TASK FORCE ON CLIMATE, DEVELOPMENT AND
THE INTERNATIONAL FINANCIAL ARCHITECTURE

APRIL 2026

# Climate Change and External Fragility

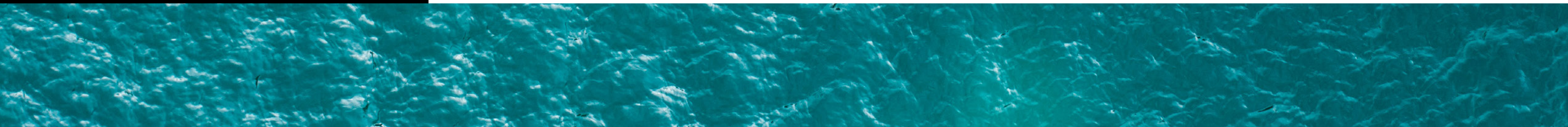
## LIFELINE FUND AS A FINANCIAL ARRANGEMENT FOR V20 COUNTRIES

DANIEL TITELMAN AND MARINA ZUCKER-MARQUES[1]

## EXECUTIVE SUMMARY

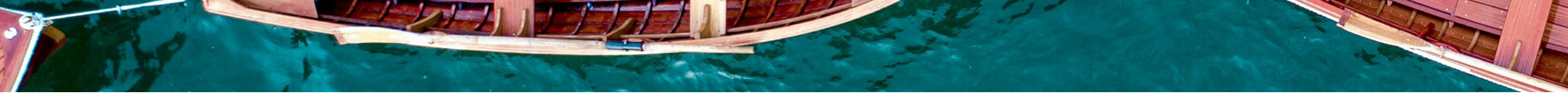
**Climate shocks are an increasing source of balance of payment imbalances and macroeconomic instability.** The balance of payments becomes a critical transmission channel through which climate shocks constrain adjustment, delay recovery and weaken resilience. This is especially true in countries that are highly open but have a narrow export base, limited reserve buffers and already constrained access to affordable market finance.

**For the V20 climate-vulnerable economies, a destabilizing consequence of climate shocks emerges through the external sector.** Local projection estimates indicate a statistically significant deterioration in the trade balance. A 10 percent increase in the cost of damage due to a climate shock is on average associated with roughly a 1 percent worsening of the trade balance. Impulse responses analysis for V20 countries suggests that the negative impact of climate shocks persists over several years, implying medium-



---

[1] We thank Dr., The Most Honourable Kevin Greenidge, F.B. and Nkenge Lawrence of the Central Bank of Barbados, Sara Jane Ahmed, Jwala Rambarran and Geneva Oliverie from the CVF-V20 Secretariat, and Task Force members John Asafu-Adjaye, Rishikesh Ram Bhandary, Amar Bhattacharya, Kevin Gallagher, Xiaobei He, Abbi Kedir, Fahmida Khatun, Iyabo Masha, Rakesh Mohan, Irene Monasterolo and Janak Raj. We also thank V20 central banks and members for their comments and insights; Rosa He, Kundan Kumar and Vincent Kambou for superb research assistance; and Brigid Smith and Emanne Khan for communications support. Any remaining errors are the authors' own.



***Daniel Titelman** is a Non-Resident Senior Fellow with the Global Economic Governance Initiative at the Boston University Global Development Policy Center and a member of the Task Force on Climate, Development and the International Financial Architecture, a consortium of experts working to advance a development-centered approach to climate change across the international financial architecture. He previously served as the Director of the Economic Development Division at the United Nations Economic Commission for Latin America and the Caribbean (ECLAC). Prior to that role, he was the Coordinator of the Special Studies Unit of the Executive Secretary at ECLAC, and expert on monetary and financial policies. He has a long and substantive experience in macroeconomic and financial issues and has published numerous papers on these subjects.*

term balance-of-payments deficits rather than only short-lived liquidity disruptions. Hence, liquidity support should be understood as a central component of climate resilience, not as a secondary financial add-on.

**V20 countries, as well as the broader Global Financial Safety Net, are not adequately equipped to meet the rising short-term financing needs generated by climate shocks**. V20 economies remain highly vulnerable because they combine narrow export bases, limited reserve buffers, shallow financial markets and restricted access to affordable external finance. The Global Financial Safety Net is not designed to deliver timely responses to climate shocks. Existing instruments are often too slow, too rigid or insufficiently tailored, leaving vulnerable countries to rely on reserve depletion or procyclical adjustment when rapid liquidity support is most needed.

**The Lifeline Fund could constitute an important innovative addition to the V20 architecture.** Its role would be to provide rapid and targeted liquidity support to countries facing short-term balance-of-payments pressures after climate shocks. By helping finance urgent external needs, it could ease adjustment, preserve critical imports and support macroeconomic stabilization during recovery. Its main value would lie in the speed, predictability and shock-specific design of the support provided.

**Lifeline should also be understood as complementary to other V20 and multilateral climate finance initiatives**, including the V20 Sustainable Insurance Facility, the 100 Banks Initiative, the G7-V20 Global Shield against Climate Risks, the V20 Loss and Damage Program, the Fund for Responding to Loss and Damage and the Green Climate Fund.

**The empirical analysis highlights substantial heterogeneity across V20 members**. Countries differ markedly in economic size, trade openness, reserve adequacy, access to external finance and overall shock-absorption capacity. As a result, climate shocks do not produce a uniform balance-of-payments response across the membership. In more open and externally constrained economies, even relatively short-lived disruptions can quickly translate into sizable financing pressures, while in others the adjustment may be more gradual or partially absorbed through existing buffers.

**This heterogeneity is captured in a three-tier classification of countries**. Tier 1 includes a very small number of countries with large trade deficits and therefore potentially large financing requirements in the event of a shock. Tier 2 groups countries with intermediate deficits and Tier 3 comprises countries with smaller deficits, reflecting lower absolute financing needs. Tiers 2 and 3 together account for nearly 75 percent of V20 membership, which means that the bulk of the group consists not of the largest deficit countries, but of economies with moderate or small external gaps.

**The estimated external effects of climate shocks are significant but uneven across groups**. Local projection results indicate that climate damage leads to a deterioration in the trade balance, but the timing and magnitude of deterioration vary across countries depending on their production structure, export concentration, import dependence and available policy buffers. Some countries experience a rapid worsening of their external position, while others face more delayed but persistent pressures.

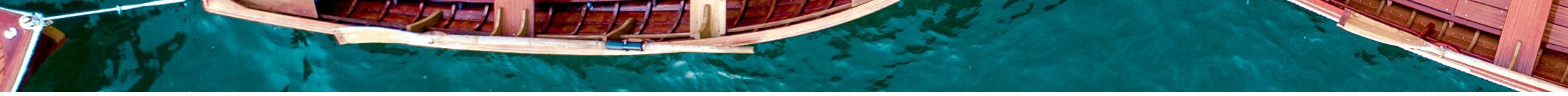
**These results suggest that climate shocks should be understood as heterogeneous external financing shocks rather than only output shocks.** In some V20 countries, the main transmission channel operates through export losses associated with damaged productive capacity, tourism disruptions or infrastructure bottlenecks. In others, the dominant effect comes from higher import requirements for food, fuel, relief supplies and reconstruction materials. This distinction matters because it implies that financing needs differ not only in scale, but also in composition and timing. A common instrument must therefore be designed to accommodate different external adjustment paths rather than assuming a single post-shock profile across countries.

**Weak synchronization of shocks strengthens the case for pooling.** The evidence points to limited cross-country correlation both in the incidence of climate shocks and in the scale of their economic damage. This means that although V20 members are collectively highly vulnerable to climate events, they are unlikely to all require support at the same moment and in the same magnitude. This feature is central to the feasibility of a pooled mechanism: the economic logic of Lifeline depends precisely on the fact that risks are significant but not perfectly synchronized across members.

**The estimated size of Lifeline appears meaningful yet manageable.** Scenario analysis suggests that a facility in the range of US$436.1 million to US$983.5 million could provide substantial coverage under plausible assumptions about post-shock financing gaps and differentiated access rules. This represents from 0.1 percent to 0.2 percent of the groups' total international reserves in 2024. This range is significant enough to offer meaningful support to countries facing temporary external stress, but is still modest relative to the aggregate size of the V20. In practical terms, this implies that a pooled balance-of-payments backstop could be designed at a scale that is operationally realistic while still delivering broad coverage, particularly for countries in Tiers 2 and 3, which constitute most of the membership.

**Lifeline is a tool to strengthen south-south cooperation and will allow solidarity mechanisms within V20 countries**, where countries with higher response capacity can support countries with lower capacity to respond to climate-shocks. This south-south cooperation could be further supported by a "coalition of the willing" in global-north economies and groups such as Group of 7 (G7), the Group of 20 (G20), Brazil, India and China. The specific capital structure and contribution for specific members should consider south-south and north-south cooperation.

***Marina Zucker-Marques** is a Senior Academic Researcher at the Global Economic Governance Initiative and Team Lead for the Financial Stability workstream at the Boston University Global Development Policy Center. She holds a PhD from Freie Universität Berlin and worked as a Post-doctoral Researcher at SOAS, University of London. Previously, she has worked at UNCTAD's Debt and Development Finance Branch and specializes in sovereign debt, the Global Financial Safety Net, international finance and currency internationalization.*

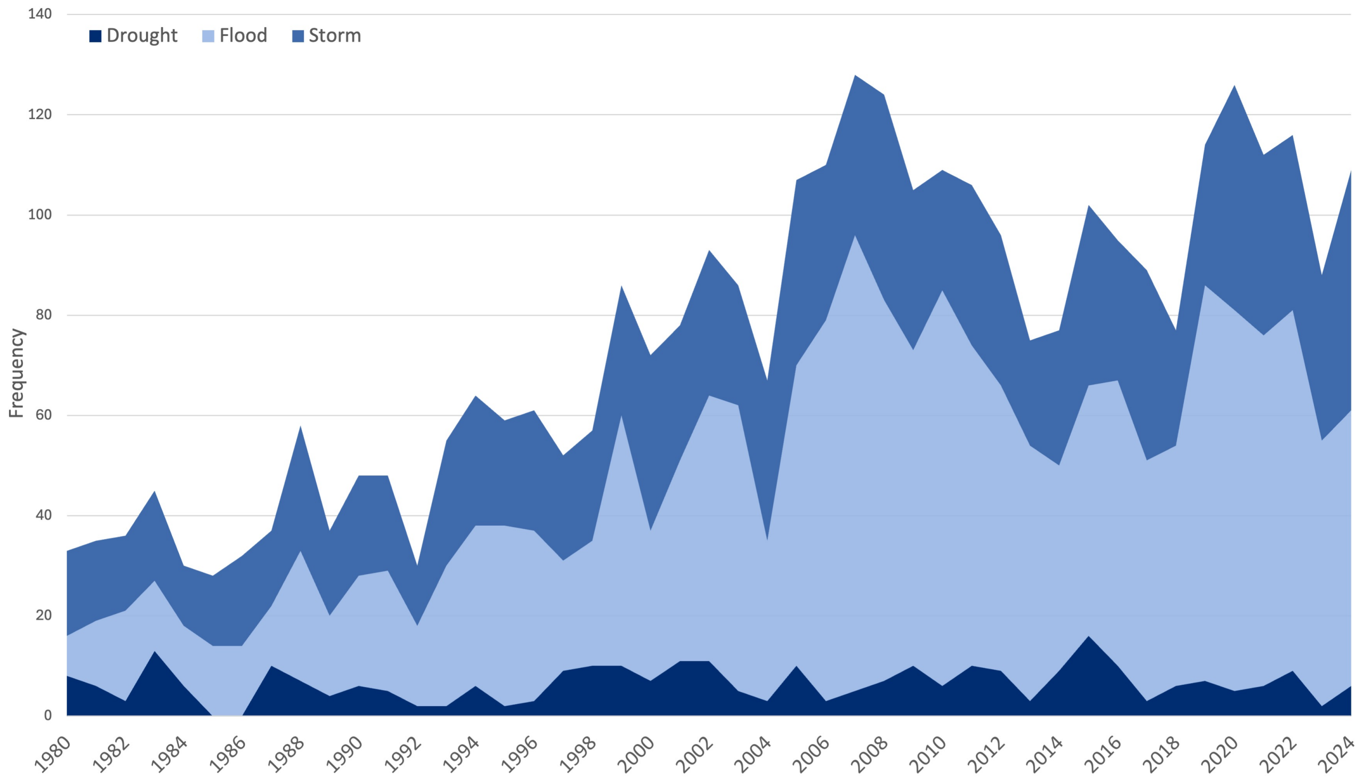


## CLIMATE SHOCKS GENERATE RECURRENT MACROECONOMIC INSTABILITY

Climate shocks are becoming more frequent and more intense. According to the Intergovernmental Panel on Climate Change, human-induced climate change has already increased the frequency and severity of extreme weather events, including heatwaves, heavy precipitation, droughts and tropical cyclones (IPCC 2021). And even small increases in global temperatures significantly raise the likelihood of extreme events. As climate shocks become a recurrent phenomenon – rather than an exceptional event – they reshape the macro-financial risk landscape faced by members of the Climate Vulnerable Forum – Vulnerable Twenty Group of Finance Ministers (CVF-V20).

The economic consequences of climate shocks are often framed in terms of physical destruction, fiscal costs and long-term developmental setbacks. For V20 countries, climate change is estimated to already have resulted in a cumulative wealth loss of approximately 20 percent over the past two decades (CVF-V20 2022). Yet, for many climate-vulnerable economies, one of the most immediate and destabilizing consequences emerges through the external sector. As climate-related physical shocks have become more frequent (Figure 1) and more intense, they have generated a pattern of reoccurring balance-of-payments stress that existing international financial arrangements are ill-equipped to address (IMF

**FIGURE 1** Frequency of Climate-Related Natural Disasters (Drought, Flood, Storm), V20 Countries, 1980-2024



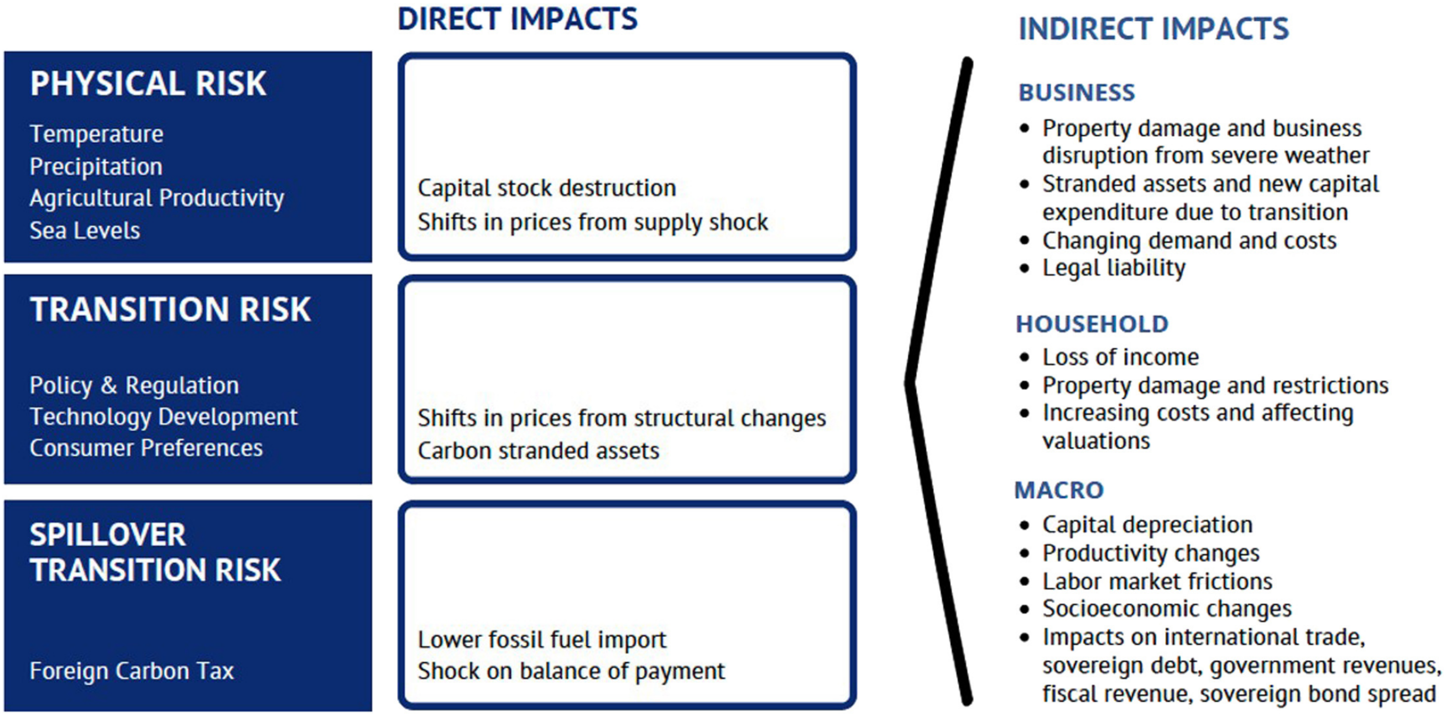
**Source:** EM-DAT (2026).

Committee on Balance of Payments 2021; NGFS 2024) (IPCC 2023). While the Global Financial Safety Net has historically evolved to respond to financial crises, sudden stops and conventional external shocks, it has not been redesigned for a world in which climate events have become a structural source of external instability.

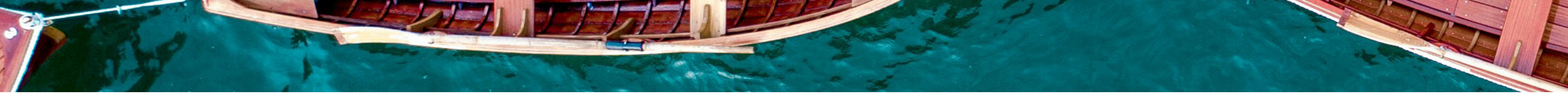
The uneven access to the GFSN is particularly concerning for V20 economies because climate shocks do not just impact domestic output. They also disrupt the balance between foreign exchange inflows and outflows precisely at a time when countries require rapid access to external resources. Climate vulnerability thus increasingly translates into external vulnerability. The balance of payments becomes a critical transmission channel through which climate shocks constrain adjustment, delay recovery and weaken resilience (Mitra et al. 2025). This is especially true in countries that are highly open but have a narrow export base, limited reserve buffers and already constrained access to affordable market finance. Figure 2 shows that climate shocks have transmission mechanisms that include physical risks, transition risks and spillovers risks. For Lifeline purposes, what matters is the balance of payments and macroeconomic impacts.

The external effects of climate shocks operate through several mutually reinforcing macroeconomic mechanisms. Balance-of-payments disequilibria put pressure on monetary and fiscal policy, often inducing unwanted investment and growth adjustments to absorb widening external financing gaps. Climate shocks can also heighten uncertainty, increase perceived sovereign risk and reduce confidence among external investors and creditors (Ranger et al. 2022). Risk-sensitive private flows may slow, refinancing costs may rise and foreign direct

**FIGURE 2** Macro-Critical Aspects of Climate Risks



**Source:** Task Force on Climate, Development and the IMF (2023).



investment may be delayed or repriced (Ranger et al. 2022). Thus, even when the initial disturbance is physical rather than financial, its macroeconomic consequences can quickly migrate into the sphere of external financing and domestic adjustment. For countries with shallow domestic capital markets or limited policy credibility, interaction can be particularly damaging. It narrows financing options just as reconstruction needs intensify, making a temporary climate shock more likely to evolve into a permanent macroeconomic disruption.

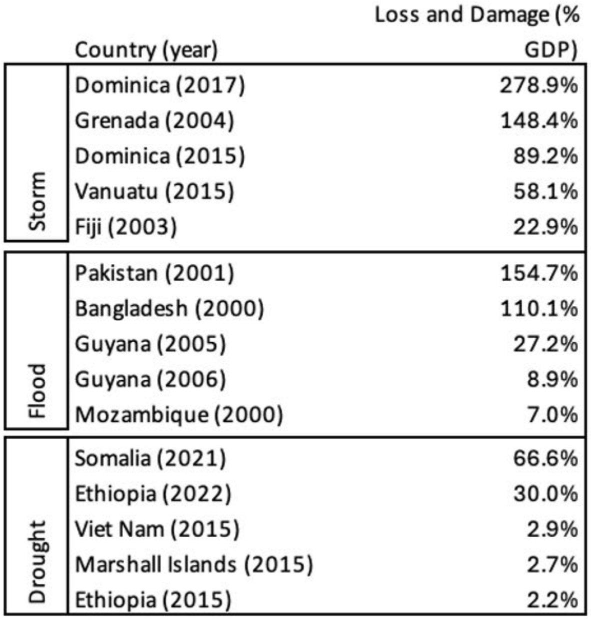
The concern, therefore, is not limited to the need to address losses and damages induced by climate shocks. Rather, the key challenge we highlight here is how climate shocks can undermine the external sector positions necessary for recovery and future growth.

The empirical significance of this problem is evident in the scale of losses observed across climate-vulnerable countries. Within the V20 countries, historical data shows that climate-related damages reached extraordinarily high shares of GDP for some countries (Figure 3a), even though the V20-wide average is lower in aggregate terms. Figure 3b shows that over the period 2000–2024, the weighted average impact of climate shocks across V20 countries peaked at 0.62 percent and averaged 0.22 percent, even though some countries went above 100 percent of GDP.

As usually occurs, aggregate averages obscure the highly uneven distribution of climate risk and the fact that some countries face episodic shocks large enough to overwhelm domestic absorptive capacity. Moreover, the macroeconomic problem is not solely one of solvency. Even where long-run debt sustainability is not immediately at risk, climate shocks can

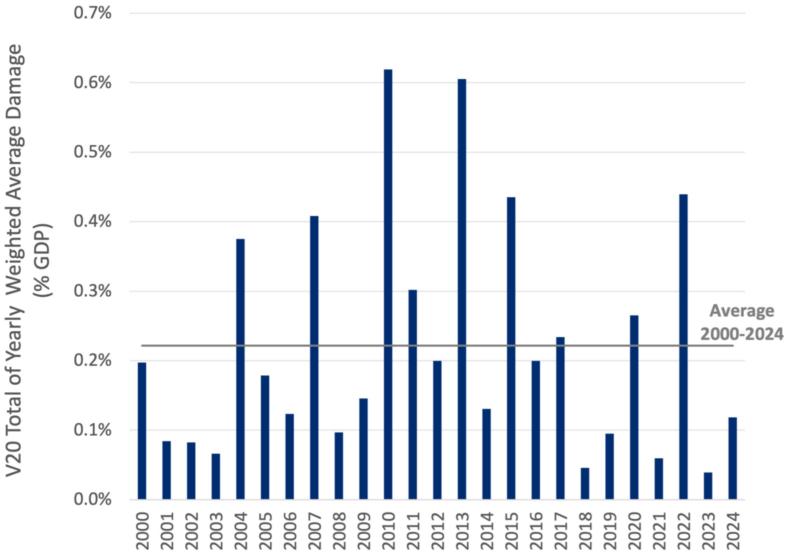
**FIGURE 3** V20 Loss and Damage by Climate Shocks

3a: Largest Loss and Damage by Climate-Shock Type (% GDP Annual), 2000-2024



|  | Country (year) | Loss and Damage (% GDP) |
|---|---|---|
| Storm | Dominica (2017) | 278.9% |
|  | Grenada (2004) | 148.4% |
|  | Dominica (2015) | 89.2% |
|  | Vanuatu (2015) | 58.1% |
|  | Fiji (2003) | 22.9% |
| Flood | Pakistan (2001) | 154.7% |
|  | Bangladesh (2000) | 110.1% |
|  | Guyana (2005) | 27.2% |
|  | Guyana (2006) | 8.9% |
|  | Mozambique (2000) | 7.0% |
| Drought | Somalia (2021) | 66.6% |
|  | Ethiopia (2022) | 30.0% |
|  | Viet Nam (2015) | 2.9% |
|  | Marshall Islands (2015) | 2.7% |
|  | Ethiopia (2015) | 2.2% |

3b: V20 Total Loss and Damage by Storm, Floods and Drought (% Group GDP), 2000-2024



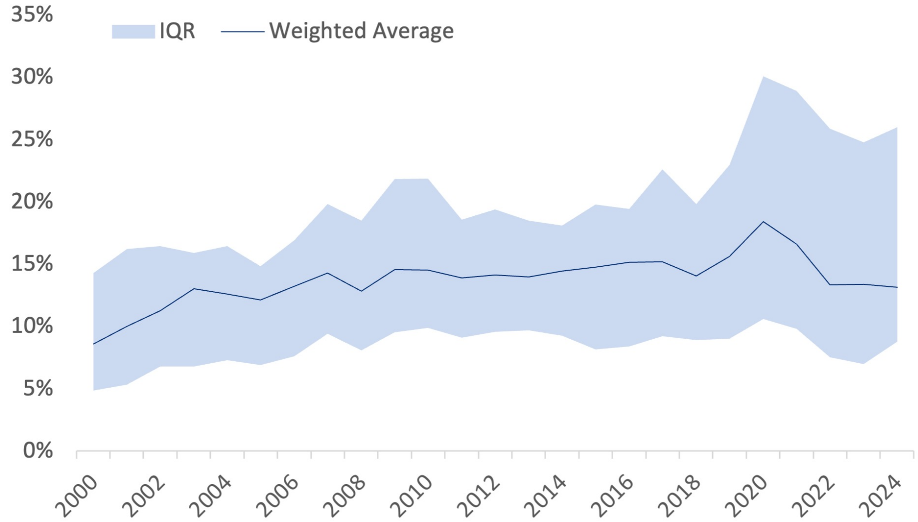
**Source:** EM-DAT (2026) and IMF World Economic Outlook (2025).

generate acute short-run foreign-exchange shortages. The central issue, then, is often one of liquidity under stress, rather than insolvency in the strict sense.

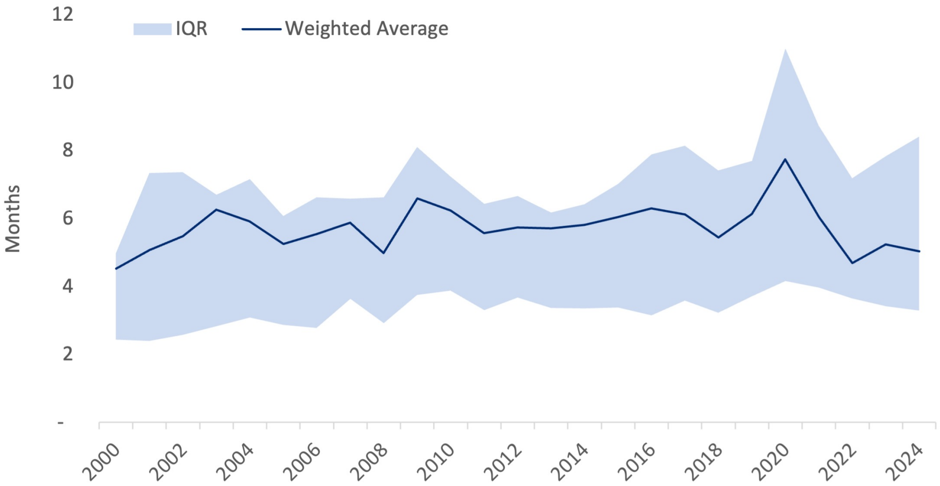
Under such conditions, international reserves become the first line of defense. Governments use them to smooth imports, maintain external payments and avoid abrupt adjustment in the immediate aftermath of a shock (Arslan and Cantú 2019). But this form of self-insurance is often insufficient. Altogether, V20 reserves account for $504 billion in 2024, but V20 members already hold reserve buffers that are limited relative to prudential benchmarks, whether measured in months of imports, ratios to GDP or broader adequacy metrics (See Table 1).

**FIGURE 4** V20 Foreign Reserve Adequacy Indicators, 2000-2024

4a: Foreign Reserve to GDP (%)

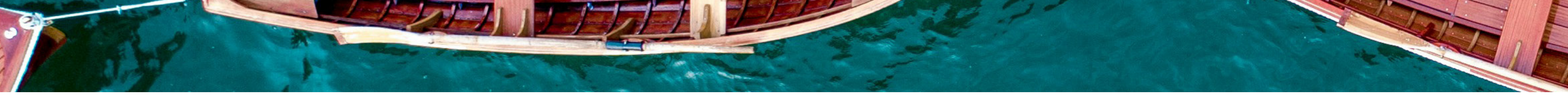


4b: Import Cover



**Source:** IMF World Economic Outlook (WEO), International Liquidity (IL) and International Trade of Goods (ITG) Datasets.

**Note:** The sample includes only V20 with available data.



Reserve drawdowns may therefore provide only temporary relief and may come at significant cost. If reserves fall too sharply, governments may face declining market confidence, worsening rollover conditions and pressure to implement procyclical measures such as import compression, fiscal retrenchment or abrupt macroeconomic tightening. These measures may reduce external imbalances, but they do so at the expense of growth, welfare and recovery.

This is the core justification for dedicated balance-of-payments support tailored to climate-vulnerable economies like V20's Lifeline initiative. The objective is not to finance reconstruction in a broad developmental sense or provide insurance, nor to address climate-related losses and damages, all initiatives that are currently being implemented across the V20 membership, either through domestic efforts or multilateral efforts, including through the V20 directly. Rather, the aim is to provide timely external liquidity to stabilize the balance of payments during the window in which climate shocks weaken export capacity, increase import needs and tighten financing conditions simultaneously. By meeting these short-term financing needs, an external backstop can reduce pressure on reserves, sustain critical imports, preserve policy space and prevent temporary disruptions from escalating into full macroeconomic crises.

Within this context, a Lifeline-type instrument represents a potentially important innovation that complements the GFSN and other V20 initiatives. Such a mechanism would not replace existing components of the Global Financial Safety Net, but complement them with a faster, more targeted and more climate-responsive layer of support. Its purpose would be to smooth external payments needs during periods of climate-related stress, especially by helping finance higher import requirements amid falling export revenues. In doing so, it would support output stabilization, reduce inflationary pressures associated with supply disruptions and exchange-rate stress and boost countries' recovery capacity without depleting their own reserve buffers. The Lifeline's value lies not only in the volume of financing provided, but in the speed, predictability and appropriateness of the instrument relative to the nature of the shock. Lifeline should also be thought of as a complement to the V20 Sustainable Insurance Facility, 100 Banks Initiative, the G7-V20 Global Shield against Climate Risks, and the V20 Loss and Damage Program, as well as multilateral initiatives such as the Fund for Responding to Loss and Damage and the Green Climate Fund.

The Lifeline proposal reflects the fact that resilience in climate-vulnerable economies cannot be defined merely in terms of adaptation projects, disaster insurance or concessional development finance. It must also encompass the ability to manage sudden external financing pressures triggered by recurrent climate shocks. Without such capacity, countries remain vulnerable to a form of macroeconomic scarring whereby each climate event erodes reserves, narrows policy space, weakens confidence and leaves the economy less prepared for the next shock. A dedicated balance-of-payments backstop would therefore serve not only as crisis finance, but as a resilience-enhancing institution that helps prevent the cumulative destabilization of vulnerable economies over time. For that reason, mechanisms capable of delivering rapid and climate-responsive external liquidity are no longer optional. They are an integral part of a credible institutional response to climate vulnerability.

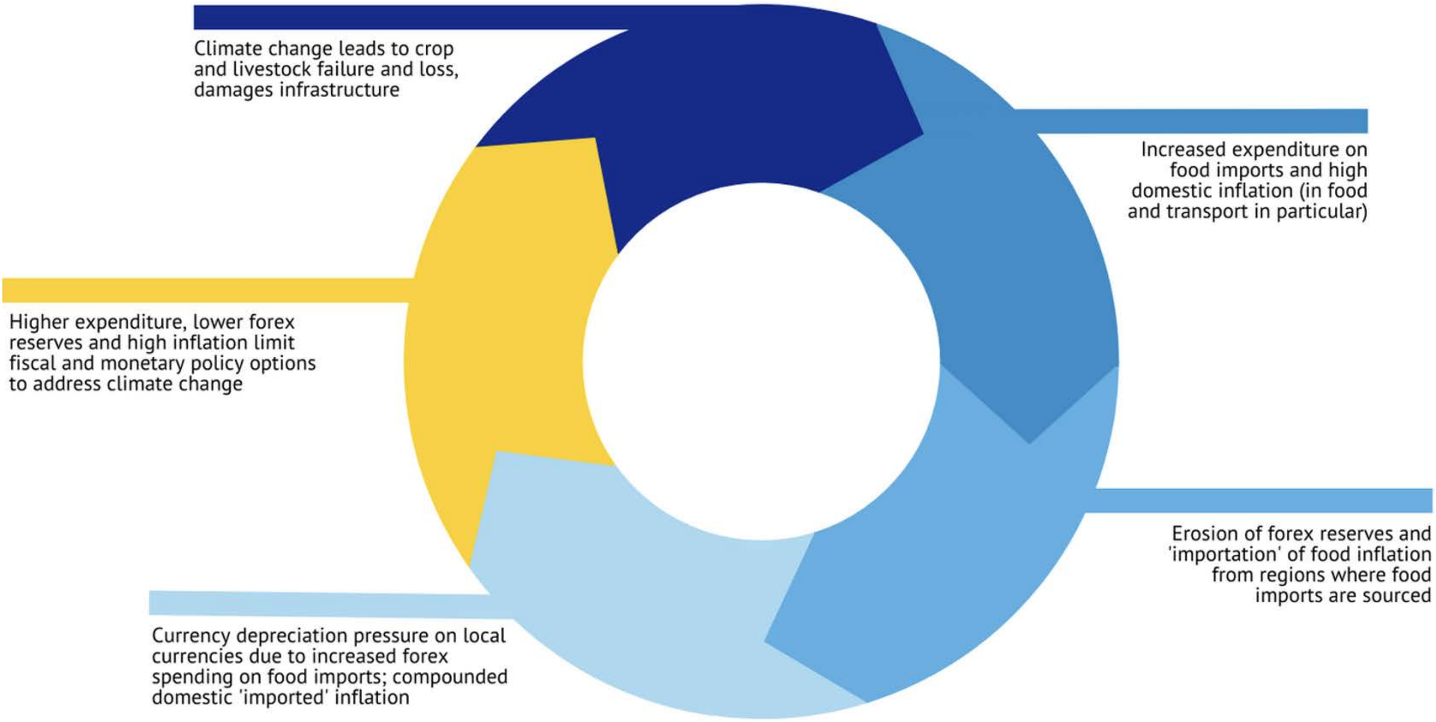
A V20-focused instrument such as the proposed Lifeline would be a logical step in that direction: an arrangement designed not simply to respond to disaster, but to safeguard external stability as a core pillar of climate resilience and the GFSN.

## TRANSMISSION MECHANISMS FROM CLIMATE SHOCKS TO THE BALANCE OF PAYMENTS

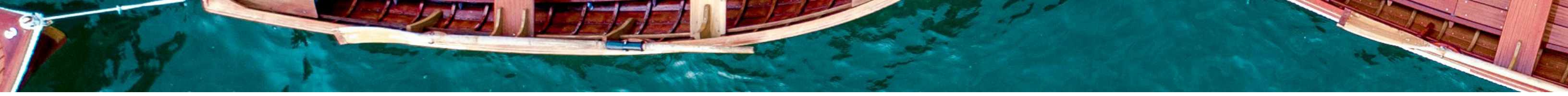
There is extensive literature on the negative impacts of climate shocks on balance of payments, economic growth and pressure on fiscal and monetary policy (Acevedo et al. 2020; Botzen et al. 2019; Klomp and Valckx 2014). These negative impacts can put countries in a vicious cycle (as depicted in Figure 5): Physical climate events first hit production, infrastructure and export capacity; they then raise import demand for relief and reconstruction; they may worsen terms of trade and exchange-rate pressures; they tighten market financing through higher sovereign risk and weaker private inflows; and they ultimately force countries to absorb the shock through reserves, contractionary adjustment or emergency external support - all of which undermine the ability to pursue climate action, making them less resilient to deal with new shocks (Gallagher et al. 2024).

Persistent climate shocks, combined with the lack of adequate liquidity support, further exacerbate these dynamics. But access to timely and affordable finance can help vulnerable

**FIGURE 5** The Fiscal and Monetary Policy Impacts of Climate Change



**Source:** Gallagher et al. (2024).



economies avoid becoming trapped in such a vicious cycle. By providing the Lifeline Fund as an option—rather than forcing countries to borrow at market rates, which often carry high premiums for post-shock vulnerable economies or may be unavailable altogether—central banks could rely on a backstop network to help fill financing gaps at affordable rates, support capital inflows and stabilize the economy more effectively.

Table 1 summarizes in more detail the transmission mechanisms running through current, capital and financial-account channels. On the current-account side, climate shocks disrupt exports while raising imports. Export losses can arise from damaged agricultural production, infrastructure disruptions, lower energy output or a collapse in services exports, such as tourism. At the same time, imports are often driven up by countries' need for more food, fuel, relief supplies, machinery and reconstruction materials after a disaster (Schenker and Osberghaus 2025; Osberghaus 2019; Dellink et al. 2017). The IMF's 2022 External Sector Report argues that natural disasters tend to widen current-account deficits as countries finance reconstruction through increased investment. Additionally, higher climate vulnerability tends to increase borrowing costs for both sovereigns and firms, thereby deteriorating their primary income account (Beirne et al. 2021; Kling et al. 2021). Regarding the secondary income, although some studies find an increase in remittances following climate shocks, these effects are not statistically significant relative to aid, and neither flow has been sufficient to offset the negative impacts observed through other channels (David 2010).

As can be seen in V20 countries, current-account effects are highly heterogeneous across country groups. In some countries, the main negative impact comes from falling investment, while in others it comes from declining net exports, likely reflecting the importance of tourism and other externally oriented sectors. This distinction is important for V20 economies because it implies that balance-of-payments stress is not just a side effect of lower output; in some highly vulnerable economies it is one of the primary channels through which output losses occur.

**TABLE 1** Transmission Channels of Climate-Shocks on the Balance of Payments

| Balance of Payments Item | | Post-Shock Mechanism | Related Literature |
|---|---|---|---|
| **Current Account (CA)** | **Trade balance of goods and services (TB)** | **Lower exports:** Destruction of production capacity and logistical bottlenecks. Disruptions to tourism and transport<br>**Higher imports:** Emergency and reconstruction | (Schenker and Osberghaus 2025; Osberghaus 2019; Dellink et al. 2017) |
| | **Primary income (PI)** | **Higher cost of capital:** Shocks impact bond spreads and increase cost of borrowing | (Beirne et al. 2021; Kling et al. 2021; Cevik and Jalles 2022) |
| | **Secondary income (SI)** | **Increase current transfers:** Increase in current international aid and remittances | (David 2010) |
| **Capital and Financial accounts (KA & FA)** | | **Reduction in capital inflows/FDI and increase in capital outflows (possible):** Heightened risk aversion and asset sales | (David 2010; Aurazo et al. 2025) |
| **Reserves (ΔR)** | | **Decline in reserve level:** Central-bank intervention to smooth payments and the exchange rate | (Khan and Anwar 2022; Strobl et al. 2020) |

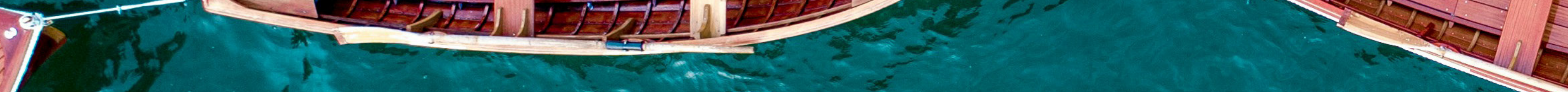
**Source:** Authors' elaboration.

The capital and financial account make up another mechanism of transmission. For example, climate shocks can disrupt international capital flows (David 2010; Aurazo et al. 2025). According to Aurazo et al. (2025), an increase in the number of extreme weather events is associated with lower portfolio and FDI inflows to emerging market economies. David (2010) finds that bank lending and equity even amplify the negative economic effects of disasters. Additionally, the higher cost of borrowing after a disaster (Beirne et al. 2021; Kling et al. 2021) can make it more difficult for countries to borrow at sustainable rates and even push countries—especially the most vulnerable low-income ones—closer to default (Cevik and Jalles 2022).

V20 economies often face constrained access to international financial markets and comparatively high financing costs because their macro-financial profiles are shaped by persistent structural and external vulnerabilities. Many of these countries have narrow export bases, recurrent current-account deficits, limited reserve adequacy and a high degree of dependence on sectors that are especially sensitive to climate shocks, such as agriculture, tourism and commodity production. These characteristics heighten perceived sovereign risk by increasing uncertainty over export performance, fiscal capacity and debt-servicing prospects. Climate vulnerability further compounds these constraints, as recurrent physical shocks may weaken foreign-exchange earnings, intensify external financing needs and undermine investor confidence. As a result, V20 countries frequently encounter tighter borrowing conditions, higher sovereign spreads and more volatile access to private capital flows. In this context, their financing difficulties should not be interpreted solely as a reflection of conventional macroeconomic weakness, but also as the consequence of a structural exposure to climate-related shocks that raises risk premia and limits access to affordable external finance.

International reserves, exchange-rate adjustment and the risk of procyclical stabilization constitute an additional mechanism of transmission. As weakening exports increase imports and market financing becomes more fragile, countries typically rely on international reserves to smooth payments and avoid abrupt macroeconomic contraction. Self-insurance is often insufficient for vulnerable economies. The World Bank's disaster-risk-financing framework emphasizes that pre-arranged financial protection helps secure rapid, cost-effective liquidity, and minimizes the timing and cost of meeting post-disaster funding needs. This is directly relevant to the V20 discussion because it shifts the policy question from ex post compensation toward ex ante liquidity provision: the key issue is not only who pays for damages in the long run, but who supplies foreign exchange in the short run so that countries can maintain essential imports, avoid excessive reserve depletion and stabilize expectations.

The gap in short-term external financing created by the climate shock is precisely what an instrument such as Lifeline would be designed to cover. It should be viewed as a complement to traditional IMF support, as a climate-responsive balance-of-payments backstop designed to act as a breaker switch between physical shock and external crisis.



## LIFELINE DEMAND AND FUNDING SIZE: A PRACTICAL ESTIMATE FOR SHORT-TERM NEEDS

The foregoing discussion underpins the use of the following framework to estimate countries' financial balance-of-payment needs arising from climate shocks. Under this framework, a country's balance of payments (BoP) gross financing needs could increase due to a widening current account deficit, compounded by the need to service debt at higher interest rates and a potentially reduced capacity to roll over existing obligations. This dynamic may be further exacerbated by market risk aversion, rising risk premiums and the limited, delayed or insufficient availability of financing options within the GFSN.

$$GFN_i = CA_i + STD_i + (RR_i * STD_i)$$

**where:**

**CA =** Current account deficit

**STD =** Short-term debt amortizations within 12 months

**RR =** Rollover ratio (share of STD refinanced)

**Lower RR** → higher financing need due to refinancing risk post-shock

In line with the recommendation of the V20 Central Banks, the present stage of the analysis focuses primarily on the current account – and specifically on trade balances – as the relevant entry point for estimating external financing needs, given that current-account dynamics are expected to account for the bulk of balance-of-payments pressures in the aftermath of climate-related shocks, and as members reported that trade-channels are the most relevant for their cases. While the broader gross external financing needs framework also includes short-term debt amortizations and rollover risk, these additional components are left for future extensions of the analysis. At this stage, emphasis is placed on the trade channel in order to provide a tractable and policy-relevant first approximation of financing requirements.

To estimate potential demand for the Lifeline facility, we adopt a pragmatic three-step approach. First, we identify those V20 countries facing significant current-account financing gaps and classify them according to the magnitude of these imbalances. Second, we estimate the extent to which current-account positions are likely to deteriorate following climate shocks, through channels including lower export earnings, higher import requirements and adverse terms-of-trade effects. Third, we assess the probability that multiple countries may be simultaneously affected by climate shocks and, consequently, may seek financing at the same time. Taken together, these steps produce country-level estimates of Gross External Financing Needs, as well as an aggregate financing envelope that reflects the joint likelihood of simultaneous demands across countries.

These calculations rest on a set of key assumptions that shape both coverage and targeting. The Lifeline is assumed to smooth balance-of-payments needs by financing higher import requirements in the context of declining exports, thereby supporting economic activity and helping to contain inflationary pressures. It is not intended to replace existing instruments

within the Global Financial Safety Net (GFSN), but rather to complement them. Countries with current-account surpluses, or only limited deficits, are assumed to be less likely to draw on the facility, while the allocation of support is guided by a principle of solidarity that provides relatively greater coverage to countries with weaker self-insurance and response capacity.

## FEASIBILITY AND SIZING OF LIFELINE

Designing a regional financial arrangement like Lifeline requires assessing whether the underlying conditions for risk sharing and resource pooling are in place. Chief among these is the degree of heterogeneity among members, as a group of countries with different risks and capacities to respond to climate shocks strengthens the risk pool. Second, it is important to assess whether shocks are temporally correlated. If members experience shocks simultaneously, the logic of pooling is weakened; if shocks are largely idiosyncratic, risk sharing becomes more effective. Third, it is important to understand the dynamics of climate shocks on the balance of payments, including the persistence of their effects. Finally, the adequacy of the reserve fund must be evaluated to ensure it is sufficient to cover shocks while maintaining a buffer against potential tail events. These issues are examined in this section.

### Accounting for the V20 heterogeneity

In 2024, the combined GDP of the V20 totaled US$4.3 trillion. Economic size varies widely within the group: the ten largest economies account for 63 percent of this total, with the Philippines, Vietnam, Bangladesh and Colombia each exceeding US$400 billion. At the other end of the spectrum, 55 countries have GDPs below US$50 billion (see Figure 6).

Figure 7 shows that V20 smaller economies tend to be more trade-open than their larger counterparts. This has direct implications for balance-of-payments vulnerability— for highly open economies, a climate shock that disrupts exports and/or raises import needs translates into a stronger macroeconomic pressure. However, the heterogeneity in trade openness and GDP size across the group also indicates that there is scope for mutual support within the pool. When some members face acute balance-of-payments stress, others may be comparatively insulated.

V20 countries face persistent structural trade deficits in goods and services, as shown in Figure 8. However, the magnitude of these deficits varies across members, and the dispersion has increased over time. The median V20 country has a trade deficit of 8 percent of GDP (Figure 8b); in dollar terms, this amounts to approximately US$1 billion (Figure 8a). This means that half of the membership has an average trade deficit below US$1 billion.

A factor supporting the feasibility of reserve pooling among the V20 is the heterogeneity in members' access to the Global Financial Safety Net (GFSN). Figure 9a shows that, when IMF resources are included, smaller V20 economies have relatively greater GFSN access (as a share of GDP) than larger ones. However, IMF facilities typically take longer to disburse and involve higher transaction costs due to administrative procedures, delaying the rapid

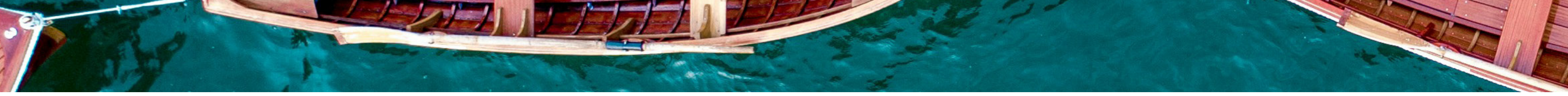
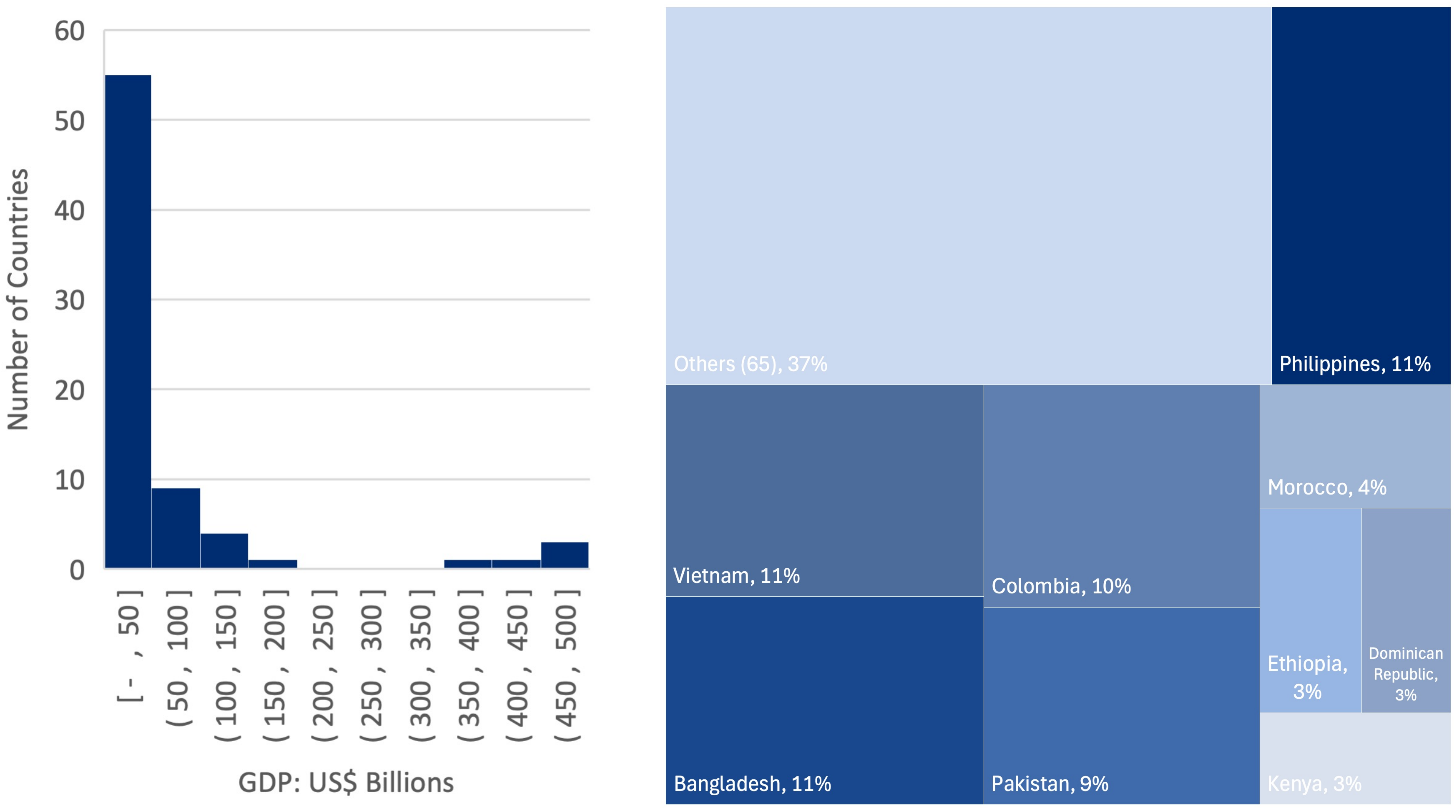


**FIGURE 6** V20 Gross Domestic Product



6a: Distribution of V20 Members by GDP, 2024 (US$ Billions)

6b: V20 GDP Shares by Country, 2024 (%)

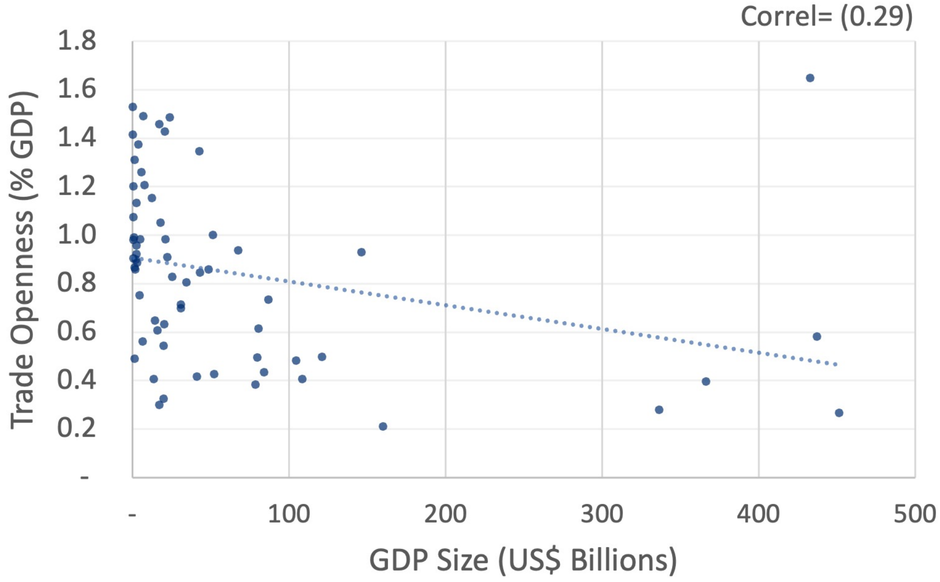
**Source:** IMF World Economic Outlook (2025).

response needed after climate shocks. When IMF financing is excluded and only regional financial arrangements and swaps are considered, the pattern reverses: larger economies have greater access to faster-disbursing instruments. In this context, the Lifeline Fund adds value by providing speedy responses to smooth macroeconomic impact and giving countries with less response capacities with greater access to flexible layers of the GFSN.

Another distinction among V20 members concerns access to international bond markets. Only 31 countries—less than half of the V20—have issued bonds in these markets. On average, larger economies tend to have greater access as measured by the share of the stock of Public and Publicly guaranteed bonds as to total external debt (Figure 10a). Among countries with bonds in international markets, larger economies also generally face lower issuance costs, as reflected in sovereign bond spreads shown in Figure 10b.

The characteristics of the V20 countries make them generally compatible with risk sharing within a group arrangement like Lifeline. V20 countries vary in terms of economic size, trade

**FIGURE 7** Trade Openness and GDP Size Across V20 Members, 2023



**Source:** IMF World Economic Outlook (2025) and Balance of Payments databases.

openness and access to both private capital markets and the Global Financial Safety Net. This diversity shapes their capacity to respond to shocks and creates opportunities for risk sharing. Larger economies may have greater market access and lower issuance costs, while smaller, more trade-open economies often rely more on rapid-response financial mechanisms. One challenge, however, is that V20 as a group has recurring trade deficits with a few country exceptions.

## Grouping V20 countries

Bearing this diversity in mind, we grouped V20 members based on their historical (2000–2024) trade deficit profiles. While expressing the trade deficit as a share of GDP highlights its economic significance for individual countries, the absolute size of each country's deficit is relevant to estimate Lifeline capitalization needs. Larger deficits imply higher potential draws on the facility, whereas smaller deficits in dollar terms correspond to lower potential demands, influencing both the design and capitalization of the risk pool. For this reason, the grouping was based on dollar amounts rather than shares of GDP.

For this we used a k-means clustering approach, which minimizes the sum of distances between the data points. This method avoids the use of arbitrary thresholds and ensures transparency and replicability in the grouping process. It is particularly well suited to contexts characterized by high heterogeneity, where group boundaries are not clearly defined ex ante.

After excluding five countries due to data limitations and an additional ten for recurring trade surpluses, the remaining 59 countries were grouped into three clusters. The list of

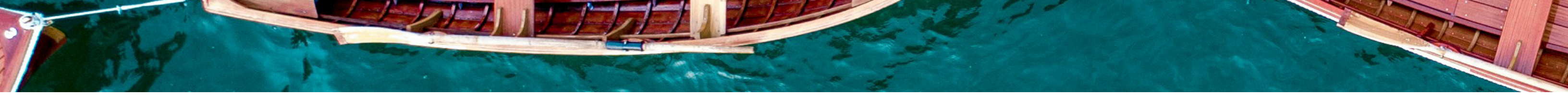
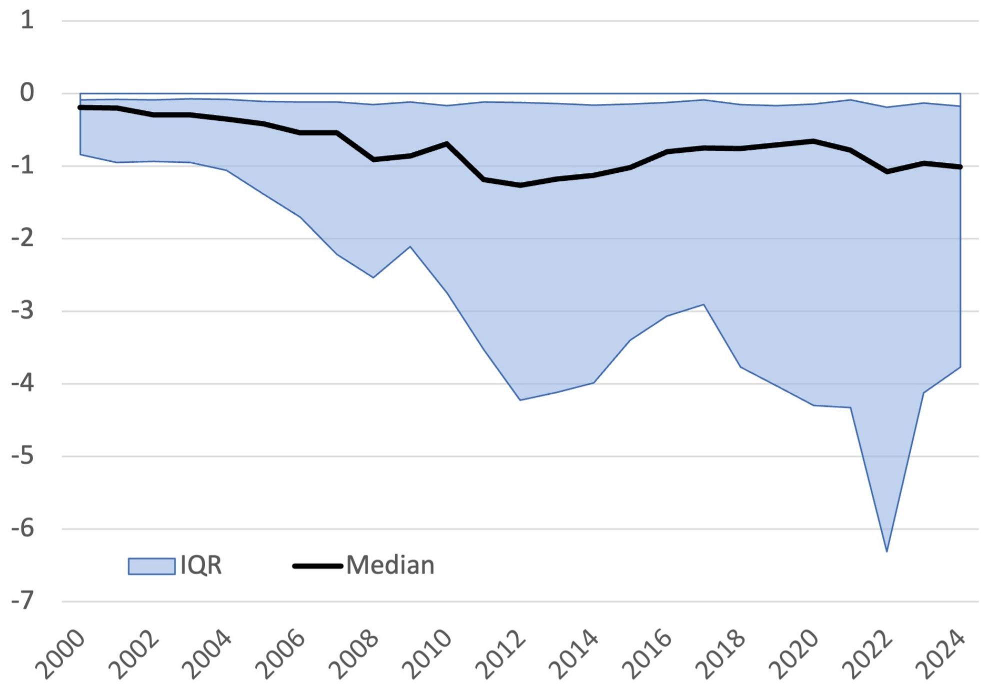
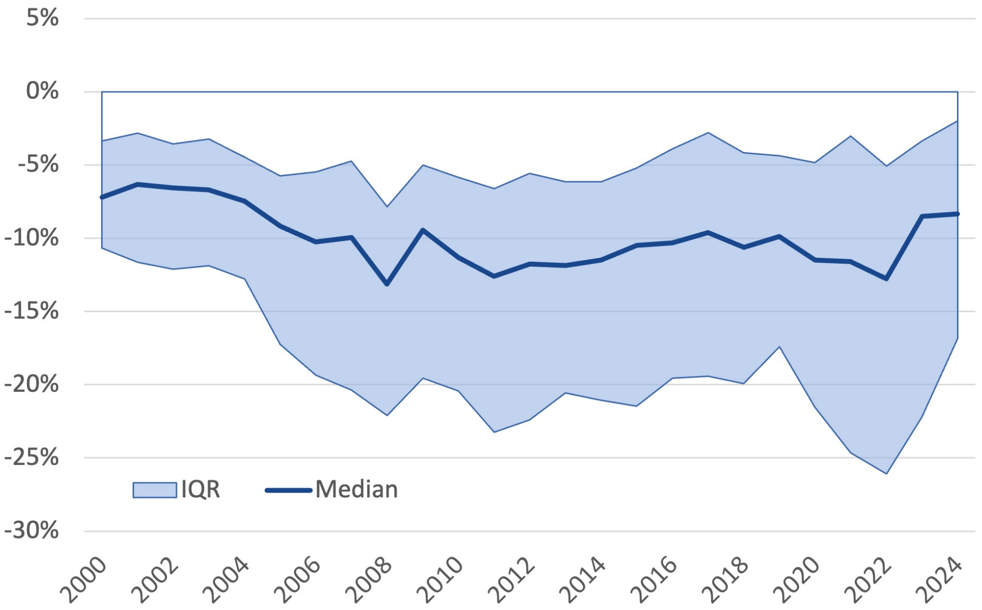


**FIGURE 8** V20 Trade Balance (Goods and Services), 2000 - 2024

8a: Million USD

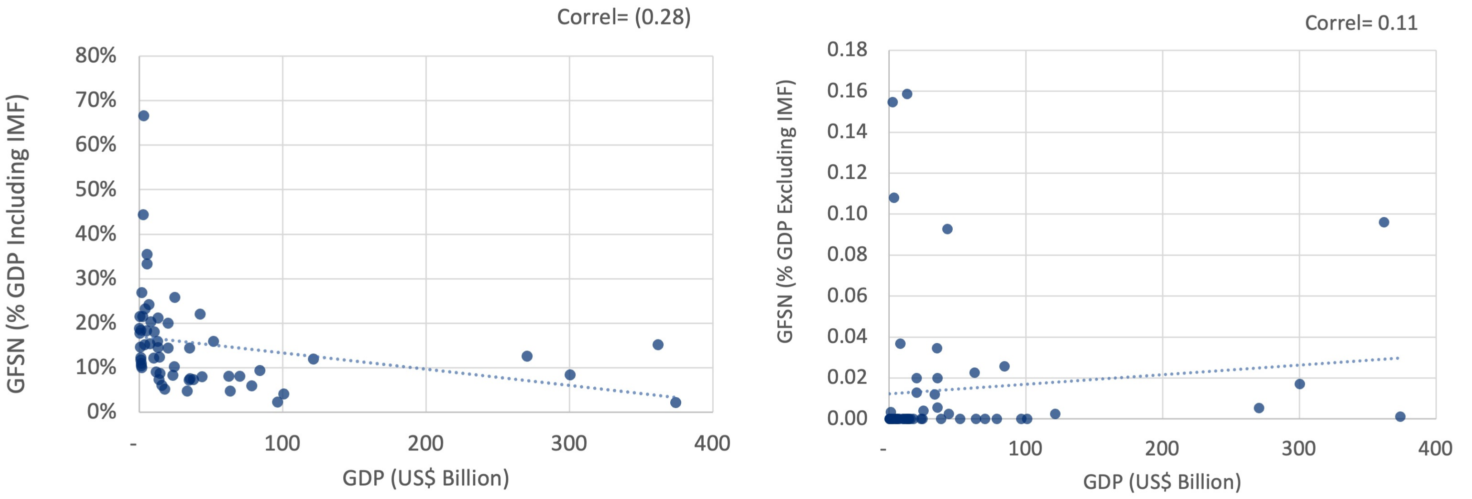


8b: Share of GDP



**Source:** IMF World Economic Outlook (2025) and Balance of Payments database.

**FIGURE 9** V20 GDP Size and Access to the Global Financial Safety Net (GFSN), 2023

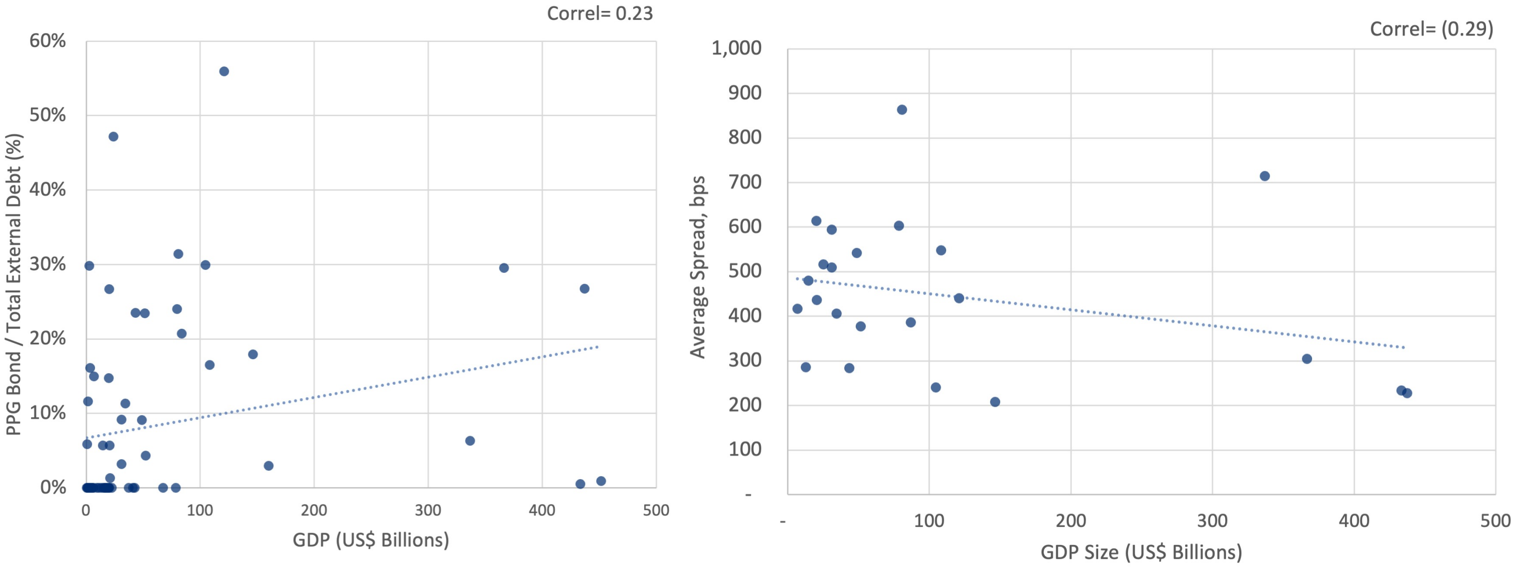


9a: GFSN Access (Including IMF) and GDP Size Across V20 Members

9b: GFSN Access (Excluding IMF) and GDP Size Across V20 Members, 2023

**Source:** IMF World Economic Outlook (2025) and Mühlich et al. 2026.

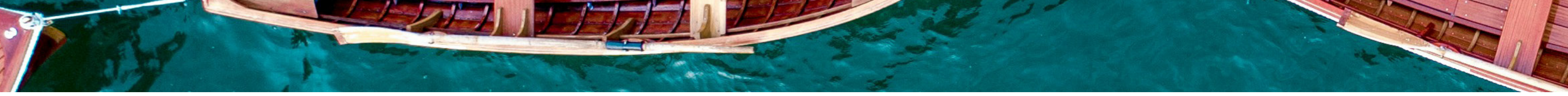
**FIGURE 10** V20 Access to International Bond Markets



10a: Stock of Public and Publicly Guaranteed Bonds (Share of Total External Debt) by GDP Size Across V20 Members, 2023

10b: Bond Spreads (Historical Averages) and GDP Size Across V20 Members, 2023

**Source:** World Bank International Debt Statistics (2025), IMF World Economic Outlook (2025), J. P. Morgan EMBI+ data.
Historical average bond spreads from 12/31/1999–3/20/2026. Countries with spreads above 1,000, due to protracted periods of default, were excluded.



country groupings is provided in Appendix I. Table 2 presents the corresponding summary statistics for these three groups.

**TABLE 2** Summary Statistics: Trade Balance of Goods and Services of V20 Countries, Period Averages, 2014–2023

| | Number of Countries | Average Yearly Deficit (million USD) | Coefficient of Variation |
|---|---|---|---|
| Tier 1 | 3 | 25,017 | 0.18 |
| Tier 2 | 17 | 6,842 | 0.42 |
| Tier 3 | 39 | 807 | 1.08 |

**Source:** Own elaboration based on IMF Balance of Payments database. Note: Five countries were excluded given data limitations.

As Table 2 shows, the majority of V20 members (39 countries, Tier 3) have relatively low average trade deficits, at approximately US$807 million per year, with a coefficient of variation of 1.08. Tier 2 comprises 17 countries with an average trade deficit of US$6.8 billion annually and a coefficient of variation of 0.42. In contrast, only three members—the Philippines, Bangladesh and Pakistan—fall into Tier 1, with an average yearly trade deficit of US$25 billion.

**TABLE 3** Period Averages for Selected Indicators, V20 Tier 1, 2 and 3, 2014–2023

| | Tier 1 | Tier 2 | Tier 3 |
|---|---|---|---|
| Membership (% of Total 74 V20 members) | 4% | 23% | 53% |
| ***Average 2023*** | | | |
| GDP (Billion USD) | 408.4 | 84.5 | 13.9 |
| Trade Openness (% GDP) | 38% | 65% | 83% |
| Import Cover (Months) | 5.6 | 6.2 | 5.6 |
| Reserves % GDP | 9% | 19% | 21% |
| GFSN (Excluding IMF) % GDP | 3.8% | 1.3% | 1.4% |
| Bond Spreads, bps (Historical)* | 471.5 | 398.0 | 534.5 |
| PPG Bonds/Total External Debt (%) | 11% | 16% | 3% |

**Source:** Own elaboration based on WB IDS, IMF BOP, J.P. Morgan EMBI+ data.

**Note:** Historical average bond spreads from 12/31/1999–3/20/2026. Countries with spreads above 1,000, due to protracted periods of default, were excluded.

The tier analysis reflects the earlier discussion on the heterogeneity of V20 members. The majority of countries fall into Tier 3 (53 percent of the group), followed by Tier 2 (23 percent), while Tier 1—despite its economic weight—represents only 3 percent of the membership (See Table 3). Most V20 countries (Tier 3) are smaller economies, significantly more trade-open, and have more limited access to international capital markets, facing higher borrowing costs as reflected in wider bond spreads. Although only 3 percent of their external debt is issued in foreign bonds, they face an average historical spread of 534 basis

points. In addition, only about 1.4 percent of their GDP comes from fast-disbursing layers of the Global Financial Safety Net (GFSN), compared to 3.8 percent in Tier 1. One area where the groups differ little is import cover, which remains around five months across tiers, reflecting the structural nature of recurring trade deficits among V20 members. Notably, Tier 3 countries hold higher reserves as a share of GDP than the other groups, which may indicate a precautionary motive given their high trade openness, more limited access to the GFSN and international capital markets.

## Assessing the correlation of shocks among V20

Considering these country groups, we assessed the correlation of climate shocks (floods, storms and droughts) using EM-DAT (2026) data on shock occurrence. The full correlation matrix across countries is reported in the appendix. We find a generally positive but weak correlation of shocks among V20 members. Additionally, even when the occurrence of shocks is positively correlated, the resulting damages of the impact can vary.

Overall, the correlation matrices suggest that shocks are largely idiosyncratic, indicating the absence of systemic shocks that could threaten the feasibility of the Lifeline mechanism. The highest positive correlations are observed among geographically proximate countries, such as Nigeria and Ghana (0.61**) and Uganda and Rwanda (0.59). However, the multiregional structure of the Lifeline mechanism strengthens risk pooling, as cross-regional correlations remain lower, with the highest positive correlation occurring between Europe and North Africa and South Asia (0.38*), shown as Figure 11a. Additionally, as shown in Figure 11b, we find a moderate correlation (0.56***) between countries in Tiers 2 and 3, which are individually.

This analysis suggests that, although V20 countries are highly susceptible to climate shocks, these shocks are largely idiosyncratic. While climate shocks may be correlated among countries within the same region, the fact that Lifeline is a multi-regional facility strengthens the risk-pooling mechanism.

## The dynamics and persistence of climate shocks on the balance of payments

A key concern in the design of Lifeline is to estimate both the impact of climate shocks on the trade deficit and the persistence of these effects, as this helps determine the appropriate design of policy instruments. To make this assessment, we employ local projection (LP) methodology to estimate the dynamic effects of climate-related damages on countries' trade deficits. Local projections, following the framework of Jordà (2005), allow us to estimate impulse responses directly by regressing future values of the dependent variable on the shock variable and a set of controls.

The dependent variable is the trade deficit of goods and services (IMF Balance of Payments dataset), measured at different horizons following the shock. The main explanatory variable is the lagged value of climate shock intensity, measured as the economic damage caused by floods, storms and droughts (in constant USD, EM-DAT 2026). The specification controls

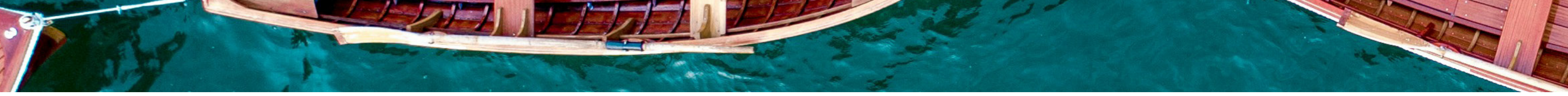
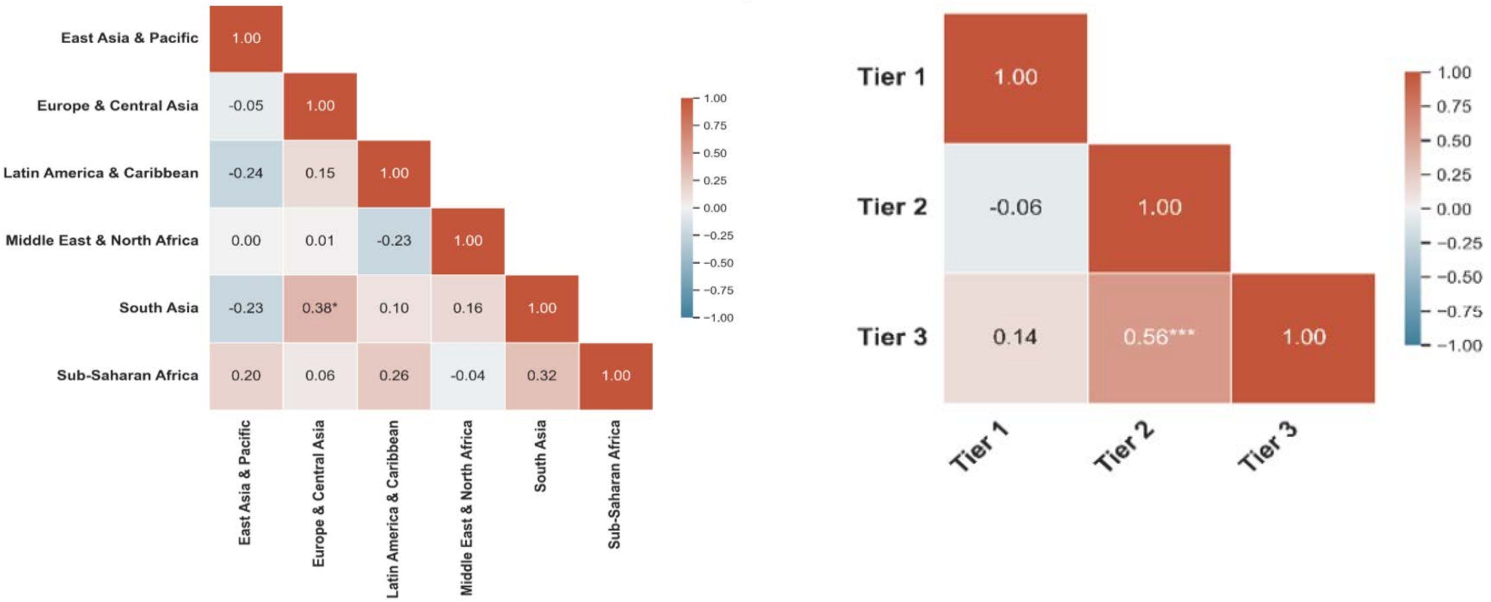


**FIGURE 11** Correlation Matrix of Climate Shock in V20 Countries, 2000-2024



11a: Inter-Region

11b: Among Tiers

**Source:** Own elaboration based on EM-DAT (2026).

for GDP growth (from IMF World Economic Outlook) and the real effective exchange rate (REER) (from Centre d'Etudes Prospectives et d'Informations Internationales, CEPII[2]) are both standard determinants of trade balance dynamics. Higher GDP growth is typically associated with a deterioration of the trade balance due to increased import demand, while real exchange rate movements affect external competitiveness. The model is estimated using panel data with country fixed effects. The regression is estimated over the period 2000–2019, with shocks included up to 2015, to avoid potential distortions associated with the COVID-19 pandemic.

**The basic LP regression model that we estimate is:**

$$IHS\left(Trade\ Balance_{i,t+h}\right) = \beta_h\ ln\ ln\ \left(Damage_{i,t-1} + 1\right)\ + \tau'_h x_{i,t} + \mu_i + \lambda_t + \epsilon_{i,t+h};$$

h = 0, 1, 2, 3, 4, 5

**Where:**

$IHS\left(Trade\ Balance_{i,t+h}\right)$: The Inverse Hyperbolic Sine[3] of trade balance of country i at time t+h.

$ln\ ln\ \left(Damage_{i,t-1} + 1\right)$: Natural log of climate disaster damage of country i at last time period (t-1).[4]

---

[2] Based on the framework of Couharde et al., 2018.

[3] As most countries in the sample exhibit trade deficits, the inverse hyperbolic sine (IHS) transformation is used to handle negative values.

[4] As climate disasters do not occur every year and damage is zero in many observations, a value of 1 is added prior to transformation to retain zero-damage observations in the sample.

$X_{i,t}$: Control variables that change with time of country i at time t.

$\mu_i$: Country specify effect of i, that doesn't change with time.

$\lambda_t$: Year fixed effect at time t.

$\epsilon_{i,t+h}$: Residue.

$\beta_h$: The dynamic effect of $ln\ ln\ (Damage_{i,t-1} + 1)$ on $IHS(Trade\ Balance_{i,t+h})$ at horizon h, which is illustrated in the Figure 12.

Assessing the impact of climate shocks on trade deficits is complex due to two countervailing forces. In the immediate term, climate shocks can reduce GDP growth, lowering import demand and shrinking trade deficit. At the same time, they disrupt production and exports while raising imports needs, worsening the deficit. The net effect depends on country-specific factors such as economic structure, import dependence and export concentration.

Looking at the average dynamics across all V20 countries (Figure 12), we observe a temporary improvement in the trade balance in the immediate horizon after the shock (H0–H1). In this period, the GDP growth channel may play a dominant role: slower growth temporarily reduces import demand, providing a modest improvement in the trade balance. However, by H2, the effects of disrupted production and increased import needs became more prominent, leading to a deterioration of the trade balance. Table A.2 in the appendix presents the full regression estimates, showing that climate shocks significantly affect the trade deficit at H2 and H4, with negative coefficients indicating a worsening of the balance in both periods. For a 10 percent increase in damage, the trade balance dropped by 1 percent in h=2. This negative trajectory persists for several years, with the aggregate response converging to initial levels only after H4.

Figure 12 shows the impact for the V20 as a group while Figure 13 illustrates the effect on selected V20 countries. Although all analyzed countries suffer a negative impact on the balance of payments from climate shocks, the specific period varies across countries, reflecting differences in the capacity to respond to shocks, trade openness and access to international markets. Some countries (e.g., Bangladesh, Nepal, Sri Lanka, Kazakhstan, Fiji and Mozambique) experience a deterioration in the trade balance as early as H0, followed by an improvement in subsequent years. In some cases, this improvement begins only in H3 (Bangladesh) or even H4 (Colombia and Mozambique). Other countries experience an initial improvement in the trade balance in the immediate period (Philippines, Pakistan, Colombia, Cape Verde, Tanzania and Ghana), followed by a subsequent deterioration. We attribute these country differences by the impact of GDP growth reductions on the balance of payments in some countries, which can outweigh the direct impact of trade disruptions.

These findings carry important policy implications for Lifeline design. First, they underscore the need for timely stabilization to smooth the adjustment path in the period immediately following a shock, preventing a deterioration of the external account and the amplification of negative growth dynamics in the subsequent time period. Second, the persistence of the

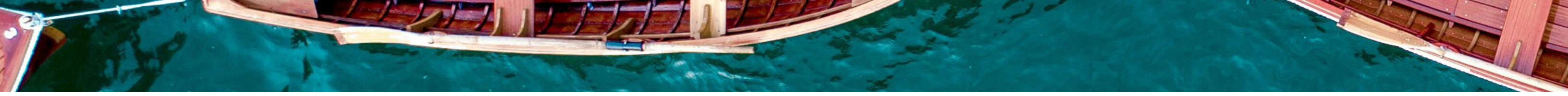
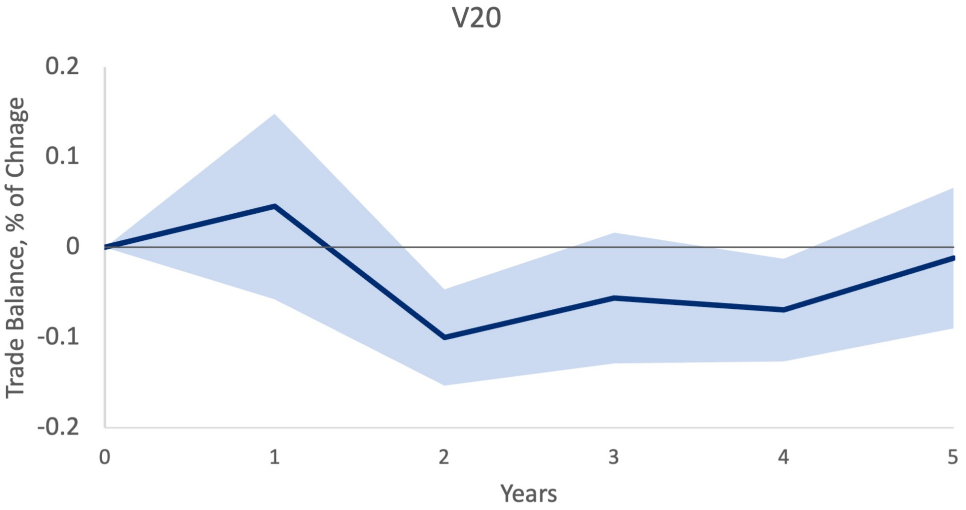


**FIGURE 12** Impulse Responses from Local Projection Estimates of the Effect of Climate Shocks (Lagged 1 Year) on the Trade Balance at Horizons H = 0–5 for V20 countries



**Source:** Own elaboration based on IMF Balance of Payments dataset (2021), EM-DAT (2026), IMF World Economic Outlook (2025) and CEPII (Couharde et al. 2018).

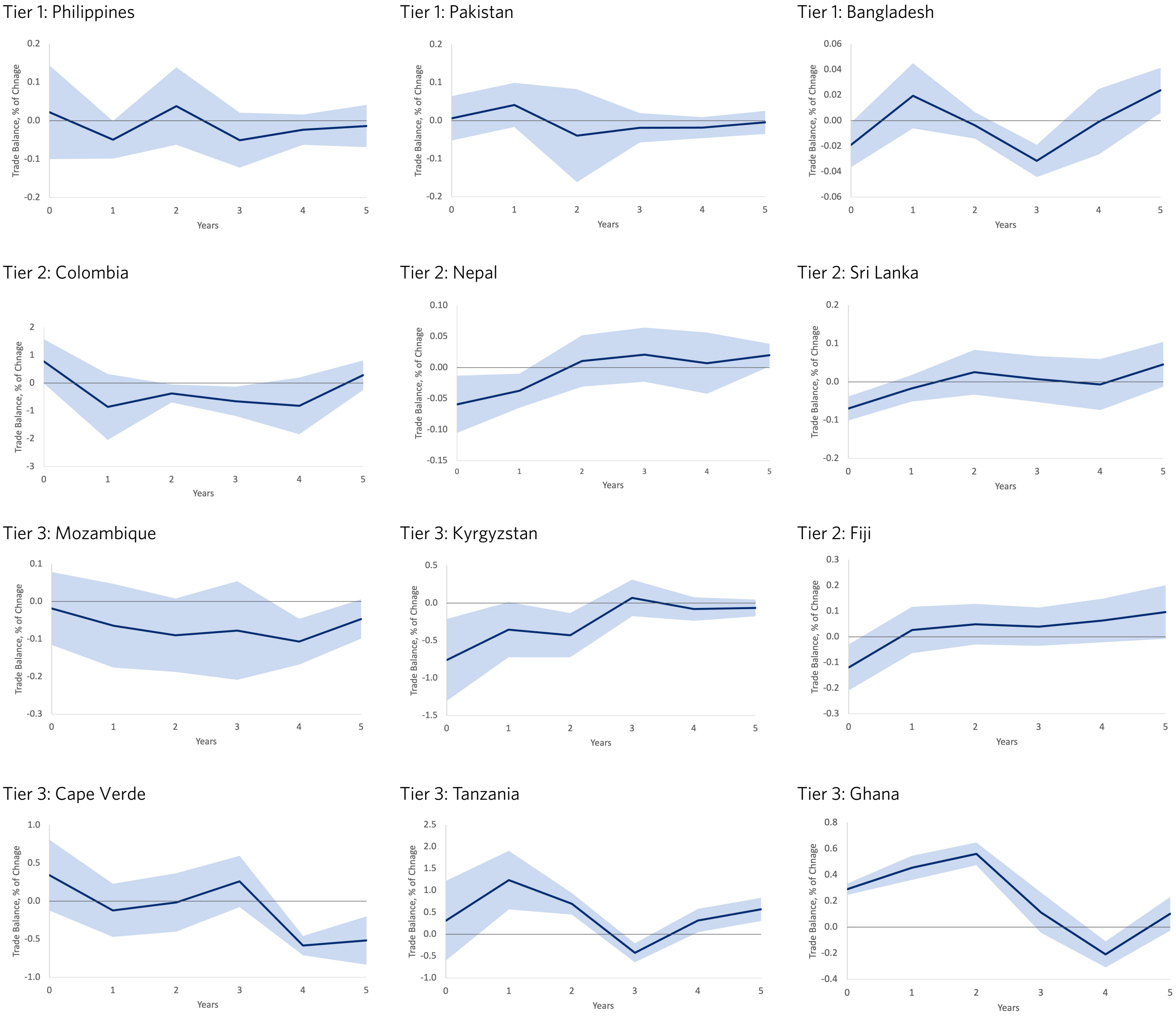
**Note:** Local projection of Hausman-Taylor (1981) response with shaded area of 90 percent confidence band.

negative effects means that V20 countries also face a medium-term challenge; therefore, members of the Lifeline fund should also consider designing mechanisms capable of supporting countries over a longer period and mitigate the structural vulnerability on balance of payments. Third, the heterogeneity in country-level responses suggests an additional advantage for the facility: because climate shocks affect balance of payments dynamics at different times and through different channels across countries, financing needs are unlikely to be perfectly synchronized. This staggered demand for resources increases the potential resilience and financial sustainability of the Lifeline mechanism, as it reduces the likelihood of simultaneous large-scale withdrawals.

## Lifeline capitalization scenarios

Based on the trade balance patterns of V20 members (Table 2) and the frequency of shocks across country groups, we construct scenarios to estimate the financing required to cover a financial gap caused by climate shocks. We consider two scenarios: a 5 percent and a 10 percent increase in financing needs in the year following a shock. Accounting for differences in shock-absorption capacity, access to financial markets and the GFSN, we assume that Tier 1 and Tier 2 countries would require the Lifeline facility to cover a relatively smaller share of this incremental deterioration. Specifically, under a first option of distribution, coverage rates are 20 percent for Tier 1, 40 percent for Tier 2 and 60 percent for Tier 3, reflecting a principle of solidarity. Alternatively, a second option of distribution would cover 10 percent for Tier 1, 50 percent for Tier 2 and 90 percent for Tier 3. Table 4 shows that, under a 5 percent increase in financial needs, Lifeline capitalization would range from US$436.1 million

**FIGURE 13** Impulse Responses from Local Projection Estimates of the Effect of Climate Shocks (Lagged 1 Year) on the Trade Balance at Horizons H = 0–5 for Selected V20 Countries



Tier 1: Philippines

Tier 1: Pakistan

Tier 1: Bangladesh

Tier 2: Colombia

Tier 2: Nepal

Tier 2: Sri Lanka

Tier 3: Mozambique

Tier 3: Kyrgyzstan

Tier 2: Fiji

Tier 3: Cape Verde

Tier 3: Tanzania

Tier 3: Ghana

**Source:** Own elaboration based on IMF Balance of Payments dataset (2021), EM-DAT (2026), IMF World Economic Outlook (2025) and CEPII (Couharde et al. 2018).

**Note:** LP-OLS with Newey-West (1987) error band at 90 percent confidence level.

to US$491.7 million depending on the allocation chosen. Under a 10 percent increase, the required capitalization rises to between US$872.3 million and US$983.5 million, as shown in Table 5. Considering that V20 foreign exchange reserves were equivalent to $504 billion in 2024, the capitalization needs of Lifeline would range between 0.1 to 0.2 percent of the group's reserves.

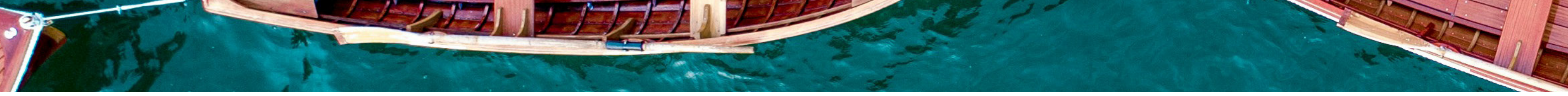


**TABLE 4** Lifeline Capitalization Scenario 1: 5% Increase in Financial Needs Due to Climate-Shock

| | | Distribution: Option 1 | | Distribution: Option 2 | |
|---|---|---|---|---|---|
| | Financial Gap (million USD) | Coverage (%) | Amount Required* (million USD) | Coverage (%) | Amount Required* (million USD) |
| Tier 1 | 1,250.8 | 20% | 250.2 | 10% | 125.1 |
| Tier 2 | 342.1 | 40% | 205.3 | 50% | 257.6 |
| Tier 3 | 40.2 | 60% | 36.3 | 90% | 54.5 |
| Total | 1,633.3 | | 491.7 | | 436.1 |

**Source:** Authors' calculation.

**Note:** For Tiers 1 and 2, which have more countries and shocks, we set the required amount at 1.5 times the average financial gap.

**TABLE 5** Lifeline Capitalization Scenario 2: 10% Increase in Financial Needs Due to Climate-Shock

| | | Distribution: Option 1 | | Distribution: Option 2 | |
|---|---|---|---|---|---|
| | Financial Gap (million USD) | Coverage (%) | Amount Required* (million USD) | Coverage (%) | Amount Required* (million USD) |
| Tier 1 | 2,501.7 | 20% | 500.3 | 10% | 250.2 |
| Tier 2 | 684.2 | 40% | 410.5 | 50% | 513.1 |
| Tier 3 | 80.7 | 60% | 72.7 | 90% | 109.0 |
| Total | 3,266.6 | | 983.5 | | 872.3 |

**Source:** Authors' calculation.

**Note:** For Tiers 1 and 2, which have more countries and shocks, we set the required amount at 1.5 times the average financial gap.

The analysis presented in this section points to two key findings: First, the heterogeneity of V20 members — in economic size, trade openness and the timing and magnitude of climate shock impacts on the balance of payments — makes risk sharing feasible. Because shocks are largely idiosyncratic across the membership, a country experiencing balance-of-payments stress due to climate shock is unlikely to be at the same time as most of its peers. This asymmetry is precisely what makes pooling viable and gives Lifeline its value as a vehicle for South-South cooperation.

Second, the capitalization scenarios demonstrate that Lifeline is financially achievable. Tier 2 and Tier 3 countries together represent nearly 76 percent of the membership, and the analysis shows they can be covered in a meaningful way with a fund ranging from approximately US$435 million to just under US$1 billion, depending on the scenario and distribution policy chosen. Given the majority of the membership is under Tiers 1 and 2, and following the principle of solidarity, we modeled a distribution policy that gives higher coverage for these two groups.

Lifeline contribution can come from a diversified source. First, it should include international reserves from member countries – and other non-member countries that are willing to support Lifeline. Contributions from donor partners and other stakeholders could significantly reduce the burden on member countries while substantially strengthening the facility's firepower. Finally, leverage in the financial markets could also be an option in future stances. The result would be a well-capitalized, rapid-disbursing instrument that enhances macroeconomic stability across some of the world's most climate-vulnerable economies.

## CONCLUSION

The analysis of this report indicates that climate shocks create significant negative, but uneven, balance-of-payments pressures across V20 countries. Heterogeneity in economic size, trade openness, reserve buffers and access to external finance means that shocks are largely idiosyncratic, with limited cross-country synchronization. Most V20 members fall into Tiers 2 and 3, with moderate or smaller financing needs, while only a few Tier 1 countries face large absolute gaps. These differences highlight that a risk pooling of V20 countries could be a strategy to improve macroeconomic stability. Scenario analysis suggests that a facility in the range of US$436.1 million to US$983.5 million could provide substantial coverage under plausible assumptions about post-shock financing gaps and differentiated access rules. This would represent approximately 0.1 percent to 0.2 percent of the group's total international reserves in 2024.

By pooling risks across countries and providing rapid, targeted liquidity support, the Lifeline Fund can strengthen the Global Financial Safety Net for the most vulnerable economies. Capitalization from donors and partners can further supplement the lower reserves of some countries, making the facility operationally feasible while delivering meaningful coverage. In this way, Lifeline offers a practical mechanism to smooth adjustment, preserve critical imports and enhance resilience to climate-induced external shocks across the heterogeneous V20 membership.

## REFERENCES

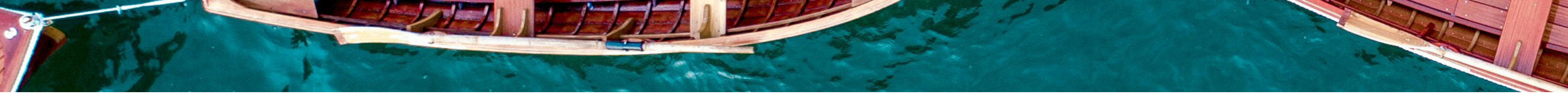
Acevedo, Sebastian, Mico Mrkaic, Natalija Novta, Evgenia Pugacheva, and Petia Topalova. 2020. "The Effects of Weather Shocks on Economic Activity: What Are the Channels of Impact?" *Journal of Macroeconomics* 65 (September): 103207. https://doi.org/10.1016/j.jmacro.2020.103207.

Arslan, Y., Cantú, C. 2019. "The Size of Foreign Exchange Reserves." BIS Papers No 104 https://www.bis.org/publ/bppdf/bispap104a_rh.pdf

Aurazo, José, Rafael Guerra, Pablo Tomasini, Alexandre Tombini, and Christian Upper. 2025. *Environmental Factors and Capital Flows to Emerging Markets*. Bank of International Settlements.

Beirne, John, Nuobu Renzhi, and Ulrich Volz. 2021. "Feeling the Heat: Climate Risks and the Cost of Sovereign Borrowing." *International Review of Economics & Finance* 76 (November): 920–36. https://doi.org/10.1016/j.iref.2021.06.019.

BIS (2023). Climate-related financial risks and global financial stability.



Botzen, W. J. Wouter, Olivier Deschenes, and Mark Sanders. 2019. “The Economic Impacts of Natural Disasters: A Review of Models and Empirical Studies.” *Review of Environmental Economics and Policy* 13 (2): 167–88. https://doi.org/10.1093/reep/rez004.

Cevik, Serhan, and João Tovar Jalles. 2022. “An Apocalypse Foretold: Climate Shocks and Sovereign Defaults.” *Open Economies Review* 33 (1): 89–108. https://doi.org/10.1007/s11079-021-09624-8.

Couharde, C., Delatte, A.-L., Grekou, C., Mignon, V., & Morvillier, F. 2018. “EQCHANGE: A world database on actual and equilibrium effective exchange rates.” *International Economics*, 156, 206–230. https://doi.org/10.1016/j.inteco.2018.03.004

CVF V20. 2022. *Climate Vulnerable Economies Loss Report: Economic Losses Attributable to Climate Change in V20 Economies over the Last Two Decades (2022-2019)*. The Climate Vulnerable Forum and V20 Finance Ministers. https://cvfv20.org/v20-viewpoint-on-premium-and-capital-support-2/.

David, Antonio. 2010. *How Do International Financial Flows to Developing Countries Respond to Natural Disasters?* International Monetary Fund. https://www.imf.org/en/publications/wp/issues/2016/12/31/how-do-international-financial-flows-to-developing-countries-respond-to-natural-disasters-24050.

Dellink, Rob, Hyunjeong Hwang, Elisa Lanzi, and Jean Chateau. 2017. *International Trade Consequences of Climate Change*. OECD Trade and Environment Working Papers No. 2017/01. Vol. 2017/01. OECD Trade and Environment Working Papers. https://doi.org/10.1787/9f446180-en.

EM-DAT, CRED / UCLouvain. 2026. The international disaster database (Version 1/5/2026) [Dataset]. https://www.emdat.be/

Gallagher, Kevin P., Luma Ramos, Anzetse Were, and Marina Zucker Marques. 2024. “Debt Distress and Climate-Resilient Development in Sub-Saharan Africa.” *Journal of African Economies* 33 (Supplement_2): ii8–25. https://doi.org/10.1093/jae/ejae028.

Hallegatte, S., Rentschler, J., & Walsh, B. 2018. Building Back Better: Achieving Resilience through Stronger, Faster and More Inclusive. Washington, D.C. : World Bank Group. http://documents.worldbank.org/curated/en/420321528985115831

Hausman, J. A., & Taylor, W. E. 1981. *Panel Data and Unobservable Individual Effects*. Econometrica, 49(6), 1377. https://doi.org/10.2307/1911406

IMF Committee on Balance of Payments. 2021. *Sustainable Finance: Integrating Measures of Climate Change Risk into External Sector Statistics*. https://www.imf.org/-/media/files/data/statistics/bpm6/approved-guidance-notes/b6-sustainable-finance-integrating-measures-of-climate-change-risk-into-external-sector-statistics.pdf.

IMF (2022). External Sector Report: The Impact of Natural Disasters on External Balances.

IPCC. 2021. *The Physical Science Basis: Working Group I Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Intergovernmental Panel On Climate Change. https://doi.org/10.1017/9781009157896.

IPCC (2023) Summary for Policymakers. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 1-34, doi: 10.59327/IPCC/AR6-9789291691647.001

Jordà, Ò. 2005. Estimation and inference of impulse responses by local projections. *American economic review*, *95*(1), 161-182.

Khan, M. T. I., & Anwar, S. 2022. Natural disasters and foreign exchange reserves: The role of renewable energy and human capital. *Renewable Energy*, *192*, 838-848.

Kling, Gerhard, Ulrich Volz, Victor Murinde, and Sibel Ayas. 2021. "The Impact of Climate Vulnerability on Firms' Cost of Capital and Access to Finance." *World Development* 137 (January): 105131. https://doi.org/10.1016/j.worlddev.2020.105131.

Klomp, Jeroen, and Kay Valckx. 2014. "Natural Disasters and Economic Growth: A Meta-Analysis." *Global Environmental Change* 26 (May): 183–95. https://doi.org/10.1016/j.gloenvcha.2014.02.006.

Mitra, Pritha, Mehdi Raissi, Bruno Versailles, et al. 2025. "Integrating Climate Change into Macroeconomic Analysis:" International Monetary Fund. https://www.imf.org/en/publications/wp/issues/2025/08/26/integrating-climate-change-into-macroeconomic-analysis-a-review-of-impact-channels-data-569996.

Mühlich, Laurissa; Zucker-Marques, Marina; Fritz, Barbara; William N. Kring. 2026. "Global Financial Safety Net Tracker." Boston University Global Development Policy Center, Freie Universität Berlin, the United Nations Conference on Trade and Development and Hochschule für Technik und Wirtschaft Berlin. Retrieved from https://www.bu.edu/gdp/global-financial-safety-fnet-tracker/.

Newey, Whitney K., & West, Kenneth D. 1987. *A Simple, Positive Semi-definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix.* Econometrica, 55(3), 703–708.

NGFS. 2024. *Acute Physical Impacts from Climate Change and Monetary Policy.* Network for Greening the Financial System. https://www.ngfs.net/system/files/import/ngfs/medias/documents/ngfs_acute_physical_impacts_from_climate_change_and_monetary_policy.pdf.

Osberghaus, Daniel. 2019. "The Effects of Natural Disasters and Weather Variations on International Trade and Financial Flows: A Review of the Empirical Literature." *Economics of Disasters and Climate Change* 3 (3): 305–25. https://doi.org/10.1007/s41885-019-00042-2.

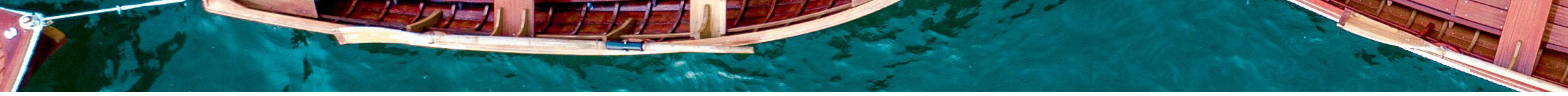
Ranger, Nicola Ann, Olivier Mahul, and Irene Monasterolo. 2022. *Assessing Financial Risks from Physical Climate Shocks*. February 1. https://doi.org/https://doi.org/10.1596/37041.

Schenker, Oliver, and Daniel Osberghaus. 2025. "International Trade and the Transmission of Temperature Shocks." *Environmental and Resource Economics* 88 (4): 965–1007. https://doi.org/10.1007/s10640-025-00957-3.

Schuler, P., Oliveira, L. E., Mele, G., & Antonio, M. (2019). Managing the fiscal risks associated with natural disasters. *Fiscal Policies for Development and Climate Action. Washington, DC: World Bank*, 133-154.

Strobl, E., Ouattara, B., & Kablan, S. A. (2020). Impact of hurricanes strikes on international reserves in the Caribbean. *Applied economics*, *52*(38), 4175-4185.

Task Force on Climate, Development and the IMF. 2023. (R. R. Bhandary & M. Uy, Eds.) The International Monetary Fund, Climate Change and Development: A Preliminary Assessment. World Bank (2022). Financing Rapid Disaster Response in Developing Economies.



# APPENDIX

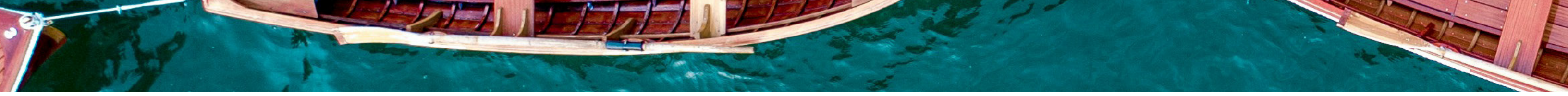
**TABLE A.1** V20 Country Grouping

| Tier 1 | Tier 2 | Tier 3 | SURPLUS | No Data (Trade Balance) |
|---|---|---|---|---|
| Philippines | Colombia | Uganda | St. Lucia | Yemen |
| Pakistan | Ethiopia | Haiti | Cote d'Ivoire | Somalia |
| Bangladesh | Lebanon | Kyrgyz Republic | Suriname | Palestine |
|  | Morocco | Tanzania | Barbados | Gabon |
|  | Nepal | Namibia | Paraguay | Chad |
|  | Guatemala | Niger | Guinea |  |
|  | Kenya | DR Congo | Costa Rica |  |
|  | Jordan | Ghana | Trinidad and Tobago |  |
|  | Afghanistan | Malawi | Papua New Guinea |  |
|  | Sri Lanka | Nicaragua | Vietnam |  |
|  | Dominican Republic | Rwanda |  |  |
|  | Honduras | Liberia |  |  |
|  | Mozambique | Sierra Leone |  |  |
|  | Sudan | Benin |  |  |
|  | Tunisia | Madagascar |  |  |
|  | Cambodia | Togo |  |  |
|  | Senegal | Burkina Faso |  |  |
|  |  | Bhutan |  |  |
|  |  | Fiji |  |  |
|  |  | South Sudan |  |  |
|  |  | Cabo Verde |  |  |
|  |  | Gambia, The |  |  |
|  |  | Timor-Leste |  |  |
|  |  | Guyana |  |  |
|  |  | Comoros |  |  |
|  |  | Tonga |  |  |
|  |  | Vanuatu |  |  |
|  |  | Samoa |  |  |
|  |  | Kiribati |  |  |
|  |  | Mongolia |  |  |
|  |  | Dominica |  |  |
|  |  | Solomon Islands |  |  |
|  |  | Palau |  |  |
|  |  | Marshall Islands |  |  |
|  |  | Nauru |  |  |
|  |  | Tuvalu |  |  |
|  |  | Grenada |  |  |
|  |  | Eswatini |  |  |
|  |  | Maldives |  |  |

**Source:** Own elaboration based on IMF Balance of Payments database.

**TABLE A.2** Local Projection Estimates of the Effect of Climate Shocks (Lagged 1 Year) on the Trade Balance at Horizons H = 0–5 for V20 Countries

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | y | y | y | y | y | y |
| Year — 2001 | 0.923*** | 0.950*** | 1.289*** | 1.254*** | 0.721** | 0.907* |
| | (0.223) | (0.340) | (0.493) | (0.439) | (0.321) | (0.504) |
| Year — 2002 | 0.918*** | 1.210*** | 0.829 | 0.615* | 0.988** | 0.938** |
| | (0.214) | (0.463) | (0.523) | (0.326) | (0.494) | (0.375) |
| Year — 2003 | 1.173*** | 0.724 | 0.213 | 0.851* | 0.961*** | 0.290 |
| | (0.404) | (0.535) | (0.408) | (0.498) | (0.358) | (0.431) |
| Year — 2004 | 0.701 | 0.129 | 0.536 | 0.852** | 0.277 | 0.561** |
| | (0.468) | (0.440) | (0.559) | (0.360) | (0.417) | (0.229) |
| Year — 2005 | 0.101 | 0.449 | 0.575 | 0.247 | 0.559*** | 0.557* |
| | (0.325) | (0.580) | (0.501) | (0.416) | (0.164) | (0.325) |
| Year — 2006 | 0.397 | 0.488 | -0.0493 | 0.468*** | 0.521* | 0.527 |
| | (0.492) | (0.460) | (0.368) | (0.176) | (0.281) | (0.393) |
| Year — 2007 | 0.447 | -0.197 | 0.182 | 0.418 | 0.436 | 0.160 |
| | (0.355) | (0.298) | (0.373) | (0.290) | (0.336) | (0.189) |
| Year — 2008 | -0.220 | 0.120 | 0.198 | 0.449 | 0.113 | 0.0635 |
| | (0.419) | (0.318) | (0.337) | (0.345) | (0.119) | (0.179) |
| Year — 2010 | -0.0112 | -0.0266 | -0.323 | -0.110 | 0.0215 | 0.350* |
| | (0.324) | (0.338) | (0.338) | (0.0752) | (0.194) | (0.210) |
| Year — 2011 | -0.0940 | -0.389 | -0.375 | -0.00462 | 0.310 | 0.327 |
| | (0.319) | (0.301) | (0.349) | (0.184) | (0.286) | (0.322) |
| Year — 2012 | -0.479*** | -0.450 | -0.327 | 0.333 | 0.388 | 0.301 |
| | (0.175) | (0.303) | (0.409) | (0.286) | (0.392) | (0.432) |
| Year — 2013 | -0.547*** | -0.299 | 0.00835 | 0.312 | 0.359 | -0.299 |
| | (0.174) | (0.340) | (0.491) | (0.404) | (0.448) | (0.289) |
| Year — 2014 | -0.415* | -0.0409 | -0.00915 | 0.343 | -0.305 | -0.0842 |
| | (0.246) | (0.422) | (0.523) | (0.445) | (0.300) | (0.349) |
| Year — 2015 | -0.120 | -0.0236 | 0.00340 | -0.306 | 0.00429 | 0.359 |
| | (0.374) | (0.500) | (0.557) | (0.288) | (0.379) | (0.536) |
| Year — 2016 | -0.141 | -0.275 | -0.653 | -0.0682 | 0.448 | -0.0398 |
| | (0.432) | (0.486) | (0.412) | (0.367) | (0.549) | (0.326) |
| L1_lnDamage | 0.0455 | -0.0999*** | -0.0563 | -0.0696** | -0.0119 | 0.0184 |
| | (0.0625) | (0.0324) | (0.0440) | (0.0345) | (0.0475) | (0.0341) |
| GDP_growth | -0.00360 | -0.00527 | -0.0231 | 0.0289* | 0.0285 | -0.0484 |
| | (0.0243) | (0.0227) | (0.0281) | (0.0150) | (0.0180) | (0.0397) |



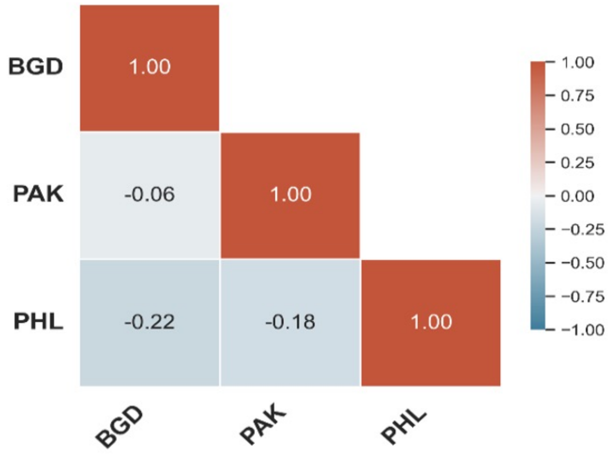
| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | y | y | y | y | y | y |
| real effective exchange rate, CEPII, 2010=100 | -0.00473 | -0.00426 | -0.00463 | -0.00845 | -0.0112 | -0.0107 |
| | (0.00513) | (0.00498) | (0.00501) | (0.00732) | (0.00880) | (0.00773) |
| group (Country) | -0.000320 | -0.000874 | 0.00211 | 0.00302 | 0.00206 | -0.00125 |
| | (0.0117) | (0.0113) | (0.0116) | (0.0124) | (0.0129) | (0.0125) |
| Observations | 800 | 813 | 825 | 835 | 843 | 845 |
| sigma_u | 2.176 | 2.048 | 2.001 | 2.006 | 2.082 | 2.144 |
| sigma_e | 1.897 | 1.935 | 1.986 | 1.962 | 2.015 | 2.053 |
| rho | 0.568 | 0.528 | 0.504 | 0.511 | 0.516 | 0.521 |

**Source:** Own elaboration based on IMF Balance of Payments dataset (2021), EM-DAT (2026), IMF World Economic Outlook (2025) and CEPII (Couharde et al. 2018).

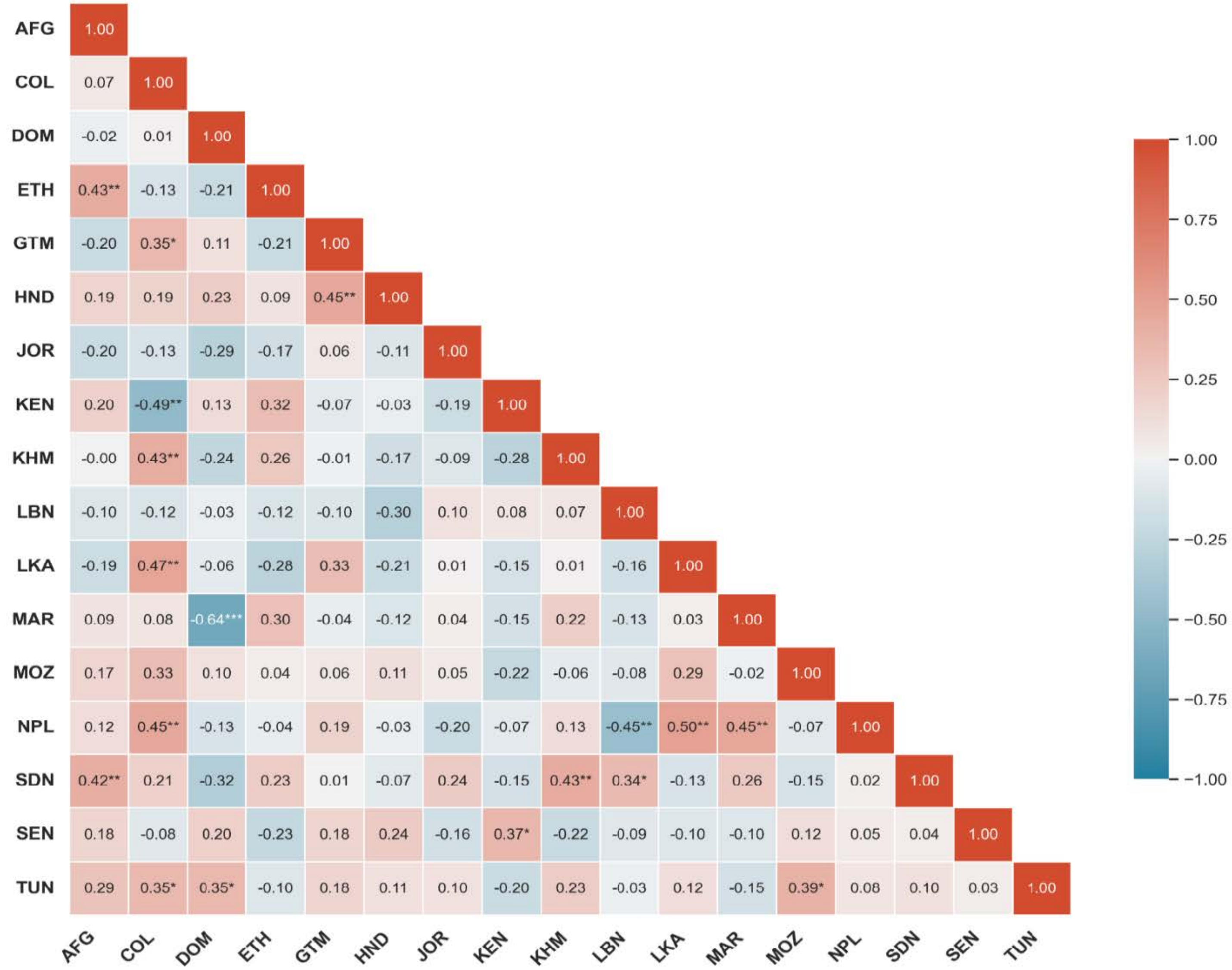
**Note:** Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

**FIGURE A.3** Correlation Matrix of Climate Shock in V20 Countries, 2000-2024

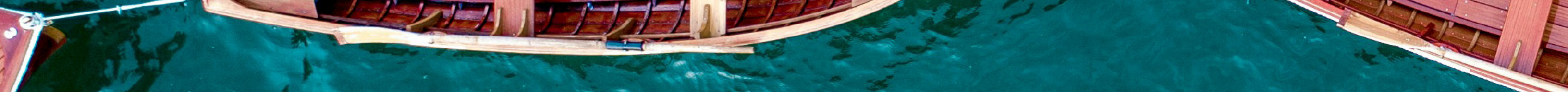
A.3.1 Tier 1



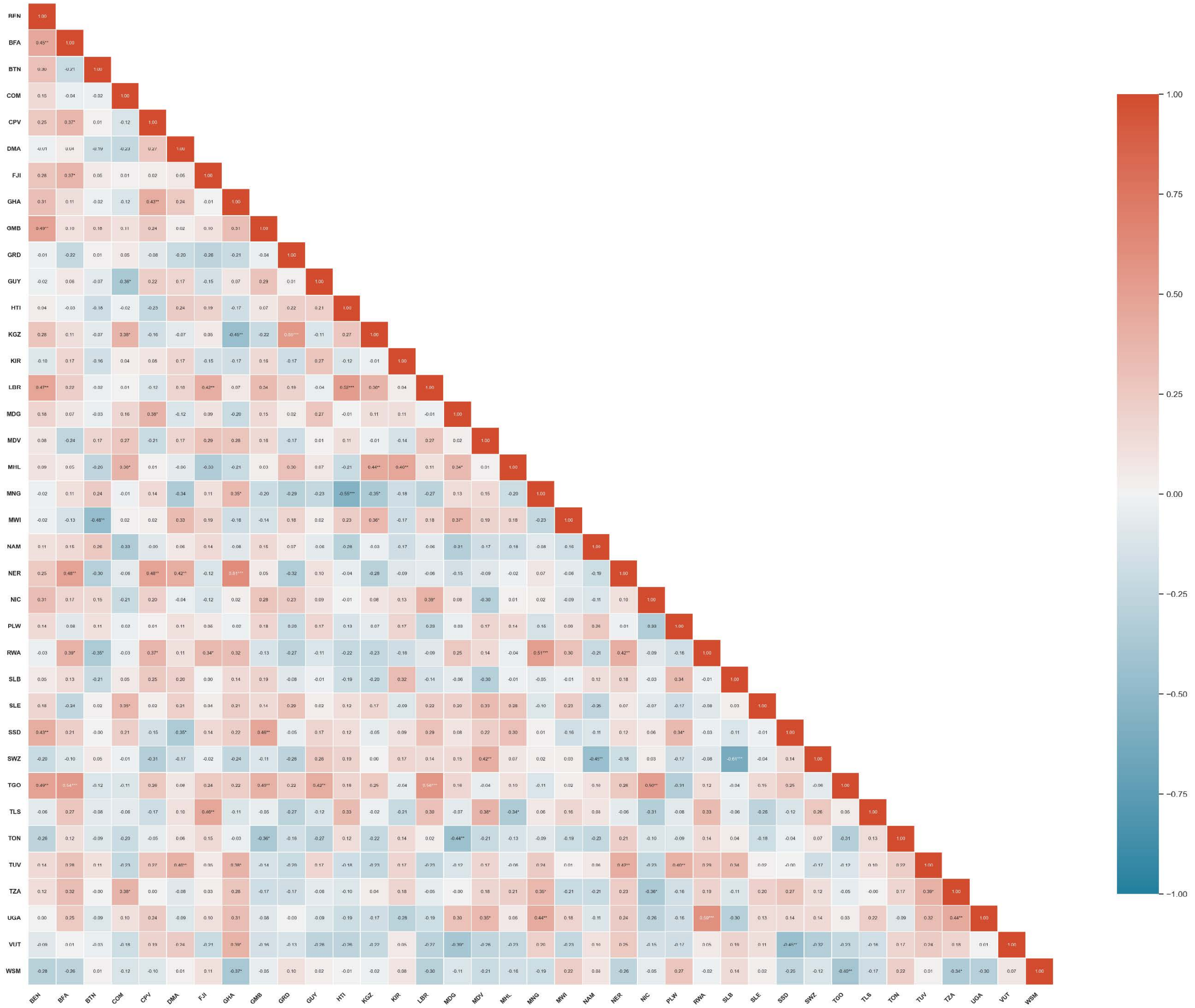
A.3.2 Tier 2



| | AFG | COL | DOM | ETH | GTM | HND | JOR | KEN | KHM | LBN | LKA | MAR | MOZ | NPL | SDN | SEN | TUN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AFG | 1.00 | | | | | | | | | | | | | | | | |
| COL | 0.07 | 1.00 | | | | | | | | | | | | | | | |
| DOM | -0.02 | 0.01 | 1.00 | | | | | | | | | | | | | | |
| ETH | 0.43** | -0.13 | -0.21 | 1.00 | | | | | | | | | | | | | |
| GTM | -0.20 | 0.35* | 0.11 | -0.21 | 1.00 | | | | | | | | | | | | |
| HND | 0.19 | 0.19 | 0.23 | 0.09 | 0.45** | 1.00 | | | | | | | | | | | |
| JOR | -0.20 | -0.13 | -0.29 | -0.17 | 0.06 | -0.11 | 1.00 | | | | | | | | | | |
| KEN | 0.20 | -0.49** | 0.13 | 0.32 | -0.07 | -0.03 | -0.19 | 1.00 | | | | | | | | | |
| KHM | -0.00 | 0.43** | -0.24 | 0.26 | -0.01 | -0.17 | -0.09 | -0.28 | 1.00 | | | | | | | | |
| LBN | -0.10 | -0.12 | -0.03 | -0.12 | -0.10 | -0.30 | 0.10 | 0.08 | 0.07 | 1.00 | | | | | | | |
| LKA | -0.19 | 0.47** | -0.06 | -0.28 | 0.33 | -0.21 | 0.01 | -0.15 | 0.01 | -0.16 | 1.00 | | | | | | |
| MAR | 0.09 | 0.08 | -0.64*** | 0.30 | -0.04 | -0.12 | 0.04 | -0.15 | 0.22 | -0.13 | 0.03 | 1.00 | | | | | |
| MOZ | 0.17 | 0.33 | 0.10 | 0.04 | 0.06 | 0.11 | 0.05 | -0.22 | -0.06 | -0.08 | 0.29 | -0.02 | 1.00 | | | | |
| NPL | 0.12 | 0.45** | -0.13 | -0.04 | 0.19 | -0.03 | -0.20 | -0.07 | 0.13 | -0.45** | 0.50** | 0.45** | -0.07 | 1.00 | | | |
| SDN | 0.42** | 0.21 | -0.32 | 0.23 | 0.01 | -0.07 | 0.24 | -0.15 | 0.43** | 0.34* | -0.13 | 0.26 | -0.15 | 0.02 | 1.00 | | |
| SEN | 0.18 | -0.08 | 0.20 | -0.23 | 0.18 | 0.24 | -0.16 | 0.37* | -0.22 | -0.09 | -0.10 | -0.10 | 0.12 | 0.05 | 0.04 | 1.00 | |
| TUN | 0.29 | 0.35* | 0.35* | -0.10 | 0.18 | 0.11 | 0.10 | -0.20 | 0.23 | -0.03 | 0.12 | -0.15 | 0.39* | 0.08 | 0.10 | 0.03 | 1.00 |



## A.3.3 Tier 3



**Source:** Own elaboration based on EM-DAT (2026).

TCD IFA

**TASK FORCE ON CLIMATE, DEVELOPMENT AND THE INTERNATIONAL FINANCIAL ARCHITECTURE**

gdpcenter.org/TaskForce