

# World in disunion: Climate change and the 2023 Rugby World Cup

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**Above:** Pacific Islanders performing a traditional dance as the waters rise in the River Thames to spread awareness of the climate crisis and the damage rising sea levels will do to communities around the world



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## Foreword

Every four years the rugby world cup brings together millions of people from around the world in a great sporting spectacle. Occasionally, sport can go further, and provide moments in which boundaries are transcended and people are united. The extraordinary final in 1995 in which Nelson Mandela joined hands with the Springboks team in a gesture of reconciliation, was one such occasion.

Yet the tournament more often reflects a world in disunion – the unequal wealth and power of national rugby associations finds a parallel in the inequality of the climate crisis. The actions of big polluting countries like Australia, France and the UK have devastating consequences on vulnerable low lying island nations in the Pacific, in the form of storms and rising sea levels and temperatures. The countries first and worst affected are those that have contributed little to the problem. Meanwhile the major emitters are lagging in their commitments to help poorer countries adapt to the effects of climate change and support for a loss and damage fund.

More than any other sporting contest, the Rugby World Cup brings together countries on the frontline of the climate crisis and those countries that have contributed most towards it. England, Scotland and Wales are collectively responsible for the 8th largest cumulative carbon emissions in the world – at 79 billion tonnes, more than the cumulative emissions of all but three other countries taking part in the tournament.

This report shows both the stark economic cost of climate breakdown for Pacific nations, and the inadequate climate plans of major emitters, as assessed by Climate Action Tracker.

Given this context, the choice of oil giant Total Energies as the main sponsor is grimly ironic, as teams from climate vulnerable nations compete in an event that directly benefits an industry that is a primary cause of the climate crisis.

Rugby's anthem is World In Union. One line goes *"We may face high mountains, must cross rough seas, we must take our place in history and live with dignity."*

The people of the Pacific face a growing threat from rough seas, made worse by the pollution of the world's richest countries. However, if those countries step up and deliver on their commitments to curb emissions, and support poorer countries efforts to adapt to the climate crisis, and meet the cost of irreversible loss and damage, there is still time to ensure that lives can be lived in dignity, and our common home restored.

**Below:** Patrick Watt, Chief Executive Officer, Christian Aid.



A handwritten signature in black ink that reads "P. Watt". The signature is written in a cursive, slightly stylized font.

**Patrick Watt**

Chief Executive Officer, Christian Aid

## Summary

No sporting occasion better encapsulates the injustice of the climate crisis like the Rugby World Cup. Some of the most vulnerable nations in the world, Fiji, Samoa and Tonga, share the playing field with some of the biggest historical carbon polluters; UK, Japan and tournament hosts France, as well as some of the world's current biggest per capita emitters like Australia.

This report calculates the devastating economic harm that these climate vulnerable Pacific islands will face due to climate change – harm caused not by their own doing but by the countries they will be facing at the Rugby World Cup.

If the global temperature rise hits 3C by 2100 Pacific island nations face a reduction in GDP growth of around -40% compared to a scenario with no global heating. Fiji faces a reduction in GDP growth of -38.5%, Tonga of -39.7% and Samoa -41.7%. Fellow Rugby World Cup participant Namibia will see a GDP growth hit of -56.6% by 2100 in a 3C scenario, which shows the scale of the economic hit faced by many African nations.<sup>1</sup>

These countries face a host of climate related impacts from hurricanes, rising temperatures and sea level rise, which threatens their very existence. In the past decade the two most intense cyclones recorded to date in the southern hemisphere ripped through the Pacific. Tropical Cyclone Pam, the second worst, devastated Vanuatu in 2015 while in 2016 Tropical Cyclone Winston, the worst, ravaged Fiji. Both not only caused extreme environmental damage but economic damage worth 64% and 20% of the respective nations' GDP.

Pacific island nations contribute only 0.03% of the world's greenhouse gas emissions. And yet in the World Risk Report 2021, which ranks countries by their vulnerability to natural disasters, Pacific Island nations occupied the top three spots: Vanuatu, Solomon Islands and Tonga.

The World Cup website lists 'reducing its impact on the environment' among its 4 commitments. However by choosing oil giant TotalEnergies as its sponsor it has undermined both its environmental credentials and shown disregard for its Pacific island nations.

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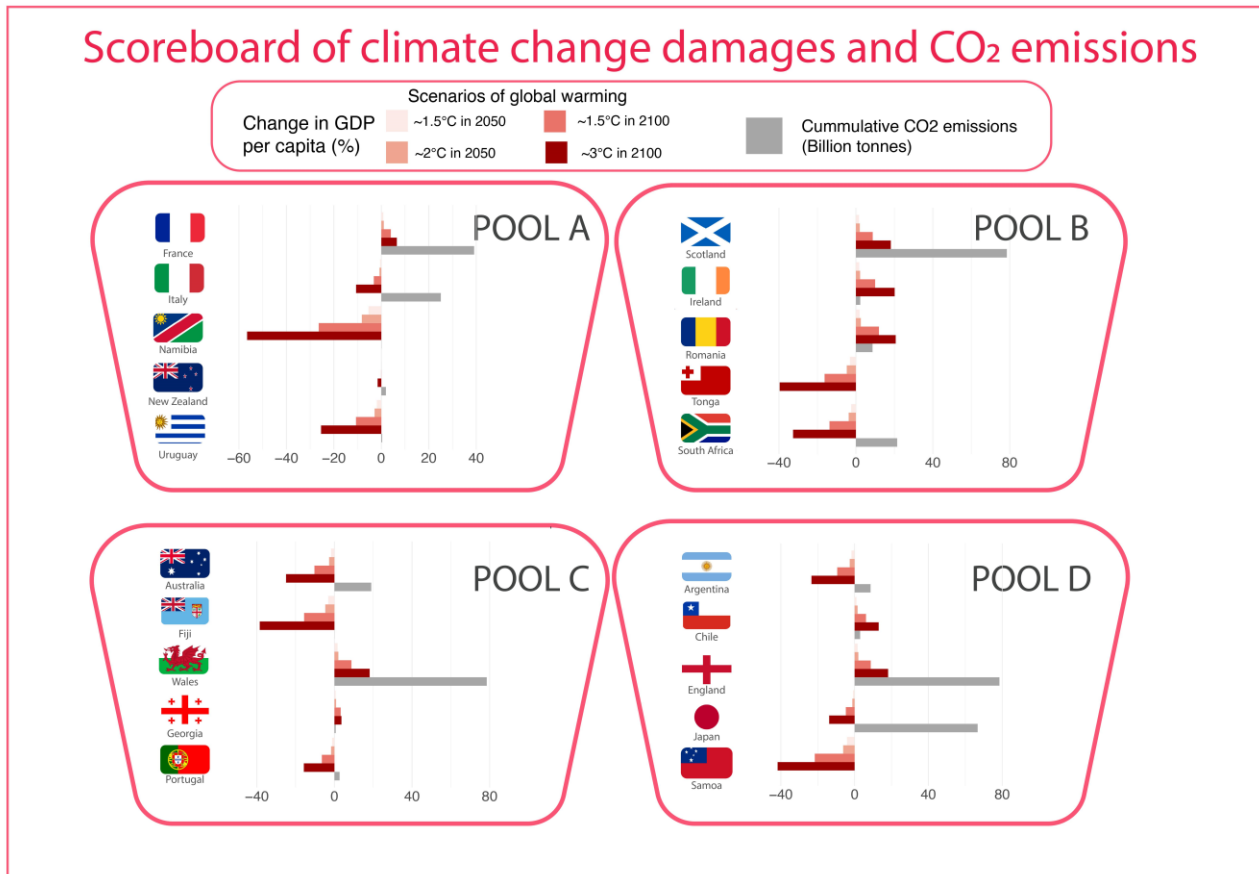
*"People here are complaining of climate change, of disasters and it's hurting."*

*"It's a consequence of greed, or corporations exploiting the planet. It's the same economics of exploitation and greed that is hurting rugby."*

*"Greed is destroying the planet and in my mind it's destroying rugby."*

*Former Samoan rugby international*

## The economic threat to Pacific Island nations



(Historic emissions of England, Scotland and Wales not available individually so cumulative UK figure used for each country)

These findings show how the island nations of Fiji, Tonga and Samoa, as well as Namibia, will face severe economic pain, despite contributing hardly any of the emissions which have caused the climate crisis.

Impacts of climate change on economic performance (here measured by country-level GDP per capita growth projections) were estimated using a two-step modelling procedure proposed by Burke et al. (2015, 2018). The first step estimates a historical relationship between GDP growth and climatic variables, and in the second step this relationship is extended to different temperature pathways over the 21st century to estimate how GDP growth might be affected by climate change (See Appendix for a full methodology).

Our estimates are modelled projections which naturally have some limitations. The data assumes countries undertake no adaptation, so where adaptation happens, we would expect a reduction in the economic damage estimates; however, neither does the data predict the impacts of individual extreme events of which we are seeing an increasing number with more acute events and corresponding impacts happening in different countries in recent years. Recent research shows that extreme weather events are already reducing economic growth in many Pacific countries, and that lower income countries tend to experience greater reductions in GDP, widening global inequalities.

Therefore, even these drastic projections are likely to be an underestimate given the impact of more frequent and acute weather events which themselves are likely driven at least partly by climate change.



France v Tonga, Rugby World Cup 2011. Credit: Stewart Baird, creative commons<sup>2</sup>

## The economic impact will be global

Not only have Pacific Islanders contributed almost nothing to the climate crisis, they are set to face the greater economic harm. This research shows that if climate change was just about temperatures, the UK may even see a mild economic benefit from temperature changes, as it is currently just outside what is considered to be the optimal annual temperature for economic productivity. However, a future Earth ravaged by climate change will not be a British utopia. The model used for this study has been developed by Burke et al (2015, 2018) which focusses on the optimal temperature concept and doesn't factor in the potential costs of extreme weather events and knock-on effects to the UK of climate breakdown around the world.

A 2022 study by the London School of Economics found that under current climate trajectories, the total cost of climate change damages to the UK are projected to increase from -1.1% of GDP at present to -3.3% by 2050 and at least -7.4% by 2100.<sup>3</sup> Even the UK Government itself calculated last year that if global temperature rise reaches 2C above pre industrial levels would wipe at least 1% a year off the UK's economy by 2045.<sup>4</sup>

The UK's GDP would also suffer as global supply chains come under pressure and collapse due to more severe climate impacts around the world.<sup>5</sup> Drought may set off civil wars in Africa and South America, entire cities and regions of the Middle East might become too physically hot to survive in, millions of migrants will likely be heading north to seek refuge in countries like the UK, and one-off superstorms that might destroy financial centres like London and New York would pitch the global economy into a tailspin. Trading with countries suffering GDP reductions of more than 50% by 2100 will be chaotic. One of the great unknowns about climate change is when certain tipping points could be triggered when permafrost in the northern hemisphere melts. This would release currently trapped potent greenhouse gasses, like methane, which

would accelerate heating, resulting in further melting and the potential for a feedback loop that could cause runaway climate change and push global temperatures much higher than currently expected.

The full data set for each Rugby World Cup nation is below, ordered by cumulative CO2 emissions.

Percentage impact of GDP growth based on the below global temperature scenarios					
Country	RCP 2.6 – 1.5C by 2050	RCP 2.6 – 1.5C by 2100	RCP 4.5 – 2C by 2050	RCP 6.0 – 3C by 2100	Cumulative CO2 emissions (tonnes, billions)
Tonga	-3.08	-16.30	-4.75	-39.65	0.01
Samoa	-4.11	-21.61	-6.20	-41.74	0.01
Fiji	-3.21	-15.62	-4.71	-38.50	0.05
Namibia	-5.38	-26.37	-8.22	-56.56	0.08
Uruguay	-1.87	-10.67	-2.84	-25.40	0.38
Georgia	0.62	3.23	0.86	3.62	0.67
New Zealand	0.01	-0.06	-0.02	-1.57	1.92
Ireland	1.72	10.01	2.19	20.17	2.26
Portugal	-1.16	-6.48	-1.74	-15.76	2.66
Chile	1.00	6.17	1.62	13.05	3.00
Argentina	-1.71	-9.42	-2.65	-23.39	8.64
Romania	1.93	11.98	2.55	20.70	8.65
Australia	-1.74	-10.30	-2.72	-24.94	18.97
South Africa	-2.48	-13.73	-3.76	-32.68	21.47
Italy	-0.51	-3.17	-0.77	-10.64	25.07
France	0.82	4.01	1.05	6.54	39.11
Japan	-0.85	-4.76	-1.24	-13.79	66.71
UK	1.62	8.75	2.03	18.16	78.51

(Historic emissions of England, Scotland and Wales not available individually so cumulative UK figure used)

RCP stands for Representative Concentration Pathway. They describe different climate change scenarios, all of which are considered possible depending on the amount of greenhouse gases emitted in the years to come.

## Climate performance of World Cup nations

This year's World Cup includes Australia, one of the world's biggest per capita emitters, as well as a number of countries that burn and produce a lot of the dirtiest fossil fuel, coal, in the form of Australia, Japan and South Africa. England, Scotland and Wales, whose emissions are recorded as the United Kingdom, are also the 8<sup>th</sup> biggest polluter in world history, when historical emissions are calculated.<sup>6</sup>

These, and other rugby playing nations, are also way behind in terms of their national climate policies. The Climate Action Tracker is an independent scientific project that tracks government climate action and measures it against the globally agreed Paris Agreement aim of "holding warming well below 2°C, and pursuing efforts to limit warming to 1.5°C." According to their analysis none of the countries taking part this year's tournament are providing sufficient policies.

Country	Climate Action Tracker assessment of climate policies <sup>7</sup>	Per capita CO2 emissions 2021 (tonnes)
Australia	Insufficient	15.09
Japan	Insufficient	8.57
Ireland	Insufficient	7.53
South Africa	Insufficient	7.34
New Zealand	Highly insufficient	6.59
Italy	Insufficient	5.55
England	Almost sufficient	5.15
Scotland	Almost sufficient	5.15
Wales	Almost sufficient	5.15
France	Insufficient	4.74
Chile	Insufficient	4.38
Argentina	Highly insufficient	4.12
Romania	n/a	4.1
Portugal	Insufficient	3.96
Georgia	n/a	2.93
Uruguay	n/a	1.97
Tonga	n/a	1.65
Fiji	n/a	1.59
Namibia	n/a	1.59
Samoa	n/a	1.34

Climate Action Tracker assesses 39 countries and the EU, which covers around 85% of the global emissions. The lower emitting nations in the table are not tracked.



Fiji v Australia, Rugby World Cup 2015. Credit: Marc, creative commons<sup>8</sup>

## Case study: Jonny Fa'amatuainu, Samoa

The climate crisis is already having an impact on rugby players and their families in the region. Former Samoan international flanker Jonny Fa'amatuainu, who had a five-year spell at Bath as well as stints with clubs in Wales and Japan, has seen his own community have to move to avoid the rising sea levels which threaten their homes.

He said: "Climate impacts are everywhere we look, from accelerating ice melt in Greenland, increasingly savage hurricanes in the Atlantic and severe droughts in Australia.

"As a Pacific Island rugby player, tackling the climate crisis is close to my heart. My grandparents and other families who lived in a village on the coast in Samoa moved inland two years ago because of climate change.

"The Pacific Islands are the soul of our sport, and we have produced some of the most dynamic and exciting players on the planet. Yet as this report underlines, Samoa, Tonga and Fiji are all facing increased risks from rising sea levels and extreme weather.

"Climate change is a crisis these countries did not cause yet it's a fight they are suffering from the most. It's a fight they need the help of the rugby community to win.

"Pacific islanders representing other countries at the Rugby World Cup, I urge you to use that platform to help with the climate challenge."



The Samoan Rugby team perform Siva Tau. Credit: CpaKmoi, creative commons<sup>9</sup>

## The impacts of climate change on Pacific island nations

### Islands threatened by sea level rise

Global heating is causing icecaps to melt and sea water to expand, resulting in global sea level rise. Sea levels have already risen by more than 20cm since the Industrial Revolution and, unless emissions fall, they will rise increasingly quickly over the coming decades.<sup>10</sup> Scientists project that, without emission cuts, global sea levels will rise by about 34cm by 2050, by about a metre by 2100 and by about 1.8m by 2150.<sup>11</sup>

The Pacific islands are particularly vulnerable to the consequences of sea-level rise. Sea levels do not rise at the same rate worldwide, and the oceans around some of the islands, such as Suva in Fiji, have been rising roughly three times higher than the global average.<sup>12</sup> One study has shown that eleven islands across the northern Solomon Islands have either totally disappeared over recent decades or are currently experiencing severe erosion. Since much of the islands are near sea level, the rising oceans will mean the loss of land to regular flooding and to being permanently swallowed by the waves. Much of the Pacific islands' population and infrastructure are near the coast (for example, 70% of the Samoan population is in low-lying areas) and so are particularly vulnerable to flooding and erosion of land.<sup>13</sup> The climate crisis has already forced some residents of Fiji, Samoa and Tonga to move from their homes. Among the land being lost is at the Fijian village of Namatakula, home to some of the country's top players.

### Livelihoods and agriculture face saltwater intrusion

It's not just losing landmass where sea-level rise is a threat to islands like Fiji, Samoa and Tonga. With higher sea levels, water supplies more often become contaminated with salt, meaning residents may be unable to rely on the water for drinking, washing and cooking. This would be a particular problem for people on the smaller islands within these countries. Coastal erosion and contamination of groundwater by saltwater intrusion risk making soils unusable for agriculture. This would mean that the islands would be increasingly unable to grow food for their own use and for export. Agriculture is currently a major employer and export earner in the islands. Alongside the problems caused by saltwater intrusion, climate change leads to increased temperatures and more extreme rainfall in the islands, making soils less fertile.

### Fish populations feeling the heat

One of the major sources of food and income in the Pacific is fishing and fish populations are directly threatened by the climate crisis. Across the region, 47% of people living near the coast earn an income from selling seafood or shells.<sup>14</sup> But rising sea temperatures and more acidic oceans - both caused by climate change - are already damaging coral reefs, and this is expected to worsen with further emissions. If emissions do not fall rapidly, coral reefs would be at risk of severe degradation by 2050. The loss of coral reefs would cause far-reaching damage to the survival of fish that depend on them. Reefs provide home and protection to over 25% of fish in the ocean and up to 2 million marine species.<sup>15</sup> In parts of the region, the amount of fish available could halve by 2050 as a result of climate change.

### Food supplies in danger

The various climate impacts mean that people living on these islands risk being less able to reliably access enough nutritious food. This is because of the combination of damage to domestic agriculture, the loss of fish

populations, and the consequences of climate change for people's income, which could make it harder for them to buy imported food. According to a 2010 study, "climate change puts at risk the very basic and universal need for people in the islands to have access to sufficient, safe, and nutritious food at all times".<sup>16</sup>



Children playing rugby in Fiji. Credit: Tomas Maltby, creative commons <sup>17</sup>

### Lethal superstorms threaten people and tourism

Evermore powerful tropical storms, driven by climate change, are already wrecking infrastructure in the region. Cyclone Pam set the record for the area in March 2015, only to be beaten within a year by Cyclone Winston in February 2016. In Fiji, for example, cyclones and floods already cause damage worth 5% of GDP per year. Cyclone Winston - the strongest storm ever recorded in the Southern Hemisphere - seriously damaged Fiji's infrastructure in 2016, causing \$1.4 billion in damage and losses. In 2018, Tonga was hit by Cyclone Gita, the country's worst storm since records began. The buildings destroyed included the parliament building. This is likely to intensify because of climate change: heating oceans allow storms to become more powerful and to intensify more quickly, and storm surge increases with higher sea levels. The damage from storms and floods in Fiji, for example, is expected to increase by much more than 50% if emissions do not fall rapidly, according to a World Bank study.<sup>18</sup> As well as the direct effects on residents of the islands, increasingly destructive storms are potentially disastrous to tourism, one of the major economic sectors in the Pacific region (for example, 20% of Samoa's GDP comes from tourism). Flooding and other damage to beach-front hotels and other tourist infrastructure would hurt the islands' reputation among holidaymakers. Combined with the damage to coral from ocean warming and acidification, the effect could be significant. One study found that Fiji alone could lose 18% of tourism revenue by 2030, because of climate change.<sup>19</sup>

## Health and agriculture under threat from extreme heat

Rising temperatures are putting people at risk across the Pacific islands, with the elderly, women, children and labourers the most likely to suffer. The islands are on the frontline of this threat. Fiji would face near permanent heatwave by the end of the century, if emissions don't fall - projections suggest the number of heatwave days could rise from 25 a year to 350 by 2100.<sup>20</sup> With lower emissions, Fiji would face heatwaves for less than half the year. As well as the direct effects of heat, high temperatures could increase the spread of diseases like dengue fever. The 2019 dengue emergency in the Philippines has been linked to climate change. Fiji suffered a major outbreak of the disease in 2014. Increased heat will also affect agriculture on the islands. With projected temperature increases, crops may reach the threshold of their heat tolerance, which could lead to heat stress, wilting and crop failure, threatening food supplies on the islands. High temperatures would also cause problems for agricultural workers, which could mean that productivity is reduced as workers have to avoid being outside during the hottest part of the day. The combined result of these climate change impacts will be for many people to leave their Pacific island homes. One study suggested that up to 1.7 million people could move from their homes in the region as a result of climate change by 2050.<sup>21</sup> There will be only seven more Rugby World Cups by that date: fewer than the ten that have already been played.

## The fossil fuel World Cup

Despite these devastating impacts which threaten the countries which make up the heart and soul of world rugby, this year's tournament has chosen to have a global oil company, Total Energies, sponsor the event.

This is not only a slap in the face to the climate vulnerable nations taking part it shows the hypocrisy of the organisers which proudly claim 'reducing impact on the environment' as one of their 4 core commitments.

By allowing the world cup to 'sportwash' a fossil fuel corporation, the organisers are doing exactly the opposite of this. Sportswashing, is a form of 'greenwashing', where corporations are allowed to appear more virtuous and sustainable than they actually are. Laurence Tubiana, a key architect of the Paris Agreement – which was struck in the same city as this year's World Cup final – has said that "greenwashing is the new climate denial."

## Recommendations

Countries need to focus on averting and minimising the impacts of the climate crisis whilst providing funding to those in need.

**Avert** – Rich countries must take action in this decade to close emissions reduction gaps to stay within Paris limits of 1.5C to prevent escalating Loss and Damage.

**Minimise** – The existing adaptation funding gap needs to be closed and countries should redouble efforts for climate finance to flow to countries most vulnerable to climate change to withstand existing and future climate impacts.

**Fund** – The Loss and Damage Fund, agreed at COP27, needs to be established as a matter of urgency; and rich countries to provide their fair share of finance, based on the polluter pays principle.

## Appendix: Methodology

Impacts of climate change on economic performance (here measured by country-level GDP per capita) were estimated using a two-step modelling procedure proposed by Burke et al. (2015, 2018). The first step estimates a historical relationship between GDP growth and climatic variables, and in the second step this relationship is extended to different temperature pathways over the 21st century to estimate how GDP growth might be affected by climate change.

There is no consensus so far in economics and statistics on the “right” theoretical approach to estimate economic damages of climate change and the numbers vary widely depending on the initial specification and the modelling approach. One of the most prominent sources of differences stems from the choice between estimating damage to the level of output in an economy (i.e., impact on GDP in a single year or at a point in time) or whether it impacts economic growth (i.e., impact on GDP growth via damages to natural and human capital, under-investment, etc.). Resulting estimates from the two approaches vary primarily because the growth effects accumulate over time and are, by definition, substantially larger than level effects. Growth based effects from prominent global assessments based on top-down econometrics vary between 7% (Kahn et al. 2019) and 23% (Burke et al. 2015) globally, while the level-based effects are centered around 1-2% of GDP reduction globally (Newell et al., 2021).

The analysis here is based on an econometric approach proposed in prominent papers of Marshall Burke and colleagues published in Nature magazine in 2015 and 2018.

Historical relationship between per capita GDP growth, temperature and precipitation is estimated using a fixed effects model with the following equation:

$$\Delta \ln \text{GDP}_{i,t} = \beta_1 T_{i,t} + \beta_2 T_{i,t}^2 + \beta_3 P_{i,t} + \beta_4 P_{i,t}^2 + \mu_i + \nu_t + \theta_1 t + \theta_2 t^2 + \varepsilon_{i,t}$$

where the dependent variable is GDP growth of country  $i$  in year  $t$ ,  $T$  and  $P$  are the average temperature and precipitation in year  $t$ ,  $\mu_i$  represents country-fixed effects that control for heterogeneity between countries that do not vary over time (e.g. historical legacy, institutions or culture),  $\nu_t$  are year-fixed effects that account for common global shocks in a given year (e.g. financial crisis), and  $\theta_1 t + \theta_2 t^2$  are country-specific linear and quadratic time trends, which allow GDP and temperature to evolve flexibly (e.g. account for positive growth trends of both variables without confounding the relationship). Inclusion of the three types of fixed effects means that the estimated coefficients  $\beta_1 - \beta_4$  can be interpreted as actual impacts of temperature and precipitation that are independent of non-climate related confounding factors. Only temperature variable (coefficients  $\beta_1$  and  $\beta_2$ ) is statistically significant in different specifications tested and this relationship holds robustly across alternative models. The non-linear (quadratic) relationship between GDP and climate variables allows the effect of warming to differ depending on the country's average temperature.

Several bootstrapping techniques (by country; by year; by five-year blocks) have been used to quantify uncertainty in coefficient estimates  $\beta_1$  and  $\beta_2$ . Bootstrapping uses different sampling methods to derive improved estimates of standard errors and confidence intervals.

Future GDP growth in the climate change scenarios is compared to the “baseline” scenarios available from the socio-economic scenario framework – the Shared Socioeconomic Pathways (SSPs) (O'Neill et al. 2017) – which are the basis for climate impact assessments in the 6th Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC). The SSPs are meant to represent a range of plausible futures of socio-economic components in a hypothetical world without climate change. They are used as baselines in comparisons to scenarios with climate change. Here we use the SSP1 scenario which is meant to be most compatible with the 1.5°C-consistent pathway. Baseline SSP scenarios can also be explored here.

**Caveats:**

Estimates presented here are based on an econometric model that is based on the relationship between GDP growth and temperature, without accounting for the possible impacts of extreme events. Incorporating climate extremes such as droughts, floods or storms that could have a substantial impact on economic performance. Recent advances in damage estimates that include extreme events are significantly larger than the ones who do not, implying that the optimal temperature pathways are the ones that limit global warming in line with the Paris Agreement (Piontek et al., 2021). Additionally, it is useful to keep in mind that adaptation measures which could potentially alleviate some of the damage are not incorporated here either.

## Endnotes

- 1 <https://www.christianaid.org.uk/sites/default/files/2022-11/the-cost-to-africa.pdf>
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