A grand bargain for climate mitigation, adaptation and compensation

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for the COP30 Ad Hoc committee

This report is a concrete proposal responding to COP30 President-designate Ambassador André Correa do Lago's eighth letter to the international community focused on elevating global action on climate adaptation and adaptation finance. The content of this report was discussed in the context of an independent council convened by the COP30 President-designate to inform some economic dimensions of COP30, including contributions to the 'Baku to Belém Roadmap to 1.3T', to be presented by the President of COP29 and the President-designate of COP30, and to the COP30 Action Agenda.

The views expressed in this report are solely those of the authors and not of any other person or institution.

SUMMARY

Per capita carbon consumption is vastly lower in Low- and Middle-Income Countries (LMICs) than in the OECD, and yet the burden of climate change is projected to fall almost entirely on these countries, where most of the world's poorest live. In this report, we propose a bold new vision for international climate cooperation with a proposed accord that would provide unrestricted climate finance compensation from OECD countries to LMICs in exchange for the adoption of carbon pricing. The proposal's starting point is a transparent method to assess damages from the OECD's current CO2e emissions on LMICs, based on their projected impact of climate change on mortality. We then propose a "grand bargain" wherein LMICs who agree to introduce carbon pricing mechanisms would be eligible to receive damage compensation commensurate with these costs. The bulk of the funds would be distributed directly to citizens and communities as cash transfers, according to simple, parametric rules. We discuss potential avenues to raise funds for these transfers, by closing international tax loopholes, notably on richest people and corporations. Most broadly, this proposal offers an opportunity to right the harms of the OECD's emissions on LMICs and make LMICs, who are projected to account for the great majority of future emissions, willing partners in the global project to take climate action everywhere.

Last, our proposal is a concrete response to the COP30 President-designate's October 2025 call for the international community to scale up global adaptation action through a strategic mix of finance and international cooperation, and to implement ambitious adaption solutions for the world's poor in LMICs.[1]

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EXECUTIVE SUMMARY

Three decades of negotiations have failed to resolve a pair of tensions that undergird the climate challenge. On the one hand, the burden of climate change, including the loss of life, is projected to fall squarely on LMICs and the OECD countries have failed to compensate the LMICs for the climate damages their emissions cause. On the other hand, rapid economic growth is urgent in LMICs and their emission are projected to grow rapidly, with the non-OECD accounting for 80% of projected emissions over the remainder of the century, so any plan to avoid disruptive climate change must include emissions reductions in these countries. We propose a climate grand bargain that delivers compensation from the OECD countries to the LMICs for the damages their emissions cause in exchange for economywide carbon pricing in LMICs that reduces their emissions.

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OUR PROPOSAL THAT LINKS CLIMATE COMPENSATION AND CLIMATE ACTION RESTS ON FOUR KEY IDEAS:

1 A transparent social cost calculation to assess damages owed to poor countries by the OECD for current year-by-year emissions:

a. We set a lower bound on the social cost of carbon by using recent, careful, research that connects a ton of carbon emitted at any point in time to excess mortality from heat in the future. This mortality social cost of carbon is only a part of the damage from that ton, but the most essential. ***A conservative estimate is that the mortality social cost of carbon is about $130 per ton.***

b. ***Assignment of mortality damages*** caused by any OECD country's emissions in any LMIC: Using this social cost of carbon, we can assign a number to the mortality damages imposed by any OECD country's annual emissions in any LMIC (e.g., the effect of the EU's emissions in Pakistan).

c. A key pattern is that more than 96% of all the mortality damages are experienced in the LMICs

d. The OECD countries' 2022 emissions impose **$1.8 trillion in mortality damages** to LMIC countries (all numbers are expressed in 2025 dollars). The polluter pays principle suggests that this is what the OECD owes the LMICs for their 2022 emissions.

2 A concrete proposal to allocate loss and damage funds in participating countries: FAIR (Foreseeable, Automatic, Immediate, Regular)

a. **Pillar 1: Individual transfers**

   i. Universal Basic Income (UBI). In countries most affected by climate change, a Universal Basic Income of $3.00 PPP dollars a day will be sent to all adults in the country, complemented by a universal asset transfer every 10 years, with the first transfer when the person reaches the age of 20.

   ii. Weather Triggered Basic Income (WTBI). In countries where damages owned are insufficient to fund a UBI, a WTBI is provided instead. Triggered by preset specific weather conditions in each small region, automatic monthly transfers will be sent to all households in that region. This would be available in all participating eligible countries.

b. **Pillar 2: Community block grants** proportional to ex-ante damages (we set it at 10% of yearly damages, on a per capita basis). Allocates grants directly to communities, which are automatically disbursed every year, and are proportional to the expected per capita mortality social cost of carbon. These grants allow communities to undertake repair, protect households collectively, and to undertake protective investments.

c. **Pillar 3: Government insurances.** There would be a disaster insurance fund for LMICs' governments, which are the countries for which access to market finance is most limiting. The disaster insurance funds payment would be proportional to loss of lives.

d. Based on our computations, in 2024 all this would have cost **$737 billion**, much less than the full value of the mortality damages imposed by emissions. The difference is in many extremely poor, extremely hot African countries, mortality damages are enormous, but the FAIR proposal caps the expenditures.

3 *A "grand bargain": A quid pro quo on carbon taxes/pricing to create a coalition of participating countries.*

Every low- or middle-income country is eligible to apply for damage compensation, provided that

a. They agree to allocate it according to the FAIR proposal above.

b. They agree to put in place a carbon pricing mechanism (tax or cap and trade), graduated by income levels, following the principle of common but differentiated responsibilities (CBDR). Specifically, we proposed that the required price would be $10 per ton of CO2e for low-income countries, $30 for lower-middle income countries, and $50 per ton for upper-middle income countries.

c. We estimate that the complete adoption of this plan in 2025 would reduce global CO2 emissions by roughly 125 billion tons of CO2 between now and 2050, reducing global climate damages by $28.6 trillion.

4 *Financing based on solidarity levies at the international level*

a. The immediate financing needs will be well below the $1.8 trillion of damages from the OECD emissions, since spending proposal totals **$737 billion**.

b. Money can be raised from various sources, including solidarity levies, and most particularly the closing of two international tax loopholes. These tax proposals are already under discussion in the international community: the "Pillar 2" tax of the OECD and the minimum taxation on billionaires that was introduced by Brazil in the G20. This could raise **$500–$550 billion** annually at first, increasing over time. Other revenues sources, including general taxes, an aviation tax, or a tax on financial transactions could also be mobilized.

This climate grand bargain addresses the main concerns in the climate conversation: the growing carbon footprint of developing countries, how to make sure that the money does not disappear on the way (most of it is being delivered directly to the harmed), what is the basis for computing who pays what to whom, and where will the money come from. This proposal is a complement and brings together several initiatives that are already underway, including: the Global Solidarity Levy Task Force,[2] the process that led to the establishment of the Loss and Damage Fund,[3] the working group on climate coalitions,[4] the G20 Report on taxation of billionaires,[5] damage calculations by the Climate Impact Lab[6] and the UN Human Climate Horizon platform,[7] the High Level Expert Group on Climate Finance,[8] the High Level Panel on the Crisis Protection Gap,[9] the credible global carbon market working group,[10] and the reversing deforestation mechanism.[11]

1. Introduction

Per capita carbon consumption is vastly lower in Low- and Middle-Income Countries (LMICs) than in the OECD countries, and yet the burden of climate change falls squarely on the former, where most of the world's poorest live. In fact, the group of the world's most disadvantaged both consume the least carbon per head and will experience the largest losses from climate change—including the loss of lives. This is clear from Figure 1, which shows excess mortality by the year 2100 under the RCP 8.5 emission scenario. Most of the poorest countries are bright red, indicating an increase in mortality by 2100, while the OECD countries are largely blue.

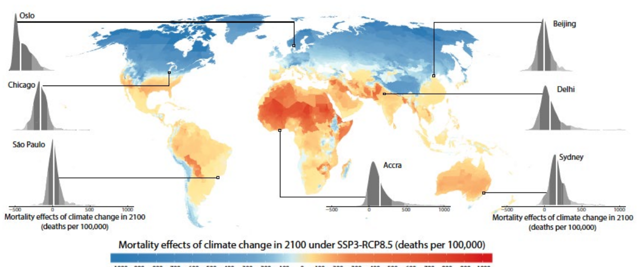

Figure 1: Expected mortality effects of climate change in 2100 from Carleton et al., 2022.

Basic fairness would suggest that the countries whose pollution is causing climate change should compensate those that are being harmed. Yet, there has been no serious attempt to do so, not even for the world's poorest. Nor has there been a concerted effort to help them cope better with a problem that they neither chose nor caused.

A key aspect of the climate problem that is starting to come into focus, is that while countries outside the OECD are not major contributors to greenhouse gas (GHG) emissions today, they are projected to account for nearly 80% of emissions by the end of this century. This means that any plan to limit climate change must include large adjustments in these countries, compared to expected trajectories. Yet, given all the challenges they face today—including adapting to the consequences of climate change that have already occurred—the LMICs have very little room for handling this problem.

The current plans for dealing with this inconvenient fact are based on mobilizing a variety of funds from rich countries. After significant efforts by the developing world, there is now recognition of the need for mitigation, adaptation, and loss and damages. The idea is that experts evaluate the needs in the different categories that developing countries cannot fulfill by themselves, and then developed countries make commitments to fill these gaps. COP29, in Baku, was supposed to be mainly concerned with a renewal of these commitments, first made in Copenhagen.

However, the commitments so far have been well below estimated needs (both for mitigation and adaptation), and slow to be fulfilled (even as loans, let alone grants). Even when the money was there, spending has been slow, due to the many constraints placed on the uses of the funds by donor countries. The resulting conflicts are increasingly out in the open and in the meanwhile, poor people are dying, and the planet is warming. The "road from Baku to Belém", which is meant to take us from $300 billion to $1.3 trillion in climate finance for developing countries, seems checkered with pot holes roadblocks.

Given the urgent need to spur climate action in developing countries, a new vision aims to provide the right incentives to all countries (rich and poor). This is the idea of creating "climate clubs," or "coalitions of the willing" that would impose tariffs on countries who do not implement carbon pricing, at least in the products they export—the EU carbon border adjustment mechanism is one such mechanism. It has the downside of forcing energy transition on developing countries that have done little to cause the problem (the climate coalition working group recommends a graduated carbon tax to ameliorate this concern and stay consistent with CBDR), but also the merit of providing incentives to every country (including OECD countries) to act, and putting them in the driving seat of how to do it. It is a "stick", rather than a "carrot", approach which reduces the chances that the LMICs, where the great majority of projected emissions are expected to take place, will resist or evade it.

In this report, we propose a bold new vision to:

1) provide climate finance for developing countries; and

2) reduce global emissions. It has compensation for damages at the core but links it to the need to take action everywhere and provides incentives to do so.

- The first step is a transparent methodology for calculating how much is owed to specific developing countries in the form of damages caused by emissions in OECD countries, sidestepping the fraught calculation of "needs". The calculation generates a value for the total present and future damages due to yearly emissions from OECD countries, broken down by country. We propose that this should be the prime basis for calculating how much climate finance should flow to each developing country.
- The second step is a concrete proposal of the way in which loss and damage funds could be spent to reduce poverty and increase climate resilience of individuals, communities, and countries.
- The third step is the idea of a grand bargain for climate mitigation, adaptation, and compensation, in which developing countries become eligible for compensation for climate damages in exchange for introducing graduated carbon pricing, consistent with common but differentiated responsibilities.
- The fourth step is to put in place financing options to raise regular and consistent public funding for the scheme.

Each of these steps can be considered separately, but together, they are a coherent alternative to the current paradigms for climate financing for LMICs. Moreover, they together promise to reduce emissions from the countries that are projected to account for 80% of emissions over the remainder of the century.

This proposal is a complement and brings together several initiatives that are already underway, including: the Global Solidarity Levy Task Force,[12] the process that led to the establishment of the Loss and Damage Fund,[13] the working group on climate coalitions,[14] the G20 Report on taxation of billionaires,[15] damage calculations by the Climate Impact Lab[16] and the UN Human Climate Horizon platform,[17] the High Level Expert Group on Climate Finance,[18] the High Level Panel on the Crisis Protection Gap,[19] the credible global carbon market working group,[20] and the reversing deforestation mechanism.[21]

2. A transparent method to calculate climate changes damages

The core of the “polluter pays principle” is that if one produces pollution that damages someone else, then the polluter should be required to compensate the victims to make them whole. A great appeal of this idea lies in its utter simplicity and fairness. Further, it was introduced by the OECD more than a half century ago (1972) and affirmed a few decades later in the Rio Declaration on Environment and Development (1992).[22]

Here, we explain how this principle can be applied to GHG emissions in a straightforward way. The basis of this approach is to determine the monetary damages associated with each additional ton of CO2 equivalent (CO2e) emissions emitted into the atmosphere. Although the damages from these emissions take many forms, including increased mortality, crop losses, declines in labor productivity, etc., this proposal focuses on the mortality impacts due to higher temperature. Temperature related mortality accounts for the majority of estimated damages in LMICs, and it is relatively easy to put a number on it. Moreover, restricting the calculations to this category makes our estimate conservative, protecting it against accusations of climate alarmism. Additionally, people go to incredible lengths to avoid death, so it sidesteps arguments about its legitimacy as a measure of welfare.

The specific calculation of the damages from an additional ton of CO2 emissions involves a four-step process that is outlined in the figure below. Panel A plots the release of an additional ton of CO2 emissions in the present. Its influence on CO2 concentrations is reported in Panel B; the immediate decline followed by a century-long increase has to do with the fact that the ocean first absorbs CO2 and then releases it. Panel C displays the resulting change in temperature, which makes clear that an additional ton of CO2 emitted today will influence temperatures even three centuries later. The solid lines are median estimates, while the shaded area in Panels B and C depicts the interquartile range of each year’s outcome, reflecting uncertainty about the climate system.

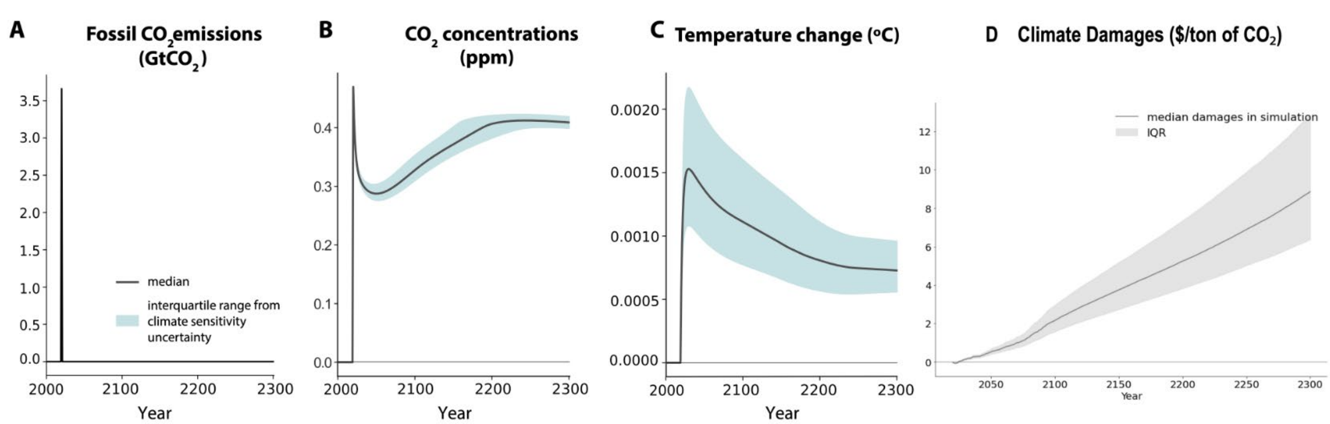

Figure 2: Change in Emissions, Concentrations, Temperatures, and Damages Due to a Marginal Emissions Pulse Today, based on Carleton et al, 2023

Panel D plots the dollar value of the mortality damages annually from a ton of CO_2 emitted in the present. These dollar values are calculated by first determining the mortality impacts globally of the marginal ton for each year that the CO_2 remains in the atmosphere and affects temperature (assuming a baseline climate change projection of RCP 4.5). The change in mortality is then converted into monetary terms by assigning $2 million to each life lost, wherever it occurs in the world. This valuation of life, known as the value of a statistical life (VSL), does not reflect the value that an individual would pay to save their own life, but rather what people and societies are willing to pay to avoid a modest increase in mortality risk. The VSL concept is used globally in policymaking, including in the US, EU, and Australia, especially for environmental, health, and safety regulations.

The headline number that comes out of this is that an additional ton of CO_2 emitted today causes at about **$130 of present and (discounted) future mortality damages**, over the infinite future, which we refer to as the *mortality-driven partial social cost of carbon (SCC)*, or mortality SCC for short. This is the present value of the year by year mortality damages represented by the solid line in Panel D. Importantly, it reflects the range of projected damages in each year (depicted by the light gray area) by recognizing that people dislike uncertainty. Further, it is calculated using a standard approach to discounting the future (i.e., "Ramsey discounting") that is pegged to the average risk-free discount rate of 2% over the last several decades.

The damage calculation is based on several assumptions on the VSL, discounting, treatment of uncertainty, population growth, etc. Table 1 reflects our preferred assumptions, but if the general idea of this proposal were to be adopted, the specific set of assumptions would be the responsibility of a governance committee.

The mortality SCC can be apportioned across countries. Table 1 reports on this disaggregation in several ways. It is evident that the damages will be concentrated outside the OECD countries: each ton of CO_2 emissions is projected to cause $127 of mortality damages outside the OECD countries and just $3 in OECD countries (see Panel B, Row 1). The small effect in OECD countries is because the increase in deaths in hotter summers is nearly perfectly counterbalanced by a decline in deaths due to warmer winters. Panel C does a further disaggregation and reveals that $81, or more than 60% of the total cost, is projected to occur in Africa. This is because Africa has many countries that are relatively poor and hot today and, moreover, expected to have significant population growth in the coming decades.

Note that for many reasons, the mortality SCC is likely to be a lower bound on damages resulting from emissions: first, it takes into account only mortality, not diseases or economic losses associated with crop losses, labor supply, labor productivity, etc. Second , the mortality effect reflects additional death in a given year. However, something like the kidney damage suffered by someone who works under extreme heat only shows up some years later and therefore will not be ascribed to the year when it occurred. And third, it is missing the broader effects of climate that can cross international borders, like large-scale migration and disruptions in trade. We think this conservative approach makes the least controversial case for damages.

The remainder of Table 1 uses the mortality SCC to compute the payments that rich countries would owe poor countries under our proposed scheme, using 2022 as an example (in future versions of this note, we will calculate the evolution of damages under different predictions of the emissions' trajectory for the OECD countries, as well as changes in the mortality partial SCC). Column 2 reports total CO_2e emissions for each region. Globally, there was a total of 50.1 billion tons of CO_2e emissions and 14.5 billion tons came from OECD countries.

The remaining columns report the damages caused in the countries and groups of countries listed in the column headings. In the context of the proposal, the key findings are that the OECD countries' 2022 emissions are projected to cause $1.9 trillion in mortality damages and more than 96% of it will occur in non-OECD countries. Conversely, the 2022 non-OECD emissions are projected to cause just $124 billion of damages in OECD countries, despite the fact that the non-OECD emissions account for nearly 72% of global emissions. As we mentioned before, it is because OECD countries are cooler to start with, and more able to spend resources to adapt to climate change, and thus will experience very little mortality increase under climate change. Panel C allows for additional disaggregation by countries and major groupings of countries.

Table 1: Mortality Climate Changes Damages caused by current annual CO2 emissions

	Mortality partial SCC (USD)	Emissions 2022 (Bt CO_2e)	Total damages to (billions of USD)								
			World	OECD	Non–OECD	U.S.	E.U.	China	India	Africa	Rest of the World
	(1)	(2)	(3a)	(3b)	(3c)	(3d)	(3e)	(3f)	(3g)	(3h)	(3i)
Panel A: World											
World	119	53.3	6,320	169	6,151	-54	111	126	385	3,935	1,816
Panel B: OECD vs. Non-OECD											
OECD	3	15.0	1,776	47	1,729	-15	31	36	108	1,106	510
Non-OECD	115	38.3	4,543	121	4,422	-39	80	91	277	2,829	1,305
Panel C: Major regions											
U.S.	-1	6.1	719	19	700	-6	13	14	44	448	207
E.U.	2	3.3	396	11	386	-3	7	8	24	247	114
China	2	13.4	1,589	42	1,547	-14	28	32	97	989	457
India	7	4.0	469	13	456	-4	8	9	29	292	135
Africa	74	4.7	552	15	537	-5	10	11	34	344	159
Rest of the World	34	21.9	2,595	69	2,525	-22	46	52	158	1,616	745

Notes: Data Source: Climate Impact Lab. Scenario: RCP 4.5. All monetary values are 2025 USD (rounded to whole numbers). Damages (cols 3a–3i) are expressed in billions of USD. Emissions are measured in billions of tons CO_2 equivalent and rounded to one decimal. "Rest of the World" comprises all countries other than the U.S., E.U., China, India, and the African countries.

A straightforward application of the "polluter pays principle" then says that the OECD countries would owe non-OECD LMIC countries $1.8 trillion for their 2022 emissions (for comparison, world GDP was $101 trillion US dollars). Africa's claim on this total would be $1.2 trillion. To further contextualize these numbers, Africa's GDP in 2022 was about $3 trillion, which, at once, underscores the magnitude of the projected damages there (37% of current GDP) and climate change's inherent inequities. Further, it is noteworthy that these damages are associated with just one year's emissions and that the OECD countries' 2023 and other subsequent year's emissions would cause a similar amount of damages. A further logical step is that each country is "owed" the amount of damages that is specific to them. This is taken into account in the rest of our proposal.

3. FAIR (*Foreseeable, Automatic, Immediate, Regular*): A concrete proposal to allocate and spend loss and damages funds

A contentious aspect of climate finance is the governance of the funds, and particularly the permitted uses of the money. Funds raised for mitigation and adaptation, both from multilateral and bilateral donors, come with numerous strings to ensure that they are spent according to the objectives of each donor, which may not be what countries prioritize. In fact, some of these rules make it impossible for many of the poorest countries to apply directly for some of the multilateral funds. As a result, the spend rates of climate funds have been surprisingly low and certainly not commensurate with the urgency of damages in LMICs or need to cut emissions globally.

The "Fund for Responding to Loss and Damages" agreed upon by COP28 was set up as an independent fund within the World Bank to help it become active and operational faster, but this means that it will inherit the rules and procedures of other international climate funds, and some of the tensions. It is essential to find a way to disburse funds more quickly, and with less overhead. At the same time, it is important to ensure that money that is meant to compensate people for the present and future losses of climate change really does that.

Our solution to this problem is to send the bulk of the funds directly to individuals in the form of cash transfers, and use the remainder to enable communities and governments to purchase parametric weather insurance.

This gives us a three pillar solution:

- Pillar 1: Individual transfers
- Pillar 2: Community insurance
- Pillar 3: Government insurance

PILLAR 1: INDIVIDUAL TRANSFERS

Today, it is possible to connect every citizen in the world, even in the poorest, most vulnerable countries, to individual financial accounts, allowing them to receive money quickly and efficiently. This will require some investment in transfer infrastructure—especially in the poorest countries—and the adoption of appropriate safeguards, but it is entirely doable. If a government is willing to participate, it is possible to organize the registration of every citizen in a direct cash transfer system. There is considerable evidence from more than a hundred studies on direct cash transfer, that people who receive such cash transfers use them well, and several studies also show that cash transfers make households more resilient, notably by facilitating adaptation at the individual level.

Those transfers would not need to be sent directly from a central international account to each household. The logistics of the transfers would vary, from country to country. Typically, they would transit through each country's social protection system, unless the country does not have the financial infrastructure in place. But the principle would remain the same: people, not countries, would be at the center, and the fund would agree on a rule about how much each person gets.

Although the details could be worked out, we propose (and provide costing for) a tiered system, to make the money go the furthest in helping people adjusting to climate change:

1. **Universal Basic Income (UBI)**. When countries have enough damages to finance it (those are the poorest, hottest countries), there will be in addition a Universal Basic Income of $PPP dollars a day, sent to all adults in the country and a universal asset transfer every 10 years, with the first transfer when the person reaches the age of 20.

2. **Weather Triggered Basic Income (WTBI).** Triggered by preset specific weather conditions in each small region (predicted heat waves), automatic transfers will be sent to all households in that region. This would be available in all participating eligible countries.

PILLAR 2: COMMUNITY TRANSFERS: BLOCK GRANTS FOR COMMUNITIES THAT ARE AFFECTED BY CLIMATE CHANGE

Some climate-related disasters, such as heat waves or floods, cannot be effectively addressed or prevented by individuals alone. The second pillar of our proposal allocates grants directly to communities, which are automatically disbursed every year, and are proportional to the expected per capita mortality social cost of carbon. These grants allow communities to undertake repair, protect households collectively, and to undertake protective investments, such as building levees, providing cool spaces in hot months, repairing damaged infrastructure, or installing air conditioning in schools.

PILLAR 3: DISASTER INSURANCE FOR GOVERNMENTS IN LOW-INCOME COUNTRIES

Climate change will also increase the frequency of other weather-related events. Of the 393 disasters reported by the Emergency database EM-DAT (a database on the occurrence and impacts of over 26,000 mass disasters worldwide from 1900 to the present day compiled from various sources, including UN agencies, non-governmental organizations, reinsurance companies, research institutes, and press agencies by the Center for Research on the Epidemiology of Disasters). In 2024, 147 were the result of storms, while 142 were caused by floods.

When a disaster strikes, the government ends up being the insurer of last resort, through the provision of disaster relief. This is also true in rich countries, where government funded relief agencies, such as FEMA in the US, intervene in case of disaster, but given the lack of well-developed formal insurance markets in poor countries, government intervention is even more critical. In India, for example, where nearly 3,000 people died in floods and storms in 2024-2025, the central government alone spent $3 billion dollars (0.8% of GDP) on disaster relief.

At this time, according to a recent report by the high-level panel on risk prevention, only 2% of the financing for coping with disasters is pre-arranged, through contingent loans, grants, and insurance. And only 1.4% of the pre-arranged amount reaches low-income countries: for every $5,000 of the amount spent on crisis finance worldwide ($76 billion), only $1 dollar goes to low-income countries as pre-arranged finance.

When a poor country encounters a crisis, it launches a desperate search for funds: in its own budget by cutting other social services, by passing a begging bowl among bilateral and multilateral donors, and sometimes by borrowing. It is far from being an ideal system. First, it hobbles the country's finances, often worsening their fiscal situation and slowing down recovery. If resources were available, we would expect a growth rebound right after a disaster, as the region rebuilds. Instead, according to the IMF, LMICs that face disasters grow 1 to 2 percentage points slower after a disaster.

To address this problem, we propose a third pillar which is a disaster insurance fund for LMICs (excluding the upper-middle-income countries), which are the countries for which access to market finance is most limiting. The disaster insurance funds would be set up to partially cover the costs of damages experienced.

Note that neither the WTBI nor the disaster insurance for the governments are trying to tackle climate attribution. Instead, we are proposing to insure households and governments against weather shocks because they are poorly insured, and this is an effective way of spending damage money.

Costing

In Annex 1, we propose a costing for each of these three pillars. At the moment, given data availability, we calculate the cost that would have been incurred in 2022, given the actual realization of temperatures, and disasters. In a future version, we will provide a simulation for the financing needs under different climate scenarios until 2100.

Following established practice in the COP process, we consider the set of eligible countries for WTBI, and community transfers to be the "developing" countries (countries outside Annex I), while the set of eligible countries for disaster insurance are the low- and lower-middle-income countries in this group (in the next section we discuss what countries would need to do to access the funds).

Countries are eligible for UBI if 70% of their total damages would be sufficient to cover a transfer of $2.15 dollars a day at PPP, after WTBI is financed. Covered countries are therefore the poorest, most vulnerable countries (Annex I includes a list).

> Under this scenario, the total financing needs in 2025 would have been:
>
> - $197 billion for the WTBI
> - $280 billion for UBI in the most affected countries
> - $186 billion for community transfers
> - $55 billion for government disaster insurance in low- and lower-middle income countries

This is a total of $721 billion, well below the estimated mortality damages from OECD emissions under a moderate climate change scenario ($1.8 trillion).

In the attached technical note we propose a simulation of the expected spending for these three pillars in future years given climate changes, population increases, and disaster may become more present. The overall expenditure continue to stay well below projected below damage until the end of this century at least.

The views expressed in this report are solely those of the authors and not of any other person or institution.

4. A grand bargain: climate damages in exchange for climate mitigation

Our core proposal is to complement the current system of climate finance by a “damage money for mitigation” bargain, where damage compensation is used as a “carrot” to introduce carbon pricing in the countries that will drive emissions in the coming decades.

Carbon pricing (either in the form of a carbon tax or an emissions trading market) would serve as a signal of the willingness to take serious steps in reducing emissions. They would apply economy-wide and cover scope 1 and scope 2 emissions. Following the principle of common but differentiated responsibility, the carbon price could have several tiers based on current income, for low-income countries ($10 per ton of CO2), lower-middle income countries ($30 per ton of CO2), and upper-middle-income countries ($50 per ton of CO2). There should be coordination with CBAM or other tariff based “sticks”, so that the carbon price under these schemes would satisfy CBAM requirements.

Importantly, just as in CBAM, the revenues from the carbon tax would stay within each country. Thus, the political acceptance of the tax would be easier, because by participating, poor and severely affected countries would be able to redistribute significantly more than they collect.

Every country outside Annex I would be in principle eligible for damage compensation, provided that:

1. They agree to allocate it according to the FAIR proposal above.
2. They agree to put in place a carbon tax, graduated by income levels following the principle of common but differentiated responsibilities, with pro-rata ramp up as they become richer.

Point (2) borrows from the Climate Club idea the main insight that it will be much more effective for each country to be in the driver seat of their climate transition.[23] With strong incentives to reduce emission, LMICs can be in the driver seat of their own emissions' trajectory.

The climate grand bargain proposes is based on autonomy and cooperation: countries would voluntarily agree to set up a carbon tax in order to get access to significant transfers to compensate their citizens for climate damages and help them deal with the consequences of climate change in their everyday lives. Clearly, in this scheme, nobody gets exactly what they want: developing countries want compensation for loss and damages, without counterparts. Rich countries want them to implement high carbon taxes to curb their future emissions and would prefer not to pay anything in exchange. But with each of them giving something up to get something, we may finally be able to make progress.

The table below shows the projected change in emissions under this proposal.

Table 2: Climate and Economic Impacts of Heterogeneous Carbon Prices in Low and Middle-Income Countries, 2025–2050

	Business as usual	Carbon prices in 2025: \$10/t (Low), \$30/t (Lower-middle), \$50/t (Upper-middle) all rising 5% annually in real terms		
	(billion tCO_2e)	Cumulative Change in Emissions (billion tCO_2e)	Present Value of Cumulative Reduction in Climate Damages (billion \$)	Avg Annual Carbon Price Revenue (% of GDP)
	(1)	(2)	(3)	(4)
Low and Middle Income Countries By Income Group				
Low income countries	49.2	-1.4	325.4	2.9
Lower-middle income countries	224.5	-51.2	11,892.6	2.8
Upper-middle income countries	242.2	-70.6	16,335.0	5.6
Total	516.0	-123.2	28,552.9	4.0

Notes: Data sources: Larsen et al. (2025), Black et al. (2023), and World Bank (2025). The table summarizes the effects in low and middle income countries of carbon-price paths applied by income group: \$10/t in 2025 for low income countries, \$30/t in 2025 for lower-middle income countries, and \$50/t in 2025 for upper-middle income countries, each rising by 5% annually in real terms. Column (2a) shows the change in cumulative emissions relative to the Business-As-Usual scenario, in billion tCO_2e. Column (2b) reports the present value of cumulative avoided climate damages (billion 2025 USD) with a 2% annual discount rate. Column (2c) reports the average annual carbon-tax revenue as a share of GDP (%). China and Argentina are not included because they will be high-income countries in 2026.

5. Financing options

Getting serious about damage compensation and the grand bargain would require committing real flows of funds towards the damage funds, ideally to cover the emission damages of \$1.8 trillion (at least it should be the notional target), and at a minimum the approximately \$700 billion that we estimate would be necessary to finance our redistribution proposal.

This money has to come from public sources, because while investing in the poorest people and getting full cooperation from the developing countries on climate mitigation has huge social return, there is no private money to be made in compensating the world's poorest for the climate damages they experience.

The simplest solution would seem to be to impose an additional carbon tax of \$127 in all OECD countries, to be redistributed to poor countries. This would be symmetric to the effort required from LMICs to participate. Alternatively, each country in the OECD could be given the task of collecting taxes equal to \$127 times their yearly emissions, in whatever way they see fit. However, developed countries have made it very clear that they will not sign up for any "liability" for past or present climate damages, and the COP framework puts voluntary commitments at the heart of the mechanism. This makes both of these options impractical. But the problem is that voluntary public transfers to the Loss and Damage funds have been minimal, and we could expect this to continue.

Our proposal to resolve this tension is thus to replace the commitment to raise a certain amount of dollars every year by a commitment to put in place regular sources of financing and allocate them to fund damages. This money could come from general budgets, additional carbon taxes, or from one of the "Global Solidarity Levies" which have been studied by the Global Solidarity Task Force.[24] Ideally, those taxes would be enforceable by a group of "willing" countries, even if some large countries do not sign up.

The Global Solidarity Levies task force considers a number of possible levies (such as taxes on extractive industries, shipping, aviation, rich people, tax on financial transactions), one of which (the tax on shipping) has already been the subject of a global accord (although it will now be postponed due to US opposition) and one (airplane tax) is under active discussion.

To raise sufficient funds that can indeed be redistributed in poor countries, we propose to focus on two taxes, one of which is already in place (OECD, Pillar 2, the taxation on the largest multinational corporations) and the other has been the topic of discussions at the G20 (tax on billionaires):

- OECD Pillar 2 could be reformed to remove loopholes and could be increased from 15% to 21%. According to EU-tax simulation, this would raise an additional $300 billion every year (this is assuming that the US corporations pay, which may not be the case, given recent G7 negotiations).

- A yearly tax of 2% on the wealth of the 3,000 richest billionaires would raise $200-$250 billion (according to the report for the G20 prepared under the Brazil Presidency)[25]. The report also outlines practical steps that could be taken to make this tax a reality.

These two sources alone would raise $500 billion a year for now, enough to fund the current spending needs. The gap between $500 billion and $1.8 trillion could be covered by exploring different funding sources (including a tax on financial transactions). There could also be commitment funds raised by solidarity levies would continue to be allocated to these needs in eternity, even after OECD countries reach levels of emissions. In future versions of the note, we will explore minimum permanent yearly commitments to cover the flow of damages owed, and how they could be funded.

6. Governance

We have sought to design a system that requires few decisions and has very little overhead. Nevertheless, a governance system will be necessary to make some critical decisions: assumptions underlying damage calculations, benefits level, parametric insurance rules, payout on the country level insurance, etc. There will also need to be a financial host for the fund and to monitor disbursement.

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ANNEX 1:

Climate Compensation for LMICs: A Spending Simulation

September 4, 2025

1 Introduction

This short technical note quantifies the expenditures associated with the Banerjee-Duflo-Greenstone proposal for climate compensation. Under the proposed system, any LMIC that incurs climate damages would receive compensation.

Compensation is provided at 3 levels, to:

- *Individuals*–in the form of either:
  1. a **Universal Basic Income (UBI)**, which is provided in the most affected countries. A UBI is composed of a daily transfer (hereafter, "*daily UBI*") and a large lump-sum transfer provided every 10 years (hereafter, "*Universal Asset Transfer (UAT)*"), *or*
  2. a **Weather-Triggered Basic Income (WTBI)** in months with five or more days with mean temperature over 32°C. A WTBI is funded in places where the compensation budget is insufficient to fund a UBI.
- *Communities*–who receive a yearly **community block grant** corresponding to 10% of the total per capita damages the country incurs, for each of its members
- *Governments*–who receive support through a **disaster insurance** scheme that provides payouts in the event of climate-related disasters.

The cost of funding each module is presented in Section 2. The budget available for each country is determined by the total damages it incurs from OECD countries' carbon emissions, which are estimated in Carleton et al. (2025). Any unspent budget is carried over to the following year. Section 3 outlines the assumptions used to estimate these damages and describes how we determine which modules can be implemented given budget constraints. In Section 4, we report the resulting spending on each program for the year 2024. In Section 5, we estimate the total spending that would result from implementing the proposal each year between 2020 and 2099.

The exact methodology employed to derive these results is presented in a companion technical note.

2 Compensation Costs

2.1 Universal Basic Income (UBI)

Table 1: Cost of providing a Universal Basic Income in the most affected LMICs in 2022 (constant 2025 bn USD)

Country	**Population (millions)**	**Share of pop. reached (%)**	**UBI cost**
Burkina Faso	22.69	41.02	4.75
Niger	23.33	36.97	4.39
Pakistan	214.06	50.08	38.59
Afghanistan	42.74	39.61	5.52
Bangladesh	169.45	55.29	46.47
Sudan	56.27	46.92	16.92
Mali	21.42	39.56	4.15
Nigeria	211.38	41.99	55.77
Chad	15.27	40.34	3.26
Somalia	11.62	40.49	4.2
Togo	7.52	47.49	1.97
Benin	12.07	43.12	2.68
Iraq	42.63	44.86	11.53
Ghana	31.32	46.79	8.25
Tanzania	61.25	40.86	11.18
Senegal	16.29	43.1	4.04
Mozambique	29.69	43.3	7.59
Malawi	21.21	39.18	4.32
Côte d'Ivoire	23.78	45.58	6.31
Central African Republic	5.43	46.21	1.7
Uganda	48.24	37.73	10.06
Guinea	12.11	42.72	2.35
Cameroon	24.4	45.7	5.54
Nepal	36.9	51.34	7.97
Sierra Leone	7.61	44.21	1.4
Syria	24.94	52.44	5.14
Zimbabwe	13.15	46.8	2.92
Liberia	6.12	44.49	0.01
Mauritania	4.42	47.34	1.09
Guinea-Bissau	1.87	44.87	0.46
Djibouti	1.07	50.35	0.45
Gambia	2.27	43.42	0.45
Total			**281.44**

Notes: Simulated costs of providing a UBI composed of a daily transfer of $3 PPP (constant 2021 USD) and a UAT worth 2 years of daily UBI once every 10 years. All costs are expressed in billions of constant 2025 USD. The share of population reached corresponds to 80% of all adults aged 18 or more. Values reported only for countries for which damages incurred are enough to fund a daily UBI.

In the countries most affected by climate change, adults receive a UBI, without targeting, composed of a daily transfer of $3 PPP for a year—calibrated to the international poverty line—and a larger lump-sum transfer equivalent to two years' worth of daily transfers, disbursed once every ten years. We refer to this large transfer as a *Universal Asset Transfer (UAT)*.

The cost of funding a UBI is reported in Table 1, where we report numbers for the set of countries for which we can fund a UBI given the budget constraints, which we introduce in Section 3.

2.2 Parametric Insurance

Table 2: Cost of providing climate insurance to LMICs in 2022 (constant 2025 bn USD)

Country	**WTBI Recipients (millions)**	**WTBI cost**	**WTBI spending**	**Disaster insurance cost**	**Total Insurance cost**
Burkina Faso	7.93	1.22	*0*	6.95	8.17
Niger	8.62	1.79	*0*	7.75	9.54
Pakistan	94.86	12.65	*0*	4.45	17.1
Afghanistan	3.21	0.14	*0*	0.64	0.77
India	562.54	52.64	*93.41*	5.39	58.03
Bangladesh	0	0	*0*	0.44	0.44
Sudan	24.86	7.38	*0*	8.62	15.99
Mali	7.47	1.21	*0*	6.1	7.31
Nigeria	26.11	3.54	*0*	11.16	14.71
Chad	6.04	0.99	*0*	6.38	7.37
Somalia	0.67	0.15	*0*	0.06	0.21
Togo	0.44	0.05	*0*	0.07	0.12
Benin	0.61	0.08	*0*	0.11	0.19
China	0.18	0.02	*32.35*	0	0.02
Iraq	18.95	4.32	*0*	0	4.32
Ghana	1.96	0.18	*0*	0.06	0.24
Tanzania	0	0	*0*	0.03	0.03
Dem. Rep. of the Congo	0	0	*10.89*	10.77	10.77
Senegal	0.97	0.18	*0*	0.15	0.32
Mozambique	0.09	0.01	*0*	0.51	0.52
Malawi	0	0	*0*	6.94	6.94
Côte d'Ivoire	0	0	*0*	0.03	0.03
Egypt	8.69	0.86	*14.01*	0	0.86
Iran	12.05	9.0	*13.78*	0	9.0
Central African Republic	0.02	0	*0*	6.42	6.42
Uganda	0	0	*0*	6.36	6.36
Guinea	0.07	0.01	*0*	0.08	0.09
Cameroon	2.79	0.37	*0*	6.47	6.83
Nepal	2.82	0.21	*0*	0.42	0.63
Sierra Leone	0	0	*0*	0.03	0.03
Syria	5.15	0.31	*0*	0.01	0.31
Philippines	0	0	*6.29*	1.53	1.53
Zimbabwe	0	0	*0*	0.03	0.03
Myanmar	3.03	0.11	*7.08*	0	0.11

Continued on next page

Table 2: Cost of providing climate insurance to LMICs in 2022 (constant 2025 bn USD)

Country	**WTBI Recipients (millions)**	**WTBI cost**	**WTBI spending**	**Disaster insurance cost**	**Total Insurance cost**
Turkey	4.02	0.29	*6.64*	0	0.29
Mauritania	1.42	0.35	*0*	0.04	0.38
Algeria	2.43	0.29	*4.87*	0	0.29
Vietnam	0	0	*4.53*	0.17	0.17
Cambodia	1.08	0.06	*4.05*	0.08	0.14
Thailand	24.94	1.28	*3.45*	0	1.28
Uzbekistan	0	0	*3.0*	0.01	0.01
Zambia	0	0	*2.22*	0.01	0.01
Djibouti	0.54	0.18	*0*	3.98	4.17
Sri Lanka	0	0	*1.58*	0.04	0.04
Laos	0	0	*1.3*	0	0
Morocco	0.03	0	*1.09*	0	0
Gambia	0	0	*0*	0.02	0.02
Tunisia	0.17	0.01	*0.97*	0	0.02
Republic of the Congo	0	0	*0.81*	0.09	0.09
Haiti	0	0	*0.72*	0.02	0.02
Libya	0.34	0.06	*0.55*	0	0.06
Nicaragua	0	0	*0.42*	0.01	0.01
Yemen	2.2	0.39	*0.39*	0.27	0.66
Bolivia	0	0	*0*	0.15	0.15
Colombia	0.01	0	*0.03*	0	0
Australia	0.14	0.08	*0*	0	0.08
Ethiopia	0.83	0.07	*0*	0	0.07
Saudi Arabia	17.73	6.21	*0*	0	6.21
Venezuela	0.23	0.09	*0*	0	0.09
United States	8.42	2.44	*0*	0	2.44
United Arab Emirates	7.48	4.06	*0*	0	4.06
Kenya	0.13	0.01	*0*	0	0.01
Mexico	2.15	0.51	*0*	0	0.51
Total	**874.41**	**113.79**	***224.88***	**102.86**	**216.65**

Notes: Simulated costs of providing a WTBI and disaster insurance to countries that experience positive damages. All costs are expressed in billions of constant 2025 USD. The minimum cost of providing a WTBI at $4.2 PPP (constant 2021 USD) per day in hot months is indicated in the column "WTBI cost", while the actual amount spent on WTBI under the proposal is reported under "WTBI spending". "WTBI recipients" correspond to 80% of the number of adults who experience at least one hot month. The cost of disaster insurance corresponds to the mortality damages from disasters, defined as the death toll from disasters multiplied by a constant VSL of $2M. Disaster insurance is provided only for low and lower middle income countries.

Automatic transfers are sent automatically following extreme weather events. Insurance is provided at 2 levels:

1. *Individuals* in countries without a UBI receive a *Weather Triggered Basic Income (WTBI)* corresponding to the transfer of $4.2 PPP per day for 30 days in any month

with at least 5 days exceeding 32°C. This amount reflects the lower-middle-income poverty line.

2. *Governments* of low income and lower middle income countries receive insurance payouts following climate disasters, corresponding to a fixed share of the total climate damages incurred from global carbon emissions

Countries' income groups are defined using thresholds on GDP per capita. These thresholds were chosen so that the resulting income groups match the World Bank's 2025 lending groups.

To estimate the total WTBI-eligible population in 2021, we use data on daily temperatures and population across 24,378 separate regions around the world, of a size comparable to a U.S. county, obtained from Carleton et al. (2025).

For government insurance, we use data from EM-DAT to measure the total number of deaths that resulted from climate-related disasters between 2020 and 2024 in low and lower middle income countries. This number is transformed into a monetary amount using a constant Value of a Statistical Life (VSL) of $2M to approximate the payouts of the disaster insurance scheme.

EM-DAT includes all disasters worldwide in which over 100 persons were affected and more than 10 died. We focus on large droughts, floods, storms, and fires. Missing values are imputed by fitting a poisson regression of deaths on various observables, and using the resulting coefficients to predict total deaths.

The breakdown of the estimated cost of climate insurance for 2022 is presented in Table 2.

2.3 Community Block Grants

Each community receives a yearly transfer, proportional to the amount of damages incurred from OECD countries' carbon emissions, and to the population in that community. In particular, each community receives 10% of the per-capita damages experienced multiplied by its total population. The amounts of these community grants are presented in Table 4.

3 Budget Constraints

Estimating budgets—For each country, the maximum total compensation provided is determined by the mortality damages incurred from OECD carbon emissions. Damages are estimated using the data and methods presented in Carleton et al. (2025), under a moderate climate change scenario (RCP 4.5, SSP2).

Disbursing funds—In each country, a UBI is provided if funds are sufficient to cover it together with community block grants. Otherwise, a WTBI is provided, along with the community transfer. When available resources are insufficient to fully finance both a WTBI and community transfers, the budget is allocated between them according to a fixed share until exhausted. Disaster insurance is always provided, even if doing so requires exceeding the budget. In practice, disaster insurance payouts would be financed from pooled reserves of unused funds.

In countries where a UBI is funded, any unspent budget automatically rolls over to the next year. On the other hand, in countries receiving a WTBI, any residual funds after financing the WTBI, community grants, and disaster insurance are used to increase the daily WTBI rate until fully exhausted.

4 Expenditures

Table 4 presents the total spending on each module that would have resulted from implementing the proposal in 2022. The potential cost of funding a UBI is reported, with values in bold indicating that a UBI is funded.

Note that budgets are enough to fund a either UBI or a WTBI in every country except Yemen. In this case, the budget is allocated between WTBI and community grants until exhausted. Here, we assume that 95% of the budget is allocated to the WTBI. In that case, in 2022, recipients in Yemen would be receiving a WTBI of 4.14$ PPP in Yemen, instead of 4.2$ PPP.

In total, under the rules outlined above, the total spending for 2022 would have been of 794 bn USD (expressed in constant 2025 USD). Note that disaster insurance spending is high in 2022 ($103 bn), where EM-DAT reports a large number of deaths from climate disasters. For instance, in 2025, we estimate that total spending would have been $718 bn, with $55.3 bn spending on disaster insurance (cf. Table 4).

Table 3: Simulated spending on climate compensation under the Banerjee-Duflo-Greenstone proposal in 2022 (constant 2025 bn USD)

Country	**Total budget**	**Total spending**	**WTBI spending**	**WTBI as a share of budget (%)**	**Community grant spending**	**Disaster insurance spending**	**Disaster insurance as a share of budget (%)**	**UBI cost**	**UBI as a share of budget (%)**
Burkina Faso	263.32	38.03	0	0	26.33	6.95	2.64	**4.75**	**1.8**
Niger	225.75	34.72	0	0	22.57	7.75	3.44	**4.39**	**1.94**
Pakistan	201.63	63.2	0	0	20.16	4.45	2.21	**38.59**	**19.14**
Afghanistan	112.94	17.45	0	0	11.29	0.64	0.56	**5.52**	**4.89**
India	109.77	109.77	93.41	85.09	10.98	5.39	4.91	296.42	270.04
Bangladesh	78.85	54.8	0	0	7.89	0.44	0.56	**46.47**	**58.94**
Sudan	70.96	32.63	0	0	7.1	8.62	12.15	**16.92**	**23.84**
Mali	69.2	17.18	0	0	6.92	6.1	8.82	**4.15**	**6.0**
Nigeria	66.79	73.62	0	0	6.68	11.16	16.71	**55.77**	**83.5**
Chad	66.07	16.25	0	0	6.61	6.38	9.65	**3.26**	**4.94**
Somalia	49.0	9.16	0	0	4.9	0.06	0.13	**4.2**	**8.57**
Togo	44.88	6.53	0	0	4.49	0.07	0.16	**1.97**	**4.4**
Benin	40.2	6.81	0	0	4.02	0.11	0.28	**2.68**	**6.67**
China	35.95	35.95	32.35	90.0	3.59	0	0	787.07	2189.43
Iraq	32.37	14.77	0	0	3.24	0	0	**11.53**	**35.62**
Ghana	32.05	11.52	0	0	3.21	0.06	0.2	**8.25**	**25.75**
Tanzania	31.03	14.31	0	0	3.1	0.03	0.08	**11.18**	**36.04**
Dem. Rep. of the Congo	24.07	24.07	10.89	45.24	2.41	10.77	44.76	39.83	165.51
Senegal	21.97	6.39	0	0	2.2	0.15	0.67	**4.04**	**18.41**
Mozambique	21.21	10.22	0	0	2.12	0.51	2.41	**7.59**	**35.76**
Malawi	17.56	13.02	0	0	1.76	6.94	39.52	**4.32**	**24.61**
Côte d'Ivoire	16.18	7.96	0	0	1.62	0.03	0.2	**6.31**	**39.0**
Egypt	15.57	15.57	14.01	90.0	1.56	0	0	18.26	117.26
Iran	15.32	15.32	13.78	90.0	1.53	0	0	117.74	768.73
Central African Republic	15.11	9.63	0	0	1.51	6.42	42.49	**1.7**	**11.24**
Uganda	15.07	17.92	0	0	1.51	6.36	42.16	**10.06**	**66.73**
Guinea	13.97	3.83	0	0	1.4	0.08	0.59	**2.35**	**16.81**
Cameroon	12.75	13.28	0	0	1.28	6.47	50.69	**5.54**	**43.4**
Nepal	12.19	9.61	0	0	1.22	0.42	3.47	**7.97**	**65.4**

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Table 3: Simulated spending on climate compensation under the Banerjee-Duflo-Greenstone proposal in 2022 (constant 2025 bn USD)

Country	**Total budget**	**Total spending**	**WTBI spending**	**WTBI as a share of budget (%)**	**Community grant spending**	**Disaster insurance spending**	**Disaster insurance as a share of budget (%)**	**UBI cost**	**UBI as a share of budget (%)**
Sierra Leone	9.39	2.37	0	0	0.94	0.03	0.32	**1.4**	**14.89**
Syria	9.36	6.08	0	0	0.94	0.01	0.05	**5.14**	**54.89**
Philippines	8.7	8.7	6.29	72.36	0.87	1.53	17.64	33.72	387.62
Zimbabwe	8.54	3.81	0	0	0.85	0.03	0.41	**2.92**	**34.26**
Myanmar	7.87	7.87	7.08	90.0	0.79	0	0	11.29	143.42
Liberia	7.49	0.76	0	0	0.75	0	0	**0.01**	**0.17**
Turkey	7.38	7.38	6.64	90.0	0.74	0	0	21.95	297.59
Mauritania	6.3	1.75	0	0	0.63	0.04	0.56	**1.09**	**17.26**
Algeria	5.41	5.41	4.87	90.0	0.54	0	0	10.21	188.83
Vietnam	5.23	5.23	4.53	86.7	0.52	0.17	3.3	28.15	538.2
Cambodia	4.58	4.58	4.05	88.3	0.46	0.08	1.7	4.93	107.62
Thailand	3.83	3.83	3.45	90.0	0.38	0	0	23.86	622.31
Uzbekistan	3.35	3.35	3.0	89.62	0.34	0.01	0.38	7.14	213.19
Guinea-Bissau	2.96	0.76	0	0	0.3	0	0	**0.46**	**15.65**
Indonesia	2.56	2.56	2.31	90.0	0.26	0	0	83.45	3257.44
Zambia	2.48	2.48	2.22	89.69	0.25	0.01	0.31	4.03	162.85
Djibouti	2.23	4.66	0	0	0.22	3.98	179.01	**0.45**	**20.14**
Sri Lanka	1.8	1.8	1.58	87.9	0.18	0.04	2.1	5.17	287.22
Laos	1.44	1.44	1.3	89.83	0.14	0	0.17	1.57	108.41
Paraguay	1.3	1.3	1.17	90.0	0.13	0	0	2.54	195.29
Kazakhstan	1.21	1.21	1.09	90.0	0.12	0	0	5.17	425.52
Morocco	1.21	1.21	1.09	90.0	0.12	0	0	12.26	1012.9
Gambia	1.14	0.58	0	0	0.11	0.02	1.33	**0.45**	**39.34**
Ukraine	1.1	1.1	0.99	90.0	0.11	0	0	12.91	1171.55
Tunisia	1.08	1.08	0.97	89.77	0.11	0	0.23	3.05	282.96
Republic of the Congo	1.0	1.0	0.81	80.65	0.1	0.09	9.35	1.42	141.39
Jordan	1.0	1.0	0.9	90.0	0.1	0	0	3.15	315.88
Serbia	0.82	0.82	0.74	90.0	0.08	0	0	4.43	537.73
Haiti	0.82	0.82	0.72	87.84	0.08	0.02	2.16	5.05	618.92

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Table 3: Simulated spending on climate compensation under the Banerjee-Duflo-Greenstone proposal in 2022 (constant 2025 bn USD)

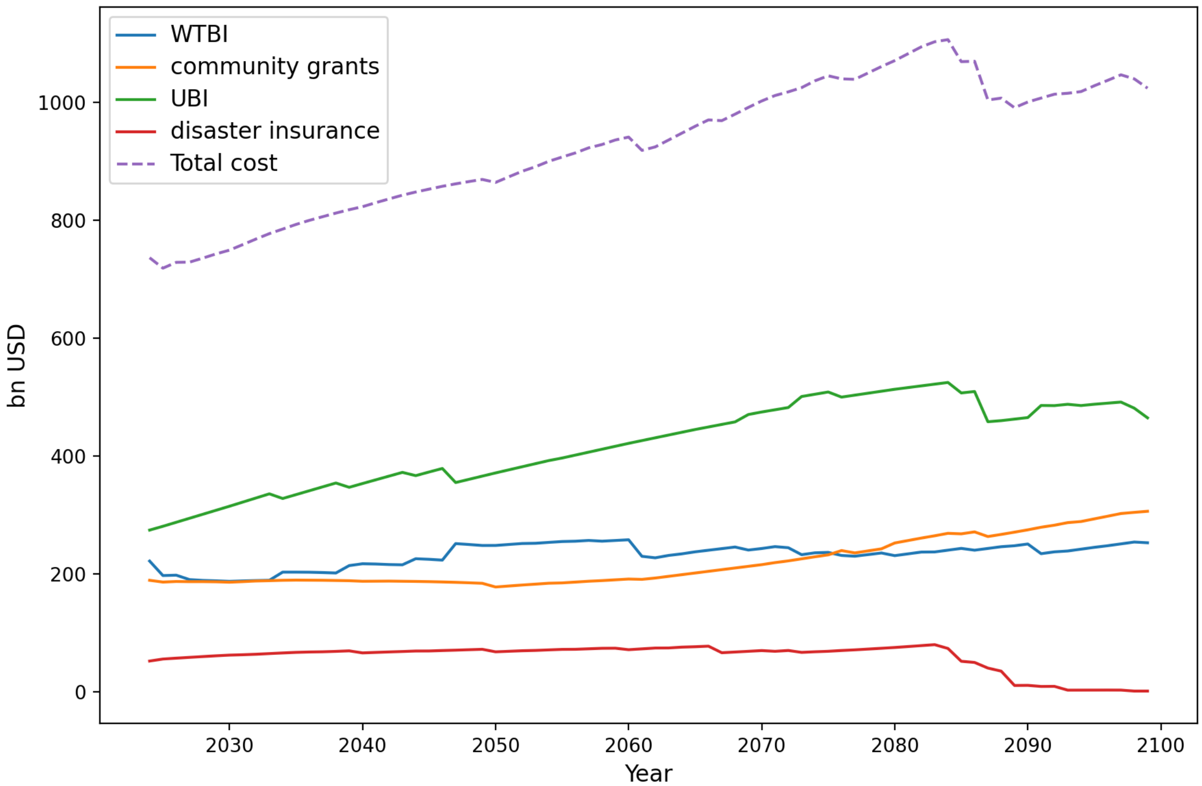
Country	**Total budget**	**Total spending**	**WTBI spending**	**WTBI as a share of budget (%)**	**Community grant spending**	**Disaster insurance spending**	**Disaster insurance as a share of budget (%)**	**UBI cost**	**UBI as a share of budget (%)**
Tajikistan	0.71	0.71	0.64	90.0	0.07	0	0	1.86	263.03
Azerbaijan	0.67	0.67	0.6	90.0	0.07	0	0	2.85	428.86
Libya	0.61	0.61	0.55	90.0	0.06	0	0	2.49	407.65
Nicaragua	0.48	0.48	0.42	87.37	0.05	0.01	2.63	1.87	391.3
Yemen	0.41	0.67	0.39	95.0	0.02	0.27	64.95	5.93	1451.11
Kyrgyzstan	0.36	0.36	0.32	90.0	0.04	0	0	1.5	421.85
Albania	0.31	0.31	0.28	90.0	0.03	0	0	1.41	459.72
Ecuador	0.25	0.25	0.23	90.0	0.03	0	0	6.72	2660.12
Georgia	0.23	0.23	0.2	90.0	0.02	0	0	1.53	677.92
North Macedonia	0.2	0.2	0.18	90.0	0.02	0	0	0.8	405.2
Papua New Guinea	0.18	0.18	0.16	90.0	0.02	0	0	5.22	2892.29
Comoros	0.17	0.17	0.15	90.0	0.02	0	0	0.32	189.83
Bosnia and Herzegovina	0.15	0.15	0.14	90.0	0.02	0	0	1.6	1037.33
Lebanon	0.13	0.13	0.12	90.0	0.01	0	0	34.6	25661.82
Armenia	0.13	0.13	0.11	90.0	0.01	0	0	1.1	868.83
Namibia	0.06	0.06	0.06	90.0	0.01	0	0	0.93	1492.14
Moldova	0.06	0.06	0.05	90.0	0.01	0	0	1.26	2188.63
Bolivia	0.05	0.16	0	0	0	0.15	303.63	3.05	6118.99
Colombia	0.04	0.04	0.03	90.0	0	0	0	17.34	46319.68
Total	**1848.46**	**794.0**	**224.88**		**184.83**	**102.86**		**281.44**	

Notes: Total budget is defined as the estimated damages reported in Carleton et al. (2025). UBI costs are bolded for countries where a UBI is funded under the proposal. Total spending corresponds to the total compensation provided to the country under the proposal.

5 Estimating the cost of the proposal from 2024 to 2099

5.1 Aggregate spending

Figure 1: Total spending by module (bn constant 2025 USD)



The spending that would result from implementing the proposal can be projected until 2099. The details of the assumptions and datasets used to obtain our estimates are presented in the companion technical note.

Figure 1 shows the total cost resulting from implementing the proposal, and breaks it down across modules. The share of the total expenditure spent on each modules is relatively stable across time (see Appendix, Figure 6). We report the breakdown of total spending for a set of years in Table 4.

If the damage fund were to collect 500 bn USD in 2025, and assuming a 5% yearly increase of the funds collected (in real terms), the resources of the fund would be enough to fund the proposal starting in 2035 (cf. Figure 7).

The number of countries where a UBI is funded varies over time (see Appendix, Figure 8). A drop in this number can be explained by a) the graduation of a country from the program after becoming a high income country, b) an increase in the population leading

Table 4: Aggregate spending by module (constant 2025 bn USD)

	2022	2025	2050	2070	2099
Total Budget	1848.5	1867.5	1834.6	2222.6	3073.7
UBI spending	281.4	280.7	371.3	474.7	464.8
WTBI spending	224.9	197.0	248.1	242.9	252.7
Community grant spending	184.8	185.9	177.6	215.5	306.2
Disaster insurance spending	102.9	55.3	67.5	69.6	0.9
Total spent	**794.0**	**718.9**	**864.5**	**1002.8**	**1024.6**

Notes: Total aggregate spending across countries from implementing the Banerjee-Duflo-Greenstone proposal for various years. The total budget corresponds to the sum of individual country budgets.

to a higher cost of the UBI. The number of country by income groups over time is shown in Figure 9.

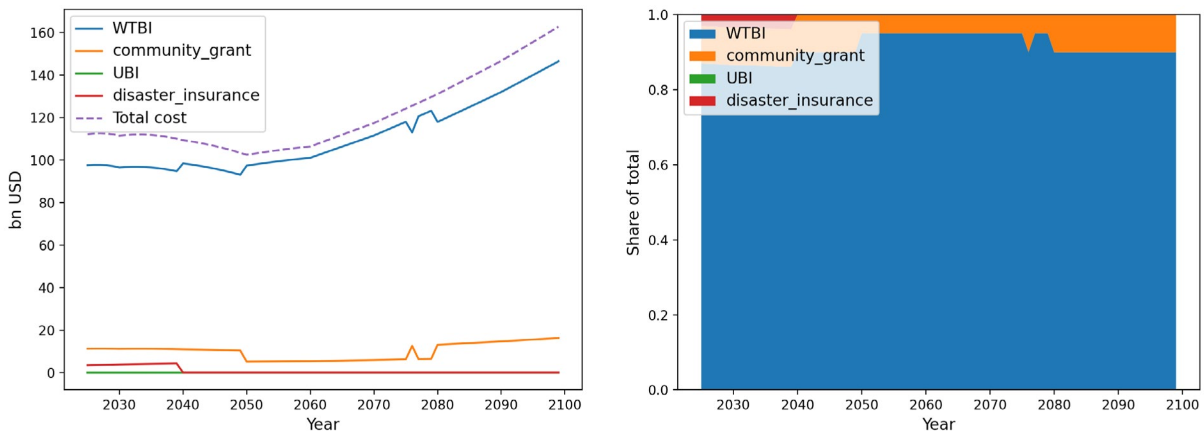
5.2 Case studies

We consider the evolution of total spending in 3 countries:

- **India**–which makes up for the largest share of total spending
- **Nepal**–which is an example of a country where we can fund a UBI in some, but not all years
- **Bangladesh**–which becomes a upper middle income in 2025, and a high-income country around 2085
- **Burkina Faso**–where damages are so high that the cost of a UBI is less than the cost of the disaster insurance

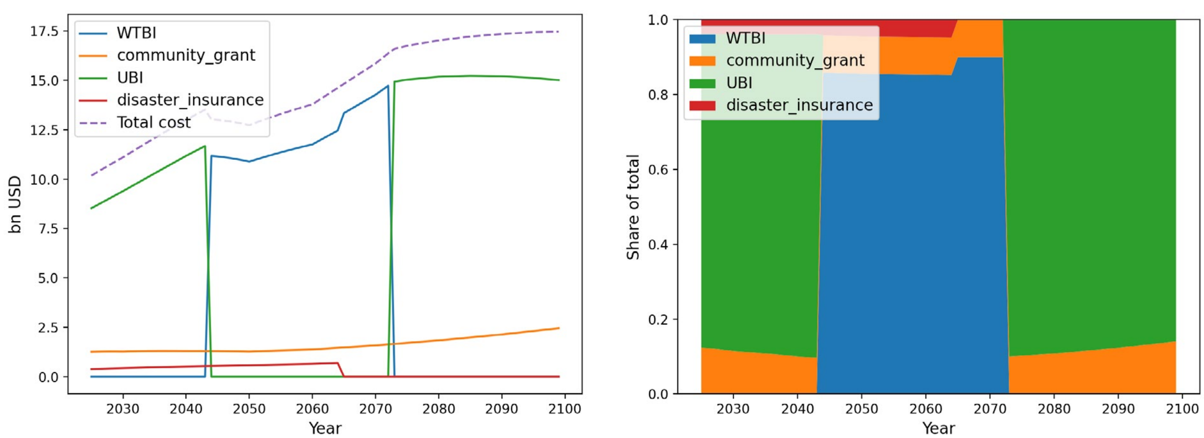
5.2.1 India

Figure 2: **India** – Total spending by module in absolute terms (left) and as a share of total spending (right)



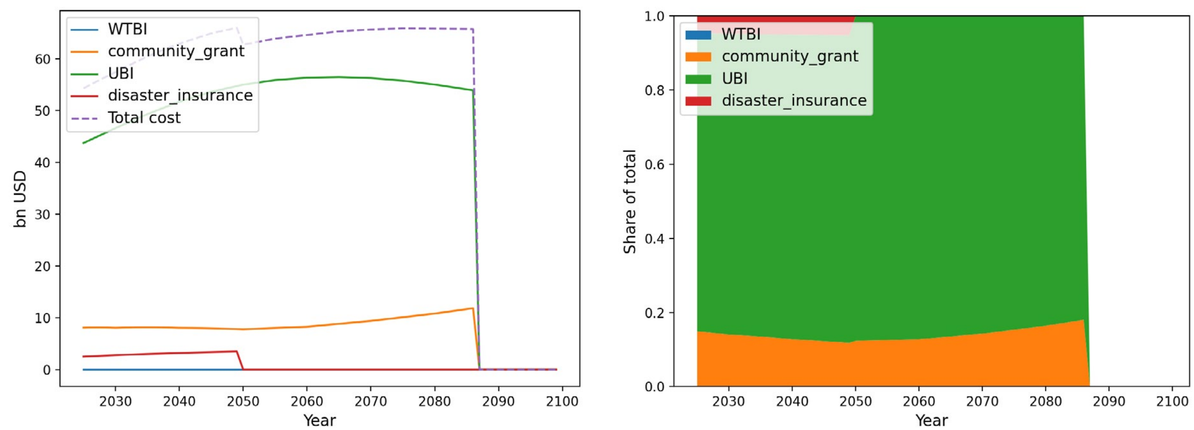
5.2.2 Nepal

Figure 3: **Nepal** – Total spending by module in absolute terms (left) and as a share of total spending (right)



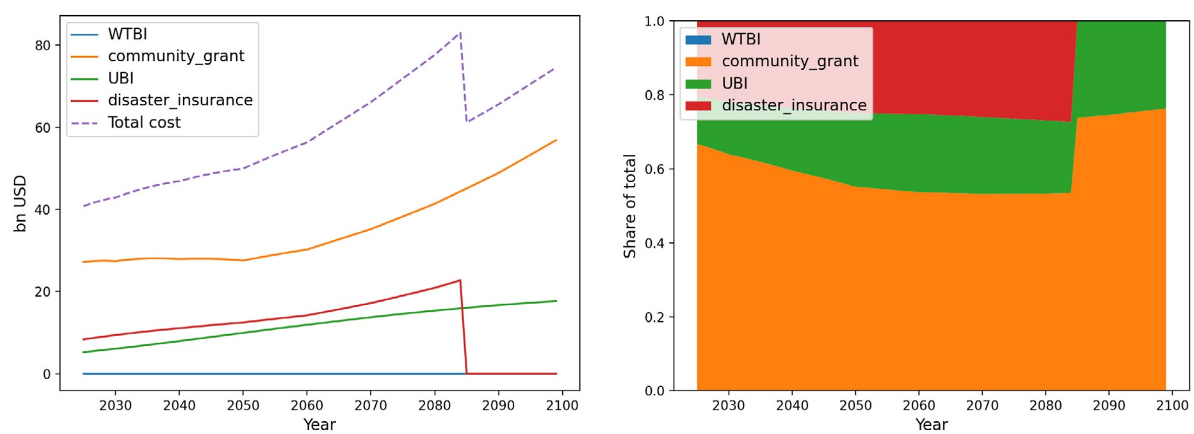
5.2.3 Bangladesh

Figure 4: **Bangladesh** – Total spending by module in absolute terms (left) and as a share of total spending (right)



5.2.4 Burkina Faso

Figure 5: **Burkina Faso** – Total spending by module in absolute terms (left) and as a share of total spending (right)



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A Appendix

Figure 6: Spending on each module as a share of total spending

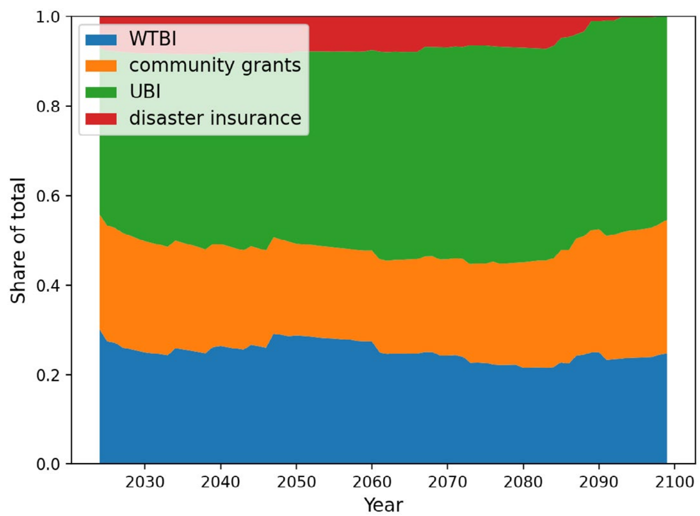


Figure 7: Total spending compared to total available funding for the proposal, assuming an initial budget of $500 bn with a 5% yearly increase (bn constant 2025 USD)

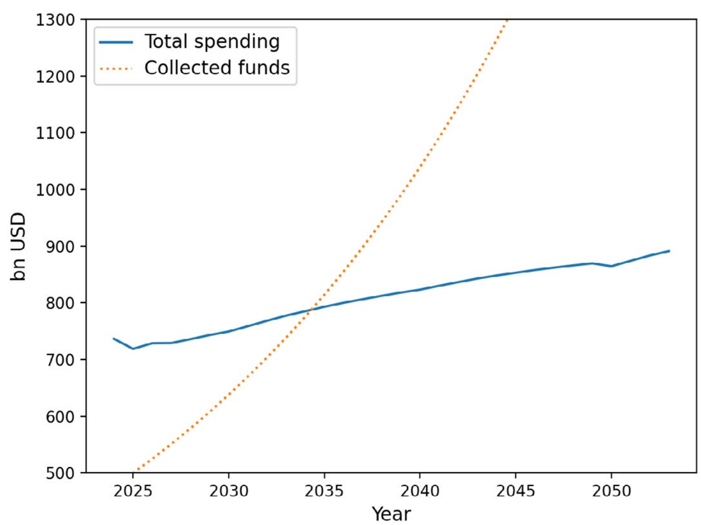


Figure 8: Number of countries where a UBI is funded

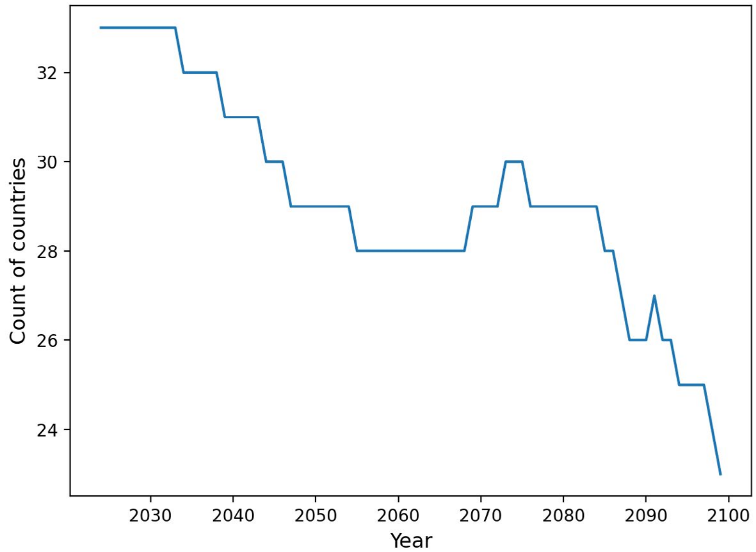
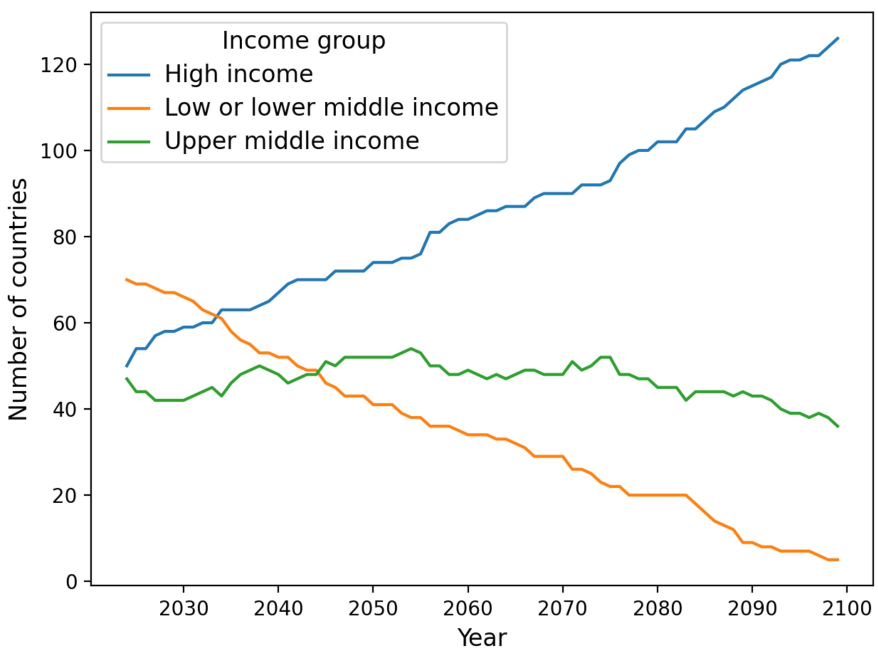


Figure 9: Number of countries by income group



Climate Compensation for LMICs: A Spending Simulation – Technical Appendix

September 5, 2025

1 Introduction

This note introduces the methodology used to simulate the spending that would result from implementing the Banerjee-Duflo-Greenstone proposal. The available data allows us to estimate spending for the period 2020-2099.

The assumptions and methods used to impute missing conversion factors used throughout the simulations are presented first. The formulas and datasets used to compute each transfer are then introduced.

All funding rules are specified in constant 2021 USD PPP, to align with the definitions of the global international poverty lines.

2 Conversion and adjustment factors

2.1 Exchange rates

The rules for allocating money from the loss and damage fund are expressed in PPP USD. Since PPP conversion factors are in local currency units (LCU) per USD, computing the actual cost of each transfer requires the conversion of LCU into USD.

Official exchange rates are obtained from the World Bank.[1] Missing values are interpolated by linear interpolation, and by linear projection for missing values at the boundaries of the range covered.

2.2 PPP conversion factors

We use *private consumption* PPP factors from the WB.[2]

PPP factors are available for every country until 2024, with the exception of Yemen (data ending in 2013) and South Sudan (data ending in 2021). We assume linear growth of the

[1] `https://data.worldbank.org/indicator/PA.NUS.FCRF`

[2] `https://data.worldbank.org/indicator/PA.NUS.PRVT.PP`

conversion factor for Yemen, and a linear growth starting in 2015 for South Sudan.[3]

We assume that the conversion factors from USD to PPP USD remain constant between 2025-2100.

3 Budgets and climate scenario

We consider the allocation of compensation to LMICs, where the maximum budget allocated to each country corresponds to the mortality damages from climate change incurred by that country from OECD emissions. The monetary value of these damages is taken from Carleton et al. (2025), using the partial mortality social cost of carbon of each country (expressed in 2019 constant USD) and multiplying it by OECD emissions. The resulting numbers capture the (time discounted) number of additional deaths from OECD carbon emissions multiplied by a constant Value of a Statistical Life (VSL) of $2M.

Any unspent budget automatically rolls over to the next year.

We restrict compensation to Low and Middle Income Countries (LMICs). High income countries are defined as having a GDP per capita above $14,150 (in 2019 USD). Upper middle income countries are defined as having a GDP per capita between $4,862 and $14,150 (in 2019 USD). These thresholds were chosen so that the resulting income groups align with the World Bank's definition of Lending Groups in 2023, even though their definition is based on GNI per capita. The only noteworthy discrepancies are:

- Costa Rica and Argentina are classified as high income, instead of upper middle income
- Iran and Namibia are classified as lower (instead of upper) middle income

We follow the World Bank classification to estimate spending before 2024, so that these discrepancies only affect our results after 2025.

Countries' income groups between 2025 and 2099 are determined using SSP GDP and population projections, which are computed the same way as in Carleton et al. (2022). We rescale GDP per capita estimated under the SSP scenario so that their 2023 levels align with observed level. That is, we use :

$$\widetilde{GDP}_y = GDP_y^{projected} \times \frac{GDP_{2023}^{observed}}{GDP_{2023}^{projected}}.$$

[3]Yemen's PPP conversion factor has grown steadily between 1990 and 2013, motivating this assumption. The PPP factor in South Sudan started increasing sharply in 2015. In Sudan, where data is available until 2022, a similar hike started in 2017 and has continued after. We assume that the increase in PPP factor also continued for South Sudan in the years after the data ends.

4 WTBI

A Weather-Triggered Basic Income (WTBI) is created, which allocates 4.2$ PPP per day per adult in months preceding a *hot months*, defined as a month with 5 or more days where the average temperature is of 32°C or above.

To estimate the cost of providing a WTBI, daily average temperature data are obtained at the level of the impact regions defined in Carleton et al. (2025). That is, we consider 24,378 regions of roughly the size of a US county. Temperatures are downloaded from the daily Berkeley Earth Surface Temperature data set (BEST). Similarly, we use the same population data as in Carleton et al. (2025), which uses the IIASA SSP population projections.

The number of adults in each region is computed following Carleton et al. (2025). Using SSP age group data, we define adults as:

- 2/5 of the population in the 15–19 group, plus
- all individuals above 20 years old.

These numbers are then downscaled at the region level following Carleton et al. (2022).

We assume that 80% of eligible recipients claim the payments.

For region r in year t the cost of implementing a WTBI is thus:

$$\text{WTBI}_{rt} = 0.8\,\text{AdultPopulation}_{rt} \times \sum_{m=1}^{12} 1\{\text{HotDays}_{\text{rmt}} \geq 5\} \times \$4.2\,\text{PPP}$$

where the subscript m describes months, and N is the total population.

Note that we are unable to consider the sequences of hot days that overlap two consecutive months, with less than 5 hot days in each month.

5 UBI

Computing the cost of a UBI is straightforward: we allocate $3 PPP per day per adult in the most affected countries. In addition, a UAT corresponding to 2 years' worth of UBI is disbursed once every ten years. Population data is again taken from the SSP data, and we assume that 80% of all adults claim the payments.

6 Community Block Grants

Community transfers are assumed to correspond to 10% of the yearly OECD-induced mortality damages incurred by a region. That is:

$$\text{CommunityGrant}_{rt} = 0.07 \times \text{OECDMortalityDamages}_{\text{rt}}$$

7 Disaster insurance

Allocation Rule–Part of the funds are used to provide governments from low or lower middle income countries with insurance payouts following climate-related disasters (droughts, floods, storms, and fires). Upper middle income countries are *not* eligible for disaster insurance.

For our exercise, we define the payouts to be the mortality damages from disasters. To approximate the monetary cost of disasters in the future, we allocate a fixed share of the mortality damages from *global* carbon emissions (taken from Carleton et al. (2025)) to disaster insurance. That is, we assume that the death burden of natural disasters is proportional to the mortality damages from extreme temperatures. We use the formula:

$$\text{DisasterInsurance}_{rt} = 0.008 \times \text{TotalMortalityDamages}_{\text{rt}}$$

Choice of coefficient–The relative mortality cost of disasters relative to the mortality damages from Carleton et al. (2022) is estimated using data from EM-DAT. We compute the total number of deaths that resulted from climate-related disasters between 2020 and 2024 in low and lower middle income countries. This number is transformed into a monetary amount using a constant Value of a Statistical Life (VSL) of $2M. Finally, it gets divided by the total mortality damages from global emissions in that period. Over that period, deaths from disasters represented 0.8% of the total mortality damages from global emissions.

Missing values–EM-DAT includes all disasters worldwide in which over 100 persons were affected and more than 10 died. EM-DAT records the total deaths from these disasters. However, a significant share of these entries are missing. To impute the total number of deaths from disasters, we estimate, for each disaster i, the Poisson model:

$$\begin{aligned}\mathbb{E}\left[\text{Total Deaths}_i \mid X_i\right] = \exp(&\beta_0 + \beta_d + \beta_{1t} \cdot \text{T}_i \times \text{PopAffected}_i + \beta_{2t} \cdot \text{T}_i \times \text{PopInjured}_i \\ &+ \beta_{3t} \cdot \text{T}_i \times \text{PopHomeless}_i + \beta_{4t} \cdot \text{T}_i \times \text{PhysicalDamages}_i \\ &+ \beta_{5t} \cdot \text{T}_i \times \text{Magnitude}_i + \delta_s + \theta_{sy})\end{aligned}$$

where d is the subtype of disaster i (e.g., tornado, tropical cyclone, coastal flood...), and $T(i)$ is a binary indicator indicating its type (drought, flood, storm, or fire). We use the notation β_{kt} for conciseness, where β_{kt} is a coefficient on the interaction between an indicator of the disaster type of i and the k-th interacted covariate. We include both subregion δ_s and subregion-year θ_{sy} fixed effects.

We obtain a pseudo-R-squared of 0.86. We impute missing values of Total Deaths by taking the fitted values of the estimated model.

Note that these estimates are biased, given that values are *not* missing at random, as more accurate reporting is available for larger disasters.

8 Budget constraints

Each year, the total transfers made to a country are limited to its mortality damages from OECD emissions, plus any leftover budget carried over from previous years (see below).

Countries receive either a WTBI or a UBI, in addition to community transfers and disaster insurance. Disaster insurance is always financed, even in years when the country's budget constraint is binding. In practice, these payouts would be covered by countries' pooled reserves of unused funds. Any unspent national budget automatically rolls over to the following year.

In our simulation, transfers are determined according to the following rules:

- A UBI is financed if available funds are sufficient to cover it together with the community transfer. Disaster insurance is financed in all cases, irrespective of the remaining budget. Any residual funds after these allocations are carried over to the following year.
- Otherwise, a WTBI is provided. Two cases are distinguished:
    1. If the budget can cover both the WTBI and community grants, then both are financed, together with disaster insurance. Disaster insurance is always provided, even if doing so requires exceeding the budget. Any residual funds after financing all three modules are used to increase the WTBI daily rate until fully exhausted.
    2. If the budget is insufficient to finance both a WTBI and community grants, 95% of available funds are allocated to WTBI and 5% to community grants. Disaster insurance is then financed on top of these allocations.

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