

Climate Change, mandates ... and central banks

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The views expressed in this presentation are those of the author and not necessarily the views of the BIS.

How should CB consider issues outside their explicit mandate? For example, should CB help combat Climate Change?

- **Two tails: strict separation or activism?**
 - Do nothing, CC policies outside mandate; or
 - Do everything, demanded by societies (also private financial sector)
- **Taking into account political economy and other change factors**
 - Redistributive effects of CC and mitigation policies (poor countries most affected; poor HH in rich countries most affected)
 - Most effective action is outside CB remit (carbon pricing, structural reforms)
 - Implementing changes will take time (coordination, free riding, political cycles, distributional effects, etc); carbon budget has a time dimension
 - Instruments for communication, guiding expectations are evolving (MP reviews, speeches, etc)

Analysis of balance of risks could shed light on need to act and how to act

● Balance of risk in each of the tails and in median position

- Do nothing: Preserve independence, respect of explicit mandate → risk of being “too little too late” for global warming; risk of being “behind the curve” (private sector moving).
- Do everything: Listen to more vocal parts of civil society, expecting changes in mandate → risk of becoming hostage of any future demand by any influential group.
- Do something: No “silver bullet” for CC, CBs do not have tax / carbon price lever. CBs alone cannot mitigate CC; even moderate activism can bring moral hazard (reduce effort of other actors?) → risk of becoming again “only game in town”.

● Emerging consensus? Current CB mandates impacted by CC. Recognition that climate change directly undermines central banks in fulfilling their mandates:

- Financial stability – potentially severe effects (related to CC-risks, physical and transition risks)
- Price and macroeconomic stability: effects on inflation (heat), employment (CC-related real and financial crises) etc

CC new systemic risk, not “moral” story...

- “**Green Swan**” concept suggesting balanced approach for CBs in age of CC, 3 ideas:
- Best science today says CC calls for **epistemological break in risk models**, away from Gaussian distribution of risk, non-linearity, massive threats and irreversible “**tipping points**”
- How to act under **radical uncertainty** and **asymmetric game** (future huge potential losses for “small” –if coordinated– cost today)
 - Wait for new clarity / explicit CC mandate to act?
 - Interpret existing mandate enabling actions that can trigger cost-pushed change in mindset of consumers, investors and financial sector?

With Patrick Bolton
Morgan Després
Frédéric Samama
Romain Svartzman



The green swan

Central banking and financial stability
in the age of climate change

Within their mandates, what can central banks do?

- **Information.** Raising awareness (Stern (2008)), helping building consensus, providing framework for current changes taking place in private financial sector, civil society, etc. Ex: the Network for Greening the Financial System (NGFS)
- **Coordination.** CB can offer policy directions, for mitigation and adaptation to CC-related risks:
 - CB can liaise, help to coordinate financial markets incentives, work with fiscal authorities and relevant international bodies; key instrument under purview of fiscal policy (Pigovian tax, carbon pricing)
 - CC is global not local issue poses complex problem of global and local coordination (Ostrom (2009), Olson (1965)) compounded by distributional effects of policies (inequality, cost of adaptation, etc)

Many other practical actions are being considered and implemented...

- **Continue to improve analytical tools** to assess risk (macro models (IAMs), risk metrics, stress tests, provide climate scenarios to financial sector)
- **Measure physical risk better.** More and better disclosures of exposures to CC risks
- **Strengthen standards and taxonomy** on green investment products, useful for investors and civil society (ESG, PRI, Green bonds, EU sustainable finance taxonomy)
- **“Green” own assets** (eg reserves, pension funds); offer investment options for CBs (BIS)
- **Help pooling risk and re-establishing insurance coverage.** Market failures in many areas now (“red” no insurance zones, no available insurance against CC weather events)
- **Help coordinate compensatory transfers to restore (some) Pareto optimality of CC policies** (national budgets, regional funds, IFIs, etc)
- **Help financing the MLT transition and post-Covid “green recovery”** (role of Development Banks, of IFIs, private sector with “green” financial instruments); help finance **global public goods** (Covid is a Green Swan, green infrastructure, see Stern and Stiglitz (2020))

Thank You

Changes in mindsets on Climate Change: alignment of the stars?

BEFORE 3 to 5 years ago	TODAY
1 Deniers	1 Acceptance of climate change
2 One of many risks	2 Biggest risk
3 Limited regulations	3 Multiple regulations
4 No global agreement	4 COP 21
5 China blocking	5 China leading
6 Limited interest within populations	6 Millennials
7 Economics only	7 Observations in day to day lives
8 Cost of renewables	8 Competitive pricing
9 Few European investors	9 Major world investors
10 Progressist agenda	10 Central Bank's agenda

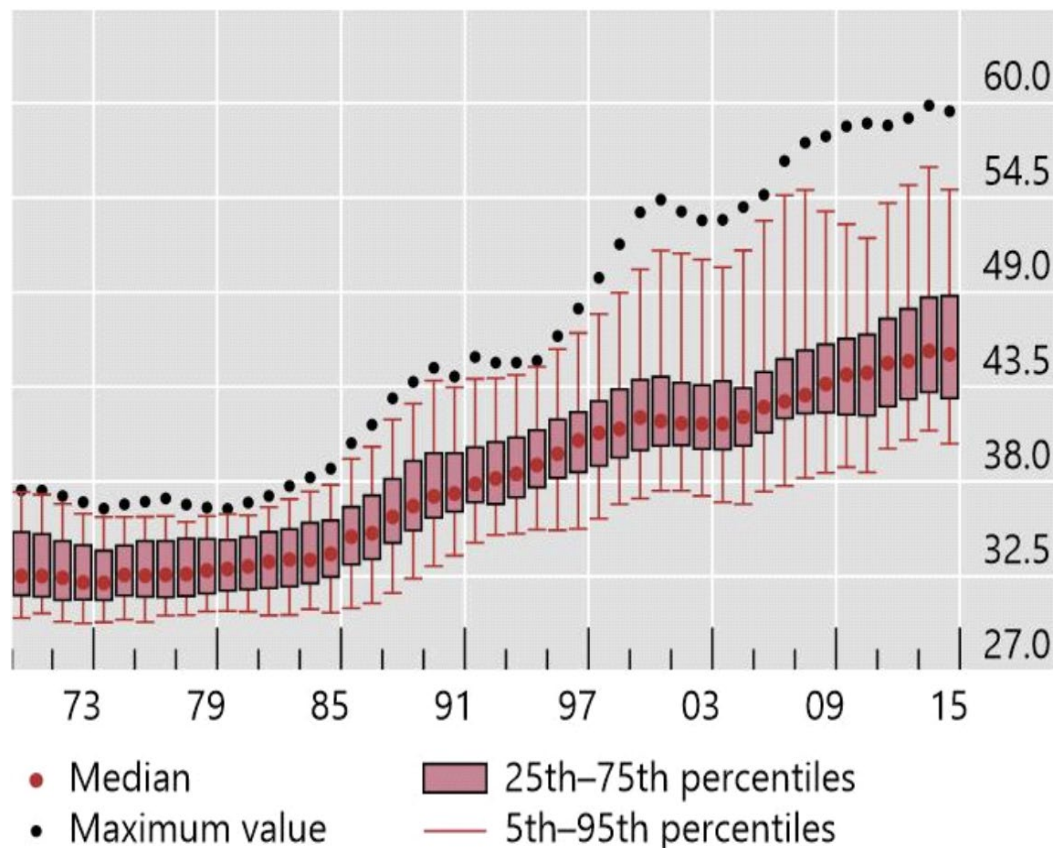
Source: Amundi

Annex 1a: Monetary policy and inequality, why bother?

- Conventional view: existing MP mandates address inequality by smoothing business cycles, reducing length of recessions (unemployment, income effects); ensuring longer-run income stability and growth;
 - No need for more; if the “divine coincidence” holds, all this comes as a by-product of stabilising inflation!
- But MP may affect wealth, income inequality (through financial channel, asset prices) that, in turn, have implications for MP effectiveness
 - Heterogeneous households will respond differently to MP decisions, and their different reactions will need to be factored in
- For example, does inequality hamper monetary policy transmission?

Annex 1b: cost of rising inequality in the US: deeper recessions under the GFC

Income inequality across US states
(percent income share of the top decile of the distribution)

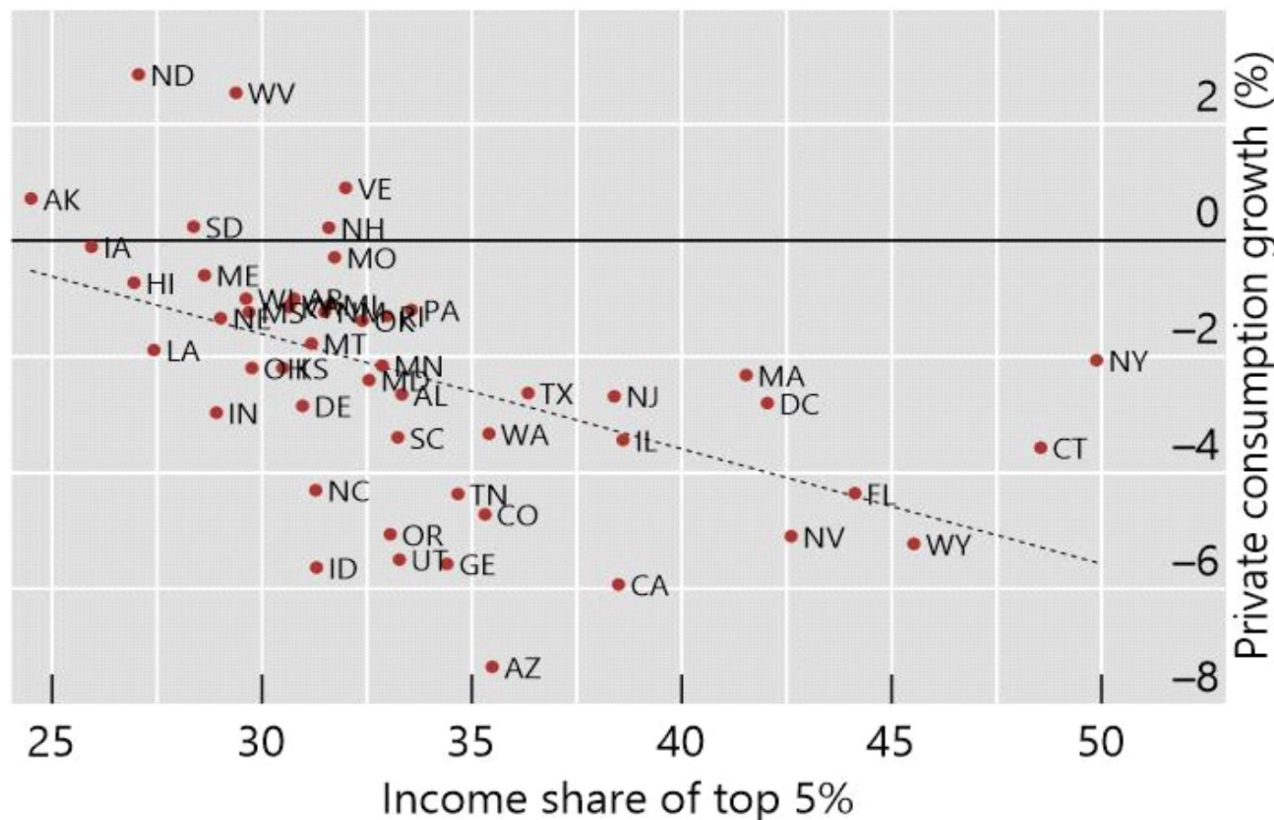


Source: Estelle Sommeiller and Mark Price

<https://www.epi.org/publication/the-new-gilded-age-income-inequality-in-the-u-s-by-state-metropolitan-area-and-county/>

Source: Kharroubi, Kohlscheen, Lombardi, Mojon and Pereira (2021), in progress

GFC: more unequal US states had steeper declines in consumption¹



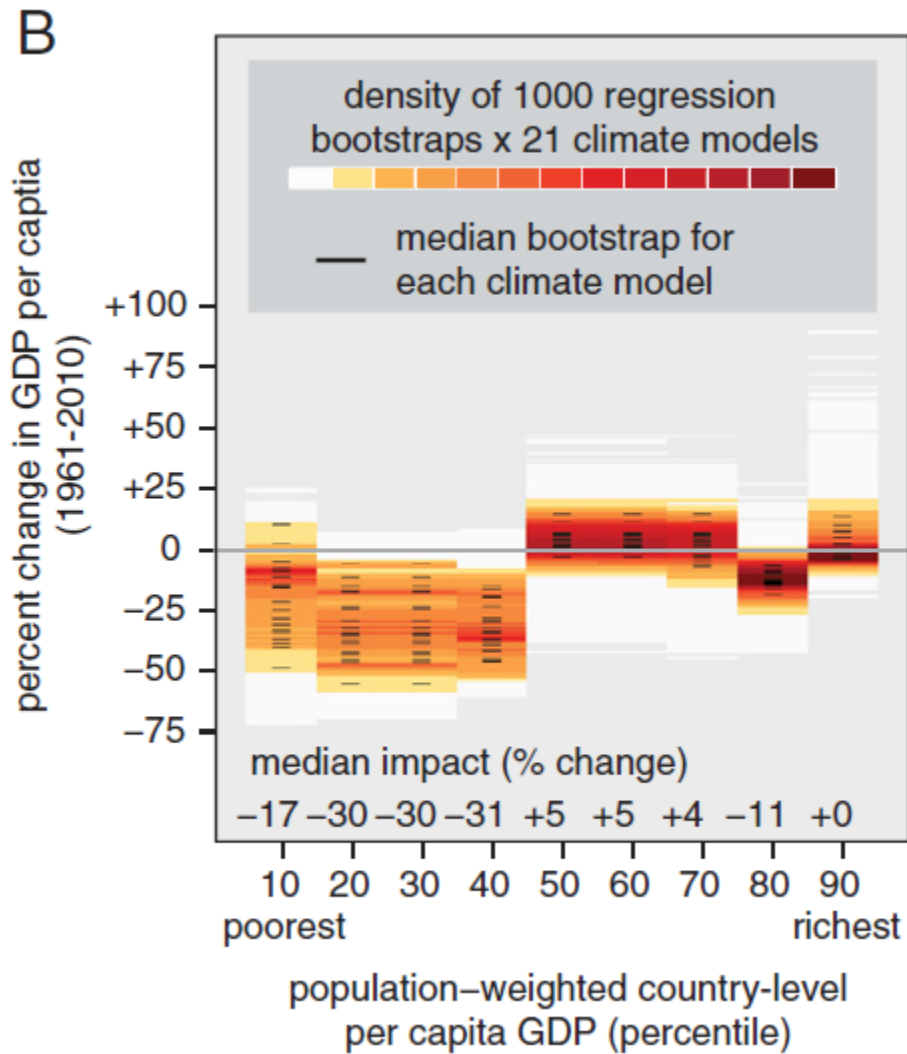
¹ Aggregate private consumption growth between 2007 and 2009 as a function of the income share of the top 5% earners in the respective state

Annex 2a: Negative distributional consequences of climate change: Impact first poor countries and poor households in rich countries

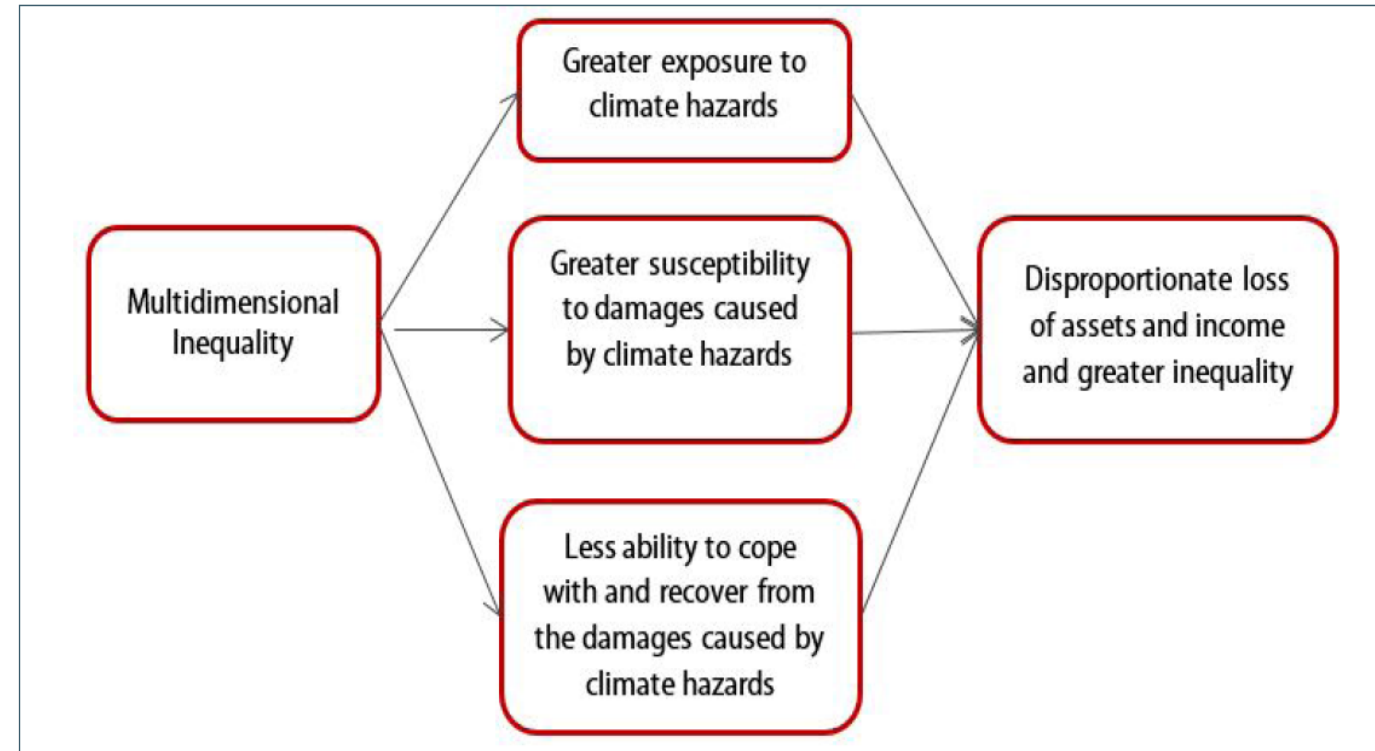
- **Poor countries** will be most hit by climate change related physical risks (eg., rising sea levels, extreme weather events, lack of prevention, lack of health facilities, etc.)
- In **rich countries poor households** can be hit most by (a) physical risks, (b) cost of mitigation / adaptation climate 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 to new regulations;
- **Some climate policy tools can be regressive in the ST** (eg., carbon taxes for different fuels, new mandatory standards, removal of subsidies and new regulatory tools). Political economy of acceptance policies combatting climate change.

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

Annex 2b: CC affects poor countries and poor households in vicious circle



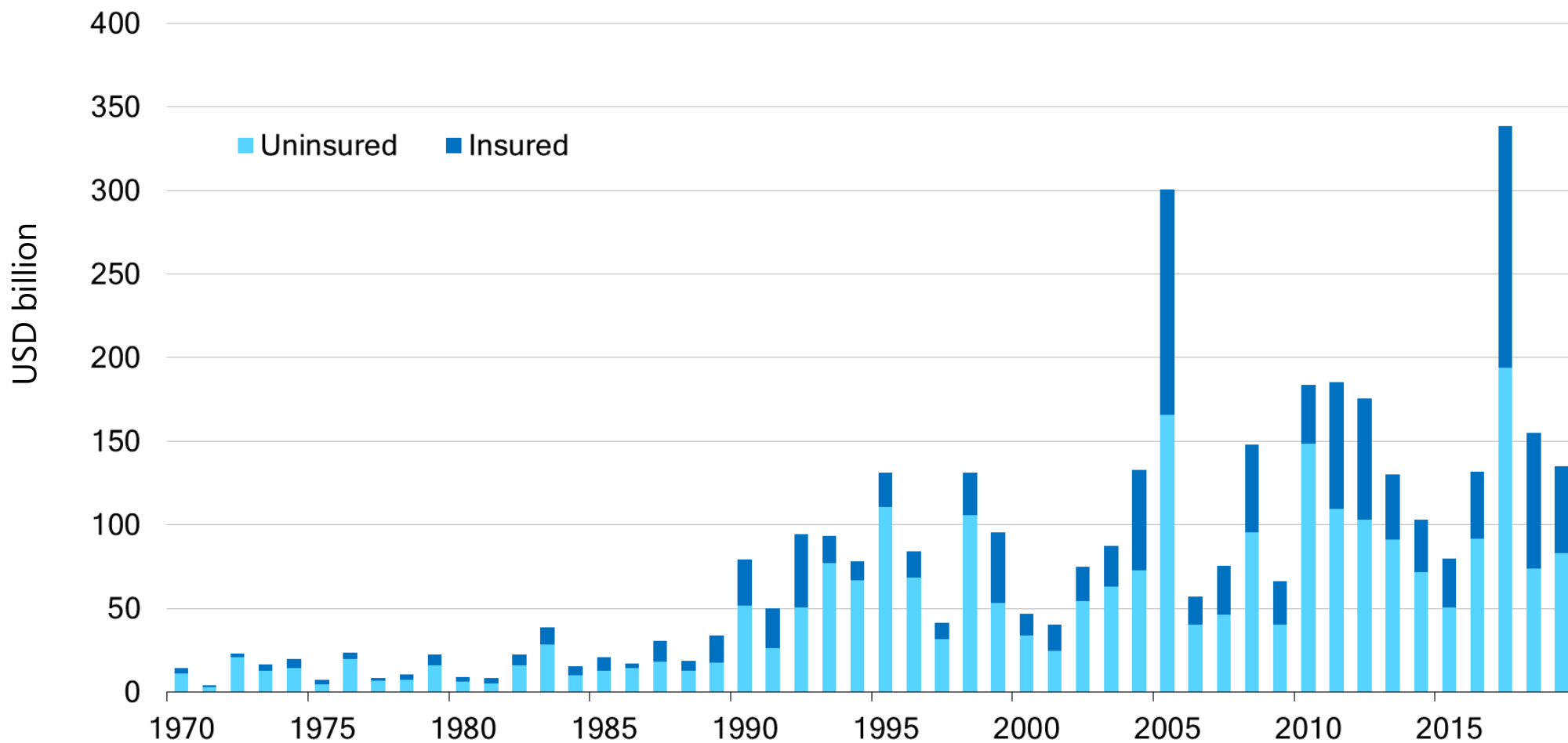
Three effects of inequality on disadvantaged groups



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

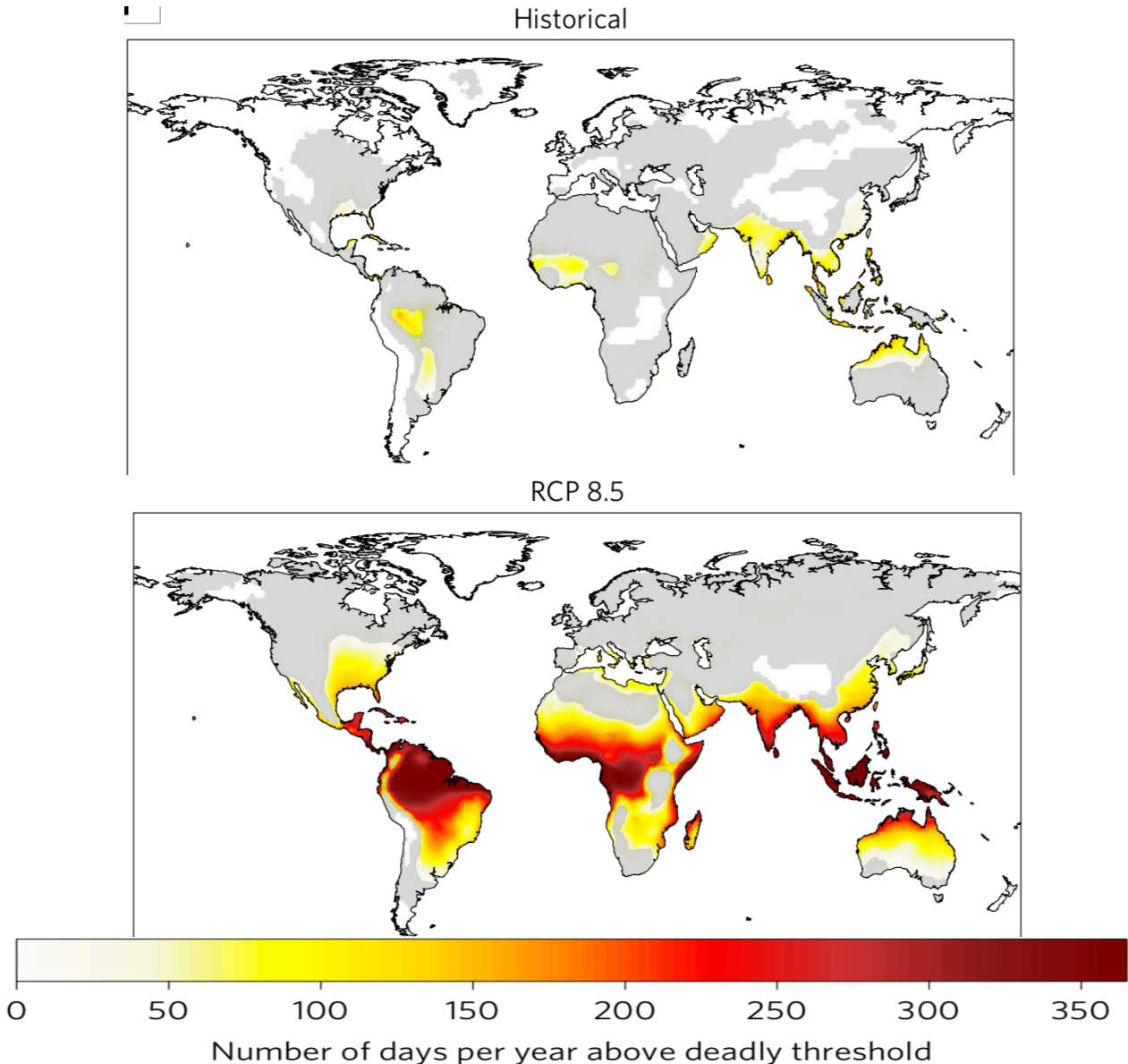
Annex 3a: Insurance costs - poor countries impacted more by large and growing losses & cost (uninsured weather related disasters) of physical



Economic losses = insured + uninsured losses

Source: Swiss Re Institute

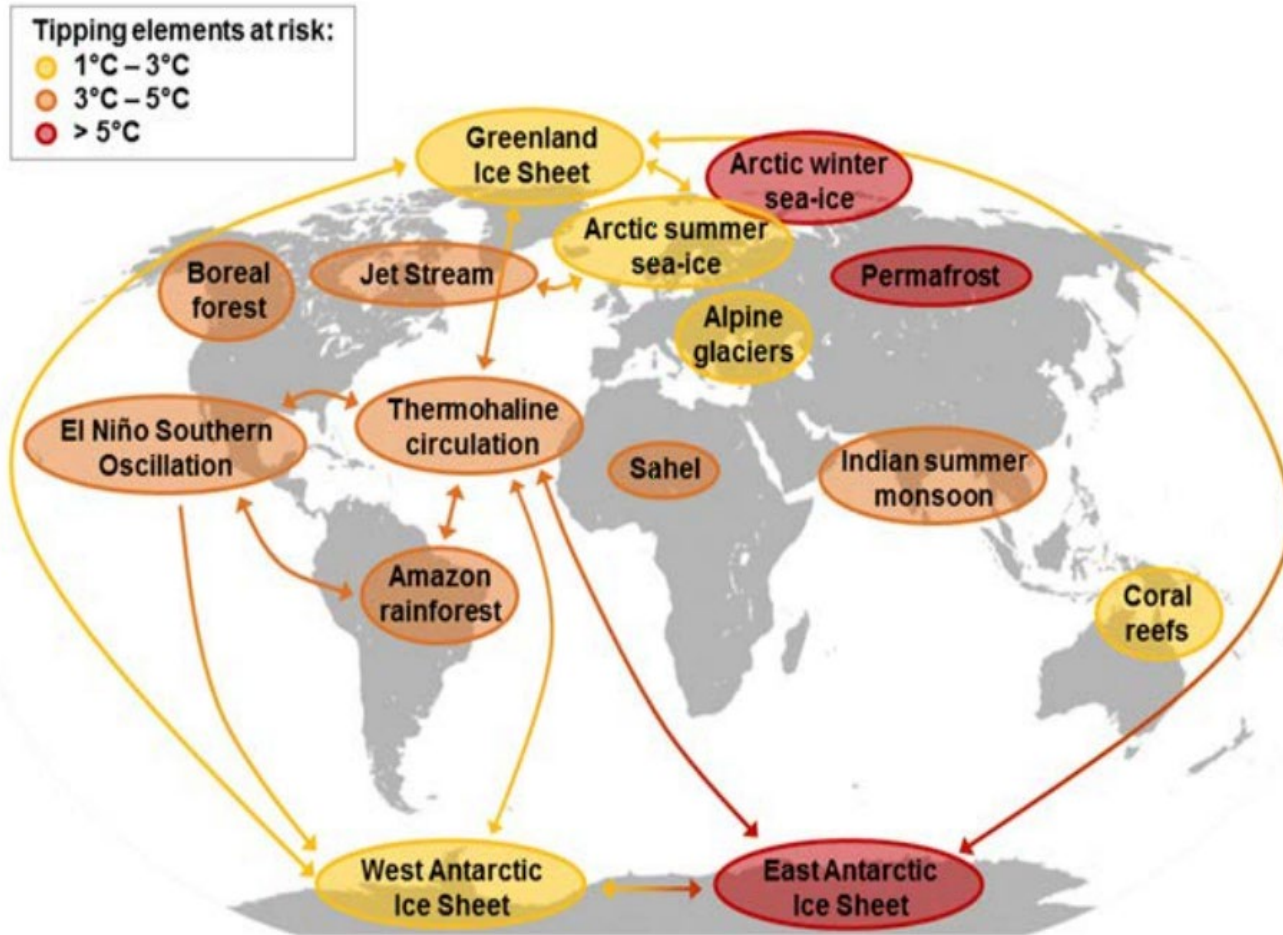
Annex 3c: Poor countries more impacted by GHG: temperatures where we could live



- **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: Mora et al, "Global Risk of Deadly Heat", *Nature Climate Change*, vol 7, issue 7, June 2017

Annex 3d: 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 are difficult:

- Tipping points are complex, trigger irreversible consequences with nonlinearity, cascading effects...
- Add global inequality effects, migrations, conflicts, etc...

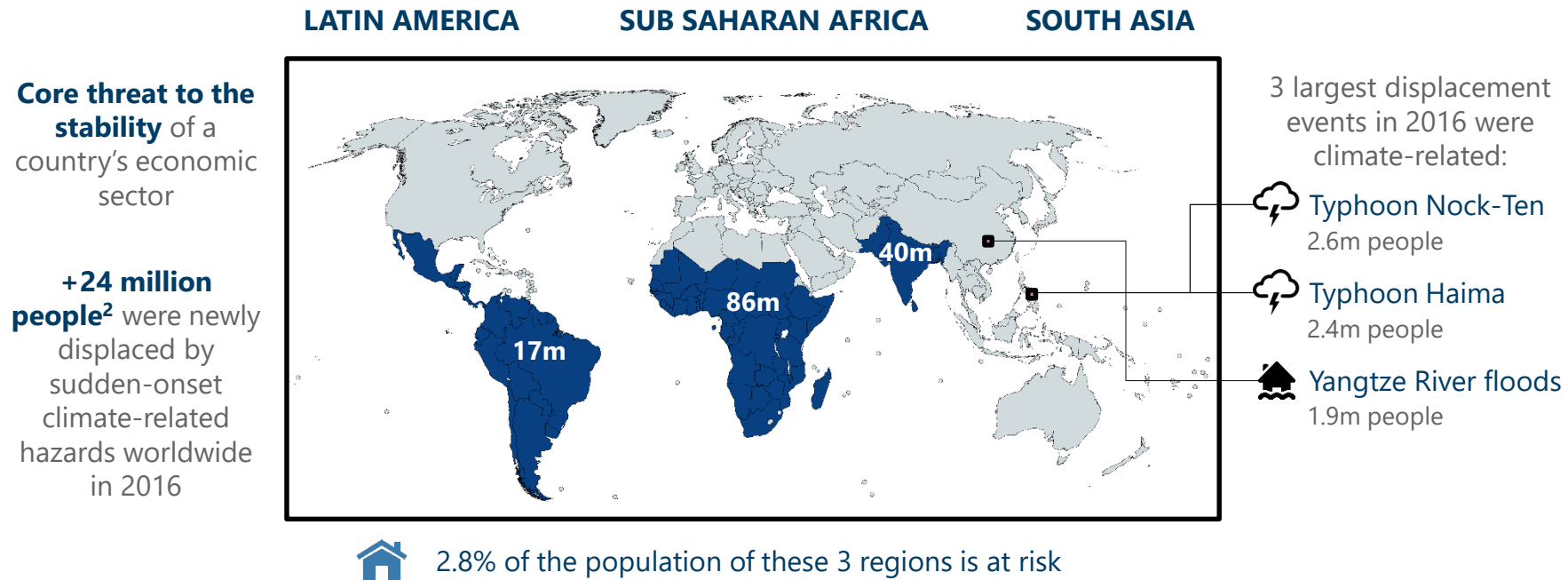
Example: ramifications of “Melting of Polar Ice Sheets”?

Annex 3e: CC-related risks will trigger 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 Group¹



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

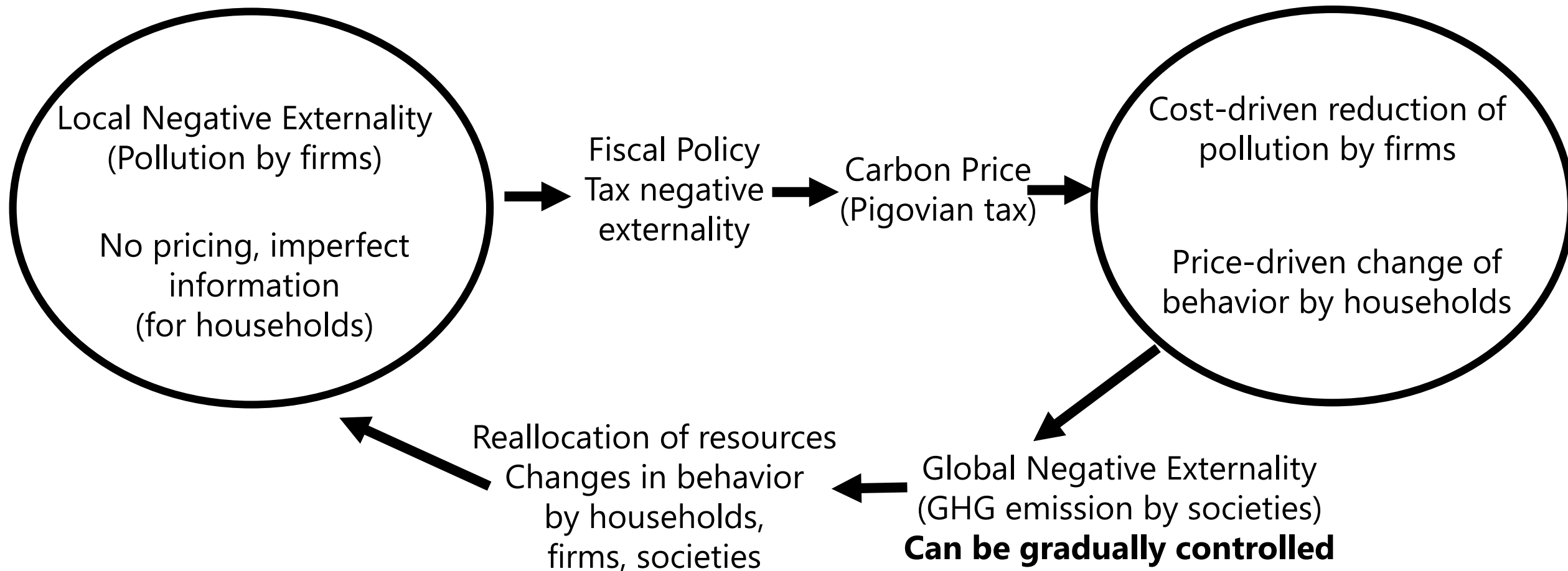
Annex 4a: global coordination with “all hands on deck” and action

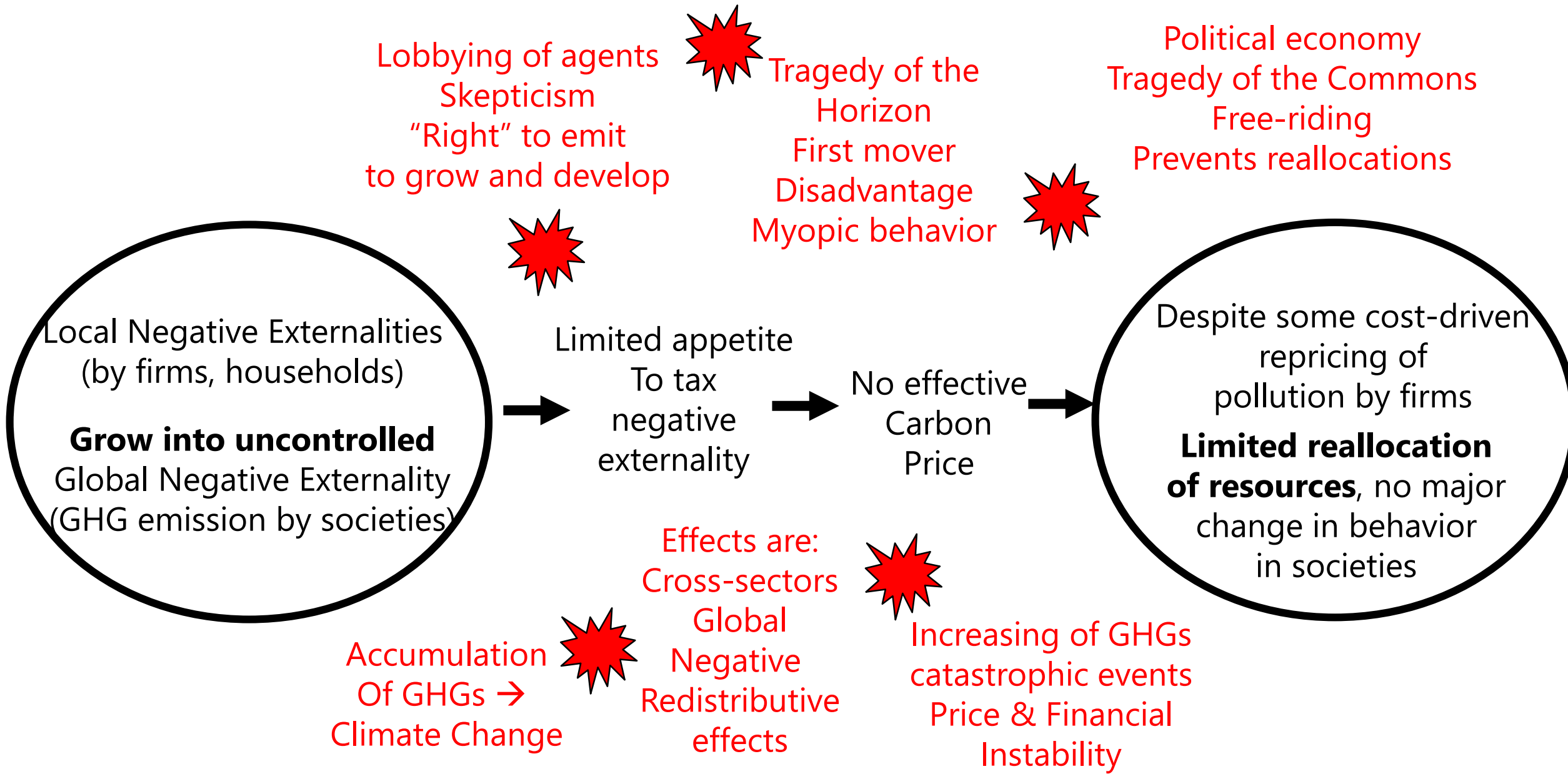
- **Solution requires global and local coordination between Agents**: Global risks require global coordination plus local **cooperation among many players** (Governments, CBs, private sector, IFIs, regulators, standard-setters, ratings agencies, etc);
- **Solution requires technology (supply) and behavioral change (demand)**: financing costs of transition and mitigation face old political economy, game theory, collective action issues to find fair burden sharing, cooperation and incentives for action
- **Solution calls for immediate action given severity of CC-related events**, perhaps without full understanding, because of radical uncertainty
 - From myopic behavior: **Tragedy of the Horizon** (Carney 2015), to CC-risk awareness
 - Covid-19 might have triggered **behavioural change**: overwhelming evidence of huge costs of **Green Swans**, convincing societies, policy-makers, private sector of **need for action**

Annex 4b: never “waste a crisis” use Covid-19 to aim at Green recovery

- **Covid has produced the unprecedented contraction that we feared with CC physical and transition risks.** So “never waste a crisis”, recovery can aim at being as “green” as possible. Macro conditions favourable (low rates, demand, awareness, ambition in US, EU, China, etc)
- **Consumer information and incentives to lower carbon economy** (public awareness, carbon pricing, GHG emission taxation & certificates, etc)
- **Proposing to investors practical diversification projects/paths to lower carbon economy and finance the transition,** “green” research” R&D, new technologies, carbon capture, new “green” financial instruments, green infrastructure, “global funds” for MICs and LICs, etc.
- **Distributional consequences of CC policies and transition** are important; political economy of CC is pervasive issue; international (between rich and poor countries) and local compensation & transfers can be important elements to gather support and efficiency

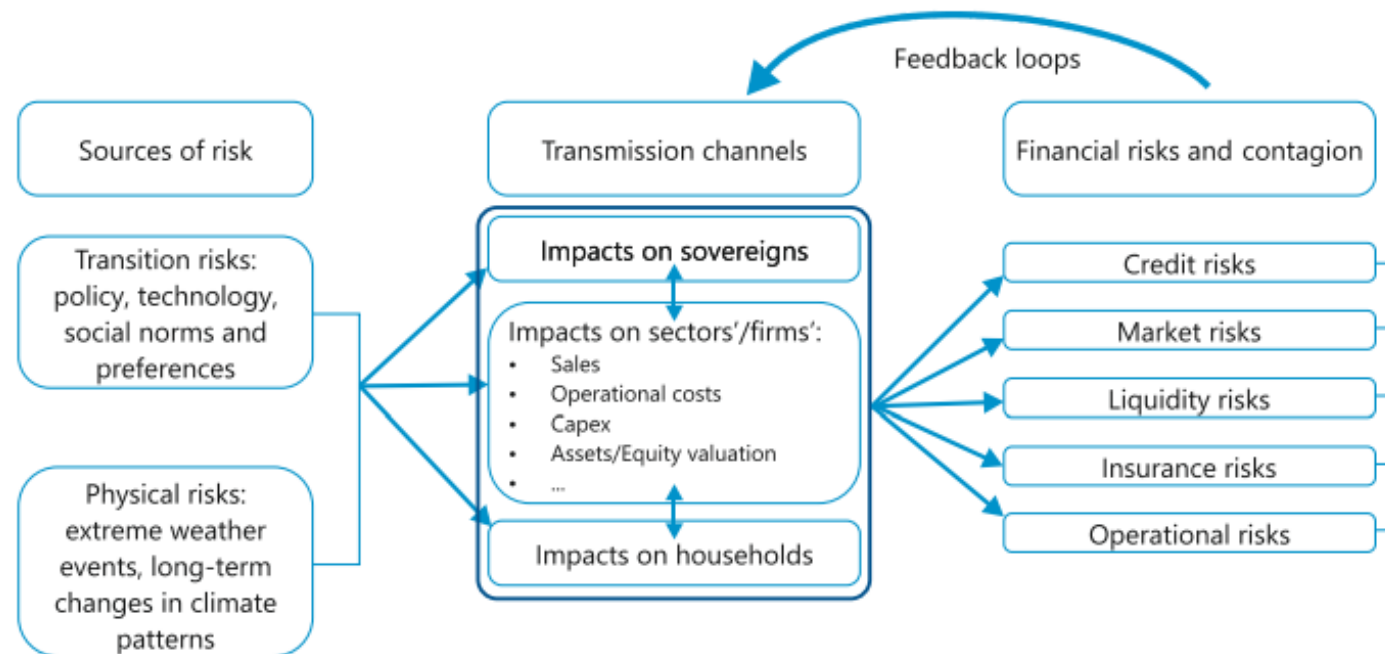
Annex 5: The elegance and simplicity of our pre-CC vision...





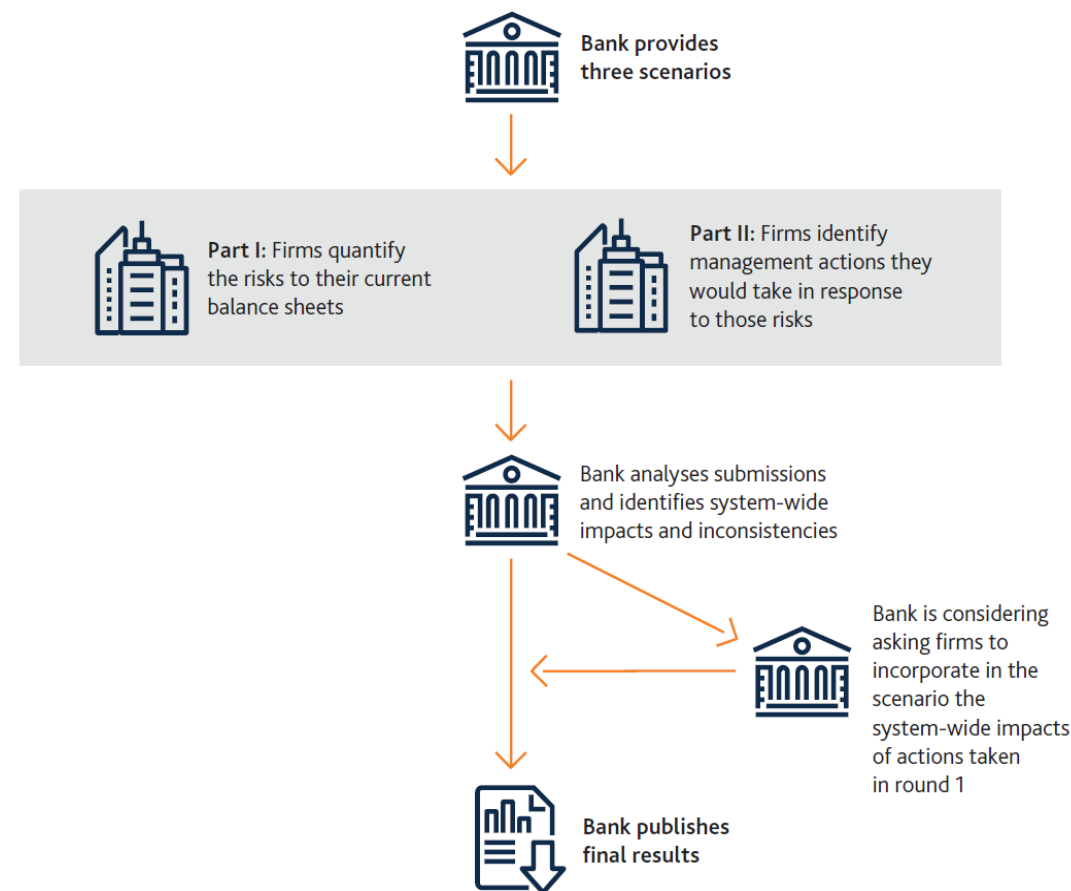
Annex 6a: Concrete roles for central banks – models of transmission of CC-related risks

- **Analytical challenge:** understand how financial stability risks transmits
 - **Development of new models** (IAMs, general equilibrium or disequilibrium, links to human migration, global effects → some risks “not-diversifiable”, etc)
 - **Complexity of transmission of CC**, irreversible “tipping-points”, non-linearity, “cascading effects” into economy, feedback loops, etc.



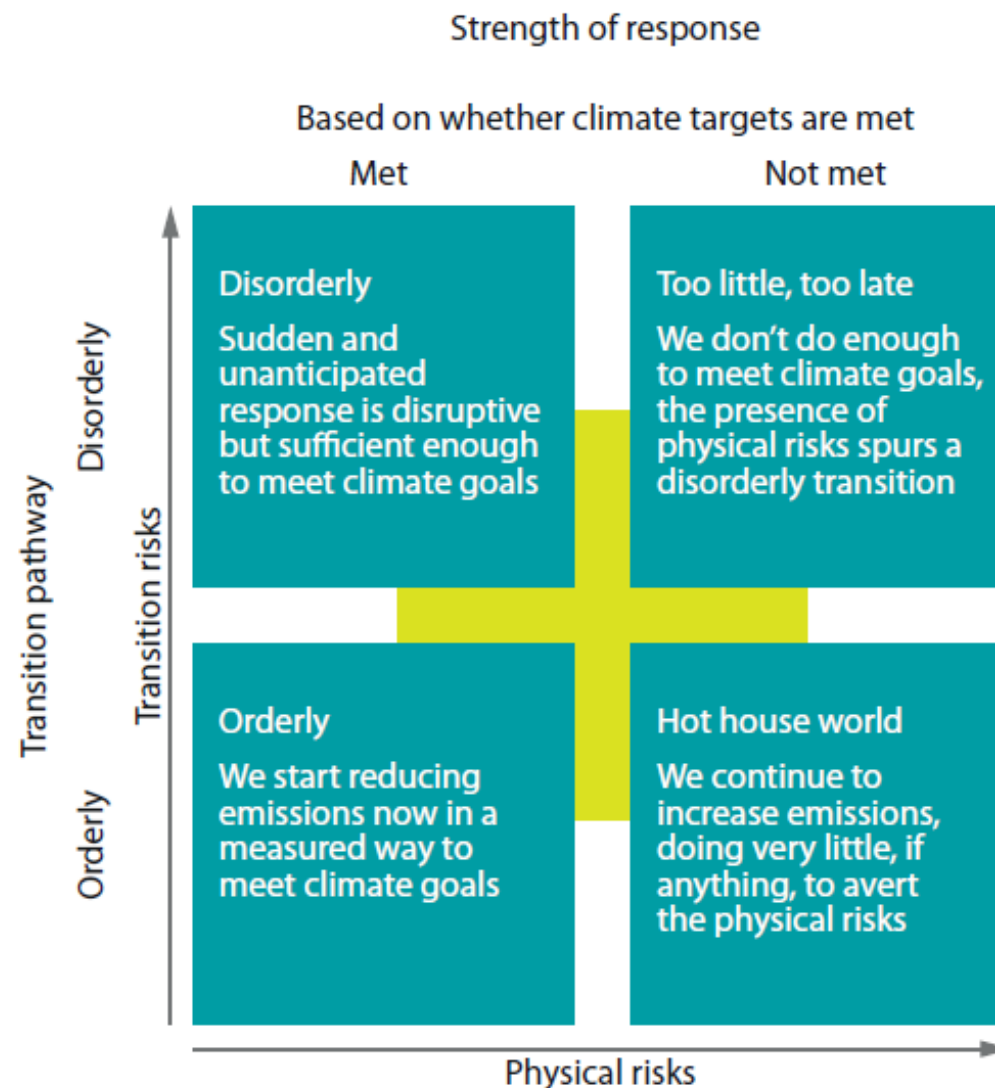
Annex 6b: Concrete roles for central banks – stress-testing

- **Assessment and management of climate-related risks** (in the banking and insurance sector)
 - **Stress-testing** a key instrument, given the forward-looking nature of risks
 - See UBS white paper
 - Several CBs, supervisors taking concrete actions to incentivise banks to enhance their risk management (see Bank of England 2021 climate-stress test on the right, also in emerging markets)
 - **Disclosure of exposures** (TCFD, FSB)



Annex 6c: Concrete roles for central banks – provision of climate scenarios

- **Scenarios are the key ingredient to stress-testing** and the NGFS has developed reference scenarios (on the right)
 - These scenarios are a public good (freely available) and increasingly used by the private sector as well (eg Blackrock “Aladdin” platform)
 - Further refinements (eg sectoral granularity, more financial variables) are in the pipeline
 - Reference scenarios can help to ensure comparability and information value in stress-tests



Annex 6d: Concrete roles for central banks – improve taxonomy around “green”

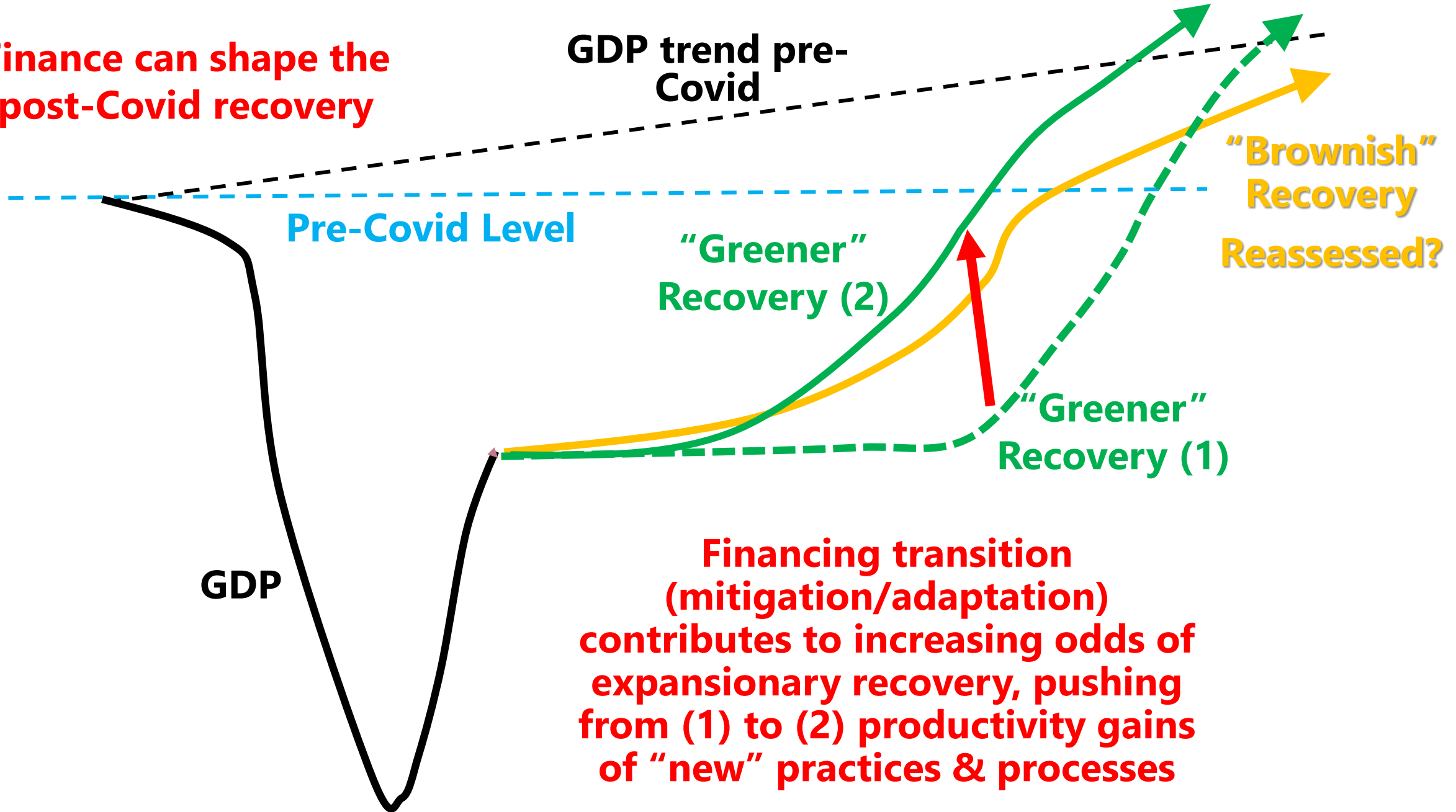
- **Holdings of assets** for implementation of policies → hence definition of “green” is important
 - Reserve management
 - BIS green bond fund as a practical means for CBs to invest in green assets; official launch of EUR green bond fund last week
 - Moving towards sustainability and responsible investment (SRI) practices (eg SNB, BdF)
 - Pension funds
 - CBs are implementing SRI strategies; ESG disclosures in annual reports
- **Improving definitions** of “green” financial instruments, taxonomies (ESG, responsible investment)
- **Demand high from investors and civil society** to inform and guide decisions

Annex 6e: The five Cs – Contribute to Coordination to Combat Climate Change

- **NGFS** (“coalition of the willing”) to coordinate among supervisors and central banks
 - Broad representation: Currently 83 members and 13 observers
- Coordinate and support international effort to *close data gaps* (NGFS workstream on bridging data gaps; FSB (SCAV) work to monitor and assess the implications of climate-related risks to financial stability; Irving-Fisher committee; G20 data gaps initiative etc)
- Help in developing green and sustainable finance standards
 - Engagement with issuers to improve green bond reporting to prevent green-washing
 - Support the development of ESG standards (see UBS white paper)

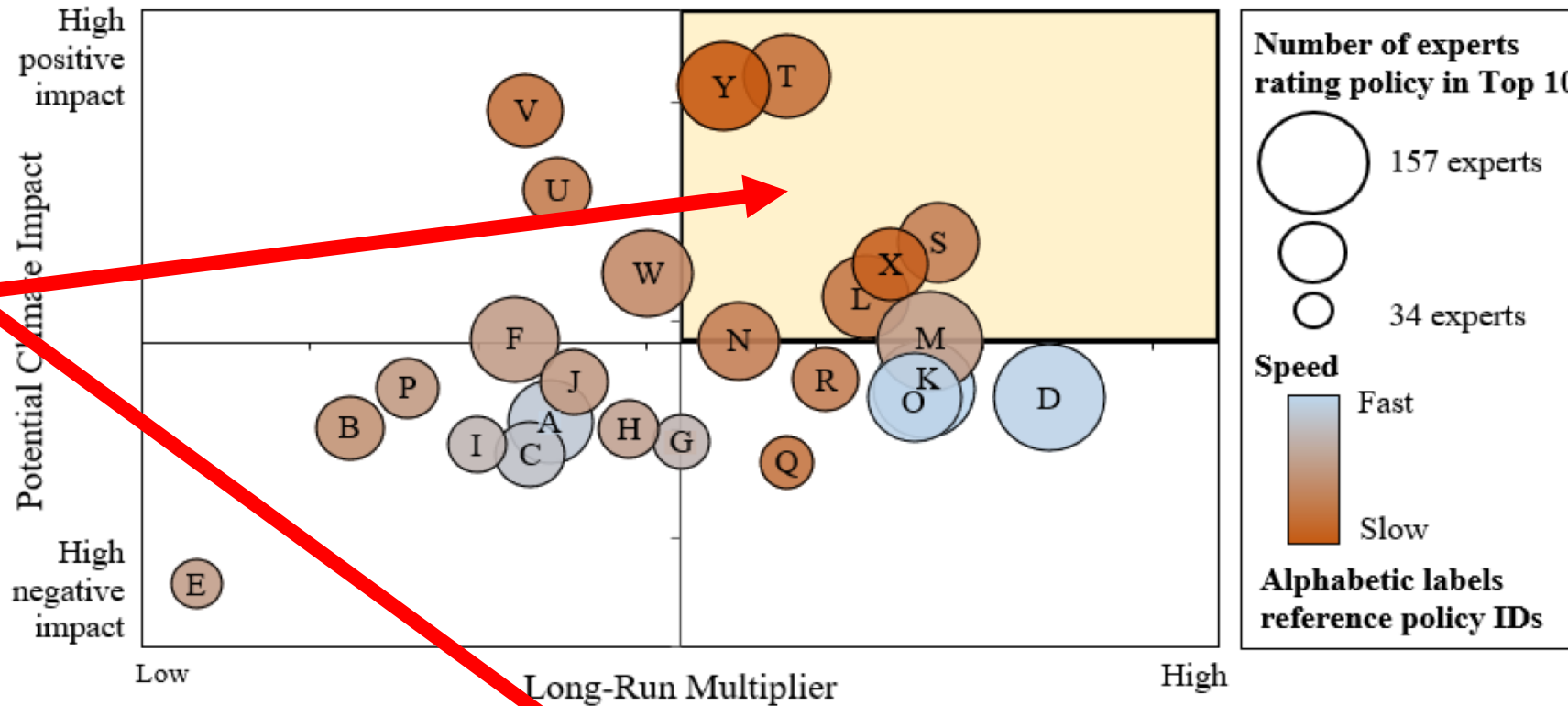


Finance can shape the post-Covid recovery



Multipliers and CC-impact of a "green" recovery according to experts

Financing policies / projects with high multiplier + high climate impact

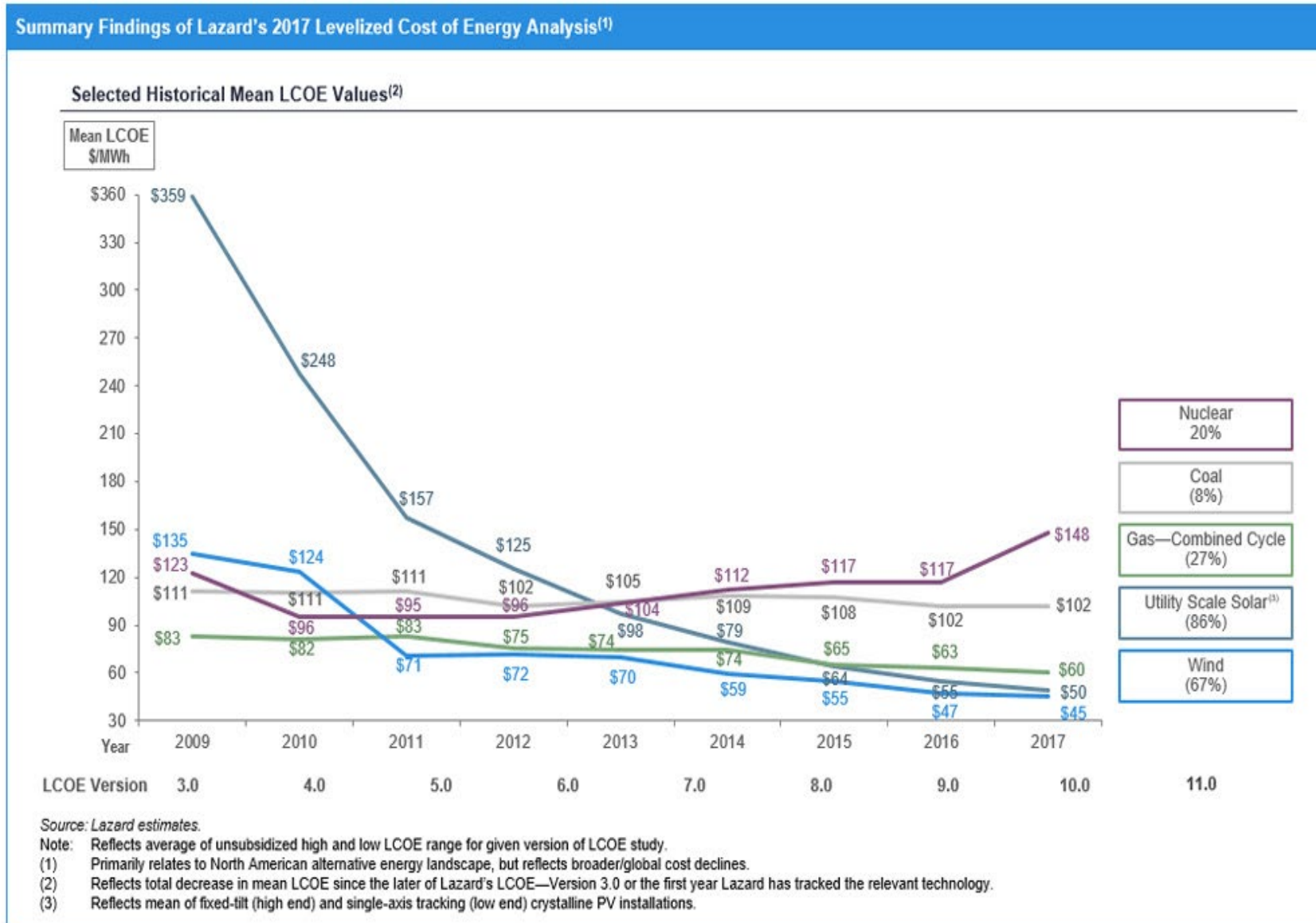


A	Temporary waiver of interest payments	N	Worker retraining
B	Assisted bankruptcy (super Chapter 11)	O	Targeted direct cash transfers or temporary wage increases
C	Liquidity support for large corporations	P	Rural support policies
D	Liquidity support for households, start-ups and SMEs	Q	Traditional transport infrastructure investment
E	Airline bailouts	R	Project-based local infrastructure grants
F	Not for profits, education, research, health inst. bailouts	S	Connectivity infrastructure investment
G	Reduction in VAT and other goods and services taxes	T	Clean energy infrastructure investment
H	Income tax cuts	U	Buildings upgrades (energy efficiency)
I	Business tax deferrals	V	Green spaces and natural infrastructure investment
J	Business tax relief for strategic and structural adj.	W	Disaster preparedness, capacity building
K	Direct provision of basic needs	X	General R&D spending
L	Education investment	Y	Clean R&D spending
M	Healthcare investment		

Never waste a crisis: the Stern-Stiglitz report provides opportunities for the private sector investment and financing:

Source: C Hepburn, B O'Callaghan, N Stern, J Stiglitz and D Zenghelis, "[Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change?](#)", *Oxford Review of Economic Policy*, no 36, S1, 4 May 2020.

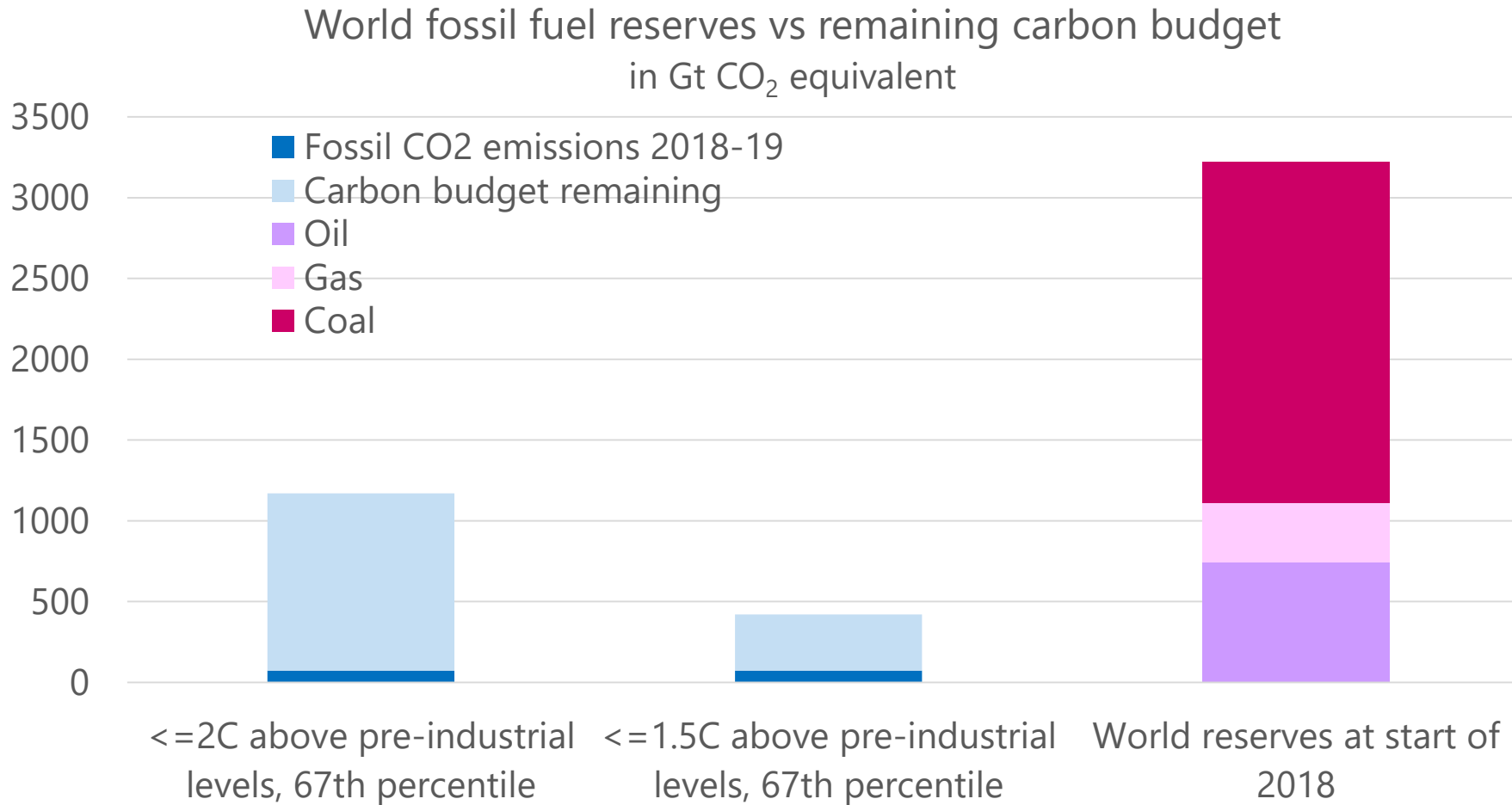
Research changing costs in energy production: a shifting to “renewable”...



- Key technologies like (i) natural gas per generation (ii) utility-scale wind and (iii) Utility-scale solar are now cheaper on a life time basis than a marginal cost of running nuclear or coal plants
- This is different from years ago
- They could be forced to retire
- Comparison with renewable will be more favorable outside of the US where natural gas is cheap.

Source: Lazard 2017 Levelized Cost of Energy Analysis, The levelized cost of energy (LCOE) is a measure of a power source that allows comparison of different methods of electricity generation on a consistent basis. The LCOE can also be regarded as the minimum constant price at which electricity must be sold in order to break even over the lifetime of the project.

Example: pricing of potential “stranded” assets still neglect change / enforcement of CC agreements or new regulation → potential financial instability



Much of the existing reserves would be potentially “un-burnable”, thus “stranded”

Sources: IPCC SR15 (2018); Global Carbon Project “Carbon Budget 2019”; BP Statistical Review of World Energy; EPA and EIA; author’s calculations

End