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Left Behind by Design? Climate Vulnerability and Institutional Barriers in Global Environment Facility Financing

By

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Abstract: This paper examines whether Global Environment Facility (GEF) financing systematically disadvantages climate-vulnerable and low-capacity countries, and whether this operates through GEF's own grant allocation or co-financiers' independent decisions. By using 3,581 single-country GEF projects approved between 1996 and 2026, it estimates OLS regressions examining how governance quality and climate vulnerability predict GEF grant size and co-financing separately. Co-financing correlates to higher Government Effectiveness and Regulatory Quality, while grant allocation is negatively associated with Control of Corruption, Rule of Law, and Political Stability. This suggests that the two channels respond to different governance signals. A vulnerability penalty is identified across both outcomes but is consistently larger for grants, implying that GEF's own allocation disadvantages vulnerable countries at least as much as external co-financiers. Social readiness predicts co-financing but not grants, while economic readiness shows the opposite pattern, suggesting that the two channels impose different institutional barriers on recipient countries.

Key words: Climate Finance, Co-Financing, Global Environment Facility, Governance Quality, Climate Vulnerability

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Acronyms and Abbreviations

AR5	Fifth Assessment Report (IPCC)
CC	Control of Corruption (WGI dimension)
FCIF	Climate Investment Funds
CPI	Country Performance Index (STAR)
DFI	Development Finance Institution
FE	Fixed Effects
GBI	Global Benefits Index (STAR)
GCF	Green Climate Fund
GDP	Gross Domestic Product
GDPI	Gross Domestic Product Index (STAR)
GE	Government Effectiveness (WGI dimension)
GEF	Global Environment Facility
GHG	Greenhouse Gases
IPCC	Intergovernmental Panel on Climate Change
LDC	Least Developed Country
MDB	Multilateral Development Bank
MOPAN	Multilateral Organisation Performance Assessment Network
ND-GAIN	Notre Dame Global Adaptation Initiative
OLS	Ordinary Least Squares
OFP	Operational Focal Points
PS	Political Stability (WGI dimension)
RQ	Research Question
RL	Rule of Law (WGI dimension)
RegQ	Regulatory Quality (WGI dimension)
SD	Standard Deviation
SE	Standard Error
SIDS	Small Island Developing States
SREX	Special Report on Managing the Risks of Extreme Events (IPCC)
STAR	System for Transparent Allocation of Resources
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
VA	Voice and Accountability (WGI dimension)
WGI	World Governance Indicators

1. Introduction

A core principle of international climate finance is that support should reach the countries most exposed to climate change and least able to respond to it. That is the explicit commitment of international climate agreements, from the 1992 United Nations Framework Convention on Climate Change (UNFCCC) and the 2015 Paris Agreement (United Nations, 1992, 2015). In practice, however, this is not always the case. Instead of funding going to the most vulnerable countries, it tends to end up in contexts with stronger institutions and better governance, effectively leaving behind the fragile and conflict-affected states that, arguably, need it most (Garschagen & Doshi, 2022; Prasad & Singhania, 2026). Empirical assessments of major multilateral funds find very limited overlap between the ten most climate-vulnerable countries and the top ten recipients of climate finance (Lee et al., 2023). In fact, the distribution of funding shows a fairly counterintuitive pattern where moderately vulnerable countries receive more than the most vulnerable ones (Islam, 2022). So, in other words, the countries with the greatest need are structurally and persistently not the ones receiving the most support.

The scale of the climate challenge makes this misalignment between need and allocation even more relevant. Climate finance flows in 2024 amounted to approximately $2 trillion USD, roughly 1.8% of global GDP ((Climate Policy Initiative, 2025; World Bank, 2026a). Yet there are estimates that suggest that at least $8-9 trillion per year will be needed by 2030 to meet global climate goals (Buchner et al., 2023). This funding shortfall is especially important considering that it impacts the countries least responsible for causing climate change the most. For example, the world's 74 lowest-income countries account for only around 10% of global greenhouse gas (GHG) emissions, but face some of the most severe climate impacts (Bhargawa & Bhargava, 2023). The Intergovernmental Panel on Climate Change (IPCC) warns that populations in Sub-Saharan Africa, South Asia, and low-lying island nations face growing risks of food insecurity, water scarcity, and economic loss (IPCC, 2023), and without adequate financial support, climate change could displace over 200 million people by 2050 and push 130 million into poverty (Bhargawa & Bhargava, 2023). The gap between who is responsible for climate change and who bears the brunt of its consequences makes the question of how climate finance is allocated not only a technical issue but also an essential question of global justice.

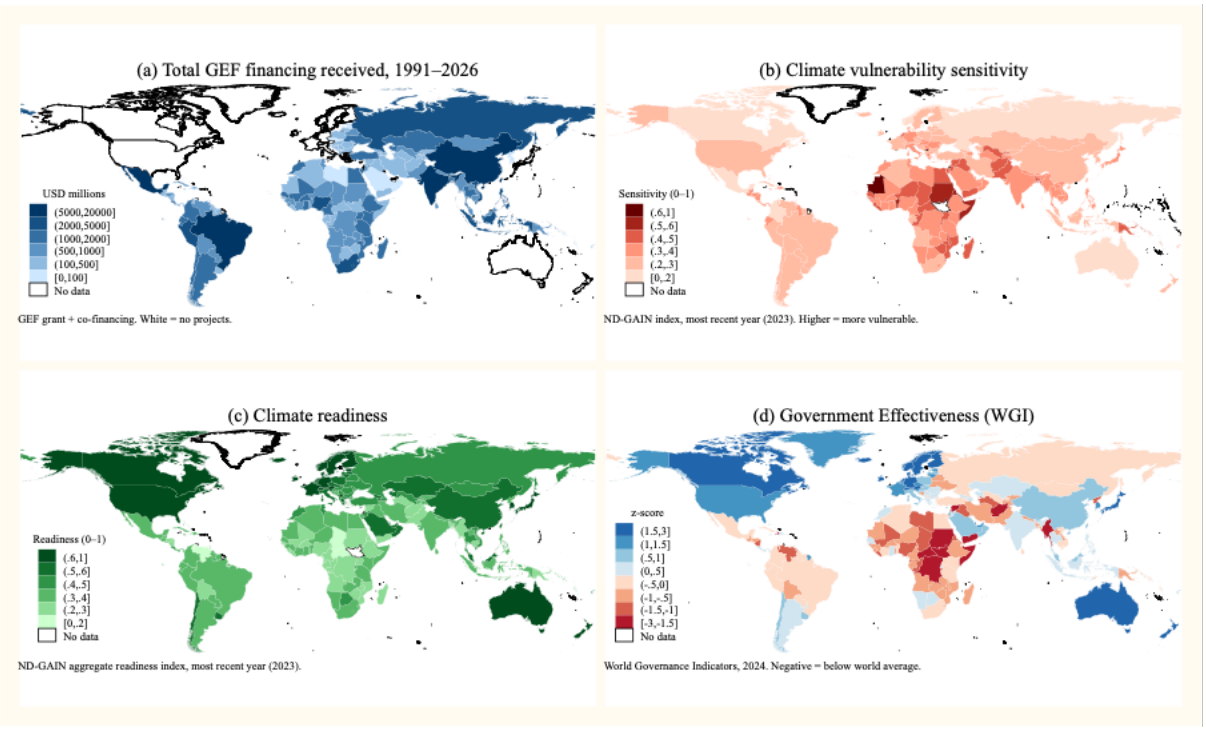

***Figure 1**: GEF Financing, Climate Vulnerability, Readiness and Governance*

Figure 1 graphically represents the tension between need and climate finance allocation. Panel (a) shows total climate financing received from the Global Environment Facility between 1991 and 2026, with the largest recipients concentrated in Asia and Latin America. Panel (b) shows climate vulnerability sensitivity, where the highest vulnerability is concentrated in Sub-Saharan Africa and parts of South and Southeast Asia, the same regions that appear comparatively light in panel (a). Panels (c) and (d) show climate readiness and Government Effectiveness, respectively, both of which are lowest in the regions where vulnerability is highest. The mismatch between financing and vulnerability is the backbone of the issue this paper examines.

A potential driver of this misalignment of vulnerability and recipients is the growing focus on co-financing ratios in multilateral climate funds. Co-financing in this context refers to the additional resources that external actors (e.g., development banks, bilateral donors, and private investors) contribute beyond the grant. This is the case for the Global Environment Facility (GEF). The GEF was established in 1991 and is one of the world's largest multilateral environmental funds, with 186 member countries, 40 donor countries, and recipients spanning the full range of developing nations and economies in transition (GEF, 2026a). It works at a global scale, providing grants for projects that promote environmental benefits in areas such as climate change, biodiversity, and land degradation (GEF, 2026a; Kotchen & Negi, 2019).

Importantly, it serves as a financial mechanism for several major multilateral environmental conventions, including the UNFCCC, and is therefore expected to reflect the Convention's commitment to prioritizing the most vulnerable developing countries in its grant allocation (GEF, 2026c; United Nations, 1992). Another important feature of the GEF's model is its co-financing mandate, which states that, along with each grant, recipient countries are expected to mobilize additional capital from external sources. Specifically, under GEF-6 (adopted in 2014), this was formalized as a 6:1 target, with six dollars of external capital set as the goal for every dollar of GEF grant across the portfolio as a whole. Co-financing ratios have since become a central metric through which donors evaluate the GEF's performance, making the ability to attract external co-financiers increasingly important to a country's access to GEF resources (GEF, 2018b; Kotchen & Negi, 2019).

The co-financing mandate is based on the idea that concessional public grants can absorb risk and costs, making projects more financially attractive to external investors (Attridge & Engen, 2019). In theory, this allows the GEF to multiply its limited resources and extend its reach. However, since external co-financiers are not obliged to adhere to the GEF's (or rather UNFCCCs) equity mandate, there is a structural tension. Because many external actors are profit-oriented and respond to their own risk assessments and return requirements, they tend to avoid countries with weak institutions, political instability, and high transaction costs (Attridge & Engen, 2019; Gabor, 2021). Often, donors and multilateral funds direct resources toward countries with strong institutions and solid administrative capacity, because these characteristics reduce the risk of project failure and increase confidence that funds will be used effectively (Garschagen & Doshi, 2022; Prasad & Singhania, 2026). Countries that lack this capacity face constant barriers to accessing climate finance. Moreover, when they do receive funding, weak institutional readiness often forces them to work through international intermediaries rather than their own national institutions, consequently undermining local ownership and limiting the ability to build capacity over time (Garschagen & Doshi, 2022). This dynamic is especially relevant for the GEF, where both the fund's own internal allocation criteria and the independent preferences of external co-financiers are shaped by governance quality, potentially in very different ways.

1.1. Aim and scope

There is a growing body of literature on co-financing in multilateral climate funds, but two important gaps remain. The first concerns the decomposition of financing outcomes. Most existing studies examine co-financing as a single outcome without separating GEF's own grant allocation from that of co-financiers (Cui et al., 2020; Kotchen & Negi, 2019; Miller & Yu, 2012). This means we have limited knowledge on whether specific governance signals drive GEF's internal allocation criteria, co-financiers' independent behavior, or both. Since the GEF and its co-financiers operate under fundamentally different logics, with one being guided by an equity mandate and the other more often by market returns, the answer may have some direct implications for policy. The second gap concerns the equity dimension of this. While the literature documents a disconnect between climate vulnerability and finance allocation (Beynon, 2025; Garschagen & Doshi, 2022; Islam, 2022), no study, to my knowledge, has examined whether this vulnerability disadvantage differs between GEF grants and co-financing amounts. This distinction is important because it makes it possible to isolate which actor is driving the vulnerability penalty, and to design policy responses depending on where the problem originates.

This paper aims to address these gaps. Using a dataset of 3,581 single-country GEF projects approved between 1996 and 2026 across 156 countries, it estimates Ordinary Least Squares (OLS) regressions that examine how governance quality, climate vulnerability, and readiness predict two distinct outcomes (GEF grant size and total co-financing). It uses six different measures of governance quality, sourced from the World Governance Indicators (WGI) from the World Bank. This design allows both research questions to be answered from the same set of regressions, with the governance coefficients addressing the first research question and the vulnerability and readiness coefficients addressing the second.

1.2. Research Questions

The two research questions this paper aims to address are the following:

RQ1: Which dimensions of governance quality predict GEF co-financing mobilization and grant allocation, and do co-financiers and the GEF respond to different governance signals?

RQ2*:* Conditional on governance quality, does GEF co-financing systematically disadvantage climate-vulnerable countries, and does this pattern reflect GEF's own grant allocation, co-financiers' independent decisions, or both?

1.3. Findings and contributions

The empirical analysis finds that co-financing is significantly predicted by Government Effectiveness and Regulatory Quality, both of which signal market-friendly regulatory conditions, whereas GEF grant allocation is significantly and negatively predicted by Control of Corruption, Rule of Law, and Political Stability. In other words, GEF and its co-financiers respond to completely different governance signals. Co-financiers reward regulatory capacity while GEF grants tend to go to countries with weaker accountability and stability scores, consistent with a needs-based logic. For vulnerability, a significant penalty is observed across both outcomes, as more vulnerable countries receive both smaller grants and less co-financing. Notably, the penalty is consistently larger for grants than for co-financing. This suggests that GEF's own allocation decisions disadvantage vulnerable countries at least as much as, if not more than, the independent decisions of external co-financiers. The results also reveal an asymmetric readiness premium where social readiness predicts co-financing but not grants, and economic readiness predicts grants but not co-financing. These findings suggest that the two channels impose different institutional barriers on recipient countries. Addressing the equity problem in GEF financing will therefore need to target both fronts, for instance by differentiating co-financing requirements based on country capacity and vulnerability and reconsidering how institutional capacity is weighted in grant allocation criteria.

Overall, the findings contribute to the literature by providing a systematic breakdown of governance effects on GEF financing across grant allocation and co-financier behavior, showing that the two channels respond to different institutional signals. Second, this paper provides evidence that climate vulnerability penalizes GEF grant allocation itself, not just co-financing, and that this penalty is robust across all governance specifications. Finally, the findings offer empirical support for previous warnings in the literature that GEF's co-financing model places disproportionate institutional demands on vulnerable countries, contributing to the ongoing policy debate on whether the leverage model is compatible with the fund's mandate to support the most climate-vulnerable developing countries.

1.4. Outline of Thesis

The remainder of the paper is structured as follows: Section 2 presents an overview and contextualizes the relevant literature on climate finance equity, co-financing mechanisms, governance quality, and the GEF's allocation criteria. Section 3 presents the theoretical framework used, and Section 4 describes the data and empirical strategy. Section 5 presents

the empirical results, and Section 6 discusses the findings in relation to the literature and theoretical framework. Lastly, Section 7 concludes.

2. Literature Review

2.1. The Equity Problem: Need versus Capacity

An overarching goal of international climate agreements is that climate finance should prioritize the most vulnerable developing countries, such as Least Developed Countries (LDCs) and Small Island Developing States (SIDS) (Beynon, 2025; Ferreira, 2017). However, research shows that there is a severe disconnect between a country's actual climate vulnerability and the amount of climate finance it receives, especially when it comes to adaptation finance (Beynon, 2025; Lee et al., 2023). For example, an analysis of adaptation finance found limited correlation between the per capita funding a country received and its level of vulnerability or per capita income (Beynon, 2025). Similarly, an analysis of the Green Climate Fund (GCF) and the Climate Investment Funds (CIF) found no overlap between the ten most climate-vulnerable countries and the top ten recipients of adaptation finance (Beynon, 2025; Lee et al., 2023).

Instead of targeting the most vulnerable countries, climate finance has a tendency to be allocated to countries with higher levels of institutional capacity, or so-called 'readiness' (Garschagen & Doshi, 2022; Kiremu et al., 2022). Often, donors will use perceived 'good governance' and strong institutional frameworks as guidelines to minimize risk and limit ineffective aid spending (Halimanjaya, 2015; Kotchen & Negi, 2019; Robinson & Dornan, 2016). Because highly vulnerable countries tend to have weaker social, governmental, and economic capacity relative to donor requirements, they face persistent barriers to accessing climate finance. This results in a "low funding trap" where moderately vulnerable countries, rather than those with the greatest need, receive a disproportionate share of funding (Islam, 2022). Furthermore, Garschagen and Doshi (2022) provide an example of how competitive, funds-based mechanisms at the Green Climate Fund disadvantage highly vulnerable countries by limiting direct access and reinforcing reliance on international intermediaries. Regional conflicts further worsen this inequity, seeing as violent conflicts might significantly undermine the flow of climate finance to fragile states already affected by and vulnerable to climate change (Prasad & Singhania, 2026).

Over the past three decades, climate finance allocation has largely been shaped by neoliberal governance frameworks that prioritize market-based solutions and return on investment over compensatory or distributive justice (Khan et al., 2020). This becomes evident in the growing emphasis on leveraged co-financing within major multilateral climate funds, including the GEF, where mobilizing private and institutional capital alongside public grants has become a core performance metric (Kotchen & Negi, 2019). The emphasis on leveraging private finance creates conditions for what Dafermos (2026) calls "climate de-risking," where climate investment needs in the Global South are made into relatively low-risk opportunities for financial institutions in the Global North. Rather than directing finance toward structurally vulnerable and exposed communities, allocation patterns end up reflecting donor interests, institutional risk preferences, and the pursuit of market returns (Dafermos, 2026; Khan et al., 2020).

This co-financing logic results in a systematic advantage for certain types of projects and certain types of countries. Specifically, mitigation efforts, such as renewable energy development and efficiency improvements, often create revenue streams attracting private investment (Kalinowski, 2024). Because mitigation finance is quantifiable to a greater extent, it is more attractive to investors and policymakers (Locatelli et al., 2016). For instance, mitigation projects can be evaluated based on the tons of CO_2 reduced whereas adaptation outcomes such as improved disaster resilience, on the other hand, are often more difficult to measure and more context dependent. The result is a structural bias that inherently favors projects in middle-income and emerging economies with stronger regulatory capacity and more potential for mitigation projects than those that mainly need adaptation support (Cui et al., 2020; Kotchen & Negi, 2019).

2.2. Co-financing in Multilateral Climate Finance Institutions

Within the context of multilateral climate finance, co-financing involves mobilizing additional financial resources from a broad pool of actors and investors, including multilateral development banks (MDBs), bilateral donors, various private sector actors and domestic governments (Kotchen & Negi, 2019; Miller & Yu, 2012). The logic behind the strong emphasis on co-financing by institutions such as the GEF and GCF is in the idea of financial leverage (Kotchen & Vogt, 2025). Because public global climate finance is severely insufficient to meet the global needs for climate mitigation and adaptation, the multilateral funds use their limited concessional grants to crowd in additional, external, capital (Kotchen &

Negi, 2019). That way, the idea is, that they can maximize the overall financial capital available to face the global environmental challenges (Development Committee, 2015; G20, 2017).

Empirical evaluations of funds such as the GEF show that the goal of maximizing co-financing can structurally bias project portfolios (Kotchen & Negi, 2019). Specifically, some evidence shows that co-financing ratios are higher for projects that are larger in size, focused on climate change mitigation rather than adaptation or biodiversity, and more often implemented by MDBs rather than United Nations agencies (Cui et al., 2020; Kotchen & Negi, 2019; Miller & Yu, 2012). Consequently, the mandate to maximize co-financing risks generating "mission creep" where, rather than allocating resources based purely on severe environmental or developmental need, funds are incentivized to prioritize projects that offer the highest co-financing potential (Kotchen & Negi, 2019).

The goal of high leverage ratios has raised some critical questions in the literature, notably regarding whether the mobilized financing is genuinely additional or catalytic (Kotchen & Vogt, 2025). While the goal of blended finance mechanisms is to de-risk investments and promote commercial capital (Huckstep & Beynon, 2024a), global finance tends to avoid the most vulnerable contexts (Attridge & Engen, 2019). For example, the leverage ratio for $1 invested by a MDB or DFI is $1.06 in lower-middle-income countries, but only $0.37 in low-income countries, showing that blended finance struggles to mobilize private capital in low-capacity contexts. Moreover, a study by Buntaine and Pizer (2015) evaluating multilateral assistance for clean energy found no evidence that early donor investments successfully catalyze subsequent private-sector capacity in underserved markets. Instead, they found that multilateral aid disproportionately targets countries and sectors that already receive substantial private investment. In reality, it seems that the vast majority of co-financing for multilateral funds comes from other public institutions, such as MDBs and various national governments, rather than the private sector (Kotchen & Vogt, 2025). This indicates that high co-financing ratios frequently capture non-additional public funds or private capital that would have been invested regardless of the multilateral grant (Buntaine & Pizer 2015; Kotchen & Vogt, 2025).

The dependence on co-financing highlights an important distinction between the logic of primary grant allocation and the logic of third-party participation. While main grants are often based on a fund's internal needs-based criteria that account for economic vulnerability and specific environmental benefits, co-financing reflects the independent risk calculations and

profit incentives of external actors (Kotchen & Vogt, 2025; Miller & Yu, 2012). Notably, prioritizing co-financing during project selection can lead to inefficiency issues. Kotchen & Vogt (2025) found that higher co-financing ratios are associated with smaller emission reductions per gross dollar spent, indicating a direct trade-off between maximizing co-financing and maximizing environmental benefits. Ultimately, the behavior of external co-financiers means that potential equity biases in multilateral climate finance largely reflect their risk-averse preferences, shifting funds away from the most fragile states.

Addressing these structural failures requires targeted interventions at multiple levels, and the literature offers some potential solutions to the structural limitations and issues related to blended finance. For instance, it is argued that development finance institutions should move away from standard senior debt toward more risk-appreciative instruments (e.g., subordinated debt, equity, and early-stage grants) that can absorb the "pioneer" risks associated with climate investment in vulnerable markets (Attridge & Engen, 2019). Additionally, multilateral funds should move away from general co-financing requirements toward differentiated standards that reflect a country's economic situation, applying looser requirements for LDCs and higher expectations for emerging economies (Attridge & Engen, 2019; Cui et al., 2020). More generally, Mazzucato and Vieira de Sá (2025) argue that public funds should be directed toward clear public missions rather than simply making individual projects more attractive to private investors, and that risk-sharing arrangements should be redesigned so the public sector can retain a fair share of the returns it helps create. Lastly, improving the general macroeconomic environment matters too. Phasing out fossil fuel subsidies and wider implementation of carbon pricing would level the playing field between high-carbon and low-carbon infrastructure, that way climate investments could become more commercially attractive without requiring ever-larger public subsidies (Bak et al., 2017; Mazzucato & Vieira de Sá, 2025).

2.3. Absorptive Capacity, MDB Behavior, and the Readiness Premium

Unlike multilateral grant institutions that rely on needs-based criteria, external co-financiers assess projects mainly in terms of risk-adjusted returns and the overall investment climate (Attridge & Engen, 2019). From this perspective, a recipient country's absorptive capacity is not just a proxy for institutional quality, but a direct determinant of whether an investment can be effectively absorbed, managed, and implemented (Bécault et al., 2016; Kiremu et al., 2022). In practice, this absorptive capacity, or *readiness*, is defined as the ability to plan for, access, deliver, monitor, and report on external capital. Co-financiers often require a certain level of

readiness to avoid environments where markets function poorly and the risk-adjusted rate of return is uncompetitive (Attridge & Engen, 2019).

Within the context of public development finance, multilateral development banks MDBs act as the main source of co-financing (Kotchen & Negi, 2019; Miller & Yu, 2012). The institutional principles of MDBs can differ quite a bit from those of grant-giving agencies because they rely predominantly on reimbursable loan instruments to meet their co-financing target (Humphrey & Michaelowa, 2019; Miller & Yu, 2012). For instance, MDBs have a strong internal incentive to lend to non-concessional, middle-income borrowers because the revenue generated from these loans covers the banks' own administrative expenses and produces necessary net income (Humphrey & Michaelowa, 2019). Thus, the use of loan instruments tends to funnel MDB capital toward middle-income countries that already have higher levels of macroeconomic stability, required to service debt.

Empirical research on the GCF by Garschagen and Doshi (2022) illustrates how low levels of institutional readiness results in a so-called ‘readiness premium’. Within the GCF, they find that the proposal-driven application process demands high levels of bureaucratic capacity, and that countries with lower institutional capacity often fail to establish national accredited entities (local partner institutions), needed to receive funding. Without national entities, lower-capacity countries must rely on international intermediaries, such as MDBs, to deal with complex application processes, or they are effectively excluded from competitive project funding. Given the strong sensitivity of both co-financiers and competitive fund-based mechanisms (as the ones in place at the GCF) to institutional quality, it is important to identify which aspects of governance actually drive investor behavior.

2.4. Governance quality and international finance allocation

Relying on governance indicators in climate finance allocation raises questions about what these indicators truly measure. Kurtz and Schrank (2007) show that the dominant indices like the WGI are subject to considerable perceptual biases, as they predominantly rely on surveys of business elites and foreign investors. As a consequence, dimensions of Government Quality like Government Effectiveness and Regulatory Quality equate strong state capacity with pro-market policies and light regulation, privileging investor-friendly governance as opposed to genuine administrative capability. Despite these apparent methodological issues, external co-financiers rely heavily on these institutional quality metrics as proxies to minimize

implementation risk and prevent ineffective aid spending (Halimanjaya, 2015; Robinson et al., 2023). International agencies rely on this logic because they expect better policies to produce better project outcomes, despite evidence that country-level institutions and macroeconomic conditions account for only a small share of project success (Denizer et al., 2013). These metrics have consequences for which countries attract climate finance. Kotchen and Negi (2019), illustrate this empirically in the GEF context, finding that higher scores in Government Effectiveness and Regulatory Quality predict higher co-financing ratios, while metrics like Control of Corruption and Voice and Accountability either have no positive effect or even discourage external capital.

This preference suggests that Government Effectiveness and Regulatory Quality matter primarily because they help enable investment. At the same time, multilateral development banks and private investors operate in highly competitive finance environments, where they face strong incentives to mobilize capital while meeting requirements for additionality and returns (McHugh, 2023). Because institutional, political and legal barriers often act as the largest and most significant barriers to private climate investments (Bhandary et al., 2021), co-financiers actively look for environments where there are strong investor protections and pro-business regulatory frameworks to minimize transaction costs (McHugh, 2023). For instance, multilateral lenders like the World Bank structurally direct finance toward countries with better institutional quality based on the expectation that good governance yields better project outcomes (Denizer et al., 2013). This explains why Government Effectiveness and Regulatory Quality are systematically rewarded with higher co-financing ratios and greater private sector involvement in GEF projects, as these specific governance dimensions signal de-risked, market-friendly environments (Kotchen and Negi, 2019).

The prioritization of de-risked, high-readiness environments creates a political stability paradox regarding the equitable allocation of climate finance. On one hand, institutions like the GEF operate under mandate-driven equity frameworks that explicitly target and allocate resources to highly vulnerable nations, including Fragility-Conflict-Violence (FCV) affected states (MOPAN, 2025). On the other hand, empirical evaluations of 25 years of adaptation finance reveal a structural aversion to instability, because external financiers systematically avoid fragile contexts to minimize risk (Khan et al., 2020). Similarly to the readiness premium, this donor risk aversion generates a "conflict penalty" where the presence of violent conflict significantly reduces the flow of both mitigation and adaptation funding to fragile states (Prasad

& Singhania, 2026). Moreover, many national and local institutions in these contexts lack the staff and technical capacity needed to prepare successful proposals, implement projects, or meet the strict requirements set by international co-financiers (Patel et al., 2020). Ultimately, this paradox means that even when climate funds are mandated to prioritize the most vulnerable states, the structural demand for political stability and institutional readiness redirects large volumes of climate finance away from conflict-affected contexts that need it most, often those that also have high levels of exposure to climate risk (Prasad & Singhania, 2026).

2.5. Measuring climate vulnerability: conceptual and methodological debates

A fundamental challenge within the climate literature is how to define and measure vulnerability. In the third and fourth impact assessments (TAR/TAR4) by the IPCC, vulnerability is expressed as the product of three interacting components: exposure, sensitivity, and adaptive capacity (Estoque et al., 2023). The IPCC's subsequent reports (the Special Report on Managing the Risks of Extreme Events and Disasters (SREX) and the Fifth Assessment Report (AR5)), however, revise this by counting exposure as a separate and distinct component of overall risk. Vulnerability then is strictly defined as a combination of sensitivity to harm and the lack of ability to adapt and cope. In a review of the IPCC's vulnerability concepts, Estoque et al. (2023) find that the SREX and AR5 definitions of vulnerability have been poorly adopted in practice, as researchers continue to overwhelmingly favor the TAR/AR4 framework because of established methodological preferences. Regardless of which framework is applied, a key theoretical challenge is that adaptive capacity overlaps heavily with a country's socioeconomic development, resources, and governance quality (Garschagen et al., 2021; Islam, 2022). Thus, composite vulnerability indices that include adaptive capacity can mistake a country's fundamental climate needs with its institutional quality (Beynon, 2025).

The complexity of defining and measuring vulnerability has produced different indices that produce markedly different assessments of which countries are most at risk (Garschagen et al., 2021). For example, the leading indexes (WRI, INFORM, ND-GAIN, and CRI) show significant differences in terms of which countries are the most vulnerable, with one comparative analysis finding that out of a possible 35 countries, only four consistently appeared in the top quartile of vulnerability (Beynon, 2025; Leiter, 2017). Because no single index has universal acceptance, Robinson et al. (2023) emphasize that there is no objective "truth" in vulnerability assessments, meaning that identifying the *particularly vulnerable* remains a political process.

2.6. GEF allocation criteria and the equity mandate

A central principle of the GEF is that it provides grants and concessional finance to cover the incremental costs required to turn ordinary development projects into initiatives that deliver global environmental benefits (Kotchen & Negi, 2019). As established in the introduction, the GEF operates as the financial mechanism for the UNFCCC and is therefore expected to prioritize the most vulnerable developing countries. This funding is guided by structured four-year replenishment cycles, which determine the strategic priorities and resource envelopes across core focal areas such as climate change, biodiversity, and land degradation (Kotchen & Negi, 2019; MOPAN, 2025). To distribute these funds transparently and equitably, the GEF utilizes the System for Transparent Allocation of Resources (STAR) (Cui et al., 2020; GEF, 2018a). The STAR is designed to balance equity with capacity by combining three indices to determine a country's allocation score: the Global Benefits Index (GBI), the Country Performance Index (CPI), and the Gross Domestic Product Index (GDPI) (GEF, 2018a). The GBI represents a country's potential to generate global environmental benefits, such as biodiversity richness or GHG reduction potential. The CPI captures institutional capacity and past GEF project performance and has the strongest positive influence on the final allocation score, meaning countries with stronger institutions and better implementation track records receive larger allocations. The GDPI works in the opposite direction, with higher GDP per capita reducing a country's score, creating a built-in bias toward lower-income countries.

To protect highly vulnerable countries from being excluded from funding due to low capacity or performance scores, the GEF extends the STAR formula with absolute funding floors. LDCs are guaranteed higher minimum allocations relative to non-LDCs, receiving at least $3 million for biodiversity, $1.5 million for climate change, and $1.5 million for land degradation (a total safety net of USD 6 million). Essentially, the STAR framework attempts to balance two objectives: rewarding strong institutional governance through the CPI, while guaranteeing a structural financial safety net for the world's poorest nations through the funding floors.

Over its years of operation, the GEF has acknowledged that its grant resources alone are far from sufficient to meet global climate finance needs, which has resulted in the adoption of ambitious co-financing targets (Kotchen & Vogt, 2025). In 2014 (GEF-6) the GEF formally set the co-financing target at a ratio of 6:1 (co-financing/grant), a target that was increased to 7:1 during GEF-7 (GEF, 2018b; Kotchen & Vogt, 2025). While co-financing is mandatory for all Full-Sized Projects, Medium-Sized Projects, and programs, the GEF does not have strict

minimum levels on a project-by-project basis (GEF, 2018b). Instead, it attempts to drive leverage through portfolio-wide ambitions. The updated policy introduced a targeted expectation for higher-income recipient countries, as the portfolio of projects approved in Upper-Middle and High-Income Countries (excluding SIDS and LDCs) is expected to reach a ratio of "Investment Mobilized" to GEF financing of at least 5:1 (GEF, 2018b). The GEF policy on cofinancing starts out by explicitly stating how the goals of instituting these co-financing targets are twofold (GEF, 2018b). Firstly, the higher ratio of co-financing is meant to enhance the overall effectiveness, impacts, and sustainability of GEF interventions by enabling longer-lasting and larger-scale environmental benefits. Second, it aims to deepen collaboration with recipient governments, bi- and multilateral and national financing institutions, as well as with the private sector and civil society.

The 2025 Multilateral Organisation Performance Assessment Network (MOPAN) report provides the most current evaluation on how the GEF system works in practice (MOPAN, 2025). Overall, the MOPAN assessment establishes that the GEF's STAR allocation “provides funds in a transparent, accessible and predictable manner”, and that effectively targets priorities ensuring access to the most vulnerable countries (p.37). However, it is important to note that the MOPAN evaluation highlights severe capacity constraints that limit equitable access to these funds. The GEF operates through a country-driven approach (GEF, 1998) but the MOPAN assessment raises concerns that this model places substantial responsibility on national Operational Focal Points (OFPs). These focal points are expected to coordinate domestic stakeholders, set national priorities for GEF resources, and ensure alignment with both national development strategies and global environmental objectives. MOPAN warns that the administrative and technical capacity required to manage these complex tasks often exceeds what OFPs in vulnerable countries can realistically provide. As a result, they claim that the country-driven model can become a bottleneck, limiting effective implementation and constraining equitable access to GEF funding.

3. Theoretical Framework

The core theoretical background of this paper is the tension between two competing logics: the equity logic of public climate funds and the market logic of private co-financiers. Understanding why they may not be the same requires starting with the basic economics of public goods.

The economic theory of public goods provision dates back to Samuelson (1954), who formally defined collective consumption goods (i.e., public goods) as those for which each individual's consumption does not subtract from others' consumption. In other words, the total quantity can be used simultaneously by everyone. The joint consumption part, termed *non-rivalry* by Musgrave (1959, 1969, cited in Pickhardt, 2006), combined with non-excludability, means that public markets will systematically underprovide these goods because rational individuals have an incentive to hide their true preferences and free-ride on others' contributions (Pickhardt, 2006). Samuelson (1954) shows that no decentralized pricing system can optimally determine the level of collective consumption, since it is always in each person's selfish interest to signal less demand than they actually have.

Hardin's (1968) “Tragedy of the Commons” extends this logic, showing that shared resources are systematically degraded when each rational actor captures private benefits while spreading costs across everyone. This shows how the free-rider problem is not only theoretical but also translates into real patterns of underinvestment and overexploitation. He gives an example of this issue in the case of pollution, where, rather than extracting from a shared resource, individuals release waste into it, such as sewage, chemical runoff, and air pollution. Individuals do this because the personal cost is lower than the cost of treatment. Since this holds for every rational actor, the collective result is environmental degradation that no individual intended, but everyone contributes to. In terms of the welfare implications, the Samuelson condition shows that optimal provision of a public good requires summing every individual's valuation of it, since everyone consumes the same good simultaneously, the total social value is everyone's willingness to pay added together. However, no market mechanism can achieve this, because rational individuals will always understate their true preferences to avoid bearing the cost (Samuelson, 1954; Pickhardt, 2006).

Applying this to the context of climate finance, climate adaptation investments are systematically underprovided by private markets because their benefits are non-excludable and non-rival (Mazzucato, 2024; Miller & Yu, 2012). For example, a flood barrier can protect an entire coastal community regardless of who pays for it, and impact-based forecasting and warning systems benefit everyone simultaneously (Di Leva, 2017; United Nations Environment Programme, 2023). However, because investors cannot restrict these benefits to paying customers, the private return on adaptation investment is too low to justify its

investment, even when the social return is very high (Flammer et al., 2025; Mutambatsere & Schellekens, 2020). This market failure is the fundamental reason public grants are needed as a correction of a genuine economic problem (Attridge & Engen, 2019).

The GEF's co-financing mandate is based on the theory of additionality and de-risking. The idea is that by providing a concessional grant, institutions like the GEF can absorb enough risk and cost to bring a project up to the return level required by external investors, theoretically crowding in co-financing that would not otherwise happen (Attridge & Engen, 2019; Mutambatsere & Schellekens, 2020). The grant is intended to make a project more financially attractive, but it does not fundamentally change the kind of country co-financiers are generally willing to invest in. External and private investors are considered rational, profit-seeking actors who avoid contexts with high transaction costs, weak institutions, and high political or macroeconomic risks (Attridge & Engen, 2019; Engel et al., 2014; Gabor, 2021; Kotchen & Negi, 2019). This leads to the first theoretical prediction tested in this paper: co-financing will systematically favor countries with strong investor-friendly governance, specifically dimensions that signal low implementation risk and market-friendly regulatory conditions, while GEF grants, guided by equity mandates, should not. Kotchen and Negi (2019) confirm the first part empirically, finding that government effectiveness and regulatory quality predict co-financing ratios, but their analysis does not explore whether these governance signals drive GEF's own grant allocation or co-financiers' independent decisions. The second theoretical prediction is a vulnerability penalty. Climate-vulnerable countries, i.e., those most dependent on climate-sensitive sectors, tend to be precisely the countries with weak institutions, fragile economies, and limited administrative capacity (Beynon, 2025; Garschagen & Doshi, 2022; Robinson et al., 2023). Without massive public subsidies to fully offset these risks, co-financiers will avoid them (Islam, 2022). This paper tests whether this vulnerability penalty operates through GEF's own grant allocation, through co-financiers' independent decisions, or both, and whether it persists after controlling for governance quality and income.

4. Data & Methods

4.1. Data Sources

The primary dataset used for the analysis is the GEF project database, publicly available on the GEF website, covering all projects approved between 1991 and 2026 (GEF, 2026c). The country-level governance quality measure used is the World Bank's Worldwide Governance Indicators (WGI), which provide annual standardized scores (z-scores) across six dimensions:

Control of Corruption (CC), Government Effectiveness (GE), Rule of Law (RL), Regulatory Quality (RegQ), Political Stability (PS), and Voice and Accountability (VA) (World Bank, 2025). Climate vulnerability and readiness data are sourced from sub-components of the ND-GAIN Country Index, developed by the University of Notre Dame, which quantifies a country's vulnerability to climate change and its readiness to leverage investment for adaptation across economic, governance, and social dimensions (ND-GAIN, 2023). GDP per capita is included as a control for country income level and is measured in constant 2015 USD, sourced from the World Bank World Development Indicators (World Bank, 2026b). Together, these sources make up the basis of my sample.

4.2. Sample Construction

The sample was then refined, with the most significant restriction being the focus on single-country projects. This is because the outcome variables of interest (GEF grant and co-financing) cannot be disaggregated across participating countries, and averaging country-specific variables across countries would introduce substantial measurement error. By restricting the sample to single-country projects, I can get a cleaner match between project- and country-level characteristics. Kotchen and Negi (2019) find that excluding multi-country projects from their specifications does not materially alter their results, supporting the restriction, as it does not introduce systematic bias into the analysis.

Additionally, projects lacking country labels or those simply labeled Global or Regional were dropped. Projects with missing approval years and co-financing values were excluded (projects with zero co-financing were retained, only those with no recorded value were dropped). The GEF projects date back to 1991, and ND-GAIN data is available from 1995; however, since WGI coverage begins in 1996, projects approved before that were also excluded from the analysis. Two projects had a recorded GEF grant of zero and were dropped (assumed to be data-entry errors), and the single Pilot Phase observation was dropped as it is insufficient for period fixed effects.

The four data sources differ in their temporal coverage, requiring several gap-filling procedures. The WGI was published every other year before 2003, leaving gaps in 1997, 1999, and 2001. These gaps were filled by linear interpolation between observed values for each country. Early coverage gaps for 17 small island states and late entry states whose WGI data begins after 1996 were addressed by backward fill, carrying the first observed value back to

earlier years. These include Pacific Island states such as Kiribati, Tonga, Tuvalu, and Vanuatu, Caribbean states such as St Kitts and Nevis and St Lucia, and newly independent states including Montenegro, Timor-Leste, South Sudan, and Kosovo. Because the sample extends to 2026, but WGI coverage ends in 2024, scores for 2025 and 2026 were extrapolated using a country-specific OLS time trend estimated over 1996-2024. This is justified by the slow-moving nature of institutional indices. The ND-GAIN index is published up to 2023, and the same extrapolation method was applied for 2024-2026. GDP per capita is available up to 2024, and 2025-2026 values were carried forward from 2024 rather than extrapolated, as the greater year-to-year volatility of income can make trend projection unreliable in small or conflict-affected economies. Approximately 49 observations were lost due to missing GDP data, concentrated among small island states and conflict-affected countries. Two projects in Cook Islands and Niue were lost due to the absence of ND-GAIN coverage for these territories. The final analytical sample is made up of 3,581 projects across 156 countries, approved during GEF replenishment periods 2 through 8 from 1996 to 2026.

4.3. Dependent Variables

The analysis builds on two main outcome variables designed to distinguish the GEF's own allocation decisions from those made by independent co-financiers. The two primary variables are the size of the GEF grant (in USD) and the amount of co-financing, defined as the total third-party funding mobilized per project (also in USD). These are modeled as separate outcomes because while the GEF sets portfolio-wide co-financing targets, no minimum or maximum co-financing threshold is imposed on individual projects (GEF, 2018a). The amount of co-financing a project attracts therefore varies freely relative to the grant size, which is why the two outcomes can respond differently to country characteristics such as governance quality and climate vulnerability. I transformed all numerical dollar values to natural logs to address the strong right skew in the data (including GDP per capita). The large variation in grant and co-financing amounts can be illustrated by two contrasting projects from the dataset. In Turkey, a $2 million GEF grant for the *Turkey Irrigation Modernization Project* (project ID: 9984) mobilized $387 million in co-financing, a leverage ratio of almost 200:1. By contrast, in Mauritania, one of the most climate-vulnerable countries in the sample (see Appendix 4a), a $1.1 million GEF grant for the project *Strengthening Mauritania's National Capacity for Transparency and Ambitious Climate Reporting* (project ID: 10428) attracted only $161,000 in co-financing, a ratio of 0.15:1. Summary statistics for all variables are reported in Table 1.

***Table 1**: Summary Statistics of Key Variables*

Variable	Obs	Mean	Std. dev.	Min	Max
Control of Corruption (WGI)	3,575	-0.454	0.607	-1.806	1.622
Government Effectiveness (WGI)	3,574	-0.336	0.589	-2.206	1.305
Political Stability (WGI)	3,579	-0.422	0.800	-2.901	1.557
Rule of Law (WGI)	3,581	-0.474	0.598	-2.636	1.450
Regulatory Quality (WGI)	3,575	-0.333	0.595	-2.265	1.618
Voice and Accountability (WGI)	3,581	-0.369	0.742	-2.274	1.331
Vulnerability: Sensitivity (ND-GAIN)	3,535	0.334	0.087	0.179	0.628
Readiness: Social (ND-GAIN)	3,526	0.279	0.101	0.084	0.717
Readiness: Economic (ND-GAIN)	3,521	0.384	0.146	0.000	0.856
GDP per Capita (USD)	3,581	4528.197	4192.568	240.605	33374.603
GDP per Capita (ln)	3,581	7.981	0.992	5.483	10.416
GEF Grant (million USD)	3,581	4.269	4.591	0.025	60.330
GEF Grant (ln)	3,581	14.762	1.107	10.127	17.915
GEF Cofinancing (million USD)	3,581	30.402	67.997	0.008	1650.000
GEF Co-financing (ln)	3,581	15.873	2.091	8.987	21.224

Note: WGI scores are presented as Z-scores, and ND-GAIN scores are on a scale of 0-1. GDP is expressed in constant 2015 USD.

4.4. Key Independent Variables

The governance quality in the analysis is measured using the six dimensions of the WGI, which are expressed as z-scores standardized relative to the global distribution of countries in each year, meaning a score of zero represents the world average. The six WGI dimensions are organized into three broad themes of governance quality/capacity. The first one captures how governments are selected and held accountable. The indicators in this aspect are VA, which captures citizens' ability to participate in selecting their government, press freedom, and access to information, and PS, estimating the likelihood that political authority will be challenged or destabilized through violent or unconstitutional means. The second theme concerns the government's capacity to formulate and implement policy and includes GE, capturing the quality of public services, civil service capacity, and the credibility of policy implementation, and RegQ, evaluating the government's ability to design regulations that promote private-sector development. The third touches on respect for the institutions that govern economic and social interactions, and includes RL, measuring the extent to which agents respect contractual enforcement, property rights, and the courts and CC, capturing the extent to which public power is exercised for private gain, including both small scale corruption and elite capture of the state (World Bank, 2025). Because the sample consists entirely of GEF-eligible developing countries, the WGI mean scores in the sample are negative across all dimensions, reflecting that recipient countries sit below the global average on all governance indicators, as shown in Table 1.

Climate vulnerability is measured using the sensitivity sub-component of the ND-GAIN Vulnerability Index, which assesses structural dependence on six climate-affected sectors: food, water, health, human habitat, ecosystem services, and infrastructure (see details in appendix 1). The sub-index preferred over the full ND-GAIN vulnerability score because the aggregate score is largely driven by adaptive capacity, which is strongly correlated with income ($r = 0.78$, see pairwise correlation in Table 2). This means the aggregate measure would overlap heavily with the GDP per capita control already included in the model. Moreover, the exposure subcomponent of vulnerability was also excluded because as it is constant over time, making it act more like a fixed country characteristic than a meaningful variable and was thus not suitable to include in the model. Ultimately, the sensitivity component is used as a proxy for climate vulnerability because it specifically measures how a population is dependent upon climate-sensitive sectors or how susceptible they are to climate change hazards. From here on out, vulnerability sensitivity will simply be referred to as vulnerability.

Additionally, the ND-GAIN data also provides data on Readiness. Social and economic readiness are measured using the corresponding ND-GAIN subcomponents. Social readiness captures education, access to ICT infrastructure, and social inequality, while economic readiness captures business environment and investment climate. The governance readiness sub-index is not used as readiness control in the analysis due to strong correlation with the individual WGI dimensions (see Table 2). A small number of countries lack complete ND-GAIN or WGI coverage for specific years. These observations drop automatically from any regression that includes that variable, meaning the sample size varies slightly across specifications, depending on which variables are included.

4.5. Additional Control Variables

GDP per capita (transformed to a natural log and measured in 2015 USD) from the World Bank included as a country-level control for income. Moreover, the sample dataset includes additional project-level control variables, all sourced from the GEF database. First is the implementing agency, which I constructed as a MDB dummy. The project is deemed an MDB project if at least one of the implementing agencies is an MDB, including the World Bank, Asian Development Bank, African Development Bank, Inter-American Development Bank, European Bank for Reconstruction and Development, CAF Development Bank of Latin America, and Development Bank of Southern Africa. Of the 3,581 projects, 805 projects

(22.5%) were implemented by an MDB. Additionally, a non-grant instrument dummy was constructed, coded as 1 if the project includes a loan, equity stake, or guarantee alongside the primary grant; 58 of the projects had non-grant elements. The dataset also includes the GEF replenishment period (GEF-2 through GEF-8), project type (Full-Size, Medium-Size, Enabling Activity, Global Biodiversity Framework Fund, and Project Framework Document), and focal area. Focal areas, i.e., the thematic environmental targets of each project, were grouped into five broad categories: Biodiversity, Climate Change, International Waters, Land Degradation, and Chemicals and Waste. Full construction details of these categories are provided in appendix 2.

Table 2: *Pairwise Correlation of All Variables*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Readiness score	1.000														
(2) Vulnerability score	-0.552	1.000													
(3) Social Readiness	0.641	-0.507	1.000												
(4) Governance Readiness	0.656	-0.355	0.136	1.000											
(5) Economic Readiness	0.830	-0.416	0.337	0.306	1.000										
(6) Sensitivity Vulnerability	-0.478	0.776	-0.336	-0.352	-0.370	1.000									
(7) Exposure Vulnerability	-0.209	0.617	-0.287	-0.147	-0.114	0.165	1.000								
(8) Capacity Vulnerability	-0.637	0.906	-0.575	-0.381	-0.466	0.624	0.411	1.000							
(9) Log GDP/Capita	0.649	-0.750	0.455	0.560	0.432	-0.679	-0.260	-0.779	1.000						
(10) Corruption Control	0.607	-0.283	0.132	0.911	0.297	-0.301	-0.081	-0.322	0.502	1.000					
(11) Gov. Effectiveness	0.671	-0.487	0.311	0.812	0.387	-0.455	-0.109	-0.530	0.668	0.778	1.000				
(12) Political Stability	0.465	-0.260	0.129	0.789	0.125	-0.197	-0.190	-0.298	0.449	0.652	0.517	1.000			
(13) Rule of Law	0.619	-0.263	0.108	0.930	0.302	-0.268	-0.086	-0.326	0.474	0.865	0.758	0.683	1.000		
(14) Regulatory Quality	0.658	-0.495	0.221	0.818	0.427	-0.485	-0.180	-0.471	0.590	0.707	0.825	0.435	0.773	1.000	
(15) Voice & Account.	0.365	-0.188	-0.031	0.699	0.117	-0.308	0.044	-0.204	0.393	0.636	0.524	0.513	0.766	0.641	1.000

4.6. Empirical Strategy and Model Specification

This analysis estimates OLS regressions at the project level to evaluate conditional associations rather than causal effects. The use of OLS is appropriate in this context given the continuous, log-transformed outcome variables and the relatively large sample size (Wooldridge, 2009). Furthermore, because multiple projects are approved within the same country, unobserved country-specific characteristics make it unlikely that residuals are independent within a given country. To address this, standard errors are clustered at the country level throughout the analysis. This approach aligns with previous research, particularly that of Kotchen and Negi (2019). In their paper on the same topic, they use OLS regressions with log-transformed financial variables and control for within-country correlation using clustered standard errors at the country level. The core empirical strategy is built around a single estimating equation, estimated separately for two financing outcomes. Each of the six WGI governance dimensions

are entered one at a time, resulting in twelve parallel specifications in total. The estimating equation is presented below:

$$Y_{pct} = \alpha + \beta_1 GOV_{ct} + \beta_2 VULN_{ct} + \beta_3 READs_{ct} + \beta_4 READe_{ct} + \gamma Z_{ct} + \delta W_p + \mu_t + \lambda_p + \varepsilon_{pct}$$

Where Y_{pct} denotes the log GEF grant or log co-financing for project p in country c in year t. GOV_{ct} is one WGI governance dimension entered separately per specification, and $VULN_{ct}$ is the ND-GAIN vulnerability sensitivity sub-index. $READs_{ct}$ and $READe_{ct}$ represents the ND-GAIN social and economic readiness sub-indices, respectively. Z_{ct} is log GDP per capita in constant 2015 USD, and W_p is a vector of project-level controls, including the MDB-led project dummy, the non-grant instrument dummy, and (in the co-financing specification only) the log GEF grant. Finally, μ_t denotes replenishment period fixed effects (GEF-2 through GEF-8), λ_p denotes project type and focal area fixed effects, and ε_{pct} is the error term, clustered at the country level. The six WGI dimensions are entered one at a time rather than jointly due to high correlation (see Table 2), following Kotchen and Negi (2019).

GDP per capita is included in the model as a proxy for development status and to control for the fact that income levels can strongly affect both co-financing and grant allocation (Islam, 2022; Kotchen & Negi, 2019). Although GDP per capita is correlated with the vulnerability sensitivity sub-index, the correlation remains moderate (r = 0.68, see Table 2), it is lower than the accepted limit of 0.7 (Wooldridge, 2009). Moreover, it is lower than the correlation between GDP per capita and the aggregate vulnerability score (r = 0.78), which is one of the reasons the sensitivity sub-index is preferred over the aggregate measure. The MDB dummy is included because they can have institutional incentives to direct capital toward middle-income countries (Humphrey & Michaelowa, 2019). This would suggest that MDB involvement is likely to independently predict both grant size and co-financing volume.

The non-grant instrument dummy is used for similar reasons, as they signal a different financing structure. The non-grant instrument dummy is included because projects that combine a grant with a loan, equity stake, or guarantee signal a different risk profile to potential co-financiers than pure grant projects and may therefore independently predict co-financing volumes (Attridge & Engen, 2019). Replenishment period fixed effects are included to control for changes in co-financing targets and broader institutional shifts over time, such as the adoption of co-financing targets under GEF-6. Focal area fixed effects are included because

the GEF sets different co-financing requirements across environmental themes and they can vary in their commercial viability and capacity to attract external capital (Miller & Yu, 2012). This follows Kotchen and Negi (2019) and Miller and Yu (2012), who both include focal area dummies in their baseline specifications. Finally, GEF grant size is included as a control in the co-financing specification because larger grants mechanically attract more co-financing (Kotchen & Negi, 2019).

For each categorical variable, the baseline categories were chosen to reflect the most common and representative groups in the sample. For the focal area, Climate Change is the omitted category because it is the largest and most central in the sample. For project type, full-size projects are omitted, as they represent the majority of projects and the type for which co-financing requirements are most explicitly mandated by GEF policy. GEF-5 served as the baseline for the replenishment period, as it represents a mid-sample period and predates the formal adoption of the 6:1 co-financing target in GEF-6 (extended regression results, including the coefficients for the control variables, are presented in Appendix 3). The GEF grant log is included as an additional control in the co-financing specification.

The coefficients on the governance dimensions address RQ1 by showing whether different governance indicators are differently associated with the two outcome variables. The coefficients on vulnerability and readiness speak to RQ2, i.e., whether climate-vulnerable or low-readiness countries are systematically disadvantaged once governance quality and income are taken into account. Based on the literature and theoretical framework, the GEF grant size should reflect GEF's own allocation decisions, guided by the STAR formula and needs-based criteria, whereas the co-financing could reflect a different preference based on the independent decisions of external actors, who are guided by their own risk assessments and return requirements. Additionally, vulnerability and readiness are included in every specification, regardless of the governance dimension used, so consistency of their coefficients across all specifications can serve as implicit evidence that the vulnerability and readiness findings are not sensitive to the choice of governance control.

5. Results

5.1. Descriptive Patterns

Before diving into the regression results, Figure 2 lays out the evolution of GEF and cofinancing over time, showing total annual co-financing and total GEF grants by approval year across the full sample period. Both co-financing volumes and total grant sums have grown substantially over time. Something worth noting is that co-financing volumes appear broadly resilient to global financial shocks, as the only major economic shock in the last 30 years to precede a period of lower financing was the European debt crisis in 2009. There is volatility in total funding, but it does not seem particularly tied to major economic events; it may rather reflect donor-country priorities. It is also worth noting that 2026 is only partially captured in the sample, so the decline at the end of the period should not be interpreted as a trend. Essentially, Figure 2 shows that GEF financing has grown substantially over the sample period, with co-financing volumes increasingly driving that growth.

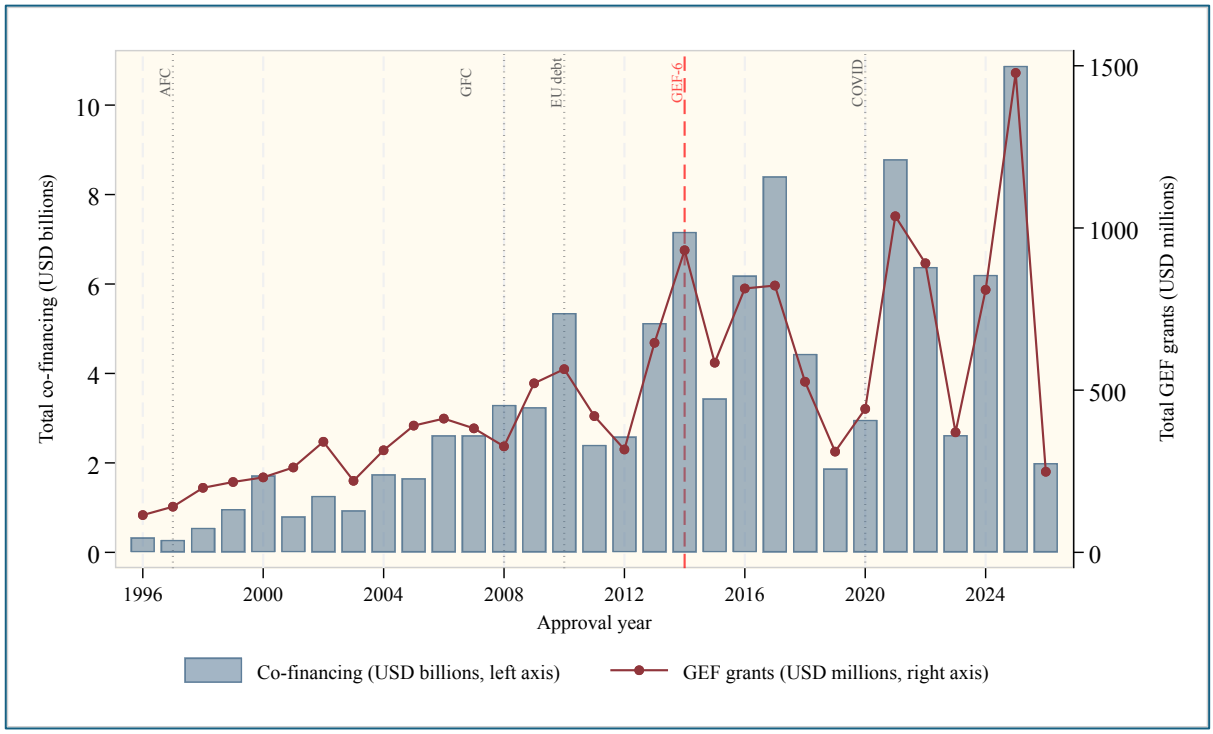

***Figure 2**: Total Co-Financing and Total GEF Grant Sums Over Time (1996-2026)*

Figure 3 complements the time trend presented in Figure 2 by showing the mean co-financing, mean grant size, and the mean co-financing ratio across replenishment cycles (the GEF's four-year funding periods, from GEF-2 through GEF-8). This makes the institutional shift clearer, illustrating how the co-financing ratio rises markedly over the period while mean grant sizes

remain relatively flat. The growing co-financing ratios thus reflect increased external capital mobilization rather than larger GEF investments. This confirms that the GEF's leverage model has become progressively more dominant over time, raising the question of whether the growing reliance on external co-financiers has shaped which countries benefit most from the fund.

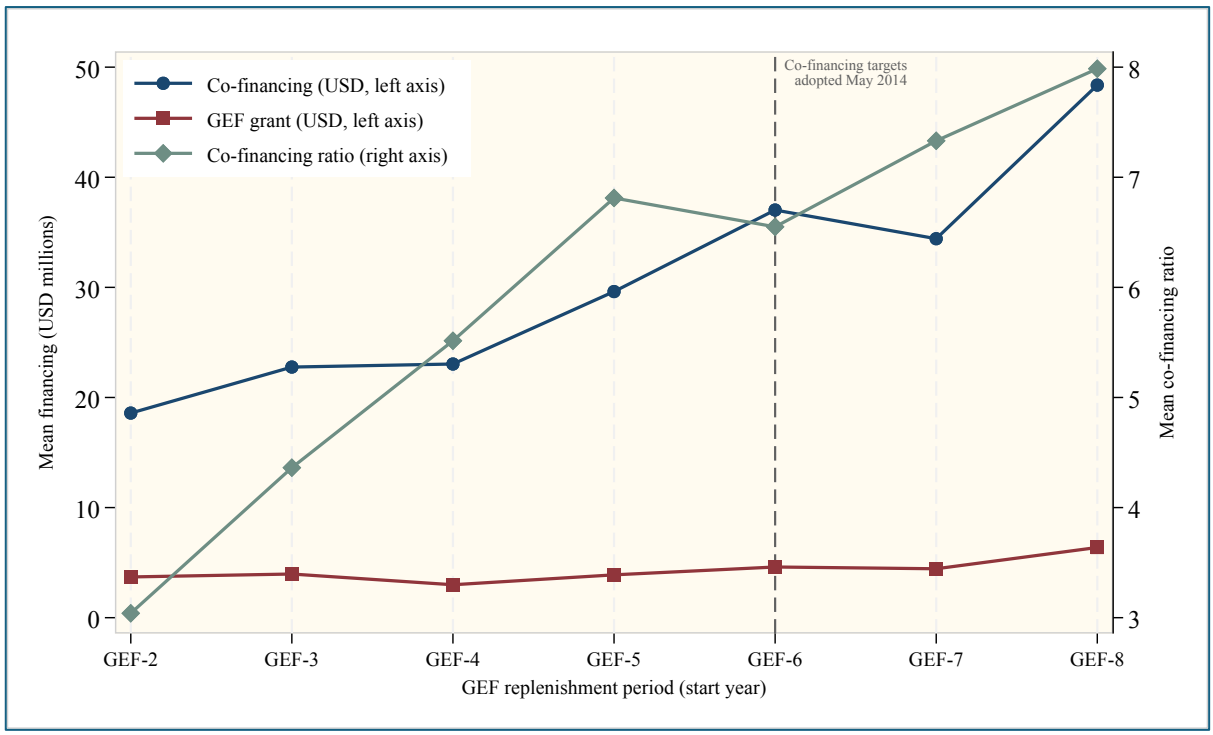

Figure 3: *Grant and Co-Financing Over Replenishment Cycles (1996-2026)*

To begin to answer the question of who has benefitted most from the co-financing targets, Figure 4 shows the mean co-financing by vulnerability group, divided into low, medium, and high vulnerability based on the mean vulnerability score. There is a persistent gap between the most and least vulnerable across the whole period, with the most vulnerable receiving (on average) substantially less funding per project. This gap does not seem to have disappeared after the co-financing targets were implemented in GEF-6. This suggests that the expansion of the leverage model has not closed the equity gap, and if anything, the growth in co-financing volumes appears to have disproportionately benefited countries already best equipped to attract external capital.

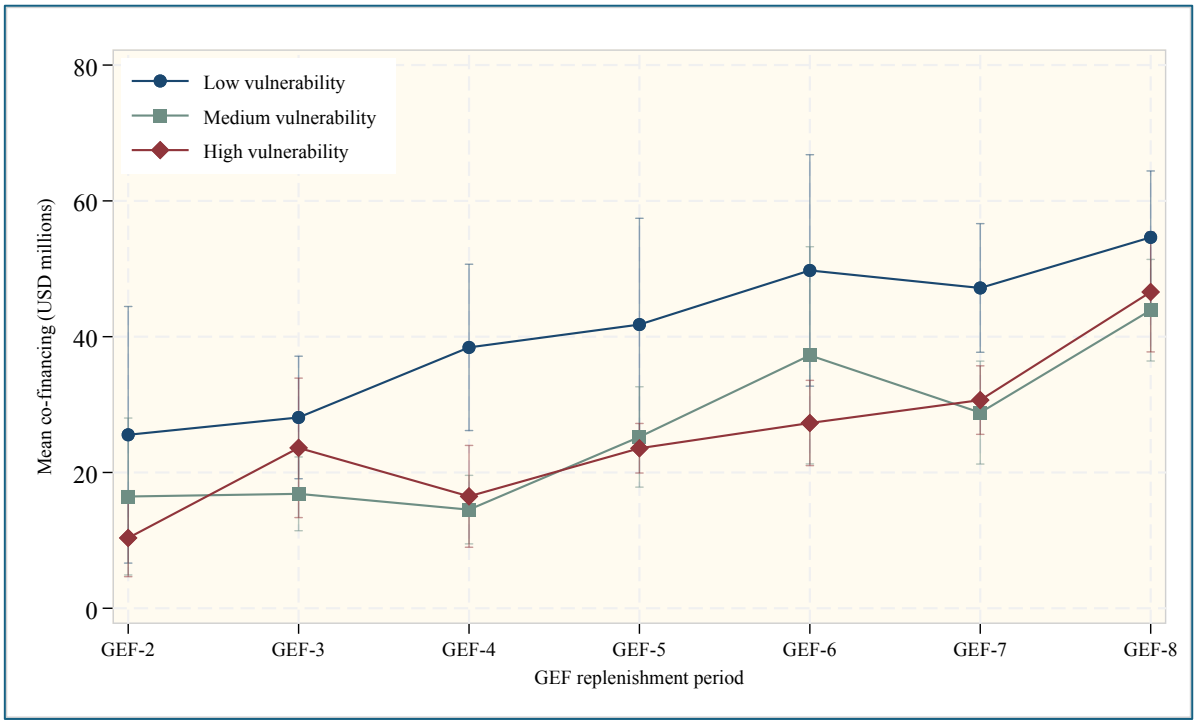

***Figure 4**: Financing by Vulnerability Group Across Replenishment Cycles (1996-2026)*

5.2. Financing Outcomes Across Governance Dimensions

Starting with co-financing presented in Table 3, GE (column 2, β=0.106) and RegQ (column 4, β=0.105) are the only two dimensions that significantly predict co-financing volumes (at the 5% confidence level). Since the governance indicator variables are coded as z-scores, the interpretation is that a one standard deviation improvement in GE and RegQ is associated with approximately 11.2% and 11.1% higher co-financing, respectively. CC, RL of, PS, and VA (columns 1, 3, 5, and 6) are all statistically insignificant (see Appendix 5 for all coefficient interpretation calculations). Among the control variables, log GEF grant size is positive and highly significant across all six specifications (β ≈ 1.034–1.040), where a 1% larger grant is associated with approximately a 1.037% increase in co-financing, as expected since larger grants mechanically attract more co-financing (Kotchen & Negi, 2019). Across all specifications, MDB-led projects are associated with approximately 52% higher co-financing than non-MDB projects (β = 0.418-0.422, p<0.01). Projects including a non-grant instrument, such as a loan, equity stake, or guarantee alongside the primary grant are associated with approximately 32% higher co-financing (β = 0.26–0.29, p<0.05 across all specifications), though it should be noted that only 58 of the 3,581 projects in the sample include such instruments. Log GDP per capita is mostly insignificant across the model specifications, with only the GE (column 2) having significance at the 10% level (β = -0.065), meaning that a 1% increase in GDP per capita is associated with approximately 0.065% lower co-financing.

Though this effect is very small in magnitude and insignificant across five of the six specifications, suggesting it does not represent a robust pattern. These findings imply that co-financing responds specifically to governance dimensions that signal RegQ and GE, rather than to governance quality in the broader sense.

***Table 3**: Co-financing and Governance Dimensions*

	(1) Control of Corruption	(2) Gov. Effect.	(3) Rule of Law	(4) Reg. Quality	(5) Pol. Stability	(6) Voice & Account.
Vulnerability: Sensitivity	-0.829**	-0.850**	-0.840**	-0.744**	-0.759*	-0.860**
	(0.391)	(0.372)	(0.389)	(0.376)	(0.397)	(0.382)
Readiness: Social	0.924***	0.942***	0.934***	0.984***	0.895***	0.813***
	(0.245)	(0.235)	(0.248)	(0.249)	(0.243)	(0.255)
Readiness: Economic	0.173	0.110	0.164	0.090	0.178	0.180
	(0.177)	(0.187)	(0.182)	(0.190)	(0.173)	(0.161)
Log GEF grant	1.038***	1.036***	1.038***	1.040***	1.034***	1.034***
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.032)
Log GDP per capita	-0.031	-0.065*	-0.033	-0.056	-0.008	-0.009
	(0.035)	(0.037)	(0.034)	(0.034)	(0.035)	(0.033)
MDB-led project	0.419***	0.419***	0.420***	0.418***	0.419***	0.422***
	(0.063)	(0.063)	(0.063)	(0.064)	(0.063)	(0.063)
Has Non-grant Instrument	0.273**	0.266**	0.271**	0.260**	0.280**	0.290**
	(0.118)	(0.117)	(0.118)	(0.118)	(0.119)	(0.119)
Control of Corruption (CC)	0.018					
	(0.042)					
Gov. Effectiveness (GE)		0.106**				
		(0.048)				
Rule of Law (RL)			0.025			
			(0.040)			
Regulatory Quality (RegQ)				0.105**		
				(0.047)		
Political Stability (PS)					-0.036	
					(0.034)	
Voice & Accountability (VA)						-0.045
						(0.034)
N	3321	3320	3322	3321	3322	3322
R^2	0.777	0.778	0.777	0.777	0.778	0.778
Replenishment period FE	Yes	Yes	Yes	Yes	Yes	Yes
Focal area FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Dependent variable: log co-financing (USD). Each column enters one WGI dimension separately (because of strong pairwise correlation r=0.43-0.87). Clustered SE at country level. (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$)

The GEF grant results in Table 4 show a different pattern from Table 3. Here, the significant governance dimensions are CC, RL, and PS, and all three have negative coefficients (see columns 1, 3, and 5). Again, the interpretation is that a one standard deviation improvement in the variables (CC, RL, and PS) is associated with approximately 5.2% ($\beta = -0.053$, $p<0.05$), 7.1% ($\beta = -0.074$, $p<0.10$), and 5.5% ($\beta = -0.057$, $p<0.01$) smaller GEF grants, respectively. Here, GE, RegQ, and VA are all insignificant (columns 2, 4, and 6). The negative signs on CC, RL, and PS, indicate that GEF grants go to countries with lower scores on accountability and stability indicators, which is consistent with a needs-based allocation logic, and directing resources toward more fragile contexts. As for the control variables, MDB-led projects are

associated with approximately 45% larger grants (β = 0.371–0.375, p<0.01), consistent with the co-financing results. The non-grant instrument projects are also associated with larger grants , approximately 14% (β = 0.125-0.142, p<0.05), though the effect is notably smaller than for co-financing. Log GDP per capita is insignificant across all specifications in the grant model. So, for co-financing, the significant effects for the governance indicators are positive and of similar magnitude, with around 11% per standard deviation. For grants, the significant effects are all negative and somewhat smaller in magnitude (ranging from about 5% to 7% per standard deviation). Notably, the direction is the opposite, meaning better governance on these dimensions is associated with smaller rather than larger grants. The differences in results between Tables 3 and 4 directly relate to RQ1, as the GEF and its co-financiers react to different governance signals, with co-financiers rewarding regulatory capacity and GEF grants flowing toward countries with weaker accountability and stability scores.

Table 4: *GEF Grant Size and Governance Dimensions*

	(1) Control of Corruption	(2) Gov. Effect.	(3) Rule of Law	(4) Reg. Quality	(5) Pol. Stability	(6) Voice & Account.
Vulnerability: Sensitivity	-1.192***	-1.236***	-1.155***	-1.263***	-1.121***	-1.260***
	(0.306)	(0.317)	(0.303)	(0.313)	(0.309)	(0.310)
Readiness: Social	-0.129	-0.087	-0.157	-0.125	-0.117	-0.186
	(0.249)	(0.247)	(0.231)	(0.241)	(0.237)	(0.198)
Readiness: Economic	0.322***	0.278***	0.347***	0.335***	0.280***	0.287***
	(0.103)	(0.102)	(0.103)	(0.101)	(0.102)	(0.106)
Log GDP per capita	-0.049	-0.074**	-0.043	-0.052*	-0.039	-0.051
	(0.031)	(0.037)	(0.034)	(0.030)	(0.029)	(0.031)
MDB-led project	0.373***	0.374***	0.371***	0.373***	0.371***	0.375***
	(0.031)	(0.032)	(0.031)	(0.031)	(0.032)	(0.031)
Has Non-grant Instrument	0.135**	0.125**	0.142**	0.135**	0.133**	0.140**
	(0.061)	(0.062)	(0.061)	(0.061)	(0.061)	(0.063)
Control of Corruption (CC)	-0.053**					
	(0.026)					
Gov. Effectiveness (GE)		0.019				
		(0.042)				
Rule of Law (RL)			-0.074*			
			(0.040)			
Regulatory Quality (RegQ)				-0.050		
				(0.034)		
Political Stability (PS)					-0.057***	
					(0.018)	
Voice & Accountability (VA)						-0.043
						(0.043)
N	3321	3320	3322	3321	3322	3322
R^2	0.758	0.758	0.759	0.758	0.759	0.759
Replenishment period FE	Yes	Yes	Yes	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes	Yes	Yes	Yes
Focal area FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Dependent variable: log GEF grant. Each column enters one WGI dimension separately. Clustered SE at country level. (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$)

Figure 5 presents the governance coefficients from Tables 3 and 4 as a coefficient plot, showing the point estimates and the confidence intervals (at 95%) for each WGI dimension separately.

Co-financing is presented as circles and the GEF grant as diamond, and allows for a direct comparison of the direction, magnitude, and significance of each governance dimension. As illustrated in the figure, the solid (non-faded) markers confirm that GE and RegQ are the only dimensions significantly associated with co-financing, while CC, RL, and PS are the only dimensions significantly associated with GEF grant size, and notably in the opposite direction.

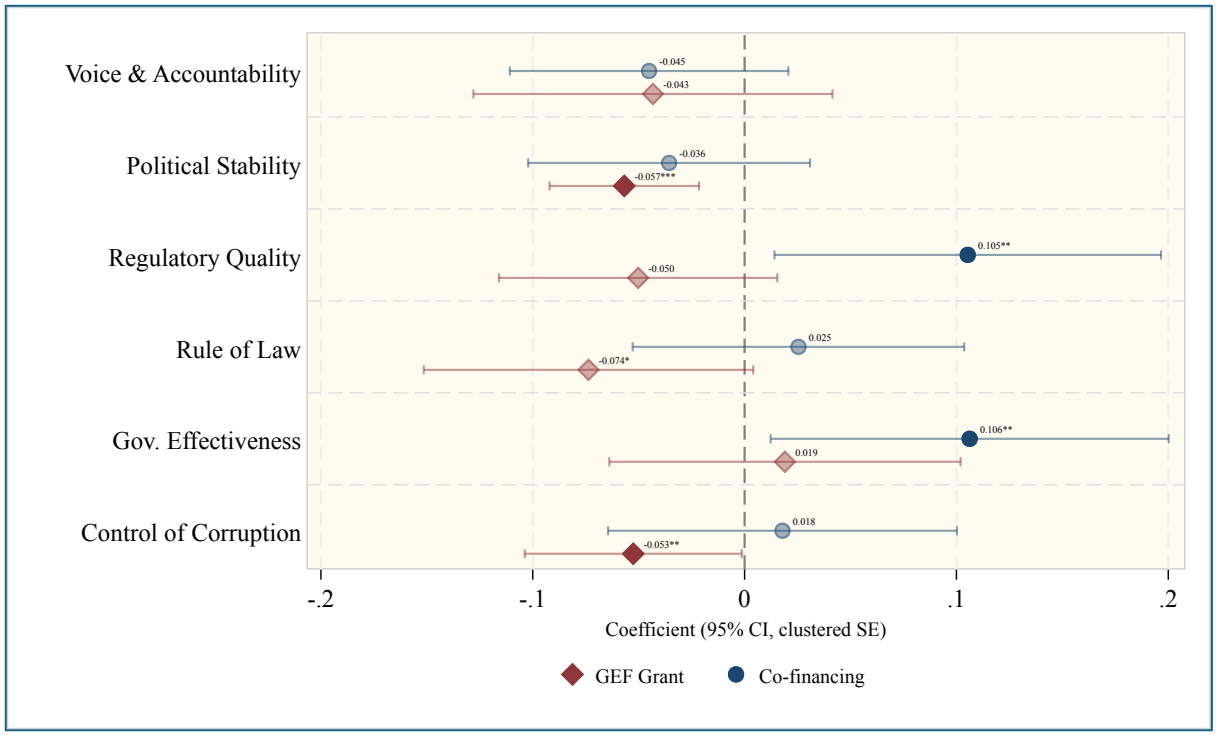

Figure 5: *Governance Dimensions Across Co-financing and Grants*
Notes: Each dot represents the coefficient on the corresponding WGI governance dimension from a separate OLS regression. Diamond = grant-financing outcome; circle = co-financing outcome. Faded markers indicate p>0.05, solid markers indicate p≤0.05. Horizontal lines show the 95% confidence interval. Based on models presented in table 3 and 4.

5.3. Vulnerability, Readiness and the Equity Pattern

Turning to the equity question, Tables 3 and 4 also present the coefficients for vulnerability sensitivity, social readiness, and economic readiness across all six governance specifications. Figure 6 plots these coefficients, along with the corresponding confidence intervals across all six specifications, showing the range and consistency of the estimates. Firstly, vulnerability has negative coefficients across all specifications. For co-financing (Table 3), it ranges from -0.744 to -0.860, significant at the 5% level in five out of six specifications and at the 10% level in the remaining one (Political Stability, column 5). A one standard deviation increase in vulnerability is associated with approximately 6.3% to 7.2% lower co-financing.

For GEF grants (Table 4), the coefficients are even larger in magnitude, ranging from -1.121 to -1.263, and are significant at the 1% level across all six specifications, where a one standard deviation increase in vulnerability is associated with approximately 9.3% to 10.4% lower grant sizes. A vulnerability penalty is therefore evident across both outcomes and unchanged based on the choice of governance control, and it is consistently larger for GEF grants than for co-financing. This suggests that GEF's own allocation decisions disadvantage vulnerable countries at least as much as the independent decisions of co-financiers.

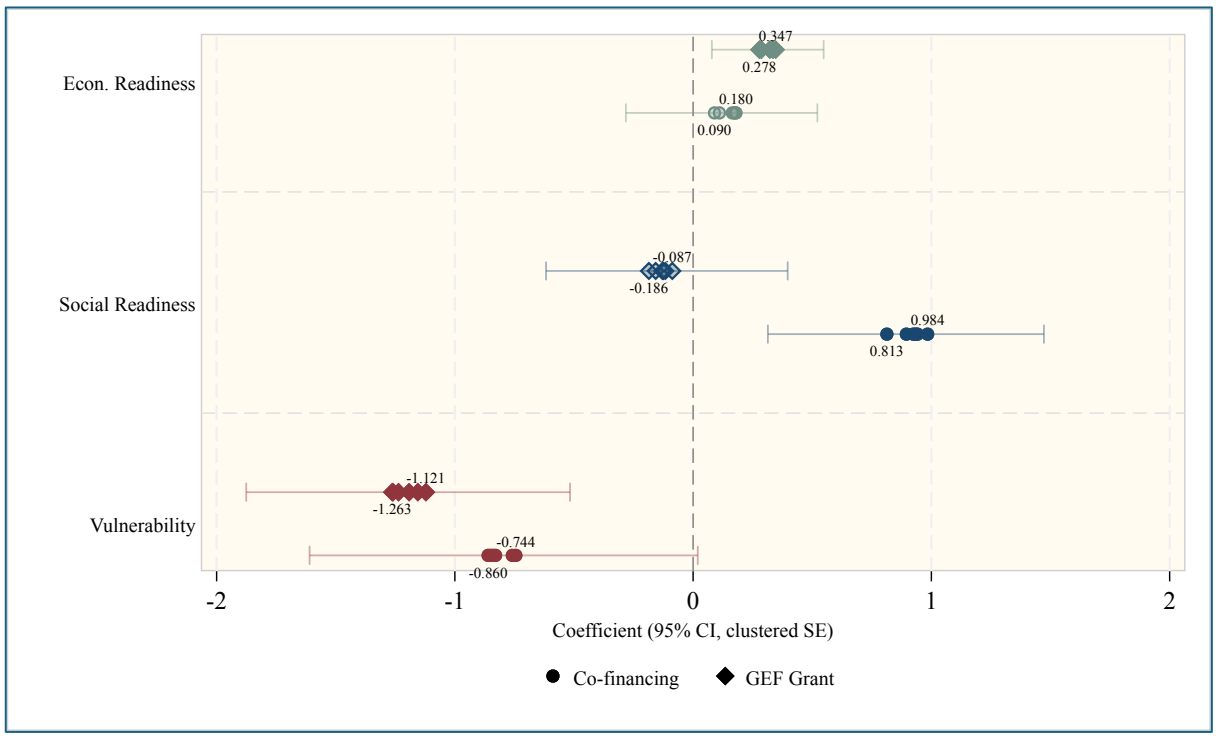

Figure 6: *Vulnerability and Readiness Coefficients Across Governance Models*
Notes: Each dot represents the coefficient on vulnerability sensitivity, social readiness, or economic readiness from a separate OLS regression controlling for one WGI governance dimension (6 specifications per row). Circle = co-financing outcome; diamond = GEF grant outcome. Faded = $p>0.10$, solid = $p\leq0.10$. Min and max coefficient are presented below and above the dot, respectively. All models include project and approval period fixed effects. Standard errors clustered at the country level. Horizontal lines show the overall CI range across specifications.

The social readiness coefficients are positive and significant for co-financing across all model specifications, ranging from 0.813 to 0.984 (all $p<0.01$). Thus, a one standard deviation increase in social readiness correlates to an 8.5% to 10.4% higher co-financing. For GEF grants, however, social readiness is consistently insignificant, with coefficients ranging from -0.087 to -0.186. This asymmetry suggests that the social readiness premium operates only through co-financiers rather than through GEF's own grant allocation. Economic readiness shows the opposite pattern to social readiness. For GEF grants, the coefficient is positive and significant across all specifications, ranging from 0.278 to 0.347 (all $p<0.01$), translating to

grants 4.1% to 5.2% larger. For co-financing, however, economic readiness is consistently insignificant. Overall, this implies that GEF's grant allocation favors countries with stronger economic infrastructure, while co-financiers do not independently respond to this dimension once other controls are accounted for.

Figures 7 and 8 show the predicted co-financing and GEF grant size across the observed range of vulnerability sensitivity, social readiness, and economic readiness, respectively, holding all other variables at their means. This is meant to visually illustrate the direction and magnitude of these coefficients. For the graphs, the ND-GAIN governance readiness served as the control for governance quality. This is valid because of the high correlation between the ND-GAIN governance readiness score and the individual WGI indicators (see Table 2). Since the separate WGI dimensions should not be used simultaneously, the ND-GAIN was used as a proxy here. Figure 7 shows a steep decline in predicted co-financing with vulnerability and a clear positive gradient for social readiness, while Figure 8 shows the same vulnerability decline for grants but with economic readiness, rather than social readiness, showing a positive gradient.

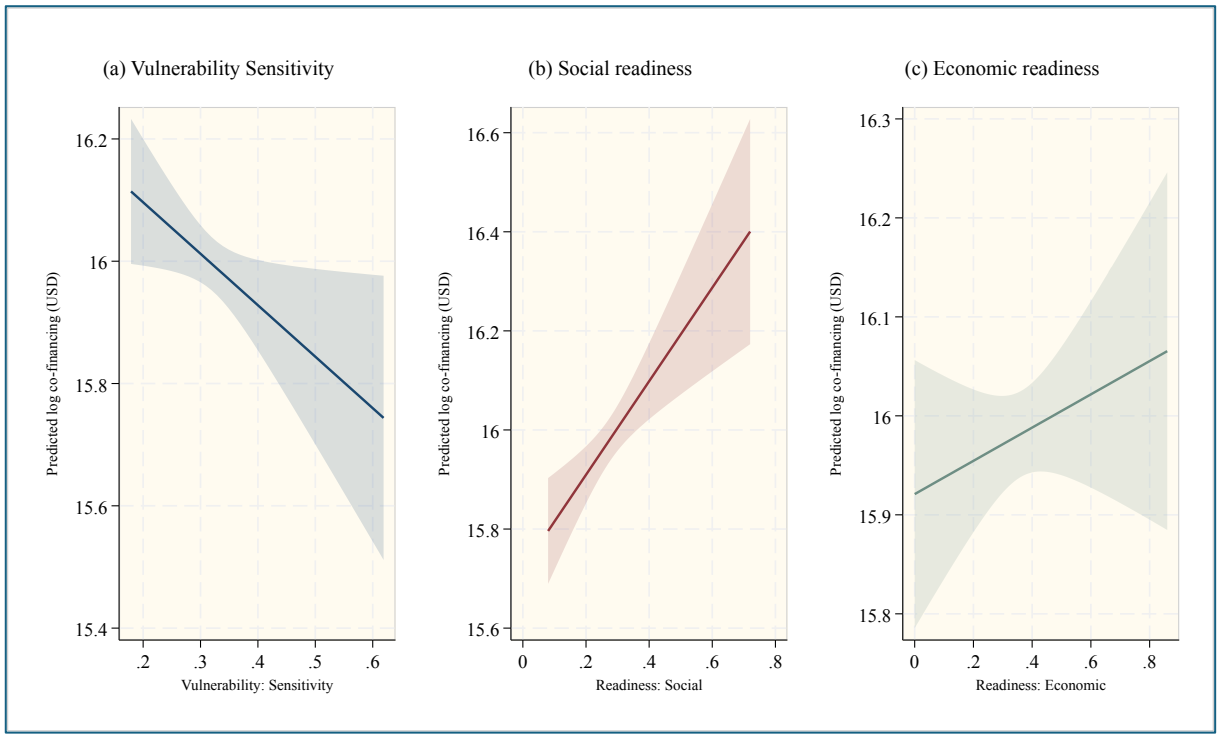

Figure 7: *Predicted Margins - Co-Financing Across Vulnerability and Readiness*
Note: Shaded areas = 95% confidence intervals. All other variables at means. Based on full co-financing model. The ND-GAIN governance readiness as a control for governance quality.

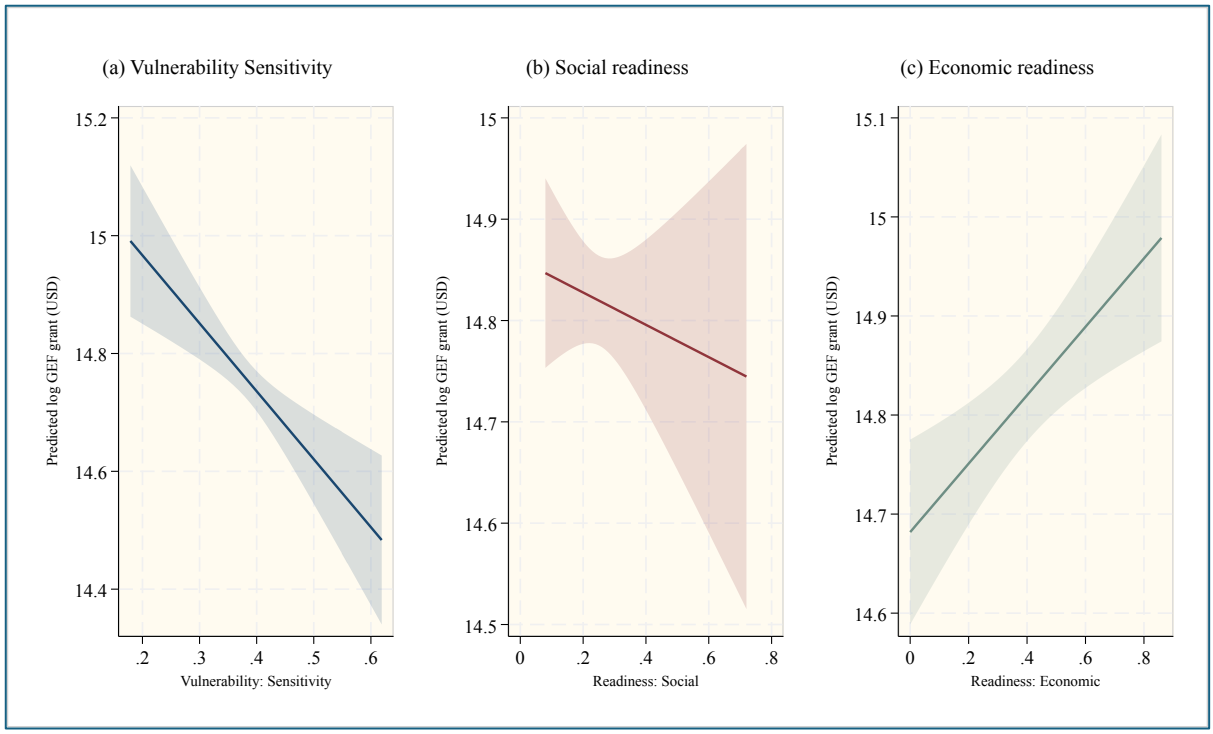

Figure 8: *Predicted Margins - GEF Grant Size Across Vulnerability and Readiness*
Note: Shaded areas = 95% confidence intervals. All other variables at means. Based on full grant model with governance readiness control. The ND-GAIN governance readiness as a control for governance quality.

5.4. Robustness Checks

Tables 5 and 6 replicate the main specifications from Tables 3 and 4, excluding the four largest co-financing and grant recipients in the sample (China, India, Brazil, and Mexico). Table 4a in Appendix presents a tabulation of the highest recipient countries, showing that China, India, Brazil and Mexico are substantially larger recipients than the rest of the sample, both in terms of size and volume. Therefore, these four countries are excluded as a robustness check, addressing the concern that their inclusion could disproportionately influence the estimated coefficients. If the main findings from the analysis holds under this restriction, it would provide evidence that the results are not driven by the outlier influence of these four large recipient countries. The empirical model is tested on the restricted sample which consists of between 2,916-2,918 observations, and the results are presented in tables 5 and 6.

Table 5: *Co-financing and Governance Dimensions (Excl. CHN, IND, BRA, MEX)*

	(1) Control of Corruption	(2) Gov. Effect.	(3) Rule of Law	(4) Reg. Quality	(5) Pol. Stability	(6) Voice & Account.
Vulnerability: Sensitivity	-0.828**	-0.844**	-0.847**	-0.718*	-0.766*	-0.842**
	(0.411)	(0.390)	(0.407)	(0.394)	(0.418)	(0.403)
Readiness: Social	0.760**	0.834***	0.775***	0.815***	0.719**	0.716**
	(0.292)	(0.292)	(0.292)	(0.291)	(0.283)	(0.290)
Readiness: Economic	0.141	0.053	0.113	0.021	0.159	0.164
	(0.195)	(0.198)	(0.198)	(0.206)	(0.190)	(0.189)
Log GEF grant	1.008***	1.008***	1.009***	1.009***	1.003***	1.006***
	(0.036)	(0.035)	(0.036)	(0.035)	(0.036)	(0.036)
Log GDP per capita	-0.025	-0.064	-0.033	-0.050	0.001	-0.011
	(0.037)	(0.039)	(0.037)	(0.036)	(0.037)	(0.037)
MDB-led project	0.391***	0.390***	0.391***	0.389***	0.392***	0.393***
	(0.056)	(0.056)	(0.056)	(0.056)	(0.057)	(0.057)
Has Non-grant Instrument	0.281**	0.273**	0.277**	0.267*	0.289**	0.289**
	(0.139)	(0.138)	(0.138)	(0.138)	(0.139)	(0.139)
Control of Corruption (CC)	0.022					
	(0.044)					
Gov. Effectiveness (GE)		0.118**				
		(0.053)				
Rule of Law (RL)			0.045			
			(0.043)			
Regulatory Quality (RegQ)				0.115**		
				(0.047)		
Political Stability (PS)					-0.038	
					(0.035)	
Voice & Accountability (VA)						-0.018
						(0.040)
N	2917	2916	2918	2917	2918	2918
R^2	0.773	0.774	0.774	0.774	0.774	0.774
Replenishment Period FE	Yes	Yes	Yes	Yes	Yes	Yes
Project Type FE	Yes	Yes	Yes	Yes	Yes	Yes
Focal Area FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Dependent variable: log co-financing. Replicates Table 3 excluding China, India, Brazil, and Mexico. Clustered SE at country level. (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$)

The governance results are mostly consistent with the main co-financing specification. GE (β = 0.118, p<0.05) and RegQ (β = 0.115, p<0.05) remain the only two dimensions that significantly predict co-financing, with slightly larger coefficients than in Table 3. The remaining four dimensions remain insignificant. For the vulnerability and readiness coefficients, vulnerability remains negative and significant across all six specifications (ranging from -0.718 to -0.847), although the PS and RegQ specifications now reach only the 10% significance level rather than the 5% level. Social readiness is positive and significant across all robustness specifications (ranging from 0.716 to 0.834, all p<0.05 or higher), and economic readiness stays consistently insignificant. The control variable coefficients are also consistent with the main specifications. The co-financing results are therefore robust to the exclusion of the four largest recipients, with the same governance dimensions significant and the vulnerability and readiness pattern unchanged.

***Table 6**: GEF Grant Size and Governance Dimensions (Excl. CHN, IND, BRA, MEX)*

	(1) Control of Corruption	(2) Gov. Effect.	(3) Rule of Law	(4) Reg. Quality	(5) Pol. Stability	(6) Voice & Account.
Vulnerability: Sensitivity	-0.591***	-0.606***	-0.567***	-0.629***	-0.533***	-0.613***
	(0.206)	(0.213)	(0.203)	(0.215)	(0.204)	(0.208)
Readiness: Social	-0.227	-0.188	-0.230	-0.200	-0.203	-0.197
	(0.164)	(0.171)	(0.167)	(0.173)	(0.168)	(0.178)
Readiness: Economic	0.169	0.137	0.188	0.162	0.129	0.134
	(0.118)	(0.126)	(0.118)	(0.122)	(0.115)	(0.116)
Log GDP per capita	-0.039*	-0.051**	-0.035	-0.046**	-0.031	-0.049**
	(0.021)	(0.022)	(0.022)	(0.022)	(0.021)	(0.021)
MDB-led project	0.314***	0.315***	0.314***	0.315***	0.313***	0.315***
	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)
Has Non-grant Instrument	0.187**	0.181**	0.189**	0.185**	0.185**	0.183**
	(0.073)	(0.073)	(0.073)	(0.073)	(0.073)	(0.073)
Control of Corruption (CC)	-0.042*					
	(0.021)					
Gov. Effectiveness (GE)		-0.006				
		(0.033)				
Rule of Law (RL)			-0.053**			
			(0.026)			
Regulatory Quality (RegQ)				-0.025		
				(0.032)		
Political Stability (PS)					-0.045***	
					(0.014)	
Voice & Accountability (VA)						-0.012
						(0.018)
N	2917	2916	2918	2917	2918	2918
R^2	0.792	0.791	0.792	0.791	0.793	0.792
Replenishment Period FE	Yes	Yes	Yes	Yes	Yes	Yes
Project Type FE	Yes	Yes	Yes	Yes	Yes	Yes
Focal Area FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Dependent variable: log GEF grant. Replicates Table 4 excluding China, India, Brazil, and Mexico. Clustered SE at country level. (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$)

For the grant specifications, the governance results show some changes relative to Table 4. CC ($\beta = -0.042$, $p<0.10$), RL ($\beta = -0.053$, $p<0.05$) and PS ($\beta = -0.045$, $p<0.01$) remain negative and significant, although the magnitude of the governance coefficients is smaller than in the main specification. Social readiness and economic readiness are both consistently insignificant across all six specifications in the restricted sample, in contrast to Table 4, where economic readiness was significant. Moreover, GDP per capita shows a weak negative association in several specifications ($\beta = -0.031$ to -0.051), with significance at the 10% level in columns 1, 2, 4, and 6. MDB-led projects are still associated with larger grants, although they are only about 37% larger in the restricted-sample models ($\beta = 0.313$–0.315, $p<0.01$). Essentially, the grant results show more sensitivity to the exclusion of the four countries, as the vulnerability penalty is about half the magnitude in the restricted sample.

Overall, the co-financing results are mostly stable across the two samples, with the same governance dimensions significant and vulnerability and readiness coefficients of similar magnitude and significance. The grant results are more sensitive to the exclusion of the four countries, particularly for the vulnerability coefficient. In the restricted sample, the magnitude is roughly half. This suggests that the large vulnerability penalty in the grant model is partly driven by the contrast between the relatively large, low-vulnerability, and most-frequent recipients (China, India, Brazil, and Mexico) and the rest of the sample and should therefore be interpreted with this caveat in mind.

6. Discussion

6.1. Governance signals differ between GEF and co-financiers

The first research question presented in the introduction asks which governance dimensions predict GEF financing outcomes, and whether different dimensions work differently across grant allocation and co-financing. The results presented in section 5 provide a clear answer: governance effects are both dimension-specific and outcome-specific, and the two outcomes respond to entirely different governance signals.

The first interesting finding is that co-financing is significantly predicted by GE and RegQ, whereas the other dimensions (CC, RL, PS, and VA) are not. For GEF grants, by contrast, funding amount is significantly and negatively predicted by CC, RL, and PS, while GE and RegQ are insignificant. This difference directly addresses the gap identified in the introduction, because while previous literature (e.g., Kotchen and Negi, 2019) shows that GE and RegQ predicts co-financing ratios, it does not differentiate whether these signals drive GEF's own grant allocation or co-financiers' independent decisions. This analysis shows that the answer is indeed dependent on which governance measure is considered and which outcome you look at.

The finding regarding co-financing is consistent with the theoretical predictions presented in Section 3, and with the overall broader literature on co-financier behavior. Specifically, as theorized, external co-financiers such as MDBs, multilateral donors, and private investors are so-called rational actors, and act accordingly, i.e., avoiding contexts with higher transaction costs, weaker institutions, and political or macroeconomic risk (Attridge & Engen, 2019; Engel et al., 2014; Gabor, 2021). Here, it presents itself in GE and RegQ. These dimensions of

governance capture whether a government can reliably implement projects or not, and if the regulatory environment is suitable for private investments. As noted by Kurtz and Schrank (2007), these two dimensions of the WGI reflect the perceptions of business elites and foreign investors rather than genuine administrative capability. So the finding that co-financing reacts specifically to these two dimensions is not only consistent with what the theory would predict but also aligns with the more general critique in the climate finance literature that funding allocations reflect investor and donor preferences rather than institutional quality (Halimanjaya, 2015; Robinson et al., 2023). From the perspective of the Dafermos (2026) framework of climate de-risking, this result can be read as evidence that co-financiers use governance signals to identify contexts where climate investment needs can be made into relatively low-risk opportunities.

The finding also aligns with the empirical literature on MDB behavior. As discussed in Section 2.3, MDBs most often rely on reimbursable loan instruments and have strong internal incentives to lend to non-concessional borrowers with sufficient macroeconomic stability to service debt (Attridge & Engen, 2019; Humphrey & Michaelowa, 2019; Miller & Yu, 2012). The MDB dummy in the co-financing equation confirms this, with MDB-led projects associated with approximately 52% higher co-financing, consistent with the idea that MDB involvement mobilizes additional capital but also directs it toward contexts with favorable institutional and regulatory conditions. Ultimately, the co-financing findings regarding GE and RegQ thus likely reflect, at least in part, the preferences of large MDBs, as they are a dominant source of co-financing.

The negative signs for the CC, RL, and PS coefficients in the grant model require a different explanation. Countries that score higher on these dimensions, meaning that they have higher accountability, rule-based governance, and political stability scores, evidently receive smaller GEF grants. This finding is consistent with the STAR formula's design described in Section 2.6. Because while the CPI used in the STAR rewards institutional capacity and implementation track record, the GDPI and funding floors prioritize poorer and more fragile contexts. The negative sign of the coefficients in the grant equation, therefore, likely reflects the GEF's needs-based allocation logic, in which countries with weaker accountability and stability scores receive larger grants. This is the equity logic of a public climate fund working as intended, in direct contrast to the market logic of its co-financiers. However, it is important to note that the magnitude of these grant effects is relatively small (between 5% and 7% per

standard deviation) compared to the vulnerability penalty discussed below, suggesting that the needs-based allocation logic exists but may not be strong enough to overcome the structural disadvantages facing climate-vulnerable countries.

Overall, the governance findings confirm the first theoretical prediction that co-financiers and GEF respond to different governance signals, consistent with the dual-logic framework presented in Section 3. Essentially, the market logic of co-financiers reward investor-friendly regulatory capacity, while the equity targets of GEF grants direct resources toward countries with weaker accountability and stability, i.e., the contexts external financiers tend to avoid.

6.2. A vulnerability penalty across both channels

The second research question concerns whether GEF financing systematically disadvantages climate-vulnerable countries and, if so, through which channel. The results confirm the second theoretical prediction that a vulnerability penalty is present across both co-financing and grant size, and all governance specifications. However, the findings also reveal an important difference that goes beyond what the theory predicted: the penalty is larger for GEF grants than for co-financing.

As Tables 3 and 4 (visualized in Figure 6), show that vulnerability has negative and significant coefficients across all specifications and is remarkably stable across the six governance controls. This seems to confirm that the vulnerability penalty is not simply the result of using a particular governance control, but rather a consistent feature of GEF financing. Notably, the penalty is substantially larger in the grant models than in the co-financing models, a finding that is both robust and central to topic of this paper.

The co-financing finding aligns with the general literature on equity issues in climate finance. For instance, as Islam (2022) argues, structural dependence on climate-sensitive sectors and weak institutional capacity penalize highly vulnerable countries, leading them into a “low funding trap”. Moreover, as other studies have found that the leverage ratios for MDBs and DFIs are much higher in lower middle-income countries than in low-income countries, and it seems that the ability to mobilize external capital drops in the most fragile and vulnerable contexts (Attridge & Engen, 2019). So, the co-financing vulnerability penalty identified in the analysis aligns with these broader patterns in the climate finance literature, showing that

blended finance mechanisms often fail to mobilize capital in contexts where it is needed most (Buntaine & Pizer, 2015; Kotchen & Vogt, 2025).

The grant vulnerability penalty, however, is more striking and more difficult to understand given the GEF's stated equity mandate. That the GEF's own allocation decisions disadvantage vulnerable countries at least as much, and in fact more than, the independent decisions of external co-financiers seem to contradict the expectation that a needs-based grant institution would compensate for market failures. The theoretical framework presented predicted a vulnerability penalty operating mainly through the co-financiers, based on the market logic of risk-averse investors. The finding that the grant channel is equally or more penalizing is a result that the theory does not fully predict and warrants further examination.

The most plausible explanation comes from the structural tension inherent in the STAR formula. Although the GDPI and funding floors are made to direct resources to lower-income and more vulnerable countries, the CPI has the largest positive weight. This means that countries with weak institutional capacity receive smaller baseline allocations, and these countries tend to overlap substantially with climate-vulnerable countries (Garschagen et al., 2021; Islam, 2022; Robinson et al., 2023). The STAR formula, therefore, creates a structural tension between its equity and performance objectives. The funding floors only partially resolve these tensions, and the grant vulnerability penalty documented here may reflect, at least in part, the capacity bias working through the same institutional quality signals that co-financiers respond to. This interpretation is consistent with Beynon's (2025) finding that adaptation finance shows limited correlation with per capita vulnerability or income, and with Lee et al.'s (2023) observation that the ten most climate-vulnerable countries do not overlap with the top ten recipients of adaptation finance. This lack of overlap was also evident in my sample, as seen in Appendix 4a. The existence of a vulnerability penalty within the GEF grant model adds a new dimension to this finding, as even within a single multilateral fund with an explicit equity mandate and needs-based allocation criteria, climate-vulnerable countries receive systematically smaller grants, and the magnitude of this disadvantage is at least as large as the disadvantage they face from external co-financiers.

The robustness checks provide an important caveat. When China, India, Brazil, and Mexico are excluded from the model, the grant vulnerability penalty roughly halves in magnitude, while the co-financing penalty is broadly stable. This suggests that part of the grant penalty in

the main specification reflects the contrast between these large, relatively low-vulnerability, high-frequency recipients and the rest of the sample, rather than a uniform penalty applied across all countries. However, this does not eliminate the finding, and the penalty remains significant in the restricted sample. This suggests that the grant vulnerability effect is partly driven by a small number of large, low-vulnerability recipients in the GEF portfolio, which is itself an equity concern worth noting.

6.3.The readiness premium is co-financier-specific

In addition to the vulnerability penalty, the analysis reveals an important difference in how readiness affects the two financing outcomes. Notably, social readiness is positively and significantly associated with co-financing, whereas it is consistently insignificant for GEF grants. Economic readiness, on the other hand, shows the opposite. Evidently, economic readiness is positively and significantly correlated with grant size but is insignificant for co-financing. This difference mirrors the governance variation discussed in Section 6.1, where co-financiers and GEF responded to different institutional signals.

The social readiness premium in co-financing is consistent with the readiness premium mechanism identified by Garschagen and Doshi (2022) in the context of the Green Climate Fund. In their analysis, countries with lower institutional readiness fail to establish national accredited entities and must rely on international intermediaries (which are predominantly MDBs) to tackle the complex application processes. They see that countries with stronger social infrastructure are better equipped to manage the bureaucratic demands of co-financing arrangements, can develop project proposals that meet co-financier requirements, and are better equipped to build the institutional relationships necessary to attract external capital. The finding that this premium operates through co-financing rather than GEF grants suggests that it reflects co-financiers' independent preferences, consistent with Attridge and Engen's (2019) description of co-financiers as actors with strict requirements regarding risk and absorptive capacity before committing resources. Moreover, social readiness, according to the ND-GAIN, signals solid education systems and better communication technologies, which can attract larger levels of corporate investment.

These readiness results also provide direct empirical support for the MOPAN (2025) warning that GEF's co-financing targets and bureaucratic demands place disproportionate strain on the institutional capacities of vulnerable countries. The MOPAN assessment identified the

administrative requirements of co-financiers as a barrier that systematically disadvantages certain countries. This is what the social readiness premium for co-financiers shows. Moreover, the absence of this premium from the grant specifications further confirms that it is a co-financier effect rather than a GEF effect.

An interesting revelation from the analysis is the economic readiness premium in grant allocation, which is harder to explain within the theoretical framework alone. The ND-GAIN economic readiness sub-index captures a country's business environment and investment climate, including factors such as ease of doing business, access to financial services, and trade openness. The empirical analysis showed that countries with stronger economic infrastructure receive larger GEF grants , even after controlling for governance quality and income, while the co-financing results were less clear.

There are two possible explanations for this. The first is that economic readiness captures something about a country's ability to absorb and mobilize large grant-funded projects that the WGI governance dimensions do not fully pick up. For instance, a country might score reasonably well on governance indicators like CC or RL, but still lack the economic infrastructure, such as a functioning financial system, business-enabling regulations, and trade connectivity, which are all needed to effectively implement GEF projects. In this reading, economic readiness is a genuine capacity signal that GEF's allocation criteria independently reward. The second, and perhaps more straightforward, interpretation is that economic readiness is simply correlated with the CPI component of the STAR formula, which has the highest positive weight in GEF's allocation model. Countries with stronger economic infrastructure tend to score better on the CPI, and the economic readiness premium in the grant equation may therefore just be another expression of the capacity bias embedded in the STAR formula rather than an independent effect. Why economic readiness does not predict co-financing in the same way is less straightforward to explain. Given that the correlations between economic readiness and the governance dimensions that do predict co-financing are only moderate ($r = 0.39–0.43$, see Table 2), it is not simply a case of the two measures capturing the same information. This asymmetry does not have a fully satisfying explanation within the theoretical framework and warrants further investigation in future research.

Together, the two readiness effects support the equity concern identified in this paper. Countries with weak social readiness struggle to attract co-financing, while countries with

weak economic readiness receive smaller grants. Ultimately, this means that the most capacity-constrained countries are disadvantaged across both financing channels at the same time, suggesting that the equity problem in GEF financing runs deeper than the vulnerability penalty alone.

6.4. Policy Implications

The findings of this paper can be relevant for discussions on how the GEF and similar multilateral climate funds design their co-financing requirements and grant allocation. There is a vulnerability penalty documented across both the grant and co-financing channels. Especially given its size in the grant equation, the current STAR formula with its strong positive weight on institutional capacity, may be working against the fund's own equity mandate for the most climate-vulnerable countries. A first and most direct response would be to (to a greater extent) differentiate co-financing requirements based on a country's capacity and vulnerability level, applying explicitly lower co-financing expectations for LDCs and highly vulnerable countries and higher expectations for emerging economies (Attridge & Engen, 2019; Cui et al., 2020). This could reduce the structural disadvantage that the co-financing model currently places on the countries least able to attract external capital. Second, since co-financiers respond to governance and risk signals rather than grant size alone, simply increasing grant amounts is unlikely to attract more co-financing to the most vulnerable countries. Instead, a shift toward instruments that absorb more risk may be needed to reduce the risk exposure for private co-financiers and could make vulnerable contexts more attractive to external capital (Attridge & Engen, 2019). These types of investments include, e.g., subordinated debt, equity stakes, and more early-stage grants. This is also consistent with the finding that GEF projects including a non-grant instrument component attract about 32% more co-financing than pure grant projects, which is roughly twice the effect seen for GEF funding size alone (14%). While the small number of non-grant projects in the sample (n=58) warrants caution, the consistency of this finding supports Attridge and Engen's (2019) argument. More generally, Mazzucato and Vieira de Sá (2025) argue that public climate funds should be directed toward clear public goals rather than simply making projects attractive to private investors, which is a concern that the governance findings here directly support. Given that the GEF projects appear to direct resources toward countries that are already attractive to co-financiers rather than those with the greatest climate need, a reevaluation of the goals and intended recipients could be useful.

6.5. Limitations

Several limitations of this analysis should be acknowledged. First, the analysis is correlational rather than causal, and thus the estimates should not be interpreted as causal effects. There are potential omitted variables, such as country-level political relationships with GEF implementing agencies or other capacity or project-specific variables, that could confound the results. Second, the WGI dimensions are imperfect. As Kurtz and Schrank (2007) show, they mainly reflect the perceptions of business elites and foreign investors rather than genuine administrative capability. The finding that co-financing responds specifically to GE and RegQ should therefore be interpreted with this in mind. Third, the choice of vulnerability measure can affect what researchers find, as there is notable variation across composite vulnerability indices (Beynon, 2025; Garschagen et al., 2021). However, this analysis uses the vulnerability sensitivity sub-index of the ND-GAIN vulnerability score, rather than any composite score. This focuses the analysis on the sensitivity of socio-economic systems and was done specifically to avoid conflating physical climate dependence with adaptive capacity and income, which drives much of the cross-index variation. Lastly, the analysis is restricted to single-country projects, which excludes regional and global GEF initiatives and may not fully represent the equity dynamics in those parts of the portfolio.

7. Conclusion

This paper examined which dimensions of governance quality predict GEF grant allocation and co-financing mobilization, and whether GEF financing systematically disadvantages climate-vulnerable countries. It also explored whether such a disadvantage operates through GEF's own grant allocation, co-financiers' independent decisions, or both. The findings show that the answer depends on which funding channel you look at, since both are implicated but in different ways.

Co-financiers and the GEF respond to different dimensions of governance quality. Where co-financiers reward regulatory capacity and investor-friendly governance, GEF grants flow toward countries with weaker accountability and stability scores, which is consistent with a needs-based allocation logic. This distinction contributed to the literature by showing that governance effects on climate finance should not be explained without separating the two channels.

The equity concern, however, can be seen most clearly in the vulnerability findings. There is a persistent penalty across both outcomes, where more vulnerable countries receive both smaller grants and less co-financing. Importantly, the penalty was also consistently larger in the grant model than in the co-financing model. This is the paper's most striking finding: that GEF's own allocation decisions disadvantage vulnerable countries at least as much as the independent decisions of external co-financiers, despite the mandate to prioritize the most vulnerable countries.

A potential explanation for the grant penalty lies in the structural tension within the GEF's System for Transparent Allocation of Resources formula itself, where the Country Performance Index's strong positive influence on allocation partially offsets the equity protections set in place by the funding floors. The readiness findings add a further layer, seeing as social readiness creates a barrier in the co-financing channel and economic readiness creates a separate barrier in the grant channel. This means that the countries with the lowest capacity face significant financial access constraints.

Together, these results suggest that reforming either the co-financing model or the grant allocation formula in isolation is unlikely to be enough to address the equity problem in climate finance. Both channels need to be re-evaluated, and any reform should account for the structural disadvantages facing the most climate-vulnerable countries rather than applying uniform standards across very unequal recipients. Future research could examine whether similar patterns hold across other multilateral climate funds, and whether the difference between grant allocation and co-financier behavior show similarly diverging institutional logics in funds such as the Green Climate Fund or the Climate Investment Funds, where co-financing requirements and allocation criteria differ from those of the GEF.

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Appendices

Appendix 1: Vulnerability Sensitivity indicators (ND-GAIN)

Sector	Indicator
Food	• Food import dependency • Rural Population
Water	• Fresh water withdrawal rate • Water dependency ratio
Health	• Slum population • Dependency on external resources for health services
Ecosystem Service	• Dependency on Natural Capital • Ecological footprint
Human Habitat	• Urban concentration • Age dependency ratio
Infrastructure	• Dependency on imported energy • Population living under 5m above sea level

Appendix 2: Tabulation of Focal Area

Broad Focal Area (Constructed)	Focal Area (original)	Freq.	Percent	Cum.
Biodiversity	Biodiversity	962	28.00	28.00
	Biodiversity, Chemicals and Waste	2	0.06	28.06
	Biodiversity, Climate Change	77	2.24	30.30
	Biodiversity, Climate Change, Chemicals and Waste	3	0.09	30.38
	Biodiversity, Climate Change, International Waters	4	0.12	30.50
	Biodiversity, Climate Change, International Waters, Land Degradation	11	0.32	30.82
	Biodiversity, Climate Change, Land Degradation	228	6.64	37.46
	Biodiversity, Climate Change, Land Degradation, Chemicals and Waste	1	0.03	37.49
	Biodiversity, International Waters	14	0.41	37.89
	Biodiversity, International Waters, Land Degradation	2	0.06	37.95
	Biodiversity, Land Degradation	217	6.32	44.27
Total		**1521**	**44.27**	**44.27**
Chemicals and Waste	Chemicals and Waste	309	8.99	53.26
	Chemicals and Waste, Chemicals and Waste	63	1.83	55.09
Total		**372**	**10.83**	**55.09**
Climate Change	Climate Change	1239	36.06	91.15
	Climate Change, Chemicals and Waste	3	0.09	91.24
	Climate Change, International Waters	3	0.09	91.33
	Climate Change, International Waters, Chemicals and Waste	1	0.03	91.36
	Climate Change, Land Degradation	55	1.60	92.96
Total		**1301**	**37.86**	**92.96**
International Waters	International Waters	65	1.89	94.85
	International Waters, Chemicals and Waste	10	0.29	95.14
	International Waters, Land Degradation	2	0.06	95.20
Total		**77**	**2.24**	**95.2**
Land Degradation	Land Degradation	165	4.80	100.00
Total		**165**	**4.80**	**100.00**
	All Projects	**3436**	**100.00**	

Appendix 3: Extended Regression Results

	(1) GEF Grant	(2) Co-financing	(3) Leverage Ratio
Vulnerability: Sensitivity	-1.154***	-0.842**	-0.896**
	(0.303)	(0.389)	(0.382)
Readiness			
Social	-0.159	0.944***	0.937***
	(0.243)	(0.253)	(0.254)
Economic	0.345***	0.168	0.184
	(0.103)	(0.179)	(0.177)
Governance	-0.437***	0.144	0.123
	(0.160)	(0.253)	(0.252)
Log GDP per capita	-0.034	-0.039	-0.041
	(0.032)	(0.037)	(0.037)
MDB-led project	0.370***	0.413***	0.430***
	(0.032)	(0.064)	(0.061)
Non-grant instrument	0.128**	0.285**	0.291**
	(0.061)	(0.120)	(0.119)
Focal Area (Climate change omitted)			
Biodiversity	-0.082**	-0.102**	-0.105***
	(0.039)	(0.039)	(0.039)
International Waters	-0.140**	0.204	0.197
	(0.070)	(0.134)	(0.134)
Land Degradation	-0.168***	0.319***	0.312***
	(0.056)	(0.078)	(0.079)
Chemicals and Waste	-0.022	-0.237***	-0.238***
	(0.046)	(0.078)	(0.077)
Project Type (Full-Size Omitted)			
Enabling Activity	-2.602***	-2.122***	-2.243***
	(0.057)	(0.132)	(0.093)
GBFF	-0.592***	-1.221***	-1.249***
	(0.180)	(0.259)	(0.261)
Medium-size Project	-1.442***	-0.457***	-0.525***
	(0.035)	(0.067)	(0.044)
PFD	-0.137	-0.549*	-0.555*
	(0.312)	(0.315)	(0.317)
Replenishment Period (GEF-5 Omitted)			
GEF-1	0.123	-1.358***	-1.352***
	(0.097)	(0.123)	(0.124)
GEF-2	-0.146**	-1.119***	-1.126***
	(0.065)	(0.066)	(0.066)
GEF-3	-0.064	-0.781***	-0.784***
	(0.052)	(0.072)	(0.073)
GEF-4	-0.217***	-0.440***	-0.450***
	(0.034)	(0.045)	(0.045)
GEF-6	0.193***	-0.201***	-0.192***
	(0.032)	(0.052)	(0.052)
GEF-7	0.305***	-0.111**	-0.096*
	(0.037)	(0.052)	(0.051)
GEF-8	0.453***	-0.002	0.020
	(0.038)	(0.053)	(0.053)
Log GEF grant		1.047***	
		(0.031)	
N	3270	3270	3270
R^2	0.759	0.778	0.435

Notes: Full results for grant, co-financing and ratio. Baseline categories: Climate Change focal area, full-size project, GEF-5. Governance control = ND-GAIN governance readiness score. Clustered SE at country level. (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$)

Appendix 4a: Summary of received total funding (1996-2026)

Top 10 countries by most vulnerability			Top 10 countries by mean Readiness			Top 10 countries by total co-financing received			Top 10 countries by total GEF grants received		
Country	Mean Sensitivity	No. Projects	Country	Mean Readiness	No. Projects	Country	Financing (million $)	No. Projects	Country	Financing (million $)	No. Projects
MRT	0.586	24	KOR	0.715	1	CHN	17267.15	172	CHN	1409.70	172
TON	0.583	4	KNA	0.627	4	IND	6295.60	83	BRA	759.49	78
ERI	0.545	9	BRB	0.546	7	MEX	4749.50	80	IND	684.12	83
SOM	0.545	11	SVN	0.537	2	BRA	4153.03	78	MEX	636.48	80
SDN	0.533	25	BLR	0.535	18	VNM	2807.50	65	IDN	393.96	67
GNB	0.530	16	RUS	0.531	37	IDN	2768.76	67	COL	313.56	56
LBR	0.524	23	GRD	0.523	9	PHL	2574.59	68	ZAF	308.48	63
BEN	0.523	26	UKR	0.472	23	ZAF	2465.69	63	PER	299.91	58
SLB	0.511	13	TUR	0.455	37	PER	2112.47	58	PHL	279.79	68
VUT	0.482	14	KAZ	0.451	36	NGA	2034.80	36	MDG	230.94	41

Note: Mean is average score between 1996 and 2026. Vulnerability based on ND-GAIN Vulnerability Sensitivity, Readiness based on ND-GAIN Social Readiness.

Appendix 4b: ISO3 country code list

ISO3	COUNTRY	COUNT
AFG	Afghanistan	15
AGO	Angola	22
ALB	Albania	15
ARG	Argentina	40
ARM	Armenia	31
ATG	Antigua and Barbuda	9
AZE	Azerbaijan	16
BDI	Burundi	15
BEN	Benin	26
BFA	Burkina Faso	33
BGD	Bangladesh	25
BGR	Bulgaria	11
BHS	Bahamas	9
BIH	Bosnia and Herzegovina	15
BLR	Belarus	18
BLZ	Belize	19
BOL	Bolivia	22
BRA	Brazil	78
BRB	Barbados	7
BTN	Bhutan	17
BWA	Botswana	17
CAF	Central African Republic	13
CHL	Chile	42
CHN	China	172
CIV	Côte d'Ivoire	23
CMR	Cameroon	28
COD	Democratic Republic of the Congo	25
COG	Republic of the Congo	12
COL	Colombia	56
COM	Comoros	16
CPV	Cabo Verde	16
CRI	Costa Rica	37
CUB	Cuba	31
CZE	Czech Republic	5
DJI	Djibouti	12
DMA	Dominica	6
DOM	Dominican Republic	11
DZA	Algeria	13
ECU	Ecuador	56
EGY	Egypt	32
ERI	Eritrea	9
EST	Estonia	2
ETH	Ethiopia	34
FJI	Fiji	12
FSM	Micronesia	7
GAB	Gabon	8
GEO	Georgia	29
GHA	Ghana	27
GIN	Guinea	20
GMB	The Gambia	26
GNB	Guinea-Bissau	16
GNQ	Equatorial Guinea	7
GRD	Grenada	9
GTM	Guatemala	23
GUY	Guyana	12
HND	Honduras	21
HRV	Croatia	10
HTI	Haiti	18
HUN	Hungary	7
IDN	Indonesia	67
IND	India	83
IRN	Iran	12
IRQ	Iraq	9
JAM	Jamaica	12
JOR	Jordan	30
KAZ	Kazakhstan	36
KEN	Kenya	45
KGZ	Kyrgyzstan	19
KHM	Cambodia	37
KIR	Kiribati	11
KNA	Saint Kitts and Nevis	4
KOR	South Korea	1
LAO	Laos	32
LBN	Lebanon	16
LBR	Liberia	23
LBY	Libya	2
LCA	Saint Lucia	8
LKA	Sri Lanka	36
LSO	Lesotho	21
LTU	Lithuania	6
LVA	Latvia	8
MAR	Morocco	38
MDA	Moldova	28
MDG	Madagascar	41
MDV	Maldives	16
MEX	Mexico	80
MHL	Marshall Islands	5
MKD	North Macedonia	13
MLI	Mali	26
MMR	Myanmar	13
MNE	Montenegro	15
MNG	Mongolia	30
MOZ	Mozambique	25
MRT	Mauritania	24
MUS	Mauritius	18
MWI	Malawi	26
MYS	Malaysia	33
NAM	Namibia	32
NER	Niger	23
NGA	Nigeria	36
NIC	Nicaragua	22
NPL	Nepal	28
NRU	Nauru	3
OMN	Oman	1
PAK	Pakistan	34
PAN	Panama	26
PER	Peru	58
PHL	Philippines	68
PLW	Palau	9
PNG	Papua New Guinea	16
POL	Poland	11
PRY	Paraguay	16
ROU	Romania	14
RUS	Russia	37
RWA	Rwanda	21
SDN	Sudan	25
SEN	Senegal	35
SLB	Solomon Islands	13
SLE	Sierra Leone	18
SLV	El Salvador	11
SOM	Somalia	11
SRB	Serbia	21
SSD	South Sudan	1
STP	São Tomé and Príncipe	21
SUR	Suriname	9
SVK	Slovakia	8
SVN	Slovenia	2
SWZ	Eswatini	14
SYC	Seychelles	20
SYR	Syria	9
TCD	Chad	23
TGO	Togo	16
THA	Thailand	39
TJK	Tajikistan	23
TKM	Turkmenistan	15
TLS	Timor-Leste	15
TON	Tonga	4
TTO	Trinidad and Tobago	9
TUN	Tunisia	26
TUR	Türkiye	37
TUV	Tuvalu	9
TZA	Tanzania	41
UGA	Uganda	35
UKR	Ukraine	23
URY	Uruguay	27
UZB	Uzbekistan	24
VCT	Saint Vincent and the Grenadines	4
VEN	Venezuela	17
VNM	Vietnam	65
VUT	Vanuatu	14
WSM	Samoa	15
XKX	Kosovo	1
YEM	Yemen	11
ZAF	South Africa	63
ZMB	Zambia	27
ZWE	Zimbabwe	13

Appendix 5: Coefficient Interpretation Calculation Notes

All outcome variables (log co-financing and log GEF grant) are natural log transformed. The percentage interpretation of each coefficient depends on the type of variable, as described below.

Continuous variables (governance dimensions, vulnerability, readiness)
The semi-elasticity transformation is: (e^β - 1) × 100 = % (percent change in outcome)

Since WGI governance dimensions are z-scores (mean 0, standard deviation 1), a one-unit change is interpretable as a one standard deviation change. For the ND-GAIN vulnerability and readiness sub-indices (scaled 0-1), a one standard deviation change is calculated as β × SD, and the percentage interpretation is (e^(β×SD) - 1) × 100, and SD values are taken from Table 1.

Variable	β	SD	β × SD	% Change	Interpretation
Gov. Effectiveness (cofin)	0.106	1.000	0.106	+11.2%	per 1 SD
Regulatory Quality (cofin)	0.105	1.000	0.105	+11.1%	per 1 SD
Control of Corruption (grant)	-0.053	1.000	-0.053	-5.2%	per 1 SD
Rule of Law (grant)	-0.074	1.000	-0.074	-7.1%	per 1 SD
Political Stability (grant)	-0.057	1.000	-0.057	-5.5%	per 1 SD
Vulnerability sensitivity (cofin)	-0.744 to -0.860	0.087	-0.065 to -0.075	-6.3% to -7.2%	per 1 SD
Vulnerability sensitivity (grant)	-1.121 to -1.263	0.087	-0.098 to -0.110	-9.3% to -10.4%	per 1 SD
Social readiness (cofin)	0.813 to 0.984	0.101	0.082 to 0.099	+8.5% to +10.4%	per 1 SD
Economic readiness (grant)	0.278 to 0.347	0.146	0.041 to 0.051	+4.1% to +5.2%	per 1 SD

Note: Only statistically significant coefficients were transformed to percentages

Log GDP per capita (log-log specification)
Since both the outcome and GDP per capita are log-transformed, the coefficient is a direct elasticity, i.e., a 1% increase in GDP per capita is associated with a β% change in the outcome.

Variable	β	Interpretation
GDP per capita (cofin, col 2)	-0.065	-0.065% per 1% increase in GDP
GDP per capita (grant, col 2)	-0.074	-0.074% per 1% increase in GDP
GDP per capita (grant, col 4)	-0.052	-0.052% per 1% increase in GDP

Dummy variables (MDB-led project, non-grant instrument)
The same semi-elasticity formula applies: (e^β - 1) × 100 = % difference relative to the omitted category. Examples:

Variable	β	Calculation	Interpretation
MDB-led project (cofin)	0.418–0.422	(e^0.420 - 1) × 100	+52.2% vs non-MDB projects
MDB-led project (grant)	0.371–0.375	(e^0.373 - 1) × 100	+45.2% vs non-MDB projects
Non-grant instrument (cofin)	0.285–0.291	(e^0.288 - 1) × 100	+33.4% vs pure grant projects
Non-grant instrument (grant)	0.125-0.142	(e^0.134- 1) × 100	+14.3% vs pure grant projects

Appendix 6: AI statement

This thesis was written using a few AI tools. Firstly, NotebookLM was used to locate relevant passages within the academic literature I had already selected. Second, Claude was used to help with Stata syntax and to clarify how certain commands work, but all empirical decisions, coding choices, and interpretations are my own. Claude was also used to check calculations and interpretations of the results and to proofread my text. Lastly, Grammarly was used for language editing to improve clarity and flow in the text. All use of AI tools follows the LUSEM guidelines, and I take full responsibility for the content produced and the choices made during the process of writing this thesis.