Macroprudential and climate change stress test 2021

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03/09/2021
Macroprudential stress testing: motivation

Why?

• A complementary metrics for judging the *resilience* of the banking sector as a whole by acknowledging endogenous reactions of banks

• Informs banks and supervisors about the system-wide consequences of banks’ *most likely decisions*, possibly reducing coordination failures

• Validates the appropriateness of the calibration and *phase-in of policy measures*

How?

• Two scenarios 2021-2023 from the EBA/ECB EU-wise stress test:
  • Baseline
  • Adverse

• **Dynamic balance sheet**: banks react to scenario adversity

• Two *amplification mechanisms*:
  • Solvency-funding cost
  • Banking sector-real economy

• **Policies** (bank-specific): supervisory and macroprudential capital releases (incl. changes in the definition of the leverage ratio), profit distribution restrictions, public guarantees and moratoria
Macro-micro model*

19 euro area economies + 89 significant euro area banks

- Semi-structural design that combines empirical identification, economic theory, accounting and regulatory principles
- Detailed exposition of banks’ balance sheets and profit and loss accounts
- Mapping economic scenario into banks’ balance sheets
- Estimated banks’ reaction functions for lending, deposit volumes, profit distributions, interest rates, write-offs

Amplification

Banking sector – real economy feedback loop

Macroeconomic structural shocks (‘scenarios’)

(Excessive) deleveraging

Economic conditions, incl. loan demand

Impact on banks’ balance sheets and profit and loss

Reaction of banks: deleveraging, profit accumulation, interest rates, liability structure

Solvency – funding costs feedback loop

Shock to bank profitability e.g. an increase in provisioning

Reduction in net interest income

Change in bank capital volume and drop in the leverage ratio

An increase in the wholesale funding costs (price and volume effect)
2021-23: the banking sector stays resilient after the pandemic

System-wide CET1 ratio

- The system-wide CET1 ratio in the baseline scenario gradually returns to its pre-pandemic level, while in the adverse scenario it goes down to 10.3%
- In the adverse scenario, banks adding up to 43% of SSM banking sector assets (28 banks) dip in their CET1 regulatory threshold incl. capital buffers in the adverse scenario, therein 14% also below their hard requirements (10 banks), which compares to the results of the macroprudential stress test 2020 (45% and 29 banks)
The reduction of the system-wide CET1 in the baseline scenario is driven by expansion of assets and of (outstanding) dividend pay-outs, while in the in the adverse scenario, by capital depletion.
Stable profitability outlook in the baseline

- Improving bank profitability in the baseline scenario, though it stabilises at relatively low pre-pandemic levels
- Credit and market risk losses drive the deterioration of bank profitability in the adverse scenario
COVID-19 mitigation policies continue to support lending

- Robust, though also uncertain, lending dynamics in the baseline scenario
- Banks deleveraging in the adverse scenario
- Different relative role of remaining individual Covid-19 mitigation policies in the two scenarios
COVID-19 policies mitigate the adverse feedback loop

- Moderate role of the feedback loop in the adverse scenario with -0.6% of euro area GDP net effect, with relatively substantial -1.6% of the original amplification mechanism, and +1% mitigating impact of COVID-19 policies

The cumulative growth of GDP in 2021-2023
Macroprudential stress test 2021-23: main takeaways

- Sound bank solvency and stable profitability outlook in the baseline scenario. 14.4% CET1 ratio in 2023 signifies resilience of the banking sector at its exit from the COVID-19 crisis.
- Robust growth of lending to the non-financial in the baseline scenario, 5% annually (on average) in 2021-2023.
- The results confirm the role of profit distribution restrictions in preserving bank solvency during the pandemics, and are qualitatively not affected by the gradual phase-in of the Basel III finalization at the end of the horizon.
- Loans to the non-financial private sector in the adverse scenario contract by -1% annually (on average) triggering the negative banking sector – real economy feedback loop.
- The availability of public guarantees, and maintaining of other COVID-19 mitigation policies in 2021, more than halves the banking sector – real economy amplification.
And now a preview of the ECB’s economy-wide climate change stress test...
Three climate scenarios that combine transition and physical risk

1. Orderly transition with limited physical risk
   Early and effectively implemented policies
   Limited costs from transition and physical risk

2. Disorderly transition with limited physical risk
   Delayed policies implemented
   High costs from transition and average costs from physical risk

3. Hot house world with extreme physical risk
   No new policies implemented (only current policies)
   Very limited costs from transition but extremely high costs from physical risk

Quantitatively, based on NGFS scenario outputs (phase I)
Integrated data infrastructure

**Feature 1:** granular climate and financial information for millions of corporates

- **Physical risk score:** 4.3 million firms worldwide (address level)
- **Transition risk:** 5 million firms worldwide (4digit NACE)
- **Financial info:** From Orbis, Eikon, Bloomberg, iBACH
- **Anacredit bank exposures:** ~4.2 million firms in EA
- **SHS (security holdings):** ~6.000 firms in EA

**Firms sample:** 2.3 million European firms, ~80% AnaCredit exposures

**Banks sample:** ~1,600 consolidated banking groups in EA

Calculation of **proxies** to fill data gaps when matching to Anacredit
Firms’ sample by transition and physical risk

Emissions by country-sector (tCO2e)

Physical risk intensity

- **Highest emitting sectors**: mining, electricity, manufacturing
- **Physical risk hazards** heterogeneous across countries: south more subject to wildfire, north to flood

Source: ECB calculations on Urgentem data (2018). Coverage of GHG emissions in France is relatively lower due to lack of information on firms’ revenues.

Source: ECB calculations on 427 data (physical risk scores are forward looking and reflect intensity and magnitude of natural catastrophes over a 30y horizon). Data are provided at the address level. The regional proxies are based on a sample larger than Anacredit.
Novel models to derive counterparty PDs

**Feature 2:** new models to capture climate risk transmission channels and damages from natural disasters

**Risk drivers**

- **Transition risk**
  - Carbon costs
  - Technological change and energy efficiency
  - Demand for goods

- **Physical risk**
  - Damages to physical capital
  - Production disruption

**Banks**

- Aggregate **default probability** of credit portfolio
- **Losses** from corporate bond repricing

**Mitigants:** Insurance coverage protects capital from damages

**Amplifiers:** Insurance costs increase in some vulnerable areas

**Corporates** (banks’ counterparts)

**Revenues, costs, debt, profits, leverage, PD**

**Credit risk**

**Market risk**