



# Resilience to climate change and transition: implications for developing countries

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Panel Presentation  
1 July, 2021

<https://www.bis.org/publ/othp31.htm>

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# Climate Change as global risk → affects macro (fiscal & financial) stability

## Tests the resilience of our economies

### From a narrow finance perspective CC will impact:

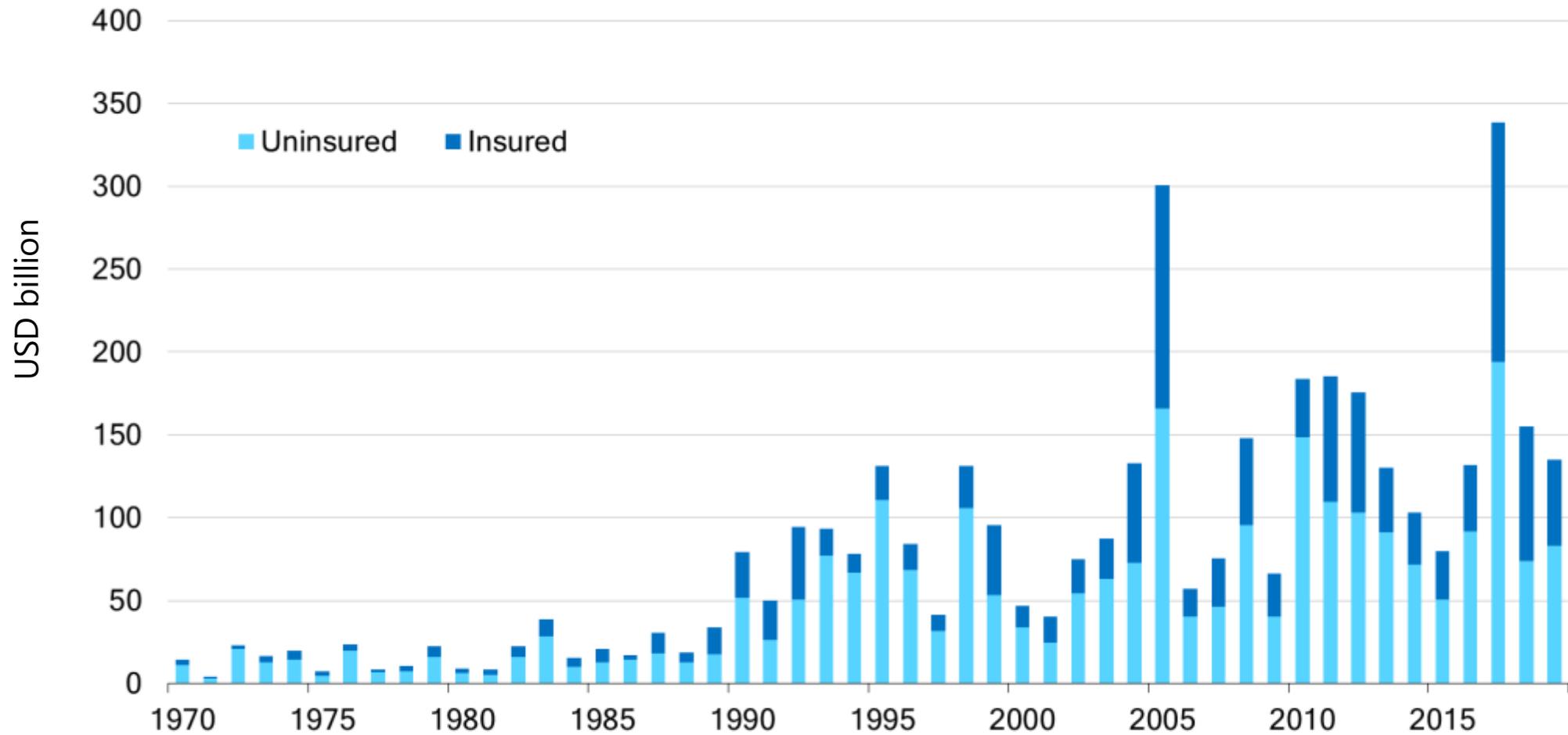
- Value of “brown” assets, then others
- Thus, risks to banks, insurance companies, etc.

### From a broader macroeconomic perspective CC will impact:

- $C, I, G, T, N, X, M, Y, p, r^*, U^*, K$ , etc
- At the same time
- Thus, finance sector needed to better measure risks

	Type of shock	From gradual global warming	From extreme weather events
<b>Demand</b>	Investment	Uncertainty about future demand and climate risks	Uncertainty about climate risk
	Consumption	Changes in consumption patterns, eg more savings for hard times	Increased risk of flooding to residential property
	Trade	Changes in trade patterns due to changes in transport systems and economic activity	Disruption to import/export flows due to extreme weather events
<b>Supply</b>	Labour supply	Loss of hours due to extreme heat. Labour supply shock from migration	Loss of hours worked due to natural disasters, or mortality in extreme cases. Labour supply shock from migration
	Energy, food and other inputs	Decrease in agricultural productivity	Food and other input shortages
	Capital stock	Diversion of resources from productive investment to adaptation capital	Damage due to extreme weather
	Technology	Diversion of resources from innovation to adaptation capital	Diversion of resources from innovation to reconstruction and replacement

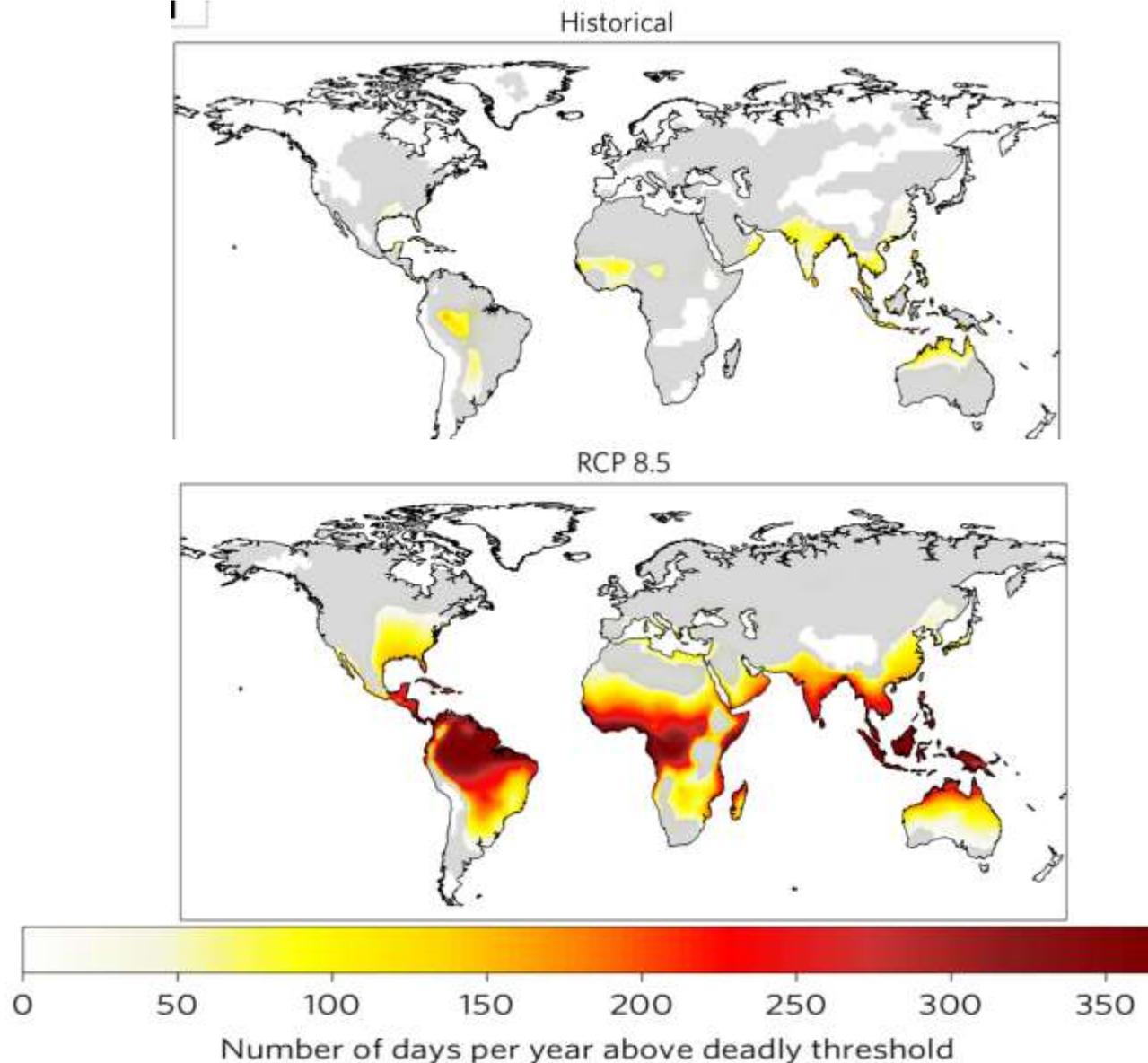
# Climate Change linked to large and growing losses & cost (uninsured weather related disasters), insurance industry says



Economic losses = insured + uninsured losses

Source: Swiss Re Institute

# GHG emissions impact temperatures on where we could live → trigger complex new risks → affect more developing world



- **Human beings must regulate their internal heat, and so they are exposed to the mix of :**
  - External temperatures and
  - Humidity
- **In 2000\*, this was already a severe risk:**
  - 13.2% of the planet's land area where 30.6% of the population resides...
  - was exposed to 20 or more days when temperatures and humidity surpassed the threshold beyond which such conditions become deadly.
- **By the end of the century, in a BAU scenario, entire regions of the world would be inhabitable.**

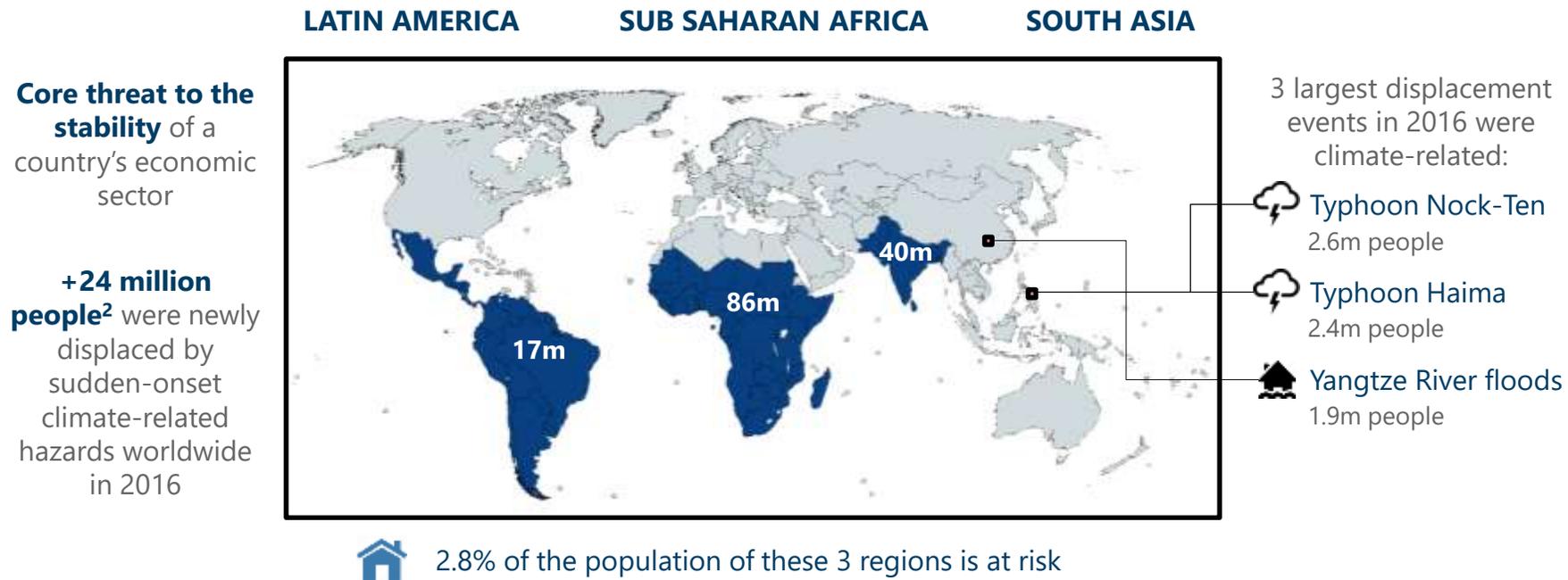
\* Source; Global Risk of Deadly Heat (Science 2017)

# CC-related risks have multiple ramifications, one example: involuntary migration risks complex to assess

- Changes in the global environment cause an increasing number of human displacements

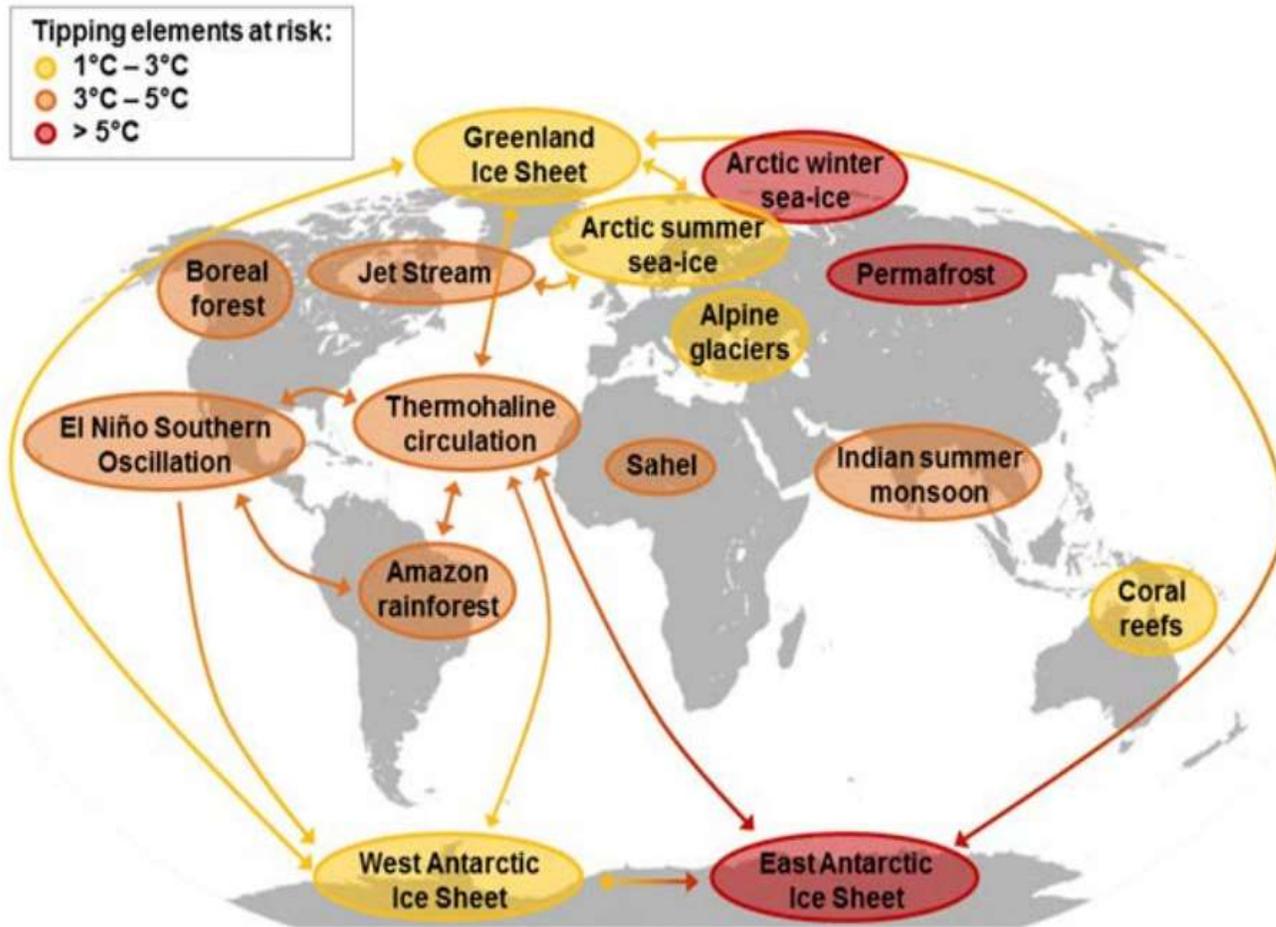
“By 2050, climate change could force more than **143 million people in just 3 regions to move within their countries**”

– World Bank Group<sup>1</sup>



Sources: (1) Groundswell, Preparing for internal climate migration, World Bank Group, 2018  
(2) Internal displacement monitoring centre database 2017

# Quantifying these physical and transition global risks is complex..... Mis-pricing is linked to ramifications of radical uncertainty



The individual tipping elements are colour-coded according to estimated thresholds in global average surface temperature. Arrows show the potential interactions among the tipping elements that could generate cascades, based on expert elicitation.

Source: Steffen et al. (2018)

## Impacts on socioeconomic systems:

- First Integrated Assessment Models (IAMs): do not account for tail risks (Weitzman 2011); predicted outcomes and ensuing policy recommendations could be misleading (Stern 2016)
- Tipping points are complex, trigger irreversible consequences with nonlinearity, cascading effects...
- Add global inequality effects, migrations, conflicts, etc...

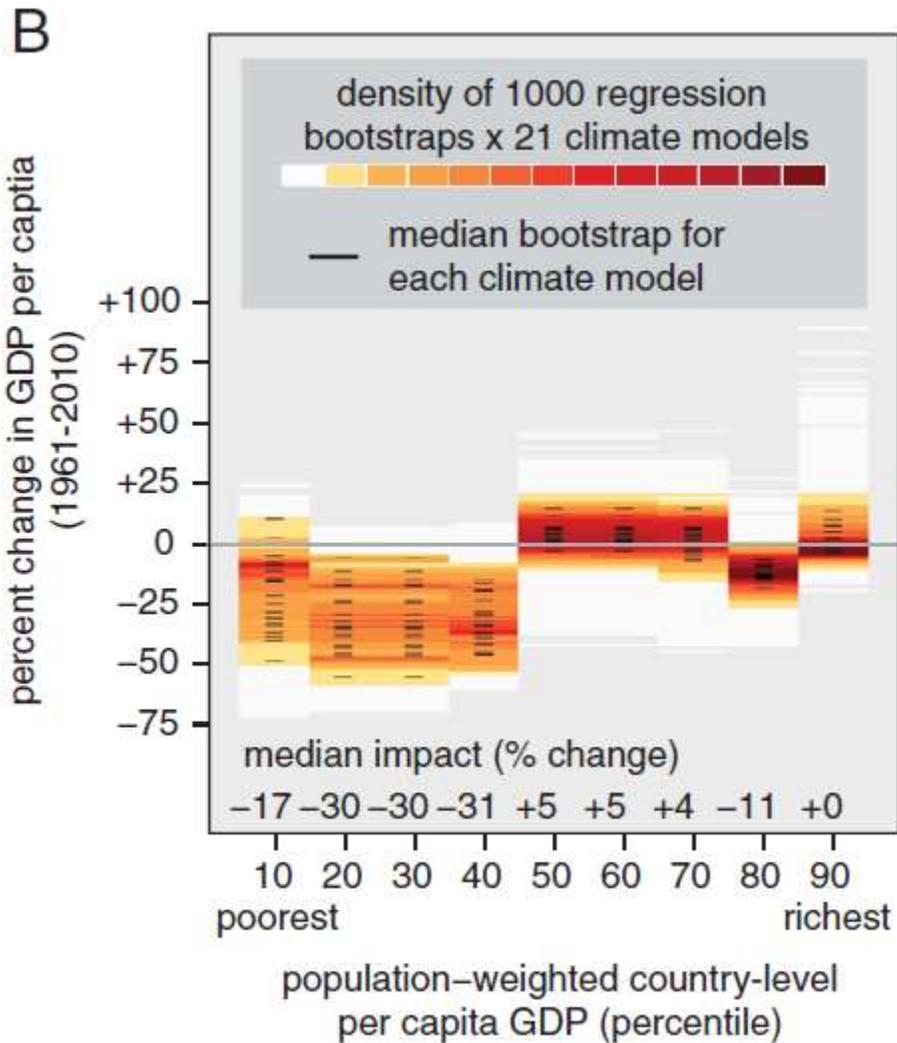
## Example: ramifications of “Melting of Polar Ice Sheets”?

## Distributional consequences of climate change: affect poor countries and poor households in rich countries

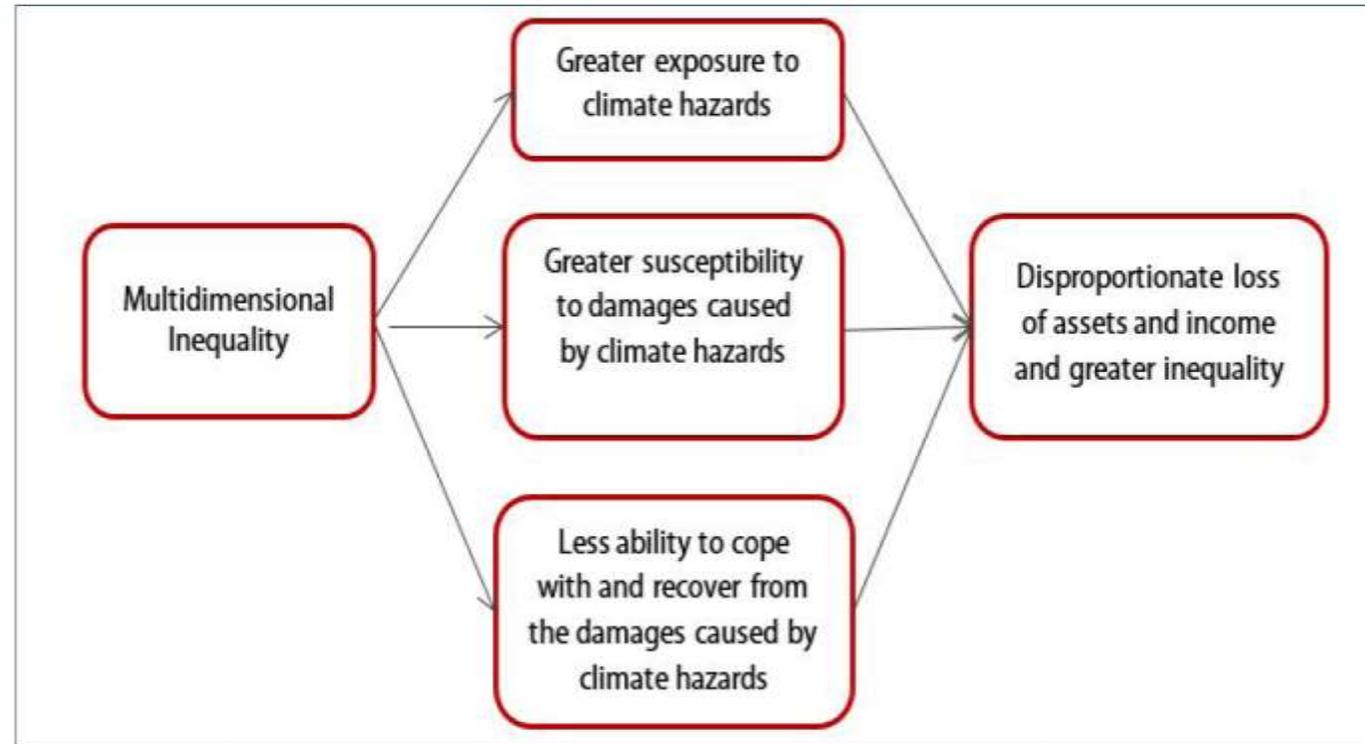
- **Poor countries** will be most hit by climate change related events (eg., rising sea levels, extreme weather events, lack of prevention, lack of health facilities, etc.)
- In **rich countries poor households** can be hit most by individual climate policies compared to higher-income households:
  - Face more difficult budget constraints that offer limited choice of consumption “greener” baskets;
  - Have harder borrowing constraints that constraint procuring more “green” durables;
  - Have different skill endowments, more difficult to adapt, lower wages; and
- **Some climate policy tools can be regressive** (eg., carbon taxes for different fuels, certain mandatory standards, subsidies and regulatory tools). Compensation & transfers during transition need to be considered

See “Distributional effects of climate policies” Bruegel, 2018 by Georg Zachmann, Gustav Fredriksson and Grégory Claeys

# Climate change affects poor countries and poor households in vicious circle



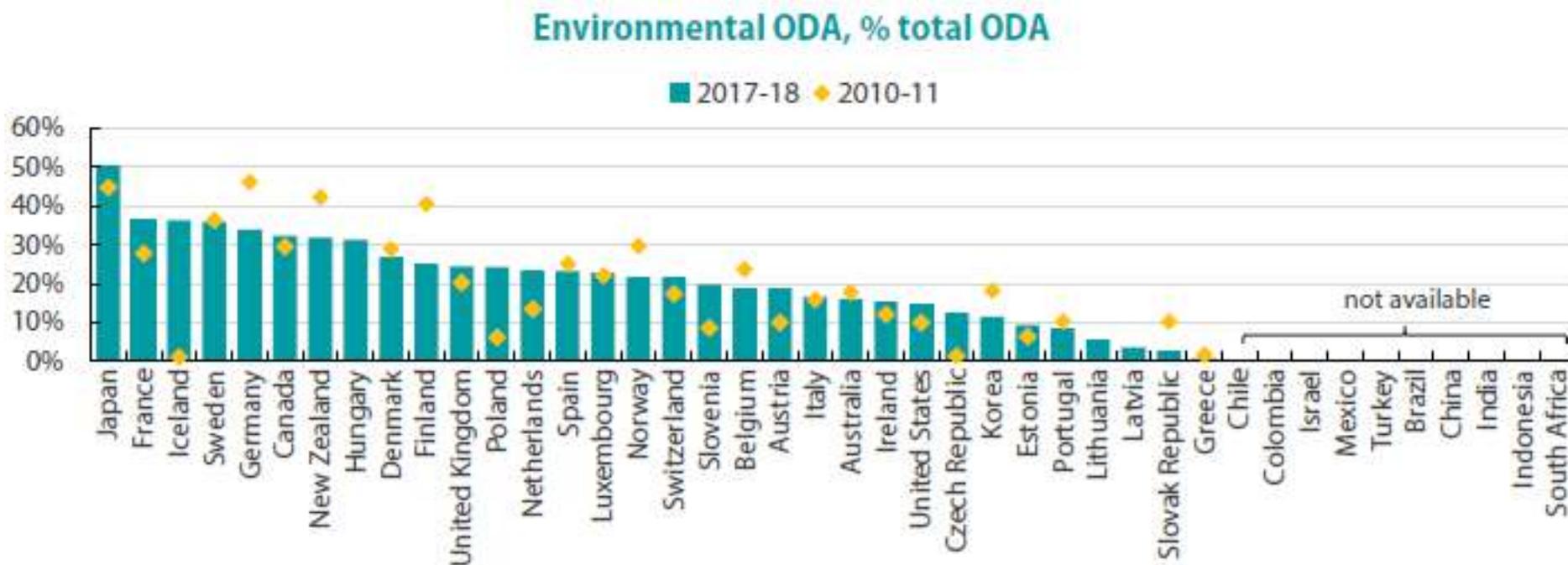
Three effects of inequality on disadvantaged groups



Source: Noah S. Diffenbaugh and Marshall Burkea "Global warming has increased global economic inequality" PNAS, Potsdam Institute for Climate Impact Research, March 22, 2019

Source: S. Nazrul Islam and John Winkel, "Climate Change and Social Inequality" DESA Working Paper No. 152, October 2017

# Distributional consequences of climate change: affect poor countries and poor households in rich countries



Note: Environmentally related Official Development Assistance is identified using the set of “Rio Markers”. The Rio Markers screen for policy objectives of a cross-sectorial nature, including climate change, biodiversity and desertification. This variable includes only data on bilateral commitments and is calculated from microdata on individual projects. There is no internationally agreed methodology for tracking actual disbursements of ODA related to each environmental objective. Thus, it remains difficult to determine the environmental purpose of existing commitments and projects. There are also data gaps for some donors. Moreover, Rio markers for ODA refer to donors’ commitments (i.e. policy objectives).

Source: OECD (2020), “Creditor Reporting System: Aid activities”, OECD International Development Statistics (database).

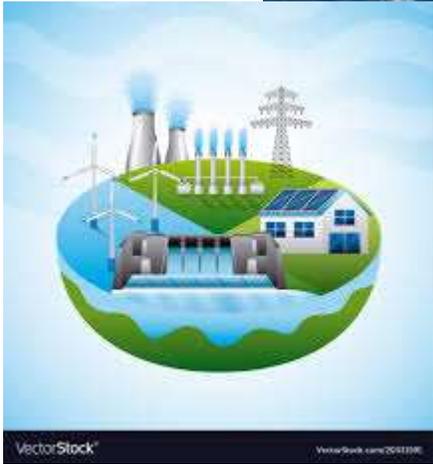
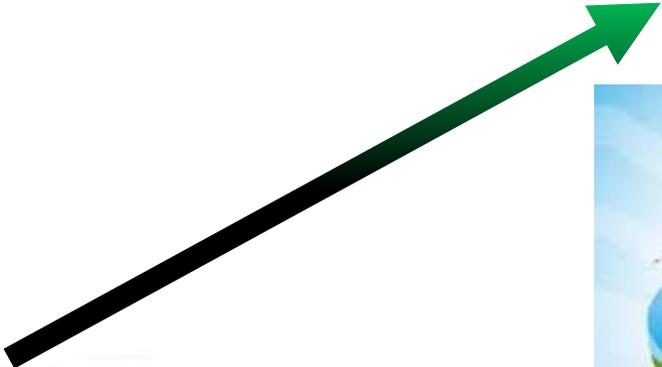
# To Financing Opportunities of Increasing Resilience + Green Recovery

## From Climate Change Green Swans Global Risks & Crises



The green swan

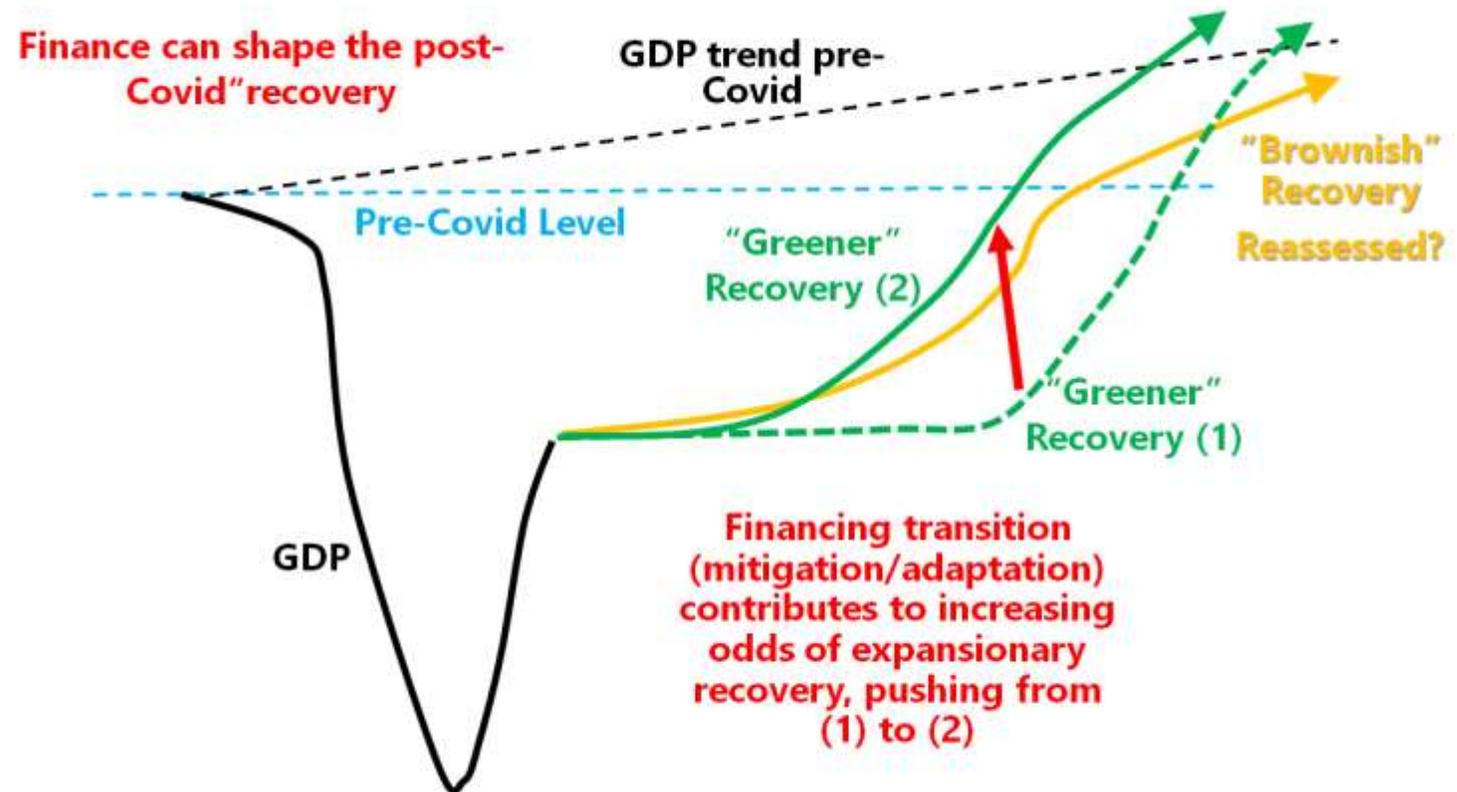
Central banking and financial stability  
in the age of climate change



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# Finance (Green, Innovation) essential to increase resilience and the odds of “expansionary” path to transition to a lower carbon economy...

- More resilience and higher growth post-Covid can come from:
- Increase awareness and better measurement of CC related risks → increase resilience of financial sector to withstand physical and transition risks
- Provide new financial instruments to help change behavior on demand (consumers) and supply (investors) sides
- Engage in financing “green recovery”, financing R&D, new technology
- Coordinate with other stakeholders
- International coordination with developing countries (DBs, IFIs, financing transition)



## Conclusions: for Green Swans solutions are global coordination with “all hands on deck” and immediate action, finance has special role to play in transition

- **Solution requires global and local coordination between Agents**: Global risks require global coordination by definition plus local **cooperation among many players** (Governments, CBs, private sector, IFIs, regulators, standard-setters, ratings agencies, etc); the NGFS (*Network for Greening the Financial System*) playing important role for CBs
- **Solution requires technology (supply) and behavioral change (demand)**: financing costs of transition and mitigation paramount
- **Solution calls for immediate action given severity of CC-related events**, even without full understanding, because of radical uncertainty
- **Creative financial solutions needed for developing countries with limited resources**:
  - Local development institutions, role of IFIs critical, bilateral cooperation
  - Financial markets (eg., CAT bonds, asset managers' changing, “green bonds”, etc)
  - Financial innovation (eg., backed by SDRs, guarantees by official sector, etc)

# Thank You