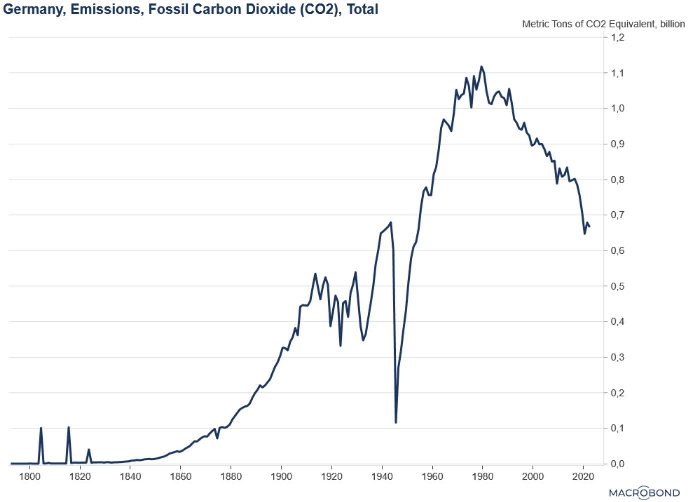
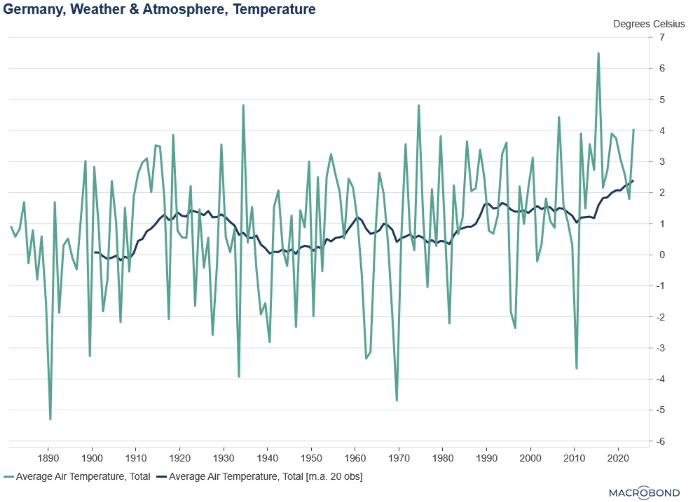
Climate change, monetary policy, and financial stability

Advanced Monetary Economics

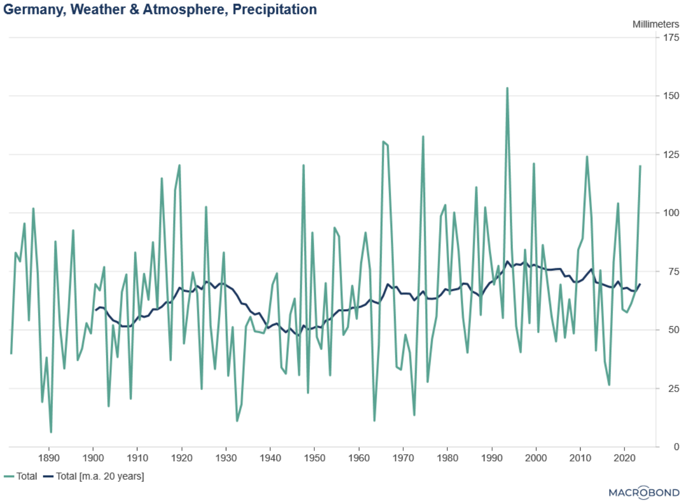
CO2-emissions Germany



Average temperature Germany



Average precipitation Germany



EU targes

- reduction of CO_2-emissions by 55% until 2030
- emission neutrality by 2050

Learning objectives today

- How do climate risks affect the financial sector?
- What are the macroeconomic impacts of climate change?
- How does the ECB deal with climate risks?

Climate risks

- The ECB distinguishes between two types of climate risks:
  1. **physical risks:** acute extreme weather events (storms, floods, droughts) and chronic climatic changes (sea level rise, pollution, species extinctions)
     $\rightarrow$ physical damage, reduced productivity, supply chain disruptions
  2. **transitory risks:** political/regulatory requirements, technological progress (e.g. e-mobility), market reactions

1. Climate risks in the financial system

- European financial sector has €1 trillion at risk with respect to fossil fuel companies
- even with orderly decarbonization of the economy, €350-400 billion in losses loom
- losses may be higher the later policy measures are taken to mitigate climate change
- high share of loans, mortgages, and equity of banks in regions with extreme weather

Effect of climate risks on financial system

- In the financial sector 4 types of risks are distinguished:
  1. credit risk
  2. market risk
  3. operational risk
  4. other risks (liquidity, business model)
- Physical and transitory risks have different effects on financial institutions depending on the type of risk.

Credit risk

physical risk	**transitory risk**
values of loan collateral (e.g., real estate) declines	energy efficiency standards reduce corporate profitability

Market risk

physical risk	transitory risk
natural disasters can change market expectations and prices, increasing volatility	price changes of equities and derivatives, especially in fossil industries

Operational risk

physical risk	**transitory risk**
destruction of financial institution infrastructure	changing public opinion increases reputational risk (e.g., financing climate-damaging industries)

Strategies of the financial sector

- financed energy mix in line with 2015 Paris climate agreement (limit global warming below 1.5-2 degrees Celsius)
  $\rightarrow$ reduction of reputational risks.
- climate risks to be priced into default probabilities
  $\rightarrow$ credit portfolio is more realistically valued
- designing balance sheets that are more climate resilient
  $\rightarrow$ reduction of physical and transitory risks

2. ECB and price stability

- The ECB's main objective: stable *general* price level
- medium-term inflation target of 2%
- inflation target influences inflation expectations
- inflation expectations influence investment and consumption decisions (see Fisher equation).

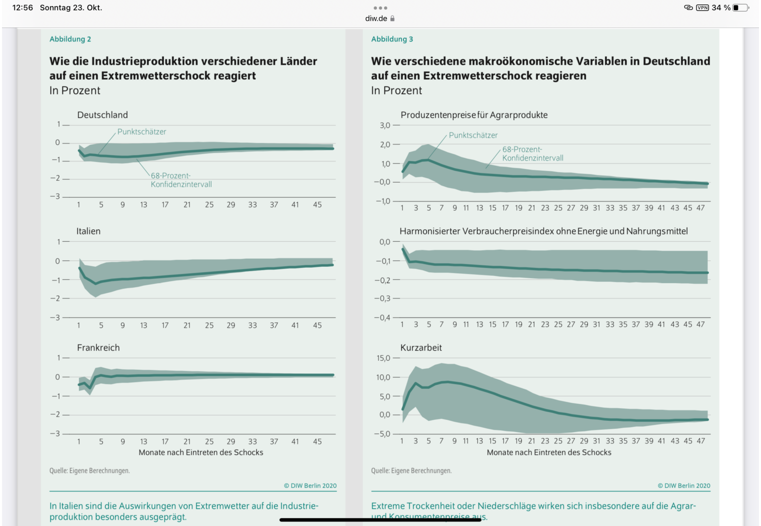
Effects of climate change on prices

- long known link between severe weather (floods, storms, droughts) and inflation in developing countries
- meanwhile more natural disasters in Europe (2022: record year for forest fires)

Effects of natural disasters

- Crop failures (due to droughts, for example) cause prices of agricultural products to rise as supply falls. This can lift inflation above the ECB's target.
- In addition, disruption of supply chains (for example, due to floods or storms) can reduce the supply of labor and goods. This lowers growth and productivity.
- Furthermore, climate protection policy has an impact on prices (transitory risks). For example, emission-intensive goods and services become more expensive.

Macroeconomic effects of weather shocks



Source: Bremus et al. 2020, DIW Berlin.

Expanded objectives of the ECB

- ECB 2020/21 strategy revsision: climate change affects price stability
- Adapting the ECB mandate: taking into account the impact of climate change
- This also pursues secondary objective of supporting EU general policies.

3. Climate risks and financial stability

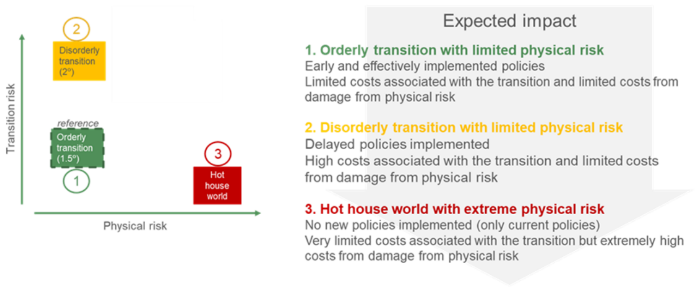
- other secondary mandate of the ECB is banking and financial supervision
- ECB assesses the vulnerability of banks and financial markets to climate risks by:
    1. support for climate-related data collection and research
    2. disclosure requirements for market participants
    3. stress-testing

Stress-tests

- Until now, the ECB has used a top-down approach.
- Assessment of systemic risk using proprietary models and data.
- Assessment of resilience in 3 scenarios.

Chart 3

ECB climate scenarios



Source: ECB

- Although there is geographic and sectoral heterogeneity, the overall assessment shows that the risks and costs of inaction are higher than those of quick and decisive action.
- Soon the ECB will start with a bottom-up approach.
- 2000 banks are conducting stress-tests themselves.
- Central to this are data and models. These are still experimental, but will be refined to better measure climate risks.

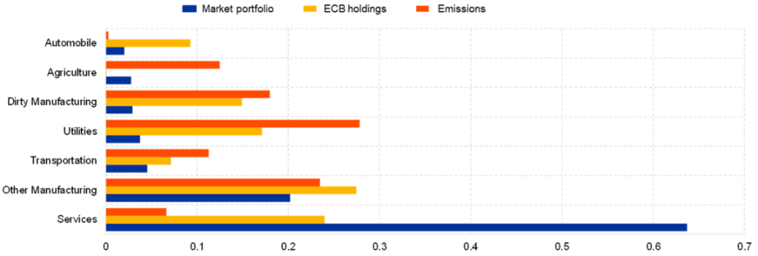
Reduce climate risks in the financial system

- The ECB can use macroprudential measures to create incentives for market participants to act in a greener manner.
- collateral provided by banks in ECB refinancing operations
  $\rightarrow$ lower carbon footprint
  $\rightarrow$ higher disclosure requirements related to climate targets

Requirements for corporate bonds

- climate-related collateral disclosure requirements for purchase programs
- Previous purchase programs have bias toward coal-intensive sectors because companies in these sectors are large and capital intensive.
- Coal-intensive sectors account for 63% of corporate bonds on the ECB balance sheet but only 29% of gross value added.

Market portfolio vs. ECB holdings vs. sectoral emission intensity



Source: Papoutsi, Piazzesi, Schneider (2021).

- Starting this year, the ECB plans to decarbonize its portfolio.
- considers past emissions and climate target setting and transparency of companies

Green bonds

- The asset purchase programs will shift more to green bonds.
- This is to improve the financing of environmentally friendly projects.
- Problem: no international standard of green bonds.

Learning objectives

- Physical and transitory climate risks affect financial sector fourfold.
- Climate change leads to larger economic fluctuations.
- ECB has extended its mandate to include climate targets.