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REINFORCE



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PARIS REINFORCE (PR) input to the first global stocktake

SYR (e)

Efforts to enhance understanding, action and support, on a cooperative and facilitative basis, related to averting, minimizing and addressing loss and damage associated with the adverse effects of climate change

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Key Points:

- By 2050 climate risks are highly dependent upon the temperature pathway (Gambhir et al., 2021).
- Of the risks analysed, experiencing a major heatwave, agricultural drought, maize heat stress, and changes in maize crop growth showed the most nonlinear relationship with temperature (Gambhir et al., 2021).

About the project

PARIS REINFORCE (PR) is an EU Horizon 2020 funded project, with a consortium of thirteen European and five international partners. PR's fundamental aim is to enhance and improve climate policymaking. To do so, the consortium has access to a range of sophisticated climate-economic scientific models and brings together a wide range of knowledge and expertise to produce interdisciplinary analyses and reports. PR has been working on a number of additional Deliverables which will prove relevant to the GST. However, analyses are unfinished and thus remain to be published. PR will update our inputs with our latest results once they are complete.

Summary of the relevant work

Gambhir et al. (2021) have presented an integrated framework that explores both near-term transition risks (to 2030) and longer-term physical risks (to 2050) associated with a range of plausible temperature pathways and GHG emissions (spanning 1.5°C-4°C). Analysis focused on seven key physical hazard indicators: heatwave, major heatwave, hydrological drought, river flooding, agricultural drought, maize heat stress, and change in maize crop growth duration. These indicators have previously been reported in literature on the impacts of climate change when considering different underlying socio-economic development scenarios, and their impact on human health and wellbeing. These risks also correspond to many of those risks identified by the IPCC Special Report on warming of 1.5°C (IPCC, 2018).

Analysis revealed that, by 2050, the physical and adverse effects of climate change are highly dependent upon the temperature pathway. The risks with the most nonlinear relationship with temperature included the three agricultural risks identified (agricultural drought, maize heat stress, and changes in maize crop growth) and the likelihood of experiencing a major heatwave. For example, in most regions the change of a major heatwave in 2050 is 30-40% greater under the NDC pledges scenario than the 2°C central scenario. The greatest differences arose when comparing NDC pledges and 2°C central scenario for the chance of river flooding in India (18% for India vs 12% globally). For agricultural drought frequency, the greatest differences occurred in India (25% increase), Sub-Saharan Africa (25% increase), and the Middle East (50% increase).

Compared to the 2°C central scenario, the NDC pledges scenario sees the frequency of periods with heat stress for maize increase by >50% in Russia and the EU (plus the UK), and regional reductions in maize yield due to reduced growth durations increase by up to 20-30%. Risks can be reduced by the upscaling and acceleration of climate mitigation and transformational adaptation (IPCC, 2018)

Figure 1 (below) illustrates the seven physical hazard metrics for the World, U.S., EU (plus UK), China, and India. Figure 2 shows the physical risk metrics for Russia, Middle East, Japan, Brazil, and Sub-Saharan Africa (SSA).

Van Vliet et al. (2020) designed a risk elicitation process to capture the broadest set of transition risks and enable comparison across multiple low-carbon pathways, to facilitate enhanced risk mitigation and increase the likelihood



of a sustainable transition. In total, Van Vliet et al. collected 145 implementation risks and 121 consequential risks that are reflected within the current literature. Investigations showed that there are more barriers to implementation than there are consequences of actions and decisions – i.e., there are more risks surrounding a lack of climate mitigation effort than there are potential consequences to this effort (however, this does not indicate the relative importance of each risk). Stakeholders tended to consider political risks more, whereas experts and academics focused more on economic risks. Among the consequential risks associated with decarbonisation, the economic and environmental risks were the most focused on within the literature.



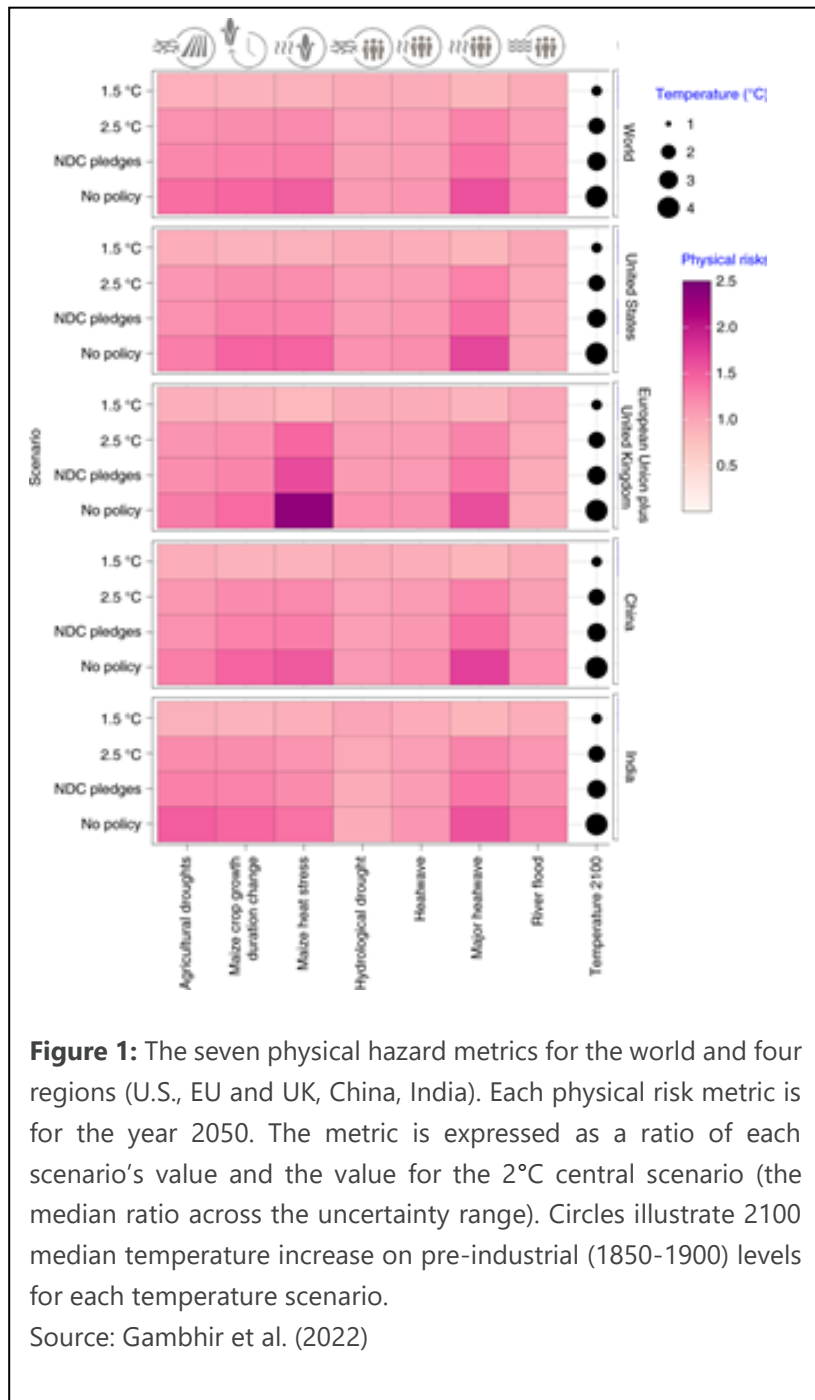


Figure 1: The seven physical hazard metrics for the world and four regions (U.S., EU and UK, China, India). Each physical risk metric is for the year 2050. The metric is expressed as a ratio of each scenario’s value and the value for the 2°C central scenario (the median ratio across the uncertainty range). Circles illustrate 2100 median temperature increase on pre-industrial (1850-1900) levels for each temperature scenario.
 Source: Gambhir et al. (2022)

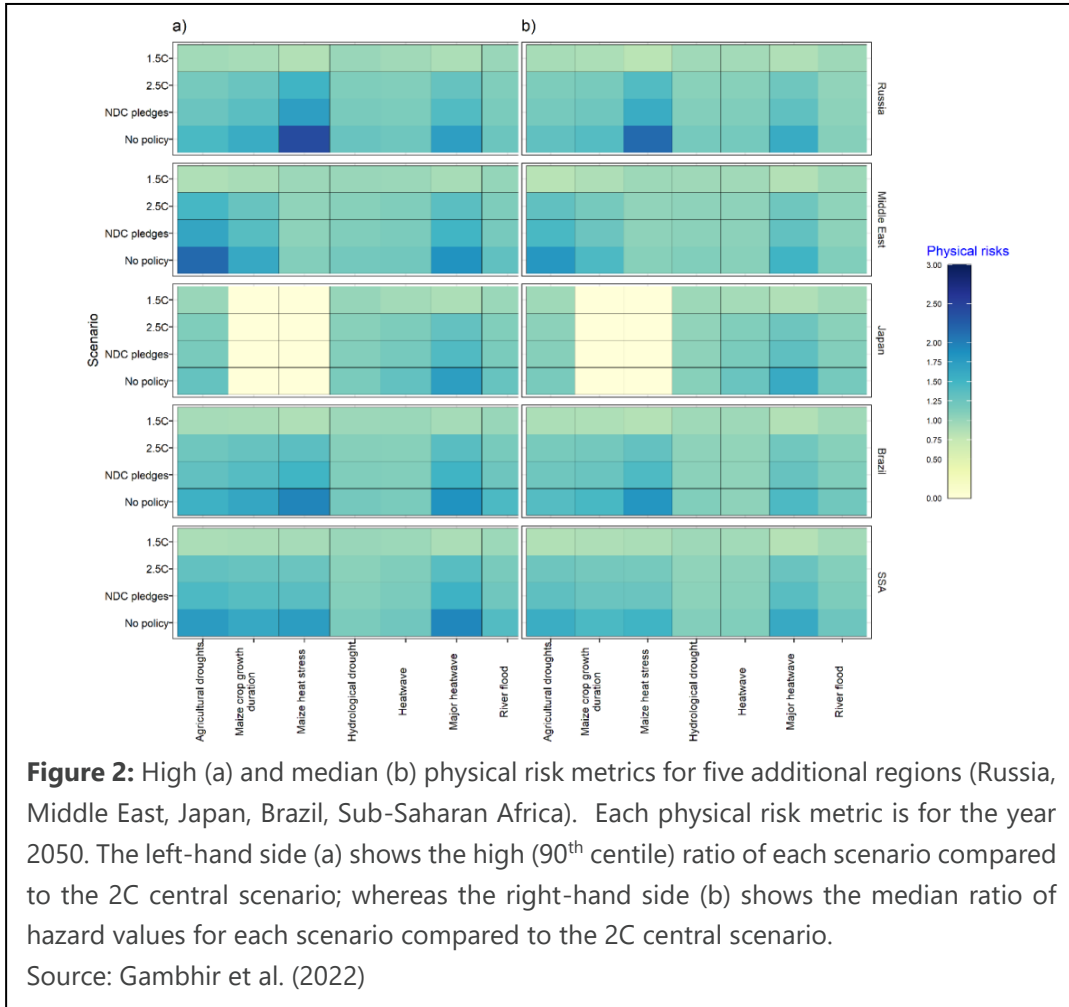


Figure 2: High (a) and median (b) physical risk metrics for five additional regions (Russia, Middle East, Japan, Brazil, Sub-Saharan Africa). Each physical risk metric is for the year 2050. The left-hand side (a) shows the high (90th centile) ratio of each scenario compared to the 2C central scenario; whereas the right-hand side (b) shows the median ratio of hazard values for each scenario compared to the 2C central scenario. Source: Gambhir et al. (2022)

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