EUROPEAN CENTRAL BANK

EUROSYSTEM

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Climate change and financial risks. An introduction.

Florence, 29 November 2019

"… global warming is a source of significant financial risk and can jeopardise the stability of the entire financial system" Sabine Mauderer Member of the Executive Board of the Deutsche Bundesbank, July 2019

"*4°C warming makes the world uninsurable*" Thomas Buberl, Axa CEO, One Planet Summit – Axa, 12 December 2017, Boulogne-Billancourt, France

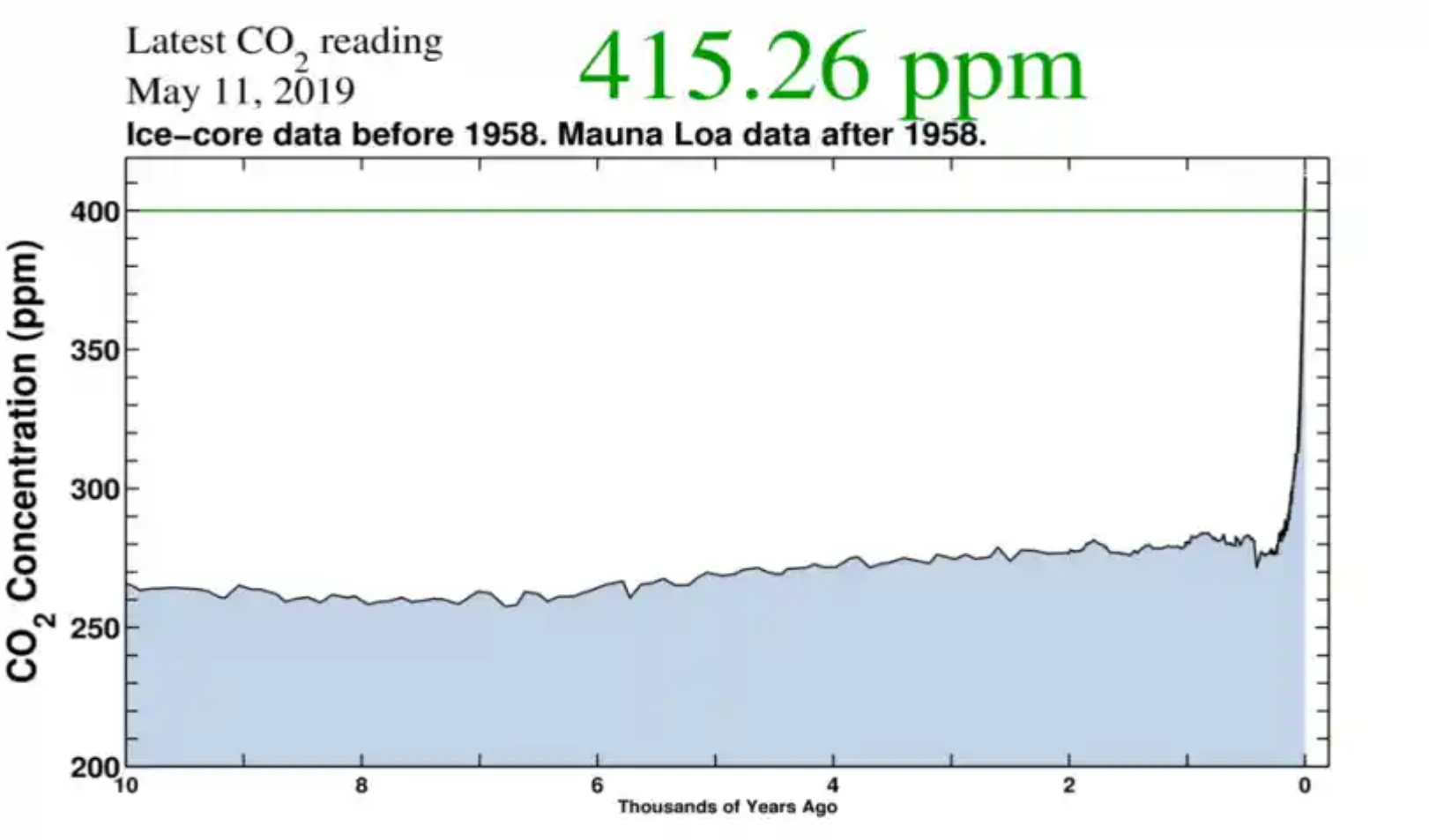
"*It is also part of our mandate for monetary policy because climate change affects price evolutions, affects the economic outlook…This is one of the most difficult shocks we central bankers have to deal with*" Francois Villeroy de Galhau, ECB Board member, speech to Amundi annual conference, June 2019.

"*Central banks need to understand better the impact of climatic events on output, labour markets and prices over the medium term. The disruption to economic activity and changes to the industrial composition are likely to be substantial*" Luis de Guindos, Vice-President of the ECB, at the European Savings and Retail Banking Group Conference, "Creating sustainable financial structures by putting citizens first"
Brussels, 21 November 2019

AGENDA

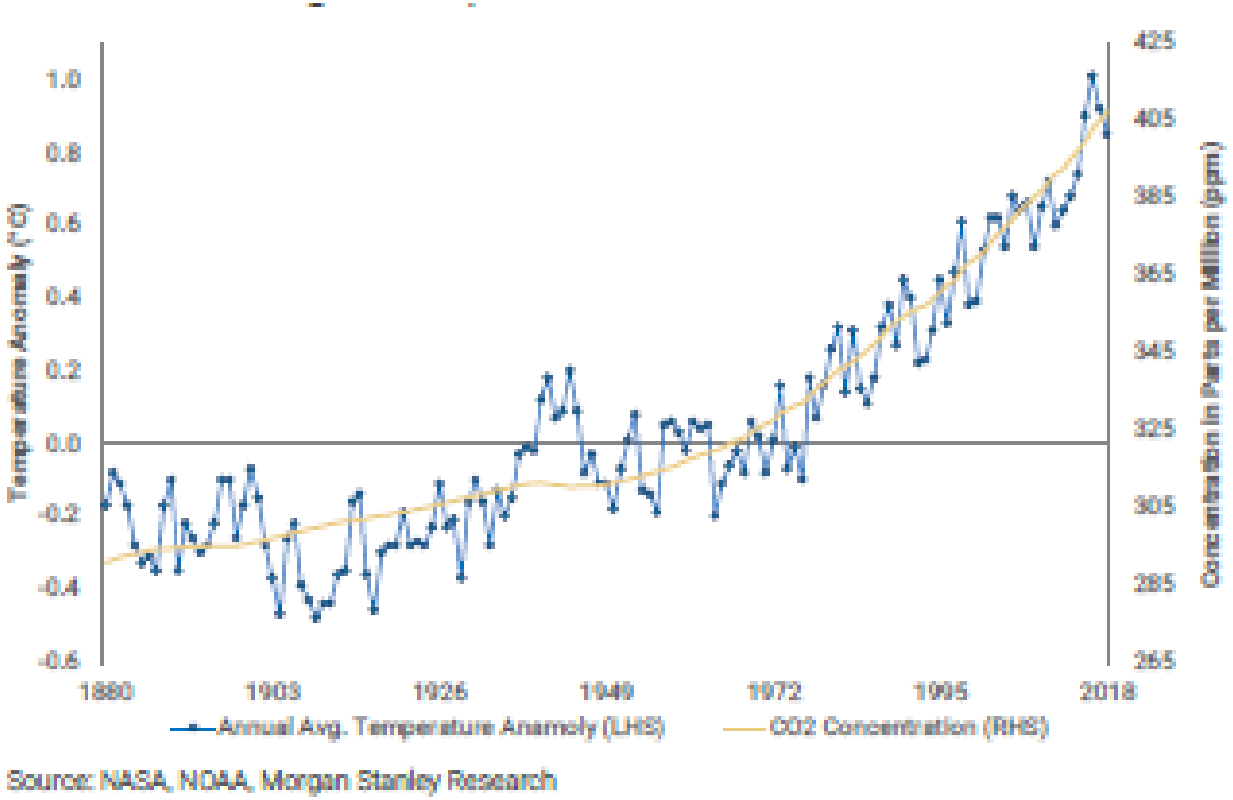
- **Climate change**
- Climate change impact on economy
- Climate risks and financial risks
- Policy initiatives

Climate change



- See also: Hsiang S. and R.E. Koop (2018), '*An economist's guide to climate change science*', Journal of Economic Perspectives 32(4), pp. 3–32.

Increases in atmospheric CO2 concentrations and higher temperature anomalies



Source: NASA, NOAA, Morgan Stanley Research

Morgan Stanley Research, “Sustainability Decarbonisation: The Race to Net Zero”, October 2019

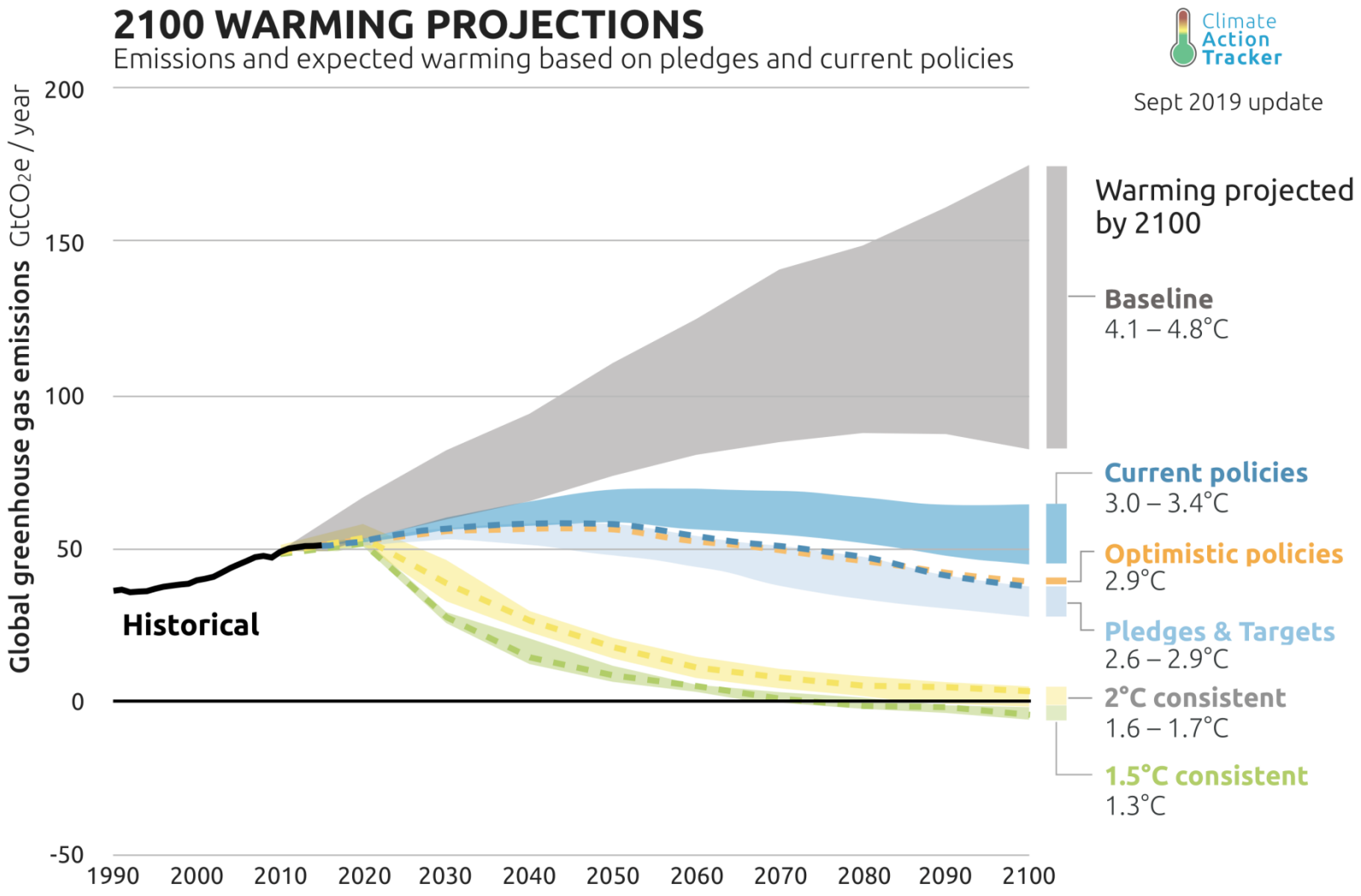
Climate change

- The **Intergovernmental Panel on Climate Change (IPCC)** has estimated human activities to have led to at least 1°C of global warming compared with pre-industrial times (https://www.ipcc.ch/sr15/).

- Without substantial mitigation of **greenhouse gas emissions (GHG)**, global temperatures are projected to rise by around 4°C above preindustrial levels by 2100, although there is substantial uncertainty about the precise estimates.

- The **Paris Agreement**, signed in December 2015, aims to limit the rise in global average temperatures to well below 2°C above pre-industrial levels and to pursue efforts to limit the rise to 1.5°C

Climate change

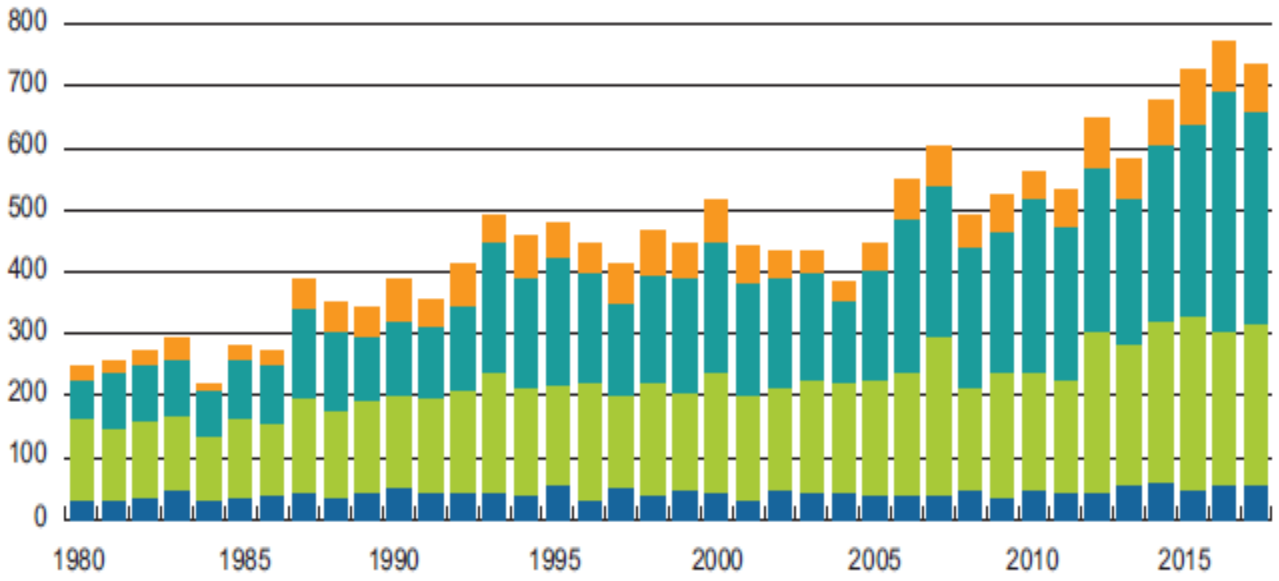


Source. CAT Emissions Gaps September 2019

Climate change

Exhibit 1

Climate-Related Events Have Been on the Rise



Geophysical events
(earthquake, tsunami, volcanic activity)

Hydrological events
(flood, mass movement)

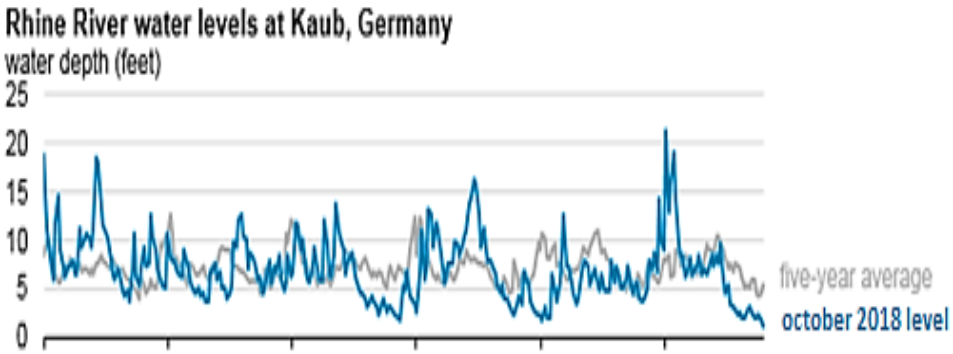
Meteorological events
(tropical, extratropical, convective or local storm)

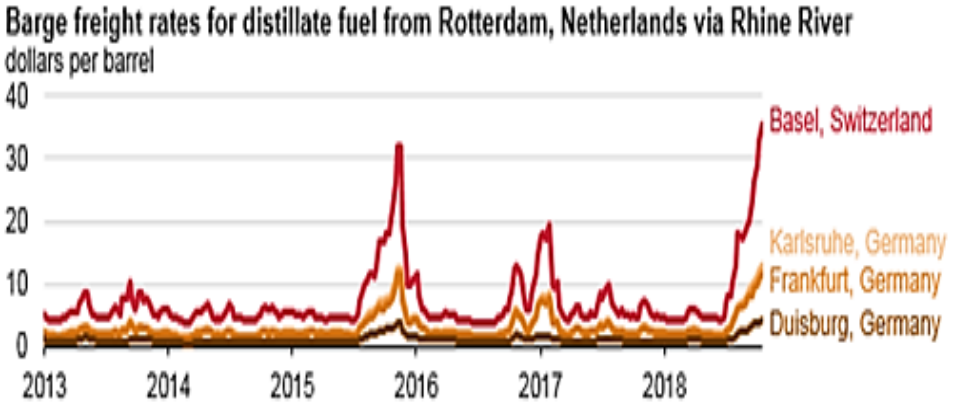
Climatological events
(extreme temperature, drought, wildfire)

Source: Munich Re, NatcatSERVICE (2017)

… and climate change at our doorstep …

e.g. Rhine river drought, Bingen, October 2018





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Climate change impacts on economy

Failure to act on climate change could result in catastrophic flooding, wildfires, mass migration, and destruction of biodiversity and … besides the social and environmental consequences, climate change **also affects the economy**.

Climate change is a negative side-effect of economic activity a '**negative externality**'.

This externality arises because the costs caused by the emission of CO2 and other greenhouse gases **are not borne by the emitters**, who **do not internalise** the effect of these emissions on the planet or on future generations.

This is a classic '**tragedy of the commons**' scenario: the atmosphere – a shared or 'common' resource that is available to us all but belongs to no one is being overexploited and degraded.

Impact on economy and prices

- Major structural change in the economy **with effects on growth & productivity**.
- **Direct impact** (e.g. agricultural yields and volatile weather patterns) may affect prices and inflation.
- **Indirect impact** via the broad demand and supply impacts (e.g. changes in energy mix, sectoral reallocation, etc.)
- **Taxation or market-based mechanisms** with direct impact on prices.

Climate change impacts on economy

- Various academic studies on the effects of climate change have tried to **quantify the impact that climate change can have on economies**.

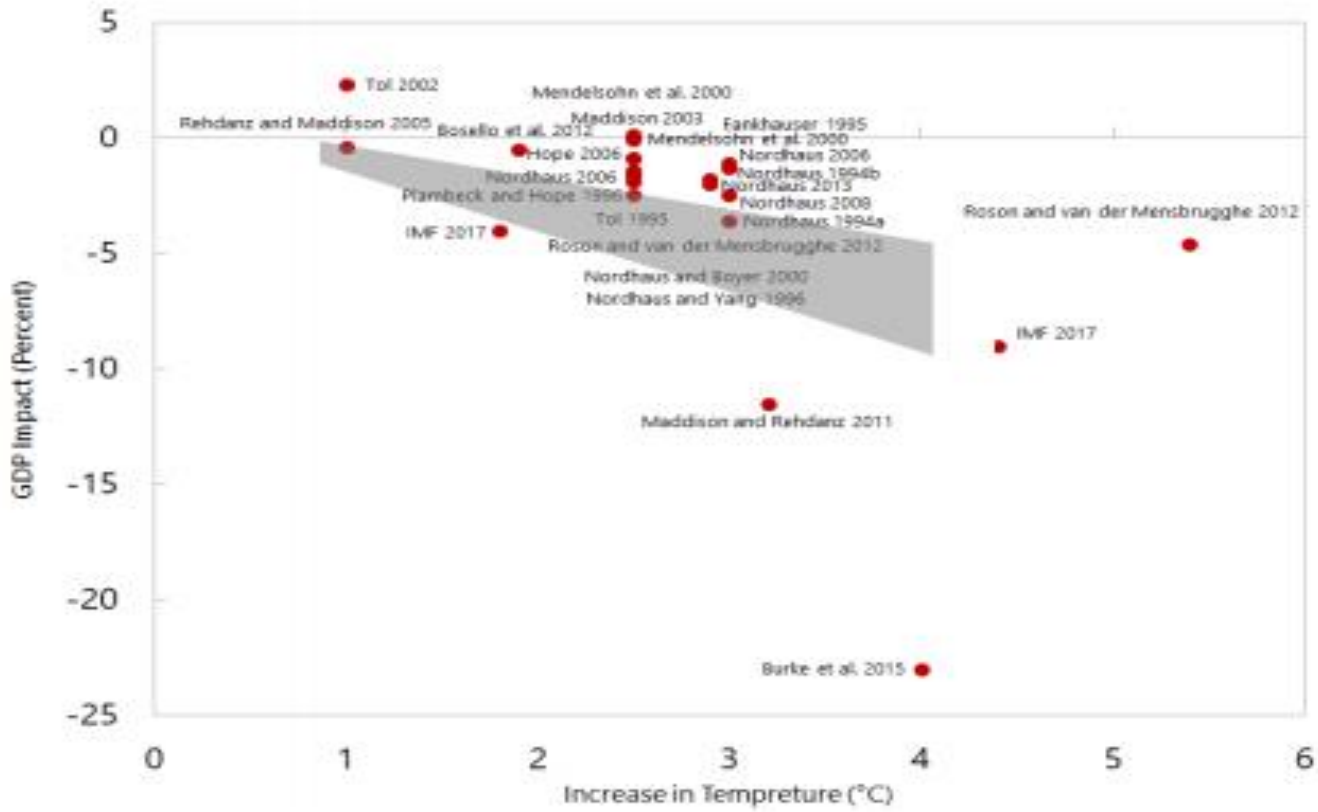
- These studies have utilized multiple approaches, and a survey of the recent literature suggests that the economic losses due to climate change can affect anywhere between 3-7% of global GDP over the long term, with most of these estimates running out to 2100 (*Morgan Stanley Research, "Sustainability Decarbonisation: The Race to Net Zero", October 2019*).

- Net economic consequences of different climate impacts **are projected to be unevenly distributed across regions**

The Economic Consequences of Climate Change, OECD (https://espas.secure.europarl.europa.eu/orbis/sites/default/files/generated/document/en/OECD%20Climate%20Change.pdf).

Impact on economic activity varies across different studies

Figure 2: GDP Impact of Increases in Temperature



"Long-Term Macroeconomic Effects of Climate Change: A Cross-Country Analysis", Matthew E. Kahn et al, Federal Reserve Bank of Dallas ,July 2019

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Climate-related risks are a source of financial risk

Climate-related risks.

Risks posed by the exposure of financial firms and/or the financial sector to physical or transition risks caused by or related to climate change (such as damage caused by extreme weather events or a decline of asset value in carbon-intensive sectors).

Climate-related risks are not the same of environment-related risks

Climate-related risks are a source of financial risk

Climate change is different from other sources of structural change affecting the financial system

- Far-reaching impact in breadth and magnitude
  - climate change will affect all agents in the economy, across sectors and geographies, and the risks will likely be correlated
- Foreseeable nature … but exact outcomes, time horizon and future pathway uncertain
- Irreversibility
  - there is currently no mature technology to reverse the process
- Dependency on short-term actions
  - the magnitude and nature of the future impacts will be determined by actions taken today

For a discussion of financial stability risks from climate change see Carney (2015); IMF (2016); European Systemic Risk Board (2016); Bank of England Prudential Regulatory Authority (2018); European Central Bank (2019); Lane (2019); and Network for Greening the Financial System (2019).

Two main channels of transmission of climate-related risks

Climate-related risks

Physical risk
includes the economic costs and financial losses resulting from the increasing severity and frequency of extreme climate change-related weather events

Transition risk
results from the uncertainties related to the timing and speed of the adjustment towards a low-carbon economy, prompted for example by changes in climate policy, technology or market sentiment

- Credit risk (increased PDs and LGDs, collateral ..)
- Market risk
- Operational risk
- Reputational risk
- Liquidity risk
- Insurance risk

Physical risk

- Physical risks arise from climate- and weather-related events, such as droughts, floods, storms and sea-level rise and from progressive shifts in climate and weather patterns such as increasing temperatures.

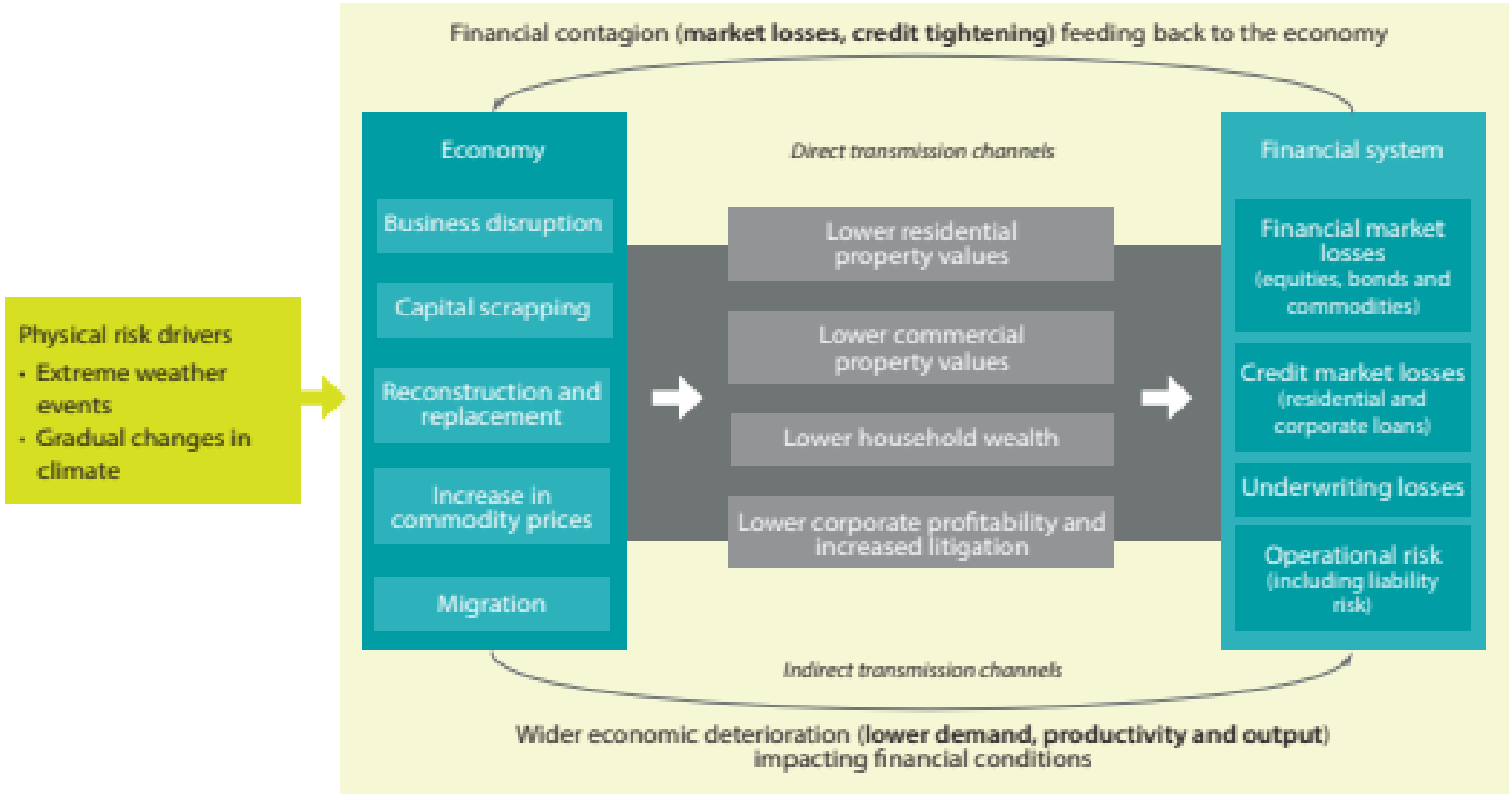
- They comprise direct impacts from such as damage to property or reduced productivity, and also those that may arise indirectly through subsequent events, such as the disruption of global supply chains.

- Physical risks can potentially result in large financial losses that can have micro as well as wider systemic impacts. Financial institutions can be affected by physical risk directly, for instance by reduced value of assets and collateral, increasing insured damages, or by disrupting their own business operations.

- If losses are insured, they can directly affect insurance firms through higher claims. If losses are uninsured, the burden can fall on households, corporates and states. This can impair asset values, for example through increasing sovereign risk, and reduce the value of investments held by financial institutions

Physical risk

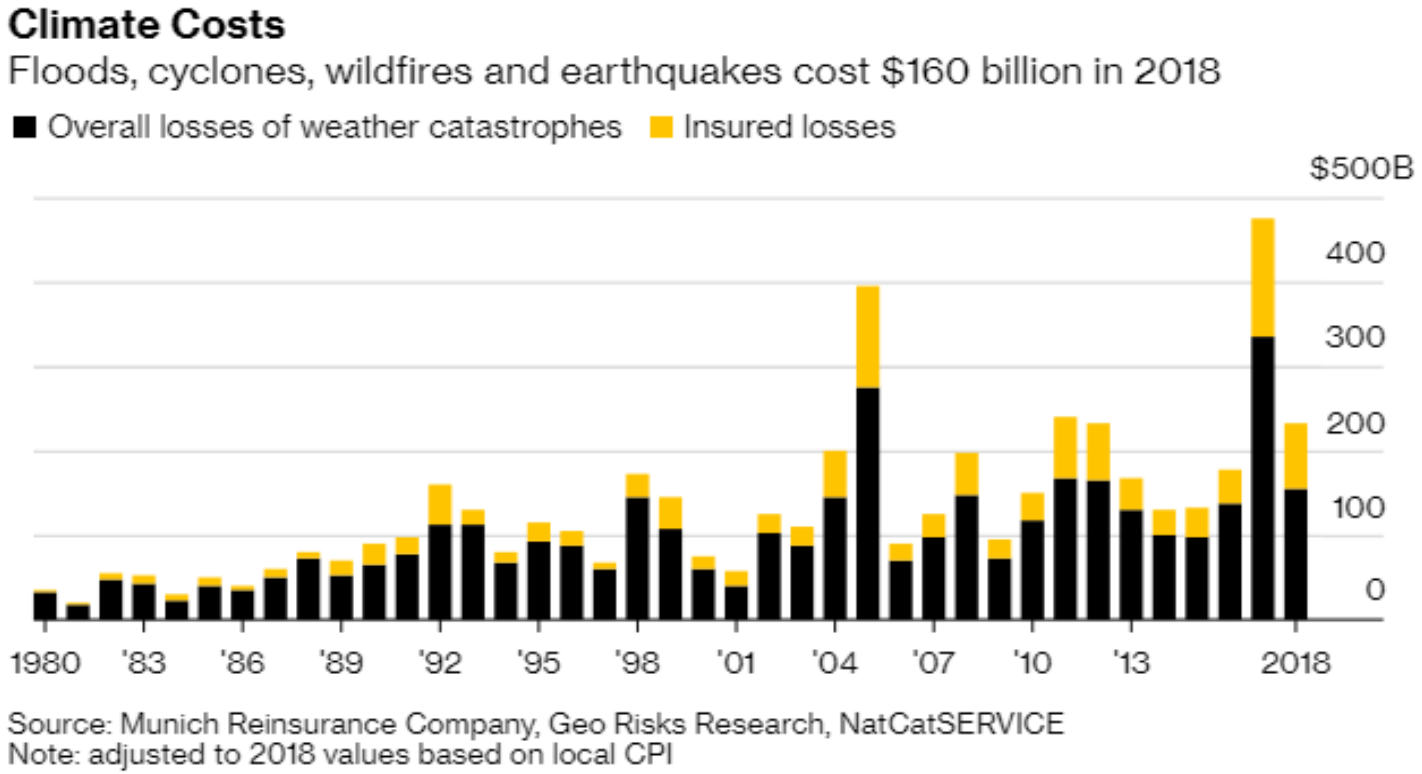
From physical risk to financial stability risks



https://www.banque-france.fr/sites/default/files/media/2019/04/17/ngfs_first_comprehensive_report_-_17042019_0.pdf

Physical risk

Insurance liabilities are particularly exposed to an increased frequency and severity of climate and weather-related events that damage property or disrupt trade



https://www.bloomberg.com/news/articles/2019-09-23/no-laughing-matter-how-climate-change-is-scaring-central-banks

Physical risk

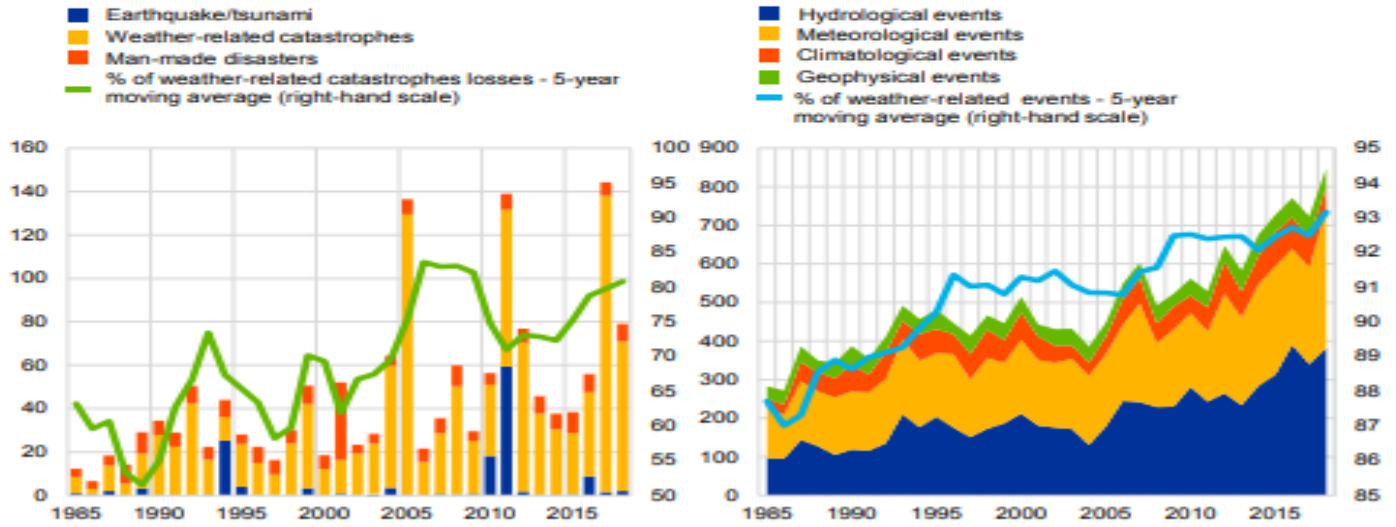
Insurance liabilities are particularly exposed to an increased frequency and severity of climate and weather-related events that damage property or disrupt trade

Chart A.1

Physical risk: weather-related insured losses and the number of natural loss events are increasing

Global insured catastrophe losses (left panel) and number of relevant natural loss events worldwide (right panel)

(1985-2018; left panel: left-hand scale: USD billions; right-hand scale: percentages; right panel: left-hand scale: number of events; right-hand scale: percentages)



Sources: Swiss Re Institute, Munich Re NatCatService and ECB calculations.

https://www.ecb.europa.eu/pub/pdf/fsr/ecb.fsr201905~266e856634.en.pdf

Transition risk

- Transition risk materialises when mitigation policies, technological advances or changes in public sentiment lead to value reassessments by financial market participants, possibly in an abrupt manner.

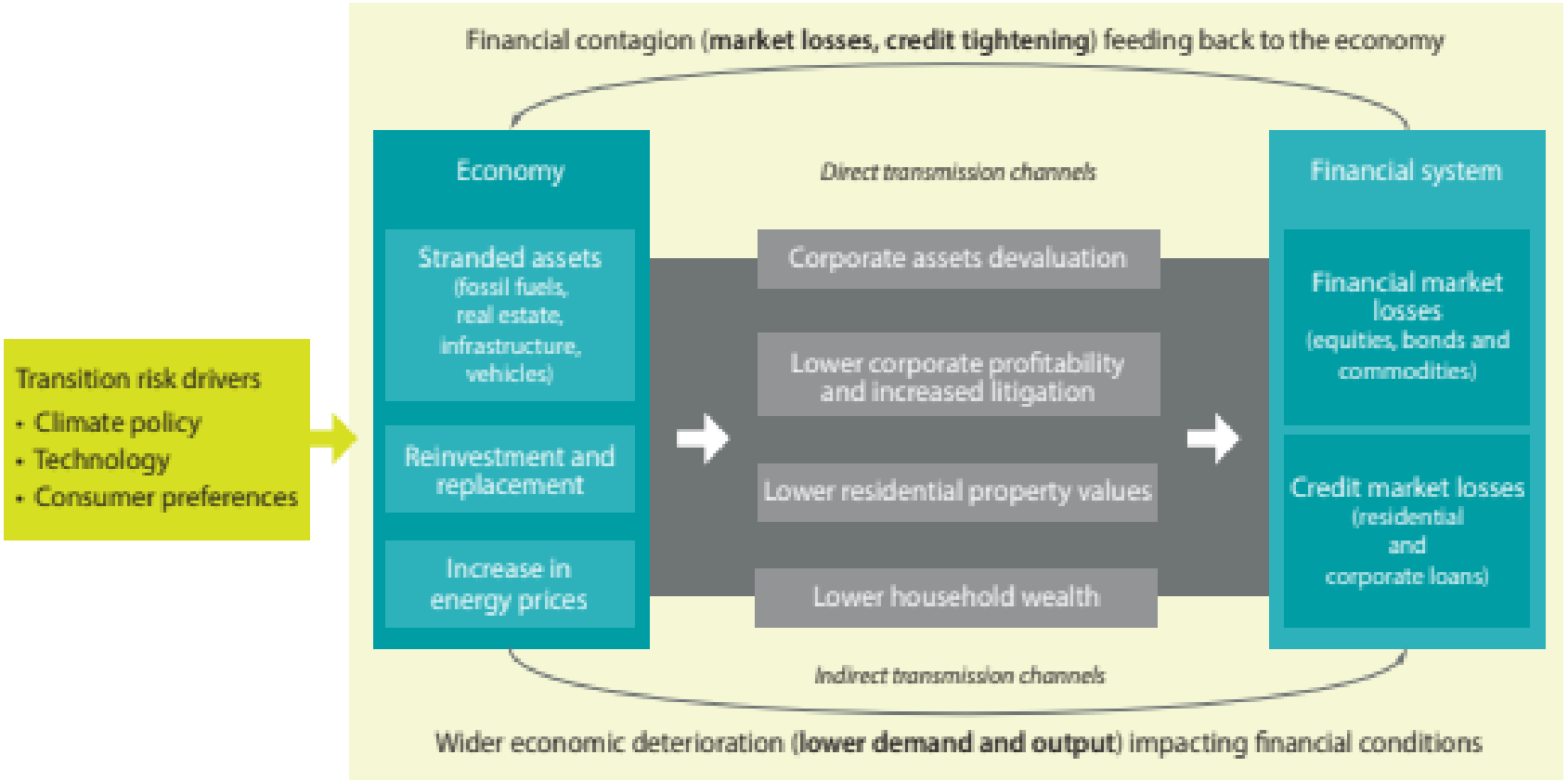
- The potential risks from the transition are greatest in scenarios where the redirection of capital and policy measures such as the introduction of a carbon tax occur in an unexpected or otherwise disorderly way.

  - Market risk. An unanticipated introduction of policy measures or a rapid change in consumer preferences could trigger abrupt asset price decreases for the affected firms and sectors.
  - Credit risk could increase if policies, market reactions or the impact of new technologies lead to lower profitability and higher default risks for carbon-intensive firms, and ultimately to higher capital charges and risk weights for bank exposures.
  - Sovereign risks could increase for countries with carbon-intensive industries.

https://www.ecb.europa.eu/pub/pdf/fsr/ecb.fsr201905~266e856634.en.pdf

Transition risk

From transition risk to financial stability risks



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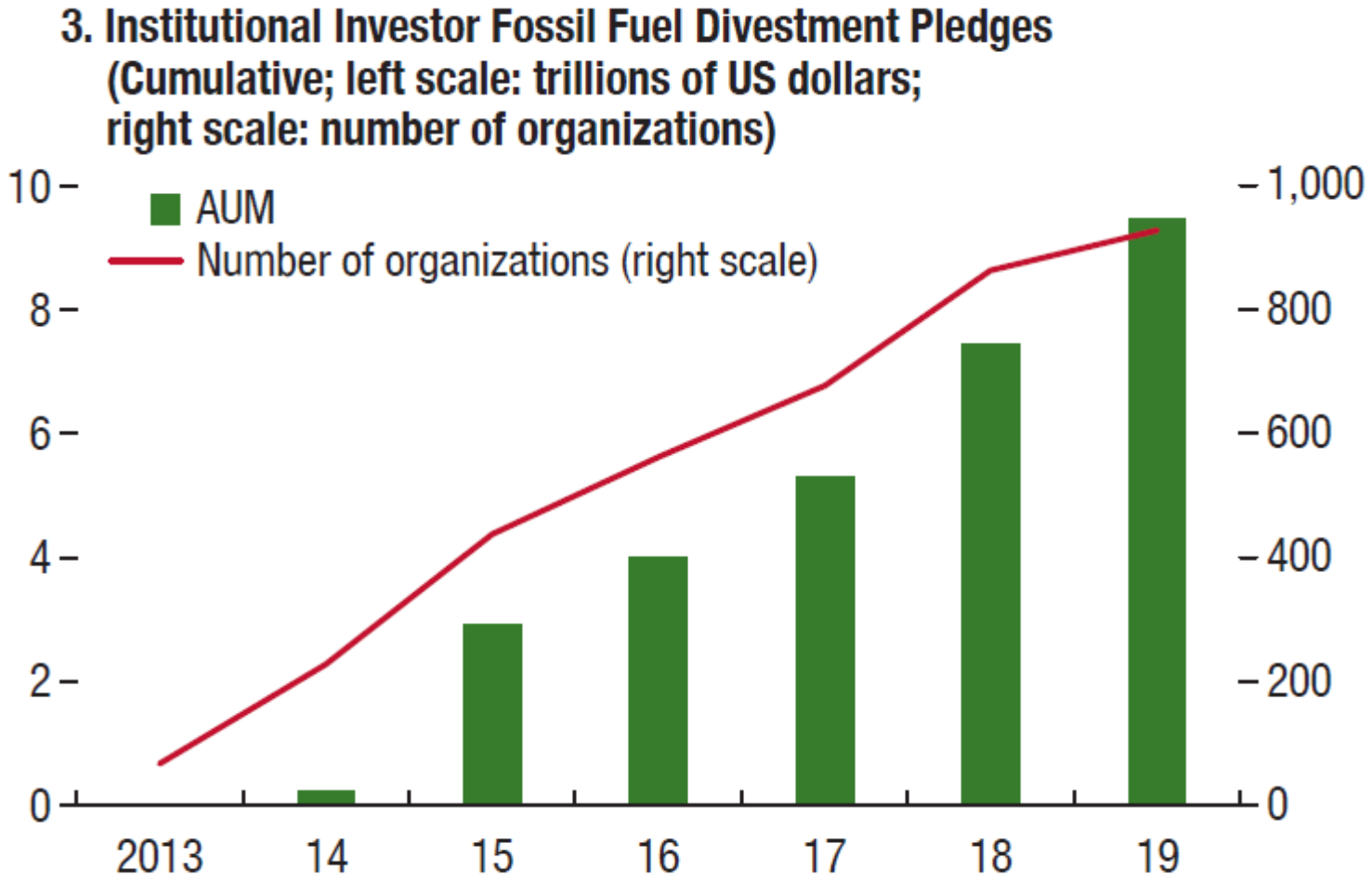
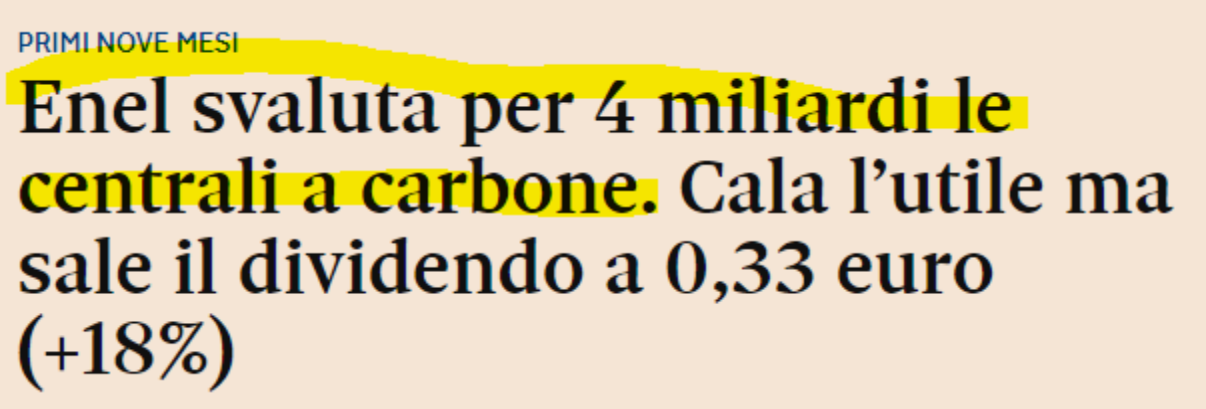
Transition risk



https://www.imf.org/en/Publications/GFSR/Issues/2019/10/01/global-financial-stability-report-october-2019#Chapter6

Transition risk

Il Sole24Ore 13 Novembre 2019



PRIMI NOVE MESI

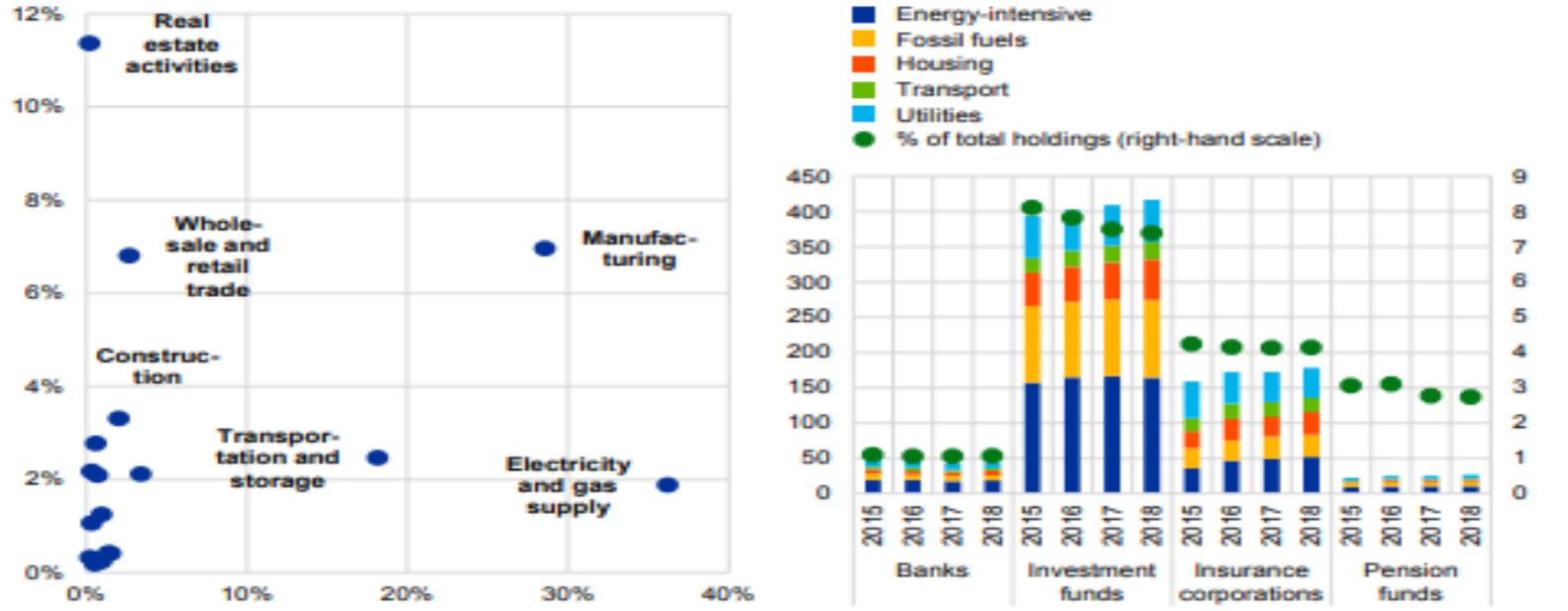
Enel svaluta per 4 miliardi le centrali a carbone. Cala l'utile ma sale il dividendo a 0,33 euro (+18%)

https://www.ilsole24ore.com/art/enel-l-utile-scende-813-milioni-la-svalutazione-impianti-carbone-ACeNdTy?fromSearch

Transition risk

Euro area banks' exposures and sectoral contributions to carbon emissions (left panel); evolution of investment exposures to climate-sensitive sectors (by issuer sector) (right panel)

(left panel: percentages; x-axis: sectoral contributions to total carbon emissions; y-axis: bank exposures (as a share of total exposures); right panel: Dec. 2015-Dec. 2018; left-hand scale: € billions; right-hand scale: percentage of total holdings)



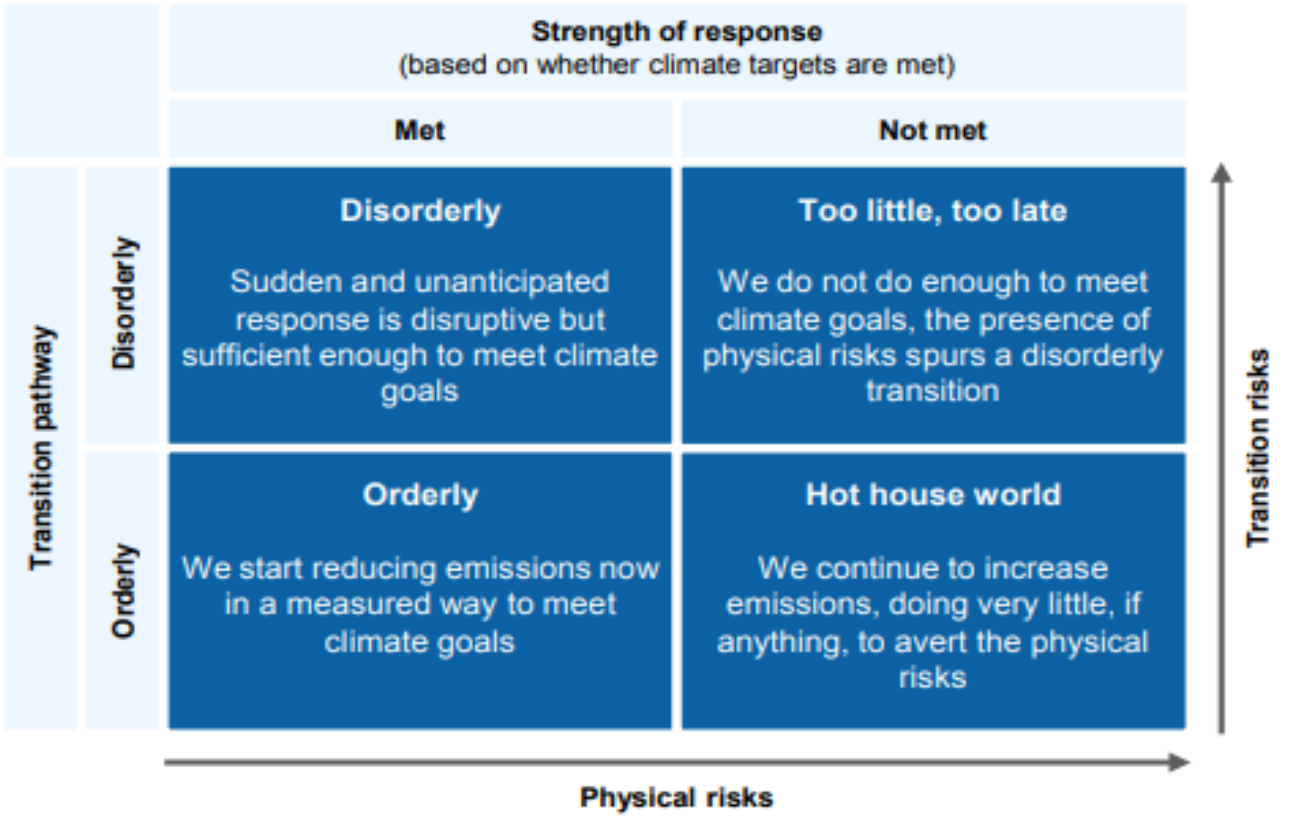
Sources: ECB supervisory statistics, European Commission EDGAR dataset, Eurostat, ECB SHSS, ECB CSDB and ECB calculations.
Notes: Left panel: the share of carbon emissions is calculated from Eurostat data on air emissions accounts by NACE activity, which cover the EU28, Turkey and Serbia. Electricity and gas supply also includes steam and air conditioning supply. Right panel: the classification of climate-sensitive assets follows the approach of Battiston et al. (2017). Sectoral holdings are classified according to the NACE categorisation in the ECB's Centralised Securities Database (CSDB).

https://www.ecb.europa.eu/pub/pdf/fsr/ecb.fsr201905~266e856634.en.pdf

Physical and transition risk

The impact of the transition risk may depend on the **timing** as well as the **speed** of the transition (early versus delayed transition and/or gradual versus abrupt transition.

Physical versus transition risks: temperature scenarios and the cost of climate change



Network for Greening the Financial System
"A call for action Climate change as a source of financial risk", April 2019

SPEECH

Implications of the transition to a low-carbon economy for the euro area financial system

Speech by Luis de Guindos, Vice-President of the ECB, at the European Savings and Retail Banking Group Conference, "Creating sustainable financial structures by putting citizens first"

Brussels, 21 November 2019

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Policy initiatives related to climate risk

- Network for Greening the Financial System (NGFS)
- European Commission Sustainable Finance Action Plan
- FSB Task Force on Climate-related Financial Disclosures
- IOSCO Sustainable Finance Network

The Network for Greening the Financial System

At the Paris "**One Planet Summit**" in December 2017, eight central banks and supervisors established the Network of Central Banks and Supervisors for Greening the Financial System (NGFS). Since then, the membership of the Network has grown dramatically, across the five continents.

As of October 15th 2019, the NGFS consists of 48 members and 10 observers.

https://www.ngfs.net/en/about-us/membership

Purpose of the Network for Greening the Financial System

The Network's purpose is to help strengthening the global response required to meet the goals of the Paris agreement and to enhance the role of the financial system to manage risks and to mobilize capital for green and low-carbon investments in the broader context of environmentally sustainable development. To this end, the Network defines and promotes best practices to be implemented within and outside of the Membership of the NGFS and conducts or commissions analytical work on green finance.

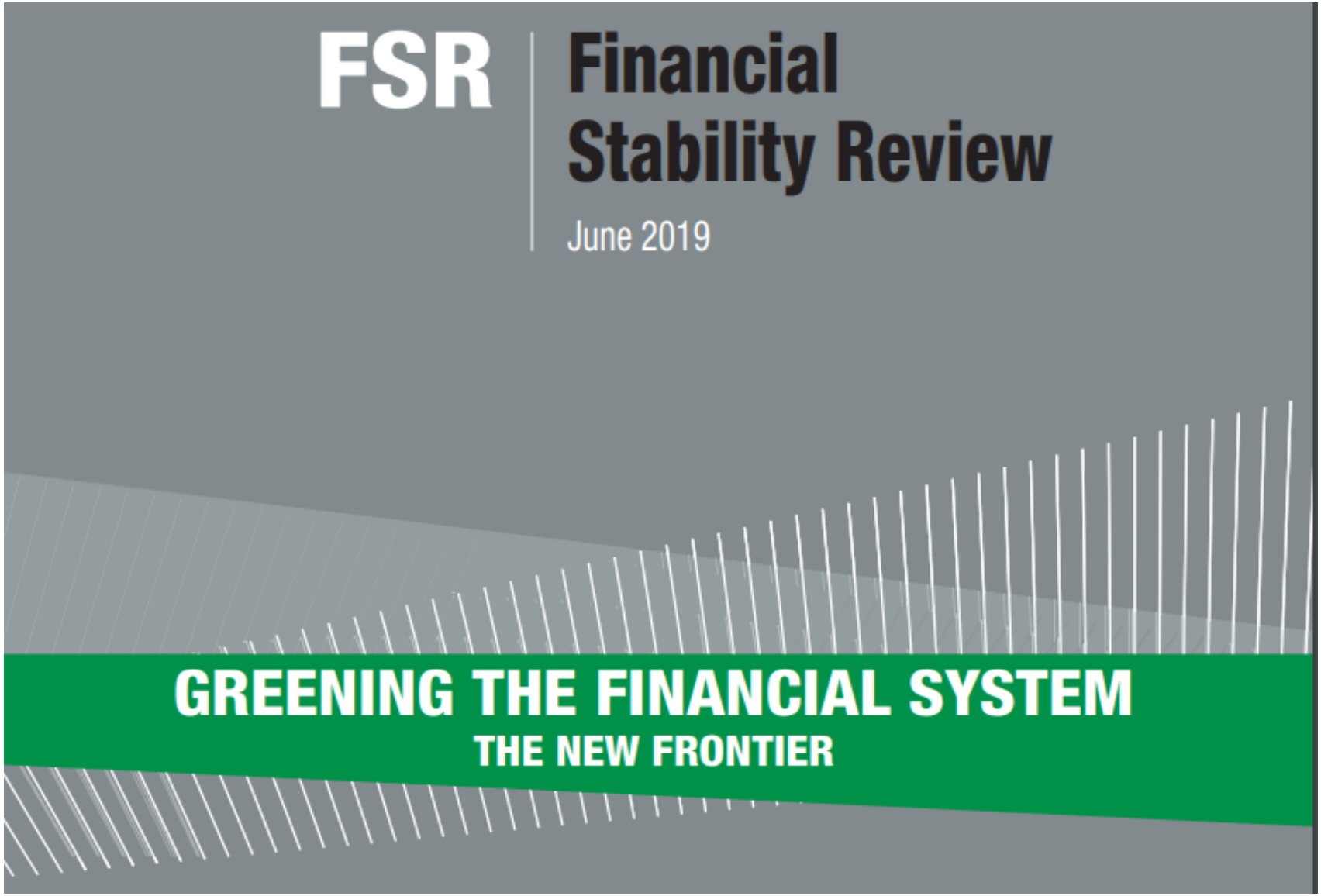
Policy initiatives related to climate risk

Network for Greening the Financial System
"Climate change as a source of financial risk", April 2019

https://www.ngfs.net/sites/default/files/medias/documents/ngfs_first_comprehensive_report_-_17042019_0.pdf

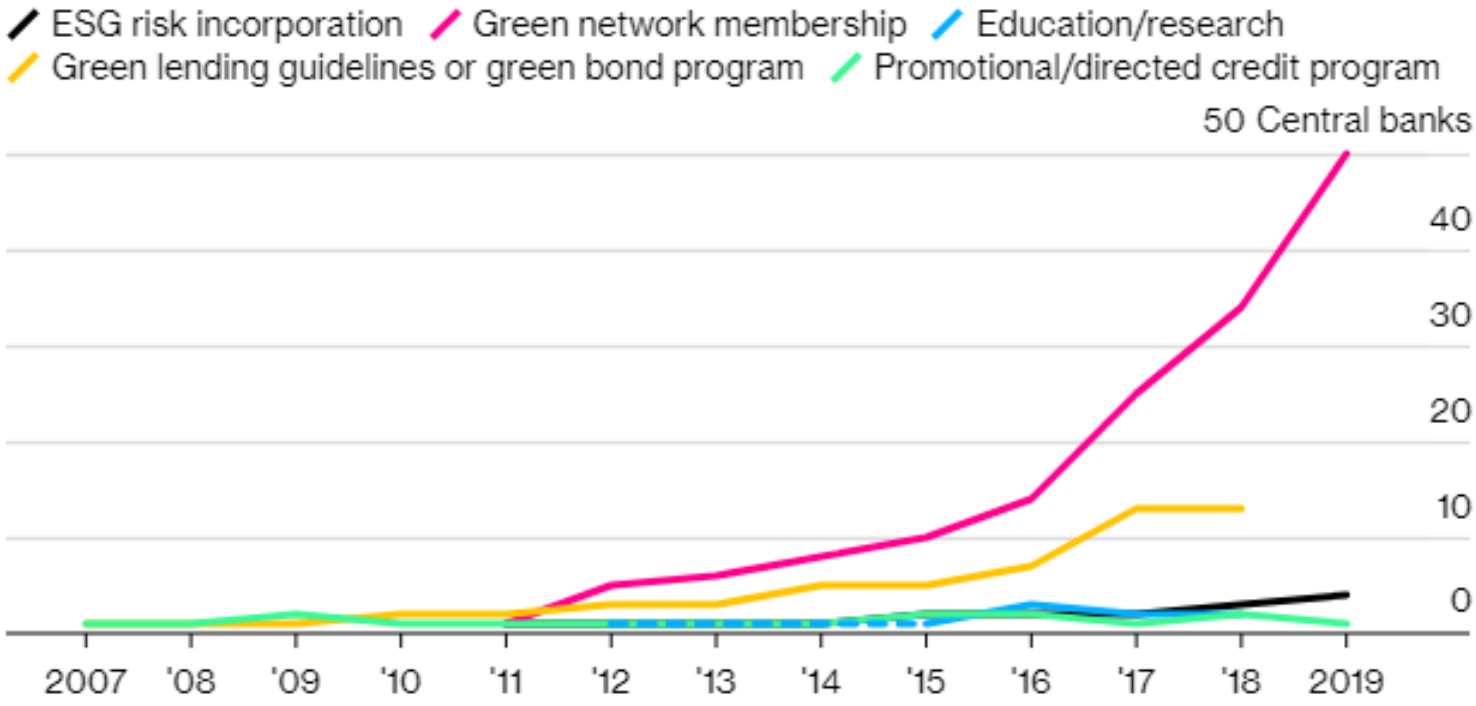
Six recommendations for central banks, supervisors, policymakers and financial institutions to enhance their role in the greening of the financial system and the managing of environment and climate-related risks

1. Integrating climate-related risks into financial stability monitoring and micro-supervision
2. Integrating sustainability factors into own-portfolio management
3. Bridging the data gaps
4. Building awareness and intellectual capacity and encouraging technical assistance and knowledge sharing
5. Achieving robust and internationally consistent climate and environment-related disclosure
6. Supporting the development of a taxonomy of economic activities


FSR
Financial
Stability Review
June 2019
GREENING THE FINANCIAL SYSTEM
THE NEW FRONTIER

A Climate of Change

Central banks are starting to take the environment into account



Source: SOAS, IMF and central banks
Note: Shows number of central banks that have adopted "green" activities, by type

https://www.bloomberg.com/news/articles/2019-09-23/no-laughing-matter-how-climate-change-is-scaring-central-banks

Policy initiatives related to climate risk

- The **Financial Stability Board's Task Force on Climate-related Financial Disclosures (the FSB TCFD)** highlighted the need for comparable and consistent disclosures about the risks and opportunities of climate change, and issued recommendations to this effect.

- The most recent status report says that 785 organisations, of which 374 are in the financial sector, have committed to support the TCFD recommendations (though disclosure is still insufficient with only 25% of companies reporting on five or more of the 11 recommended disclosures)
  - https://www.fsb-tcfd.org/wp-content/uploads/2019/06/2019-TCFD-Status-Report-FINAL-053119.pdf

Policy initiatives related to climate risk

- The **securities and exchanges regulators (IOSCO)** have established a **sustainable finance network**. The network is kicking off work by undertaking a stock take on current actions by members especially on standards for ESG disclosures recommended by regulators.

- IOSCO, Final report, Sustainable finance in emerging markets and the role of securities regulators, June 2019
  - https://www.iosco.org/news/pdf/IOSCONEWS534.pdf

European Commission Sustainable Finance Action Plan

https://ec.europa.eu/info/business-economy-euro/banking-and-finance/green-finance_en#action-plan

In May 2018, the Commission adopted measures implementing several key actions announced in its **plan on sustainable finance**. The package includes:

- ✓ A proposal for a regulation on the establishment of a framework to facilitate sustainable investment (taxonomy regulation).
- ✓ A proposal for a regulation on disclosures relating to sustainable investments and sustainability risks and amending Directive (EU)2016/2341.
- ✓ A proposal for a regulation amending the benchmark regulation.

EU taxonomy for sustainable activities

https://ec.europa.eu/info/publications/sustainable-finance-teg-taxonomy_en

In order to inform its work on the action plan, the European Commission established a Technical Expert Group (TEG) on sustainable finance. Action 1 of the action plan calls for the establishment of an EU classification system for sustainable activities, i.e. an EU taxonomy.

The European Commission followed through on this action in May 2018 with a proposal for a regulation on the establishment of a framework to facilitate sustainable investment (**taxonomy regulation**).

Premium slide!!!!

Ralph De Haas, Alexander Popov, "Finance and carbon emissions"
ECB Working Paper Series, No 2318 / September 2019

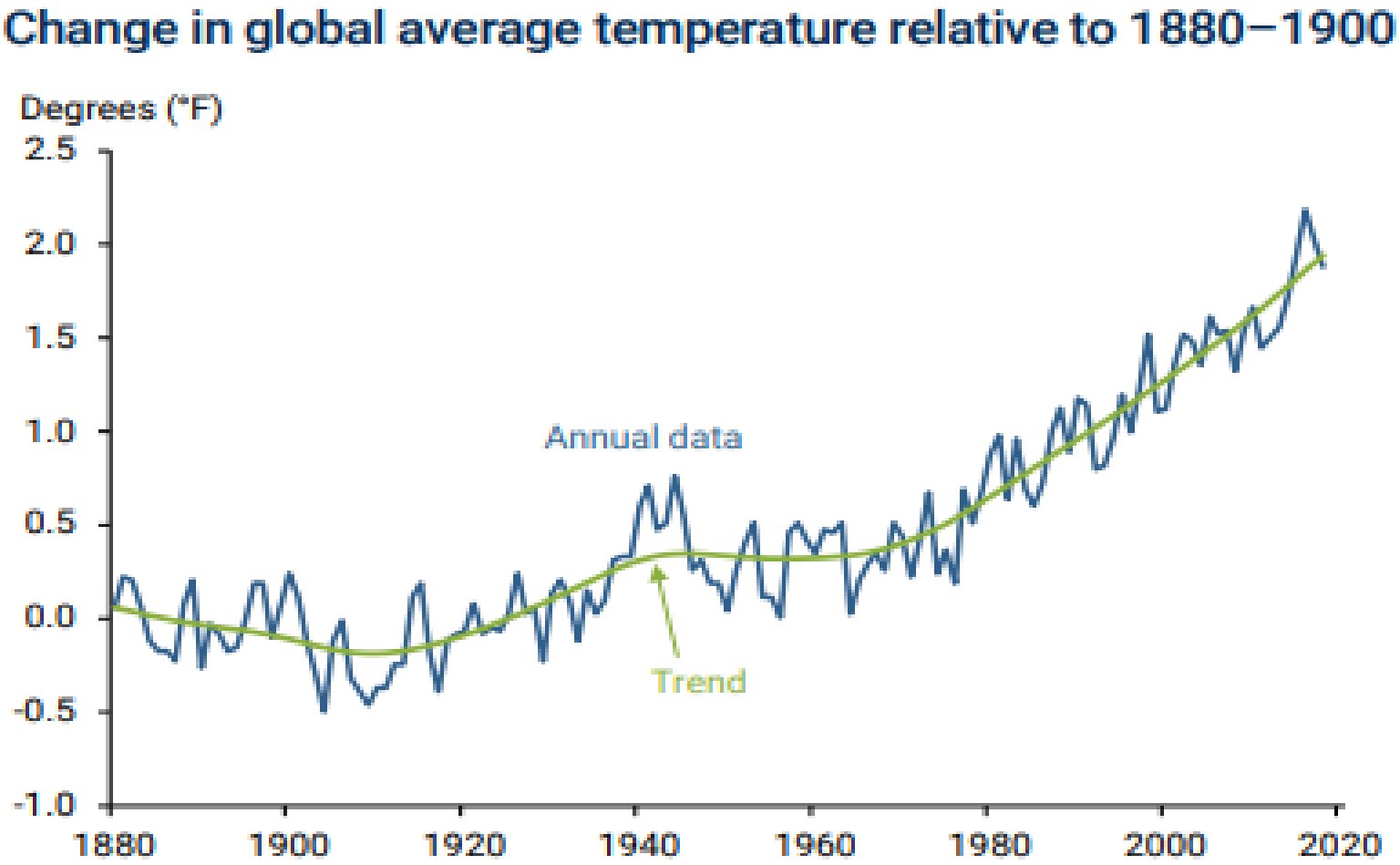
This paper studies the relation between the structure of financial systems and carbon emissions in a large panel of countries and industries over the period 1990-2013.

- → for given levels of economic and financial development and environmental regulation, CO2 emissions per capita are lower in economies that are relatively more equity-funded. Industry-level analysis reveals two distinct channels.
  - → First, stock markets reallocate investment towards less polluting sectors.
  - → Second, they also push carbon-intensive sectors to develop and implement greener technologies.

Many thanks for your attention!

Supplementary slides

Climate change



Note: Global average surface temperature based on land and ocean data from the National Aeronautics and Space Administration (NASA).
https://data.giss.nasa.gov/gistemp/

Number of Reported Disasters by Type