

MACRO RESEARCH FOR DEVELOPMENT
An IMF-FCDO Collaboration



Country Application: DIGNAD Application to Democratic Republic of Congo (DRC) in the Context of the Resilience and Sustainability Facility (RSF)

The impact of ex-ante climate adaptation investments on growth and public debt were analyzed using the Debt-Investment-Growth and Natural Disasters (DIGNAD) model, as featured in *The Benefit of Investment in Adaptation: Results from DIGNAD Simulations* (Box 2) in the [IMF Country Report for the Democratic Republic of Congo](#). The simulations demonstrate that while greater investment in resilient infrastructure initially results in a similar trajectory for real GDP and public debt during the years of the RSF program, it leads to better outcomes once an exogenous natural disaster occurs.

Adaptation capital enhances economic resilience by mitigating the disaster's impact on output, reducing the decline by 0.8 percentage points of steady-state GDP through more contained damage to physical assets. Additionally, these investments contribute to a sustained increase in GDP over the long term by maintaining a higher level of capital.

Technical Assistance Report: Bank of Ghana Forecasting and Policy Analysis System (FPAS)

The Technical Assistance (TA) report presents the outcomes of the multi-year [Bank of Ghana \(BOG\) Forecasting and Policy Analysis System \(FPAS\)](#) macroframeworks TA project, conducted between late 2019 and mid-2024 over a total of seven missions. Four sessions were held virtually and three took place in person.

The project aimed to enhance and build new institutional capacity for model-based policy analysis and macroeconomic forecasting, integrating these capabilities into monetary policy processes and external communications. The project has contributed to building strong analytical capabilities among BOG staff to support policymakers. Model-based analysis plays an important role in BOG's internal deliberations and serves as a key input in forward-looking monetary policy formulation, including regular external communications.

Remaining recommendations focus on ensuring the sustainability of the FPAS framework and further streamlining external communications.

Course: Climate in Macroeconomic Frameworks

As part of the *Climate in Macroeconomic Frameworks* course, Azar Sultanov delivered a training on the [Debt, Investment, Growth, and Natural Disaster \(DIGNAD\)](#) model—also known as the DIGNAD toolkit—on February 6, 2025, at the IMF headquarters in Washington, D.C. The toolkit, an FCDO-financed product, helps users assess debt sustainability risks in the aftermath of natural disasters while addressing the need to rebuild public infrastructure within a robust general equilibrium framework. It also facilitates the analysis of ex-ante policies, such as investing in climate adaptation infrastructure, enhancing fiscal buffers, and improving public investment efficiency. This makes it a valuable tool for analysts conducting tailored assessments of macro-fiscal impacts related to natural disasters and resilience-building investments.

This was the first pilot delivery of the course in a blended format, combining virtual and in-person instruction. The blended format included a two-week self-paced virtual component, equipping 38 participants from 36 countries with essential skills in *Financial Programming and Policies* as well as the *Debt Dynamic Tool*, followed by a one-week in-person session focused on *Climate in Macroeconomic Frameworks*. Participants provided positive feedback, emphasizing the high quality of the course content.

The IMF Working Paper (WP) [Quarterly Projection Model for the Bank of Ghana: Extensions and Applications](#), co-authored by IMF and Bank of Ghana (BOG) staff, documents the latest extensions to the BOG's *Quarterly Projection Model (QPM)*, which is regularly used for policy analysis and forecasting in support of the Bank's policy processes.

The model's GDP decomposition separates the agriculture and oil sectors—largely influenced by exogenous and international developments—from non-agriculture, non-oil activities, which are more relevant to the central bank's assessment of the business cycle position. Additionally, the model explicitly accounts for inter-sectoral price spillovers and their role in shaping inflation expectations, with important policy insights.

Specific applications of the extended QPM model—including impulse response functions, simulations of shocks affecting agricultural production (such as climate disruptions), and counterfactual simulations to evaluate recent policy choices—demonstrate its usefulness. These extensions provide a more detailed account of economic developments, enhance forecast coverage, broaden the underlying narrative, and thus strengthen the BOG's forward-looking policy framework.

Working Paper: The Macroeconomic and Welfare Benefits of Building Resilience in Disaster-Prone Developing Countries

Natural disasters often impose significant economic costs, reversing years of investment in developing countries. Yehenev Endegnanew, Rafael D Goncalves, Samuel Mann, Marina Mendes Tavares, and Harold Zavarce explore this challenge in their IMF WP [The Macroeconomic and Welfare Benefits of Building Resilience in Disaster-Prone Developing Countries](#).

The paper develops a multi-sector DSGE model to study the macroeconomic and welfare implications of financing resilience-building through different fiscal instruments. The model incorporates key characteristics of developing economies, including a large, low-productivity rural sector, an incomplete credit market, and a substantial informal sector. The findings suggest that while investing in resilience capital in a disaster-prone country entails high economic costs, it ultimately enhances welfare. However, the choice of financial instrument for mobilizing revenue plays a crucial role in shaping its impact.

Working Paper: Transport Frictions and the Pass-Through of Global Price Shocks in a Spatial Model of Low-Income Countries

Lisa Martin, Christopher Adam, and Douglas Gollin published their work [Transport Frictions and the Pass-Through of Global Price Shocks in a Spatial Model of Low-Income Countries](#) as part of the IMF WP series. The paper develops a spatial dynamic general equilibrium model of a small open agricultural economy to examine the impact of global food, fuel, and fertilizer price shocks on household consumption patterns across different regions. The analysis considers alternative fiscal responses, including direct price subsidies and household transfers.

The authors find strong spatial heterogeneity in response to shocks, with important welfare implications. Specifically, while urban households' consumption baskets are more directly affected by global food price shocks, remote rural households are more vulnerable to supply-side disruptions from fuel and fertilizer price shocks, which impact both production and consumption.

Working Paper: Shocks and Shields: Macroeconomic Institutions During Commodity Price Swings

Economic orthodoxy suggests that countries should smooth commodity price shocks through macroeconomic planning. In practice, however, responses vary. In their IMF WP [Shocks and Shields: Macroeconomic Institutions During Commodity Price Swings](#), Rabah Arezki and co-authors find that while countries adapt to commodity price fluctuations, their responses do not always align with conventional theory.

Using a panel dataset covering 182 economies from 1970 to 2021, the study examines the impact of exogenous commodity price shocks on fiscal rules and financial openness. The findings reveal that countries experiencing positive net export price shocks are more likely to adopt fiscal rules but also tend to close their capital accounts—prioritizing stability over liberalization. Notably, this effect is asymmetric: high-income countries lead in fiscal rule adoption, while low-income countries remain more exposed to volatility.

Working Paper: Foreign Aid and (Big) Shocks: Evidence from Natural Disasters

What drives foreign aid? This is an important question, given the critical role of foreign aid in supporting the most vulnerable countries, particularly in times of crisis. Rabah Arezki and co-authors tried to shed light on the issue in an IMF

WP titled [Foreign Aid and \(Big\) Shocks: Evidence from Natural Disasters](#), which analyzes bilateral aid flows from 1995 to 2021 using natural disasters as exogenous shocks.

Drawing on data from EM-DAT and OECD-DAC, the study shows that while aid commitments rise after disasters, they do not necessarily go where the devastation is greatest. While humanitarian aid tends to increase in the aftermath, structural aid—essential for long-term recovery—remains stagnant. The findings suggest that factors such as donor-recipient political alignment play a role in determining aid flows, often more than economic need or state capacity. Despite their heightened vulnerability, low-income countries do not receive proportionally more aid. To enhance effectiveness, aid allocation should prioritize needs-based approaches over political considerations, with a stronger emphasis on building resilience in low-income countries before disasters occur.

Working Paper: State Capacity and Growth Regimes

Does strong state capacity guarantee economic growth? Not necessarily. The IMF WP [State Capacity and Growth Regimes](#) by Patrick A. Imam and Jonathan R.W. Temple explores the role of state capacity and governance systems in shaping growth outcomes. While high state capacity helps sustain growth and limit the risk of economic collapse, the study suggests that democratic governance often matters more.

Using a Markov chain model and data from 108 developing countries over five decades, the study examines how countries transition between growth, stagnation, and collapse. The findings suggest that while high-capacity states tend to be more stable, they are not immune to crisis. Autocratic regimes with strong institutions can still face downturns, whereas democracies—even those with relatively weaker state capacity—tend to avoid deep and prolonged declines. This is attributed to democracy's ability to allow course correction through leadership change.

Crucially, state capacity is not static—countries are not bound to a predetermined trajectory. Although it evolves slowly, investing in both strong institutions and democratic governance can support sustained growth, particularly in low-income countries.

Working Paper: Foreign Aid and Conflicts: The Effects of 9/11 on Donor Behavior

Foreign aid is intended to respond to need, yet in practice, geopolitical factors also shape its distribution. In their IMF WP [Foreign Aid and Conflicts: The Effects of 9/11 on Donor Behavior](#), Rabah Arezki, Youssef Camara, Patrick Imam, and Kangni Kpodar uncover a notable shift: before 2001, aid commitments declined when armed conflicts erupted. After 9/11, however, they increased.

Using a gravity model of bilateral aid flows from 1980 to 2021, the study finds that this reversal was primarily driven by grants rather than loans, with humanitarian and health aid seeing the largest increases. The findings suggest that donor priorities play a significant role in shaping aid flows, sometimes outweighing recipient needs.

Low-income countries, often the most affected by conflict, remain vulnerable to these shifting priorities. To enhance its impact, foreign aid should be aligned with long-term development needs rather than short-term geopolitical considerations.

External Presentation: Changing Global Linkages: Bridging Geopolitical Fragments

The new paper [Changing Global Linkages: Bridging Geopolitical Fragments](#) by Gita Gopinath, Pierre-Olivier Gourinchas, Andrea Presbitero, and Petia Topalova was presented at the [American Economic Association Annual Meeting](#) in San Francisco in January 2025. The recent surge in geopolitical tensions and trade restrictions has raised important questions about the global allocation of production, investment, and trade across countries.

Using bilateral sectoral data on foreign direct investment (FDI), trade, and trade-distortive measures over the past decade, the paper finds that countries have responded to export restrictions by shifting production to third countries whose exports face fewer import restrictions from their trading partners. The findings show that while FDI flows are becoming more fragmented along geopolitical lines, they are also responding to trade restrictions by relocating to countries that can act as both producers and 'connectors'.

External Presentation: Knowledge Diffusion Through FDI: Worldwide Firm-Level Evidence

The paper [Knowledge Diffusion Through FDI: Worldwide Firm-Level Evidence](#) by Jaebin Ahn, Chan Kim, Nan Li, and Andrea Manera was also presented at the [American Economic Association Annual Meeting](#) in San Francisco in January 2025.

Using novel firm-level data that combines global patent records with project-level FDI data, the paper finds that FDI significantly enhances knowledge flows both to and from investing firms. However, there is substantial heterogeneity in FDI spillovers: host countries with higher innovation capacity or greater technological similarity to the investing firm benefit the most, while lower-income countries with limited absorptive capacity capture fewer gains.

External Presentation: Do Capital Inflows Spur Technology Diffusion? Evidence from a New Technology Adoption Index

Gabriela Cugat presented the IMF WP [Do Capital Inflows Spur Technology Diffusion? Evidence from a New Technology Adoption Index](#) at the Research Institute for Development, Growth and Economics (RIDGE) [2024 December Forum GDM/International Trade Workshop](#). The paper was also presented at the [American Economic Association Annual Meeting](#) in San Francisco in January 2025.

Co-authored with Andrea Manera, the paper introduces the Embodied Technology Imports Indicator (ETI), a novel measure of technology adoption spanning 181 countries from 1970-2020. The ETI leverages patent data from PATSTAT and trade data from COMTRADE to quantify the technological intensity of imports, with a focus on developing economies.

The study examines the relationship between capital flows and technology diffusion in emerging markets and low-income countries. Using a local projection difference-in-differences approach, the authors find that changes in capital flow regulations lead to a 7-9 percentage point increase in technological intensity over 5-10 years. This is accompanied by a 28-33 percentage point rise in gross capital inflows and a 9-12 percentage point increase in Real GDP per capita (in PPP terms). The findings highlight the important role of capital flow regulations, particularly FDI, in promoting technology adoption in developing countries.

Internal Presentation: Scaling Up Investment, Enhancing Growth, Debt Sustainability, and Climate Resilience in Senegal

On February 19, 2025, Samuele Rosa from IMF's Senegal Team, in collaboration with Azar Sultanov from the Research Department, and Chen Chen and Tolga Tiryaki from the IMF's Institute for Capacity Development, delivered an internal presentation to IMF staff as part of the AFR Seminar Series. The presentation, titled *Scaling Up Investment, Enhancing Growth, Debt Sustainability, and Climate Resilience in Senegal*, was organized by the African Department and chaired by Edward Gemayel.

The team applied the [DIGNAR \(Debt-Investment-Growth and Natural Resources\)](#) and [DIGNAD \(Debt- Investment-Growth and Natural Disasters\)](#) frameworks—both FCDO-financed products—to model the impact of sustained public investment and a set of reforms in Senegal. These reforms include improving public investment efficiency, increasing tax revenues, and reducing untargeted energy subsidies. The frameworks illustrate how these measures can promote economic growth while ensuring debt sustainability. Additionally, the analysis explores how climate adaptation investments can further enhance Senegal's resilience to climate change, support sustained economic growth and reduce inequality in the face of extreme weather events.

The views expressed in this newsletter are those of the contributors and do not necessarily represent the views of the International Monetary Fund (IMF), or UK's Foreign, Commonwealth and Development Office (FCDO). For more information, please contact MacroResDev@imf.org or visit the IMF-FCDO Macroeconomic Research for Development [website](#).