

# Who's Responsible for Climate Change? New Evidence Based on Country-level Estimates of Climate Debt

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## 1. Motivations underlying the research

Persistent increases in average global temperatures, in the absence of mitigation policies, risk catastrophic climate change as well as reduced world GDP per capita. In the absence of policy changes, fossil fuel consumption and global CO<sub>2</sub> emissions are projected to continue to rise, with an increase in global CO<sub>2</sub> emissions of 4 percent by 2030 relative to 2019. Over the longer term, even scenarios that maintain global emissions at present levels, before dropping after 2050, are troubling. For example, the intermediate scenario of the Intergovernmental Panel on Climate Change predicts an increase in average global temperatures from the present 1.2 degrees Celsius above the pre-industrial average (1850–1900) to an average of 2 degrees in 2041–60 and 2.7 degrees in 2081–2100.

In order to avoid the adverse consequences of this scenario of increasing global temperatures, a number of countries have pledged to reduce emissions beyond their initial commitments in the 2015 Paris Agreement (COP21), under which countries agreed to limit global warming to well below 2 degrees relative to pre-industrial levels and aim for 1.5 degrees.

Under the present framework, mitigation pledges in countries' nationally developed contributions (NDCs) are voluntary. However, pledges would only cut global emissions by 1/3–2/3 of the reductions consistent with Paris warming targets. As such, there is a large gap between what countries have committed to do and what needs to be done. In this context, a key issue in deciding which countries should do more is an assessment of which countries have contributed the most to climate change (through their CO<sub>2</sub> emissions) and its associated economic damages. The total sum of these damages can be conceptualized as a "climate debt" in the sense that these costs have been imposed on the globe without any compensation. This paper seeks to contribute to this debate by providing an assessment of the climate debt of each country, based not only on historical emissions, but emissions that are likely in the near future. These estimates could be used to address the appropriate size of climate finance assistance, where countries with large climate debt may be seen as needing to contribute proportionately more to these efforts.

## 2. A short account of the research performed

Climate debt is estimated on the basis of historical data on emissions and estimates of the social cost of carbon (SCC), which measures the economic damage per ton of CO<sub>2</sub> emissions. We estimate this climate debt for 131 countries in a number of ways (in dollars, in per capita terms, and as a share of a country's GDP). In absolute terms, global CO<sub>2</sub> emissions from 1959 to 2018 amounted to 1,259 gigatons, or about 83 percent of historical global emissions. These estimates capture CO<sub>2</sub> emissions from both the burning of fossil fuels and those arising from cement production and the flaring of natural gas. We estimate projections for CO<sub>2</sub> emissions for 2019–2035 on the basis of country level projections for greenhouse gases from the IMF's Fiscal Affairs Department, which follow the methodology described in the IMF's 2019 Fiscal Monitor. Future emissions are estimated under a "business-as-usual" scenario, which is grounded on data on energy consumption by product in 2018 and projected economic growth.

We find that the climate debt is extremely large, equaling some \$59 trillion over the 1959–2018 period. Climate debt is also substantial relative to other government liabilities; in the G-20, it equals about 81 percent of GDP. Looking forward to 2035, cumulative climate debt will rise another \$80 trillion.

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### **3. Main conclusions and policy implications of the work**

Climate debt from CO<sub>2</sub> emissions is large and unevenly spread across the world's economies. In the advanced economies, the climate debt accumulated up to 2018 equaled about \$22,065 per person, some 2 times that of emerging economies and 11 times that of low-income economies. Among the biggest emitters, climate debt per capita is the highest in the United States and 6 times as high as that of China (and 25 times as high as that of India). While fiscal policy will face constraints going forward, the large size of the climate debt, and the disparities in climate debt by countries, portends contentious discussions on what constitutes a country's fair burden in slowing climate change and the level of assistance that should be given to developing countries to aid this effort. The cumulative climate debt of the US in 2035, for example, is projected to equal about 117 percent of GDP, compared to its annual official development aid of 0.17 percent of GDP. Climate debt per capita is projected to be much higher in the advanced economies than in developing economies, even under the full implementation of NDCs by G-20 countries. This implies that additional effort by advanced economies may be needed to achieve a fair burden in the fight against climate change. If countries were to fully meet the Paris targets for limiting increases in temperatures, there would be a sizeable reduction in climate debt. However, implementing the required reductions in emissions would be problematic, given that advanced economies—which have accumulated a large share of the stock of climate debt—are already reducing their emissions sharply under their NDCs. Thus, a more pragmatic approach to achieving a fair distribution of the burden is for advanced countries to ramp up their assistance to developing countries, including through climate finance. Current levels of climate finance, which have not yet reached the goal of \$100 billion per annum, are clearly inadequate in light of the large size of climate debt accumulated by advanced economies.