SMOOTH

Sustainable Finance for a Smooth Low-Carbon Transition

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Research motivation: A rapid and smooth transition

- Rapid transition to low-carbon technologies
  - Past/current investment patterns not aligned with climate change mitigation goals
- Minimise socio-economic costs of low-carbon transition
  - Abrupt shift could lead to asset stranding and financial instability (a 'Climate Minsky moment')
- To what extent and how are these two objectives achievable at the same time?

Research questions

1. Carbon intensity of investment choices
2. Macro-financial implications of a low-carbon transition
3. Policies for a smooth and rapid transition

1. Carbon intensity of investment choices

- Physical and financial investments
  - Investments in physical capital stocks by non-financial firms
  - Investments in financial assets by financial firms
- 1. Transition expectations
  - Clusters of investors' expectations on transition speed/shape
  - Expectations formation process
- 2. Obstacles to low-carbon investments
  - Behavioural and institutional dimensions
  - Short-term planning horizons

1. Preliminary and planned work

- Methodological approach:
  - Surveys, interviews, experiments
  - Related lit: Krueger et al. (2020) on RFS; Harnett 2017 on JSFI; Gutsche et al. at EAERE 2020
- Preliminary 2020 work (with R. Wendtner)
  - Survey of asset management professionals
  - Impact of reputational herding on inclusion of ESG factors in investment choices

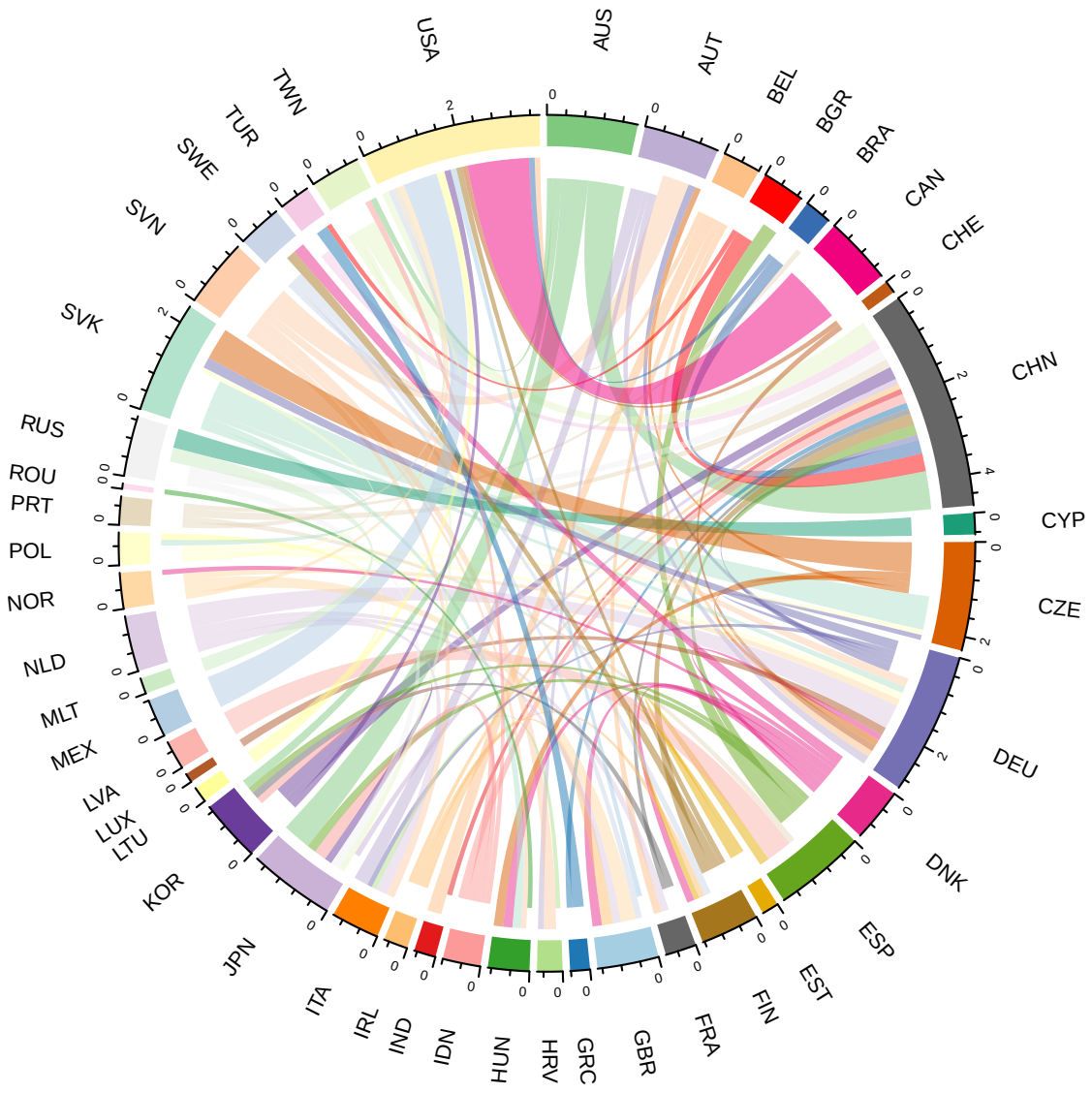
2. Macro-financial transition costs

- 1. Transition-related disruptions
  - Drivers and transmission channels
- 2. Dynamic socioeconomic impacts
  - Stranding of natural, physical and financial assets
  - Macro-financial instability
- 3. Policy scenarios
  - Fiscal, monetary, financial
- Methodological approach:
  - Network analysis
  - Dynamic macro-financial modelling

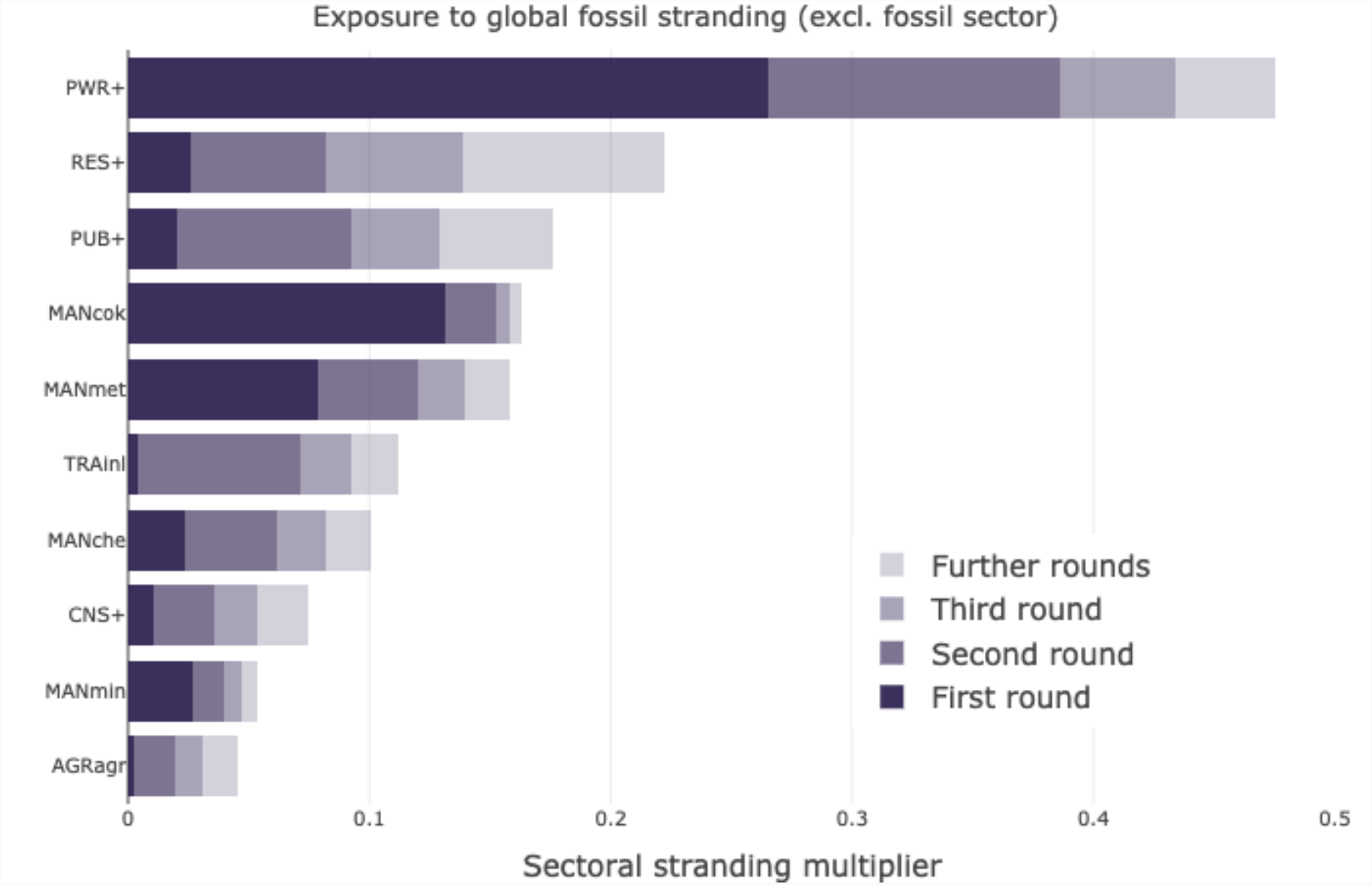
2. Exposure to transition risks using networks

- Asset stranding risks
  - Lit on financial stranding (EAERE 2020: Roncoroni et al., Stolbova and Battiston)
  - Still missing: Stranding in production networks
- 'Capital stranding cascades: The impact of decarbonisation on productive asset utilisation' (with L. Cahen-Fourot, E. Kemp-Benedict, A. Godin, S. Trsek)
  - Novel methodology to assess the 'marginal stranding multipliers' triggered by defossilisation/decarbonisation
  - Direct and indirect effects

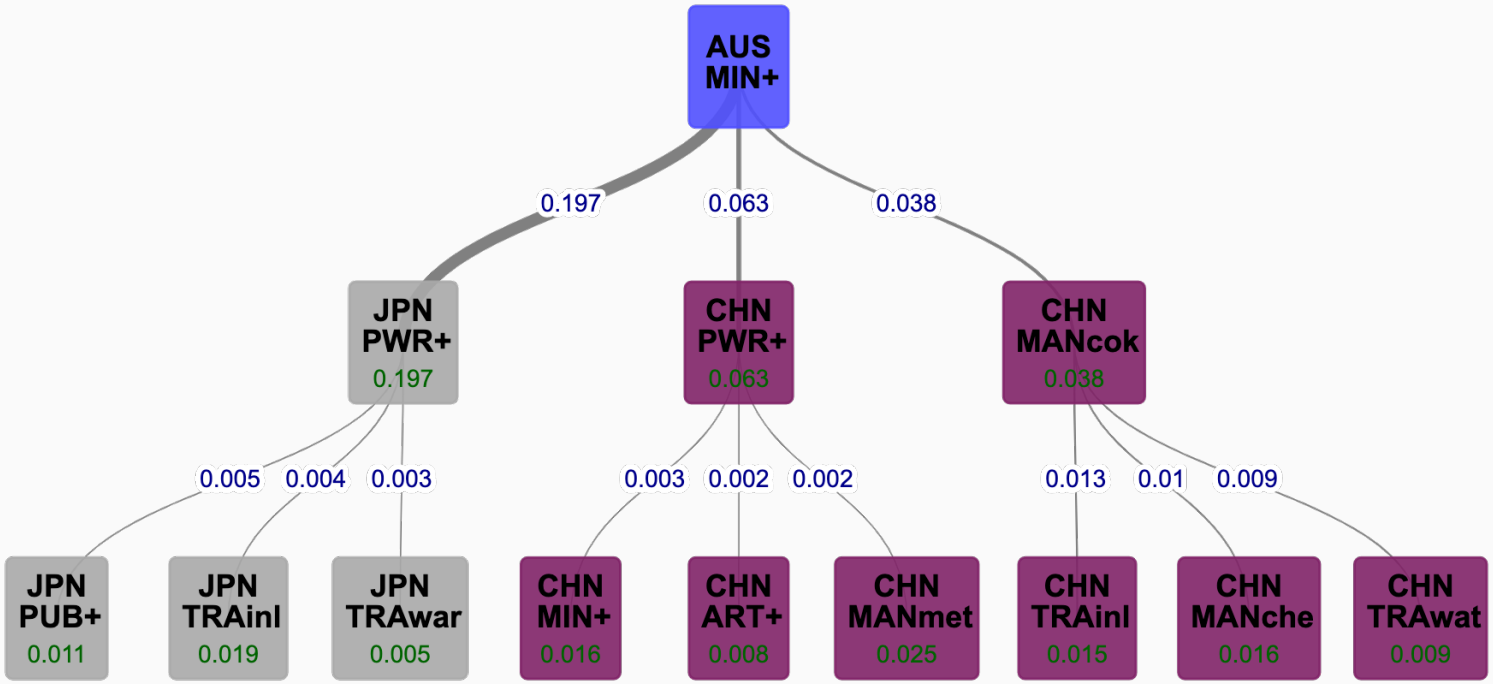
2. Cross-boundary fossil stranding



2. Top sectors by exposure to global fossil stranding



2. International stranding from unitary fossil shock in Australia



2. Planned work on networks

- Supply- and demand-side perspective on physical asset stranding
  - Stranding costs of decarbonisation strategies
- Dynamic version using CGE modelling
  - In collaboration with F. Bosello and CMCC Venice
- Multi-layer networks
  - Joint analysis of physical and financial stranding

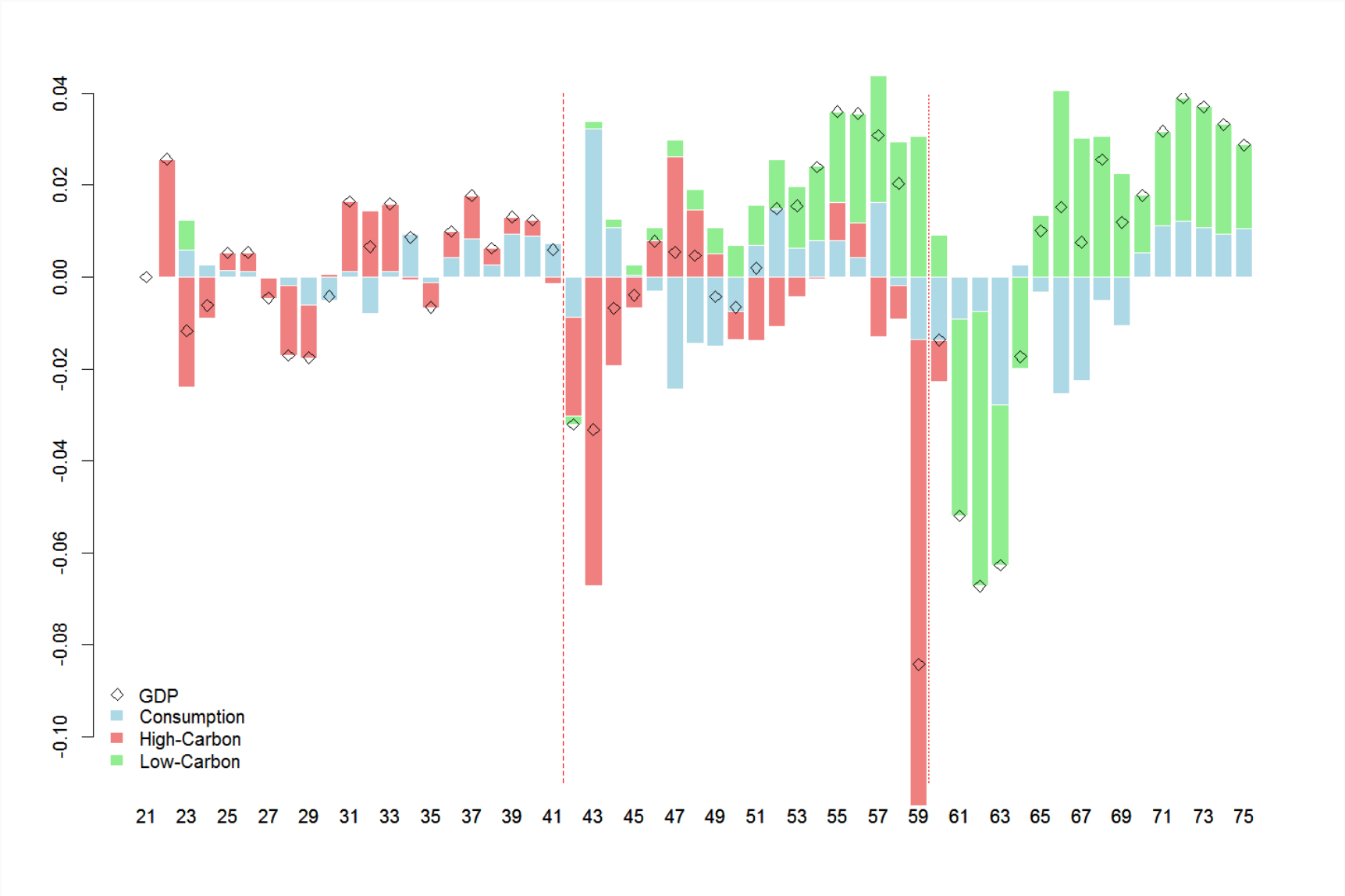
2. Dynamic macro-financial modelling

- Large developing literature using a range of modelling methods
  - Optimisation-driven methods: IAM, CGE, DSGE, CAPM (EAERE 2020: Hambel et al, Schuldt & Lessmann, Jin et al., Daubanes & Rochet, Economides & Xepapadeas, Colesanti Senni and Böser, Yanovski et al, Diluiso et al...)
  - Complexity-driven methods: SD, SFC, ABM (other academic communities: e.g ecological/evolutionary econ)
- Treatment of investment decisions and transition expectations
  - Neoclassical workhorse: rational agent investing after conducting an intertemporal optimisation of welfare
  - Complexity approach: radical uncertainty suggest adaptive expectations and satisficing behaviour (EAERE 2020: Sandorf et al.)

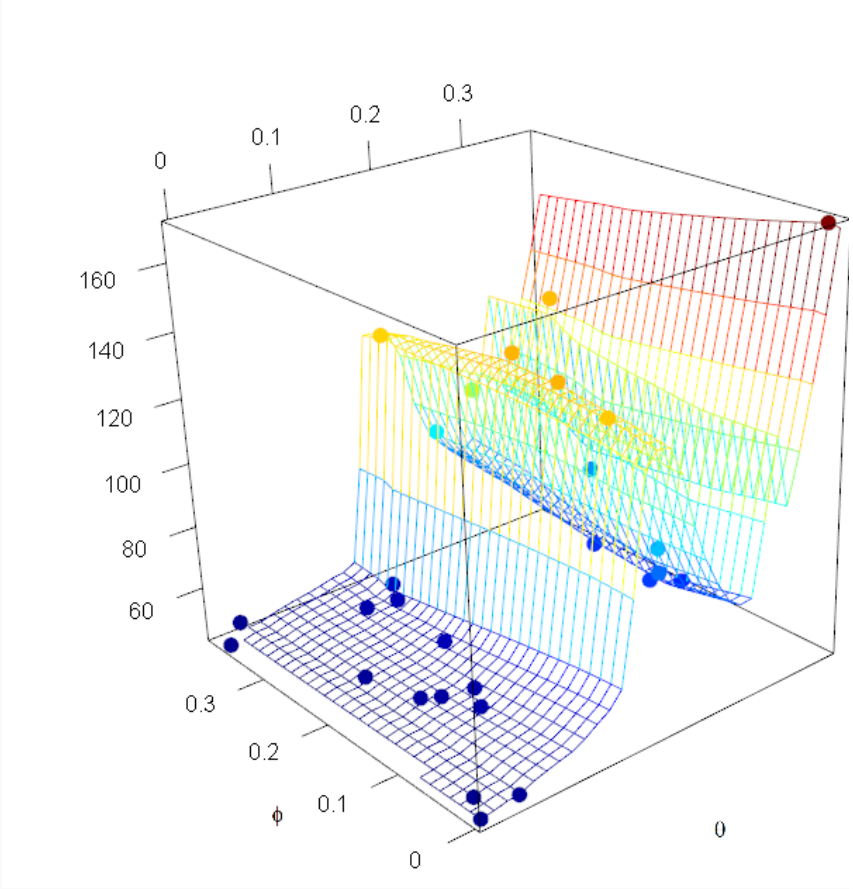
2. Preliminary work

- Neoclassical approach
  - Preliminary 2020 work on stranding and investment adjustment costs with stochastic uncertainty (with S. Dietz and F. Venmans)
  - Planned work on carbon bubbles using DSGE framework
- Introduce forward-looking expectations in models without optimisation
  - Preliminary 2017 work (with E. Kemp-Benedict and A. Godin) 'Climate financial bubbles: How market sentiments shape the transition to low-carbon capital' (EAERE 2017)
  - Forward-looking expectations in financial investment decisions
  - Behavioural biases: 'Climate financial apathy' and 'climate blindness'

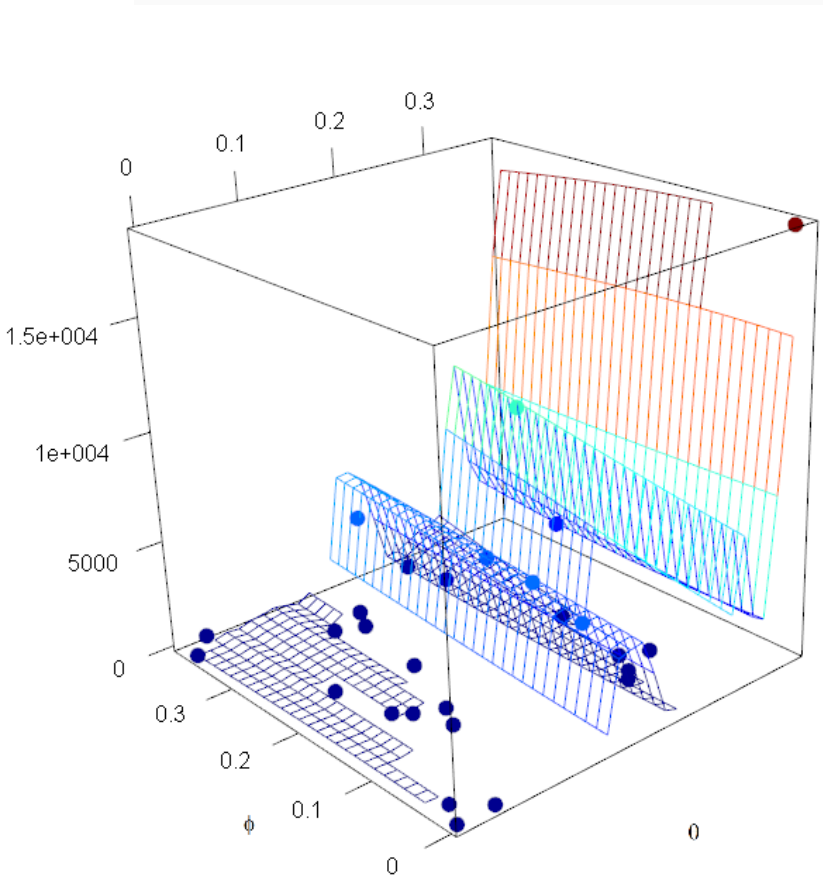
Transition macro-financial disruptions without exogenous shocks



The effect of 'apathy' (θ) and 'blindness' (ϕ) on the transition



Physical stranded assets

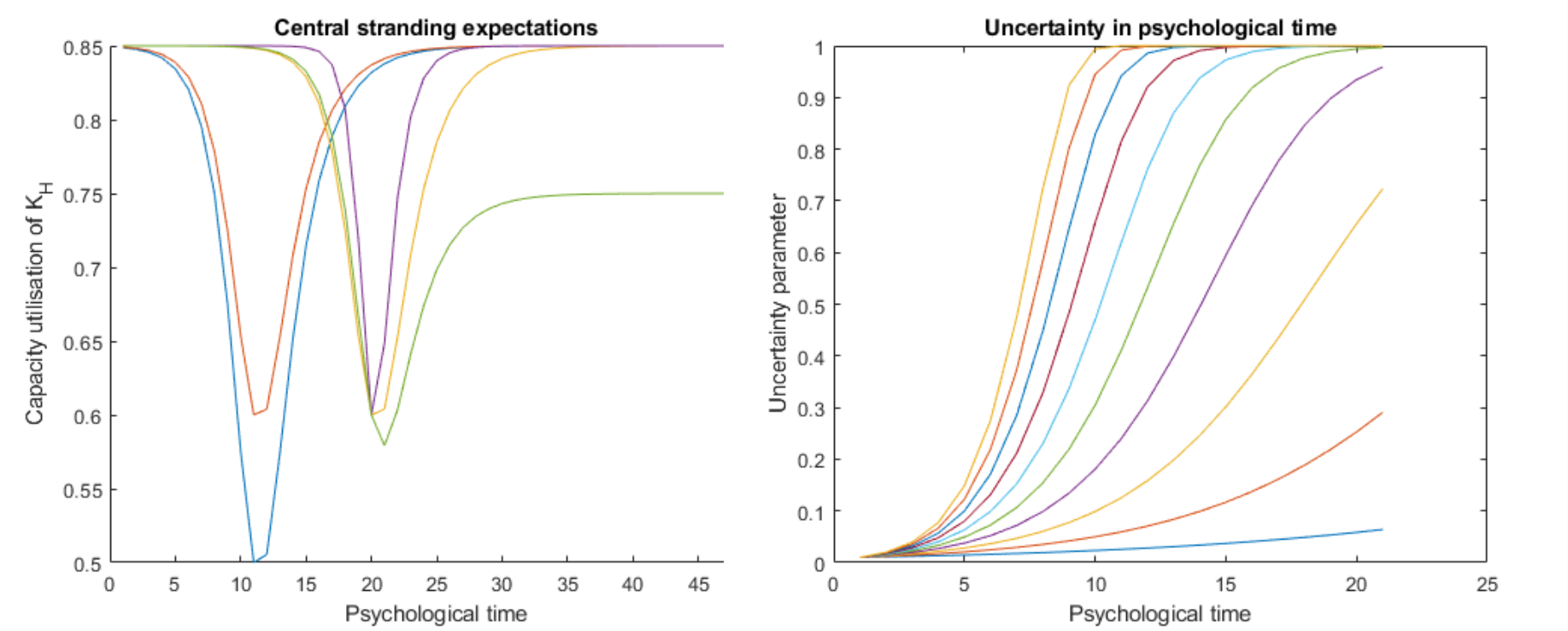


Financial stranded assets

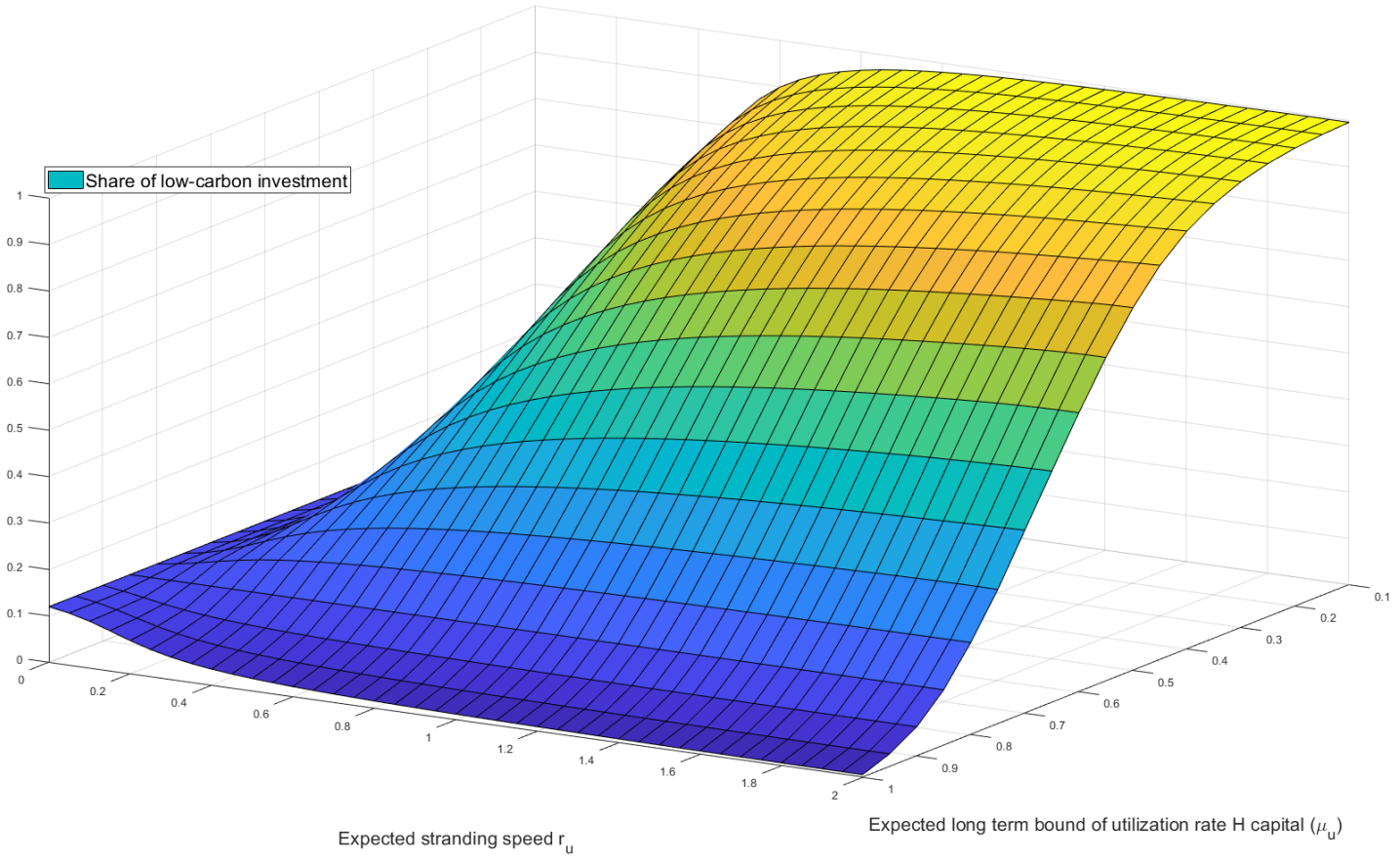
2. A probit transition model

- Preliminary 2020 work (with L. Cahen-Fourot, L. Daumas, M. Miess, A. Yardley)
  - Focus on stranding of physical assets on the electricity sector
  - Firms allocate investments across capital stocks (low- and high-carbon) according to expected profits
  - Stranding (transition) expectations define profitability expectations
- Utilisation expectations
  - Central stranding expectations ('narratives')
  - Error term (uncertainty, heterogeneity) increases logistically in psychological time

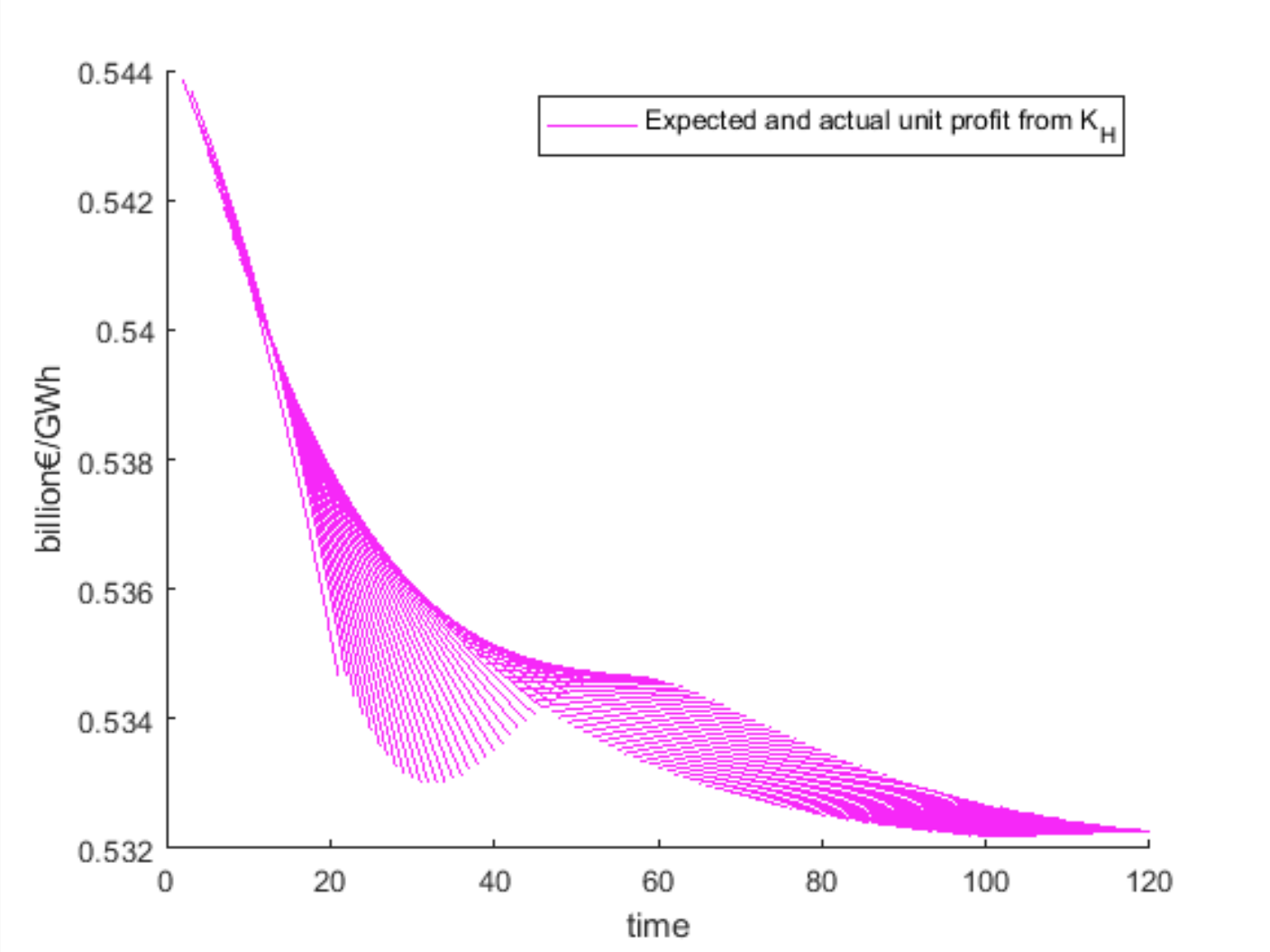
Stranding expectations and uncertainty



Share of low-carbon investment at time t



Preliminary results in time t



3. Policies for a smooth and rapid transition

- 1. Policies targeting financial behaviours
  - Prudential regulation (micro/macro), monetary policy
  - Impact of current policies on low-carbon transition
  - Harmonised approach (fiscal/monetary/financial)
- 2. Institutions
  - Governments, central banks and financial regulators
  - Prudential vs promotional measures
  - Public governance on private financial dynamics

3. Preliminary and planned work

- Methodological approach:
  - Empirical analysis
  - Comparative political analysis (EU/China)
- Preliminary 2019 works
  - Cooperating along the green road? How central banks in Europe and China are shaping the transnational governance of sustainable finance (with N. Robins, Y. Wang, L-Y Zhang)
  - Preliminary 2019 work: It takes two to dance: Prudential and promotional measures in the European sustainable finance sphere (with M. Baer)

Conclusions

Conclusions

- SMOOTH: 5-year project with three pillars
  - Capture and understand investors' transition sentiments
  - Model the macro-financial transition dynamics
  - Identify policies and institutions to mitigate transition risks
- Host institutions
  - University of Bologna
  - RFF-CMCC European Institute on Economics and the Environment (Milano)
- Open to collaborations and visits

Thank you !

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