Climate change: what challenges and risks for central banks?

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Outline

● Growing evidence of increasing losses / costs due to climate change

● Risks will have systemic consequences for global economy, cascading and non-linear: Green Swans

● Carbon budget is limited, time to address risks is of the essence

● What challenges / risks for central banks
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

Natural disasters caused losses of more than $5.2 trillion since 1980, 70% uninsured. 30% of climate disaster damages insured over the past decade, insurance cies disbursed $135 billion but cumulative shortfall in covering damages of $1.3 trillion.
GHG emissions impact temperatures on where we could live → trigger complex new systemic risks

- **In the 2000s, 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.**

- **This is likely to cause massive migrations from these regions to Northern hemisphere**

- Groundswell, Preparing for internal climate migration, World Bank Group, 2018
- Internal displacement monitoring centre database 2017
Quantifying these physical and transition global risks is complex..... Mis-pricing is linked to ramifications of radical uncertainty.

Impacts on socioeconomic systems are multiple:

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

Source: Steffen et al. (2018)
Book on these Climate Change (CC) related risks called “Green Swans” i.e. very large global risks or global negative externalities; inspired but different from Nassim Taleb’s Black Swans of the Global Financial Crisis
GHGs emissions, after 5% fall due to Covid, are trending up again

- Global fossil CO$_2$ emissions: about 30-40 GtCO$_2$ per year projected from 2020, 61% over 1990
- Fossil CO$_2$ emissions will likely be more than 5% higher in 2021 than the year of the Paris Agreement in 2015

Source: Nature, Global Carbon Projects
Estimation of remaining carbon budgets from early 2020

<table>
<thead>
<tr>
<th>(1) to limit warming to...</th>
<th>(2) ... with a probability of ...</th>
<th>(3) there remains an available carbon budget of (in GtCO2):</th>
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<tbody>
<tr>
<td></td>
<td>17%</td>
<td>33%</td>
</tr>
<tr>
<td>+ 1.5 °C</td>
<td>900</td>
<td>650</td>
</tr>
<tr>
<td>+ 1.7 °C</td>
<td>1450</td>
<td>1050</td>
</tr>
<tr>
<td>+ 2.0 °C</td>
<td>2300</td>
<td>1700</td>
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</table>

As a reminder, total CO2 emissions have been around 40 Gt/year on average since 2015.

Source: Boissinot J, "La Finance Verte" (Dunod, 2002) based from data in GIEC, AR6, WG1 report (SPM).
How to implement trajectory to net zero emissions for remaining carbon budget

Given fixed Carbon Budget to keep 1.5C, (~300 GtCO2) time is of the essence

Carbon capture (avoid deforestation) and new technologies

Source: IPCC, Carbone4, Bolton et al
Challenges / Risks for central banks: transmission of CC-related risks into economic & financial systems → affect price and financial stability

- **Analytical challenge:** understand how financial stability risks transmit
  - **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.
Example: pricing of potential “exploitable” assets neglect potential change / enforcement of CC agreements or new regulation → potential financial instability

World fossil fuel reserves vs remaining carbon budget in Gt CO₂ equivalent

- Fossil CO2 emissions 2018-19
- Carbon budget remaining
- Oil
- Gas
- Coal

<=2°C above pre-industrial levels, 67th percentile
<=1.5°C above pre-industrial levels, 67th percentile
World reserves at start of 2018

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
Thank You