TECHNICAL NOTE Nº IDB-TN-3119

Enhancing Fiscal Resilience

Medium-Term Frameworks for Managing Emerging Risks

Oscar M. Valencia
André Martinez

Inter-American Development Bank
Fiscal Management Division
Institutions for Development Sector

April 2025

Enhancing Fiscal Resilience

Medium-Term Frameworks for Managing Emerging Risks

Oscar M. Valencia
André Martinez

Inter-American Development Bank
Fiscal Management Division
Institutions for Development Sector

April 2025

Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library

Valencia Arana, Oscar.
Enhancing fiscal resilience: medium-term frameworks for managing emerging risks / Oscar M. Valencia, André Martinez.
p. cm. — (IDB Technical Note ; 3119)
Includes bibliographical references.
1. Climatic changes-Economic aspects-Latin America. 2. Climatic changes-Economic aspects-Caribbean Area. 3. Fiscal policy-Environmental aspects-Latin America. 4. Fiscal policy-environmental aspects-Caribbean Area. 5. Resilience (Ecology)-Economic aspects-Latin America. 6. Resilience (Ecology)-Caribbean Area. 7. Green marketing-Latin America. 8. Green marketing-Caribbean Area. I. Martínez, André. II. Inter-American Development Bank. Fiscal Management Division. III. Title. IV. Series.
IDB-TN-3119

JEL Codes: H60, H87, Q54, Q58
Keywords: climate change, fiscal sustainability, medium-term fiscal frameworks, Latin America and the Caribbean

http://www.iadb.org

Enhancing Fiscal Resilience

Medium-Term Frameworks for Managing Emerging Risks

Oscar M. Valencia André Martinez

IDB

Table of Content

Abstract

Climate change poses significant well-known risks to fiscal sustainability in Latin America and the Caribbean, such as annual losses of up to 1.7 percent of GDP due to extreme weather events, the devaluation of carbon-intensive assets caused by the transition to a low-carbon economy, and the loss of fiscal revenues linked to fossil fuels. This study describes how governments can integrate green medium-term fiscal frameworks (MTFFs) into their fiscal planning to mitigate these risks. Green MTFFs combine effective carbon pricing, sustainable reforms, and strategic investments in green infrastructure. They are not only a technical tool but an imperative approach to avoid fiscal decisions that undermine growth and stability in the region. They also expose certain shortcomings, such as lack of reliable data, institutional fragmentation, and fiscal space constraints.

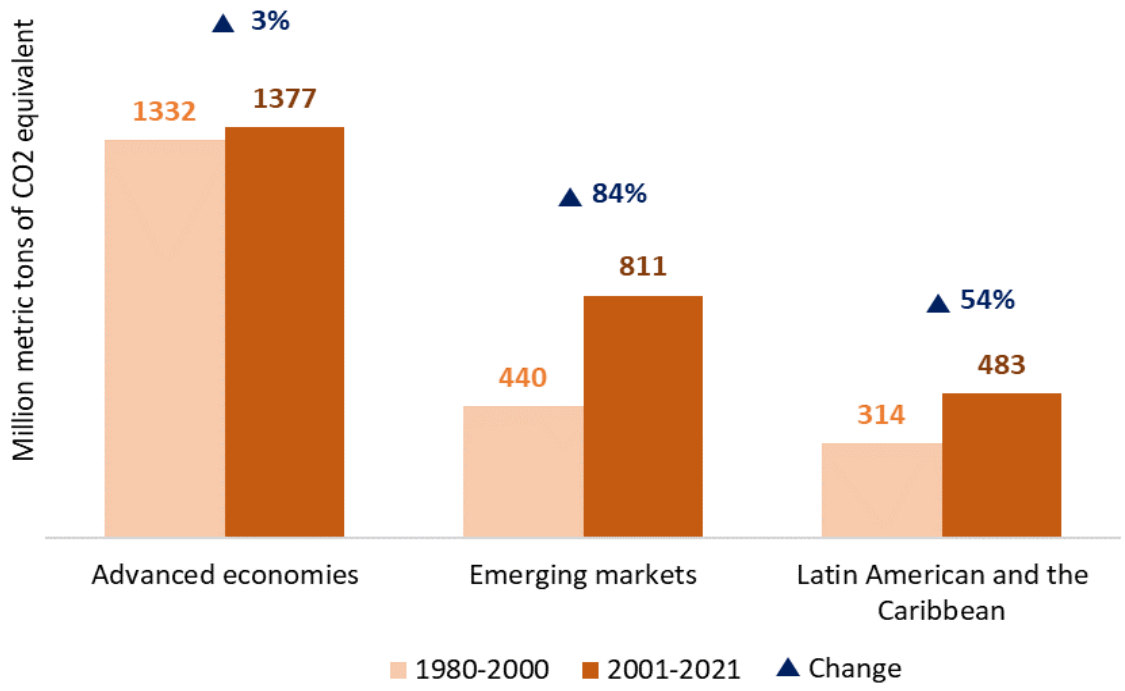
1. Introduction*

The urgency to address climate change has intensified, marking a critical juncture in the global response. While the issue has been recognized for at least three decades, the current situation demands immediate and decisive action, as human activities, such as burning fossil fuels, deforestation, industrial processes, and agricultural, significantly alter the Earth's climate. These activities have led to a considerable increase in greenhouse gas emissions worldwide. For instance, between 1980 and 2000, the average emerging country's net emissions were around 440 million tons of CO_2 annually. This figure rose to almost 811 million tons from 2001 to 2021, marking an increase of nearly 85 percent. In Latin America and the Caribbean (LAC), there was a 54 percent rise in net CO_2 emissions during the same period, compared to a 3 percent increase in advanced economies (Figure 1). If the current trend of natural capital deterioration persists unchecked, ecosystems could reach a critical tipping point beyond which they could collapse entirely, thus severely impacting economies worldwide, especially low- and low-middle-income countries. By 2030, these economies could face a substantial drop in real GDP, with estimates suggesting a potential decrease of 10 percent and 7.3 percent, respectively, when compared to a scenario where ecosystems do not surpass the tipping point. The average LAC country could face a 3.3 percent reduction in GDP by 2030 under the same scenario (World Bank Group, 2021).

Climate change introduces two primary sources of risks, each with significant economic and fiscal consequences: physical and transition risks. Physical risks arise due to climate-related hazards interacting with human and environmental systems, resulting in negative macroeconomic consequences and significant difficulties in maintaining the health of public finances. Conversely, transition risks originate from policies focused on shifting towards a low-carbon economy. These measures, intended to

* The authors are grateful to Emilio Pineda, Rudy Loo-Kung, Luis Alejos, Axel Radics, Marcio Alvarenga, Marco Buttazonni, and Phil Keefer for their useful comments, as well as Carolina Ulloa, Matheo Arellano, Gustavo Sánchez, Kim Bum, and Daiyan Correa for their excellent technical assistant. We also appreciate the support of Samuel Ceccon in the elaboration of the document.

Figure 1. Average Annual Net Emissions



Source: IDB calculations based on IMF (2024a).

reduce the long-term risks and expenses related to climate change, may also lead to economic and fiscal repercussions in the short- to medium-term. Given that these two sources of risk have significant fiscal implications, policy responses must comprehensively recognize and strategically incorporate these factors into fiscal programming, thereby creating a well-rounded and effective strategy for managing the multifaceted challenges of climate change.

Physical risks associated with climate change can lead to adverse macroeconomic developments, posing significant challenges to the sustainability of public finances. These risks manifest directly in increased public expenditure, which is necessary for repairing damaged assets and

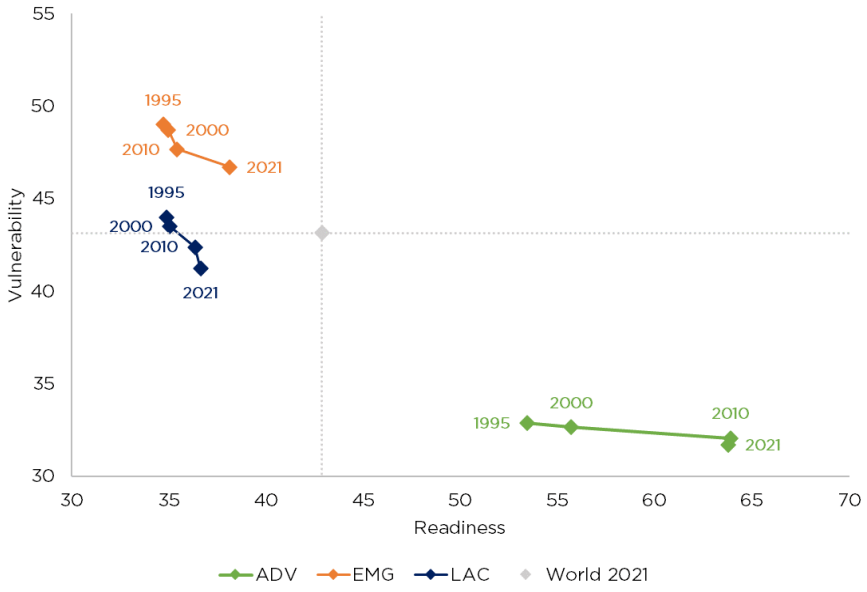
infrastructure, aiding vulnerable groups, and addressing explicit and implicit contingent liabilities. At the same time, public revenue is also affected by economic activity disruptions due to the occurrence of natural disasters. In the LAC region, climate-related disasters have resulted in an average annual economic loss amounting to approximately 1.7 percent of GDP over the past two decades. The fiscal deficit due to extreme natural disasters in middle- and low-income LAC countries was around 0.8 percent to 0.9 percent of GDP annually from 2001 to 2019 (Alejos, 2018). Specifically, the toll of extreme climate events on infrastructure has exceeded 1 percent of GDP per year in countries like Costa Rica, the Dominican Republic, Guatemala, Haiti, Honduras, Panama, and Paraguay (World Bank, 2022a). Additionally, indirect impacts include diminished tax revenues from output losses in climate-sensitive sectors, adversely affecting a country's creditworthiness and access to international finance (Gomez-Gonzalez, Uribe, and Valencia, 2024).

In light of the implications of physical risks, the inadequate readiness and limited insurance coverage in LAC countries underscore the urgent need for increased support and investment in climate adaptation initiatives. Implementing essential adaptation measures to manage the impacts of climate events is crucial. However, LAC countries need more support, especially compared to advanced economies, necessitating substantial public investment. The ND-GAIN index measures vulnerability[1] — a country's exposure, sensitivity, and adaptive capacity to climate change — and readiness, which assesses the ability to leverage investment for adaptation actions. In 2021, LAC countries scored approximately 48 percent on the ND-GAIN index, which is marginally higher than the approximate 46 percent of other emerging markets but lags almost 20 percentage points behind advanced economies. The pace of improvement in LAC's index is weak, showing an increase of only 2 percentage points between 2000 and 2021. In contrast, other emerging markets improved by 2.6 percentage points and advanced economies by 4.3 points during the same period. Despite lower exposure than other emerging regions, LAC notably lacks readiness, with a high degree of heterogeneity across the region. In turn, greater vulnerability correlates with lower readiness (Figure 2), and insurance coverage is crucial

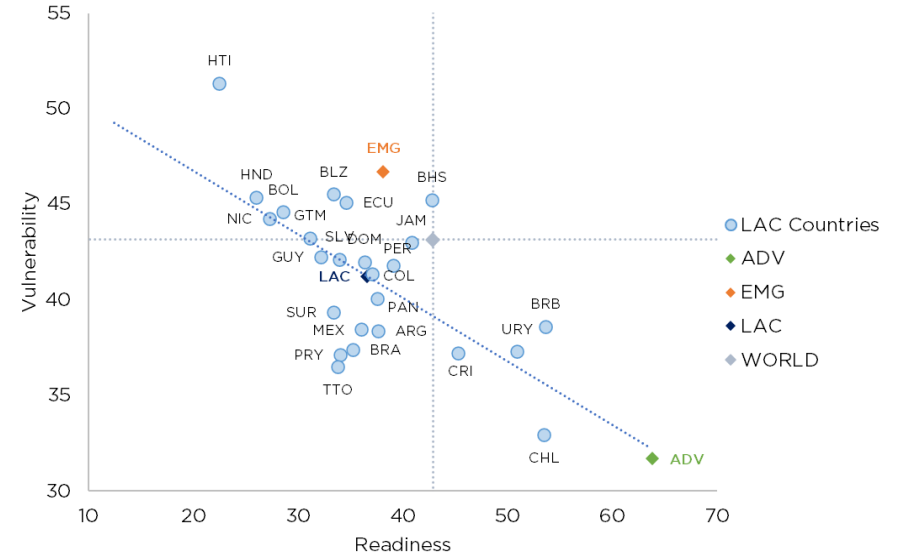
1 The Notre Dame Global Adaptation Initiative (ND-GAIN) country index evaluates a country's ability to adapt to the negative impacts of climate change through two key dimensions: vulnerability and readiness.

Figure 2. ND-GAIN Matrix

A. Historical evolution



B. Index in 2021



Source: IDB-FMM calculations based on ND-GAIN (2024).

in mitigating the economic impacts of natural disasters. However, in LAC, only about 28 percent of the damages incurred between 2000 and 2021 were insured on average, compared to 57 percent in advanced economies, highlighting the significant economic losses still borne by these regions.

Transition risks encompass challenges from policy initiatives aimed at transitioning to a low-carbon economy. The goal is to mitigate and reduce long-term risks and costs associated with climate change. However, these efforts may lead to short- to medium-term economic and fiscal impacts. Additionally, inadequate policies to fight climate change could aggravate physical risks, intensifying transition risks. The effects of these risks depend on the timing and design of transition policies, creating a trade-off between current emission reduction costs and long-term environmental quality. Fiscal implications include a potential increase in public expenditure on subsidies to support clean energy transitions and other compensatory policies. According to the IEA (2024), in 2021, 65 percent of the total energy used in the average Central and South American country came from fossil fuels. Nevertheless, renewable energy auctions in the region's biggest countries (Argentina, Brazil, Chile, Colombia, Mexico, and Peru) are accelerating the move toward renewables. LAC hosts some of the world's most dynamic renewable energy markets. Colombia recently procured more than two gigawatts through auctions, and Argentina committed almost five gigawatts through a guarantee program (World Bank, 2022).

Global economies transitioning to low-carbon energy face both challenges and opportunities, necessitating policy action for economic diversification and sustainability. Economies around the globe are grappling with sectoral challenges as they endeavor to transition towards a low-carbon paradigm. This shift presents promising opportunities and potential risks, underscoring the urgent need for policy interventions to foster economic diversification and sustainability. In LAC, 36 percent of the countries rely heavily on extractive industries, and more than a quarter of their exports are commodities. Additionally, between 2000 and 2021, the average country in the region garnered 4.3 percent of its GDP from commodity rents (World Bank, 2024).

Despite its high dependence on commodities, the region's position in the global oil market is not dominant. This may result in LAC oil exporters facing

escalating risks. The advent of more affordable alternative technologies and concerted efforts to combat climate change in alignment with the Paris Agreement goals are expected to precipitate a decline in oil demand. However, while the advent of affordable alternative technologies and the rise of renewable energy sources are reshaping the energy landscape, the global oil demand has shown remarkable resilience, remaining relatively stable despite substantial investments in green energy. Nonetheless, the continued rise of electromobility and the electrification of energy consumption are expected to gradually reduce the reliance on hydrocarbons, emphasizing the need for LAC oil exports to adapt their fiscal and economic strategies to this evolving reality.

Transition policies entail considerable challenges, with a substantial portion of carbon-intensive assets likely to become stranded before the end of their useful lifetimes. Estimates suggest that stranded assets may amount to between 0.7 and 1.7 percent of LAC's GDP in 2022 (Binsted et al., 2020). Furthermore, strong global climate action could result in staggering revenue losses, with fiscal and non-fiscal oil revenues potentially plummeting by 25 to 50 percent of the LAC's total 2022 GDP (Solano-Rodríguez et al., 2019). Policy interventions, while imperative, also carry the risk of hastening the emergence of stranded assets. For instance, government measures prohibiting some technologies could lead to stranded assets. Nevertheless, transitioning to a low-carbon economy allows governments to generate revenue through carbon pricing, green taxes, and fiscal savings. Additionally, gains in energy efficiency offer a means to reduce fossil fuel subsidies, which still constitutes approximately 6.1 percent of GDP in LAC countries, as of 2022 (IMF, 2024b).

In the post-pandemic landscape, fiscal space has become increasingly constrained, limiting the capacity to address climate change issues. The debt burden surged by 14 percentage points of the LAC region's GDP during the COVID-19 crisis. Although there has been a decrease due to consolidation efforts and inflation dynamics, the debt-to-GDP ratio in 2022 remains high (Galindo and Izquierdo, 2024). LAC is expected to return to pre-pandemic fiscal levels by 2027, contingent on primary balances increasing to a surplus of 1.1 percent of GDP. Achieving this target requires further expenditure adjustments to rebuild fiscal buffers over the medium term.

Balancing fiscal stability with essential investments and policies to face climate change risks and achieve net-zero emissions in the LAC region poses profound challenges, especially given the potential effects on public debt and the complexities of enacting effective climate policies. IMF (2023) simulations indicate that, even with a carbon price cap of US$45 per ton between 2030 and 2050, substantial increases in green investment and subsidies in emerging markets like LAC could dramatically raise public debt-to-GDP ratios by over 50 percentage points by 2050, risking debt sustainability. Consequently, to achieve net-zero targets, more than moderate spending increases are required — carbon prices may need to rise to as high as US$280 per ton, a measure that could face significant political resistance. Moreover, the need for investment in climate change mitigation is acute, particularly in LAC countries and especially in the Caribbean. These regions, classified as low-income, developing countries and small, developing states, have a pressing need for climate adaptation, estimated to require an average of 0.7 to 2.7 percent of GDP annually until 2030, as per IMF (2023) estimates.

Governments grapple with a policy trilemma, navigating the intricate balance among climate policy objectives, fiscal sustainability, and political feasibility. Addressing climate goals, such as meeting the Paris Agreement on temperature ceilings, maintaining debt sustainability, and respecting political constraints on taxation and spending, poses a formidable challenge. While a singular reliance on expenditure measures may be politically viable, it risks escalating debt substantially with adopted moderate measures falling short of achieving climate objectives. Revenue measures, such as carbon pricing, could effectively reduce emissions and generate revenues, but often face political resistance. To successfully tackle this complex trilemma, a nuanced approach is urgent. Crafting a mix of policies tailored to individual country contexts allows for effective navigation. Striking a delicate balance is essential to achieve climate goals, ensure fiscal stability, and garner political acceptability. The IMF recommends that countries mitigate this policy trilemma with a strategically crafted set of diverse policies. Such a package could encompass international carbon pricing agreements, regulatory measures, fiscal strategies, and compensation mechanisms tailored to enhance political feasibility (IMF, 2023).

In addition to the introductory section, this document is organized into three main sections. The first section focuses on implementing proactive measures for climate-disaster risk financing in Latin America and the Caribbean. It discusses strategies for resilient investment, the development of fiscal policies for mitigating physical risks, and the application of risk layering approaches. The second section focuses on macro-fiscal planning for mitigating transition risks and facilitating an orderly decarbonization process. This includes conducting an in-depth examination of fiscal tools, such as carbon pricing and revenue recycling, and exploring the integration of green taxonomy and budgeting principles into fiscal planning. The last section of the document presents policy conclusions. These conclusions aim to address existing gaps and propose actionable recommendations to enhance fiscal resilience and environmental sustainability amidst the fiscal challenges derived from climate change.

2. Why is Macro-Fiscal Planning Essential to Tackling Climate-Related Risks?

In macro-fiscal foresight and sustainability, recognizing physical and transition risks as pivotal factors is crucial for effective macro-fiscal planning. As countries handle the challenges of climate change and the imperative to transition towards greener economies, the need for macro-fiscal strategies becomes increasingly relevant. Mitigating physical risks such as extreme weather events and transitioning away from carbon-intensive economies demands proactive measures embedded within fiscal frameworks. Medium-term fiscal frameworks (MTFFs) emerge as a powerful tool in this regard, which, when complemented by other fiscal planning instruments, offer a structured approach that aligns physical and transition risks with the principles of fiscal sustainability.

MTFFs constitute essential tools within a country's fiscal and financial programming which are pivotal for meeting medium-term policy objectives and designing medium-term fiscal strategies. MTFFs involve a structured analysis and projection of fiscal variables such as revenues, expenditures, deficits, and debt levels, typically spanning three to five years. These frameworks are integral in promoting fiscal discipline, transparency, and accountability, aligning fiscal policies with broader economic goals. By establishing fiscal targets and medium-term fiscal strategies, MTFFs enable governments to link fiscal goals with policy implementation and enhance fiscal transparency through disseminating performance information. MTFFs thus serve as vital channels for implementing and communicating fiscal policy decisions, guiding resource allocation discussions, and addressing fiscal challenges over the medium term.

MTFFs facilitate the alignment of fiscal policies with environmental sustainability by tackling the challenges of physical and transition risks linked to climate change. They guide the allocation of resources towards developing low-carbon economies by setting quantitative targets for green budget items and climate expenditure. Additionally, MTFFs ensure long-term

planning by integrating climate change objectives into fiscal frameworks and enhancing transparency and accountability in fiscal decision-making. Moreover, they help governments manage fiscal risks associated with climate change, including increased public expenditure due to extreme weather events (physical risks) and policy initiatives to transition to a low-carbon economy (transition risks). By promoting coordination among stakeholders involved in climate action and building institutional capacity in climate finance and budgeting, MTFFs build climate resilience and minimize the economic and fiscal impacts from climate-related hazards (Delgado, Eguino, and Pereira, 2021).

With increasing environmental risks, governments must focus on strategically adapting rather than changing their existing public financial management strategies, including MTFFs. A crucial aspect of this adaptation is focusing on budget allocation and tackling reallocation rigidities, allowing for swift and effective funding adjustments in response to climate-related challenges. This adaptability is vital to ensure these frameworks effectively allocate funding for climate resilience and adaptation measures. It further provides that fiscal tools are flexible but can be dynamically adjusted, allocating resources where they are most needed in times of environmental stress or unexpected events. This strategic transformation is critical in maintaining fiscal sustainability amidst climate challenges and planning for unforeseen environmental emergencies. By facilitating this flexible approach within MTFFs, governments are better positioned to set clear climate targets and align their fiscal policies, thus ensuring a more sustainable and responsive approach to climate change challenges.

Aligning MTFFs with other fiscal planning tools, such as budgeting and spending plans, alongside nationally determined contributions (NDCs)[2] is crucial to the climate change risk mitigation strategy and energy transition. Integrating MTFFs with NDCs ensures the allocation of financial resources toward climate mitigation and adaptation efforts and safeguards fiscal policies coherent with climate objectives (Jaramillo and Saavedra, 2021). However, these intentions are translated into actionable strategies

2 NDCs are strategic plans for climate action to cut greenhouse gas emissions and adapt to climate change, detailing strategies for achieving goals, monitoring progress, and including essential climate finance strategies. Every participant in the Paris Agreement is required to formulate an NDC and revise it every five years.

by coordinating a comprehensive fiscal framework beyond short-term budgetary considerations. By outlining projected revenues and expenditures for a specific period, budgeting plans guide government spending across sectors. Spending plans ensure efficient resource allocation to achieve policy objectives by detailing how allocated funds will be distributed and utilized. Hence, effective budgeting and spending plans are essential for investing in climate-resilient infrastructure, renewable energy projects, and other sustainable initiatives (IMF, 2021). Therefore, governments can prioritize climate-related expenditures by harmonizing MTFFs with NDCs and fiscal planning tools, promoting fiscal responsibility and environmental sustainability.

In LAC, the adoption and implementation of MTFFs have revealed significant gaps and weaknesses, particularly in comparison to international standards. Green MTFFs requires key components to support its structure (see Figure 3), and the region faces some challenges, having shortcomings in various critical components. First, LAC countries face challenges in accurately projecting economic variables and revenue streams, hindering effective fiscal planning and resource allocation. Second, the design and execution of fiscal strategies suffer from institutional inadequacies and lack of coordination, resulting in suboptimal resource allocation and inefficient expenditure management. Third, the heterogeneity in reporting standards across countries exacerbates data comparability and transparency issues, impeding cross-country analysis and policy coordination efforts. Moreover, the absence of comprehensive fiscal risk analysis leaves fiscal frameworks vulnerable to external shocks, further jeopardizing fiscal sustainability and macroeconomic stability.

Given these existing challenges, the implementation of green MTFFs introduces additional layers of complexity, particularly regarding data requirements. While traditional MTFFs already struggle to incorporate even well-defined and quantifiable contingent and non-contingent liabilities, green MTFFs must grapple with the inherent uncertainty and long-term nature of climate-related risks. This includes difficulties in measuring and forecasting the economic impacts of climate change, the fiscal implications of transition policies, and the financial costs of adaptation and mitigation strategies. Furthermore, the lack of standardized methodologies and reliable climate-related data complicates efforts to integrate environmental considerations into fiscal planning.

The lack of comprehensive data is also a critical problem that prevents the effective allocation of climate financing. This data gap makes it challenging to quantify the benefits and financial returns from green projects, which in turn complicates the creation of accurate estimates and effective funding strategies. As a result, adaptation projects often receive less investment than mitigation projects. According to the Cárdenas and Peña (2024), only 7.3 percent of global climate investment in 2020 was directed at adaptation, despite its increasing importance. This imbalance highlights the need for better data collection and analysis to support a more balanced investment in both mitigation and adaptation efforts. In this context, it is crucial for policymakers to adopt flexible approaches to the design of green MTFFs, leveraging scenario analysis and improving data collection systems, while fostering regional and international collaboration to address these challenges.

The fiscal risks of climate change and the transition to clean energy pose additional challenges for the sustainability and resilient fiscal planning of LAC countries. The absence of comprehensive risk analysis underscores the critical need for LAC governments to develop risk identification and management policies tailored to the energy transition (Delgado et

Figure 3. Components Supportive of Green MTFFs

Macroeconomic projections	Climate-related policies	Risks and debt sustainability	Fiscal rules	Other green PFM practices
✓ Economic costs of climate change (e.g., potential growth costs) ✓ Related fiscal costs ✓ Scenarios	✓ Choice of measures ✓ Impact on taxes (e.g., carbon taxes) ✓ Impact on expenditures (investments; energy subsidies; safety nets)	✓ Risks related to climate change ✓ Effects of climate-related policies (e.g., adaptation) ✓ Long-term perspective	✓ Mitigate risks (reduce needed buffers) ✓ Target broad aggregates	✓ Green PFM through other phases of the budget ✓ Climate-smart public investment

Source: Caselli, Lagerborg, and Medas (2024)

al., 2021), highlighting the potential role of MTFFs and fiscal strategies in this endeavor. Enhancing the analysis of fiscal frameworks by incorporating projections and estimates of climate change and energy transition impacts on macro-fiscal variables can enable fiscal policy to better understand and address these emerging risks in the short- and medium-term. Moreover, leveraging a risk diagnosis to design strategies aimed at risk reduction becomes imperative in navigating the challenges posed by climate change and energy transition (Delgado et al., 2021). In general, risk mitigation strategies for energy transition should consider the following elements: i) avoid investments that increase the country's exposure to stranded asset risk, ii) plan the progressive withdrawal of economic activities exposed to energy transition and encourage economic diversification, iii) generate mechanisms for transferring and sharing residual risks, and iv) gradually reduce the dependency of public budgets on hydrocarbons.

Implementing Proactive Measures of Climate-Disaster Risk Financing in LAC

MTFFs are key in integrating natural disasters and climate risks into budgetary planning, providing a foundation for crafting efficient and fiscally responsible policies based on best practices in disaster risk management. Given the interconnected nature of physical and transition risks, best practices for addressing them often intertwine, with several aspects overlapping between the two risk types. The IMF has outlined key strategies for managing fiscal risk, encompassing environmental risks from natural disasters within its Fiscal Transparency Code of 2019. To address fiscal risk stemming from natural disasters, the strategy should evaluate physical and transitional natural disaster risks, establish a framework for monitoring these risks through early warning systems, implement preparedness and response mechanisms, and identify measures to mitigate risk exposure. Through the annual budget and MTFFs, it is possible to undertake mitigation measures like reducing exposure via sectoral planning, imposing tax premiums in high-risk areas, transferring risks to international markets with traditional or parametric insurance, issuing disaster-contingent liabilities for interest and principal waivers in disasters, and setting aside a contingency provision (IMF, 2016).

Box 1: Preserving Public Investment for Climate Resilience in Latin America and the Caribbean

During fiscal adjustments, public investment often faces significant cuts, complicating efforts to allocate resources for climate adaptation and mitigation, particularly in Latin America and the Caribbean (LAC), where the capacity to address climate risks lags behind developed economies (IMF, 2024a). Research suggests that the composition of spending during fiscal consolidations significantly affects their macroeconomic impact. Safeguarding public investment from cuts not only offsets the contractionary effects of fiscal adjustments but also has the potential to stimulate medium-term growth (Ardanaz et al., 2021).

Developing robust protection strategies to sustain resilient public investment is crucial for mitigating the macroeconomic repercussions of climate shocks while aligning with medium-term fiscal objectives. Additionally, maintaining public investment in climate-resilient infrastructure can enhance adaptive capacity and contribute to long-term macro-fiscal sustainability amidst escalating climate-related challenges.

It's important to consider the endogeneity of adaptation costs to human behavior and government policy in green MTFFs. The extent to which firms and households adopt adaptive behaviors in response to climate risks is heavily influenced by the policy environment. Government actions, such as incentives for sustainable practices, investments in resilient infrastructure, and regulations that encourage risk reduction, can significantly alter the scale and distribution of adaptation costs. Conversely, policies that fail to promote adaptive behavior or unintentionally reinforce vulnerability can exacerbate these costs. Therefore, the accuracy and relevance of green MTFFs depend on their ability to account for the interplay between policy measures and behavioral responses. Incorporating this dynamic into fiscal frameworks is essential to ensure that projections reflect the true fiscal implications of climate adaptation efforts, enhancing the effectiveness of policy design and implementation.

Resilient Investment to Mitigate the Effects of Climate Change and Preserve Fiscal Sustainability

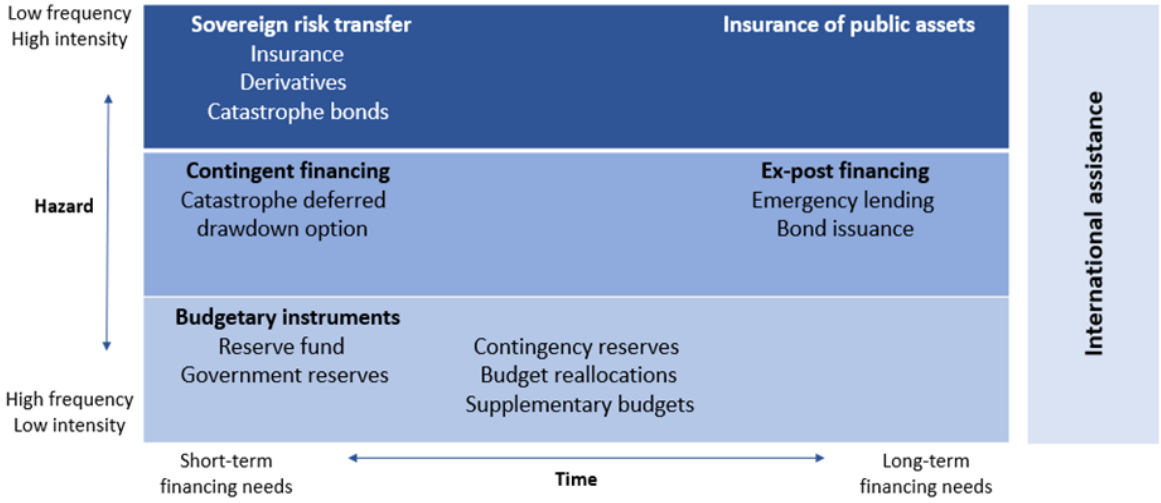
When facing the challenges of protecting public investment during fiscal adjustments and efficiently directing funds to climate-resilient infrastructure, especially in regions like LAC, MTFFs take center stage. They can protect and prioritize climate adaptation and mitigation funding, even during tight fiscal periods. MTFFs strategically embed climate resilience in budgeting and planning processes, targeting investments in the most at-risk areas. This proactive role of MTFFs not only shields infrastructure against climate impacts but also ensures that spending aligns with long-term sustainability, thereby maintaining effective and sustainable public investments in the face of climate change. Furthermore, MTFFs are instrumental in outlining future investment plans that align with the dynamics of expenditure and revenue. By forecasting fiscal trends and assessing potential revenue streams, MTFFs enable governments to strategically plan for long-term climate resilience projects. This forward-looking approach ensures that investments in climate adaptation and mitigation are not only reactive to current challenges but are also strategically planned to be financially sustainable in the long run.

Fiscal Policies to Mitigate Physical Risks and Build a Resilient Fiscal Planning Framework

MTFFs stand out in tackling climate change for their focus on government expenditures and revenues. This approach is key to understanding and managing the fiscal impacts of climate risks. MTFFs offer a clear picture of how environmental challenges can affect fiscal health, helping governments to plan accurately and strategically for these changes. By shedding light on the nuances of public finances, MTFFs enable more informed and proactive decision-making, significantly improving a government's ability to handle the financial challenges of climate change.

The main challenge that physical risks create for MTFFs is the need to effectively incorporate and manage the financial impact of climate-related disasters, which includes establishing a clear risk layering strategy and

Figure 4. Risk Layering



Source: Authors' elaboration based on European Commission (2022).

Disaster Risk Financing (DRF)[3] within the fiscal frameworks. MTFFs must account for varying severities of disasters, requiring different levels of financial response – from budget reallocation for immediate needs to employing contingent financing mechanisms and sovereign risk transfer strategies for more severe events (see Figure 4). Additionally, MTFFs face the challenge of accurately accounting for contingent liabilities, both explicit and implicit, which are crucial for effective disaster management. Responding to these challenges calls for adapting MTFFs for quantifying contingent liabilities and improving fiscal projections, ensuring a responsive and precise allocation of resources in the face of disaster-related fiscal exposures. Finally, integrating physical risks into longer-term fiscal

3 The core aim of Disaster Risk Financing (DRF) is to pre-emptively secure funds for relief, recovery, and reconstruction costs, effectively mitigating a disaster's economic and fiscal impact. This strategy can increase a country's financial resilience and secure a faster return to pre-disaster conditions. However, DRF should be part of a comprehensive approach to Disaster Risk Management (DRM), which involves proactive measures to mitigate the severe impacts of climate change and natural disasters, particularly on vulnerable communities in lower-income countries (OECD and World Bank, 2019; World Bank, 2022b). This approach requires allocating sufficient and timely funds throughout risk assessment, prevention and preparedness measures, emergency response, and recovery and reconstruction efforts (Radu, 2021).

projections and debt sustainability analyses serves to anticipate future disaster impacts and assess their associated costs, including potential implications for debt sustainability.

Box 2: Integrating Climate Risks into Fiscal Sustainability Frameworks

Institutions worldwide are increasingly embedding assessments of physical and transitional climate risks into their fiscal sustainability frameworks, recognizing the importance of addressing climate-related challenges in fiscal planning. For instance, in the UK, the Office of Budget Responsibility and the Bank of England have begun incorporating definitions and concepts like physical and transition risks into their analyses. Similarly, global organizations such as the World Bank and the IMF integrate quantitative assessments of climate risks, including stress tests for natural disasters, in their Joint Debt Sustainability Framework for Low-Income Countries (European Commission, 2022).

In parallel, fiscal rules are adapting to accommodate natural disaster risks. The IMF has recommended calibrating medium-term fiscal anchors by explicitly modeling post-disaster growth impacts or adopting stochastic approaches, which influence public debt anchor levels. Maintaining a certain level of fiscal buffers is also crucial to accommodate the adverse effects of climate shocks. For this, countries can use a combination of risk transfer or sharing instruments such as natural disaster funds, like the ones in place in Fiji, Grenada, and the Philippines; regional insurance, like the one used by the Eastern Caribbean Currency Union; or catastrophe bonds, as in the case of Barbados and Mexico.

In Latin America, escape clauses in fiscal rules increasingly include climate components, striking a balance between fiscal discipline and adaptability. These clauses are crucial for navigating economic uncertainty amid escalating climate risks, offering essential guidance for governments to manage the long-term impacts of natural disasters (Valencia, Ulloa Suarez, and Guerra, 2024).

In addition to aligning MTFFs with a DRF strategy, it is desirable to integrate physical risks into longer-term fiscal frameworks to anticipate future disaster impacts and effectively assess their associated costs, including their potential implications for debt sustainability. The European Commission recommends establishing a framework incorporating climate change considerations into the debt sustainability analysis. The physical risks of climate change, such as extreme weather events, can translate into unexpected shocks, which should be factored into the debt sustainability analysis. These unanticipated shocks can be evaluated by including a stress-testing scenario where the event can impact the government accounts and debt trajectory directly or indirectly through GDP effects (European Commission, 2022).

Integrating Climate Risks in Fiscal Frameworks: LAC Experience with MTFF

Countries in Latin America and the Caribbean have made significant progress using MTFFs as a fiscal tool to address climate change risks. Within the region, nine countries[4] have integrated climate change risks and economic impacts into their MTFFs, demonstrating a growing awareness and proactive approach. However, the full integration of these aspects into the broader fiscal strategy of the region remains a work in progress, underscoring the untapped potential of MTFFs as effective instruments for this purpose when fully leveraged. This integration often includes accounting for natural disasters within contingent liabilities and factoring environmental aspects into projections of economic activities, such as oil demand impacts. While several countries actively incorporate natural disasters into their fiscal risk analyses and others emphasize green investment and expenditure opportunities, detailed plans are not universally in place. Notably, only four countries in the region have quantified the effects of natural disasters on their GDP or debt, indicating an area for further development in climate risk assessment and fiscal planning.

4 Countries that have integrated climate change risks into their MTFFs are Argentina, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Jamaica, Mexico, Peru, and Uruguay.

The integration of climate risks into fiscal planning in LAC marks notable progress, yet it simultaneously reveals key areas that need improvement, particularly in managing the uncertainties inherent in macroeconomic projections. Adapting to the uncertain scenarios impacting fiscal frameworks calls for creating room in the government's budget to accommodate new risks. This approach, together with the development of cautious macroeconomic projections and the strategic inclusion of contingency reserves, can significantly enhance transparency and provide a buffer against uncertainties. The role of these reserves becomes important in developing economies, which often face substantial impacts from migratory trends and other unexpected events. These demographic changes can exert considerable pressure on fiscal structures, necessitating adjustments and potential reprioritization in spending. Such scenarios emphasize the need for fiscal frameworks to not only incorporate climate risks but also to remain adaptable and robust in the face of diverse challenges, including those posed by migratory dynamics.

The responses of countries like Guatemala, Bahamas, and Colombia in incorporating climate-related issues into their MTFFs offer valuable insights and lessons. Each country demonstrates a unique approach to integrating environmental considerations into its fiscal planning, reflecting the heterogeneous nature of its responses. In Guatemala, the MTFF acknowledges climate change as a significant fiscal risk and integrates environmental aspects as key determinants in public finances, encompassing areas like taxation, expenditure, and insurance. The 2021 MTFF annex, which includes the Environmental Fiscal Strategy, particularly emphasizes the technical assistance received for fiscal planning and budgeting in line with climate change adaptation policies. Through its 2022 Fiscal Strategy Report, the Bahamas has demonstrated a prioritization of budgetary elements related to climate change and energy transition. These actions are initiatives to promote energy reform via renewable sources and budget allocation for disaster and climate change management. A notable aspect of this approach is the development of methodologies, in collaboration with the World Bank, to categorize national budget expenditures to mitigate climate change and manage disaster risks. Finally, Colombia's approach in their 2022 and 2023 MTFFs involves a detailed assessment of risks associated with natural events, such as floods and droughts. The country has outlined various actions

to manage these risks, including financing initiatives through sovereign green bonds. Colombia has also focused on issuing catastrophe bonds and developing a national strategy for financial protection against disasters, epidemics, and pandemics. However, a gap remains in the integration of these contingent liabilities into the broader stochastic debt sustainability analyses framework. These country-specific strategies highlight the progress in adapting fiscal frameworks to address climate risks while underscoring the need for continuous improvement and more a comprehensive integration of these factors into fiscal planning.

MTFFs provide crucial fiscal consistency, allowing for the effective management of financial risks associated with natural disasters, a growing concern in the context of climate change (OECD, 2022). By adapting MTFFs, governments can strategically plan and allocate resources for potential disasters, facilitating risk transference through instruments such as catastrophe bonds and contingent credit lines. This approach is vital for maintaining debt sustainability, as it helps absorb the fiscal shock of unanticipated climate events. Through MTFFs, countries can shift some of the financial risks of natural disasters to insurance and capital markets, ensuring the availability of funds when needed without undermining long-term fiscal stability (Mechler, Mochizuki, and Hochrainer-Stigler, 2016).

Instruments such as catastrophe bonds and risk pooling systems provide a blueprint for allocating resources, transferring fiscal risk, and ensuring fiscal stability and sustainability. Their implementation in regions like Mexico and the Caribbean demonstrates their efficacy. Mexico, leading in catastrophe bond issuance, initiated the Natural Disasters Fund (FONDEN) in 1996 and issued the first sovereign parametric catastrophe bond, Cat Mex, valued at US$160 million in 2006 (World Bank, 2020). The bond's renewal and expansion over the years demonstrates how catastrophe bonds, as part of MTFFs, effectively manage disaster risk by allocating resources and transferring fiscal risk, thereby ensuring fiscal stability and sustainability. A successful regional model for risk pooling systems is demonstrated in the Caribbean Catastrophe Risk Financing Facility (CCRIF). As the first multi-country risk pool based on parametric insurance principles, the CCRIF has made rapid, short-term payouts totaling US$267 million for catastrophic events from 2007 to 2023, aiding 22 member countries (CCRIF, 2022; World Bank, 2021). These examples highlight the critical need to integrate risk

transfer mechanisms, such as risk pooling systems, within MTFFs, a step essential for effectively managing the fiscal impact of natural disasters. This integration, which remains urgent yet needs to be fulfilled, is key to aligning with the broader fiscal strategy. By allocating resources for participation in risk pooling systems as part of MTFFs, governments can ensure cost-effective risk mitigation, enhance fiscal stability, and maintain budget predictability, thereby strategically addressing disaster-related financial challenges.

Box 3: The Gap Between Disaster Costs and Preparedness in Latin America and the Caribbean

Despite efforts to establish national systems and funds for Disaster Risk Management (DRM) in Latin America and the Caribbean (LAC), such as Colombia's National Fund for Disaster Risk Management and Mexico's FONDEN, allocations remain inadequate compared to the escalating climate risks. Table 1 summarizes emergency funds allocated for natural disasters in the LAC region. The fund percentage of GDP represents the yearly average, comprising designated national funds for natural disasters and other budget allocations. Disaster cost represents an average economic loss attributed to disasters relative to GDP but only encompasses periods where the value is non-zero. From 2010 to 2022, the average annual cost of natural disasters in 18 LAC countries reached 1.5 percent of GDP, while the resources allocated for disaster management were significantly lower, averaging just 0.09 percent of GDP. A stark regional contrast further highlights this gap: while Central America allocated 0.12 percent of GDP and faced losses of 0.91 percent of GDP, South America dedicated only 0.07 percent of GDP but incurred losses of 2.05 percent of GDP. This underscores a significant underestimation of funds reserved for natural disasters compared to the actual costs attributed to these events, which is particularly pronounced in South America.

Table 1. Emergency Funds and Average Disaster Cost (% of GDP) from 2010 to 2022

Country	Authority	Average fund per year (% of GDP)	Average disaster cost (% of GDP)
Bahamas	Department of NEMA (National Emergency Management Agency)	0.024%	NA
Belize	Ministry of Sustainable Development, Climate Change and Disaster Risk Management	0.245%	0.24%
Bolivia	Vice-Ministry of the Civil Defense and the National Council for Risk Reduction and Disaster Attention (CONARADE)	0.044%	0.31%
Chile	National Office for Emergency (ONEMI)	0.005%	0.19%
Colombia	National Unit for Disaster Risk Management (UNGRD)	0.071%	5.13%
Costa Rica	National Commission for Risk Prevention and Emergency Response (CNE)	0.022%	4.01%
Dominican Republic	The Center for Emergency Operations (COE)	0.011%	NA
Ecuador	National Service for Risk and Emergency Management	0.060%	0.06%
El Salvador	General Directorate for Civil Protection	0.028%	0.20%
Guatemala	National Coordinator for Disaster Reduction (CONRED)	0.318%	0.35%
Guyana	Office of the Prime Minister	0.117%	5.79%
Honduras	Permanent Contingencies Commission (COPECO)	0.094%	0.78%
Jamaica	Office of Disaster Preparedness and Emergency Management	0.013%	0.81%
Mexico	National System of Civil Protection (SINAPROC)	0.0003%	0.32%
Nicaragua	Executive Secretariat of the National System for the Prevention, Mitigation and Attention of Disasters (SE-SINAPRED)	0.033%	0.54%
Paraguay	Secretariat of National Emergency (SEN)	0.038%	3.14%
Peru	National Disaster Risk Management System of Peru (SINAGERD)	0.305%	1.80%
Uruguay	The National Emergency System (SINAE)	0.0002%	0.006%

Source: The information presented has been gathered from the official websites of each respective country, with current exchange rates used. Data regarding the cost of disasters is sourced from the UNSDG. Available at: https://unstats.un.org/sdgs/dataportal/database. Data availability reviewed in Nov. 2022.

3. MTFF Planning for Mitigating Transition Risks and Leading an Orderly Decarbonization Process

Decarbonizing economies requires a strategic approach encompassing revenues, expenditures, and debt management, with MTFFs playing a key role. MTFFs are instrumental not only in communicating a country's fiscal strategy but also in conducting structured analyses and projecting fiscal variables essential for a successful transition to a low-carbon economy. While vital for environmental sustainability, this transition presents considerable fiscal challenges and has profound implications for public finances. MTFFs aid in thoroughly assessing various fiscal instruments and mechanisms, allowing governments to manage transition risks adeptly. By doing so, MTFFs help to mitigate potential financial disruptions, facilitating an orderly and effective move towards sustainable economic practices.

Mobilizing revenue for adaptation to climate change in the form of carbon pricing or carbon taxation is a priority to achieve both environmental and fiscal goals. In particular, MTFFs can bolster revenue strategies to address climate change risks by integrating carbon taxes aligned with fiscal goals and environmental commitments. As suggested by the Stiglitz-Stern Commission (CPLC, 2018) and supported by World Bank data (2021), structuring carbon taxes within MTFFs could increase national tax revenues by 1 to 3 percent of GDP by 2030. However, the effectiveness of these taxes in revenue generation varies. For instance, while the World Bank reported an increase in global carbon pricing revenues, projections in LAC countries like Colombia and Peru show significant differences, with expected revenues of about 0.03 percent and 1.7 percent of GDP, respectively, by 2030 (Pigato, 2019; World Bank Group, 2021). This discrepancy highlights the need for MTFFs to integrate carbon taxes carefully, considering both fiscal sustainability and environmental goals.

Integrating revenue recycling strategies within MTFFs is a suitable way to synchronize fiscal planning with environmental objectives in light of the economic effects of carbon taxes. Such integration can be instrumental in

counteracting potential negative impacts on GDP and exports due to carbon taxation (Pigato, 2019). Effective strategies, such as using recycled revenue to reduce labor taxes or financing carbon sequestration, can stimulate economic activities and contribute to GDP growth while also addressing the regressive nature of carbon pricing. This strategic alignment within

Box 4: Navigating Fiscal Challenges in the Transition to Decarbonization in LAC

In the LAC region, a significant revenue challenge is the heavy dependence on income from carbon sources, encompassing both direct and indirect carbon tax revenues, and a key objective in decarbonizing economies must be crafting a strategy that gradually shifts away from these traditional revenue streams. This strategy must also tackle immediate concerns like stranded fossil fuel assets. Effectively managing this transition calls for a balance between long-term strategic goals and immediate actions, ensuring that these assets and related financial decisions are handled to support the sustainability of public finances.

Moreover, in the region, diversifying economic activities to broaden the government's tax base is necessary to mitigate revenue shortfalls in fossil fuel-dependent countries. As the production and consumption of fossil fuels decline in alignment with decarbonization pathways for meeting the Paris Agreement goals, concerns about diminishing tax revenues from fossil fuels become increasingly pertinent (OECD, World Bank, and UN Environment, 2018). In the cases of Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, and Peru, whose dependence on extractive revenues has averaged between 3.2 and 11 percent of GDP during 2000-2021, 32 percent have revenue that is highly dependent on fossil fuel sources, which is around 6.5 percent of GDP on average. This generates an important challenge regarding revenue source diversification to replace the possible loss that may be generated with the transition. Thus, governments must address this tax erosion by identifying new revenue streams, such as taxing environmental externalities.

MTFFs ensures that revenue recycling not only furthers climate-related goals but also complements broader fiscal policies, promoting a balanced and equitable transition to a low-carbon economy (Fouré et al., 2023).

While broadening the tax base and increasing rates in the carbon tax domain may offer short- to medium-term revenue solutions, they will not be sufficient for very long, as emissions decrease and the tax base diminishes. Consequently, new business models and economic diversification are key to expanding the government revenue base. In addition, integrating revenue diversification measures into MTTFs and fiscal strategies is crucial for long-term economic resilience and sustainability in fossil fuel-dependent economies. MTFFs provide a structured approach to fiscal planning, ensuring revenue diversification is not merely a short-term fix but a sustained strategy for economic resilience. By embedding these measures, governments signal long-term commitment and provide certainty to investors and stakeholders, fostering stability and confidence in the transition process. Furthermore, fiscal strategies serve as guiding principles for government spending, taxation, and borrowing decisions. By incorporating revenue diversification strategies, governments prioritize the development of sustainable revenue streams, thereby facilitating the transition to low-carbon economies.

Regarding expenditures, the aim is to thoughtfully adjust current subsidies to align fiscal strategies with the broader goal of transitioning to a low-carbon economy. This process requires incorporating green taxonomies and green budgeting principles, ensuring that expenditure decisions are fiscally prudent and environmentally sustainable. By doing so, governments can effectively balance their financial responsibilities with their commitment to environmental stewardship, steering expenditure choices towards greener, more sustainable outcomes. Green budgeting involves a systematic approach to assess the overall coherence of the budget relative to the environmental agenda and to mainstream environmental and climate action across all policy areas and within the budget process (OECD, 2022). The first step to implementing green budgeting is to develop a methodology for identifying the climate expenditure and adapting budget systems and processes accordingly. In a broader sense, green budgeting should include climate change, natural disaster risk management, and biodiversity. Many LAC countries are in different stages of their implementation. Moreover,

the implementation of green budgeting has several positive developments: it improves the regulatory framework of the budget system, contributes to transparency and key input for budget decision-making, and optimizes public action to meet the challenges posed by climate change and environmental protection.

Rationalizing environmentally harmful subsidies (EHS) is another fiscal strategy that can simultaneously increase revenue and reduce carbon emissions. This initiative aims to phase out budgetary support measures incentivizing emissions-intensive behaviors and practices. As a result, the funds previously allocated to subsidies become available as additional fiscal resources, which can be utilized for revenue recycling. For instance, in Colombia, phasing out fuel subsidies could save revenue by up to 2.6 percent of the GDP. However, removing EHS often sparks political conflicts, as current beneficiaries strongly oppose losing these benefits. This means that even countries at the forefront of the green economy transition, such as Colombia and Brazil, still need help with these hurdles (World Bank Group, 2023).

With the reduction in fossil fuel-based energy driven by climate initiatives, the decarbonization process will necessitate an energy transition that comes with the challenge of diversifying energy sources. This transition is essential for mitigating risks of the new macro-fiscal balance and managing energy security. The growth in energy demand highlights the urgency to diversify energy matrices and accelerate renewable energy adoption, to maintain a balance with traditional energy. While natural gas can support the transition by maintaining a competitive and sustainable balance, the decarbonization process requires copper and lithium, as they are indispensable for producing green technology. In LAC, green hydrogen is a green technology with initiatives spanning production and distribution. While the region's renewable capacity increased from 51 to 64 percent between 2015 and 2022 (IDB, 2024), significant changes in energy matrices are necessary to achieve net zero by 2050. Brazil is leading the transition, with renewable energy powering 50 percent of domestic consumption. Initiatives like the Technical Secretariat of the "Renewables in Latin America and the Caribbean" (RELAC) by the IDB and Net Zero 2050 are examples of the regional commitment to decarbonization and sustainability, demanding collaboration between public and private sectors to facilitate the transition (Mulville et al, 2024).

Energy sources should transition to clean technologies that are consistent with environmental strategies. Electricity demand is expected to increase in the next three years, growing by up to 3.4 percent on average each year until 2026; however, this additional demand is forecasted to be covered by renewable and clean energy technologies. In 2023, low-emission sources included 40 percent of the worldwide electricity generation and it is expected to increase to almost 50 percent in 2026 (Jaynes, 2024). Nuclear power and the expansion of renewables will enable the generation of low-emission energy sources that meet the power demand, which traditionally is the sector that produces more CO_2 emissions. Initiatives like electrical integration can be strategic solutions to peaks in electricity demand and lack of investment in the energy sector, allowing the exchange of energy and the integration of electricity markets between regional countries. This initiative can transform energy generation, distribution, and consumption, increasing energy supply, stimulating competition, and favoring more efficient plants that promote clean energy and reduce the dependence on fossil fuels, contributing to the reduction of CO_2 emissions. In LAC, there are electrical interconnections in place, such as the Electrical Interconnection System of the Central American Countries (SIEPAC), the Andean Electrical Interconnection System (SINEA), and the Energy Integration System of the Southern Cone (SIESUR). If these regional networks reach an interconnection of 80 percent, US$23 billion and 0.7 gigatons of CO_2 can be saved by 2030 (IDB, 2024).

To ensure fiscal strategies are both economically viable and environmentally sound, it's essential to embed the principles of green taxonomy and green budgeting within the broader fiscal framework. This alignment is crucial for guiding economies and financial systems toward strengthened environmental responsibility. A green taxonomy is a classification system that categorizes economic activities and investments based on environmental sustainability criteria (Hussain, Tlaiye, and Jordan Arce, 2020). It provides clear guidelines for identifying environmentally sustainable investments and assisting investors, financial institutions, and policymakers in distinguishing between sustainable and unsustainable activities. This ensures that capital is directed towards projects aligning with environmental goals. In alignment with green taxonomy, a green budget represents a government's or organization's commitment to allocate financial resources prioritizing environmental protection and sustainability. It reflects a deliberate effort to

fund projects and initiatives aimed at reducing carbon emissions, enhancing resource efficiency, and promoting a resilient and sustainable society. These concepts collaborate symbiotically to steer sustainable financial decisions and resource allocations.

Green taxonomy aligns with the country's environmental objectives, reflecting broader sustainable development goals and agenda. These objectives may encompass various aspects, such as fostering cleaner urban environments, safeguarding natural resources like water, land, and forests, and pursuing a future that is low-carbon and resilient to climate change (Hussain, Tlaiye, and Jordan Arce, 2020). These objectives must be consistent with environmental plans, policies, and international commitments. The central task in developing the taxonomy involves selecting particular investments within the identified sectors and categories. The determination of relevant sectors and associated activities or investments should ideally be based on their anticipated contribution to attaining the chosen environmental objectives. Subsequently, the key criterion for selecting a specific type of investment within each sector should revolve around how it contributes to meeting a national target, a standard, or an accepted threshold[5]. Finally, it is crucial to identify the intended users of the taxonomy and provide guidelines for each type of user. The intended users include banks, financial institutions, project developers, issuers of green bonds, green funds, asset owners, investors, and others. For each user, expectations regarding how the taxonomy will be employed should be established upfront.[6]

5 For instance, in the context of a national climate mitigation target, the eligibility for selecting an activity or investment in the energy sector might be contingent on whether it meets an accepted threshold in carbon intensity like a certain amount of CO_2 per unit of production, relative emissions reduction against a baseline, or if it is compliant with energy standards set by international or national authorities. In sectors like agriculture and fisheries, activities could be chosen based on their adherence to prescribed practices outlined in nationally recognized labels and standards. In the transportation sector, regarding air quality objectives, criteria may involve assessing whether a bus engine technology complies with specific air pollutant emissions standards or if improvements in mass transportation adhere to national or international design standards.

6 For example, banks and financial institutions may utilize the taxonomy to assess eligibility for green financial products, monitor the volume of such products, and report progress towards predefined sustainability targets, such as the proportion of their portfolio dedicated to supporting low-carbon investments.

While the green taxonomy focuses on clarifying environmental objectives and green investments, a green budget is a specific government tool used to allocate resources for promoting a sustainable green economy. The importance of green budgeting is highlighted by initiatives like the Paris Collaborative on Green Budgeting, which the OECD initiated as part of the 12 announcements made at the 2017 One Planet Summit in Paris. Green budgeting goes beyond mere alignment of budget direction with climate objectives, encompassing all fiscal policies related to government expenditure and revenue. The primary goal of green budgeting is to align fiscal policies with the climate objectives outlined in the green taxonomy. This involves the development of fiscal policies that incentivize behaviors, investments, and practices conducive to the transition toward a low-emission economy. Additionally, it requires a comprehensive review of tax systems to ensure they align with sectoral decarbonization goals. Before finalizing a budget, governments should also perform a cost-benefit analysis (CBA) to evaluate the complete expenses associated with emissions, including the social cost of carbon and other greenhouse gases. This analysis redirects financial resources toward resilient, low-emission projects, offering a holistic evaluation of the climate impact and co-benefits associated with infrastructure investments. Governments can utilize fiscal instruments such as subsidies, public investments, and taxation to achieve climate objectives while managing transitional costs.

Amidst efforts to bolster government revenue, a pressing demand for substantial infrastructure investment arises at the onset of the transition to a green economy. While carbon pricing can help manage deficits during the transitional phase, it may fall short in generating the vast funding required for infrastructural transition. In this context, green bonds emerge as a financial instrument capable of raising funds for the transition towards green infrastructure (OECD, World Bank, and UN Environment, 2018). The trend in green bond issuance underscores this: in 2012, the outstanding issuances were only US$6.5 billion, but by 2022, they had surged to US$1.9 trillion (IMF, 2024a). However, for introducing green bonds, it is important to first define what projects or investments are considered ‘green,’ in other words, which ones are adopting a green taxonomy. Once this taxonomy is clearly defined, public institutions can identify which projects qualify as green and distinguish them from those that may only appear to be so as to avoid greenwashing. This enhanced clarity facilitates green bond

issuance and allows investors to make informed decisions based on genuine environmental credentials. In addition, adopting the C-PIMA can contribute to reducing bias in identifying green investments. In particular, well-defined national and sectoral planning of public investment, appropriate coordination between all levels of government, a project appraisal system

Box 5: Sustainable Finance in LAC: Green Taxonomy and Thematic Bonds

Countries such as Chile, Brazil, Mexico, Peru, Argentina, Colombia, Costa Rica, Uruguay, the Dominican Republic, Ecuador, Panama, and Barbados have witnessed green bond issuance (Dembele, Schwarz, and Horrocks, 2021), with Chile leading as the largest issuer in 2020, raising approximately US$4.25 billion in the euro and USD markets. Additionally, Mexico introduced SDG bonds worth US$890 million in September 2020, aligning with the achievement of the SDGs, while Colombia issued the region's first sovereign green bond denominated in local currency in 2021, successfully raising US$200 million in funding (World Bank, 2022c).

In terms of green taxonomy, Colombia and Mexico have made notable advancements. In the case of Colombia, the Financial Superintendence has actively integrated climate-related components into its financial sector regulations. This integration includes creating tools for assessing and overseeing climate-related risks, regulating green financial instruments, and providing training (World Bank Group, 2023). Meanwhile, Mexico has outlined three key goals concerning green taxonomy: climate change mitigation and adaptation, sustainable cities, and gender equality. Additionally, the country has identified six economic sectors linked to environmental protection: agriculture, energy, construction, manufacturing, transportation, and waste management (Secretaría de Hacienda y Crédito Público, 2023). Specific activities such as resilient housing and sustainable public transport have been pinpointed within each sector for their potential contribution to these goals. Furthermore, Mexico has developed Technical Evaluation Criteria (CET) to implement the sustainable taxonomy and identified potential users, including companies, credit institutions, and institutional investors.

that considers the potential impact of climate risks, a fiscal management plan for this type of investment, and a risk management strategy with mechanisms that mitigate the effects of climate shocks help to reduce uncertainty about the expected returns of resilient public investment, and therefore promote its financing.

Green bonds represent a robust tool for supporting financial sector reform, offering innovative investment opportunities for channeling capital into green and climate-related endeavors. Similarly, green loans can bolster sustainable finance, particularly in regions where local banking institutions meet most financing needs. One prominent example of the role that financial institutions can play in the transition to a green economy is the National Bank for Economic and Social Development of Brazil (BNDES), which, in May 2017, issued a USD 1 million green bond, the first international green bond issuance by a Brazilian bank, alongside the 500 million Reales sustainable energy fund used to finance sustainable energy projects and infrastructure. The BNDES has also been important in financing green infrastructure in Brazil, managing the Amazon Fund, and supporting the wind industry's development across the country (OECD, World Bank, and UN Environment, 2018). The green bond market has witnessed remarkable growth, increasing from US$3 billion in 2011 to US$444 billion in 2022, underscoring the growing reliance of governments on green bonds to attract private capital and mitigate investment risks while providing capacity-building support.

Box 6: Sustainable Finance in Brazil: Green Taxonomy and Thematic Bonds

The taxonomy established by the Brazilian Federation Bank (FEBRABAN) currently serves as a standard, having been published and regularly updated since 2015. FEBRABAN's green taxonomy is grounded in the National Classification of Economic Activities (CNAE). It has evaluated the 1,331 CNAE subclasses, categorizing them into three distinct taxonomy modalities: Green Economy, Climate Change Exposure, and Environmental Risk Exposure (Federal Government of

(continued on the next page)

Brazil, 2023b). The 'Green Economy' category encompasses activities that yield positive environmental and societal benefits. 'Climate Change Exposure' includes energy, transportation, materials, building, agriculture, and forestry sectors that could amplify both physical and transition risks associated with climate change. 'Environmental Risk Exposure' highlights industries like mechanical, rubber, chemical, plastics, tourism, and others that pose significant environmental impacts due to the industry's nature.

However, a severe drawback is the absence of a consolidated Brazilian taxonomy that provides a standardized framework across sectors. The Federal Government of Brazil announced the Action Plan for a Brazilian Sustainable Taxonomy in December 2023 to address this gap. This plan aims to establish a national standard that would enable the precise and objective classification of economic and financial activities and is expected to be completed by October 2024.

Besides the gaps in Brazil's national green taxonomy, green bonds have flourished independently, with the issuance of climate-aligned debt surpassing US$2.1 billion from 2016 to 2023 (Federal Government of Brazil, 2023a). This market for thematic bonds adopted international frameworks like the Green Bond Principles and Social Bond Principles outlined by the International Capital Market Association (ICMA).

Nevertheless, relying on international taxonomies without adapting them to Brazil's unique context may result in a misalignment of technical criteria and potentially underrepresent the scope of activities eligible for sustainable investment (Federal Government of Brazil, 2023b). To address this, the Federal Government introduced Brazil's Sovereign Sustainable Bond Framework in May 2023, demonstrating a commitment to channeling thematic bond proceeds into environmental and social advancements. This led to the successful issuing of a US$2 billion sovereign sustainable bond in November 2023, underscoring Brazil's dedication to sustainability and financial innovation.

4. Conclusions

Proactive and immediate action against climate change is crucial, as it poses a significant risk to economic stability and demands a swift and decisive transition towards a low-carbon economy. These risks are particularly acute in LAC countries, where there is a pressing need for enhanced climate adaptation and investment due to inadequate preparedness and limited insurance coverage. In this context, MTFFs emerge as essential tools, offering a structured approach to align fiscal policies with environmental sustainability goals and effectively address both physical and transition risks.

MTFFs are robust fiscal instruments that facilitate the integration of natural disasters and climate risks into fiscal planning. Despite existing gaps and areas for improvement across LAC countries, MTFFs remain necessary instruments for direct action in response to climate change challenges. They emphasize different areas of public finances, such as expenditure, revenue, financing, and investment, in designing fiscal strategies. These frameworks also identify critical areas like protecting public investment and fostering resilient investment, especially during fiscal adjustments, underscoring the need for efficient allocation of resources for climate change adaptation and mitigation. Moreover, MTFFs are instrumental in managing the financial impacts of climate-related disasters, involving comprehensive risk layering strategies and the integration of Disaster Risk Financing, which is key to ensuring fiscal sustainability and resilience in the face of climate change.

In the context of decarbonizing economies, the necessity of strategic planning in revenues, expenditures, and debt management is underscored. A significant challenge is the heavy reliance on income from carbon sources in the LAC region. Strategies such as carbon pricing and taxation to mobilize revenue for climate adaptation are prioritized to achieve environmental and fiscal goals. Integrating revenue recycling within MTFFs, alongside economic diversification to broaden tax bases, aligns fiscal planning with environmental objectives and mitigates revenue shortfalls in fossil fuel-dependent economies.

Adjusting current subsidies and rationalizing environmentally harmful subsidies are key strategies in aligning fiscal plans with the broader goal of transitioning to a low-carbon economy. This transition, however, is complicated by the possibility of substantial assets becoming stranded and the limited post-pandemic fiscal capacity, making the balance between fiscal stability, strategic investments, and effective climate policies even more precarious. Central to this transition is the integration of green taxonomy and green budgeting within fiscal strategies to guide economies towards enhanced environmental responsibility. Furthermore, green bonds represent an innovative tool for supporting financial sector reform and channeling capital towards green and climate-related initiatives. They highlight the importance of substantial infrastructure investment for transitioning to a green economy. These strategies are essential in managing transition risks and promoting a sustainable, low-carbon future, emphasizing the role of fiscal tools in navigating the complexities of climate change.

Implementing MTFFs, green budgeting, green taxonomies, and other strategic fiscal tools is vital in managing both physical and transition risks associated with climate change. These approaches require fiscal discipline and a steadfast commitment to sustainable development and environmental responsibility, ensuring a balanced approach to fiscal stability, strategic and resilient investments, and effective climate policy implementation.

References

Alejos, L. A. 2018. Three Essays in Public Finance in Developing Countries. Doctoral thesis, University of Michigan.

Ardanaz, M., E. A. Cavallo, A. Izquierdo, and J. Puig. 2021. The Output Effects of Fiscal Consolidations: Does Spending Composition Matter? IDB Working Paper Series No. IDB-WP-1302. Inter-American Development Bank. Available at http://dx.doi.org/10.18235/0003881

Binsted, M., G. Iyer, J. Edmonds, A. Vogt-Schilb, R. Arguello, A. Cadena, R. Delgado, F. Feijoo, A. F. P. Lucena, H. McJeon, F. Miralles-Wilhelm, and A. Sharma. 2020. Stranded Asset Implications of the Paris Agreement in Latin America and the Caribbean. Environmental Research Letters. 15 044026. Available at https://www.doi.org/10.1088/1748-9326/ab506d

Carbon Pricing Leadership Coalition (CPLC). 2018. "2017–2018 Carbon Pricing Leadership Coalition Report." The World Bank, Washington, D.C., April 2018.

Cárdenas, M., and C. Peña. 2024. Climate Action in Latin America and the Caribbean: Fiscal Policies and the Indispensable Role of Finance Ministries. Technical Note No. IDB-TN-2963. Inter-American Development Bank. Available at https://doi.org/10.18235/0013066

Caribbean Catastrophe Risk Insurance Facility (CCRIF). 2022. CCRIF Strategic Plan 2022–2025. Grand Cayman: CCRIF SPC. Available at https://www.ccrif.org/publications/strategic-plan/ccrif-spc-strategic-plan-2022-2025

Caselli, F., A. Lagerborg, and P. A. Medas. 2024. Green Fiscal Rules? Challenges and Policy Alternatives. IMF Working Paper No. 2024/125. Available at https://ssrn.com/abstract=4890801

Delgado, R., H. Eguino, and A. L. Pereira. 2021. Fiscal Policy and Climate Change: Recent Experiences of Finance Ministries in Latin America and the Caribbean. Washington, D.C.: Inter-American Development Bank. Available at http://dx.doi.org/10.18235/0003376

Dembele, F., R. Schwarz, and P. Horrocks. 2021. Scaling up Green, Social, Sustainability and Sustainability-Linked Bond Issuances in Developing Countries. Paris: OECD Publishing. Available at https://doi.org/10.1787/8a5c3156-en

European Commission. 2022. Fiscal Sustainability Report 2021. European Economy Institutional Paper 171. Luxembourg: Publications Office of the European Union. Available at https://economy-finance.ec.europa.eu/publications/fiscal-sustainability-report-2021_en

Federal Government of Brazil. 2023a. Brazil's Sovereign Sustainable Bond Framework. Available at https://sisweb.tesouro.gov.br/apex/f?p=2501:9::::9:P9_ID_PUBLICACAO_ANEXO:21043

Federal Government of Brazil. 2023b. Sustainable Taxonomy of Brazil: Action Plan. Available at https://www.gov.br/fazenda/pt-br/orgaos/spe/taxonomia-sustentavel-brasileira/arquivos-taxonomia/sustainable-taxonomy-of-brazil-december-v2.pdf

Fouré, J., R. Dellink, E. Lanzi, and F. Pavanello. 2023. Public Finance Resilience in the Transition Towards Carbon Neutrality: Modelling Policy Instruments in a Global Net-zero Emissions. OECD Environment Working Papers No. 214. Paris: OECD Publishing. Available at https://doi.org/10.1787/7f3275e0-en

Galindo, A., and A. Izquierdo. 2024. 2024 Latin American and Caribbean Macroeconomic Report: Ready for Take-Off? Building on Macroeconomic Stability for Growth. Washington, D.C.: Inter-American Development Bank. Available at https://doi.org/10.18235/0005667

Gomez-Gonzalez, J. E., J. M. Uribe, and O. M. Valencia. 2024. Asymmetric Sovereign Risk: Implications for Climate Change Preparation. IREA Working Papers No. 2024/01. University of Barcelona, Research Institute of Applied Economics, revised Jan 2024. Available at https://ideas.repec.org/p/ira/wpaper/202401.html

Hussain, F. I., L. E. Tlaiye, and R. M. Jordan Arce. 2020. Developing a National Green Taxonomy: A World Bank Guide (English). Washington, D.C.: World Bank Group. Available at http://documents.worldbank.org/curated/en/953011593410423487

Inter-American Development Bank (IDB). 2024. Boosting the Energy Transition in the Latin American and Caribbean Region. From Energy Transition in Latin America and the Caribbean. Available at https://www.iadb.org/en/news/energy-transition-latin-america-and-caribbean

International Energy Agency (IEA). (2024). Energy Statistics Database, World Energy Balances. Washington, D.C.

International Monetary Fund (IMF). 2016. Small States' Resilience to Natural Disasters and Climate Change. IMF Policy Paper. Available at https://www.imf.org/en/Publications/Policy-Papers/Issues/2016/12/31/Small-States-Resilience-to-Natural-Disasters-and-Climate-Change-Role-for-the-IMF-PP5079

--------. 2021. Strengthening Infrastructure Governance for Climate-Responsive Public Investment. IMF Policy Paper No. 2021/076.

Available at https://www.imf.org/en/Publications/Policy-Papers/Issues/2021/12/22/Strengthening-Infrastructure-Governance-for-Climate-Responsive-Public-Investment-511258

--------. 2023. Climate Crossroads: Fiscal Policies in a Warming World. Fiscal Monitor. Washington, D.C.: IMF. Available at https://www.imf.org/en/Publications/FM/Issues/2023/10/10/fiscal-monitor-october-2023

--------. 2024a. Climate Change Indicators Dashboard. Available at https://climatedata.imf.org/

--------. 2024b. Fossil Fuel Subsidies by Country and Fuel Database. Available at https://www.imf.org/en/Topics/climate-change/energy-subsidies

Jaramillo, M., and V. Saavedra. 2021. NDC Invest: Supporting Transformational Climate Policy and Finance. Washington, D.C.: Inter-American Development Bank. Available at https://doi.org/10.18235/0003340

Jaynes, C. H. 2024. Green Energy is Set to Match the World's Growing Electricity Demand - IEA Report. From World Economic Forum – Energy Transition. Available at https://www.weforum.org/agenda/2024/02/green-energy-electricity-demand-growth-iea-report/

Mechler, R., J. Mochizuki, and S. Hochrainer-Stigler. 2016. Disaster Risk Management and Fiscal Policy: Narratives, Tools, and Evidence Associated with Assessing Fiscal Risk and Building Resilience (English). Policy Research Working Paper No. WPS7635. Washington, D.C.: World Bank Group. Available at http://documents.worldbank.org/curated/en/739221468195567307

Mulville, G., F. Ezquerra, D. Brogeras, and S. Goris Porta. 2024. The Technologies That Will Turn Latin America and the Caribbean into a Global Hub for Sustainable Energies. From IDB Invest - Digital Economy. Available at https://idbinvest.org/en/blog/digital-economy/technologies-will-turn-latin-america-and-caribbean-global-hub-sustainable#:~:text=Energy%20transition%20is%20a%20strategic,a%20competitive%20and%20sustainable%20balance

Notre Dame Global Adaptation Initiative (ND-GAIN). 2024. Climate Change Indicators Database, Country Index. Available at https://gain.nd.edu/our-work/country-index/

OECD. 2022. Building Financial Resilience to Climate Impacts: A Framework for Governments to Manage the Risks of Losses and Damages. Paris: OECD Publishing. Available at https://doi.org/10.1787/9e2e1412-en

OECD and World Bank. 2019. Fiscal Resilience to Natural Disasters: Lessons from Country Experiences. Paris: OECD Publishing. Available at https://doi.org/10.1787/27a4198a-en

OECD, World Bank, and UN Environment. 2018. Financing Climate Futures: Rethinking Infrastructure. Paris: OECD Publishing. Available at https://www.oecd.org/environment/financing-climate-futures-9789264308114-en.htm

Pigato, M. A., Editor. 2019. Fiscal Policies for Development and Climate Action. International Development in Focus. Washington, D.C.: World Bank. Available at https://www.worldbank.org/en/topic/macroeconomics/publication/fiscal-policies-for-development-and-climate-action

Radu, D. 2021. Disaster Risk Financing: Main Concepts and Evidence from EU Member States. European Economy Discussion Paper 150. Luxembourg: Publications Office of the European Union. Available at https://economy-finance.ec.europa.eu/publications/disaster-risk-financing-main-concepts-and-evidence-eu-member-states_en

Secretaría de Hacienda y Crédito Público. 2023. Taxonomía Sostenible De México. Álvaro Obregón: Secretaría de Hacienda y Crédito Público (SHCP). Available at https://www.gob.mx/shcp/documentos/taxonomia-sostenible-de-mexico?state=published

Solano-Rodríguez, B., S. Pye, P. Li, P. Ekins, O. Manzano, and A. Vogt-Schilb. 2019. Implications of Climate Targets on Oil Production and Fiscal Revenues in Latin America and the Caribbean. Discussion Paper No. IDB-DP-00701. Washington, D.C.: Inter-American Development Bank. Available at http://dx.doi.org/10.18235/0001802

UNSDG Global Database. 2023. Available at: https://unstats.un.org/sdgs/dataportal/database

Valencia, O., C. Ulloa Suarez, and J. Guerra. 2024. New Index Helps Governments Design Better Escape Clauses to Bridge Fiscal Rigidity with Crisis Adaptability. Blog at Inter-American Development Bank. Available at https://blogs.iadb.org/gestion-fiscal/en/new-index-escape-clauses/

World Bank. 2020. Catastrophe Insurance Programs for Public Assets - Operational Framework (English). Washington D.C.: World Bank Group. Available at http://documents.worldbank.org/curated/en/613121596701292494

--------. 2022a. A Roadmap for Climate Action in Latin America and the Caribbean, 2021-2025. Washington, D.C.: World Bank

Group. Available at http://documents.worldbank.org/curated/en/099720509072258391

--------. 2022b. Disaster Resilient and Responsive Public Financial Management: An Assessment Tool. Equitable Growth, Finance and Institutions Insight - Governance. Washington, D.C.: World Bank. Available at http://hdl.handle.net/10986/37033

--------. 2022c. Colombia: The First Sovereign Green Bond in Local Currency in Latin America. Washington, D.C.: World Bank. Available at https://thedocs.worldbank.org/en/doc/bc687cc79a64b1640b0a1e7af7a56142-0340012022/colombia-the-first-sovereign-green-bond-in-local-currency-in-latin-america

--------. 2024. World Development Indicators Database. Washington, D.C.

World Bank Group. 2021. World Bank Group Climate Change Action Plan 2021–2025: Supporting Green, Resilient, and Inclusive Development. Washington, D.C.: World Bank. Available at http://hdl.handle.net/10986/35799

--------. 2023. Colombia - Country Climate and Development Report (English). Washington, D.C.: World Bank Group. Available at http://documents.worldbank.org/curated/en/099072023124010841/P1781040ddec680a00aebf0315573ff6d8d