



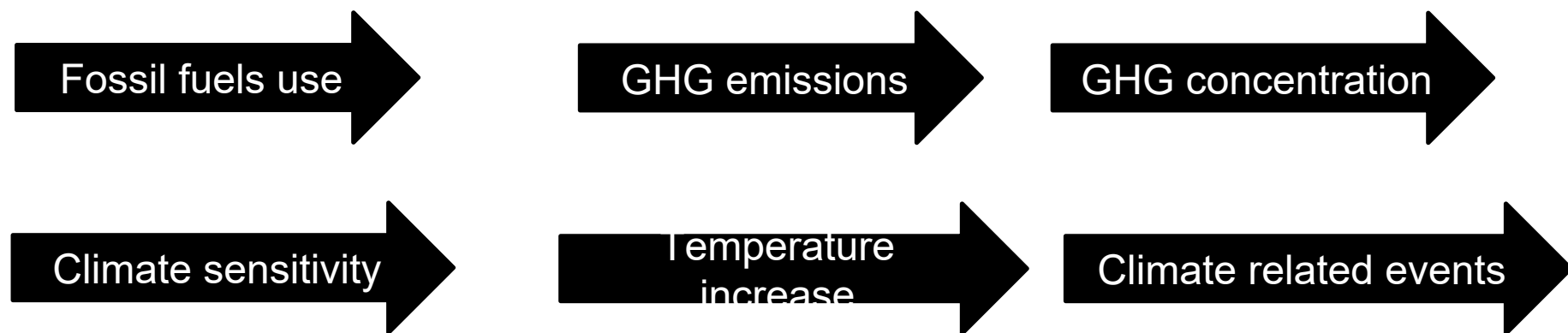
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Is climate change an issue for a central bank?

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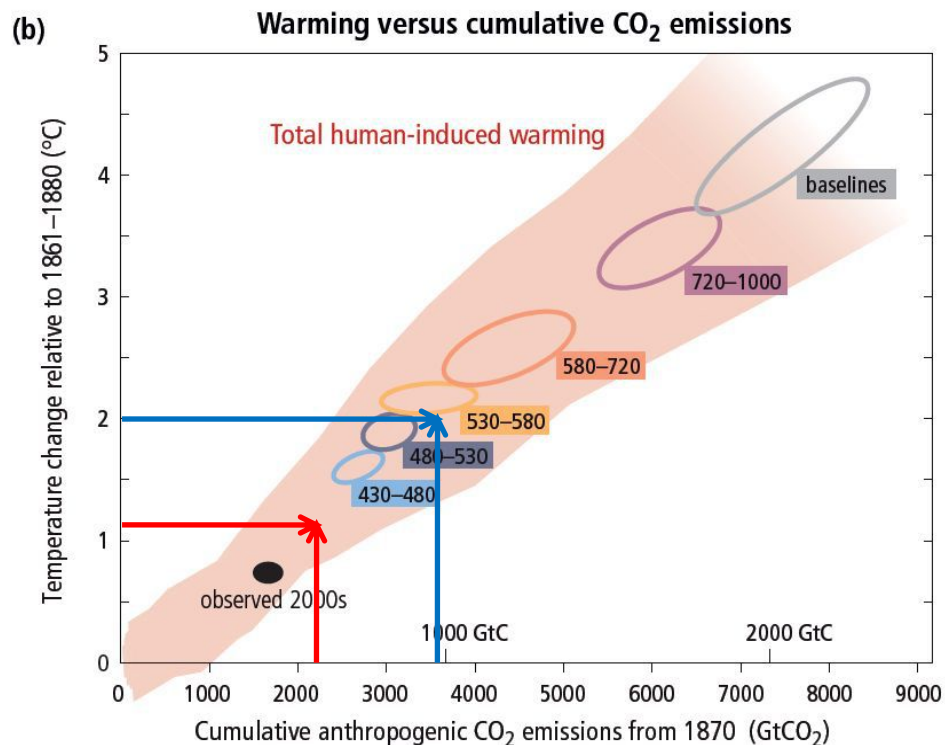
Is anthropogenic climate change an issue?



- **Climate is changing due to human-induced activities**, in particular as a consequence of fossil fuels (coal, oil, gas) use: energy-related emissions dominate total greenhouse gas (GHG) emissions.
- Temperatures depends on the concentration of GHG in the atmosphere that in turn depend on emissions (that accumulate in the atmosphere).
- It can be approximated that at the current emissions level GHG concentration - under 290 ppm in the last part of the nineteenth century – have been increasing by 2.1 ppm per year reaching 435 ppm in 2012.

How to achieve the 2°C/450 ppm target?

- **Stabilizing the atmospheric concentration of GHG at below 450 ppm of carbon-dioxide equivalent is consistent with a 50% chance of achieving the 2°C target.**
- In terms of emissions this implies that, at the global level, **from 2014 there is a carbon budget of 1.000 Gt of CO₂**: if more GHG are released in the atmosphere, concentration will increase thus reducing progressively the probability to achieve the 2°C target.
- At the current emission level (31.6 Gt in 2012) the budget will be exhausted by 2040, and GHG concentration would imply a trend in temperature increase of at least 3.5°C.

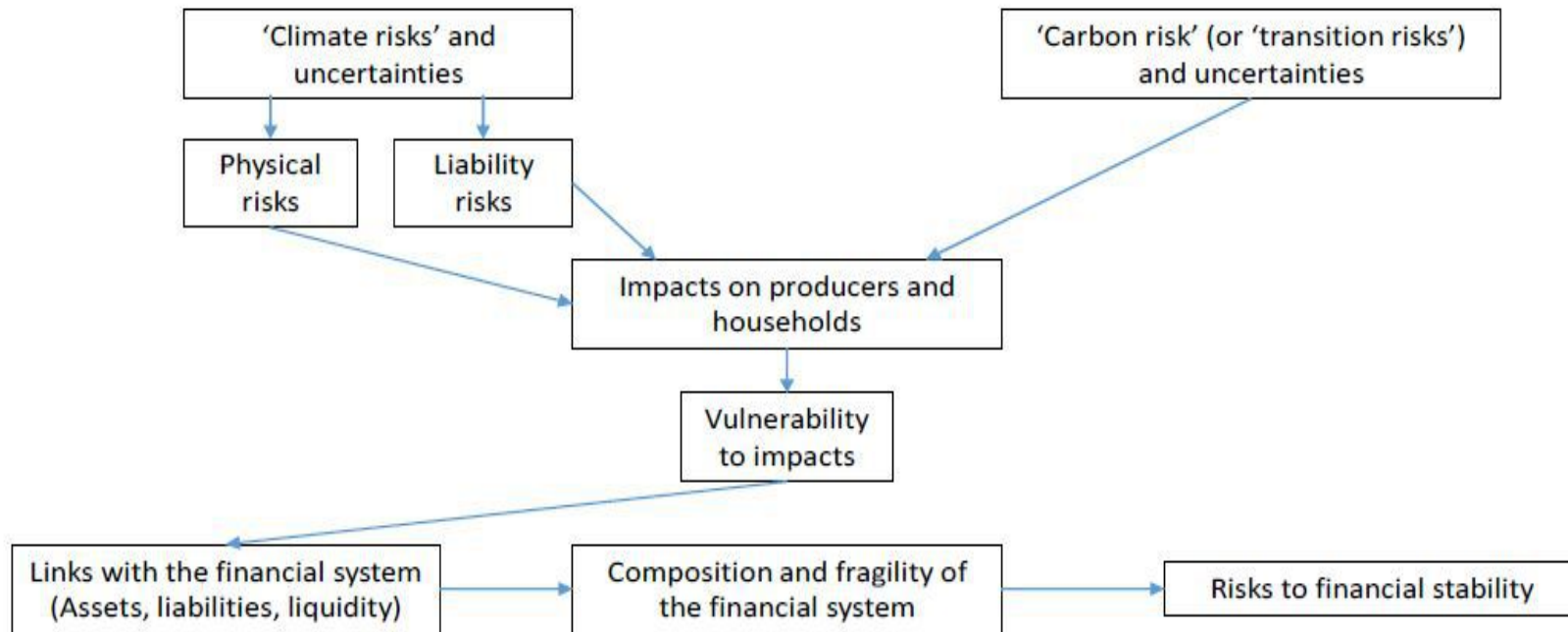


Carbon emissions generate climate risk

- The atmosphere's capacity to safely absorb emissions is limited
- From an economic perspective that capacity is a scarce resource that is being wasted (**sink**)
- Climate risk is a **risk management problem** that requires action: climate-risk disclosure and risk pricing are part of the solution

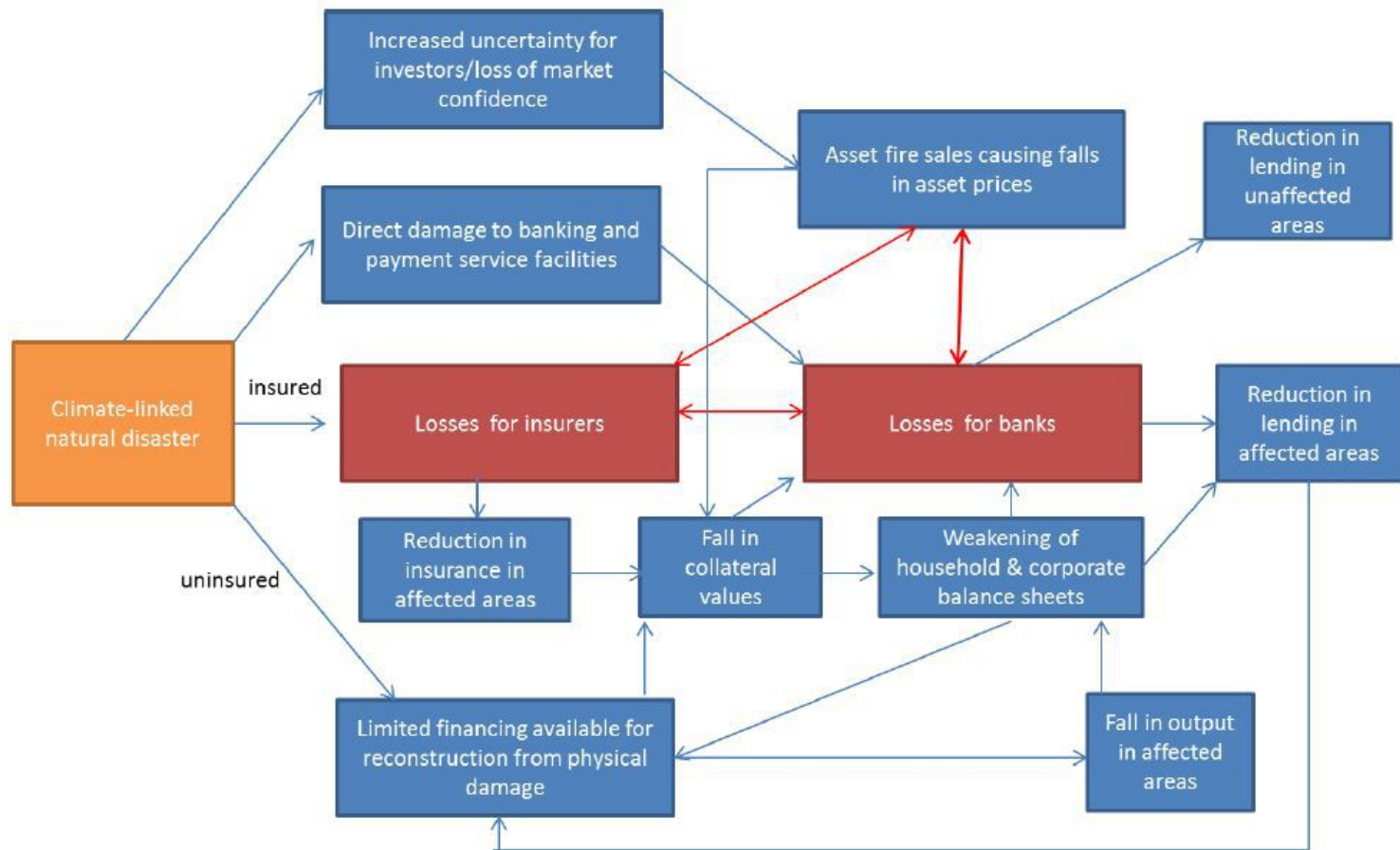
How climate risk is related to financial risk

1. **Physical risks**, direct (e.g. on property and casualties) and indirect (e.g. on economic activity) effects of climate-related events, such as floods and storms;
2. **Transition risks**, sudden devaluation of carbon-intensive financial assets or as a consequence of climate policies that aim at the decarbonization of the energy sector (e.g. “carbon bubble”);
3. **Liability risks**, insured parties having suffered loss from climate-related events seek to recover losses from insurance firms under third-party liability contracts (e.g. Tobacco, Asbestos, Deepwater horizon accident).



Source: Bowen and Dietz (2016)

Figure 2: A transmission map from a natural disaster to financial sector losses and the macroeconomy



Source: Batten et al (2016)



Transition risks and the carbon bubble: what is the value of fossil fuel reserves in the light of the 2°C target?

- In 2014, Bank of England Governor stated that **the vast majority of reserves are unburnable** if global temperature rises are to be limited to below 2°C.
- The concept of **unburnable carbon** has been first proposed by the Carbon Tracker initiative (www.carbontracker.org). If the international community is serious in pursuing the 2°C target , only a fraction of the fossil fuels reserves can be extracted and used. If the international community will show a serious commitment in curbing fossil fuels **all the remaining reserves will become useless**.
- According to Carbon Tracker calculation under a 2°C climate deal **an estimated 65-80% of listed energy companies' current reserves cannot be burnt; this would cost the fossil-fuel industry 28 trillion dollars of foregone revenues** over the next two decades, compared with business as usual.
- If exploring investments continues unchanged over the next decade, it would see up to 6.74 trillion dollars in wasted capital developing reserves that is likely to become unburnable (**stranded carbon assets**).



Is the carbon bubble bursting? The case of coal

