approach at the IMF to analyze both climate physical and transition risk dimensions together, especially in terms of debt sustainability.

Most analyses produced at the IMF build on dynamic stochastic general equilibrium (DSGE)-based macroeconomic models. This approach, while being largely used at central banks, has some well-known limitations in the context of EMDEs (e.g., modeling the structure of the labor market, elasticities, calibration) and in capturing the characteristics of climate risks (nonlinearity, deep uncertainty, tipping points and endogeneity; see Monasterolo 2020). Nonetheless, the IMF has not yet committed to any particular model given its use and adaptation of a variety of them so far.

Climate Transition Risk Modeling and Assessments

The IMF has published on transition risk through most of its major publication outputs, such as the *WEO* (Barrett et al. 2020; Andaloussi et al. 2022), the *Fiscal Monitor* (IMF 2019a) and *Finance and Development* (IMF 2019c). In Barrett et al. (2020), the authors conduct simulations with a computable general equilibrium (CGE) model with global coverage, divided into ten countries/regions (McKibbin and Wilcoxon 1999, 2013; Liu et al. 2020). This work now appears as more preliminary and aims at providing a first quantification of the effect of climate change and the cost of mitigation policies. The model includes central banks but not the rest of the financial system. As these are long-term simulations, different damage functions are also used in the model.

In the IMF's *WEO* (October 2022), Andaloussi et al. (2022) assess costs entailed by the low-carbon transition in the short term and the importance of key policy factors behind it. They use the in-house Global Macroeconomic Model for the Energy Transition (GMMET), which is a New Keynesian DSGE multiregional model, built as an extension of the IMF's Global Integrated Monetary and Fiscal (GIMF) model (Kumhof et al. 2010; Anderson et al. 2013). However, the modeling approach of Andaloussi et al. (2022) doesn't consider the developments introduced by Andrle et al. (2015) regarding the banking sector, and it thus has a very limited representation of the role of finance. The central message from their study is that the near-term economic costs of low-carbon transitions are limited relative to the long-term negative impacts, coherently with the results of the European Central Bank's economy-wide climate stress test (Alogoskoufis et al. 2021). However, the authors assume a baseline where

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agents have a perfect view of future carbon prices, and the situation where future carbon price increases are uncertain is considered a deviation due to the policymakers' lack of credibility.

At the country level, one of the first IMF works on transition has been that of Grippa and Mann (2020) for Norway. It focuses on transition risk induced by the increase in carbon price that considers four scenarios, a global carbon price and a new supply-demand equilibrium on top of the domestic one. The exercise takes a firm-level balance sheet approach, where bank loans are affected based on sectoral data. It assumes no pass-through locally so that the cost of the tax is borne by firms. As a difference from the above, this analysis is more aligned to the climate stress-test approaches developed so far by several central banks and financial regulators (e.g., Allen et al. 2020; Clerc et al. 2021; Vermeulen et al. 2021; Alogoskoufis et al. 2021).

In Chen et al. (2020) the authors analyze the impact of climate mitigation policies in the EU using the CGE model Envisage, documented in Van de Mensbrugge (2019). The development of this model originates from the World Bank and the OECD. It includes an emissions and climate module, with climate-economy feedback that allows for chronic risk to be modeled as well. The authors set an emission target, and the model then gives the carbon price needed to achieve it as well as its economic impact. With a 50 percent reduction target of carbon emissions by 2030, the authors apply different policy scenarios. For instance, they find that relying on the emissions trading system would imply a carbon price of €101 by 2030. Other policies tested include the "national targets" scenario, with countries individually intervening in their carbon-intensive sectors, or a "renewable investment subsidy" scenario (regarding how the carbon tax is recycled).

Climate Physical Risk Modeling and Climate Stress Tests at the IMF

The first paper involving staff and data input from the IMF is that of Marto, Papageorgiou and Klyuev (2018), with a model developed and applied to Vanuatu. It is a dynamic two-sector small open economy model to simulate the impact of natural disasters and associated policy trade-offs between adaptation investment and contingency planning. The goal is to determine where additional funding by donors could be best put to use. Two types of infrastructure are available for investment: standard and adaptation (suffers fewer damages and depreciates more slowly). Importantly, it features five transmission channels of damage to the economy. While exhaustive, it raises the issue of a lack of data and methods to calibrate all channels used. The model is later used in Kinoshita et al. (2020) for Samoa, a country that presents similarities in its exposure to extreme weather events. It relies in that case on the experience of cyclone Evan, used as a single synthetic natural disaster.

Two papers have also been dedicated to the Philippines (Regelink 2019; Hallegatte et al. 2022). As for other countries studied, the Philippines are especially exposed to extreme weather events. However, different from small island countries, the size of the Philippines is such that the location and/or trajectory of any event is of crucial importance. Indeed, while all locations on a small island are likely to be affected at the same time by a hurricane, the study of a bigger country requires a disaggregation that allows considering both hurricanes that would affect the hinterlands or another hitting Manila. The strength of these papers is that they rely on state-of-the-art, country-level climatological studies that can inform the modeling of extreme weather events (Gallo et al. 2019).

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The first paper, Regelink (2019), relies on an insurance industry's catastrophe risk modeling. It analyzes past natural disasters in the Philippines, both earthquakes and typhoons, with a Monte Carlo approach to generate thousands of potential future events. Climate change influence is modeled via five regional scenarios under RCP8.5 for the evolution of physical risk, based on projections by the Philippine Atmospheric, Geophysical and Astronomical Services Administration.

The second paper, Hallegatte et al. (2022), is in line with Regelink (2019), sharing a large part of its methodology. It can be decomposed into four modules: a climate scenario (future projection of typhoon likelihood and intensity); a disaster scenario; a macro-financial scenario; and stress-test modules, which use existing tools to shock the banking system. The exercise includes a DSGE macro module with a long-lasting total factor productivity decline. Interestingly the authors compare the outcome of the first two modules to that produced by the NGFS with CLIMADA (Aznar-Siguan and Bresch 2019; Bresch and Aznar-Siguan 2021), and thus it adopts a very similar approach to Alogoskoufis et al. (2021). They find that simulated scenarios are of the same magnitude where the two have an intersection.

Last, an FSAP conducted for the Bahamas (IMF 2019b) has brought innovations in the range of risks considered by using scenarios of compounding risks. Indeed, it considers the impact of shocks such as tourist arrivals on top of that of a hurricane, with the U.S. housing market as a driving factor. The impact of a hurricane is calibrated based on the International Disaster Database EM-DAT, measuring damages to the capital stock as a percentage of nominal GDP. Its simulations rely on a New Keynesian DSGE model and show that the banking system is resilient to the credit risk entailed by the compounded climate shock.

TOWARD A SCIENCE-BASED CLIMATE TOOLKIT FOR THE IMF'S DEBT SUSTAINABILITY ANALYSIS AND FSAPS

A robust assessment of climate-related financial risks at the country and regional levels is crucial to inform risk assessment and management tools. Physical climate and transition risks are relevant for sovereign fiscal and financial stability, particular in EMDEs, which are vulnerable to climate change and have high stocks of public debt and limited fiscal space to invest in mitigation and adaptation. Recent scientific evidence of growing climate impacts (Intergovernmental Panel on Climate Change 2021) and the geopolitical response to the war in Ukraine, which increased reliance on fossil fuel energy sources, make tail risk scenarios and compound physical and transition risk scenarios more relevant for sovereign risk assessment and management. In this context, despite growing investment needs, prolonged high inflation makes public debt refinancing and public investments costlier.

Moreover, the IMF could play a main role in strengthening climate financial risk assessment to inform tailored climate finance solutions for client countries to invest in climate mitigation and adaptation while avoiding a new debt burden. To this aim, it is very important for the IMF to rapidly strengthen its modeling tools to better assess climate risks for sovereigns and to integrate climate risk into country surveillance and in its lending toolkit.

With regards to the debt sustainability analysis (DSA), current models used at the IMF are not tailored to capture the impact of climate change shocks on public finance. Any ensuing risk underestimation could lead to unexpected debt accumulations. Below, we highlight five aspects that need improvement:

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- Time Horizons.** The time horizon of the analyses conducted at the IMF is mostly limited to three to five years. While a shorter time horizon is coherent with stress-test exercises, the challenge in the context of climate stress tests is to embed the characteristics of climate risks: forward-looking, deep uncertainty, nonlinearity and endogeneity. These elements can only be captured with mid- to long-term scenarios, across which the most significant physical climate impacts are expected to occur, and after 2030 for transition risk (“disorderly transition”; see Richters et al. 2021). Note also that the scenarios neglect the role of finance and investor expectations about climate risks and policy. However, recent research has shown that it is important to consider the interplay of investors’ expectations and policies when assessing the feasibility of the low-carbon transition scenarios and the associated risks (Battiston et al. 2021). Indeed, depending on their expectations, investors would revise (or not) their risk assessment and thus the cost of capital for high- and low-carbon firms (increasing it for high-carbon and decreasing it for low-carbon firms).
- State-of-the art scenarios.** The IMF’s use of scenarios is not aligned with the NGFS scenario framework which is used by over 120 central banks and financial regulators. While the representation of acute physical risk in the NGFS scenarios is still a work in progress, it is based on probabilistic risk assessment models (CLIMADA) and geolocalized data, thus allowing for a better translation of hazards into economic losses, which differs from aggregate integrated assessment models (e.g., DICE). With regards to transition risk, the NGFS provides six scenarios of orderly, disorderly and current policies, depending on the timing and stringency of the policy (i.e., carbon tax) introduction. The IMF, despite being an NGFS member, adopted a different approach with no clear reasoning as to why and with limitations that are increasingly being questioned.
- Macroeconomic models and climate risk assessments.** First, the use of mean-variance models with intertemporal optimization is well known to smooth the magnitude and duration of shocks and thus their relevance in informing risk management strategies (Dunz et al. 2021). Second, the increase in the granularity of sectoral representation would allow researchers to capture the drivers and heterogeneity of national exposure to climate physical risk, which differs widely for agriculture and energy, and to transition risk, depending on the energy technology used for business (fossil fuel or renewable). Third, the lack of balance sheet representation and interaction prevents the assessment of the indirect impacts and flow-on effects of climate physical risks and transition risks to other sectors of the economy. Fourth, the models are mostly top-down, while embedding a bottom-up approach would allow for increasing confidence in the tools developed and limited compliance on the path to a low-carbon economy defined and dictated by such analytical frameworks.
- Climate risks and sovereign risk.** In this connection, recent studies (e.g., Dibley et al., 2021) have argued that failing to account for climate change risks in sovereign debt evaluations and the credit ratings of countries could cause significant debt distress and contagion effects in the wake of major natural disasters. Failure to act could limit the possibility of low- and middle-income economies from accessing investments from international capital markets as most are vulnerable to climate risks and depend heavily on fossil fuel energy sources.
- Investment trade-offs.** Of particular concern is that the existing DSA frameworks do not capture the potential trade-off that low-income countries face between scaling up spending to fight climate risks and the critical public investment required to accelerate economic transformation. The IMF/World Bank DSA needs to be complemented by a more forward-looking, country-specific analytical framework to advise decision-makers on the optimal choices

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available to leverage debt for the purposes of productive investment that enhances employment and address inequality and poverty concerns (e.g., Adam et al. 2020).

The paper by Andaloussi et al. (2022), featured in the *WEO* (October 2022), presents an example of how there have been improvements. First, its main message is that climate policies “have a limited impact on output and inflation and don’t present a significant challenge for central banks.” However, the model only allows central banks to be affected via inflation and not via financial instability. This is driven by the fact that the model doesn’t include a financial sector connected with the real economy. Meanwhile, credit markets are likely to play a key role in enabling or hindering the transition (IPCC 2022). Neglecting this and finance-economy interactions may lead to irrelevant results in terms of access and cost of capital. This is, in turn, crucial to designing green financial sector initiatives to foster the transition, as recently discussed by the World Bank (Monasterolo et al. 2022).

With regards to the FSAP, the policy relevance of the model results would benefit from a better representation of the trade-offs between the cost of making the low-carbon transition by introducing climate policies (e.g., carbon tax) and the cost of inaction in terms of climate mitigation and adaptation. This, in turn, would allow for considering climate policies as both a cost and an investment, leading potentially to green multiplier effects (Batini et al. 2022). For example, on the one hand, the transition cost doesn’t include the cost of job losses in the carbon-intensive sectors and the cost of building low-carbon infrastructure. On the other hand, the cost of inaction in low-income countries doesn’t account for the foregone benefits of improved energy access. For example, providing access to clean cooking facilities could prevent around 300,000 children from dying annually from acute respiratory tract infections, according to the World Health Organization.

The general GDP-maximizing approach is also questionable to the extent that the current allocation of gross value added between sectors is a driver of unsustainability in the status quo. Thus, the studies presented do not identify how investment allocations could shift towards growth-enhancing areas and insufficiently address the risk of stranding assets and losses that stem directly from the current structure of GDP.

Recommendations to Strengthen Physical Risk Assessments

- **Model acute (including tail risk) and chronic physical risks and their economic dimensions.** We continue to observe a general reliance on Nordhaus’ DICE model in the IMF’s analytical work, which has well-known limitations for assessing the macroeconomic impact of climate physical risks and designing appropriate climate policy responses. It features a damage function and discount rate that lead to underestimated magnitude and persistent shocks as well as the need for early and ambitious policy response for mitigation (carbon tax). A first fix for this issue would be to replace or complement DICE with IPCC scenarios (e.g., Inter-Sectoral Impact Model Intercomparison Project, known as ISIMIP). In this regard, it is important to either develop sufficient collaborations to access data on extreme weather events that is adapted as an input to macroeconomic models or streamline the use of more generally applicable tools such as CLIMADA, as also recommended by the NGFS (Bavandi et al. 2022). Chronic risks also need to be captured more effectively.
- **Consider compound risk scenarios and their path dependence.** As recent history shows, climate-related hazards (such as floods, hurricanes or droughts) do not happen in isolation

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but can compound either among themselves (e.g., the case of multiform flood risk; see Kruczkiewicz et al. 2022) or with other shocks (e.g., the COVID-19 pandemic; see Ranger, Mahul and Monasterolo 2022). Considering compound risk scenarios is crucial to avoid underestimating risks and to plan an adequate fiscal and financial policy response (Monasterolo et al. 2022). When risks compound, they amplify the magnitude and duration of economic shocks, leading to hysteresis (Dunz, Naqvi and Monasterolo 2021). While the Bahamas FSAP (IMF 2019b) is a notable exception, the IMF’s work would benefit from further streamlining the practice of evaluating the projected climate-stressed position of a country in the context of its capacity for sustaining other concurrent or subsequent risks. A back-of-the-envelope calculation tells us that the probability of seeing two “one in a hundred years” events within a 40-year time frame is about the same as that of seeing one “one in five hundred years” event. Yet, only the impact of the latter is taken into consideration so far by IMF studies that have adapted actuarial tools for their physical risk assessment (e.g., Hallegatte et al. 2022). However, these tools are often developed for contemporary valuations and do not embed concepts of longer-term macroeconomic modeling. Thus, existing studies tend to miss the importance of path dependence and long-run measures of the effect of physical risk on sovereign debt. Models and scenarios should be extended to consider how successive extreme weather events can compound, i.e., how a first non-systemic event could weaken the economy to the point that a subsequent similar event would become systemic. This in turn requires models that include features such as stochastic acute physical modeling over time horizons closer to the ones where integrated assessment models operate (Gourdel, Monasterolo and Gallagher 2022). This would allow for a broader range of physical risk planning, while relying on one-off shocks would be too narrow. This would also eventually lead to more exhaustive policy recommendations from these models.

- **Consider the cascading implications of climate risks in the design of financially relevant scenarios.** Climate physical risks need to be understood as a starting point of cascading climate risks; other severe consequences of climate change such as conflict are not captured yet but would be relevant.
- **Strengthen geographical representation and downscaling efforts.** The downscaling of climate physical risks at the relevant geographic level (e.g., country subregions and islands) should be improved to better capture the characteristics of exposure and vulnerabilities of small islands and states, which in turn would be more relevant for policy. Better geographical disaggregation of shocks would benefit from considering the asset-level dimension of shocks (at best sector- or firm-level data). Research has shown that neglecting asset-level information (i.e., the location of productive plants and their role in the business value chain) leads to a 70 percent underestimation of disaster losses for investors when asset-specific information is not taken into account disasters (Bressan et al. 2022). Science-based frameworks for physical risk data collection can help identify and rectify information gaps (such as geolocalized assets, asset-level climate finance information). In this regard, there is a need to invest in acquiring better data on climate-proofing infrastructure and supporting related capacity building efforts where external expertise is necessary.
- **Improve and streamline the methods and tools.** While we understand that the IMF is still in the process of testing different modeling options, standardizing the modeling choice for broader use in country-level assessments would support building technical capacity in the client countries.

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Recommendations to Strengthen Transition Risk Assessment

- **Acknowledge the limits of greenhouse gas (GHG) emissions accounting and environmental, social and governance (ESG) score disclosure, and analyze transition risk exposure based on metrics that account for the energy technology profile of activities.**

The transition risk assessment of economic activities is based on firms' GHG emissions or their ESG scores. However, both are subject to major limitations as highlighted in the literature. On the one hand, GHG emissions are self-reported by large and publicly-listed firms in the absence of national or international supervision emissions reporting which leaves a large space for greenwashing. In turn, poor reporting limits the understanding of firms' and sovereigns' exposure to carbon-stranded assets. For instance, a coal-based utility could reduce its scope 1 emissions intensity by expanding its business in trading, without investing in the decarbonization of its plants. Another example relates to scope 3 emissions disclosure where the variance in emissions is wide across companies in the same industry – the global automaker Stellantis' scope 3 emissions were 30 times less than Volkswagen's, another automaker (Bressan et al. 2022). Finally, ESG scores for the same firm across rating agencies are poorly correlated which gives rise to “aggregate confusion” (Berg, Koelbel and Rigobon 2022). The IMF should consider complementing the analyses of transition risk based on emissions and ESG scores with energy technology profiles (CAPEX), business models (fossil fuel substitutability) and policy processes. Relevant starting points are the Climate Policy Relevant Sectors (Battiston et al. 2017, 2021).

- **Align transition risk scenarios with supervisory practice.** Climate transition risk scenarios are crucial for climate stress tests. However, current scenarios for transition risk used by the IMF neglect the standard best practices used by academia and financial supervisors for climate financial risk assessment and climate stress test in the world, i.e., the NGFS climate scenarios that are developed by process-based integrated assessment models and probabilistic risk assessment models reviewed by the IPCC.
- **Consider spillover transition risk scenarios.** Research has shown that climate transition risks are not confined to a country's borders (imagine the introduction of climate policies and regulations in a country that ratified the Paris Climate Agreement). Transition risks can spill over from a country that introduces a climate policy such as carbon pricing to its trading partner of carbon-intensive goods or fossil fuels, negatively affecting the latter's balance of payments, fiscal stability and sovereign debt (Gourdel, Monasterolo and Gallagher 2022). Consider, for instance, the case of China, which is a major importer of fossil fuels from Indonesia. Since China recently introduced ambitious carbon pricing policies, its import of fossil fuels from Indonesia is likely to decline. This could negatively affect Indonesia's export balance, the profitability of Indonesia's mining firms and their contribution to fiscal revenue, with attendant implications for Indonesia's balance of payments and sovereign debt. Thus, considering spillover risks is important to avoid the underestimation of climate risk for sovereigns. In its analytical work, the IMF should also embed the role of finance, the interplay between investors' expectations and policy credibility on the realization of scenarios (“climate sentiments”; see Dunz, Naqvi and Monasterolo 2021; Battiston et al. 2021).
- **Consider the key role of finance and investors' expectations (Battiston et al. 2021).** Although the financial system has been incorporated into some DSGE models since the global financial crisis, this has been done in the context of “financial frictions” without considering the endogenous buildup of financial fragility (Galí 2018), the endogeneity of

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money (Palley 2002) and the role of financial complexity and interconnectedness. DSGE models within the New Keynesian tradition assume frictions on prices (e.g., sticky prices), whereas real business cycle DSGE models usually assume an immediate adjustment in relative prices that equilibrate supply and demand. In DSGE and real business cycle models, the representation of the finance sector and its complexity is poor or missing, and the role of banks is limited to an intermediary between saving and investments. Finally, the interest rate is considered the intertemporal cost of consumption, thus affecting saving decisions.

More generally, while the IMF's analytical work needs to coalesce around a dedicated modeling toolkit, the IMF needs to adopt a critical perspective and recognize how the assumptions underpinning its modeling exercises are impacting findings. More specifically, there are drawbacks to using DSGE and CGE models, as highlighted previously in the literature. Both generally assume that agents have rational expectations and perfect foresight, economic shocks are completely exogenous, and the optimal government's policy is limited to addressing market failures. These models find price equilibrium, thus preventing the analysis of mispricing and uncoordinated agents' responses that can give rise to amplification effects (i.e., reinforcing feedback) and hysteresis.

Recommendations to Strengthen Macroeconomic Modeling of Climate Risks and Policy Response

In the context of climate risk analyses, the IMF may consider strengthening and complementing its workhorse models with macro-financial models to do the following:

- Smooth, strong assumptions about forward-looking expectations, complete markets and agents' representativeness, which would lead to fast recovery even in the face of large shocks.
- Integrate finance and the financial sector (e.g., leverage, interconnectedness), and connect them to government decisions and firm investment dynamics.
- Integrate the interplay between investors' expectations and policy credibility since the interaction can massively affect financial risk assessment and thus the cost and availability of capital for firms and sovereigns.
- Consider integrating the current macroeconomic models with macro-financial models based on dynamic balance sheet assessments to analyze:
 - shock entry points in the economy and transmission channels (direct, indirect) and drivers of amplification effects;
 - economy-finance and finance-economy feedback as well as the adjustment in expectations leading to an adjustment in risk assessment, the cost of capital, investment decisions (firms' net present value) and decarbonization;
 - the potential nonlinearity of reinforcing feedbacks and the persistency of shocks in the economy and finance; and
 - a fully-fledged climate stress test to inform DSA and FSAP.

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Mexico City, México.
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CHAPTER 4

The IMF's Bilateral Surveillance: Fiscal Aspects

INTRODUCTION

It is widely acknowledged that many countries, especially those that are small and developing, are facing critical threats to fiscal sustainability emanating from ex-ante and ex-post fiscal costs of natural disasters and climate change. The key development challenges are building climate-resilient infrastructure without risking long-term debt sustainability and transitioning management and structural reforms that promote economic diversification for mitigating the impact of climate change. Meeting these challenges requires mobilizing funds and developing an investment-led green growth strategy, and the IMF can play crucial role in ensuring that developing countries address climate change in a fiscally sound and financially manner.

The IMF has deepened its policy guidance and engagement on climate change by focusing on broad pillars of mitigation, adaptation and transition to a low-carbon economy. However, it previously did not hold an official view of integrating climate change ab initio and has only recently started to acknowledge that climate change may be a macro-critical factor, i.e., a factor crucial to achieve macroeconomic and financial stability. In the 2021 CSR, the IMF clarified that macro-critical policies for climate change adaptation, mitigation and transition fall within the scope of the 2012 Integrated Surveillance Decision and are therefore suitable topics for both bilateral and multilateral surveillance (IMF 2021a). Further, in July 2021, the IMF published a strategy document for integrating climate change more deeply into core areas of its work. This Climate Change Strategy is closely linked to the conclusions of the 2021 CSR and concerns all layers of IMF surveillance, bilateral and multilateral, and purports to comprehensively address climate-related policy challenges in both of these layers in the next three years.

The targets include coverage of 60 climate-vulnerable countries every three years with 10 per year based on the CMAP and 10 per year without the CMAP on adaptation and resilience-building policy assessment. The IMF intends to cover the 20 largest emitters every three years, with in-depth coverage provided to six-seven countries every year. For transition management, the IMF aims to cover all countries every five-six years while providing in-depth coverage to eight-nine countries per year. The IMF guidance note, however, also states that the coverage of climate change will be assessed based on macro-criticality with a surveillance time path longer than three to five years and thus can be selective in consultation (IMF 2022a). The IMF has therefore arguably made concerted efforts deep rooting its institutional capacity for policy advice on climate change through surveillance activities and capacity development processes. These developments are laudable but not yet formalized.

The IMF, relying on its policy toolkits, has advocated for a combination of adaptation and mitigation policies for a just transition. The policy advice has ranged from building natural disaster and climate-resilient adaptation policies to using carbon pricing and emission trading systems and feebates. The fiscal implications of managing the transition and implementing policies for net zero are quite significant for member countries. Dwivedi and Bhandari (2022) analyze how the energy transition will impact those governments' revenue streams both at the national and the subnational level. The paper projects that under fairly standard assumptions on growth, prices and taxes, there would be continued growth in revenue from fossil fuels until 2040. However, revenues would fall significantly as a share of the GDP and overall government budget, which would naturally impose fiscal challenges for both central and state governments in the next two decades. They estimate revenues to fall from 3.2 percent in 2019 of GDP to 1.8 percent and 1 percent in 2030 and 2040, respectively.

Titelman et al. (2022) highlight the fiscal challenges of six major hydrocarbon producers in Latin America and the Caribbean in net-zero transitions and the implications on revenue streams and debt sustainability. The study estimates that the expenditure required to achieve social and investment objectives in a net-zero emission scenario could lead to explosive debt levels, reaching upward of 200 percent for some countries. Maldonado and Gallagher (2022) experiment with incorporating both physical climate risks and the fiscal needs for financing a green transition into the IMF's framework for DSAs of two countries, Colombia and Peru. The authors signify the need to accelerate the IMF's data analytic capacities to generate reliable estimates of the fiscal needs and impacts of climate change policy and climate change itself. Songwe, Stern and Bhattacharya (2022) calculate the massive investment required to tackle climate change. Total investment need per year by 2030 is \$2.4 trillion for emerging markets and developing economies other than China, with large proportions required for transforming the energy system.

This chapter analyzes the IMF's toolkits on addressing some of the fiscal aspects of climate change and analyzes the Article IV consultations on its coverage of adaptation, transition management, mitigation policies and other capacity-building initiatives on climate change. We first highlight the key elements of bilateral surveillance through Article IV consultations using climate change assessment tools such as the Climate Change Policy Assessment (CCPA), the CMAP and C-PIMA. We then evaluate the Article IV assessments under the broader perspective of adaptation, transition management and mitigation policies; analyze interlinkages with the IMF's fiscal policy assessment toolkit and the challenges for emerging market and developing economies; and examine the possibilities of the IMF's additional role in financing climate change. We conclude with broad recommendations.

ARTICLE IV CONSULTATIONS AND THE IMF TOOLKITS

Article IV consultations are guided by the IMF's surveillance reviews and guidance notes. The IMF provides a suggestive pragmatic approach for the extensive coverage of mitigation policies wherein the NDC is compared to peer countries with similar income levels and economic structures (IMF 2021a). In particular, the mitigation policy advice should focus on an assessment of comprehensive carbon pricing and structural policies. The IMF sets the targets for Article IV consultation coverage on the three pillars of adaptation, transition management and mitigation (IMF 2021b).

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The IMF has also relied on its research — flagship reports, staff policy papers/notes, working papers, etc. — to build its institutional capacity in designing toolkit(s) for integrating natural disasters and climate change in surveillance agenda. For instance, the organization’s policy paper on its role for building resilience to natural disasters and climate change in small developing countries has been widely cited in Article IV consultations over the years (IMF 2016). The IMF Staff Climate Note series¹¹ covers the priority areas of IMF surveillance, i.e., mitigation policies such as carbon pricing and emissions trading systems, adaptation policies such as green public financial management (PFM) and climate financing, and transition management such as carbon reductions.

The Article IV consultations have thus covered issues on climate change and have relied on different toolkits. Below, we elaborate on the elements of these toolkits.

CCPA¹² and CMAP. The CCPA, initiated in 2017 as a joint collaboration with the World Bank on a pilot basis, assessed six countries in building climate change strategies. The CMAP, a successor to the CCPA, was launched in 2021 by the IMF and intends to help countries, with a special focus on small and low-income countries, build resilience with a renewed focus on macroeconomic implications of climate change policies. The IMF suggests that the Article IVs that are not preceded by a CMAP should cover standardized assessments, including input from work by partners (IMF 2021b). Two CMAP pilots have been conducted so far.

Table 4.1 highlights the commonalities of both assessment programs. The CMAP has retained most of the elements of the CCPA with changes in tools for quantitatively assessing the climate policies. A significant extension, though, in the CMAP is evaluating the distributional impact of mitigation strategies and potential gains for vulnerable sections and social safety nets. In addition, extensive focus is drawn to the introducing multilayered climate-responsive budgeting processes. Some of the recommendations of the CCPA are introduced in Article IV consultations of the respective countries.

Stedman et al. (2020) observe that the IMF contributes to CCPAs by assessing climate change risks on the macro framework and evaluating fuel and carbon taxation. Collaboration challenges and toolkit concerns are also noted in the paper. Lombardi and Rustomjee (2022) evaluate the IMF’s engagement on natural disasters and climate change issues affecting small developing states. The authors observe a lack of thorough analysis of these issues in surveillance agenda, especially for countries that did not have a CCPA or a disaster resilience strategy (DRS) in place. After an internal review, CCPA was extended and modified into the CMAP to be conducted solely by IMF staff unlike CCPAs, which were conducted jointly with the World Bank.

A closer look at the CMAP and CCPA reveals certain additionalities introduced in the CMAP, such as the quantitative assessment of the distributional impact of mitigation policies, i.e., carbon taxes, disaster risk management practices and planning processes. The CMAP is relatively less reliant on DSA and DSGE model-based assessments. Though it is too early to analyze specific elements of the CMAP, the results based on the newly introduced Debt Investment Growth and Natural Resources (DIGNAD) model may warrant further scrutiny to avoid policy bias.

¹¹ <https://www.imf.org/en/Topics/climate-change/staff-climate-notes>

¹² <https://www.imf.org/en/Topics/climate-change/resilience-building>

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TABLE 4.1 Key Elements of the Climate Change Policy Assessment and the Climate Macroeconomic Assessment Program

Elements	Climate Change Policy Assessment								Climate Macroeconomic Assessment Program							
	Climate Change Risks	Climate Preparedness	Mitigation Plans	Adaptation Plans	Financing Strategy	Risk Management	National Processes	Recommendations	Climate Change Risks	Climate Preparedness	Mitigation Plans	Adaptation Plans	Financing Strategy	Risk Management	National Processes	Recommendations
Exposure to climate risk	Y							Y	Y							Y
Impact on macro-outlook	Y		Y	Y	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y
Emission reduction targets			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Sectoral assessment			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Fuel/carbon tax/pricing policy			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Climate investment assessment			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Other public policies/programs			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Financial sector			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Fiscal and debt sustainability	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Risk assessment	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Risk layering	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Planning process	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Public investment management Assessment	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Resource requirements	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Overall policy assessment	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Toolkits	DSA/DSGE model, CPAT, PIMA								DSA/DIGNAD model, CPAT, C-PIMA, SPLAT							

Source: Authors' assessment.

Note: DSA = debt sustainability analysis; DSGE = dynamic stochastic general equilibrium; CPAT = Carbon Pricing Assessment Tool; PIMA = Public Investment Management Assessment; DIGNAD = Debt Investment Growth and Natural Resources; SPLAT = Social Protection and Labor Assessment Tool.

C-PIMA.¹³ The C-PIMA is natural extension of the IMF's Public Investment Management Assessment (PIMA) introduced in 2015. The IMF's review of the PIMA indicated the scope for improving the design of public investment management institutions and highlighted the weaknesses across the investment cycles, especially at the implementation stage (IMF 2018). The C-PIMA follows the similar general structure and evaluation approach and assesses the ability of a country to manage climate-related infrastructure and provides policy advocacy on public investment institutions and processes for building low-carbon and climate-resilient infrastructure. The C-PIMA complements the Public Expenditure and Financial Accountability (PEFA) climate diagnostics¹⁴ and green PFM¹⁵ processes. It is a questionnaire-based scorecard methodology and evaluates institutional strength on pillars of planning, coordination, project selection and appraisal, budgeting and portfolio management, and risk management. Fifteen countries have been assessed under the C-PIMA assessment so far.

The Debt Sustainability Framework for Low-Income Countries (LIC DSF) includes stress tests on natural disasters' short-term impact on growth, while the framework for market access economies adds climate change as a long-term factor for risk assessment as well.

Carbon Pricing Assessment Tool (CPAT).¹⁶ The CPAT is a spreadsheet model tool designed to project the annual use of fossil and non-fossil fuels and CO₂ emissions in major energy sectors. It also estimates the distributional burden of carbon pricing and other commonly used mitigation instruments.

Beyond these toolkits, the IMF has undertaken bilateral technical assistance missions to assess fiscal risks emanating from climate change. The IMF assessed fiscal risks from climate change for Georgia and Armenia under scenarios of mitigation, un-mitigation and volatility, respectively (IMF 2022b,c). The report categorized fiscal risks as nondiscretionary impact exogenously caused by climate change and discretionary impact endogenously driven by policies and investments. Both reports used Excel-based modules: a long-term module to incorporate the long-term impact of climate change and a disaster module to simulate the impact of natural disasters. The reports also highlight that a new module on developing fiscal stress tests for natural disasters is in progress and may be available on the IMF's fiscal risk portal in 2023. The IMF has used these toolkits in its Article IV consultation, though on an ad hoc basis, for the past few years (Table 4.2). Nevertheless, the coverage of countries has recently expanded.

¹³ <https://infrastructuregovern.imf.org/content/PIMA/Home/PimaTool/C-PIMA.html>

¹⁴ Climate PEFA is a partnership program initiated and managed by nine international development partners that provides a set of supplementary indicators to collect information on the extent to which a country's PFM system is ready to support and foster the implementation of government climate change policies. <https://www.pefa.org/resources/climate-responsive-public-financial-management-framework-pefa-climate-piloting-phase>

¹⁵ See Climate-sensitive management of public finances — Green PFM at <https://www.imf.org/en/Publications/staff-climate-notes/Issues/2021/08/10/Climate-Sensitive-Management-of-Public-Finances-Green-PFM-460635>.

¹⁶ For more details on CPAT, see <https://www.imf.org/en/Publications/Policy-Papers/Issues/2019/05/01/Fiscal-Policies-for-Paris-Climate-Strategies-from-Principle-to-Practice-46826> and <https://www.imf.org/en/Publications/staff-climate-notes/Issues/2021/10/29/Not-Yet-on-Track-to-Net-Zero-The-Urgent-Need-for-Greater-Ambition-and-Policy-Action-to-494808>.

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TABLE 4.2 Application of the IMF Toolkits in Article IV Consultations

Country	Toolkit
Tonga, Nepal (2015)	RAM
Samoa (2015)	DSA
Philippines (2015)	RAM, EBA
Solomon Islands, Tonga, Tuvalu (2016)	RAM, DSA
China (2016) (selected issues)	CPAT
Samoa, Dominica (2017)	RAM, DSA
Seychelles (2017)	RAM, CCPA
Belize (2018)	RAM, DSA, CCPA
St. Kitts and Nevis (2018)	RAM, DSA
Micronesia (2019)	RAM, CCPA
Seychelles (2019)	RAM
Botswana, Ethiopia (2019)	RAM, EBA
Fiji, Republic of Madagascar (2019)	RAM, DSA
St. Lucia (2019)	RAM, CCPA, DSA
Grenada (2019)	CCPA
Micronesia (2021)	RAM, EBA, CCPA
Belize, Bangladesh, Dominica, El Salvador, Solomon Islands, Samoa, (2021)	RAM, DSA
Republic of Kazakhstan (2021)	RAM, CPAT
Czech Republic (2021)	CPAT
Poland, Trinidad and Tobago, Nigeria, Republic of Tajikistan, Republic of Nauru, Morocco, Jamaica, France, China (2021)	RAM
India, Philippines, Kazakhstan, Kazakhstan, Albania, Oman, Bolivia, Guyana, Thailand, Austria, Burundi, Lithuania, Botswana, Mauritius, Côte D'Ivoire, Portugal, Iceland, Ireland, Vietnam, Greece, Paraguay, Kingdom of Lesotho, Peru, New Zealand, Bhutan, Malaysia, Zimbabwe, Sri Lanka, Indonesia (2022)	RAM
Cambodia, St. Lucia, St. Vincent and the Grenadines, Singapore, Dominican Republic, Belize, Bahamas (2022)	RAM, DSA
Cyprus, Israel (2022)	CPAT
Grenada (2022)	DSA

Source: Article IV consultations on various issues, IMF.

Note: This is not an exhaustive list as the IMF has covered more countries in Article IV consultations on climate change policies over the years. RAM = Risk Assessment Matrix; DSA = debt sustainability analysis; EBA = External Balance Assessment; CPAT = Carbon Pricing Assessment Tool; CCPA = Climate Change Policy Assessment.

ARTICLE IV CONSULTATIONS: AN ASSESSMENT

In this section, we analyze coverage of climate change in Article IV consultations since 2015 for 20 large GHG-emitting countries (IMF 2021a,b), using a simple heatmap exercise (Table 4.3). We estimate a cumulative scorecard¹⁷ for the countries using a simple binary response

¹⁷ See Lombardi and Rustomjee (2022) for more discussion on the methodology.

that equals one if a parameter is observed and zero otherwise for the following six parameters: i) the consultation includes natural disasters and climate change effects as risk; ii) the natural disasters and climate change effects on growth are discussed; iii) the consultation provides fiscal policy advice on natural disasters and climate change effects; iv) the natural disasters and climate change effects are captured in DSAs; v) the involvement of other donors and partners on natural disasters and climate change are referred to; and vi) the consultation includes natural disasters and climate change in policy discussions with the authorities.

TABLE 4.3 Surveillance Heat Map

	2015	2016	2017	2018	2019	2020	2021	2022
Argentina		0	0		2			5
Australia	0	0	0	0	4		4	4
Brazil		1	1	0	1	1	1	
Canada		0	1	0	0		2	4
China	1	1	1	2	1	3	4	5
India	0	1	1	0	0		4	5
Indonesia	0	0	4	0	2	4		4
Iran	0	0	0	0				
Japan	0	0	0	3	4			4
Korea	0	1	0		0		2	2
Mexico	1	0	0	0	1	0	2	5
Russia	0	0	0	0	0	0		
Saudi Arabia	0	0	0	1	1		2	3
South Africa	0	0	0	0	1		3	
Thailand	0	0	0	0	2		4	4
Turkey		1	1	3	0		2	
U.K.	0	0	0	0		3	4	
Ukraine	0	2						
U.S.	1	0	0	0	0	2	4	4

Source: Authors' assessment of Article IV consultations.

Note: The blank/white cells refers to the years where an Article IV consultation report is not available for a country. We also exclude the EU from the group of the 20 largest GHG emitters.

The heatmap pattern clearly indicates an absence of climate change coverage in these countries until recently. Though the IMF has identified climate change as an emerging structural issue since 2015, surveillance guidelines were clearly spelled out through surveillance reviews since 2021.

Table 4.4 presents a detailed coverage of climate policy in a subset of the countries mentioned above (excluding the EU and Latin American countries) in recent years. The absence of natural disasters/climate change in the DSA in Article IV consultations is noteworthy. For countries like Canada, Saudi Arabia, the U.K. and the U.S., natural disasters are not covered as potential risks in the Risk Assessment Matrix (RAM) of the consultations. Pricing carbon, eventually, is the key recommendation as the mitigation policy in most of these economies. Discussions

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on investment requirements for transition to net-zero commitments center around existing national policies without reference to fiscal costs of such transition and the extent of investment requirements.

The adaptation policy advice is mostly focused on integrating climate risks into financial and/or fiscal rules while building resilience in the socioeconomic infrastructure for climate change. One recurring policy recommendation for adaptation is creating fiscal space (Tables 4.4 and 4.5), which is against the spirit of investment-led green growth strategy required to tackle climate crisis. As discussed in the previous sections, the financing needs for various countries and the world is massive, and creating fiscal consolidation does not help in generating this amount of financing. Similarly, for mitigation, there is too much emphasis on carbon pricing/taxes despite evidence that in most countries these instruments will not generate sufficient revenues (Titelman et al. 2022).

BOX 1 Survey of Article IV Consultations and Policy Advice on Climate Change for Countries in Latin America and the Caribbean

When analyzing the latest Article IV reports for Latin American and Caribbean countries, climate change is mentioned in the key issues section of the reports for nine countries in the region, with a special focus on Caribbean countries (the Bahamas, Barbados, Dominica, Grenada, Guyana, Paraguay, St. Lucia, St. Vincent and the Grenadines, and Trinidad and Tobago). The consequences of climate change are mostly addressed as an increase in the likelihood and severity of natural disasters (Table 4.5 and Chapter 4 Annex).

Regarding fiscal policy, the incorporation of the climate perspective has increased in more recent years. In reports before 2020, climate change was analyzed in boxes or small sections. However, for reports after 2020, it was mentioned in various sections and is a factor to consider in the sustainability of debt and the RAM. In fact, it is possible to find an increase in the likelihood and severity of natural disasters in the RAM in 21 countries.

A more frequent analysis is observed in the fiscal policy areas of adaptation/resilience measures, where it is common to find mentions of the necessary fiscal space to cope with the consequences of natural disasters (Antigua and Barbuda, Bahamas, Barbados, Dominica, Ecuador, Jamaica, Paraguay and St. Vincent and the Grenadines) and the creation of funds for resilience investment (Grenada and Guyana). Regarding mitigation measures, a lower frequency of analysis of the fiscal impact of mitigation policies is observed except in very specific cases, such as Bolivia (carbon price), Mexico (carbon tax) and Trinidad and Tobago (reducing the price of oil could reduce fiscal revenues).

There are several ways to compare the progress of countries and adaptation needs. For example, the Paraguay report considers the ND-GAIN Country Index to highlight the need to increase the speed of implementation and investment in adaptation policies in the country. In the Costa Rica report, the Emergency Events Database (EM-DAT) is mentioned to refer to the country's climate risk.

Nevertheless, the IMF needs to address some of the challenges of its approach and instruments to strengthen climate change in macro-surveillance framework.

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TABLE 4.4 Article IV Climate-Related Policy Analysis and Policy Recommendations for Latin American and Caribbean Countries

Country	Year	Mitigation			Transition Management				Adaptation/Resilience Building						
		Policy Analysis	Policy Recommendation		Policy Analysis	Policy Recommendation			Policy Analysis		Policy Recommendations				
						Financing	Sector Reforms		Financing	Debt Sustain-ability Analysis	Risk Assessment Matrix	Improve Macroeconomic and Physical Resilience to Climate Change/Natural Disasters			
		GHG Emission/Climate Impact	Carbon Pricing	Others	Instruments	Others	Energy Sector	Instruments	Natural Disasters	Natural Disasters	Measures of Physical/Structural Resilience	Others	Fiscal Space/ Buffers	Support for Energy Mix	Inclusion of Climate Risks in Financial/ Fiscal Rules
Australia	2019	x	x	x	x		x	x		x					
	2021	x	x	x	x		x	x		x					x
	2022	x	x	x	x		x	x		x	x				
Canada	2021	x	x	x										x	x
	2022	x	x		x									x	x
China	2020	x	x	x	x			x		x					
	2021	x	x	x	x	x	x	x		x				x	x
	2022	x			x		x	x		x				x	x
India	2021		x				x			x	x			x	x
	2022	x	x	x		x	x			x	x	x		x	
Indonesia	2020	x		x		x	x			x	x				
	2022	x	x	x		x	x			x	x	x			
Japan	2022	x	x		x	x	x	x		x	x		x		x
Korea	2021		x	x	x		x						x		x
	2022	x	x	x	x	x	x	x		x			x		x
Saudi Arabia	2021	x			x	x	x	x			x	x		x	
	2022	x				x	x				x			x	
South Africa	2019	x				x	x							x	
	2021	x					x				x	x		x	
Thailand	2019	x		x			x			x					
	2021	x	x			x				x	x	x			
	2022	x	x				x			x	x	x			x
Turkey	2018						x							x	
	2021									x				x	
U.K.	2020		x	x	x						x				
	2021		x	x	x			x			x	x	x		x
U.S.	2020		x	x		x	x				x			x	
	2021		x	x		x	x				x			x	
	2022	x	x	x	x	x	x				x	x		x	

Source: Authors' assessment.

TABLE 4.5 Article IV Climate-Related Policy Analysis and Policy Recommendations for Latin American and Caribbean Countries

Country	Year	Mitigation		Transition Management				Adaptation/Resilience Building											
		Policy Analysis	Policy Recommendation	Policy Analysis	Policy Recommendation			Policy Analysis			Policy Recommendations								
				Financing	Sector Reforms		Financing	Debt Sustainability Analysis	Risk Assessment Matrix		Improve Macroeconomic and Physical Resilience to Climate Change/Natural Disasters								
		GHG Emissions	Introduction/Raise of Carbon Price/Carbon Tax	Transition Management Financing Needs	Implementation of Tourism Sector Reform	Implementation of Energy Sector Reform	Green Bonds	Natural Disasters Included in DSA	Natural Disasters	Climate-induced Commodity Export Shock/Domestic Supply Shock Caused by Climate Change	Measures of Physical/Structural Resilience to Climate Change	Adoption/Implementation of Disaster Resilience Strategy (DRS)	Creation or Strengthening of Resilience/Contingency Fund	Insurance Coverage for Natural Disasters	More Fiscal Space	Natural Disaster Clauses in Sovereign Debt	Inclusion of Climate-Related Risks in Fiscal Rules		
Antigua and Barbuda	2014	x				x				x								x	
Argentina	2022					x													
Aruba	2021				x					x			x						
Bahamas	2022		x		x				x	x			x		x			x	x
Barbados	2021							x	x	x			x					x	
Belize	2022								x	x			x		x				
Bolivia	2022	x	x																
Brazil	2021	x																	
Chile	2021		x																
Colombia	2022	x	x																
Costa Rica	2021	x							x				x						
Dominica	2021			x									x		x		x		x
Dominican Republic	2022					x			x	x			x						
Ecuador	2021					x							x						
El Salvador	2021		x		x				x	x									x
Grenada	2022					x			x	x				x					x
Guatemala	2022																		

Country	Year	Mitigation		Transition Management				Adaptation/Resilience Building										
		Policy Analysis	Policy Recommendation	Policy Analysis	Policy Recommendation			Policy Analysis			Policy Recommendations							
				Financing	Sector Reforms		Financing	Debt Sustainability Analysis	Risk Assessment Matrix		Improve Macroeconomic and Physical Resilience to Climate Change/Natural Disasters							
		GHG Emissions	Introduction/Raise of Carbon Price/Carbon Tax	Transition Management Financing Needs	Implementation of Tourism Sector Reform	Implementation of Energy Sector Reform	Green Bonds	Natural Disasters Included in DSA	Natural Disasters	Climate-induced Commodity Export Shock/Domestic Supply Shock Caused by Climate Change	Measures of Physical/Structural Resilience to Climate Change	Adoption/Implementation of Disaster Resilience Strategy (DRS)	Creation or Strengthening of Resilience/Contingency Fund	Insurance Coverage for Natural Disasters	More Fiscal Space	Natural Disaster Clauses in Sovereign Debt	Inclusion of Climate-Related Risks in Fiscal Rules	
Guyana	2022	x																
Haiti	2019							x		x								
Honduras	2019									x								
Jamaica	2021									x					x			
Mexico	2022	x	x			x												x
Nicaragua	2019									x								
Panama	2021	x								x		x						
Paraguay	2022	x								x								
Peru	2022	x								x								
St. Kitts and Nevis	2018									x				x				
St. Lucia	2022					x				x					x			
St. Vincent and the Grenadines	2022					x				x							x	
Suriname	2019																	
Trinidad and Tobago	2021	x		x		x				x			x					
Uruguay	2021	x																x

Source: Authors' assessment. For details about the classification, see Chapter 4 Annex.

Common Toolkits with a Differentiated Approach

- **DSA.** The framework for market access economies (last reviewed in 2021) adds climate change as a long-term factor for risk assessment.¹⁸ Many recent studies have argued for improvement in the depth and coverage of climate change, ranging from issues of improving national level estimates for climate resilient investment needs to measures of alternative risk scenarios.¹⁹ Maldonado and Gallagher (2022) suggest alternative measures to introduce climate risk, climate transition resource requirements/investments and a combination of the two as potential refinements to the current framework. Monsod, Muyot and Gochoco-Bautista (2022a) find evidence for fiscal space in V20 countries and thus argue that the IMF Debt Sustainability Framework (DSF) threshold limits should not be construed as limits to fiscal space per se. In a separate study, Monsod, Majadillas and Gochoco-Bautista (2022b) also estimate climate change gaps using reported cost needs for climate adaptation and mitigation policy by V20 countries. A reassessment of suitability of present frameworks in streamlining climate change needs is therefore warranted. Specifically, there is a clear need for a review of the framework for low-income countries to incorporate long-term implications of climate change on socioeconomic policies (see also Pinto 2018 for a critique of the DSA of low-income countries). A joint IMF-World Bank review of the low-income country debt sustainability framework is currently planned for 2023.
- **New developments in the fiscal toolkit.** In two recent reports, the IMF introduced Excel-based modules: a long-term module to incorporate the long-term impact of climate change and a disaster module to simulate the impact of natural disasters (IMF 2022b,c). The reports also highlight that a new module on developing fiscal stress tests for natural disasters is under progress and may be available on the IMF's fiscal risk portal in 2023.²⁰ This is a welcome step forward; however, the scope for applicability across countries, and integration into the DSA framework, needs to be examined.
- **Article IV consultations coverage of adaptation policies.** The IMF describes adaptation policies as a domestic policy challenge with inward spillovers (IMF 2021b, 2022a). The guidelines suggest that coverage on adaptation policies should include an assessment of exposure to climate risk and potential impact, identify policy challenges and financing gaps (based on information available), enhance financial resilience and assess expenditure priorities, especially for fragile and climate-vulnerable countries. The IMF, before piloting the CCPA and CMAP, relied on DSA, DSGE models (in some cases External Balance Assessments (EBA)) and PIMA as tools for a quantitative assessment of the adaptation policies along with building a Disaster Resilience Strategy road map in some countries. To the best of our knowledge, C-PIMA assessments are not available in the public domain and hence could not be evaluated in detail. Nevertheless, the C-PIMA methodology could be strengthened with specific elements for climate-vulnerable countries while the performance could be monitored through a portal/dashboard. Deliberations on C-PIMA assessments as one of the pillars for access to finance through the newly formed RST could be an

¹⁸ Two measures — the Climate Change Exposure Index used in IMF (2016), and the World Risk Index used in the World Risk Report (2018) — are suggestive indicators for defining high climate risk countries.

¹⁹ See the following for details: Global Commission on the Economy and Climate (2014), Organisation for Economic Co-operation and Development (2017), Bhattacharya et al. (2019), Rozenberg and Fay (2019) and Network for Greening the Financial System (2021).

²⁰ <https://www.imf.org/en/Topics/fiscal-policies/Fiscal-Risks>, <https://www.imf.org/en/Topics/fiscal-policies/Fiscal-Risks>

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important step going forward (Barbados, Costa Rica and Rwanda have undergone PIMA and C-PIMA assessments and are currently implementing recommendations as part of RSF reform conditionalities).

- **Article IV consultations on transition management and mitigation policies.** The IMF suggests that Article IV consultations should discuss mitigation and transition management policies in conjunction and discuss the specific coverage on transition management as an on-need basis (IMF 2021a). It also proposes covering mitigation policies and their adequacy at least every three years for the 20 largest GHG emitters, with voluntary coverage for other countries based on agreement with country authorities (IMF 2021b). The recent Article IV consultations of the 20 largest GHG emitters, including Canada, Denmark, Finland, Germany, Indonesia, Korea, the Netherlands, the U.S. and the U.K., thus provide extensive coverage on issues of carbon pricing, feebates, public investment in clean technology and revenue recycling among other measures. For other climate-vulnerable and developing countries, issues on energy mix, energy subsidy reforms, economic diversification and targeted social safety nets have been part of the policy advocacy. In a Staff Climate Note, the IMF illustrates options for a global just transition through larger emission reductions by higher-income countries and enhancing climate finance (IMF 2022d). The note also introduces a new IMF-ENV model which estimates GDP effects from global decarbonization and uses the existing CPAT model highlights the benefits of carbon pricing and its impact on welfare costs for carbon-intensive and fuel-exporting countries.”

The fiscal implications, however, of managing the transition and implementing policies for net zero are quite significant for member countries. In a nutshell, before developing institutional capacity for extensive assessment on climate changes policies, Article IV consultations policy advice was skewed on adaptation policies for small and developing countries prone to natural disasters, with a shifting focus on mitigation policies as well in recent years. The IMF has contributed significantly on developing tools and policy instruments for advising countries on adaptation and mitigation policies on climate change. Nonetheless, there is a significant gap to be filled on transition management policies. The IMF can thus focus on the extensive coverage of assessing the impact of transition policies at national and subnational levels, implications for carbon-intensive industries and fossil fuel-exporting countries, and its role in climate finance for future research agenda.

Other Policy Considerations and Recommendations

- **Coverage of mitigation and transition management policies.** The current surveillance framework analyses both policies in conjunction with voluntary and need basis clauses. We recommend a universal coverage of both policies across member countries in the long term subject to the institutional capacity within the IMF. Similar views are expressed by the European Central Bank (2022) as well. The IMF should also extend its focus on covering fiscal challenges in the transition to net zero (as highlighted in Dwivedi and Bhandari 2022 and Titelman 2022). Either a separate tool other than the current CPAT, IMF-ENV, and DIGNAD models or integrating transition challenges with country specificities in the existing models could be explored.
- **Consistency in designing and implementing toolkit(s).** Different toolkit(s) have been designed and piloted on selected countries. The IMF, for instance, compares climate change costs under various estimation methods (IMF 2022e). Farmer et al. (2015) also draw comparisons on DSGE, agent-based and integrated assessment models for climate

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change policy analyses. Many of the new models are either used on an ad hoc basis through bilateral technical assistance or on selected countries. There is an urgent need for streamlining these models for strengthening policy advocacy in Article IV consultations.

CONCLUSION

This chapter attempted to summarize the extent of the IMF engagement and fiscal toolkits on addressing some of the fiscal aspects of climate change. The IMF has actively developed a set of toolkits to complement its bilateral surveillance through Article IV consultations. The toolkits, however, are used on ad hoc basis, warranting an urgent need for streamlining, and thereby strengthening, policy advocacy in Article IV consultations. Based on research by the Task Force, we recommend the following to strengthen the impact of climate change on fiscal policy:

- The fiscal impacts of climate change should be addressed both in terms of revenues and expenditures and be incorporated into DSAs.
- The implementation of carbon neutrality policies will lead to the reduction of fiscal revenues of hydrocarbon-producing/consuming countries. Carbon tax revenue will not compensate it, so finding new avenues for revenue will be crucial (Titelman et al. 2021; Dwivedi and Bhandari 2022).
- Investment required to build infrastructure and change in energy matrix will vary from country to country. The IMF has a role to play to ensure it is done in fiscally sound manner.
- The commitments described in LAC countries' NDCs generally do not quantify the financing needs for their implementation. The surveillance program should work toward getting precise estimates of these costs.

Finally, the IMF should continue leveraging its position through concerted efforts in building on existing institutional capacity, as well as stimulating its capacity-building measures, to build climate expertise for authorities at the country level.

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CHAPTER 5

Assessing IMF Lending Programs for Climate and Development

INTRODUCTION

At the core of the macroeconomic response to climate change is the need for a stepwise mobilization of resources for accelerating just and low-carbon energy transitions, responding to climate shocks and addressing loss and damage, building adaptation and resilience, and triggering structural transformation away from carbon-intensive activity, especially as such economic structures pertain to balance of payments. Given the IMF mandate and its recent determination that climate change is macro-critical, the IMF needs to be at the center of these responses to safeguard that this mobilization of resources and corresponding investments is done in a fiscally sound and financially stable manner.

The IMF deserves a great deal of credit for its major new issuance of SDRs and for subsequently creating an RST that rechannels some SDRs for climate resilience and sustainability. In addition, the IMF recently issued guidance notes to help staff incorporate climate policy into IMF lending programs and expanded the Catastrophe Containment and Relief Trust (CCRT) so that some climate-vulnerable countries could receive relief from their external debts owed to the IMF. These are all very important first steps to build on given that the more climate vulnerable a country becomes, the more likely it is to seek IMF lending support.

Despite these advances, this chapter demonstrates that the IMF lending toolkit, in general, and the RSF, in particular:

- lack the scale to mitigate climate shocks and mobilize the resources necessary for low-carbon, climate-resilient and socially inclusive growth paths across the developing world;
- are adopting a “green fiscal consolidation” approach to incorporating climate considerations in its lending programs, which is inconsistent with a development-centered approach to climate; and
- are falling far short in integrating climate considerations into debt negotiations.

THE IMF LENDING TOOLKIT AFTER THE IMF STRATEGY

The IMF has made significant and unprecedented changes in its lending toolkit to respond to the macro-critical aspects of climate change. In a few short years, it has created new resources for climate change in the establishment of the RST and has begun to implement guidelines

for incorporating climate measures into the IMF's traditional suite of lending programs. This section of the chapter provides an overview of these additions to the IMF lending toolkit.

IMF lending programs receive little attention in the IMF Climate Change Strategy relative to the surveillance activities of the Fund, devoting just one paragraph to "IMF-Supported Programs." The paragraph stresses that IMF financing may be provided when climate-related measures are seen as critical to help solving a member country's balance of payments problems. The IMF notes that the Rapid Financing Instrument (RFI) and the Rapid Credit Facility (RCF) are both equipped to provide support for countries struck by natural disasters, suggesting that extreme climate shocks could be covered by these programs. In addition, the IMF Climate Change Strategy notes that the IMF had begun to merge climate considerations into fiscal consolidation efforts in the form of requirements to reduce energy subsidies and through increasing taxes on carbon-intensive activities. The Climate Strategy also foreshadows the creation of the RST as a source of additional financing of climate-related measures (IMF 2021a).

Resilience and Sustainability Facility

Regardless of the lack of attention to the lending toolkit in the IMF Climate Change Strategy, significant additions have been made to the IMF's lending operations to help it better respond to climate change. The centerpiece of these reforms has been the creation of the RST, a source of funds for a new facility, the RSF. In August of 2021, the IMF board approved \$650 billion (roughly SDR 453 billion) to enhance the liquidity positions of countries in the wake of the COVID-19 crisis (IMF 2021b). In April of 2022, financed by rechanneled SDRs, the IMF Board approved the RST to "help countries build resilience to external shocks and ensure sustainable growth, contributing to their long-term balance of payments stability" (IMF 2022a; see also Cashman et al. 2022, Plant 2021).

For the IMF board, the specific purpose of the RSF is to support policy reform and provide financing to prevent and mitigate risks that may arise from climate change (as well as

TABLE 5.1 RST Pledges and Contributions (billions)

	SDRs	USD
Australia	0.9	1.2
Canada	1.4	1.8
China	6.0	8.0
France	3.1	4.1
Germany	5.0	6.7
Japan	0.8	1.1
Korea	0.9	1.2
Spain	1.4	1.9
Total Finalized Contributions	19.5	26.0
Total Pledges	30.4	40.4

Source: IMF 2023.

Note: (1) FX rates as of December 15, 2022. (2) Contributions to the deposit and/or reserve accounts. (3) The IMF expects contributions from additional five countries early 2023. (4) RST = Resilience and Sustainability Trust; RSF = Resilience and Sustainability Facility; SDR = Special Drawing Rights.

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pandemics and other global challenges) in a manner that enhances prospective balance of payments stability. The IMF secured an initial set of pledges of \$40 billion (roughly SDR 30 billion) for this trust, which will be a source of financing for the RSF. As Table 5.1 indicates, not all those pledges had materialized by early 2023. China, Germany and France have made the largest contributions to date.

Although originally proposed to have a (low) income-based eligibility requirement similar to the PRGT, the final Board-approved RST allows PRGT members and small states with a population of under 1.5 million and a per capita gross national income below 25 times the 2021 International Development Association (IDA) threshold and for middle-income countries with per capita incomes below ten times the IDA threshold. Importantly, to access the RSF, member states must have an IMF program in place with “upper tranche” characteristics, though Rwanda managed to receive an RSF package with a less onerous “policy coordination instrument.” Members can access up to 150 percent of their IMF quota, or SDR 1 billion (IMF 2022e). Unlike other IMF-supported programs, RSF loans have 20-year maturities with a 10.5-year grace period with a tiered rate structure, with poorer countries receiving the most favorable terms (IMF 2022a).

Given that developing countries currently face multiple crises, more than 20 countries had already sought negotiations for RSF programs by the beginning of 2023. Table 5.2 exhibits some of the main features of three approved RSF packages in Barbados, Costa Rica and Rwanda. These three programs sum to \$1.2 billion, just over 2 percent of GDP on average for the participating countries.

TABLE 5.2 Core Features of Selected RSF Reform Measures

BARBADOS: \$189 million	COSTA RICA: \$725 million	RWANDA: \$319 million
Upgrade law to improve the climate resilience of roads through improved drainage.	Develop and publish guidelines for climate budget tagging.	Produce guidelines on climate budget tagging.
Enhance water availability via water reuse.	Expand quantitative climate fiscal risk analysis in the Medium-Term Fiscal Framework to include climate transition risks.	Implement climate change budget tagging as a prototype on development expenditure.
Fund the National Environmental and Conservation Trust for marine protection projects.	Develop guidelines to incorporate social cost of carbon in project appraisal processes.	Expand the climate change budget tagging framework to cover all expenditure.
Approve regulations to support ‘green procurement’ and fiscal risk assessments of climate change risks in the budget.	Publish guidelines on project selection based on climate change criteria.	Publish climate budget tagging results in the climate budget statements and quarterly reports.
Approve a National Comprehensive Disaster Risk Management Policy.	Develop and publish guidelines for including climate change analysis in Regulatory Plans.	RM1: Submit a quantitative climate risk analysis in the Fiscal Risk Statement to the Fiscal Risk Committee.
Amend laws to improve stormwater management plans.	Approve regulations to simplify power generation from renewable sources.	Expand the quantitative climate risk analysis to include public-private partnerships and state-owned enterprises that are vulnerable to climate-related risks.

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BARBADOS: \$189 million	COSTA RICA: \$725 million	RWANDA: \$319 million
Strengthen integration of climate concerns into the PFM process.	Submit legislation to strengthen incentives for low-pollution private vehicles.	Update the national investment policy to integrate climate agenda.
Lower import taxes for electric vehicles.	Review existing tax incentives to support decarbonization efforts.	Publish the guidelines for project appraisal and selection criteria, including climate considerations.
Issue regulation to incentivize investments into battery storage technologies.	Create a repository with data on climate hazards; industrial and geographical vulnerability to climate events; banks' lending exposure to vulnerable industries and regions.	Publish report on major projects in the pipeline with incorporation of adaptation and mitigation criteria.
Approve policy framework to reduce energy use of all government agencies.	Publish indicators of the "greenness" of its reserve holdings.	Issue a guideline for climate-related risk managements for financial institutions.
Adopting legislation to enhance competition in the electricity market and introduce local participation in renewable energy investment.	Approve regulation on climate change risks in the credit portfolio.	Issue a guideline to financial institutions regarding recommendations of the International Sustainability Standards Board.
Adopt strategy to assess climate change risks to the financial sector and join the Network for Greening the Financial System.	Incorporate climate effects on the banking sector in its top-down stress testing.	Adopt the new National Disaster Risk Reduction and Management Policy.
Including climate change risks in a bank stress testing exercise.		Develop financing mechanism at the local level to enhance the ability of local governments to mobilize resources to finance the planning and implementation of disaster risk reduction and management strategy at the local level.

Source: Authors adaption of IMF (2022b,c,d).

RSF programs are developed jointly between the member government and IMF staff and are then contractually enshrined in IMF programming. As can be inferred from Table 5.2, funding is conditioned on achieving different policy goals in the program in tranches. Financing and policies in each of these cases is geared toward addressing imminent adaptation needs, integrating climate risk into fiscal planning and financial institution operations, strengthening public investment and supporting decarbonization.

Traditional IMF-Supported Programs

In addition to creating a new source of financing to address climate change at the IMF, the Fund also began to bring climate considerations more consciously into its traditional lending sources, the numerous facilities stemming from the General Resource Account (GRA) and the PRGT. As mentioned in the IMF Climate Change Strategy, the RFI and the RCF can be used to gain rapid access to financing during a climate shock. Moreover, the IMF issued Staff Guidance Notes to help incorporate climate policy into IMF-supported lending programs.

EXPANSION OF ACCESS LIMITS TO THE RFI AND RCF The RFI and the RCF were designed by the IMF for countries that urgently needed rapid balance of payments financing but did not need full-scale standby arrangements. Financing is usually for three to five years and has very few conditionalities attached. The RCF is largely for countries that are PRGT eligible, and the RFI for other member states and the financing terms are the same as for the PRGT and the general account, respectively. These programs were established with what is now called the “regular window,” which was for exogenous shocks. In 2017, the IMF created the “Large Natural Disaster Window” (LND) for urgent balance of payments shortfalls when economic damages from the disaster are deemed to be 20 percent or more of the member’s GDP.

In response to the COVID-19 and subsequent shocks, the IMF board has approved extending the access limits of these two windows and has added a new window. Starting in April 2020, the IMF approved temporary increases in the access limits of the regular window from 100 to 150 percent of quota. In June of 2021 the Board voted to increase the access limits of the LND to 183 percent of quota. Finally, the Executive Board approved a new “Food Shock Window” to help member states with balance of payments shocks due to increased food and fertilizer prices, with an access limit of 175 percent of quota for members (IMF 2021b). Given that climate change can be responsible for external shocks due to “transition spillovers” such as carbon border adjustment mechanisms (see He, Fan, and Jun 2022), natural disasters due to climate-related extreme weather events, and food price increases, the expansion of these facilities are welcome additions and expansions to the IMF lending toolkit.

INCORPORATION OF CLIMATE RECOMMENDATIONS AND CONDITIONS IN IMF LENDING PROGRAMS Shortly following the economic aftershocks of the COVID-19 pandemic, the IMF Fiscal Affairs Department issued a series of guidance notes to help staff align the rapidly increasing number of requests for IMF lending with various recovery goals. One such guidance note was titled “Greening the Recovery” that documented various measures that staff could include (for conditional programs) and recommend supporting green recoveries. Analogous to the IMF’s discussion of climate change and lending in the IMF Climate Change Strategy, the guidance note outlines how staff can work with host countries to design fiscal consolidation measures consistent with climate policy. By 2023, these types of measures were found in the vast majority of IMF programs, both conditional and nonconditional in nature.

Among the possible measures, the IMF considers that the governments could finance green activities rather than “brown” activities, such as climate-smart infrastructure and technologies, support adaptation, or avoidance of carbon-intensive investments. In addition, governments could raise carbon taxes and eliminate fossil fuel subsidies, in the context of low oil prices and fiscal reallocation needs (IMF 2020a). Table 5.3 provides illustrative examples of various country programs that incorporated these kinds of measures.

Maldonado and Gallagher (2020) developed an index to measure the extent to which these guidelines were incorporated across IMF programs since their inception. On climate and the environment, they find that these types of “green fiscal adjustment measures” began to appear in the majority of program documents after 2021, though more so under conditional programs rather than nonconditional programs.

DEBT SUSTAINABILITY For some member states seeking support from IMF programs, it may be deemed necessary for the member state to enter negotiations with its creditors to have financial assurance that the IMF program will be workable. Here, the IMF has made some

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TABLE 5.3 Selected Climate Policies in Traditional IMF-Supported Programs

Country	Program Type	Recommendation and/or Conditionality
El Salvador	RFI	Increase excise duties on petrol and diesel.
Costa Rica	RFI	Increase excise duties on petrol and diesel, set environmental taxes.
Georgia	EFF	Implement law on energy efficiency and energy performance to further support energy savings and competition in the energy market.
Bahamas	RFI	Balance fiscal adjustments to maintain investment in natural disaster preparedness, and introduce hurricane insurance.
Egypt	SBA	Impose a green fee on the consumption of gasoline and diesel products.
Mauritania	ECF	Increase fiscal buffers for natural disaster related contingencies.
Ecuador	EFF	Shift from fuel subsidies to social assistance.
Afghanistan	ECF	Create fiscal space for climate change mitigation policies (e.g. investment in drought-resistant crops, irrigation, storage, etc.).
Barbados	EFF	Improve the disaster resilience of construction under the 'roofs to reefs' program.
Tonga	RCF	Invest in climate-resilient infrastructure.
Costa Rica	EFF	Staff conditions authorities to develop a roadmap to enhance infrastructure resilience to climate change, including cost assessment and financing options.
Madagascar	ECF	Reallocate fiscal spending to finance recovery work and appeal to donors for post-disaster financing.
Chad	ECF	Seek donor support for mitigation and adaptation measures.
Moldova	ECF & EFF	Diversify the economy from climate vulnerable activity and improve competitiveness via structural reforms.
Nepal	ECF	Implement an action plan to improve public investment management that strengthens climate resilience and recommends building fiscal and reserve buffers for climate shocks.

Source: Compiled by authors.

Note: RFI = Rapid Finance Instrument; EFF = Extended Fund Facility; SBA = Stand-by Arrangement; ECF = Extended Credit Facility; RCF = Rapid Credit Facility.

progress as well. It has boosted resources for its CCRT, introduced State-Contingent Debt Instruments in the restructuring of debt in some climate-vulnerable countries, and pledged to introduce a debt-for-climate instrument and to better align DSAs with climate considerations.

THE CCRT The CCRT provides grants to the poorest and most vulnerable countries struck by catastrophic natural or public health shocks. It is open to a subset of PRGT countries — those with a per capita income below the IDA threshold and for small states with a population of less than 1.5 million and a per capita income below twice the IDA threshold (roughly \$2,410). The CCRT was triggered in response to the Ebola pandemic with finances left over from the Multilateral Debt Relief Initiative, and in March 2020, the IMF sought new donations to the CCRT to help countries respond to the COVID-19 pandemic. From April 2020 to December 2021, the IMF raised an upwards of \$964 million (SDR 690 million) toward this effort. Member states were allowed to apply for CCRT funds to service their IMF debts through April 13 of 2022 (IMF 2021c). While these applications were not explicitly discussed in the guidance

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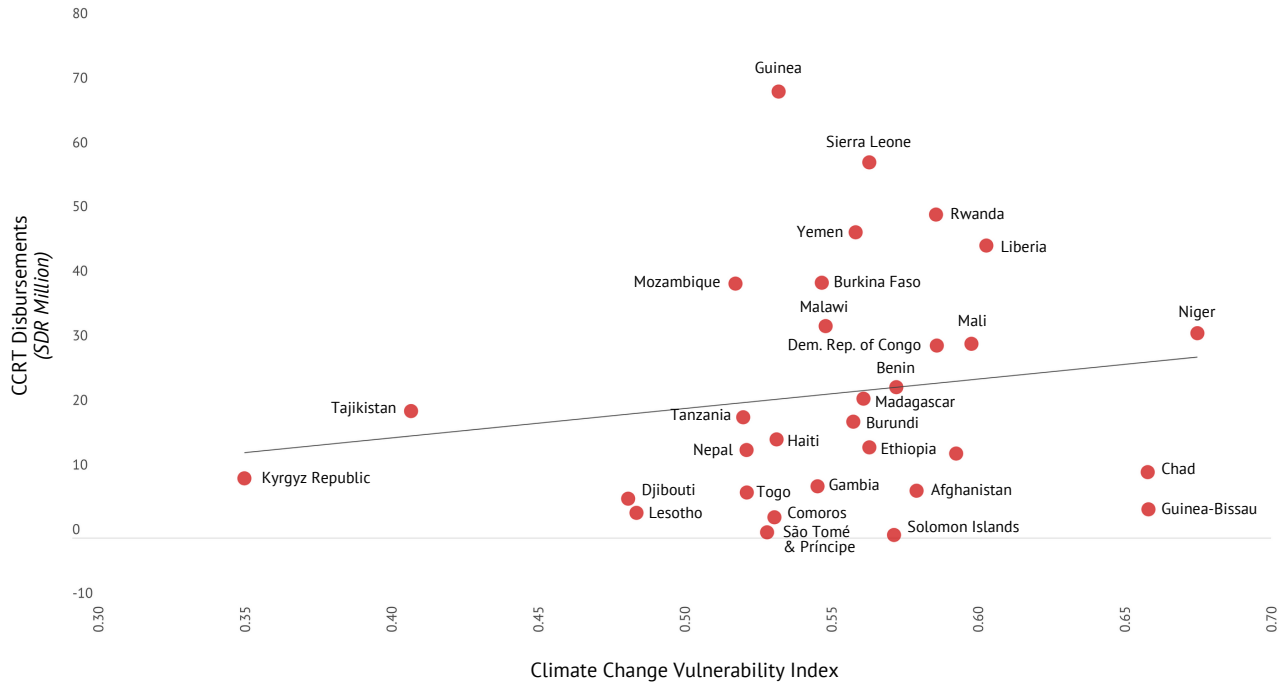
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FIGURE 5.1 Climate Vulnerability and Catastrophe Containment and Relief Trust Disbursements, 2020–2022



Source: Authors' calculations.

note on the IMF Climate Change Strategy, member states can apply for CCRT funds to help buttress from climate shocks. Figure 5.1 exhibits how CCRT relief recipients are among the more climate vulnerable in the world economy.

Between 2020 and 2022, 34 countries were eligible, and 31 took advantage of the CCRT; the others did not have standing or outstanding IMF programs. Table 5.4 exhibits the 31 countries that were beneficiaries of the CCRT during the COVID-19 CCRT period. Financing was delivered in five different tranches. Members quickly applied for the CCRT, but the IMF was only able to provide financing in tranches as they were made available through donations from other member states.

STATE-CONTINGENT DEBT INSTRUMENTS In the IMF Climate Change Strategy, the IMF notes how state-contingent debt instruments may play a larger role in how climate-vulnerable countries restructure their debts. Moreover, since the IMF Climate Change Strategy has been in place, the IMF has pledged to link debt distress and climate change through other instruments.

Before the IMF Climate Change Strategy, IMF members included natural disaster clauses in new bonds that resulted from restructurings with creditors, first in Grenada and then in Barbados. During Grenada's 2015 debt restructuring, hurricane clauses were included in the contracts that allow debt service to be automatically reprofiled in the event of a hurricane and other specific types of natural disasters. Grenada would not have to pay out debt service for one year to private bondholders, Taiwan and the Paris Club (IMF 2022d). Barbados included a broader natural disaster clause in its 2018–2019 debt restructuring for both hurricanes and other natural disasters and suspends payments for two years if the damages are significant (IMF 2020b). The IMF was initially very resistant to including these clauses in the two restructurings but has noted and embraced them in the IMF Climate Change Strategy (Lustgarten 2022).

TABLE 5.4 Recipients of CCRT Debt Relief, 2020-2022

		1st Tranche	2nd Tranche	3rd Tranche	4th Tranche	5th Tranche	Total
	Country	SDR Amount Million	SDR Amount Million	SDR Amount Million	SDR Amount Million	SDR Amount Million	SDR Amount Million
1	Afghanistan	2.40	2.40	2.40	-	-	7.20
3	Burkina Faso	8.74	10.30	9.65	10.61	0.26	39.54
4	Burundi	5.48	4.82	4.16	-	3.50	17.96
5	Central African Republic	2.96	2.92	2.92	1.53	2.65	12.98
6	Chad	-	2.00	4.06	4.06	-	10.12
7	Comoros	0.97	0.81	0.65	0.64	0.02	3.09
8	Democratic Republic of Congo	14.85	9.90	4.95	-	-	29.70
9	Djibouti	1.69	1.69	1.40	0.62	0.62	6.03
10	Ethiopia	8.56	4.50	0.47	0.24	0.24	14.01
11	Gambia	2.10	2.10	1.87	1.09	0.78	7.93
12	Guinea	16.37	16.37	18.21	1.84	16.37	69.16
13	Guinea Bissau	1.08	1.36	1.12	0.60	0.28	4.44
14	Haiti	4.10	3.98	3.98	0.87	2.29	15.21
15	Kyrgyz				8.88	0.31	9.19
16	Lesotho				3.21	0.63	3.84
17	Liberia	11.63	11.19	11.48	3.10	7.94	45.34
18	Madagascar	3.06	3.06	6.11	6.11	3.14	21.47
19	Malawi	7.20	7.20	7.81	6.72	3.91	32.84
20	Mali	7.30	7.50	7.70	5.70	1.80	30.00
21	Mozambique	10.89	9.47	9.47	9.47	-	39.29
22	Nepal	2.85	3.57	3.57	-	3.57	13.55
23	Niger	5.64	5.64	9.54	5.03	5.75	31.60
24	Rwanda	8.01	12.02	14.02	8.01	8.01	50.06
25	São Tomé and Príncipe	0.11	0.17	0.17	0.14	0.10	0.70
26	Sierra Leone	13.36	12.22	15.11	6.00	11.55	58.25
27	Solomon Islands	0.06	0.07	0.10	0.06	0.04	0.34
28	Tajikistan	7.83	5.22	3.91	1.30	1.30	19.57
29	Tanzania	10.28	8.29	-	-	-	18.57
30	Togo	3.74	2.31	0.88	-	-	6.93
31	Yemen	14.44	10.96	17.05	-	4.88	47.33
	TOTAL	183.11	168.40	168.07	87.94	82.05	689.58

Source: Compiled by authors using IMF (2021c).

Note: SDR = Special Drawing Right.

DEBT-FOR-CLIMATE SWAPS VERSUS CLIMATE-LINKED DEBT RESTRUCTURING In April 2021, Managing Director Georgieva pledged that the IMF would develop an instrument that would link debt relief and climate action. Georgieva said, “When we are faced with this dual crisis — the debt pressures on countries and the climate crisis, to which many low-income countries are highly, highly vulnerable — it makes sense to seek this unity of purpose... In other words, green debt swaps have the potential to contribute to climate finance. They have the potential to facilitate accelerated action in developing countries” (Shalal 2021). The proposed instrument by the IMF was slated for unveiling at the 26th UN Climate Change Conference (COP26) in November of 2021 but has been delayed.

In July 2021, Georgieva and her senior staff convened a number of outside experts in academia and in think tanks, including presentations by Task Force members, to discuss various options for linking debt relief and climate change as the IMF develops its instrument. As a result of that workshop, the IMF released a working paper on debt-for-climate swaps where the IMF weighed the various types of debt-for-climate linkages that have been proposed by these various actors (Chamon et al. 2022). The two means to link debt and climate that the fund considers are so called debt-for-climate swaps and explicitly linking debt restructuring to climate goals.

Debt-for-climate swaps, like their antecedents in debt-for-nature swaps, are typically an arrangement whereby a sovereign government and a single creditor engage in debt relief, often involving third-party financing, conditioned on the sovereign making climate-friendly investments or policy reforms. A recent example is the 2021 debt swap between Belize and commercial creditors. In general, the IMF expresses concern that these kinds of debt-for-climate swaps only involve one creditor class and may not restore a country to debt sustainability overall. Rather, the IMF paper points out that concessional loans and grants for specific projects may be more efficient ways to finance climate investments but acknowledges that such opportunities continue to be scarce in many countries (Chamon et al. 2022). That said, the IMF surmises that these swaps can be useful if the amount of the necessary climate investment is smaller than the amount of the debt relief and if the investments are contracted to be senior to other debt service payments that a sovereign must make.

The other option the IMF evaluated in the paper is to link comprehensive debt restructuring with climate and development action. The paper sees this option as more favorable on efficiency grounds and in its ability to bring a country back to debt sustainability and mobilize more resources for action. This broader option involves a country renegotiating its debt with all of its creditors so that the country can restore debt sustainability and then use some of the new fiscal space, new grants and loans to support climate-friendly investments. It can also involve directly linking debt restructuring with climate action. The paper prefers the first option — first restructuring debt and then using new fiscal space and a return to markets for climate action. However, the IMF recognizes that in cases where climate investments reduce sovereign risk, the two could be combined. The example that the IMF paper uses to illustrate this point is when Caribbean states invest in climate adaptation, such investments reduce sovereign risk by reducing the impact of climate change on their economies (Chamon et al. 2022).

Designed in the right way, the IMF paper concludes that linking debt restructuring and climate investment in these alternative ways is superior to debt swaps because this avenue involves all creditors, brings the country back to debt sustainability and generates more finances than debt for climate swaps. It also notes that in contrast to debt swaps that resulted in \$2.6 billion

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in debt relief, the debt restructurings in the 1990s led to \$65 billion (which in today's dollars would be roughly \$125 billion). The debt restructurings in the 1990s were successful in bringing the most reluctant creditors to the table by guaranteeing the newly discounted bonds after the restructuring. Private sector creditors were more apt to come to the table if they knew that they would be guaranteed to receive the payments from the new bonds. Such a Brady bond-like scheme is at the heart of one of the proposals considered at Georgieva's colloquium and was endorsed by the 54 finance ministers of the V20 (DRGR 2021).

When a country needs to enter into debt restructuring, a DSA is performed to examine pathways that can return the member state to debt sustainability and set the parameters for the composition and scale of debt restructuring that is needed between the member state and its creditors. As discussed earlier in this report, the IMF has agreed to integrate climate change into DSAs and has explicitly laid out those contours in the 2021 CSR and the IMF Climate Change Strategy. As discussed in Chapter 4, the IMF has been experimenting with incorporating climate concerns in DSAs as part of the surveillance function.

TASK FORCE ANALYSIS OF THE IMF TOOLKIT AND CLIMATE CHANGE

The IMF is the most appropriate multilateral institution to serve as the frontline response to climate shocks, especially where those shocks impact balance of payments, fiscal stability and growth trajectories. The last section discussed how the IMF has made unprecedented strides to incorporate climate change into the IMF lending toolkit; this section shows that the IMF's efforts remain inconsistent with the Paris Agreement. The lending apparatus of the IMF is not at the necessary scale of activity, the eligibility of IMF lending programs does not adequately reflect climate vulnerability, and the design of most of IMF lending is not conducive to building low-carbon, climate-resilient growth paths.

Lack of Scale for Climate Shocks and the Longer-Term Structural Balance of Payments Problem

The IMF Climate Change Strategy does not acknowledge the nature of how climate change and climate change policy will create an increased need for IMF resources. Climate change itself, and transition spillovers, create a vicious cycle for many IMF members. When these risks accumulate, or come in the form of a shock (such as a hurricane in a small island developing state that wipes out major balance of payment-generating components of the capital stock), a country falls victim to capital flight, falling exchange rates and rising cost of capital for rescue and rehabilitation at exactly the time when resources need to be mobilized and external debt needs to be serviced (Kling et al. 2021; United Nations Conference on Trade and Development 2022). This often leads to the need for emergency balance of payments support from the IMF.

For example, in two Task Force working papers, Asafu-Adjaye et al. (2022a,b) find that a 1.8 C rise in temperatures leads to a 2 percentage point decline in GDP growth in Africa, which in turn directly increases budget deficits and could increase debt burdens by 2.4 times. Other Task Force work shows that climate change is itself a source of macro-instability along with climate change policies through transition spillover risks. Titelman et al. (2022)'s Task Force paper on the fiscal impacts of net-zero climate policies pursued in Latin America and the Caribbean would amount to severe public revenue losses and explode public debt by 2050. Gourdel and Monasterolo (2022) model how Barbados faces a significant reduction in growth

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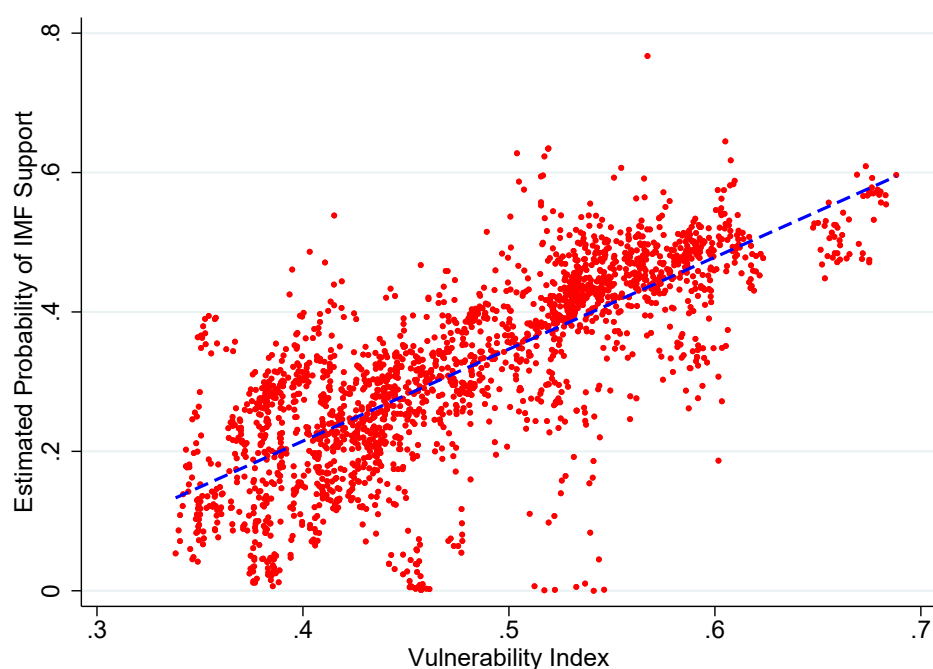
potential due to transition spillovers in the form of less tourism as prices for airfare increase and the country suffers from further climate shocks.

Increases in a member state's climate vulnerability level increases the likelihood that it will request IMF resources. Figure 5.2 presents the plotted results of a probit analysis conducted for this assessment. Analyzing data from 2010 to 2022, we examine the likelihood of needing an IMF program as a country becomes more climate vulnerable. For this analysis, the dependent variable is whether a country requests a program (0,1), and the key independent variable is a country's annual climate vulnerability score. We control for income level and the size of the current account surplus deficit as a percentage of GDP. As one would expect, increases in income and increases in current account surpluses are negatively correlated with the likelihood of requesting an IMF program and are statistically significant. Independent of those drivers, however, we find that increases in climate vulnerability are positively associated with the likelihood of requesting an IMF program and are statistically significant. The IMF will thus need to develop ways to take climate vulnerability into account in its exercises to estimate the "adequacy of fund resources" moving forward.

Resilience and Sustainability Facility: Too Few Resources, Too Much Stigma

The most unprecedented and welcomed new part of the IMF lending toolkit was the establishment of the RST and the subsequent RSF. The Task Force published two policy briefs on the RST during the period it was still being debated (Task Force 2021b, 2022) and identified a number of limitations in earlier proposals, some of which were addressed in the final decision. Still, some significant limitations remain, especially pertaining to eligibility requirements, terms and conditionalities, and scale.

FIGURE 5.2 Climate Vulnerability and Demand for IMF Resources



Source: Maldonado and Gallagher (2023).

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Access to the RSF has eligibility requirements that will hinder its use and success. The most concerning eligibility requirement is the need for a pre-existing IMF program. Figures 5.3 and 5.4 illustrate whether countries facing high transition risks or climate vulnerability have IMF programs. Because of the multiple crises facing developing countries, such a requirement is problematic for several reasons. First, because of the record and resulting stigma of traditional IMF-supported programs, many countries have vowed to never draw on those facilities and would thus implicitly not have access to the RSF. Second, many countries may not have a balance of payments problem in the short term, but precisely because they may have a structural balance of payments problem over the next decades is why they would need an RSF without a concurrent program.

Since those countries have no need for balance of payments support in the short term, why should they enter into short-term agreements to access longer-run financing? At the time of this writing, countries such as Nigeria and Indonesia are exhibiting few balance of payments difficulties precisely because they are exporting significant amounts of fossil fuels to their trading partners at a time of increased demand for fossil fuels resulting from Russia's war in Ukraine. However, over time, the structure of their balance of payments will be unsustainable due to fossil fuels becoming stranded assets. Indeed, one Task Force technical paper finds that transition spillovers in the form of coal phaseouts in China could have severe impacts on balance of payments and fiscal stability in Indonesia in the longer term (Gourdel, Monasterolo and Gallagher 2022). Similarly, in some (but certainly not all) climate-vulnerable countries, the incidence of climate shocks not been exceptionally large, but as climactic systems break down over time, countries will be more vulnerable to shocks in the future. The RSF was specifically designed to help countries address long-term threats to balance of payments stability — even if they are not threats in the short term. The European Central Bank has demonstrated that the GRA and the PRGT are not intended to address long-term balance of payments issues, so the RCF fills a key gap (European Central Bank 2022). Finally, having to build resilience and address climate when already during an economic crisis is far from optimal. By definition, financial and human resources are more limited, which makes focusing on and financing longer-term resilience more costly and uncertain.

The terms and conditions of RSF programs are also not optimal. The IMF should offer concessional rates because tackling climate change should not overburden developing countries with more debt. Many countries in need of such financing are currently faced with large debt burdens and high debt servicing costs during the most crucial decade of resource mobilization and investment needs. Like the PRGT, the RSF should have highly concessional financing.

Country ownership needs to be the organizing principle for RSF support. Countries have already submitted rounds of NDCs under the Paris Climate Agreement, and they are the clearest articulations of how countries intend to tackle climate change. V20 members have developed more detailed “climate prosperity plans.” However, a critical unanswered element is identifying how to mobilize the investment required for each country to achieve these climate objectives. As such, these country-owned proposals should form the basis of RSF support. The IMF can play a role in helping countries elaborate their NDCs in a manner that is compatible with their climate and development aspirations. As discussed further below, the IMF will need to work in coordination with multilateral development bank, like the World Bank and regional development banks, to facilitate resource mobilization and investment in climate resilience. Thus far, in the few RCF programs that the Task Force have been able to analyze, there are good signs of country ownership, though if certain milestones are not met, then additional tranches of RCF financing are not forthcoming as in traditional IMF-supported programs.

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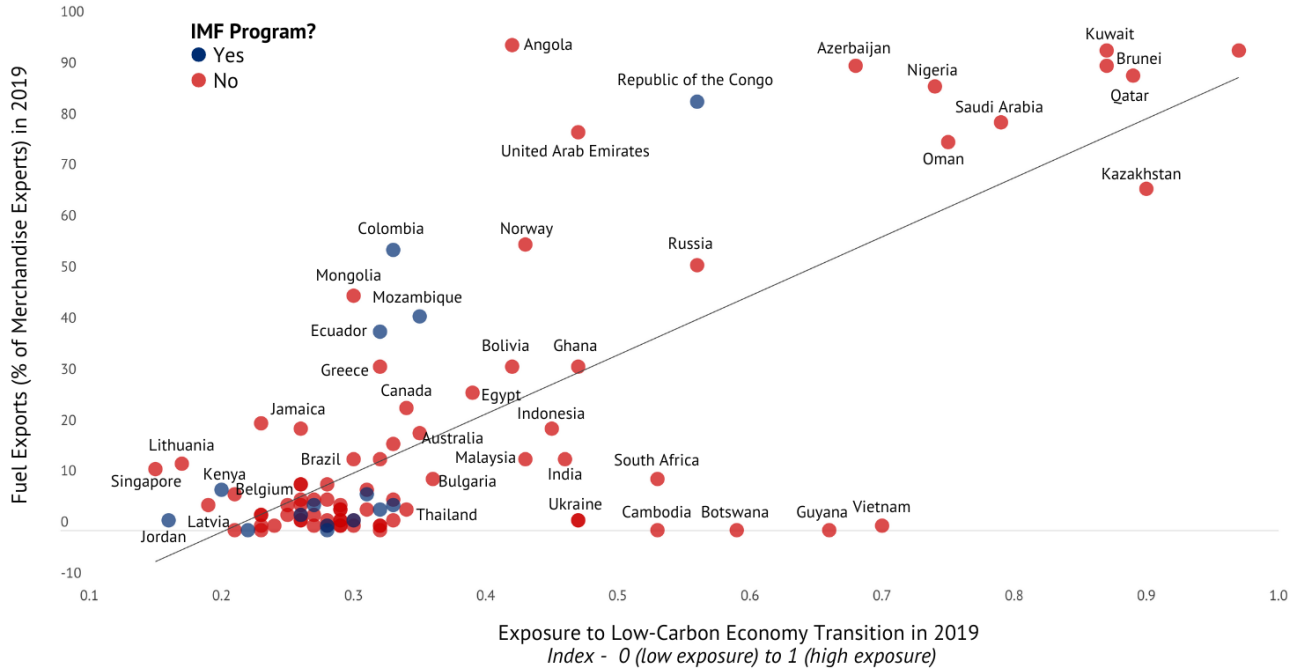
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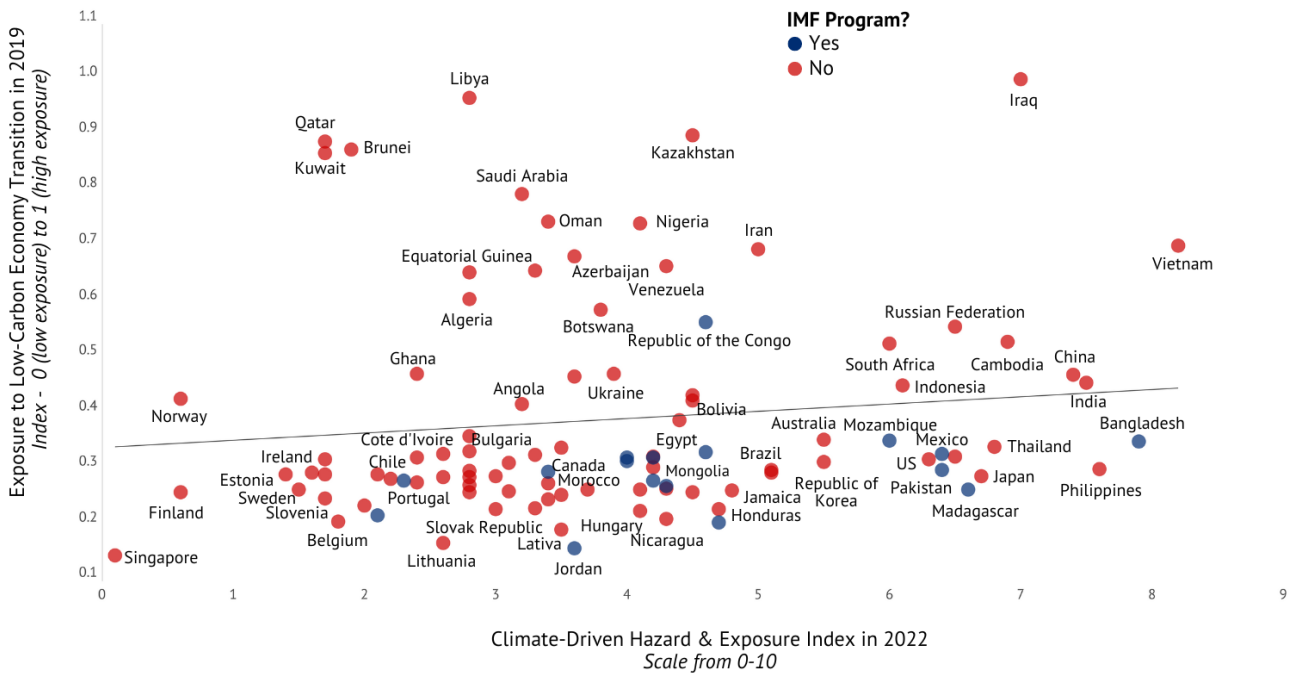
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FIGURE 5.3 Transition Risks and IMF Programs



Source: Ramos, L. (2023); Data source: IMF and World Bank (2023).

FIGURE 5.4 Climate Vulnerability and IMF Programs



Source: Ramos, L. (2023); Data source: IMF and World Bank (2023).

Finally, the Task Force has stressed the need for an appropriate scale of the RST. As noted earlier in the chapter, the IMF has underestimated the need for the RST at upwards of \$50 billion. This is largely due to the economic modeling approach deployed by the IMF (see Chapter 3 and Task Force 2022). The report of the Independent High-Level Expert Group on Climate Finance (2022) estimates that developing countries will need \$1 trillion per year until 2030. As shown earlier in Table 5.1, the RSF has only received \$40 billion in pledges, and only \$26 billion has materialized. Relatedly, the scale of resources available to countries from the RCF is relatively small, at 150 percent of quota. In many cases countries will need to make very large investments that will last for 40–75 years or more but are held to just a certain percentage of one year of GDP. Finally, it is not clear if the RSF can be used to mobilize other types of financing. The Task Force has recommended using RSF financing to collateralize green bond issuances for countries with fiscal space and to be used as collateral to guarantee new bonds resulting from a restructuring for countries that need debt relief.

Traditional IMF-Supported Programs: Conditioning Green Fiscal Consolidation

Perhaps the most concerning aspect of the IMF's lending policies has been the adoption of a green fiscal consolidation approach to integrating climate into IMF lending through IMF-supported programs from the GRA and PRGT. While the IMF deserves credit for rapidly incorporating climate into its lending programs, it is clear that it is subordinating climate change to the perceived need for fiscal consolidation. There is strong evidence that consolidation-led IMF programs are inconsistent with economic growth and will thus not help countries begin a low-carbon, climate-resilient and socially inclusive growth path moving forward.

IMF programs have a patchy record in meeting their objectives. Some of the literature has shown that the programs can help address temporary balance of payments problems but often at the expense of social outcomes and economic growth. Traditionally, the IMF's flagship lending programs have tended to condition that countries engage in contractionary monetary and fiscal policies, which has often resulted in a decrease in public investments in alignment with climate change and development and has often resulted in worsening social and environmental outcomes (Kentikelenis and Stubbs 2023). There is also a consensus in the scholarly literature on the limited effectiveness of these conditionalities that is supported by some of the IMF's own research.

Two of the more definitive studies in the academic literature are by Przeworski and Vreeland (2000) and Dreher (2006). Przeworski and Vreeland find that taking part in an IMF program lowers growth rates for the duration of time the country is in a program. When a country leaves an IMF program, it grows faster than if it had remained but not faster than it would have without participating. In another comprehensive econometric analysis, Dreher (2006) concludes that "as has been shown in several studies, with respect to this objective (growth), IMF programs are a failure. This paper provides further evidence." Some of the IMF's own research is consistent with the scholarly literature (IMF 2007, 2019). As Figure 5.5 shows, fiscal consolidation remains the centerpiece of IMF programming, with only 2008 and 2020 as exceptions during the global financial crisis and COVID-19 responses (Ray et al. 2022).

In addition, a large body of research shows that IMF programs are also associated with poor social outcomes such as health indicators, poverty and inequality (Stubbs et al. 2022). There is some evidence that green fiscal consolidation also accentuates social conflict. In two cases where the IMF required a reduction in fossil fuel subsidies. While such policies may be optimal

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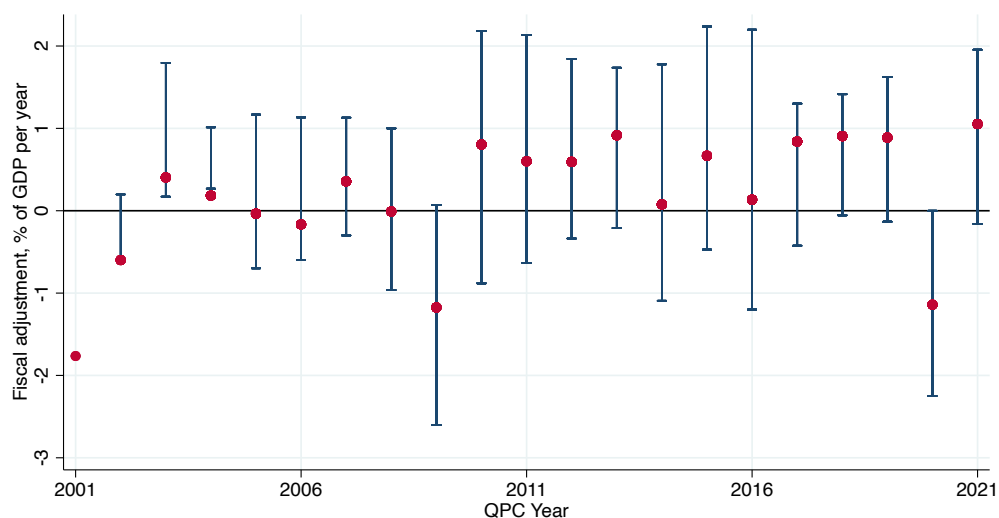
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FIGURE 5.5 IMF Fiscal Adjustment: Medians and 25th, 75th Percentiles, 2001-2021



Source: Ray et al. (2022).

Note: QPC = Quantitative performance criteria

in the intermediate term, the IMF and host countries often did not couple the elimination of fossil fuel with financial support and alternative means of energy access for those most affected from the subsidies (Joos 2018; Monahan 2019; Shellenberger 2022). Recent fossil fuel subsidy reductions in Haiti and Ecuador squeezed the poor to such a point of desperation that massive riots occurred in the capital cities of each country. In Ecuador, rioting was so heightened that the capital city had to be temporarily moved to another location (Monahan 2019).

Deep readings of IMF programs in Argentina, Pakistan, Kenya and Madagascar reveal that green fiscal consolidation is inconsistent in the programs, sending mixed messages to authorities. For example, in Argentina the IMF endorsed some subsidy cuts to help the country transition from depending on fossil fuels while also endorsing private sector investment incentives in shale oil and gas reserves. In Pakistan, researchers found that the IMF required the country to increase taxes in imported electric vehicles, wind turbines and other renewable energy technologies. While the program did include energy subsidy and pricing reforms, these were informed by fiscal rather than climate concerns and contributed to social unrest (Stubbs and Kentikelenis 2022; Kentikelenis and Stubbs 2023).

The goal of IMF surveillance and lending must be to help member states make the proper investments toward low-carbon, carbon-resilient and socially inclusive growth paths. While IMF programs are misaligned with such a mission, some of the IMF's own research suggests that a combination of climate-smart fiscal policy, significant public investment in green industry and infrastructure and social support for a just transition could show another way. In modeling exercises published in the October 2020 *WEO*, the IMF estimates that if nations phased out fossil fuel subsidies, ramped up renewable energy subsidies and invested in sustainable infrastructure and social adjustment for those workers and entrepreneurs in incumbent fossil industries, the global economy would grow by close to 1 percent and create an upwards of 12 million new jobs through 2027 (IMF 2020c). Another paper published in the academic literature by IMF economists also finds that green stimulus measures such as renewable energy and

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sustainable infrastructure have two to seven times the multiplier effect than brown stimulus measures in coal, gas, oil and beyond (Batini et al. 2022). In addition, recent modeling work by the Brookings Institution shows that when recovery packages have a ‘big push’ where the government implements the kinds of investments suggested in Songwe et al. (2022) they lead to higher growth, income and creditworthiness (Karas and Rivard 2022).

DEBT RESTRUCTURING AND CLIMATE CHANGE: SOME EXCEPTIONS, NO RULE

The IMF has piloted important experiments through its improvements in the CCRT, the design of natural disaster clauses in debt relief efforts and through changes in DSA policy. There is much room for improvement, however, as these efforts are not at scale and debt relief efforts are exceptions rather than the rule. In this time of growing debt distress, the lack of IMF action on linking debt negotiations and climate change will not only trigger more default but also jeopardize the ability of the world to stabilize the climate system.

The CCRT

The CCRT is an exceptional instrument that can help climate-vulnerable countries obtain debt relief during a period when they need to be focusing on rescue and recovery. The enhancement of the CCRT from 2020 to 2022 showed it can be an effective and rapid tool. However, it has two limitations: eligibility and lack of scale.

Many of the most climate-vulnerable countries are not eligible for the CCRT. The first column of Table 5.5 shows the 34 countries eligible to receive debt relief for IMF debt in the first column and the countries with similarly high climate vulnerability scores in the second column. With few exceptions, the ineligible countries are relatively small low-income countries and low- and middle-income countries that are highly indebted and highly climate vulnerable but are excluded from the CCRT. The CCRT also needs to be scaled up to match the needs. At short of \$1 billion, the CCRT lacks the firepower to help those countries most in need of debt relief.

Debt Restructuring and DSAs

The IMF has made some positive steps but has only just begun to act on how to incorporate climate concerns into debt restructuring. Developing nations must work to mobilize upwards of \$1 trillion per year in order to meet development and climate goals or face economic and social costs that will far outweigh such investments (Songwe et al. 2022). In the current environment, many of these countries do not have the fiscal space nor the ability to externally borrow in a stable manner to meet these needs. A concerted effort of new financing, concessional finance and debt relief is urgent for the global economy, and the IMF needs to take the lead on linking debt and climate change. Given that the underlying IMF Climate Change Strategy has largely overlooked the need for massive resource mobilization and the IMF’s role in such activity, it is difficult for the IMF to articulate a full-fledged approach to debt distress and climate change. On debt, it has started to incorporate climate into surveillance DSAs, has not mainstreamed natural disaster clauses and has been significantly delayed in introducing climate change to debt restructuring (Kraemer and Volz 2022).

Maldonado and Gallagher (2022) recently published a Task Force paper showing that the IMF toolkit is well equipped to address both the dynamics between external debt sustainability and

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TABLE 5.5 Many Climate Vulnerable Countries Not Eligible for Catastrophe Containment and Relief Trust

CCRT Eligible		Not CCRT Eligible	
Country	Vulnerability Index	Country	Vulnerability Index
Niger	0.67	Sudan	0.62
Somalia	0.67	Micronesia	0.58
Guinea-Bissau	0.66	Tonga	0.58
Chad	0.66	Mauritania	0.57
Liberia	0.60	Zimbabwe	0.55
Mali	0.60	Vanuatu	0.55
Central African Republic	0.59	Bangladesh	0.54
Eritrea	0.59	Papua New Guinea	0.54
Democratic Republic of Congo	0.59	Senegal	0.53
Rwanda	0.59	Myanmar	0.53
Uganda	0.58	Pakistan	0.53
Afghanistan	0.58	Laos	0.53
Benin	0.57	Kenya	0.53
Solomon Islands	0.57	Maldives	0.52
Ethiopia	0.56	Congo	0.52
Sierra Leone	0.56	Zambia	0.52
Madagascar	0.56	Bhutan	0.52
Yemen	0.56	Swaziland	0.52
Burundi	0.56	Cote d'Ivoire	0.51
Malawi	0.55	Cambodia	0.51
Burkina Faso	0.55	India	0.51
Gambia	0.55	Angola	0.51
Guinea	0.53	Nigeria	0.50
Haiti	0.53	Samoa	0.49
Comoros	0.53	Viet Nam	0.48
São Tomé and Príncipe	0.53	Cameroon	0.48
Togo	0.52	Sri Lanka	0.48
Nepal	0.52	Antigua and Barbuda	0.48
Tanzania	0.52	Namibia	0.47
Mozambique	0.52	Ghana	0.47
Timor-Leste	0.50	Seychelles	0.47
Lesotho	0.48	Botswana	0.47
Djibouti	0.48	Syrian Arab Republic	0.47
Tajikistan	0.41	Philippines	0.46
Kyrgyz Republic	0.35	Honduras	0.46
South Sudan	N/A	Bolivia	0.46

Source: Authors' calculations based on IMF (2021c) and ND-GAIN.

Note: Kyrgyz Republic and Lesotho gained eligibility in October 2021 and Afghanistan lost eligibility due to the government's lack of international recognition in 2021.

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climate change. Using the IMF's modeling framework, the authors introduce climate shocks to Colombia and Peru, along with the interest rate shock that occurs and the subsequent increased fiscal outlays needed to mitigate the shock. Furthermore, the authors introduce the resource mobilization needed to transition to low-carbon and resilient economies. The data needs for such analyses are intensive but not insurmountable. Some of the early DSAs after the CSR have begun to introduce climate shocks but do not incorporate resource mobilization needs.

For the more climate-vulnerable nations, new loans and restructured bonds should have clauses to suspend payments during climate shocks. While the IMF Climate Change Strategy notes how the IMF had endorsed natural disaster clauses, those restructurings were before the recent wave of debt distress brought on by the multiple crises facing developing countries. In the numerous restructurings that the IMF has been involved in since the COVID-19 crisis began, the IMF has not been involved in incorporating disaster clauses into new bonds, nor has it seriously incorporated climate change into the DSAs that form the basis of restructuring negotiations and subsequent IMF financial programs. As nations try to mobilize resources for development and climate change amid the increasingly uncertain world of natural disaster, clauses with Grenada and Barbados have been hailed as important innovations but have remained the exception rather than the rule. Indeed, in the cases of Ecuador, Lebanon, Sri Lanka and Zambia, each of these countries has had a higher climate vulnerability score than Grenada or Barbados but has not had disaster clauses introduced in their restructurings as of this writing.

There is an urgent need for the IMF to articulate a strategy and instrumentation for addressing debt distress and climate change. Its announcement of creating such an instrument in 2020 was very welcome, and the 2022 IMF working paper (Chamon et al. 2022) makes strides in what the contours should look like. Yet, the number of countries in debt distress — even without the proper consideration of the incidence of climate shocks and resource mobilization needs — is at an alarmingly high rate. The IMF paper shows that the Fund is going in the right direction in that it is better to link climate change to full-fledged restructuring rather than through bilateral debt for climate swaps. That way, countries can return to debt sustainability and chart a path to climate-resilient growth. The IMF suggests that in so doing it is more appropriate to restructure a nation's debt first and then address climate needs with new fiscal space. The one exception is linking restructuring with adaptation investments given that adaptation financing reduces sovereign risk. In a policy brief on the RST, the Task Force noted literature that finds that investments in low-carbon transitions also reduce sovereign risk by creating growth and reducing transition risks (Task Force 2022). Task Force members also documented the diverse number of creditors that climate-vulnerable nations in debt distress now face (Ramos et al. 2022). Brady bond-like arrangements that guarantee new bonds after restructurings to enhance creditor participation that also explicitly link the new bonds with climate action have been acknowledged by the IMF to help with creditor participation, bringing the country to debt sustainability, and with addressing climate change (Chamon et al. 2022; Volz et al. 2021).

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CONCLUSION

The last eight years were the hottest years on record. Developing countries face the economic and social impacts of these increasing temperatures at a time when many are at an alarming level of debt distress, and still others lack the fiscal space to respond to shocks and mobilize the proper resources to invest in a just transition. It is imperative that the IMF build on the more positive elements of its reforms at scale and with the utmost urgency. Below, the Task Force advances several reforms needed to align the IMF lending toolkit with a development-led trajectory for addressing the macro-critical aspects of climate change:

Traditional IMF-Supported Programs

- Assess climate-related needs — for both responding to shocks and mobilizing resources for transitions — in exercises to determine the “adequacy of fund resources,” and use such analyses to increase the scale of IMF programming through quota-based increases and new issuances of SDRs.
- Reform program design to make IMF programs consistent with Article 2.1(c) of the Paris Climate Agreement, which entails abandoning green fiscal consolidation and the associated conditionalities for an investment-led recovery path.

Resilience and Sustainability Facility

- Scale the RSF to meet the balance of payments related to the financing needs of climate-vulnerable countries.
- Expand the use of the RSF to be used as collateral for new green bonds or for restructured bonds connected to green and inclusive recoveries.
- Broaden the eligibility requirements to include all climate-vulnerable countries regardless of income level and make RSF financing concessional through the establishment of a PRGT-like subsidy fund.
- Eliminate the requirement that an RSF recipient must have an existing IMF-supported program, at least for those countries that do not need short term help but have longer-term structural balance of payments problems due to climate change and climate policy.
- Enshrine country ownership in RSF programs, especially through supporting and ring fencing NDCs and climate prosperity plans.

Debt Distress and Climate Change

- Scale the CCRT and expand eligibility to a broader set of climate-vulnerable countries.
- Reform DSAs to incorporate climate shocks and resource mobilization needs, and then use these DSAs as a basis for debt negotiations.
- Incorporate disaster clauses into all IMF lending instruments to climate-vulnerable countries, especially in renegotiated bonds, with *pari passu* clauses.
- Use funding from the RSF to serve as collateral and credit enhancement for newly issued green bonds when countries have fiscal space and in Brady bond-like arrangements as collateral for newly restructured bond issuances with climate characteristics.

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LOOKING FORWARD

This is a critical moment for unprecedented global collaboration to usher in green transitions that are as just as they are swift. The IMF has made substantial strides to begin streamlining climate change into its operations, but more work is ahead to ensure this approach is development-centered.

The Task Force looks forward to continuing this conversation with IMF member governments, management and staff, and the multitude of stakeholders working to align the financial system with climate and development goals.

To stay up to date and learn more at gdpcenter.org/TaskForce.

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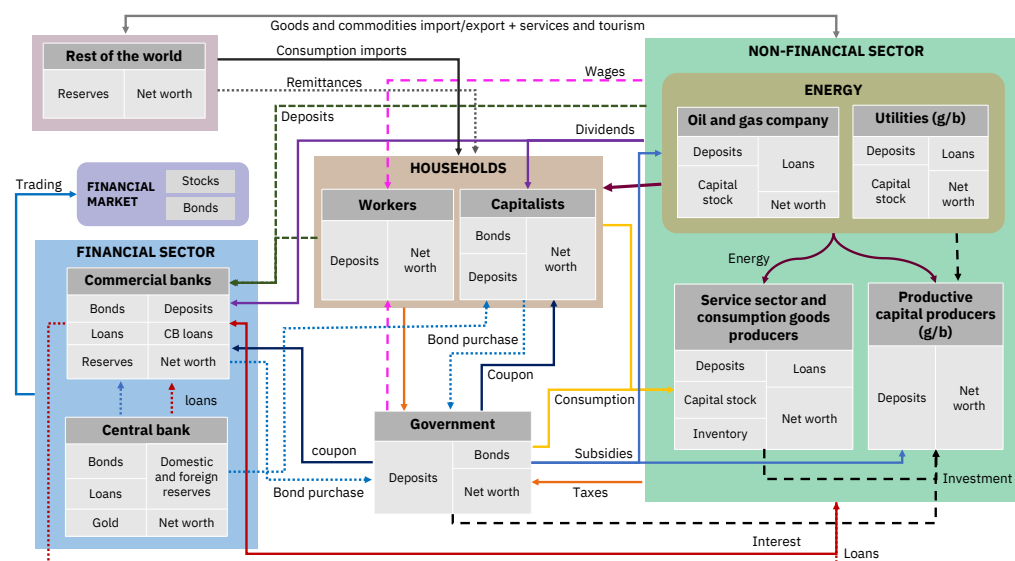
ANNEX

CHAPTER 2 ANNEX

The Task Force contributes to the discussions about climate spillovers, specifically focusing on transition spillovers from a systemic country (e.g., China, EU) and spillovers of global climate actions (e.g., coordinated policies) on vulnerable countries (e.g., fossil fuel exporters, less diversified economies like Barbados). The papers, while using different types of modeling techniques, find that transition spillovers have significant adverse impacts on global burden sharing and vulnerable countries' balance of payments, growth and fiscal sustainability.

Gourdel, Monasterolo and Gallagher (2022) use a tailored EIRIN Stock-Flow Consistent behavioral model to analyze the impacts of China's decarbonization on the macroeconomic and fiscal stability of Indonesia. The paper finds that transition spillover risk has a significant negative impact on the economic growth, balance of payments (3 percentage points lower in terms of a share of GDP) and fiscal sustainability (the government deficit to GDP ratio would be 2 percentage points higher) of Indonesia, leading to heightened sovereign risks in the long run.

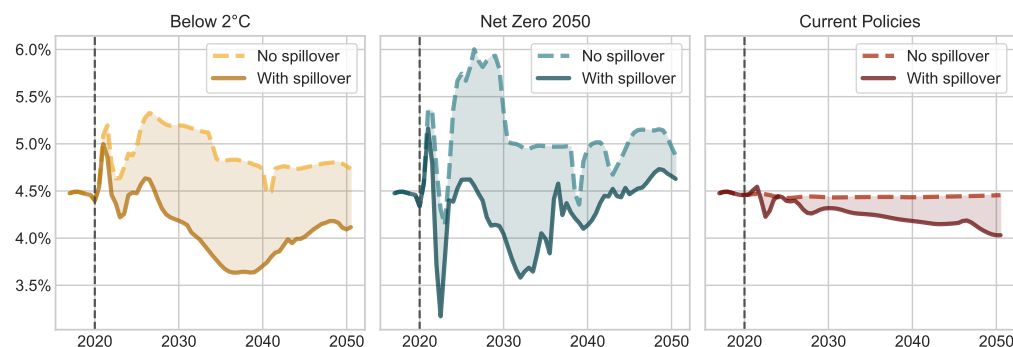
FIGURE A1 The EIRIN Model Framework: Capital and Current Account Flows of the EIRIN Economy



Source: Gourdel, Monasterolo and Gallagher (2022).

Note: For each sector and agent, a representation in terms of assets and liabilities is provided. The dotted lines represent the capital account flows, while the solid lines represent the current account flows.

FIGURE A2 Growth Rate of the Real GDP in the NGFS Scenarios



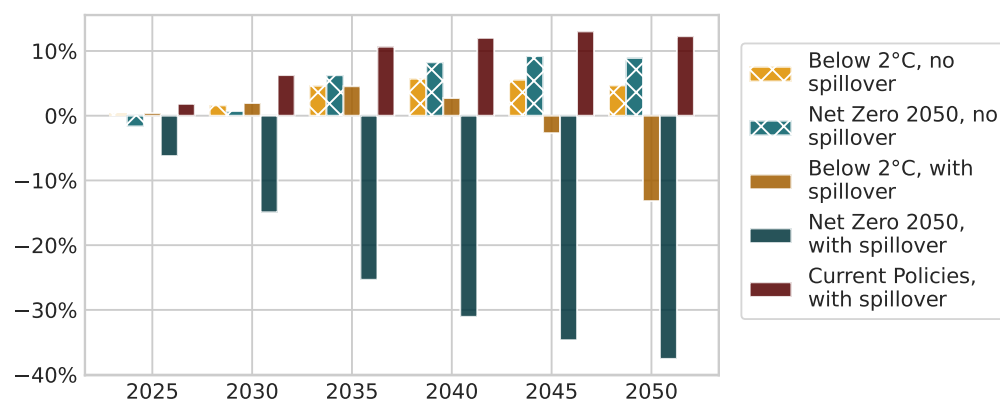
Source: Gourdel, Monasterolo and Gallagher (2022).

Note: The x-axis displays years of simulation. The y-axis displays the year-on-year growth rate of real GDP. NGFS = Network for Greening the Financial System.

Gourdel and Monasterolo (2022) use a tailored EIRIN Stock-Flow Consistent behavioral model to study the aggregate global transition spillovers on Barbados, which is highly dependent on international tourism. They find that Barbados' GDP would be 38 percent less than that under business as usual (BAU) due to the transition spillover risk, and the public debt to GDP ratio would increase to 150 percent of GDP.

Titelman et al. (2022) examine the fiscal impacts of a net-zero transition on major fossil fuel producers in Latin America — Bolivia, Brazil, Colombia, Ecuador, Mexico and Trinidad and Tobago. The authors find that fossil fuel-producing countries will face mounting pressures to increase public revenues to make up for lost hydrocarbon related revenues, finance their net-zero emission transition and respond to growing social and investment needs. To maintain a sustainable debt path in a net-zero emission transition, and to achieve sustainable and inclusive development, it will be crucial to strengthen the capacity of hydrocarbon producers to mobilize domestic and low-cost external resources.

FIGURE A3 Real GDP, as Percentage Deviation from Baseline Scenario of Current Policies Without Spillover



Source: Gourdel and Monasterolo 2022.

Note: The x axis for both panels displays selected years of the simulation, and the y axis displays the percentage deviation in real GDP level relative to the reference scenario, which is NGFS current policies with no spillover risk.

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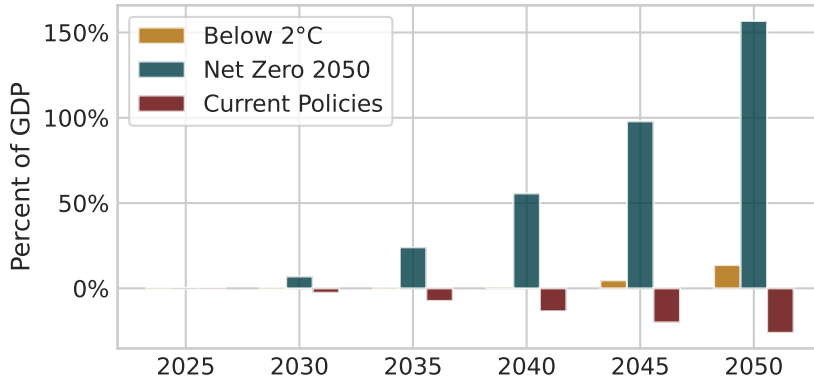
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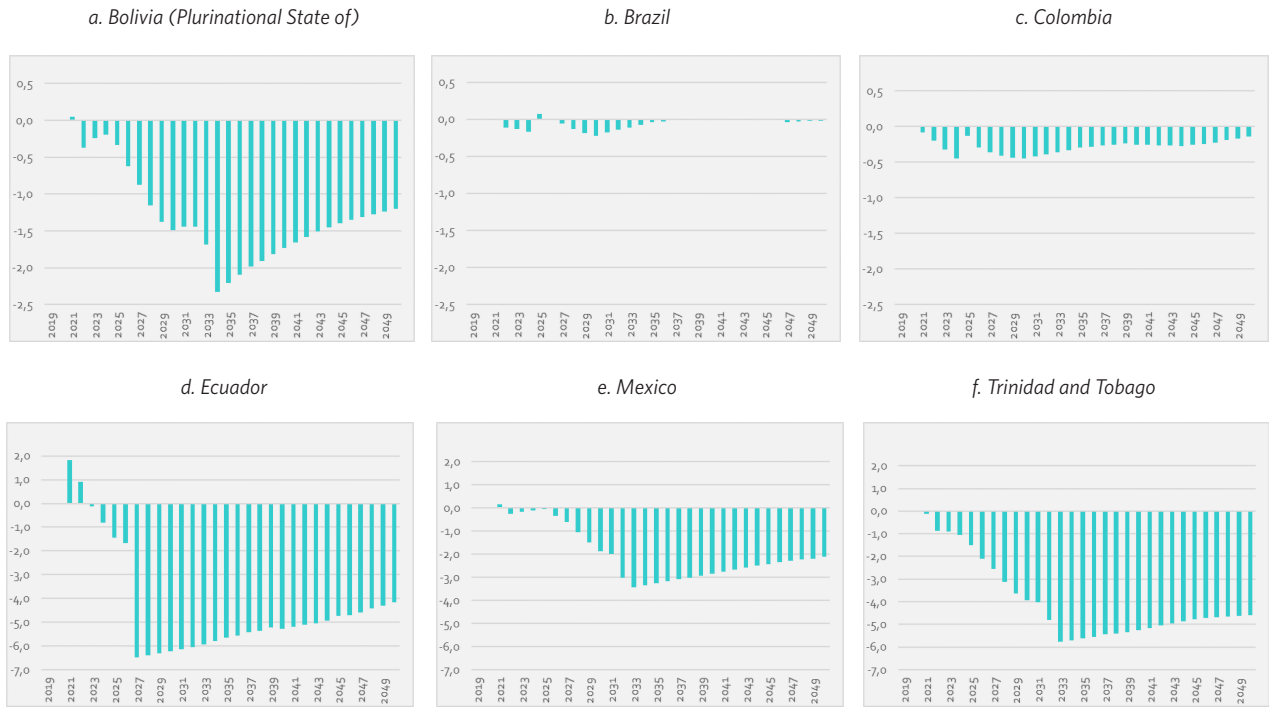
FIGURE A4 Difference in Public Debt Level Induced by Transition Spillover Shock (% of GDP)



Source: Gourdel and Monasterolo 2022.

Note: Each scenario with spillover is compared to its no-spillover version.

FIGURE A5 LAC6: General Government Fiscal Balance in the NZE-ISN-pc Scenario (Percentage points of GDP difference relative to BAU-ISN scenario)



Source: ECLAC 2022.

He et al. (2022a) CGE model to study the spillover effects of the EU’s CBAM. The authors find that countries that rely on carbon-intensive exports to the EU will be disproportionately impacted by the CBAM. At its broadest implementation, the CBAM could result in an annual welfare gain in developed countries of \$141 billion, while developing countries could see an annual welfare loss of \$106 billion, compared to a baseline scenario. To ensure a just transition, the authors suggest that the IMF should play the key role in identifying and addressing the

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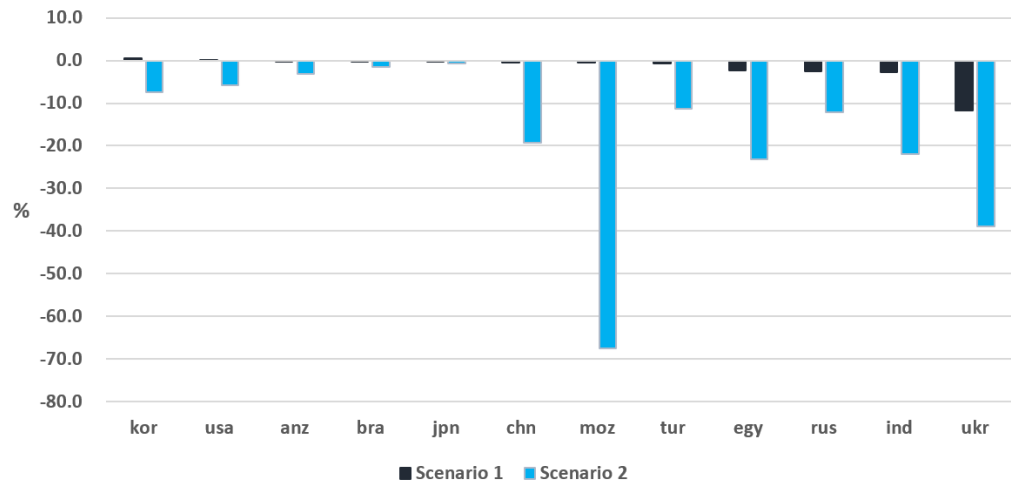
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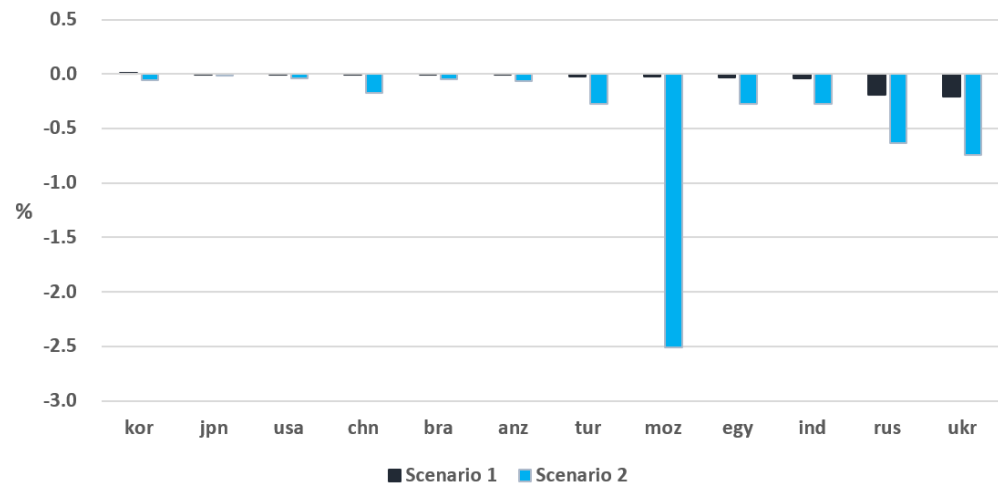
FIGURE A6 Impact of CBAM on Total Exports to EU (% Change from Baseline)



Source: He et al. (2022a).

Note: Figures in the chart indicate the % changes in total exports to the EU from exporting regions. Australia and New Zealand (anz), Japan (jpn), United States of America (usa), South Korea (kor), China (chn), India (ind), Brazil (bra), Russia (rus), Ukraine (ukr), Turkey (tur), Egypt (egy), Mozambique(moz).

FIGURE A7 Impact of CBAM on GDP (% Change from Baseline, 2030)



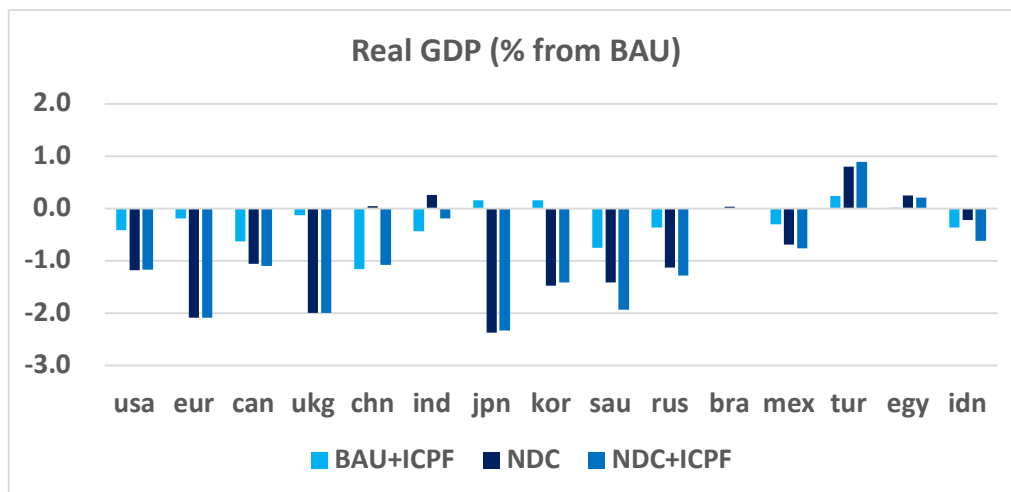
Source: He et al. (2022a).

Note: Figures in the chart indicate the % changes in the real GDP for exporting regions. Australia and New Zealand (anz), Japan (jpn), United States of America (usa), South Korea (kor), China (chn), India (ind), Brazil (bra), Russia (rus), Ukraine (ukr), Turkey (tur), Egypt (egy), Mozambique (moz).

cross-border spillover effects of climate policies, especially those on balance of payments and growth trajectories of vulnerable countries, and should explore the possibility of launching an Equitable Decarbonization Fund from the proceeds of the CBAM to support decarbonization projects in low-income countries and the development of green technologies.

He et al. (2022b) use a dynamic global CGE model and find that when compared to NDCs, the differentiated price floors are nonbinding and thus irrelevant for developed countries but are equivalent to substantial increases in developing countries' NDCs.

FIGURE A8 Economic Impact of ICPFs



Source: He et al. (2022b).

Note: Economies shown in the Figure are the US (usa), EU (eur), Canada (can), the UK (uk), China (chn), India (ind), Japan (jpn), Korea(kor), Saudi Arabia (sau), Russia(rus), Brazil (bra), Mexico (mex), Turkey (tur), Egypt (egy), Indonesia (idn). NDC = nationally determined contribution; ICPF = international carbon price floor; BAU = business as usual.

In other words, the ICPF would place additional responsibilities of emission reductions, as well as additional economic costs, on developing economies. These results suggest that the ICPF will unlikely be accepted by many developing countries. The IMF should estimate the price equivalents of non-price policy instruments for decarbonization, recalibrate the desirable floors for broadly defined carbon, and consider options to redistribute the economic benefits between advanced economies and developing countries through climate mitigation funds and making low-carbon technologies more available for developing countries.

CHAPTER 4 ANNEX

Mitigation

- *Policy Analysis*
 - GHG emissions: descriptions of GHG emissions and the policies to reduce emissions.
- *Policy Recommendations*
 - Introduction/raise of carbon price/carbon tax: implementation and increase recommendations.

Transition Management

- *Policy Analysis*
 - Transition management financing needs: financial needs to implement mitigation and adaptation measures. In the case of Dominica, the DSR estimates that the total cost of resilience is five times the country's GDP.
 - The authorities of Trinidad and Tobago estimate that the total costs to meet its Paris Climate Agreement reduction target by 2030 is about \$2 billion (9 percent of GDP).

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- *Policy Recommendations*
 - Implementation of tourism sector reforms: considers recommendations that include climate resilience measures.
 - Implementation of energy sector reforms: considers recommendations that include mitigation measures (cleaner energy matrix), without distinguishing the main reason for this recommendation. For example, Antigua and Barbuda are recommended to invest in renewable energy due to high oil prices. Argentina is recommended to increase the efficiency and sustainability of its energy sector to reduce reliance on expensive energy imports.
 - Green bonds: finances climate change mitigation and adaptation needs. It is only included as a recommendation, i.e., does not include countries that already have implemented these tools (Chile, Colombia, Costa Rica).

Adaptation/Resilience Building

- *Policy Analysis*
 - Natural disasters included in DSA natural disasters are included in baseline scenarios and/or stress tests.
 - Natural disasters included in the Risk Assessment Matrix: an increase in the frequency and/or severity of natural disasters are considered a factor in the Risk Assessment Matrix.
 - Climate-induced commodity export shock included in the Risk Assessment Matrix: impact of climate change in agricultural production and exports.
- *Policy Recommendations*
 - Measures of physical/structural resilience to climate change: build resilience to minimize public expenditures in recovery efforts from a natural disaster.
 - Adoption/implementation of the DRS: accesses bilateral and multilateral financing.
 - Creation/strengthening of resilience/contingency fund: finances climate-related initiatives and consequences.
 - Insurance coverage for natural disasters: finance damages after a natural disaster.
 - More fiscal space reducing debt: considered only when is required to finance expenditures related to climate change/natural disasters.
 - Natural disaster clauses in sovereign debt: inclusion of clauses to delay payments in case of natural disaster.
 - Inclusion of climate-related risks in fiscal rules: inclusion of natural disasters in escape clauses

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Santiago, Chile.
Photo by Christopher Quezada via Unsplash.



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