Based on:


Note:
Views expressed do not necessarily coincide with those of de Nederlandsche Bank or the Eurosystem.
Outline

• Questions
• Challenges
• Framework
• Details
Questions

1) How to quantify financial stability risks related to energy transition?
2) How large would such transition risks be (approximately)?

⇒ physical risks out of scope
⇒ application to Dutch financial system
Challenges

1) Uncertainty

2) How to model interactions between climate/economy/financial sector?

3) Granularity

4) Narratives

See also: Campiglio et al. (2018).
Framework

Stress test

1) Account for uncertainty
2) Familiar instrument to identify vulnerabilities

⇒ Scenarios, not forecasts
⇒ Guiding principle: stay close to current methods for stress testing
⇒ ‘Severe, but plausible’
Stress test framework

I. Scenario design
   - Climate policy
   - Energy technology

II. a Macroeconomy
    Multi-country econometric model

II. b Industry-level
    Vulnerability factors for 56 NACE industries, based on embodied carbon emissions

III. Exposures
    - Corporate loans
    - Bonds
    - Equities

IV. Financial stress
    Modules for credit risk and market risk
Adressing the challenges

1) Uncertainty => stress test / multiple scenarios
2) Modeling interactions => set of models
3) Granularity => 56 industries, using NACE classification
4) Narratives => climate policy / energy technology
Take-aways

1) Financial stress under disruptive energy transition scenarios can be sizeable.

2) Framework can be applied by macroprudential supervisors or financial institutions.

3) Many important avenues for future research on financial stability implications.
I. Scenarios


- Technology shock
- Double shock
- Confidence shock
- Policy shock

Technological breakthroughs

Policy stance

Passive
No
Active
Yes
II.a Macroeconomy

Deviations from baseline level in four disruptive scenarios.
II.b Industry effects

Equity indices in policy (x-axis) and technology (y-axis) scenarios. Dotted lines indicate aggregate changes in the respective scenarios.
II.b Industry effects

Transition vulnerability factors:
- measure transition risks at the industry-level
- based on an input-output analysis
- reflect embodied CO₂ emissions

III. Exposures

- EUR 2.3 trillion
- 80 financial institutions in NL
  - Bond & equity holdings
  - For banks, also corporate loans
- Positions at end 2017
IV. Risk modules

**Credit risk:** additional losses on corporate loans over five-year period

**Market risk:**
- bonds: interest-rate shock / credit spreads
- equities: industry-specific shocks

Calculations using top-down stress test model at de Nederlandsche Bank (Daniels et al. 2017).
IV. Losses under disruptive transition scenarios

Source: Vermeulen et al. (2019).
Take-aways

1) Financial stress under disruptive energy transition scenarios can be sizeable.

2) Framework can be applied by macroprudential supervisors or financial institutions.

3) Many important avenues for future research on financial stability implications.
References


