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REPORT

Innovative Finance to Ensure Stability in the Face of Adverse Climate Change Impacts

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TABLE OF CONTENTS

> SECTION 1

About the Authors

Michael Franczak is a Research Fellow in the Division of Peace, Climate, and Sustainable Development at IPI, where he leads work on climate and development finance and reform of the international financial architecture. He is a historian of international economic relations and an expert on global climate change policy and negotiations. Michael also holds appointments as a Visiting Fellow at University of Pennsylvania's Perry World House and as an Adjunct Assistant Professor of History at Columbia University.

Before coming to IPI, Michael was a postdoctoral fellow at Perry World House and at Yale University's International Security Studies, where he taught in the History Department. His book, *Global Inequality and American Foreign Policy in the 1970s* (Cornell University Press, 2022), shows how developing countries' demand in the United Nations for a New International Economic Order reshaped American and global politics for years to come. Michael has also worked as a consultant for the United Nations Climate Secretariat's Nairobi Work Programme and served as an advisor on loss and damage finance for the Republic of Maldives. He received his PhD in history from Boston College in 2018.

Koko Warner is the director of the Global Data Institute at the International Organization for Migration, and is an expert on climate change risks, impacts, and resilience. She previously managed the Vulnerability subdivision at the UN Framework Convention on Climate Change (UNFCCC) secretariat, where she guided the global adaptation knowledge-to-action hub and the Local Communities and Indigenous Peoples Platform. Warner is a lead author for the Intergovernmental Panel on Climate Change's Fifth and Sixth Assessment Reports, including the Special Report on Climate Change and Land. Previously at UNFCCC, she supervised the loss and damage policy area. Before joining UNFCCC, Warner was founder and executive director of the Munich Climate Insurance Initiative, and scientific director of environmental migration and social resilience at UN University in Bonn. The International Council of Science named Warner among the top 20 women in the climate change debate. Warner holds a PhD in economics.

> SECTION 2

Summary

When countries embark on major transformations, such as addressing climate change and its impacts, the design and deployment of financial modalities is as crucial as the total investment. Effective climate finance hinges not just on how much is needed but also on how to structure it for outcomes that deliver confidence and stability in the real economy.

Countries face political and economic constraints when deploying finance for climate change mitigation, adaptation, and resilience. To improve or maintain confidence and stability, climate finance strategies have to account for "real economy" drivers, such as interest rates, debt, trade, investment, and employment, while managing volatility such as conflict or changes in population distribution and avoiding stranded assets (investments or resources that have lost value or become obsolete due to shifts in technology, regulations, or market conditions). Revenue generation through renewable energy is one of several options for pension funds (investment pools that collect and grow money to provide retirement income for employees) to capture returns and shift smoothly away from potential stranded assets. As demographic shifts and technological advancements challenge traditional revenue streams, governments are also looking for new taxation strategies to position a country or region to capture strategic opportunities, meet public obligations, and reduce risks.
Innovative finance modalities play a critical role in addressing climate impacts, but these instruments are not equally accessible, impactful, or appropriate for all countries. Modalities may be classified by their primary purposes: mobilizing additional resources, leveraging current or future resources, reducing or managing risk, and increasing fiscal space. Policymakers must understand the distinctions between modalities and how they interact with real economy drivers to achieve the aims of Paris Agreement Article 2.1(c): to make "finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development."

Large-scale innovative climate finance is enabled when connected to global and regional coordination around real economy challenges. Initiatives such as a multilateral tax convention, Special Drawing Rights-backed lending for adaptation, and debt pause clauses in public and private lending can mobilize resources, finance resilience, and provide fiscal space. Public credit ratings agencies and currency hedging platforms supported by multilateral development banks can reduce risks for countries, investors, and lenders, while buffer stocks can stabilize prices and promote food security in climate-vulnerable regions.

Addressing climate change requires not just more finance but also well-structured financial systems that promote stability in a volatile world. Climate finance systems will need to connect public resources to jobs and production, while adapting to political, technological, and demographic shifts. With leveraged investments, strategic borrowing, public income through shifts in taxation, and regional and global cooperation, governments can build resilient financial frameworks to address the challenges of adverse climate impacts.

> SECTION 3

Introduction

The accelerating impacts of climate change pose profound challenges to global stability, necessitating urgent and substantial financial responses. Governments use a number of economic tools to advance their political and economic objectives domestically and internationally. Such tools can include industrial policy around leading industries to achieve trade aims, as well as job creation and revenue-generating shifts in taxation, and improve the terms of sovereign borrowing. The use of these tools shapes the "real economy"—where people work and what they purchase, where businesses produce and distribute goods and services, and where people build homes and raise families—and, over time, establishes parameters within which governments operate in order to maintain power and influence at home or abroad. These real economy tools together influence the degree to which a government can generate the resources needed to drive major transformations.

> In the face of accelerating climate impacts, the strategic design of financial modalities is as critical as the scale of investment itself. Effective climate finance hinges not just on the *how much*, but also on the *how*—how finance is structured to drive real economic growth, stabilize economies, and navigate political and economic constraints.

When countries undertake major transformations, such as those required for addressing climate change, the strategic design of finance modalities is often as crucial as the total investment required. This is because the success of these transformations depends not only on the amount of money allocated but also on how effectively those funds are deployed to drive real economic stability and confidence, upon which livelihoods and well-being, productivity, and social cohesion depend. Financial instruments, such as government bonds, loans, and public-private partnerships, must be carefully tailored to build productive assets such as infrastructure and to stimulate productive sectors. Likewise, policy instruments, including subsidies, tax incentives, and regulatory reforms, should be strategically coordinated to maximize investment, innovation, and the overall impact on production, employment, and consumption. Thus, in facing upheavals and transitions, the central questions involve not just *how much* to leverage but also *how* to structure and implement these financial and policy tools to achieve stable and transformative outcomes.

This white paper analyzes the political economy of innovative finance in the context of ensuring stability against adverse climate change impacts. It hopes to inform the following primary audiences:

- Political leaders who are deciding on investments in climate resilience and other immediate priorities.
- Officials at central banks and finance ministries, multilateral development banks, and pension funds who are observing the economy-wide impacts of climate change.

- Industry and labor representatives from sectors that drive the real economy and which are bearing the impacts of climate change on employment, production, and trade.
- Climate finance negotiators and others in the United Nations climate process (UN Framework Convention on Climate Change, or UNFCCC) who are considering how the real economy shapes climate finance options and outcomes.

By examining the political economy of climate finance, this paper aims to provide a practical understanding of the parameters, constraints, and opportunities associated with innovative finance solutions. The analysis is structured around four key areas essential to navigating the complex landscape of climate resilience:

- The requirements for finance that promote stabilization in the face of real economy shocks.
- The political and economic constraints and trade-offs involved when countries invest in climate resilience.
- The use of innovative finance modalities to mobilize and leverage resources, reduce risk, and increase fiscal space.
- The relevance, progress, and opportunities for innovative finance at the regional and global levels, particularly the modalities and processes that effectively address or work synchronously with real economy drivers.

The paper concludes with recommendations for stakeholders in multilateral economic and climate-related fora, including and beyond the UNFCCC. Ultimately, the success of climate finance mobilization and delivery will depend not on the specific language within a negotiated text, but on the governments, international institutions, and investors to which it is addressed. Therefore, it is essential that these actors have a common understanding of the modalities, constraints, and opportunities for innovative finance in the context of real economy drivers.

> This paper examines the political economy of innovative finance in addressing climate change, emphasizing that effective climate finance relies on not only the amount of investment but also the strategic design of financial and policy tools to foster economic growth and resilience.
>
> As countries prepare for COP29 to negotiate a new collective quantified goal for climate finance, a rightward political shift in many industrialized nations—characterized by a focus on inflation, income inequality, immigration, and domestic investment priorities—creates significant challenges for traditional sources of climate finance. This shift highlights the urgent need to leverage innovative financial mechanisms that are closely aligned with real economy dynamics.

> SECTION 4

The Financial Toolkit: Real Economy Parameters for At-Scale Climate Finance

Climate finance is crucial to addressing the challenges posed by climate change, especially as extreme weather events and slow-onset impacts such as sea level rise, desertification, and water scarcity become more frequent and severe. To effectively stabilize the climate and mitigate these impacts, the design of climate finance has to take into account economic, social, and political conditions. These real economy parameters include taxation, interest rates, balance of payments, demographic and technological shifts, and other factors in the face of escalating climate impacts. These parameters constrain and also interact with each other over economic and political cycles, shaping opportunities for how climate finance is designed and deployed and how challenges are surmounted for mitigation and adaptation. This section outlines the critical parameters that shape climate finance, recognizing that approaches need to be tailored to the characteristics of local, national, and regional economies.

> "For optimal impacts, climate finance should be strategically designed to stabilize economies against the shocks of climate change, considering the complex interplay of taxation, interest rates, trade, and volatility.
>
> It will be essential to design, combine, and deploy financial tools for effective mitigation and adaptation in ways tailored to the unique economic, social, and political contexts of both developed and developing countries."

The differences between developed and developing countries—such as their population ages, debt levels, trade balances, and responses to economic changes—shape how fiscal and monetary policies can be used to fund efforts against climate change. By considering these factors, policymakers, central banks, and financial markets can create strategies that ensure stability as climate change progresses and support a shift toward sustainable, climate-resilient development.

Taxation

Taxation is a foundational tool for generating the public revenue necessary to finance large-scale climate initiatives. However, the fast pace of technological change and shifts in demographics are changing how labor and capital are allocated. This creates new challenges for taxation, making it harder for governments to raise revenue to support their policies.

Demographic shifts. In many medium- and high-income countries with aging populations and strong tax collection systems, household tax rates typically range from 30 percent to 50 percent to sustain social welfare systems. In some medium- and low-income countries where tax collection systems are in place, household taxation rates range from 10 percent to 25 percent to encourage

Term Sheet for Climate Finance and Economic Stability

The ranges below reflect the complex interactions between demographic changes, economic policies, and global market dynamics, highlighting the importance of tailored approaches in economic and environmental strategies (International Monetary Fund, 2024).

Taxation Rates

- Developed countries with aging populations often have higher household taxes (30–50 percent) and moderate business taxes (15–30 percent).
- Developing countries with young populations often have lower household taxes (10–25 percent) and varying business taxes (15–35 percent).

Interest Rates

- High public indebtedness frequently corresponds with higher rates (5–20 percent).
- Large public bond volumes frequently correspond with moderate rates (2–10 percent).
- High inflation risks frequently correspond with widely varying interest rates (10–50 percent).

Balance of Payments

- High trade involvement: large volumes (hundreds of billions).
- Low trade involvement: smaller volumes (millions to a few billion).

Volatility

In the real economy, volatility represents the degree of variation or instability in the returns of an asset, market, or economic variables. Higher volatility signals greater uncertainty about the economy, which can reduce investment and slow economic growth. In finance, volatility typically refers to. High volatility indicates a larger price range over time, while low volatility implies more stability. Standard deviation is a statistical measure commonly used to quantify this volatility which captures how much an investment's returns deviate from its average (mean) return over a certain period.

- Extreme weather events: high volatility to returns.
- Stranded assets: medium-to-high volatility to returns.
- With coordination and regulation: lower volatility to returns.
- Without coordination and regulation: higher volatility to returns.

consumption and economic participation. However, across the globe, live births per female are falling and life expectancy is generally rising, creating higher dependency on working-age, tax-paying populations.

The aging of populations in many countries could reduce the tax base, as the proportion of the population in the workforce becomes smaller. Low birth rates and longer life expectancy contributing to this pattern are currently pronounced in wealthy countries and are becoming more common in many developing and emerging economies. Unlike countries that grew wealthy before general life expectancy had risen decades beyond working life, many developing countries are already experiencing demographic shifts and increasing proportions (15 percent or more) of their populations are becoming dependent on the young for economic support (Kotschy and Bloom 2023). This could further strain public finances, making it even more difficult for emerging economies to absorb volatility associated with rapid- and slow-onset climate change impacts and to fund new sources of revenue such as renewable, affordable energy. Developing countries with younger populations may have unique growth and investment opportunities. Realizing these opportunities depends on investments in the productivity and well-being of their populations and on the establishment of effective tax systems. By capturing the "demographic dividend"—the economic advantage of having a healthy and productive working-age population that outnumbers the elderly—these countries can harness a powerful driver of the real economy for transformation in the face of climate impacts. However, capturing the demographic dividend requires strategic investments in human capital, economic infrastructure, and policies that create employment opportunities.

Technological change and taxation. The rise of automation, artificial intelligence, and digital economies is transforming the labor market. As machines increasingly perform tasks previously done by humans, traditional labor-based taxation

models may become less effective. Some governments are exploring possibilities to shift toward other modes of taxation to generate revenue, such as taxing automation technologies or long-standing proposals such as taxing negative externalities (Nobanee and Ullah 2023). Shifts in modes of taxation, however, can generate resistance from affected industries and groups that could motivate decision-makers to provide affected industries concessions, such as trade protection or subsidies, which may affect consumer prices.

Global tax coordination. Often in medium- and high-income countries, corporate tax rates are generally lower than household tax rates to encourage investment. These corporate rates range from 15 percent to 30 percent, though some may be lower to attract even more investment. In medium- and low-income countries, corporate rates (where they are collected) vary widely—from 15 percent to 35 percent—depending on strategies to attract foreign investment and stimulate economic growth (International Monetary Fund, 2024).

Because climate change is a global issue, international coordination on taxation could help countries manage tax evasion and monitor how multinational corporations contribute to and are affected by climate-related tax schemes. To support shifting energy systems and manage climate-related impacts on the real economy, several proposals have been floated, including the taxing of carbon emissions, financial transactions, and windfall profits (European Climate Foundation, 2024). However, the varying interests of countries at different stages of development make achieving such coordination challenging (Franczak, 2024).

Interest Rates

Interest rates play a crucial role in determining the cost of capital, which directly affects the feasibility of debt-based climate finance. As the world grapples with persistent inflation and the rising cost of living, the dynamics of interest rates are becoming increasingly important in shaping climate finance strategies. High interest rates raise the cost of borrowing, making it more expensive for governments, businesses, and individuals to finance large-scale climate projects, such as renewable energy infrastructure or climate-resilient agriculture. This can lead to reduced investment in critical areas needed for climate change mitigation and adaptation.

Bond markets and green bonds. The bond market is an important source of finance to drive investments in, for example, renewable energy and climate-resilient infrastructure. Countries with a large volume of public bonds tend to have moderate to high interest rates to attract investors, especially if risk perception is high. Rates can range from 2 percent to 10 percent; some industrialized countries with large bond markets typically have lower rates, while some developing countries may have higher rates to attract buyers.

Bonds allow governments and corporations to raise capital specifically for projects designed to drive the low-carbon industry and increase resilience to climate change impacts. However, the success of bonds for these purposes is closely tied to interest rates. Low interest rates can make borrowing cheaper, encouraging investment in long-term climate projects. Conversely, high interest rates can make bonds less attractive to investors, potentially slowing down the flow of capital into climate initiatives. High borrowing costs may deter private sector investment in green technologies and projects and even public housing or other areas that affect the cost of living, as the returns on these investments might not be large enough to justify the increased cost. Insufficiently large investment can slow down the transition to a low-carbon economy while climate change impacts from floods, drought, and changes in water regimes are accelerating and increasing volatility.

Inflation. Inflation erodes the real value of money, which, if not properly managed, can undermine the effectiveness of climate finance. For instance, if inflation outpaces the returns on climate invest-

ments, it could discourage further investment. Central banks may raise interest rates to combat inflation, which could increase the cost of borrowing for climate projects. To combat inflation, central banks in countries at high risk of inflation have been known to set higher interest rates, ranging from fractions of a percent to double digits. History shows that central banks in some countries have imposed aggressive rate hikes to contain inflationary pressures (Jimenez et al. 2023). However, for some climate change impacts—especially ones that co-occur and affect essentials including food, water, and energy (for example, drought and extreme heat)—aggressive measures such as interest rate hikes that curtail public consumption may become untenable.

For governments, high interest rates increase the cost of servicing debt, potentially crowding out other essential spending, including investments in climate adaptation and resilience. This can limit the ability of governments to fund necessary climate initiatives and create a delicate balance for policymakers who have to manage inflation without stifling investment in critical climate initiatives.

Debt sustainability. For many developing and developed countries alike, debt-based finance can provide much-needed capital for climate adaptation and mitigation, but it also increases the risk of debt distress, particularly in the face of rising interest rates. Countries with high levels of public indebtedness often have interest rates ranging from 5 percent to 20 percent to offset risk. This approach necessitates the development of sustainable debt frameworks that allow countries to finance their climate needs without compromising their long-term economic stability. Innovative financial instruments such as climate resilience bonds or debt-for-climate swaps could offer potential solutions, though they would require careful design and international cooperation.

> Interest rates are pivotal in shaping the cost and feasibility of debt-based climate finance. High rates raise borrowing costs, potentially stifling investments in critical climate projects such as renewable energy and bonds for climate resilient infrastructure. Inflation puts pressure on central banks to raise interest rates, and governments face the challenge of balancing debt sustainability with spending to mitigate climate change impacts and stabilize the real economy.

Trade

In the context of climate finance, understanding the dynamics of trade and the effects on exchange rates and trade balance is essential. Trade imbalances and exchange rate fluctuations are intertwined and can affect a country's ability to effectively mobilize resources for climate action.

Trade balance and exchange rates. The trade balance—exports minus imports—directly influences exchange rates. A trade surplus (more exports than imports) increases demand for a country's currency, leading to appreciation. Conversely, a trade deficit (more imports than exports) decreases currency demand, causing depreciation. For climate finance, countries with strong exports can generate more foreign currency, which can be mobilized for investments that help move an economy toward renewable energy and new productive economic activities. However, countries facing chronic trade deficits might face currency pressure, leading to higher costs for importing foodstuffs needed to offset intensified impacts on domestic food production or for importing technologies and components critical to building out renewal energy. Many developing countries depend on commodity exports (for example, oil, minerals, or agricultural products), while some developed and developing countries depend on commodity imports such as foodstuffs, critical technology components, and

minerals. Volatility in global commodity prices can lead to significant fluctuations in trade balance, affecting exchange rate stability. For instance, a drop in oil prices could weaken the currency of an oil-exporting country, reducing its ability to finance renewable energy transitions and climate-resilient infrastructure if these rely on foreign technologies or capital.

Exchange rate policies and climate finance. Countries may adopt fixed, floating, or managed exchange rate regimes, each with different implications for trade and climate finance. A fixed regime can provide stability, encouraging foreign investment in climate-related investments. However, it can also limit a country's flexibility to respond to external shocks, such as those arising from climate-related disasters. Conversely, a floating regime can lead to more volatility, making the cost of imports for climate projects unpredictable and potentially hindering investment. Currency devaluation can make exports cheaper and more competitive globally, potentially improving the trade balance. However, it also makes imports more expensive, which can be a significant challenge for climate finance. Countries may need to import renewable energy technologies or materials for climate-resilient infrastructure, and a weaker currency could raise the costs of these imports, constraining climate action.

Trade policies and political constraints. Trade policies, including tariffs, quotas, and subsidies, can impact the balance of trade and exchange rates. For example, high tariffs on imported green technologies could slow the adoption of climate-friendly solutions in developing countries, exacerbating trade imbalances. Conversely, subsidies for exports can temporarily boost a country's trade balance but might lead to retaliatory trade measures, further complicating the economic context for climate finance. Trade agreements, particularly those involving environmental or climate clauses, can play a significant role in shaping the balance of trade and exchange rates. For instance, agreements that promote sustainable trade practices or the removal of tariffs on green technologies can enhance climate finance efforts. However, political constraints, such as domestic opposition to such agreements or geopolitical divergence, can limit their effectiveness, potentially impacting a country's trade balance and currency stability.

Capital flows and investment. Foreign direct investment can influence exchange rates and the balance of trade, particularly as countries strive to shift toward renewable energy, sustainable food production, and climate-resilient infrastructure. When foreign investors bring capital into a country for climate projects, it increases demand for the local currency, potentially strengthening it. However, sudden withdrawals of capital due to political or economic instability can lead to sharp depreciations, affecting the balance of trade and the overall economy's ability to finance climate initiatives. Speculative movements of capital, driven by expectations of exchange rate changes or political risks, can cause significant volatility in exchange rates. This volatility can undermine investor confidence, making it more difficult for countries to attract the long-term investments needed for building sustainable climate finance.

External debt, trade balance, and sovereign risk. High levels of external debt can strain a country's trade balance, particularly if debt servicing requires significant foreign currency payments. This strain can then lead to a vicious cycle where a weakened currency makes it more expensive to service debt, further deteriorating the trade balance. For countries needing to finance climate action, managing external debt becomes critical to maintaining a stable exchange rate and trade balance, ensuring sufficient resources are available for climate finance. Sovereign risk—the risk that a government might default on its financial obligations—can lead to capital flight and exchange rate instability. This instability makes it harder for countries to maintain a positive trade balance and mobilize resources for climate finance. Investors might demand higher returns for the perceived risk, increasing borrowing costs for climate projects.

The Marshall Plan: Economic Confidence, Fiscal Capacity, and Global Transformation

In the winter of 1947, it had become clear that Europe required immediate and substantial economic assistance for postwar recovery beyond what the International Bank for Reconstruction and Development (IBRD) could provide. In the European Recovery Program spearheaded by US Secretary of State George Marshall, European countries identified their own recovery and reconstruction needs and Washington worked with them to ensure these needs were met. This approach created a virtuous cycle of development for the Global North—leading to, for example, Germany's "Miracle on the Rhine" and France's "Les Trentes Glorieuses"—while transforming the IBRD's mission into promoting economic growth in developing countries. The good times lasted roughly into the early 1970s, when oil price shocks and structural shifts between the US and European economies produced widespread stagflation (high inflation and low growth) across the developed world. Eventually, overzealous petrodollar lending to the Global South, followed by a major interest rate correction in the Global North, restarted rich economies but kicked off a "lost decade of development" for many poorer ones.

Since at least the 1970s, policy experts and politicians have been calling for "Marshall Plans" for the developing world. Today, similar calls are being heard for the transformation needed in the global economy to avoid catastrophic impacts of anthropogenic climate change. But this misses a crucial lesson about the Marshall Plan. The ultimate impact on postwar recovery in Europe, economists concluded, came less from the money given ($13 billion in grants and concessional loans over four years) and more from the confidence it inspired and the fiscal capacity it generated for European governments, who used it to build substantial welfare states for their war-weary citizens (Eichengreen et al., 1992) . That confidence was further increased through global coordination on trade (the General Agreement on Tariffs and Trade, GATT) and finance (the International Monetary Fund, IMF), which were intended as bulwarks against the economic instability and retaliation that had fueled autarky and conflict in the first half of the twentieth century.

The post–World War II global economic order was flawed in many ways, including some baked-in inequalities of power between the North and South. But it was designed to ensure stability in the face of adverse economic impacts, and, for its benefactors and beneficiaries, it worked remarkably well.

Volatility

Volatility is a growing concern in the context of climate finance, as extreme weather events and the risk of stranded assets pose significant challenges to financial stability. Volatility is a way to measure price movements in values such as stocks, currency, and commodities over time. These price movements in turn affect economic decision-making, investment, and consumption in the real economy.

Extreme weather events. More frequent and severe extreme weather events, such as hurricanes, floods, and wildfires, are creating significant financial risks. These events can destroy infrastructure, disrupt economies and services, and trigger population displacement—problems that all require substantial financial resources to address. Countries facing significant disruption from climate-related events can face high volatility due to unpredictability. (Standard deviation is a measure of how much values, such as prices or returns, fluctuate around an average; a higher standard deviation means more volatility.) Examples include countries with low-lying deltas and those with significant coastlines, where extreme weather can significantly impact economic output and financial stability. It will become increasingly important for climate finance modalities to incorporate risk management strategies that account for these uncertainties, such as risk transfer mechanisms, disaster risk bonds, and contingency funds. These tools can provide financial buffers to help countries and communities recover from disasters more quickly and reduce the long-term economic impacts.

Stranded assets. As the world transitions to a low-carbon economy, there is a growing risk of stranded assets—investments in fossil fuels and other high-carbon industries that may lose value as regulations tighten and market preferences shift toward sustainable alternatives. Stranded assets represent significant financial risks, particularly for investors and economies heavily reliant on fossil fuel industries. Countries with significant stranded assets—for instance, fossil fuel infrastructure or infrastructure in inundated areas

such as major ports—may experience medium to high volatility; this volatility would reflect investor concerns about the long-term viability of fossil fuel investments. This group of countries could include densely populated deltaic states in the Global North and Global South, as well as states where reliance on fossil fuels poses a risk as global energy policies shift. Climate finance could address this risk by supporting the diversification of economies and promoting the development of green industries. Of course, this would require financing the movement of workers and communities toward more sustainable economic activities.

Financial market volatility. Climate-related risks are increasingly affecting the volatility of financial markets, as investors reassess the value of assets in the context of climate change. Countries with strong regulations to address market disruptions generally exhibit lower volatility; such states (many industrialized) often have more predictable policy environments and higher investor confidence.

Countries without regulations that are enforced can face higher volatility; these states commonly have uncertain, less stable governance and regulatory environments and are highly dependent on a few commodity exports. Transparency and disclosure of climate-related risks in climate finance send a signal to companies and financial institutions, which in turn account for these risks in their investment decisions. Increasing transparency in climate finance modalities could help stabilize markets and ensure that capital flows are aligned with the goals of climate mitigation and adaptation.

> “Volatility in climate finance is driven by extreme weather events and the risk of stranded assets, posing significant challenges to financial stability. Incorporating risk management strategies into climate investment will be needed along with support for economic diversification, and transparency in financial markets to manage volatility and align capital flows with climate resilience and stability.”

Pension Fund Stability in the Face of Climate Change

As major institutional investors, pension funds play a significant role in the global economy, driving capital markets and economic growth and influencing long-term financial stability. As large pools of capital, pension funds invest tens of trillions of dollars annually across a broad range of asset classes, including equities, bonds, real estate, and infrastructure. These investments provide essential financing for businesses, governments, and large-scale projects, such as those focused on building renewable energy infrastructure and public utilities.

Pension funds also contribute to financial market liquidity and stability, given their long-term investment horizon. They often invest in stable, income-generating assets, which helps promote economic resilience during periods of market volatility. Additionally, with the aging of the global population, pension funds are becoming increasingly important in ensuring the financial security of millions of retirees, whose consumption and savings habits influence economic activity.

The percentage of pension fund investments in fossil fuel–based activities varies significantly depending on the country, the specific pension fund, and its investment strategy. The level of investment in fossil fuels can vary widely across countries. For instance, pension funds in countries with large fossil fuel industries may have a higher exposure to oil and gas companies. Estimates suggest that 3 percent to 6 percent of global pension fund assets are typically allocated to fossil fuel–based activities, including oil, coal, natural gas, and petrochemicals (McDonnell 2024).

Pension funds may also make indirect investments in fossil fuels through broader index funds, exchange-traded funds, or bonds issued by companies with fossil fuel operations. Stemming from the economic havoc caused by the 1970s oil crisis, many pension funds are heavily diversified across sectors, which lessens their overall exposure to fossil fuel industries. Funds with a focus on environmental, social, and governance criteria or that have made divestment commitments will have little to no exposure to fossil fuels. In recent years, there has been a growing movement among pension funds to divest from fossil fuels. Some major funds, including some large university endowments, have committed to shifting investments away from fossil fuels as part of broader investment strategies (Marupanthorn et al. 2024).

> SECTION 5

Constraints and Trade-Offs When Addressing Climate Change Impacts

There are significant political and economic constraints and trade-offs involved when countries invest in climate resilience. Governments face complex decisions when financing large-scale climate change projects. The constraints are primarily fiscal—limited budgets, increasing debt, and the need to balance various social, economic, and security resource requirements. Trade-offs often involve deciding between short-term economic and security priorities and long-term sustainability and resilience goals. These decisions require careful consideration of the immediate and future needs of society, with the understanding that neglecting climate finance can lead to even greater economic, social, and security costs in the long run.

Constraints

Financing climate change projects could strain the increasing resources needed to support an aging population. Diverting funds to these projects could require significant cuts or reforms in pensions, healthcare, and social services. Alternatively, large-scale borrowing for climate finance could increase public debt and exacerbate fiscal pressure, potentially leading to higher taxes or reduced benefits for the elderly.

Many governments face the dilemma of whether to prioritize spending on their current aging population's needs or invest in climate resilience to benefit future generations. To finance both climate change adaptation and support for an aging population, governments might need to shift taxation regimes, which could have broader economic implications such as impacts on disposable income and lower consumer spending.

When governments attempt to mobilize large-scale funding (exceeding $100 billion) to address climate change impacts, they can face significant constraints and trade-offs with other critical real economy priorities. In addition to supporting an aging population, these priorities include financing technological leadership, creating jobs, meeting development goals, paying creditors, and ensuring national defense. Below are common trade-offs that governments may face when reallocating or mobilizing resources for climate change finance.

Trade-Offs

Allocating significant funds to climate adaptation and mitigation may reduce the budget available for research and development in emerging technologies such as artificial intelligence, biotech, and renewable energy innovation. This diversion could slow technological progress and reduce a country's global competitiveness. Redirecting investments

from technology development to climate resilience projects might affect sectors that could otherwise provide long-term economic growth and innovation, making policy design particularly important.

Governments may have to balance immediate investments in climate resilience (designed to yield long-term sustainability) and continued investment in technological advancements that could provide shorter-term economic returns. Investing heavily in climate-related technologies might necessitate deprioritizing other technological fields that also contribute to economic growth but are less directly related to economic stability in the face of climate change impacts.

Large-scale climate finance projects can either limit or support budgets for security priorities such as food production, ports, and critical infrastructure. This can impact a country's ability to prepare for economic challenges, especially in an unpredictable global security landscape. Prioritizing climate finance might necessitate adjusting spending on research and development and systems for security priorities. In a world of constrained resources, governments may reconsider traditional modes of enhancing security and defense and the potential multiple effects and benefits of climate resilience, with each choice carrying risks and benefits.

Governments might face challenges in balancing investments in climate resilience that could also serve stability and security purposes (for example, critical infrastructure that withstands disruption from climate impacts) against investments in maintaining and upgrading traditional critical assets.

> "Navigating the fiscal constraints and trade-offs in climate finance requires balancing immediate economic and security needs with long-term stability goals. Governments will need to effectively divide limited resources among climate resilience and other critical priorities, understanding that neglecting climate investments today could result in higher economic, social, and security costs in the future."

> SECTION 6

Modalities, Functions, and Examples of Innovative Finance for Addressing Climate Change Impacts

Exploring innovative finance modalities within the broader context of the global political economy helps us understand how they can be used to strengthen climate resilience and ensure long-term stability as climate risks increase. This section first defines innovative finance in the context of addressing shocks and climate impacts. Then, it categorizes modalities by purpose and provides specific examples that illustrate each modality's challenges and limits.

Definition and Context

In the context of development finance, innovative finance refers to initiatives that aim to raise new funds for development or optimize the use of traditional funding sources. These initiatives include common modalities such as insurance and bonds but also fiscal and monetary tools such as debt swaps and Special Drawing Rights (SDRs). In practice, it can include any financial modality used for development beyond Official Development Assistance (ODA). In this way, innovative finance is not meant to replace ODA, but rather to augment or maximize it.

Innovative finance is crucial for addressing climate change impacts due to the immense resources required. Estimates indicate that emerging markets and developing countries (excluding China) will need nearly $2.4 trillion annually by 2030 to achieve climate goals—four times the current investment level. Current adaptation costs are estimated to be 10–18 times higher than existing flows of international public adaptation finance. Global climate finance has more than tripled in the past decade, reaching $1.27 trillion in 2021-2022, which is about 1% of global GDP (Independent High-Level Expert Group on Climate Finance, 2023). However, this finance remains concentrated in developed economies and China, with a strong focus on mitigation over adaptation. Private investment is insufficient, leaving low- and middle-income countries behind in both mitigation (which relies heavily on private finance) and adaptation (which depends on public finance).

Donor countries have instructed traditional purveyors of innovative finance, such as the World Bank and other multilateral development banks (MDBs), to make climate actions and considerations a core part of their lending to those countries. However, donors have not equipped these institutions with sufficient capital increases to deliver on the banks' expanded mandates. Most current climate finance is classified as ODA, with only a few countries of the Organisation for Economic Co-operation and Development (OECD) meeting the 0.7 percent of gross national product target

(average is 0.35 percent) (UN Department of Economic and Social Affairs, 2024). In fact, ODA levels have been in relative decline for several years, while much of 2023's increase can be attributed to increased spending on Ukraine and in-country spending on refugees (OECD, 2024).

Structural forces in donor countries are also hindering the mobilization of public climate finance. Rising healthcare costs, declining real wages, and entrenched inequality reduce the willingness to allocate funds abroad, except for specific cases such as Ukraine's defense. Additionally, aging populations and low birth rates in rich countries increase the burden on pension systems, which are already underfunded due to tax policies favoring wealthy individuals and corporations. These challenges, combined with growing public debt, have eroded investor confidence and increased borrowing costs, as evidenced by the 2022 crisis in Britain when the Conservative government's tax plans triggered a severe bond market collapse (Bloomberg, 2022).

During UNFCCC Conference of the Parties negotiations, developed countries have pushed for expanding the donor base for climate finance to include some high-emitting emerging economies, namely China and the Gulf states. In the process toward a New Collective Quantified Goal on Climate Finance (NCQG), rich ("Annex II") countries insist that such emerging economies have both the capacity and, under the 2015 Paris Agreement, obligation to contribute to the "quantum" figure meant for developing countries. China and the Gulf states counter that they already supply climate finance (in the form of South-South cooperation) and that, under the 1992 Framework Convention, they are in fact developing countries ("non-Annex II") and thus not obligated (Heinrich Böll Foundation, 2024). The United Arab Emirates' (UAE) $100 million contribution to the Loss and Damage Fund at the 2023 UN Climate Change Conference (COP28) in Dubai was a notable exception, adding real value to a new and underfunded multilateral fund relying entirely on public money. Even in the unlikely event that more countries make formal pledges in support of the NCQG, the total amount will still be far short of what is needed globally.

Some developing countries have expressed skepticism toward innovative finance, not least because donors have emphasized these tools in the absence of substantial new resource transfers or reforms to global economic governance. On the other hand, some groups and countries—including the African Group, comprising Africa's UN member states, the Vulnerable Twenty (V20) group, comprising the finance ministers of states most vulnerable to climate change, and Barbados—have led or embraced specific innovative finance proposals as part of a larger package of North-South transfers and global governance reforms. While some countries in the Global North have applauded the spirit of these agendas (for example, France at its Summit for a New Global Financing Pact in June 2023), they have resisted or ignored specific commitments or changes, such as to the IMF's quota system. Meanwhile, multilateral negotiating texts such as the Pact for the Future (passed by the UN General Assembly in September 2024) and COP28's Global Stocktake are full of consensus statements affirming the importance of innovative finance and climate change. Moving from vague consensus in international forums to collective action will require understanding how different modalities operate within real economy parameters and constraints.

Modalities, Examples, and Challenges

For climate finance strategies to be effective, policymakers must understand the distinctions between different innovative finance modalities and how they interact with real economy levers and constraints, including interest rates, debt, trade, investment, demographics, and conflict. Not all innovative finance is equally impactful, accessible, or appropriate. In some cases, a counteracting structural force may render an effort ineffective or even counterproductive for a country's resilience to shocks.

Innovative finance may come in the forms of grants and loans (concessional and non-concessional), though it often involves the private sector. It may be flexible or restrictive in its conditions, and it may be anticipatory or reactive in its deployment. Additionally, because of the potential for renewable energy and different forms of food production to generate profit, innovative finance tools and investments may work more effectively for mitigation (and some types of adaptation) than for addressing climate change impacts that destroy livelihoods and infrastructure or render areas uninhabitable over time. Finally, an innovative finance proposal may look attractive on paper, but if it lacks the backing of a political coalition or does not have a direct bearing on the real economy, it is unlikely to be successful, scalable, or sustainable.

Innovative climate finance modalities can be categorized according to four purposes: mobilizing new resources, leveraging current or future resources, reducing or managing risk, and increasing fiscal space. Table 1 at the end of the section provides examples of these innovative climate finance modalities.

Mobilize new resources

As described earlier, bonds are essential for governments to mobilize large amounts of investor money for public projects, including climate-related initiatives. Sovereign green bonds finance projects linked to climate goals, while sovereign blue bonds specifically target marine and ocean-based projects aimed at, for example, promoting sustainable fisheries and coastal resilience. These types of sovereign bonds are designed to attract international investors and enable large-scale adaptation and mitigation efforts without straining current budgets. However, the market for sovereign green bonds is mostly limited to middle- and upper-income countries with the necessary financial infrastructure, and the blue bond market remains small, representing just 0.5 percent of the sustainable debt market since 2018 (Oxford-Man Institute, 2023). Additionally, governments relying on bond markets may face increased borrowing costs if climate risks are perceived as threats to economic stability, potentially leading to credit rating downgrades and reduced fiscal space for future climate investments.

Some developed and developing countries have endorsed new taxes and levies—on shipping, aviation, extreme wealth, fossil fuel production, and financial transactions—as a way to raise debt-free funds for climate needs. However, there are serious differences and disagreements regarding the application and incidence of new taxes and the earmarking and distribution of potential revenues. For instance, within the G20, some emerging economies are highly supportive of a new global wealth tax but have ruled out earmarking the funds for climate action, while other countries have ruled out the tax entirely (*Wall Street Journal*, 2024). Hence, as of October 2024, the G20 has endorsed only "progressive" taxation (G20, 2024).

Other proposals for enacting shipping and aviation levies as a sustainable source of funding have been linked to specific needs such as adaptation and loss and damage, including as a potential source of funding for the new Fund for Responding to Loss and Damage. Proponents of these "solidarity levies" argue that new and growing loss and damage needs will cut into an already small share of public climate finance, and they point to the successful example of Unitiad, which is funded in part by a levy on air travel in France, as proof of concept (Oxford Climate Policy, 2023). However, they face resistance from some developing countries on the basis of unequal incidence (being "taxed twice" for climate impacts) and from some developed countries and industry, which insist that any revenues be spent on new fuels, retrofitting, and compliance (*Financial Times*, 2023). Ultimately, new taxes or levies will likely be borne by the consumer, whether directly or indirectly, and as seen in France and Kenya (both vocal proponents of new levies), even the mention of higher taxes can spark fierce resistance from those who fear their burden (France24, 2024; *New York Times*, 2024).

> Innovative bonds and (new) tax structures offer promising avenues for mobilizing climate finance, but their success is constrained by financial infrastructure gaps, geopolitical disagreements, and the potential for economic burdens on consumers and governments alike. Overcoming these challenges will be key to unlocking large-scale investment in climate resilience.

Leverage current or future resources

Some international financial institutions and development banks offer climate-linked loans that provide lower interest rates or better terms if the funds are used for climate-related projects. Governments can leverage these loans to finance infrastructure and other critical investments. Just Energy Transition Partnerships (JET-Ps) emerged during the 2021 UN Climate Change Conference (COP26) as a plurilateral initiative from developed countries to help emerging economies transition away from coal through a mix of public and private financing from donors and international institutions. Since then, India, Indonesia, Senegal, South Africa, and Vietnam have all accepted JET-Ps from a pool including donor countries, MDBs, and national development banks.

While potentially transformative, JET-Ps carry significant risks, with a large gap between pledged funds and implementation needs. For instance, donors for South Africa's JET-P—the European Union (EU), Germany, France, the United Kingdom, and the US, acting as the International Partners Group—committed $8.5 billion in grants, concessional loans, and guarantees, but the amount was far short of the $98 billion JET-P Investment Plan presented by South Africa in November 2022. This $8.5 billion was positioned as "catalytic investment" to attract the bulk of the needed funding. The government prioritized three key sectors to transition to a net-zero, climate-resilient economy, with a primary focus on decarbonizing the electricity sector. Plans include replacing coal-fired plants with renewables and upgrading transmission infrastructure, as well as developing electric vehicles and a green hydrogen industry. However, the gap between available JET-P funds and those needed for plan implementation has raised concerns about a partial transition, leading to stranded assets, energy price volatility, and increased reliance on foreign energy sources (European Centre for Development Policy Management, 2023).

International institutions can also tap innovative financial tools to leverage their resources. The International Finance Facility for Immunisation (IFFIm) uses a financial mechanism called "frontloading" to accelerate funding for global health initiatives, particularly those led by Gavi, the Vaccine Alliance. Donor governments commit to long-term financial pledges that IFFIm uses as collateral to issue bonds, raising large sums of money up front. These funds are immediately deployed for health initiatives, and as the donor countries fulfill their commitments over time, the bondholders are repaid with interest. While effective for immediate needs, frontloading assumes that (1) future pledges are forthcoming and (2) future needs will not outstrip resources. But in reality, growing public debt in donor countries may reduce demand for these bonds, while projections show climate finance needs increasing over time.

> Leveraging existing financial resources through climate-linked loans and innovative partnerships such as Just Energy Transition Partnerships can enhance investment in climate resilience. However, a substantial gap remains between available funding and what is needed for implementation. Institutions must navigate complex financing mechanisms to meet the growing demand for climate finance while ensuring long-term sustainability.

Reduce or manage risk

Managing risk and volatility is crucial to making resilience and mitigation investments attractive and sustainable. MDBs offer Partial Risk Guarantees to make private investments more attractive by covering risks such as government nonperformance, as well as Partial Credit Guarantees to reduce capital costs by covering part of debt service in case of default. Meanwhile, regional pools such as the Caribbean Catastrophe Risk Insurance Facility provide parametric insurance to protect against extreme weather by guaranteeing payouts to governments based on specific triggers. Mexico's multiperil catastrophe bond, issued by the World Bank, offers quick liquidity after disasters. However, these bonds face criticism for their complexity, high costs, and potential for non-payouts when specific criteria are not met.

Social protection systems, including cash transfers and public works programs, are increasingly integrated into climate risk management, providing a safety net during climate-induced crises. Ethiopia's Productive Safety Net Programme combines cash transfers and public works to address food insecurity and enhance resilience. Similarly, MDBs, UN agencies, and governments fund adaptive social protection programs that can also address some climate impacts, such as income loss and injuries. Anticipatory aid is an additional strategy that involves using early warning systems to trigger preplanned responses ahead of anticipated events such as floods, droughts, or storms. The G7-V20 Global Shield Against Climate Risks, for instance, pledges budgetary support for national and local social insurance schemes, some of which are designed to provide trigger-based payouts for timely emergency preparation and response.

Developed countries have emphasized the role of risk management in reducing current and future climate change impacts. Some developing countries have noted that there is a lack of available affordable risk transfer measures and that damages often far outstrip payouts (Africa Policy Research Institute, 2024). When contract coverage collides with political considerations, risk transfer schemes can be endangered. For example, in 2016, Malawi experienced a drought that destroyed crop types not covered in the policy of the African Union's (AU) African Risk Capacity drought insurance scheme. After several months of discussion, payments were released for affected maize crops, in part to maintain the good faith of beneficiaries in the drought insurance scheme (Climate Change News, 2017). In other areas, commercial private insurers may withdraw coverage or raise premiums in response to sharply increasing risks, such as in low-lying coastal zones of highly industrialized areas or residential areas affected repeatedly by forest fires or hurricanes. In the case of more extreme weather and underinvestment in adaptation and resilience, risk transfer mechanisms will require a mix of innovative ways to diversify risk, or will need to find complementary ways to deal with spatially and temporally complex slow-onset risks such as drought and sea level rise.

> MDBs offer guarantees to support private investments, while regional insurance pools and catastrophe bonds provide rapid payouts for extreme events. Social protection and anticipatory action help vulnerable communities manage climate risks. Parametric insurance, a timely and transparent alternative to indemnity-based coverage, can be cost-effective; however, balanced trigger design and broad participation are essential to manage adverse selection, ensuring both high- and low-risk parties join to maintain affordable premiums. High costs and limited coverage remain challenging, particularly for developing countries, underscoring the need for innovative and diversified risk-transfer options as climate impacts intensify.

Increase fiscal space

Countries need fiscal space to manage budgets, invest in public goods, and spend countercyclically during a crisis or downturn. However, developed and developing countries have vastly different access to fiscal and monetary tools. For instance, in August 2021, the IMF allocated $650 billion in SDRs to combat the COVID-19 pandemic, but because the allocations were based on a country's quota, wealthier countries received the majority of this support (IMF, 2021). Proposals for reforming the international financial architecture—such as the Bridgetown Initiatives from Barbados, African leaders' Nairobi Declaration, and the V20's Accra-Marrakech agenda—have called for new SDR allocations and vehicles, and in April 2022, the IMF established the Resilience and Sustainability Trust with a $40 billion SDR capitalization. However, access to the trust has been limited due to stringent conditions, and because SDRs must be repaid, they offer limited utility for heavily indebted countries.

As climate change impacts grow, governments will need to increase borrowing for adaptation and recovery. Yet, in a survey of 144 developing countries, average debt service amounted to over 40 percent of budget revenues and spending and over 8 percent of gross domestic product (UN Conference on Trade and Development, 2024). Countries have attempted debt-for-nature and debt-for-climate swaps, where debt is forgiven in exchange for commitments to environmental conservation or climate action. While these swaps can help fund targeted projects, they often bring high transaction costs and limited debt relief, as well as lack flexibility to create fiscal space for broader climate adaptation needs. Creditor countries have initiated some debt relief and restructuring efforts, most notably the "Common Framework" offered by the "Paris Club" of wealthy lenders and the G20. However, only a few countries have sought relief under the Common Framework, which carries strict conditionalities and policy reforms. The large sovereign debt held by China additionally complicates relief efforts due to opaque terms and geopolitical tensions with the US (Council on Foreign Relations, 2023).

Another approach is to improve the terms of future debt. Introduced by the World Bank in 2023, Climate Resilient Debt Clauses or "pause clauses" allow countries to defer payments on IBRD loans and International Development Association credits for up to two years during specific natural disasters. Pause clauses are scalable, simple, and have been adopted by other MDBs, representing a structural change in global finance with increasing long-term savings. However, pause clauses are not a complete solution. They apply only to extreme events such as cyclones and earthquakes and do not address slow-onset issues such as sea-level rise. As of February 2024, they are available only to forty-five small-island and other small states, with some reluctance from banks to extend them to larger or lower-middle-income countries. Additionally, heavily indebted countries cannot access these clauses unless they are current on their World Bank loan payments at the time of the deferral request.

> "Increasing fiscal space is crucial for countries to effectively manage climate adaptation and recovery investments. However, disparities in access to financial tools complicate this process, particularly for developing countries with high debt service. Innovative solutions such as Climate Resilient Debt Clauses offer some relief by allowing temporary deferrals on debt payments during disasters, yet they do not address the broader challenges posed by slow-onset climate issues. Structural reforms and equitable access to resources are essential to empower all nations in their climate resilience efforts."

Table 1. Taxonomy for Innovative Climate Finance

Purpose	Modality	Examples	Challenges and limitations
Mobilize new resources	Sovereign green and blue bonds	World Bank (2008); US (2013); Seychelles (2019); Belize (2021); Barbados (2023)	Debt-based; tied to single projects; tough to scale; interest rates may reduce demand
	Dedicated taxes and levies	French air travel levy for Unitaid (2006); current proposals for taxes on shipping, aviation, wealth, etc.	Consumer and industry resistance; distribution and impact; keeping the revenues for climate
	Expanded donor base	UAE contribution to Loss and Damage Fund (2023); South-South cooperation	Resistance from emerging markets; unlikely to be concessional on a large scale
Leverage current or future resources	Blended finance/ public-private partnerships	Just Energy Transition Partnerships (South Africa, 2021; Indonesia, Vietnam, 2022)	Resistance from emerging markets; unlikely to be concessional on large scale
	Frontloading	International Finance Facility for Immunisation (2005)	Relies on future donor commitments and decreasing needs; interest rates may reduce demand
	SDRs	African Development Bank-Inter American Development Bank proposal for boosting adaptation funding (2023)	Resistance from some major IMF shareholders; may violate EU law
Reduce or manage risk	Regional risk pools	Caribbean Catastrophe Risk Insurance Facility (2007); The African Risk Capacity (ARC) Group (2014)	Less relevant for slow-onset impacts; requires stable macroeconomy; relatively small payout
	Adaptive social protection	Ethiopia's Productive Safety Net Programme (2005)	Limited funding; places burden on recipient
	Catastrophe and resilience bonds	Mexico (2006); Philippines (2019); Jamaica (2021)	High up-front costs; strict conditions and relatively small payout; uncertain demand
Increase fiscal space	Climate Resilient Debt Clauses ("Pause clauses")	International Capital Markets Association proposal (2022); World Bank adoption (2023); UK and France (2023)	Relevant mostly for small-island states; not applicable for slow-onset impacts
	Debt-for-nature swaps	Seychelles (2016); Belize (2021); Ecuador (2023)	High transaction costs; low impact on overall debt, fiscal space
	SDRs	IMF's Resilience and Sustainability Trust (2022)	Limited eligibility; small payout; need to pay back

> SECTION 7

Relevance, Progress, and Opportunities for Innovative Finance at the Regional and Global Levels

Innovative finance must connect public resources with real economy drivers to be sustainable, stabilizing, and at scale. This section provides some current examples and opportunities for how countries and international organizations can use innovative finance to pull levers in the real economy and imagine coordinated approaches across modalities and institutions.

Mobilize Resources Through Global Tax Coordination

For large emitters to rapidly transition away from fossil fuels, governments must employ both incentives (such as subsidies and regulations) and disincentives (such as carbon taxes and other penalties). A study evaluating over 1,500 climate policies from forty-one countries found that only sixty-three policies were successful in reducing greenhouse gas emissions. The research highlighted that subsidies and regulations, often preferred by governments, were generally ineffective unless combined with price-based measures aimed at shifting behavior in consumers and businesses. Environmental economist, Nicolas Koch, a co-author of the study explained, "The commonality in those successful cases is where we see subsidies and regulations being combined with price-based policy instruments" (Niiler, 2024). In short, countries using industrial policies such as subsidies to effect economy-wide transitions will not succeed without taxes that help generate resources as well as disincentivize high-carbon activities.

Progress toward a UN tax convention presents an opportunity to establish multilateral rules that could unlock billions in public funds for climate action, whether directly through carbon taxes or indirectly through general revenues. Currently, 35 percent of multinational foreign profits are shifted to tax havens, causing a $240 to $600 billion annual revenue loss for countries where these profits are actually earned (Stiglitz, 2024). In December 2023, the UN General Assembly passed a resolution to develop a legally binding Framework Convention on International Tax Cooperation. Despite opposition from forty-eight (mostly OECD) countries, the process is advancing; negotiations began in February 2024 and a draft terms of reference was released in August (UN DESA, 2024). The convention is vital for mobilizing public finance and represents a significant shift in multilateralism. Unlike the OECD's limited "Two-Pillar Solution," the UN framework promises a more robust system where developing countries have equal participation. Designed properly, such a system could enhance state capacity, create fiscal space, and improve credit

ratings, providing countries with greater access to capital and bond markets and leverage in sovereign debt negotiations.

Expand Multilateral Development Bank Lending with Special Drawing Rights

International finance reform agendas such as the Bridgetown initiatives, the Nairobi Declaration on Climate Change and Call to Action, and the Accra-Marrakech Agenda have much in common. First, each agenda promotes a wide range of innovative finance proposals on debt, fiscal space, risk, and investment, designed to promote sustainable development and financial stability. Second, each calls for deeper global governance reforms, including changes to representation, voting, and the link between quotas and SDRs. Third, each requires the World Bank and other MDBs to massively scale up their lending, particularly for adaptation.

The World Bank has implemented some measures in the G20's Capital Adequacy Framework, freeing up $50 billion more in lending capacity over the next ten years, but has resisted calling on its callable capital, citing risks to its credit rating (World Bank, 2024). Other MDBs have mobilized to draw on another latent source of liquidity, SDRs. The African Development Bank (AfDB), in partnership with the Inter-American Development Bank (IDB), has developed a proposal to expand adaptation lending by transforming SDRs into hybrid capital. This approach will allow these SDRs to maintain their status as reserve assets while being leveraged up to four times for lending (Inter-American Development Bank, 2023).

At COP28, the AfDB-IDB proposal received backing from some developed countries, including France, Japan, and United Kingdom, and in May 2024, the IMF removed a significant legal hurdle by approving the use of SDRs as hybrid capital. Efforts are underway to operationalize the proposal by 2025, with the goal of channeling at least $5 billion in SDRs through the AfDB and IDB (IMF, 2024). The success of this initiative will depend on further support and commitments from countries, which were not forthcoming at the IMF and World Bank annual meetings in October 2024.

> "Coordinating taxation could address profit shifting to tax havens, which could unlock billions in public funds for climate action. A global framework with robust multilateral rules could be a boon for creating fiscal space, enhancing state capacity, and improving credit ratings. Such measures could enable greater access to capital markets and better terms in sovereign debt negotiations. Leveraging SDRs by transforming them into hybrid capital would expand MDB lending, including for adaptation. This innovative approach, endorsed at COP28 and supported by recent IMF decisions, has the potential to mobilize at least $5 billion for climate adaptation, contingent on further international backing.
>
> Developing countries struggle to attract green investment in part due to high macro-risk premiums. A new FX hedging platform developed by Brazil and the IDB, discussed below, supported by $1 billion in credit, offers a model for reducing investor risks with currency hedges and making green investments more attractive by stabilizing returns in foreign currencies."

Reduce Investor Risk with Currency Hedges

Private capital is financing the green transition in some countries, but it remains limited in many developing nations due to high borrowing costs. Perceived risks—such as political instability, weak legal systems, and currency volatility—raise interest rates, while low credit ratings and significant

currency risks further deter investment. Limited fiscal space, driven by high debt levels, restricts governments' ability to finance new projects, and fears of capital flight increase costs even more. These factors together make it difficult for developing countries to attract private capital for climate and development projects, with currency hedging costs becoming prohibitively high and leaving essential capital blocked.

Bridgetown initiatives proposed an ambitious plan for the IMF and MDBs to reduce excessive macro-risk premiums on developing countries, advocating for $100 billion per year in foreign exchange guarantees to support investments in a just green transition. Building on this vision, Brazil and the IDB developed an FX hedging platform specifically for climate resilience investments, backed by a $1 billion IDB credit line (IDB, 2023). This platform allows projects funded in Brazilian currency to offer returns in US dollars or other foreign currencies without incurring high currency hedging costs. By reducing currency risk, the platform provides foreign investors with a more stable and predictable return, increasing Brazil's appeal in the global capital market.

The FX hedging platform strategically distributes risks among the government, the IDB, and project developers. Project developers handle implementation and inflation risks, while the Brazilian government covers abnormal macroeconomic and exchange rate risks, which it can manage more effectively. The IDB supports this setup with its AAA-rated credit line, making exchange rate insurance more affordable and stable. This structure promises to reduce borrowing costs for project developers while providing foreign investors with needed security. By addressing currency-related costs, such initiatives can make climate resilience projects more financially accessible and set precedent for other regions seeking to attract sustainable development capital.

Reduce Country Risk with Credit Ratings Agency Reform

Credit rating agencies (CRAs) play a pivotal role in global finance, assessing a country's creditworthiness based on factors including economic stability, debt levels, and political risks. These ratings influence the interest rates countries face when issuing bonds and impact their ability to attract foreign investment. However, the practices of the "Big 3" CRAs—Fitch Ratings, Moody's, and S&P Global—have attracted criticism from developing country leaders regarding potential bias and the overpricing of risk in CRA assessments.

In a recent paper, Daniel Cash and Maha Khan of United Nations University critiques CRAs and emphasizes the need for reform: First, CRA methodologies are not transparent and their publication by firms is voluntary. Second, stronger regulatory frameworks instituted in the US and EU after the 2008–2010 global financial crisis have encouraged the overpricing of risk in areas with weaker regulatory frameworks, especially in some countries in Africa. Even if firms want to consider a country's climate and development efforts, the short time horizon for ratings (typically one to two years) make it difficult for them to meaningfully incorporate. The CRA business model has also been criticized for conflicts of interest stemming from the "issuer pay" model, where the entity being rated funds the rating (Cash and Khan, 2024).

In 2020, the UN Conference on Trade and Development recommended establishing an international public CRA to deliver impartial ratings on countries' creditworthiness. A public CRA could serve as a benchmark against existing ratings from the major agencies and offer credit ratings for small- and medium-size enterprises (SMEs), which represent about 90 percent of all businesses and account for 50 percent of employment worldwide (Cash and Khan, 2024).

Also in 2020, African leaders proposed creating a public CRA, which led to the AU appointing the African Peer Review Mechanism to develop an African Credit Rating Agency (AfCRA). Interest in the agency has grown, with support from the AfDB to facilitate its establishment. The agency aims to be independent and funded by shareholders from both domestic and international stakeholders. It is expected to launch in early 2025 and could significantly enhance access to capital for African countries, while also focusing on SME ratings and fostering regional cooperation.

Increase Fiscal Space with High-Quality Debt

Using public funds to buy down or back developing countries' sovereign debt is fraught with challenges. As mentioned, opaque terms and geopolitics currently stand in the way of comprehensive restructuring or forgiveness, while the sheer size of their debt means little new fiscal space is created. Most important, buying down debt does not fix the systemic problem of low-quality, high interest rate–bearing private debt, which will continue to plague governments' balance sheets as long as alternatives are not available.

At COP28, Barbados, Colombia, and Kenya launched the global Expert Review on Debt, Nature and Climate. The review focuses on developing debt solutions that integrate climate and nature considerations, including debt-for-nature swaps, nature-linked bonds, pause clauses, and new metrics for valuing debt sustainability. For instance, the review recommends incorporating the value of a country's natural capital—its ecosystems, biodiversity, and other environmental assets—into debt sustainability assessments. This approach helps ensure that debt assessments reflect the true value of a country's natural resources and avoids penalizing countries for investing in environmental preservation.

Despite their limitations, pause clauses are a good example of a scalable and spreadable best practice for high-quality climate finance. At COP28, the World Bank announced a significant expansion of its pause clauses to cover all existing loans in eligible countries (as opposed to new loans alone), the inclusion of a pause on interest payments (in addition to principal payments), and permission for CRDC fees to be covered by concessional resources. Following this announcement, France, the United Kingdom, the IDB, the European Investment Bank, the European Bank for Reconstruction and Development, and the AfDB all pledged to include pause clauses in their lending (COP28 Presidency, 2023). The next step is to spread these instruments to capital markets, which countries will continue to rely on for long-term finance. Though the International Capital Markets Association developed the pause clause template, its spread among private lenders and investors is still limited.

Stabilize Food Prices Through Buffer Stocks

Many of the most climate vulnerable countries are also food insecure. Climate change is projected to reduce crop productivity by up to 30 percent in some African countries by 2050, while climate-induced disruptions may lead to job losses, reduced income, and increased poverty, particularly among smallholder farmers and rural communities (Global Center on Adaptation, 2023). During crises, these countries must purchase food at high prices on international markets to supplement local supplies. On the other hand, large producing countries can tap their own reserves during climate and other shocks to stem the rise of domestic prices, while their farmers benefit from high export prices.

The idea of a global system of food reserves—agreed on at the 1974 World Food Conference but never implemented—has been revived by economist Isabella Weber and others. Their proposed multilayered buffer stock system aims to stabilize

international prices and markets for key commodities such as rice, maize, and wheat, while allowing countries to maintain sovereignty in their food systems (Weber et al, 2024). Managed by the UN Food and Agriculture Organization or a new UN body, this system would involve strategic buffer stocks, supported by an intelligence unit to monitor markets and a commercial arm for market operations. Virtual stocks would be used to curb speculation, and the system would be financed through a mix of member state funding, IMF support, and central bank cooperation, with the potential to issue currency against the physical assets held. As Weber notes, buffer stock thinking is back in discussion in the US, which maintains a large strategic petroleum reserve, and in the EU, where economist Mario Draghi has called for a critical minerals buffer stock (ibid). Such efforts are crucial not only for reducing the immediate impacts of climate change on food prices but also for building resilient food systems that can withstand future shocks.

“CRAs assess a country’s creditworthiness, impacting borrowing costs and foreign investment. However, they face criticism for lack of transparency and perceived bias, especially in regions that have weaker regulatory frameworks, such as Africa. Proposed reforms include establishing public agencies like the African Credit Rating Agency (AfCRA) to provide relevant ratings and improve access to capital for SMEs.

Traditional debt relief often does not tackle systemic issues related to low-quality, high-interest debt. Expanding the use of pause clauses in debt agreements is a promising practice that should be more widely integrated into capital markets.

A global buffer stock system for key commodities could stabilize international food prices and enhance food security in climate-vulnerable countries. This multilayered approach, inspired by the strategic reserves of the US and EU, could mitigate speculation, protect smallholder farmers, and ensure stable food supplies during crises.”

> SECTION 8

Conclusions and Recommendations

In the face of accelerating climate impacts, the strategic design of financial modalities is as critical as the scale of investment itself. Effective climate finance hinges not just on the *how much*, but also on the *how*—how finance is structured to drive real economic growth, stabilize economies, and navigate political and economic constraints. Viewing innovative finance through a political economy lens—taking into account the economic, social, and political contexts of both developed and developing countries—can help clarify the options and trade-offs governments, businesses, and individuals should consider when aligning financial flows with climate resilience goals. In doing so, the following conclusions should be kept in mind.

The structure of finance is as critical as the amount invested because it shapes the flow, effectiveness, and impact of climate investments in the real economy. Prioritizing both increased funding and well-designed finance models is more likely to result in lasting economic stability and climate resilience. In Sub-Saharan Africa, many adaptation projects struggled because their funding was not integrated into national budgets or regional strategies, making them unsustainable after external support ended. In the Pacific, several projects funded by the Green Climate Fund struggled to achieve lasting impact because they were isolated and not integrated into broader economic systems. Without strategic financial planning, even substantial climate finance risks underperforming.

Effective climate finance strategies must account for real economy drivers such as interest rates, debt, trade, and investment alongside the risks posed by climate change, including volatility and stranded assets. Policymakers face the challenge of balancing these drivers to maximize impact, especially given the real economy's demands, from aging populations to technological change and shifting trade balances. Countries aiming to transition to low-carbon economies while shielding aging populations from inflation can capitalize on new investment opportunities, such as renewable energy, to fuel growth sectors such as artificial intelligence. Pension funds must also adjust quickly to avoid losses to their portfolios while transitioning away from high-carbon industries where they may still be invested.

Innovative finance mechanisms can be ineffective or even harmful if not part of a broader reform and investment strategy. For instance, South Africa's initial effort to shift from coal to renewable energy struggled because it lacked funding for worker retraining and community support. Now, JET-Ps combine climate finance with concessional loans and social support to enable a larger-scale transition. However, without sufficient financing, JET-P countries risk replacing coal with imported fossil fuels, leaving them with neither sustainable energy nor energy independence. Countries relying on subsidies for low-carbon transitions will also need taxes to generate funds and discourage high-carbon activities. The success of innovative finance mechanisms—such as bonds or climate taxes—depends on factors like financial infrastructure, geopolitics, and impacts on consumers and governments.

Large-scale innovative climate finance is possible when coordinated with regional and global efforts to address real economy challenges. Regional development banks and other forums for economic cooperation can be more responsive to shareholder concerns and freer to experiment with new approaches, such as the IDB's currency hedging project in Brazil, the AfDB's support for an African CRA, and their joint proposal for SDR-backed lending for adaptation. However, global solutions are also needed. A UN Framework Convention on International Tax Cooperation could establish new rules that reduce tax avoidance and strengthen public finances in developed and developing countries alike, while buffer stocks for food could enhance social and economic stability in vulnerable countries and regions. These instruments could mobilize resources, provide fiscal space, reduce risk, and stabilize markets, making them key components of a resilient global financial framework.

Climate finance requires well-structured, adaptive financial systems. Finance systems that connect public resources with real economy drivers while adapting to political, technological, and demographic shifts may have a better chance of addressing climate change challenges effectively. Governments need to leverage investments, strategic borrowing, tax reforms, and international cooperation to build resilient frameworks that support sustainable development and global climate action.

A strategic approach to stabilizing the global economy, transitioning to low-emission energy systems, and financing climate impacts may involve five key strategies:

1. Mobilizing new resources to attract investment in climate-related initiatives.
2. Leveraging current and future resources such as climate-linked loans and innovative financial tools to enhance public and private financing.
3. Reducing or managing risk through guarantees and insurance to make investments more attractive.
4. Increasing fiscal space for governments to invest in public goods and adapt to climate challenges, with mechanisms that can reach scale (likely more than $100 billion).

Additionally, diversifying revenue streams and integrating climate risk into fiscal planning could help build a resilient economy that addresses ongoing climate impacts while promoting sustainable growth. Together, these strategies offer a way to make finance flows consistent with a pathway toward low greenhouse gas emissions.
As the political landscape evolves and traditional sources of climate finance become increasingly strained, the question of how to structure climate finance to effectively engage real economy dynamics is just as critical as the question of how much finance is made available. Both are essential for translating global commitments into actual climate mitigation and adaptation efforts that contribute to economic stability.

> "To effectively finance climate change initiatives, governments should enhance international cooperation, diversify revenue streams, and integrate climate risk into fiscal planning. Supporting workers moving away from fossil fuel industries can help ease the transition (for example, through a Just Transition Fund), while innovative taxation and pension fund investments in renewable energy can create sustainable revenue sources. Reforms to credit rating agencies, including the establishment of a public CRA, can enhance transparency and improve financing options for governments and small businesses. By developing financial protection mechanisms, governments can manage stranded asset risks and foster private sector engagement in the green economy. These frameworks will not only help manage climate shocks but also promote well-being and long-term economic stability."

> SECTION 9

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