

Transition macro-finance: requirements, implications and policies

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Climate macroeconomics & finance 2024/25 - Lecture 5

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- Climate change
 - → Urgent decarbonisation needed
- Technological options
 - Different stages of development
 - Often less competitive → markets won't go there by themselves
- Policies needed!
 - Mainly: put a price on carbon
- What needs to happen in the macro-financial system?
 - Aim: rapid and orderly transition

Outline of today's lecture

- We need investments rapidly
 - Physical and financial investments
 - Clean investment status and gap
 - Obstacles to investments
 - Private vs public finance
- We need an orderly transition
 - Transition-related macro-financial risks
 - Hazards, exposure, vulnerability
 - Physical and financial stranding
 - The role of transition-related expectations
- Sustainable finance policy-making
 - Prudential vs promotional policies

How do we decarbonise? Macroeconomic requirements

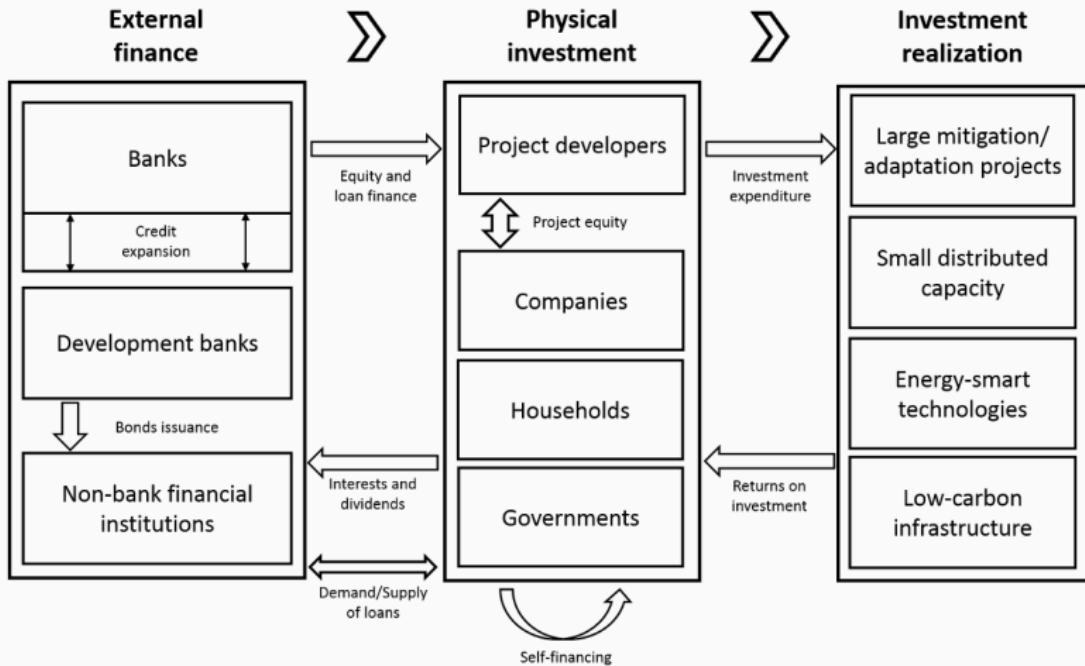
What needs to happen? Three key dimensions

- Non-financial firms
 - Investments in low-carbon tech innovation, green R&D
 - Investments in low-carbon tech roll-out (wind and solar farms)
 - Re-purposing of existing assets
- Households
 - Consumption of low-carbon goods/services
 - Voluntary reduction of high-carbon consumption
- Providers of finance
 - Loans to firms using/investing on low-carbon tech
 - Provision of equity capital

Who are the providers of finance?

- Two main types of private institutions
 - Commercial banks
 - Non-bank financial institutions
- Commercial banks
 - Special role: creators of new credit
 - Loans to households, firms, other fin.inst., government
 - Especially important for small and medium enterprises
- Non-bank financial institutions
 - Heterogeneity (venture capitalist to institutional investor)
 - Reallocate existing savings (no new money supply)
 - Firms issue financial assets (bonds, shares) to sell them
 - Investing behaviour drives stock market dynamics

Physical and financial investments

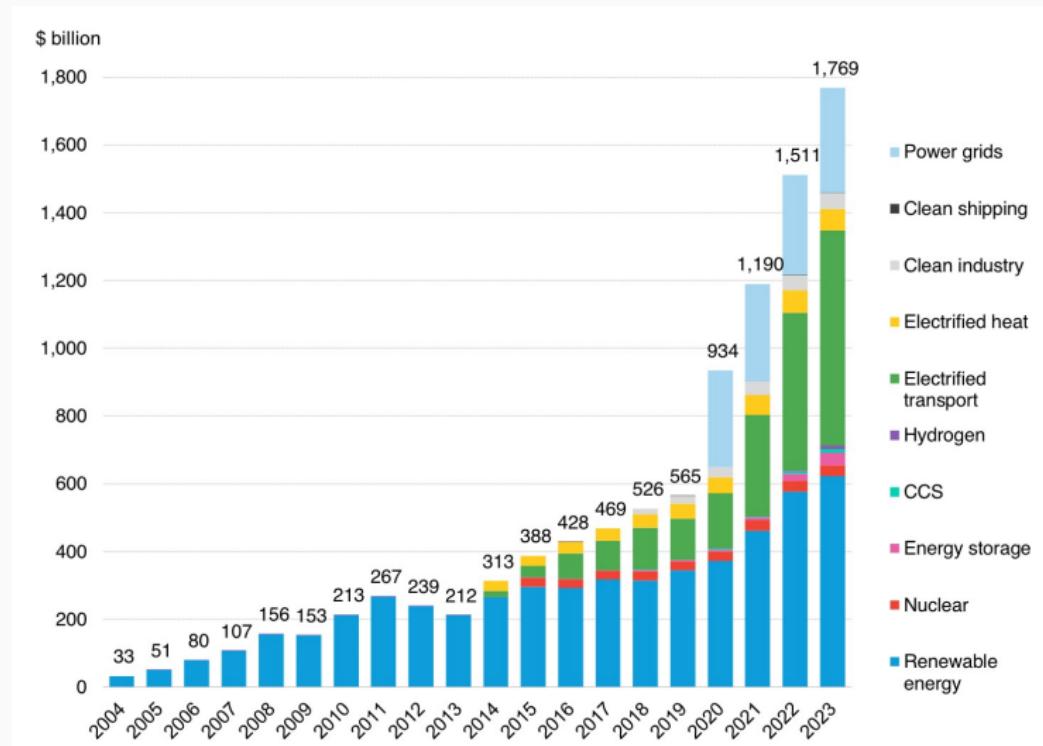


External finance needed to perform investments in new physical capital stock

Two types of 'sustainable financial investments'

- Investments in activities improving/commercialising low-carbon technologies
 - E.g. Vestas, Siemens Gamesa and GE (largest wind turbine producers)
 - E.g. Trina Solar, JinkoSolar and Canadian Solar (largest solar module producers)
- Investments in companies that behave sustainably
 - E.g. A tech company employing clean energy, installing energy-saving technologies or reducing its waste.
 - Socially Responsible Investing; Impact investing
 - ESG investing: environmental, social and governance dimensions
 - Greenwashing?

The current state of energy transition investments



Energy transition investments. Source: [BNEF \(2024\)](#)

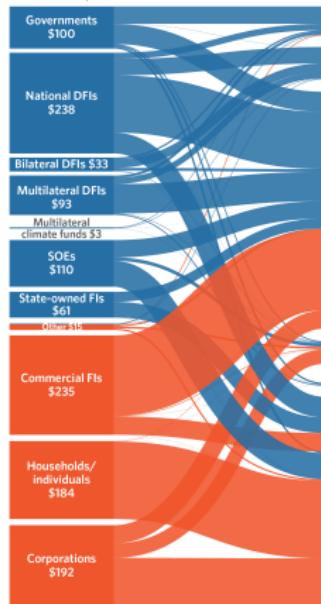
CPI climate finance estimates

LANDSCAPE OF CLIMATE FINANCE IN 2021/2022

Global climate finance flows along their life cycle in 2021 and 2022. Values are averages of two years' data to smooth out fluctuations, in USD billions.

SOURCES AND INTERMEDIARIES

Which type of organizations are sources or intermediaries of capital for climate finance?



INSTRUMENTS

What mix of financial instruments is used?



1.27 TRILLION USD AVERAGE

USES

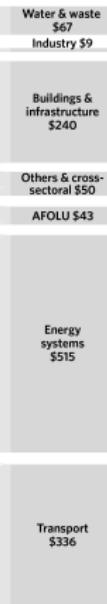
What types of activities are financed?



CLIMATE
POLICY
INITIATIVE

SECTORS

What is the finance used for?



"Other" public sources include export credit agencies and unknown public funds

"Other" private sources include institutional investors, funds, and unknown

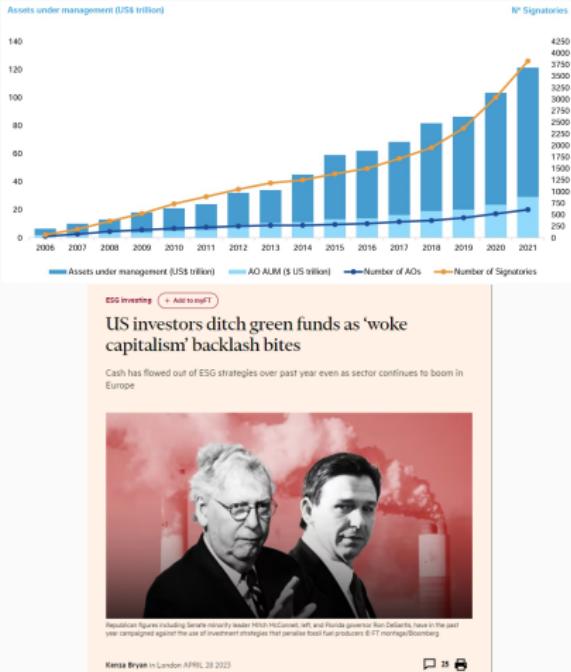
"AFOLU" stands for agriculture, forestry, other land use, and fisheries. "Others & cross-sectoral" includes \$6bn unknown

Source: Climate Policy Initiative

Landscape of climate finance. Source: Climate Policy Initiative (2023)

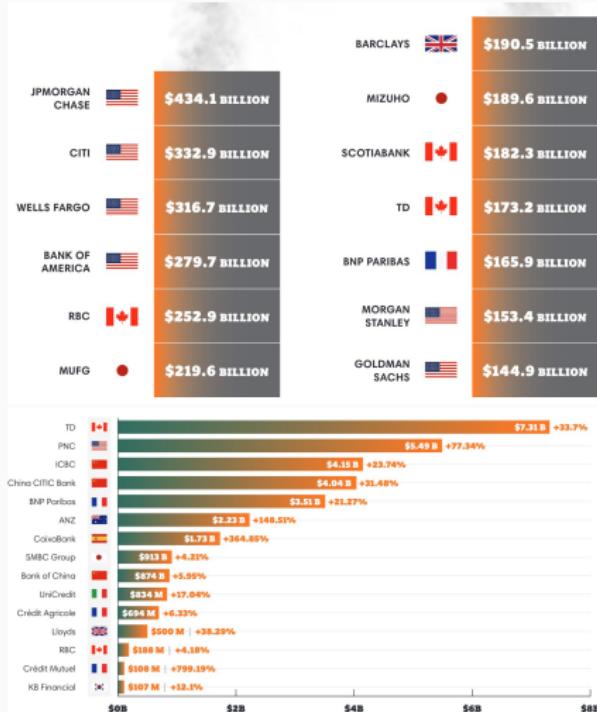
Responsible (ESG) investments

- Large expansion of interest on ESG investing by private actors
- Glasgow Financial Alliance for Net Zero ([GFANZ](#))
- Larry Fink's (Blackrock) [2020 letter to CEOs](#):
'Climate risk is investment risk'
- Backlash due to political debate?



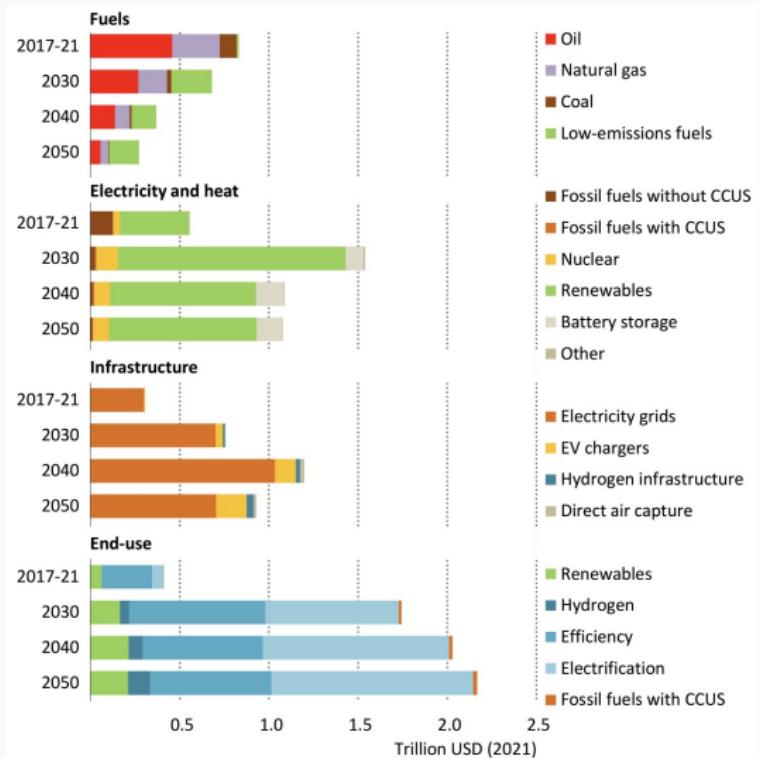
Above: Signatories to the UN Principles for Responsible Investments ([UN PRI](#) 2022). Below: [FT 2023](#)

Fossil fuel financing still going strong



Above: largest fossil fuel financiers since Paris Agreement, 2016-22. Below: increase in fossil fuel financing from 2021-22. Source: [Banking on Climate Chaos \(2023\)](#)

A large investment gap still exists



Global average annual energy investment in the IEA Net Zero Emission Scenario.
Source: IEA (2022)

Investment drivers

- How do people invest?
 - Very hard to capture (Keynes: 'animal spirits')
- Multiple dynamic investment drivers
 - Relative expected returns
 - Relative risks
 - Planning horizons (short vs long-termism)
 - Ethical considerations
 - Information
 - What are others doing?
 - + macroeconomic variables (aggregate demand dynamics, inflation, interest rates, etc.)
- Key driver in low/high-carbon choice:
 - Relative discounted sum of expected future profits

Obstacles to low-carbon investing

- Risk-return profiles
 - Depending on asset/market, green assets might be as profitable as high-carbon ones..
 - But the risk attached to them might be higher
 - Changing in recent times (transition risks)?
- Short-termism
 - Many green investments have higher upfront costs and longer-term returns
- Limits to ethical investing penetration
 - See [Giglio et al. \(2023\)](#): only 25% of investors go green for ethical reasons
- Access to finance
 - But financial experience effect: declining cost of capital for green technologies (see [Egli et al. 2018](#))

Alternatives: Green public spending

- Some investments are just too large and/or unprofitable
 - Direct intervention by public actors needed
- Green public investment
 - Public intervention needed to create infrastructure (e.g. high-speed railway, smart electricity grids)
 - Problem: public debt and austerity narrative
 - Recent change of pace with European Green Deal
- Green public procurement
 - Public procurement represents around 15-30% of GDP
 - Secure source of demand (but is supply available?)
- Climate-related ODA
 - Commitment: 100 US\$bn per year by 2020 from OECD to developing regions
 - Multilateral climate funds [Green Climate Fund](#)
 - Pledges vs disbursements: gloomy outlook

Alternatives: Public development banks

- Financial institutions with a strong public component with the goal of supporting economic development
 - Multilateral development banks: World Bank group, EIB, EBRD, ADB, IaDB etc.
 - National development banks: KfW, BNDES, CDP, and others
- Development banks at the forefront of international climate financing
 - And instrumental in the diffusion of green bonds
- Development banks have two main sources of finance
 - Public budgets
 - Private finance raised on capital markets
- However, development banks' action is limited
 - Not real banks
 - Constrained by government capital commitment and leverage ratios

Transition-related macro-financial risks

Climate-related risks

- Physical risks
 - Impact of climate-induced phenomena on human activities
- Transition risks
 - Structural change towards a lower-carbon economy
 - Focus on high-carbon sunset industries
- Liability risks
 - Parties affected by climate change looking for compensation



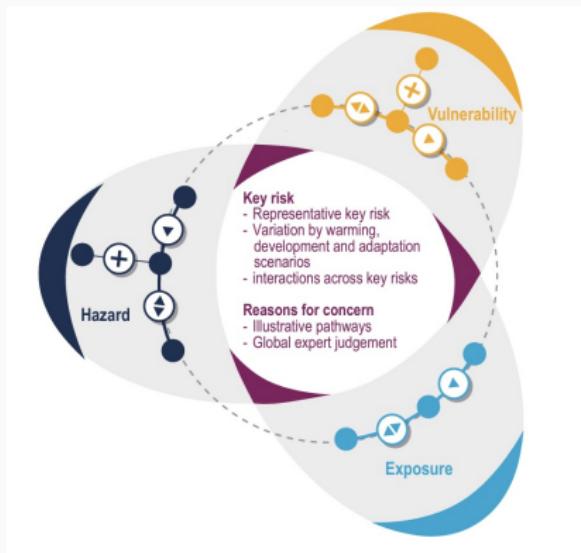
2015 Lloyd's speech by BoE governor Mark Carney ([video](#))

Physical and transition risks

- Different initial drivers
 - Climate impacts vs structural change
 - ... although climate shock could lead to policy shock
- But similar transmission channels
 - Losses to firms (flow+stock effects)
 - Propagation effects via production networks → Macro impacts
 - → Losses to financial institutions (credit+valuation)
 - Propagation effects via financial networks
 - → Wider macro-financial impacts
 - → Feedback effects on transition process
- We refer to both of them together as 'climate-related risks' (CRRs)

Risk: hazards, exposure, vulnerability

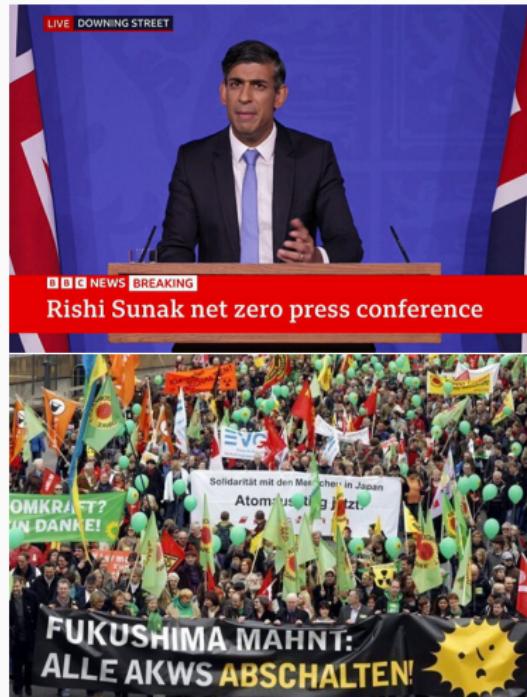
- Hazards
 - Potential occurrence of event/trend that may cause negative impacts
- Exposure
 - 'Presence' of agents, ecosystems, assets etc. in at-risk settings
- Vulnerability
 - Propensity to be adversely affected → resilience, preparedness, adaptation



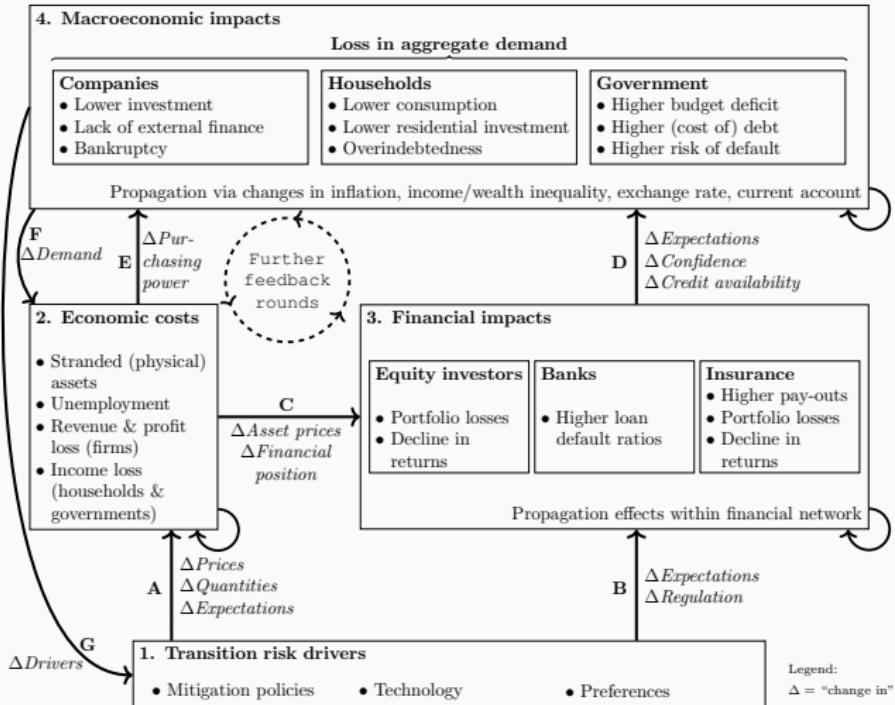
IPCC climate risk framing. Source: [IPCC AR6 WGII, Ch.1 \(2022\)](#)

TMRs: Hazards

- Policies
 - Too rapid / unanticipated / delayed implementation
 - Policy reversals
- Technologies
 - Reduction of relative costs (see solar)
 - Breakthrough (clean but also CCS)
- Preferences
 - Change in demand patterns (see Fridays for the Future, Fukushima, Ukraine..)
 - Role of moving expectations



TMRs: Exposure



An overview of transition risk dynamics. Source: [Semieniuk et al. \(2021\)](#)

Flow effects

- Impact on revenues and expenditure of firms due to climate/transition
- Higher costs: More expensive intermediate inputs
 - Climate-induced supply disruptions (eg. extreme weather events destroying port infrastructure)
 - Carbon tax making energy and energy-intensive inputs more expensive
 - Possible credit rationing: higher financing costs
- Lower revenues: Demand-side effects
 - Impossibility to produce or to reach markets
 - Higher selling prices → purchasers buy less
 - Purchasers avoid your products (social stigma)
- → Lower profits
 - → Lower expected profits as well?

- Physical loss of assets
 - Destruction of factories and infrastructure from climate hazards
 - → write off company's balance sheet
- Loss of physical asset monetary value
 - If asset used less (reduced capacity utilisation)..
 - ..expected profits from future utilisation will be lower..
 - ..decreasing the market value of the asset
 - → write off company's balance sheet (?)
- Loss of human capital
 - Labour skills, productive knowledge, business networks
 - Reconversion possible but costly for some

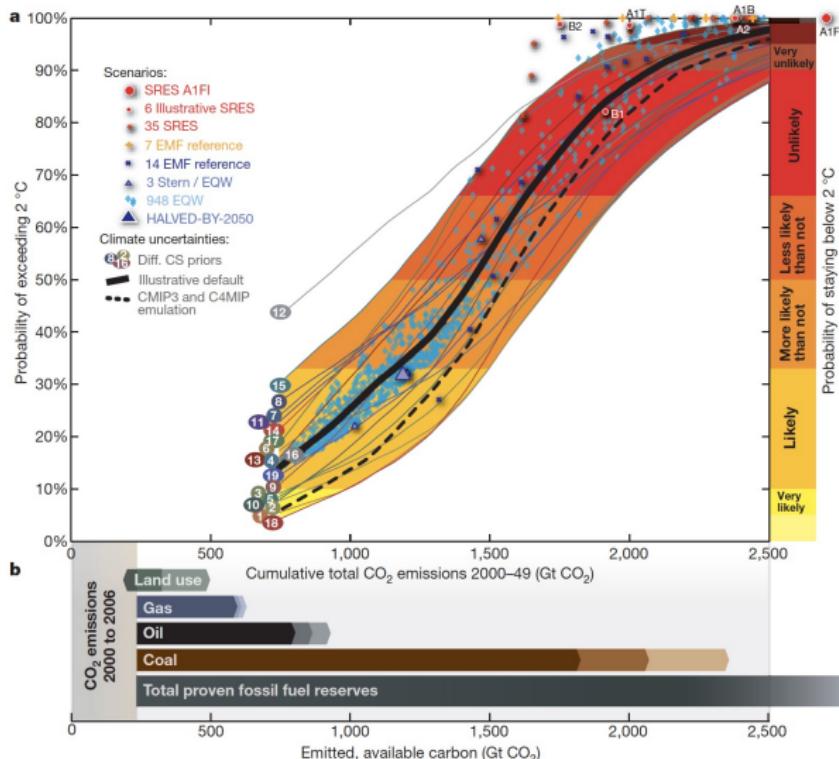
Transition impacts on firms

- Mitigation policies
 - Change in prices → reconfiguration of global value chains
 - Higher tax burdens
 - Higher energy prices for households
 - → Social unrest?
- Technological progress
 - Loss of demand for products
 - Devaluation of obsolete capital stocks
 - Excessive investments → Overcapacity
- Change in beliefs and expectations
 - Loss of demand for products
 - Change in relative prices

Focus on asset stranding

- Stranding of physical assets can mean:
 - Asset abandonment
 - Reduction of lifetime asset (premature decommissioning)
 - Costly repurposing to alternative technologies (eg. coal to biomass)
 - Reduced capacity utilization
 - Loss of market value of the asset
 - → Entire or partial write-off from company's balance sheet
- Two main types of physical assets at risk of stranding
 - Reserves of fossil fuels
 - Stocks of productive man-made capital
 - + Stranding of labour: unemployment

Stranding of fossil reserves

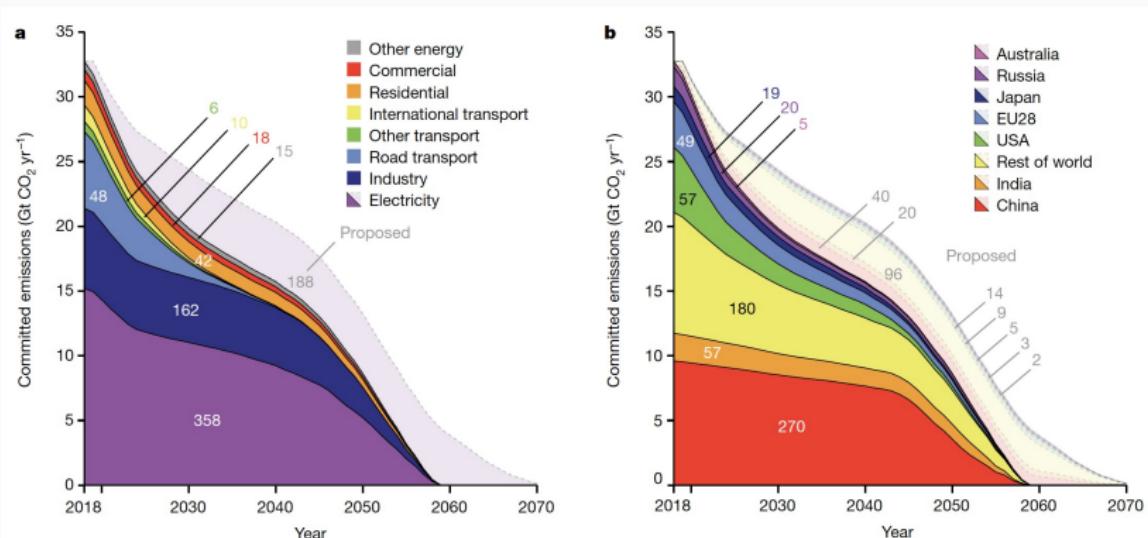


Fossil reserves and the 2°C target (Meinshausen et al. 2009)

'Committed' emissions in capital stocks

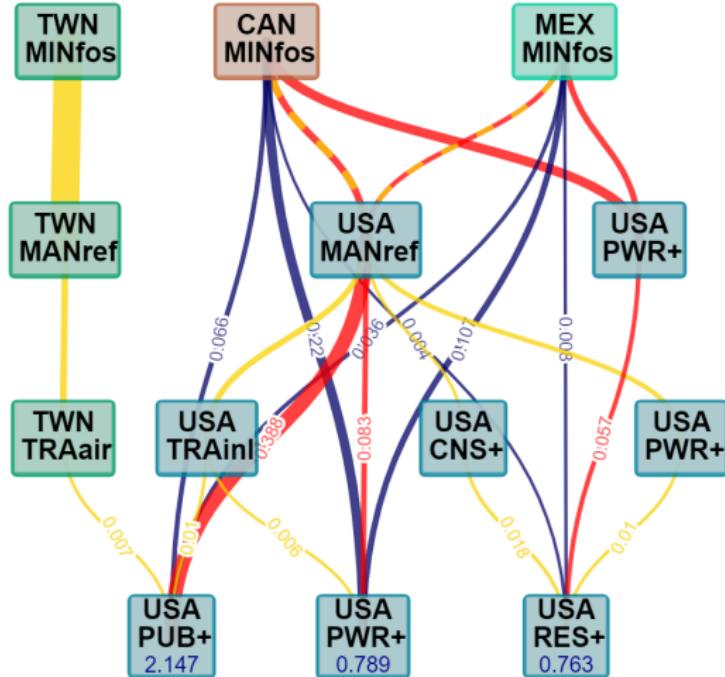
- Capital stocks often work in combination with fossil fuels
 - E.g. electricity plants, blast furnaces, cement kilns, chemical plants, buildings, transport infrastructure..
 - Emissions are already 'committed' by their existence, assuming certain lifetimes and utilisation rates
- Committed emissions are already close or above 2°C carbon budgets.
 - Either strand some of them or go beyond 2°C
 - No more high-carbon investments allowed

Committed CO₂ emissions



Committed annual CO₂ emissions from existing and proposed energy infrastructure, assuming historical lifetimes and utilization rates. ([Tong et al. 2019](#))

Indirect exposure via production networks

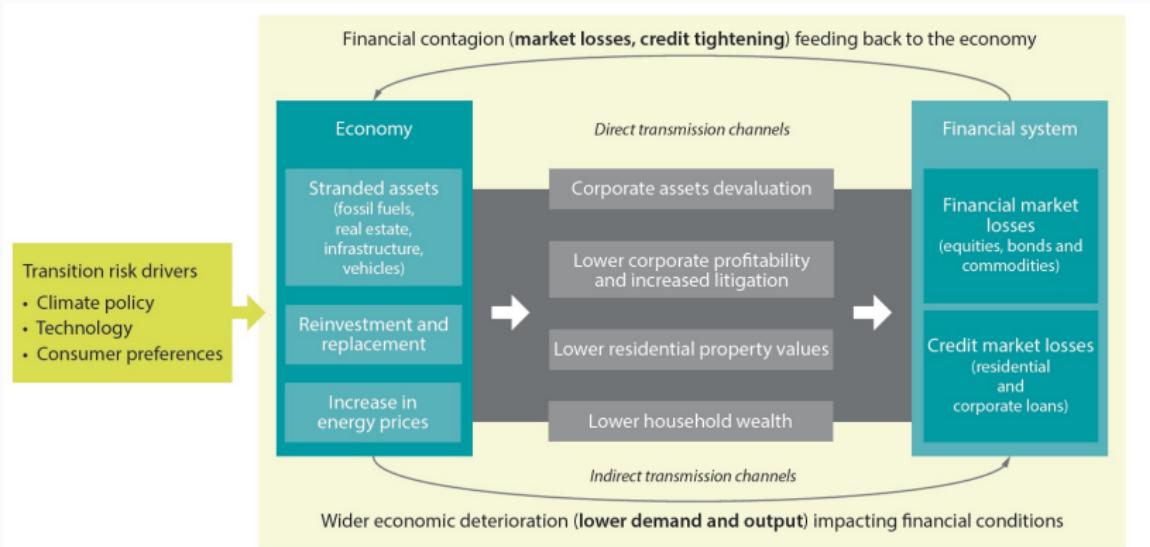


Main fossil exposure links for the USA ($r = 2$). Source: Cahen-Fourot et al. (2021)

Climate-related impacts on financial firms

- Direct impacts via:
 - Changes in expectations (leading to changes in mkt valuation)
 - Changes in actual regulation (e.g. disclosure requirements)
- Indirect impacts via impacts on firms:
 - Increase in non-performing loans → Impact on banks' balance sheets
 - Increase in insurance claims
 - Decrease in firms' market valuation → Portfolio effects
 - Revision of estimated future payoffs
 - Revision of risk/uncertainty → change in risk premium
 - Endogenous revaluation driven by new valuation models
- Financial network effects
 - Banks' NPL affecting their market valuation
 - Change in collateral values
 - Fire sales of assets

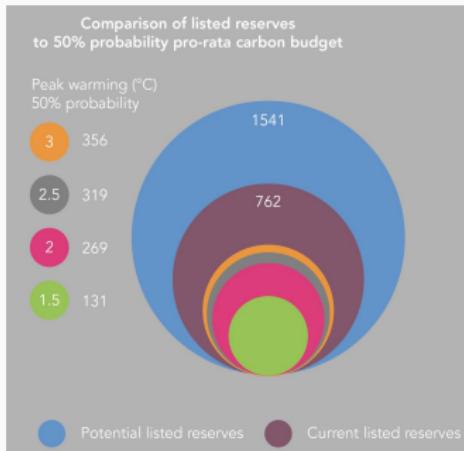
Transition risks (NGFS 2019)



Transition risks for financial stability. Source: NGFS (2019)

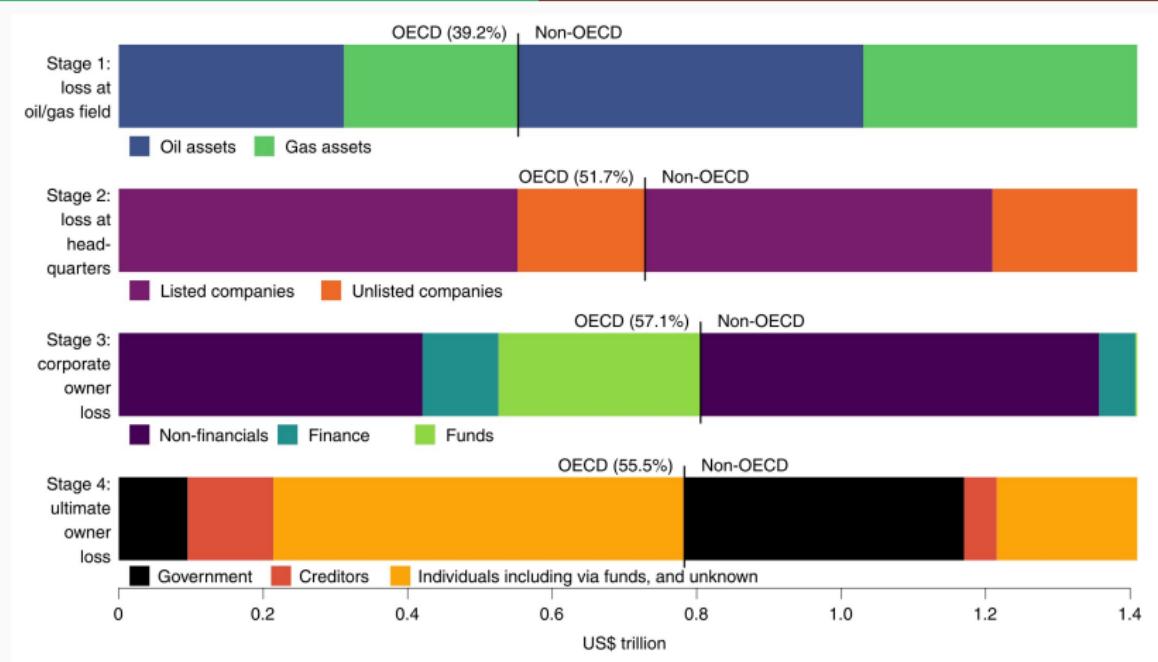
The ‘carbon bubble’

- Unburnable carbon affects market cap of fossil fuel companies
 - Market cap function of future stream of profits from extracting and selling reserves
 - What happens if they remain in the ground?
- ‘Carbon bubble’ concept first proposed by [Leaton \(2011\)](#) and [Leaton et al. \(2013\)](#)
 - Reserves of top 200 companies in coal/oil/gas sectors (around 1/4 of total)
 - Incompatible with 2°C carbon budgets



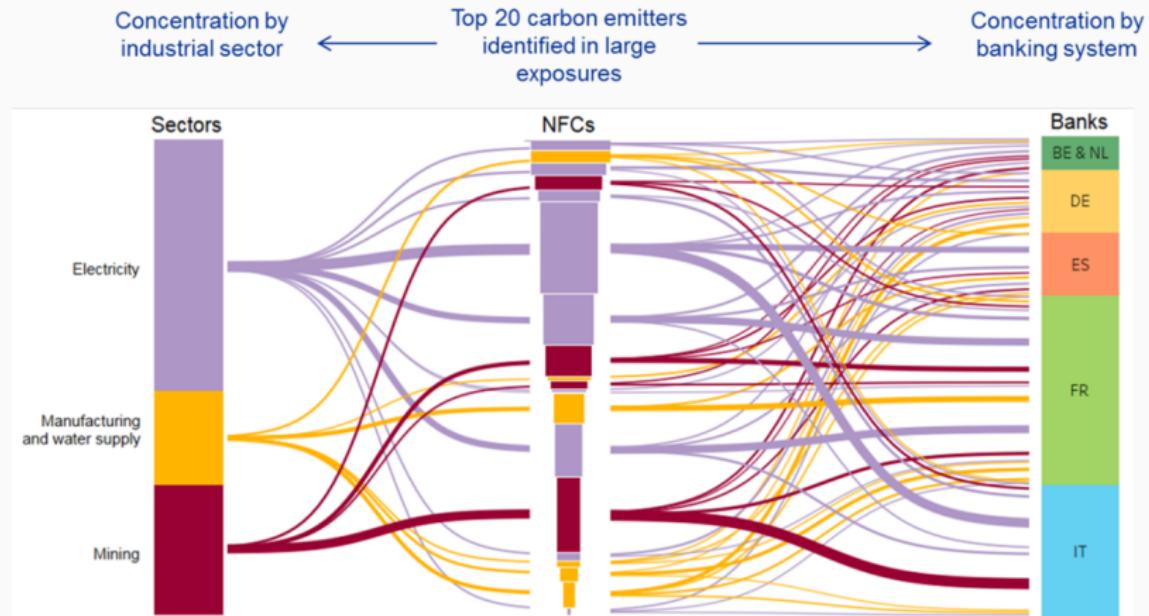
The carbon bubble ([Leaton 2013](#))

Chains of ownership exposure



Ownership chain of stranded assets by OECD/non-OECD geography and major institutional categories ([Semieniuk et al. 2022](#))

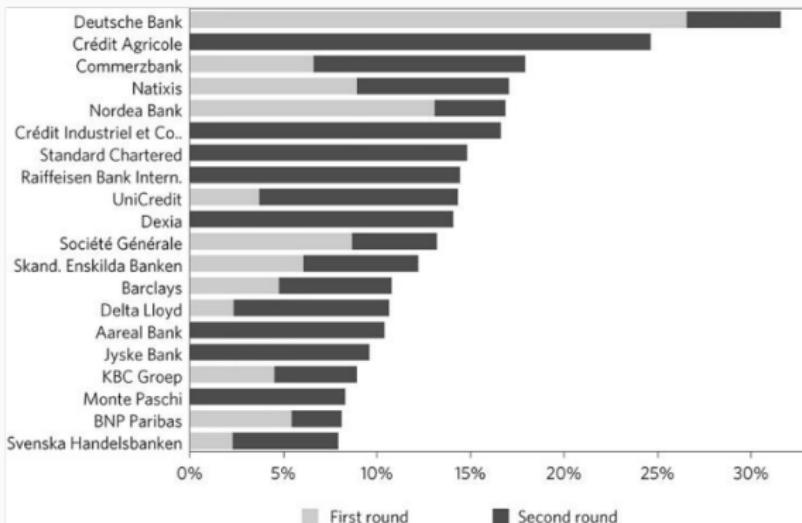
Financial exposure



Euro area banks' large exposures to reporting firms with the highest carbon emissions.
Middle bar: height reports loans; width reports emissions ([Giuzio et al 2019](#))

Financial networks and the transition

- Financial networks
 - Connections of cross-exposure among financial institutions
 - Financial contagion risks ([Acemoglu et al., 2015](#))



First- and second-round losses in banks' equity for most affected EU listed banks.
100% shock in fossil fuel and utility sectors ([Battiston et al. 2017](#))

Macro-financial transition channels

- Banking channel
 - Credit rationing via higher interest mark-ups or restrictions
 - This would in turn lead to a drop in investments
- Confidence channel
 - Less demand for investments from firms
 - Tobin's q and uncertainty roles
- Inflation channel
 - Higher prices for energy, materials, food products, or others
- Consumption channel
 - Loss of household income via unemployment or wealth decline
- Public debt channel
 - Increase in public spending (unempl. subsidies, bailouts, etc)
 - Possible increase in cost of emitting new debt
 - Possible impact also on corporate bonds.

A Climate Minsky moment?

- Additional macro impacts
 - Inflation rates, trade balances, exchange rates..
 - All contribute in depressing aggregate demand
- Climate Minsky Moment or Green Swan
 - A scenario in which misalignment of expectations with reality..
 - ..lead to an abrupt adjustment of financial assets..
 - ..which causes a loss of wealth..
 - ..depressing consumption and investment..
 - ..leading the economy in a recession.
- Avoid that at all costs!



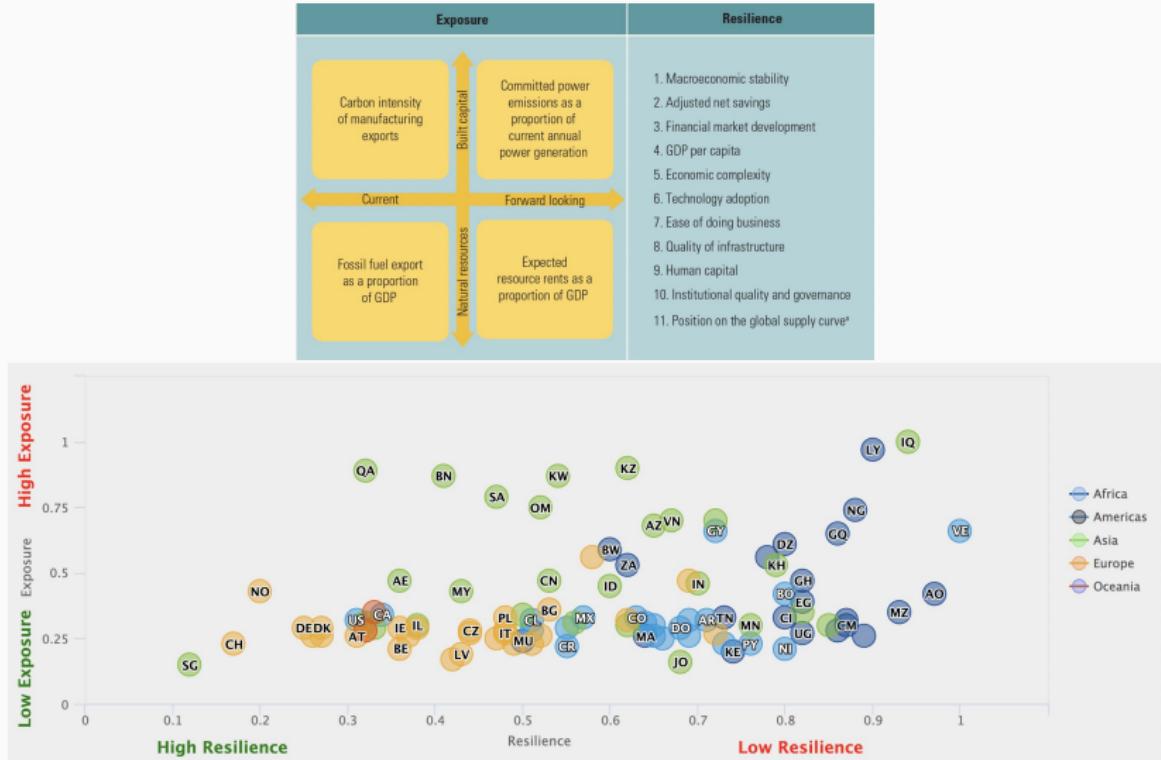
Bolton et al. (2020)

Vulnerability and transition-related expectations

What about vulnerability?

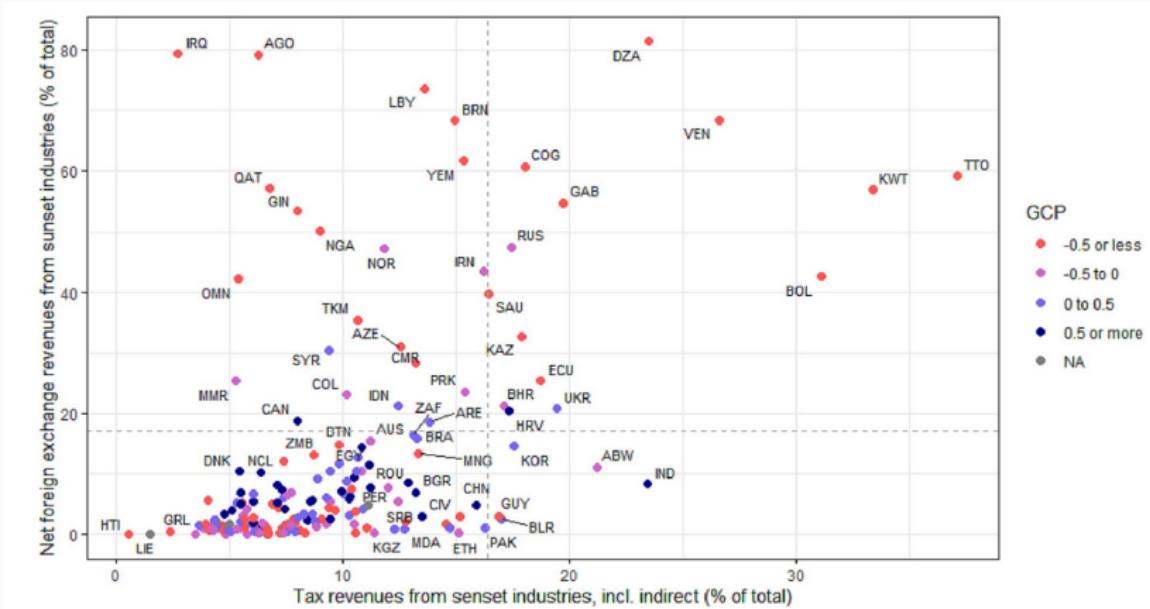
- Promising research avenues on exposure:
 - Data needed: granular (asset/firm-level), spatial, open-access (e.g. [Global Energy Monitor](#))
 - Bank/financial data → central bank datasets
- However, exposure doesn't tell us much about vulnerability and thus final costs
 - How will the system behave in the face of hazards?
 - How aware/prepared are we to hazards?
 - How resilient is the system to hazards?
 - How easily it transforms?
 - System made of multiple dynamic agents
- Some static ways to address this
 - Compare exposure with some measure of preparedness / capacity to transform

TMRs: (static) vulnerability (i)



Countries' Preparedness for a Low-Carbon Transition. Source: [IMF Climate Change Dashboard](#) with data from [Peszko et al. \(2020\)](#)

TMRs: (static) vulnerability (ii)



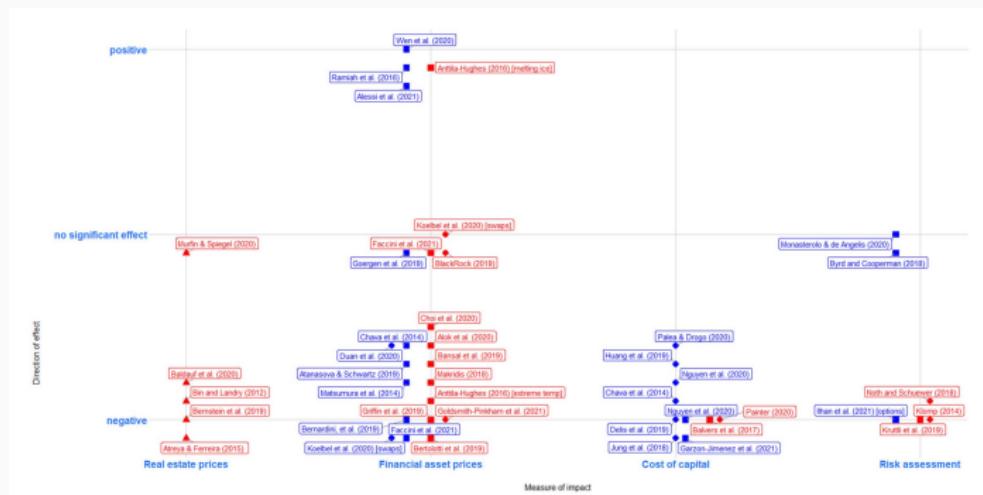
Countries' external/fiscal exposure to the low-carbon transition and their Green Complexity Potential (GCP). Source: [Magacho et al. \(2023\)](#)

TMR dynamic vulnerability: large knowledge gaps

- However, TMR vulnerability is dynamic/endogenous in nature
 - Alignment of expectations to reality
 - Responsiveness of beliefs/decisions to new information
 - Micro → macro aggregation (emergent behaviours, herding, norms)
 - Volatility of policies and transition dynamics
- We still know very little on these dimensions
 - What are current transition-related expectations?
 - What are their dynamic features; and how to manage them?
 - How do we incorporate them in economic modelling in their full complexity (heterogeneous, dynamic, biased)?

Capturing transition-related expectations (i)

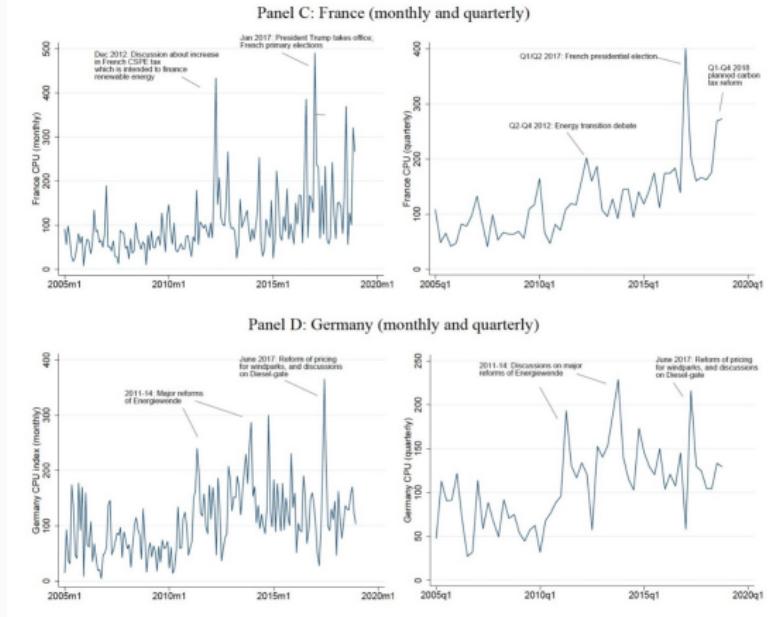
- Apply econometric methods to financial market data
- Financial econ on the problem (e.g. Bolton & Kacperczyk, 2021) but still conflicting evidence



Changes in asset prices due to physical (red) and transition (blue) risk drivers.
Symbols denote stocks and options (square); bonds and loans (circle); and real estate (triangle). Source: [Campiglio et al. \(2023\)](#)

Capturing transition-related expectations (ii)

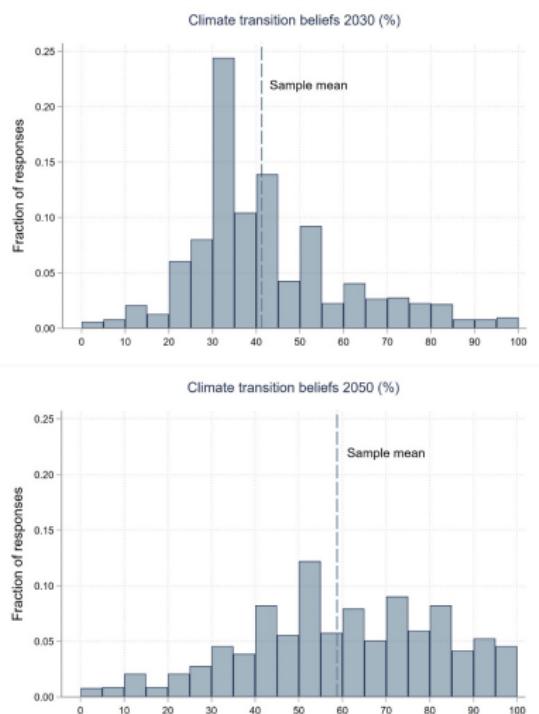
- Study communications to capture sentiments or uncertainty
- Social media posts, queries, newspaper articles..



Climate Policy Uncertainty with associated events. Source:
Beresticki et al. (2023)

Capturing transition-related expectations (iii)

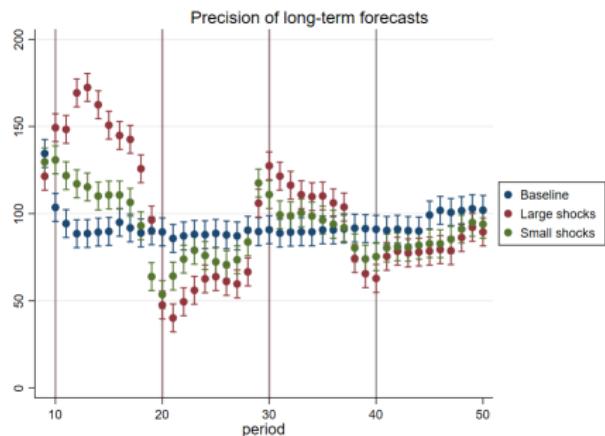
- Elicit beliefs directly via surveys
 - Recently improved methods (e.g. experimental treatments)
 - Large literature on macro expectations (Bachmann et al. 2023)
- On transition: surprisingly little data!



Expected renewable share - US retail investors.
Source: Ceccarelli & Ramelli (2024)

The dynamics of transition-related expectations

- How do transition-related expectations move?
 - Survey waves (in the future)
 - Experiments: study incentivised behaviour/interactions
- Learning-to-forecast (LtF) macro experiments
 - Used in macro to study inflation expectations
 - Ongoing work: carbon price expectations



Long-term carbon price expectations.
Government commitments shock treatments
(large vs small). Source: Campiglio, Erazo
Diaz, Lamperti, Terranova (ongoing)

Sustainable finance policy-making

Who guards the financial regime?

- Government
 - Ultimate decision-maker on development strategies
 - Can be more or less democratic/market-oriented/efficient
- Central banks
 - Delegation from the government with stated mandates
 - Price stability; macroprudential stability; employment; etc.
 - How independent is the central bank?
- Financial supervisors
 - Also public institution with a delegation
 - Microprudential aims: protect financial service consumers
 - Often specialised (insurance, banks, securities)

The main international initiatives

- Task Force for Climate-Related Financial Disclosures (TCFD)
 - Develop standardised voluntary risk reporting methods
- G20 Sustainable Finance Study Group
 - At first Green Finance Study Group, then renamed
 - Political divergences within
- Network for Greening the Financial System (NGFS)
 - Coalition of willing institutions
 - Europe+China driver
- EU Sustainable Finance Initiative
 - High-Level Expert Group (HLEG) on Sustainable Finance 2018
 - EU Commission Action Plan on Sustainable Finance
 - Technical Expert Group on Sustainable Finance
 - Legislative proposals and regulations on taxonomy, benchmarks, etc.
 - Platform of Sustainable Finance advisory body

Is there space for sustainable finance policy-making?

- In free-market economies, traditional stance is for policy-makers to stay out of regulating financial dynamics
 - Might be ok to put rules to protect consumers..
 - ..but allocation of finance is better performed by private actors
- Incentivising green credit might not be regulators' role
 - Backfire risk: favouring a green bubble?
 - Unless: reliable evidence of higher financial risk attached to dirty or climate-exposed assets
 - Financial risk as a lens to include climate-related matters into the regulators' attention (prudential purposes)
 - Different attitude in many emerging economies (promotional purposes)

Policy approach (i): clarify concepts and rules

- Investors need a commonly agreed interpretation of categories and rules
 - What does it mean to be 'green'?
 - Avoid greenwashing
- Development of a 'taxonomy' of sustainable activities
 - EU taxonomy for sustainable activities
- Development standards for financial products
 - EU green bond standard
- Develop benchmarks for low-carbon investment strategies
 - EU climate-related benchmarks
- Clarify investors' and asset managers' sustainability duties
 - Information to clients

- List of environmentally sustainable economic activities
 - The EU Taxonomy Compass
- Six climate and environmental objectives
 - Climate change mitigation
 - Climate change adaptation
 - Sustainable use and protection of water and marine resources
 - Transition to a circular economy
 - Pollution prevention and control
 - Protection and restoration of biodiversity and ecosystems
- Qualifying conditions
 - Make substantial contribution to one+ environmental objective
 - Do no significant harm to other environmental objectives
 - Comply with minimum safeguards (e.g. human rights)
 - Comply with objective-specific technical screening criteria

Taxonomy compliance timeline

As of January 2022	<ul style="list-style-type: none">Non-Financial entities report Taxonomy eligibility for the previous calendar year*Financial entities report Taxonomy eligibility for the previous calendar year*
As of January 2023	<ul style="list-style-type: none">Non-Financial entities report eligibility and alignment for the previous calendar yearFinancial entities report Taxonomy eligibility for the previous calendar year
As of January 2024	<ul style="list-style-type: none">Non-Financial entities report eligibility and alignment for the previous calendar yearFinancial entities report Taxonomy eligibility and alignment for the previous calendar year
As of January 2025	<ul style="list-style-type: none">Financial entities may include estimates on Taxonomy alignment for DNSH assessments of third-country exposures subject to the 2024 review period
As of January 2026	<ul style="list-style-type: none">Credit institutions include Taxonomy alignment of their trading book and fees and commissions for non-banking activities

Overview of timeline for reporting requirements. Source: [European Commission \(2023\)](#)

Policy approach (ii): risk assessment

- Unclear how to calculate exposure to climate/transition risks
 - Exposure of business operations (firms)
 - Exposure of financial assets (financial institutions)
 - Exposure of financial systems (financial supervisors)
- First, more data needed
 - Data on impacts, technology, finance, emissions, assets..
 - See [NGFS Report on 'Bridging data gaps'](#)
- Second, methodologies needed
 - Financial institutions very active in developing new methods
 - Development of climate-related stress testing methodologies by central banks
 - Prospective modelling efforts → Lectures 6-10

Policy approach (iii): risk disclosure

- Once assessed, risk exposure needs to be disclosed for market discipline (and regulation) to work
- Examples
 - See: Task Force for Climate-Related Financial Disclosures (TCFD)
 - See: EU Disclosure Regulation
 - See French Energy Transition Law (Art. 173)

Core Elements of Recommended Climate-Related Financial Disclosures



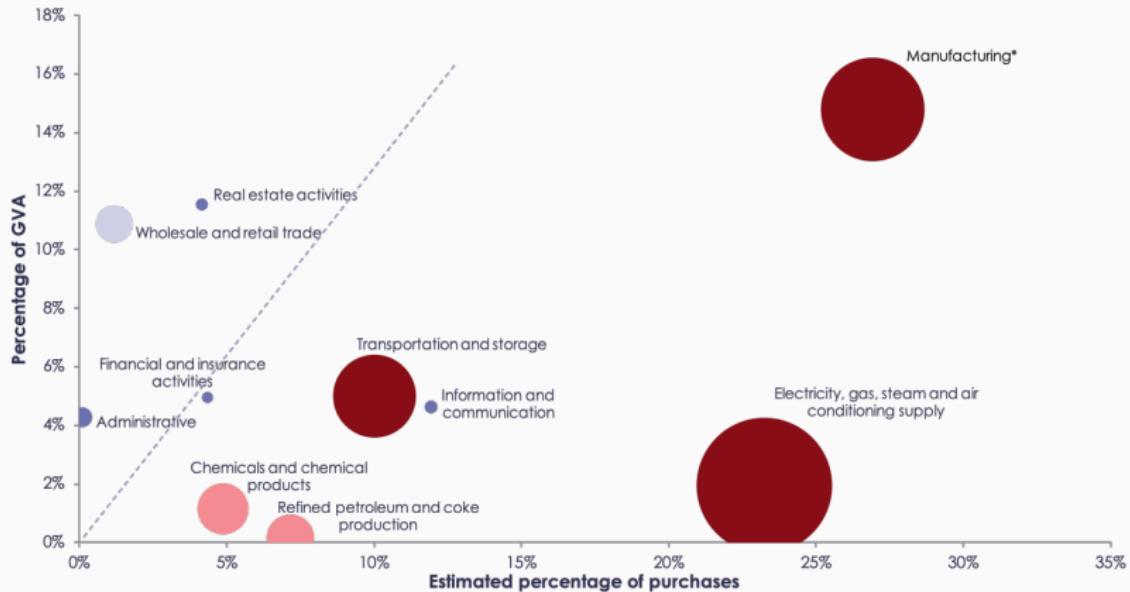
Sustainable finance: promotional policies

- Recalibrate prudential regulations so to give incentives to low-carbon investments:
 - Similar in spirit to a carbon price
 - Capital, liquidity and reserve requirements
 - E.g. Banque de Liban differentiated reserve ratios
- Use monetary policy tools to offer incentives:
 - Bank of Japan refinancing conditions depending on greenness
 - Chinese MPA framework by PBoC: greener banks pay lower interest rates on reserves
- Force banks to give credit:
 - Credit quotas set by Reserve Bank of India and Bank of Bangladesh

Green quantitative easing

- Quantitative easing (QE):
 - Programmes of purchase of financial assets by central banks (ECB, Fed, BoE, BoJ..)
 - Necessary when policy interest rates reach zero
 - Mainly sovereign bonds, but also corporate bonds, ABS, ..
 - Driving criteria: market neutrality
- Green quantitative easing idea:
 - Purchase green assets (e.g. 'green bonds') to ensure liquidity to green activities and lower their financing costs
 - Might help ease current high-carbon bias of QE programmes

A high-carbon bias in the ECB QE programme?



Size of bubble indicates relative contribution to emissions in the Eurozone. Source:
Matikainen et al. (2017)

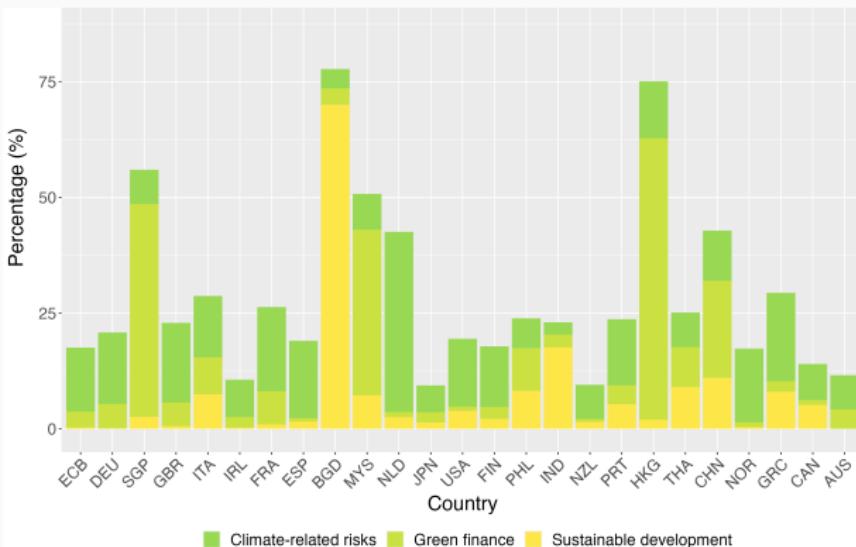
The Green Central Banking Scoreboard

Rank	Country	Aggregate Score (out of 130)	Grade (A+ to F)	Research and Advocacy (out of 10)	Monetary Policy (out of 50)	Financial Policy (out of 50)	Leading by Example (out of 20)
1	France	70	B-	10	12	31	17
2	Italy	61	C+	10	12	31	8
3	Germany	60	C+	10	12	30	8
4	European Union	58	C	10	12	28	8
5	United Kingdom	56	C	10	10	27	9
6=	Brazil	53	C	10	18	18	7
6=	China	53	C	10	12	31	0
8	Japan	35	D+	10	6	14	5
9	Indonesia	30	D+	10	1	14	5
10	Canada	28	D	10	2	14	2
11	Mexico	23	D	10	4	4	5
12	India	21	D	10	0	10	1
13	South Korea	19	D-	10	1	6	2
14	Russia	18	D-	8	0	8	2
15	Australia	17	D-	10	0	4	3
16	United States	16	D-	10	0	6	0
17	Turkey	14	D-	10	0	2	2
18	South Africa	13	D-	10	0	2	1
19	Argentina	6	F	6	0	0	0
20	Saudi Arabia	0	F	0	0	0	0

The management of climate-related expectations

- How to align expectations in support of smooth and rapid transition?
 - Key dimension: policy and institutional credibility
 - Focus for financial system: central banks
- Most appropriate institutional framework?
 - Stick to narrow mandate interpretations..
 - .. become climate policy-maker..
 - .. or alternative technocratic solution (carbon central bank)?
- Communication strategies to align expectations
 - Ongoing work: Central bank speech dataset \approx 32,000 speeches from 131 central banks
 - Small but significant impact on green vs dirty returns

Varieties of central bank climate-related narratives



Variety of climate narratives in top 25 central bank communication strategies. Source: Campiglio, Deyris, Romelli, Scalisi (ongoing)

- Promotional CBs in lower-income countries → *Sustainable development*
- Promotional CBs in Asian financial hubs → *Green finance*
- Prudential CBs in Western countries → *Climate-related risks*

Conclusions

- Double role of macro-finance
 - Provide resources for green investments
 - High-carbon orderly phase-out
 - → Several obstacles to both
- The key role of transition-related expectations
 - Alignment/misalignment and responsiveness key drivers of disruption (vulnerability to risk)
- What can the regulator do?
 - Several strategies, from prudential to promotional
- What does all of this mean for future transition pathways
 - → Prospective dynamic modelling needed (next lectures)

Additional slides: The guardians of the financial regime

Central banks

- National/regional institutions
 - European Central Bank (ECB); Federal Reserve (Fed); Bank of England (BoE); Bank of Japan (BoJ); People's Bank of China (PBOC); Reserve Bank of India (RBI); Hong Kong Monetary Authority (HKMA); ..
- Historical evolution
 - Originally banks of the sovereign (e.g. war financing)
 - Lenders of last resort; monopoly on note issuing; public ownership; reserve system
 - Central bank independence (CBI) and inflation targeting
 - Global financial crisis: central banks to the rescue! → new powers, new responsibilities

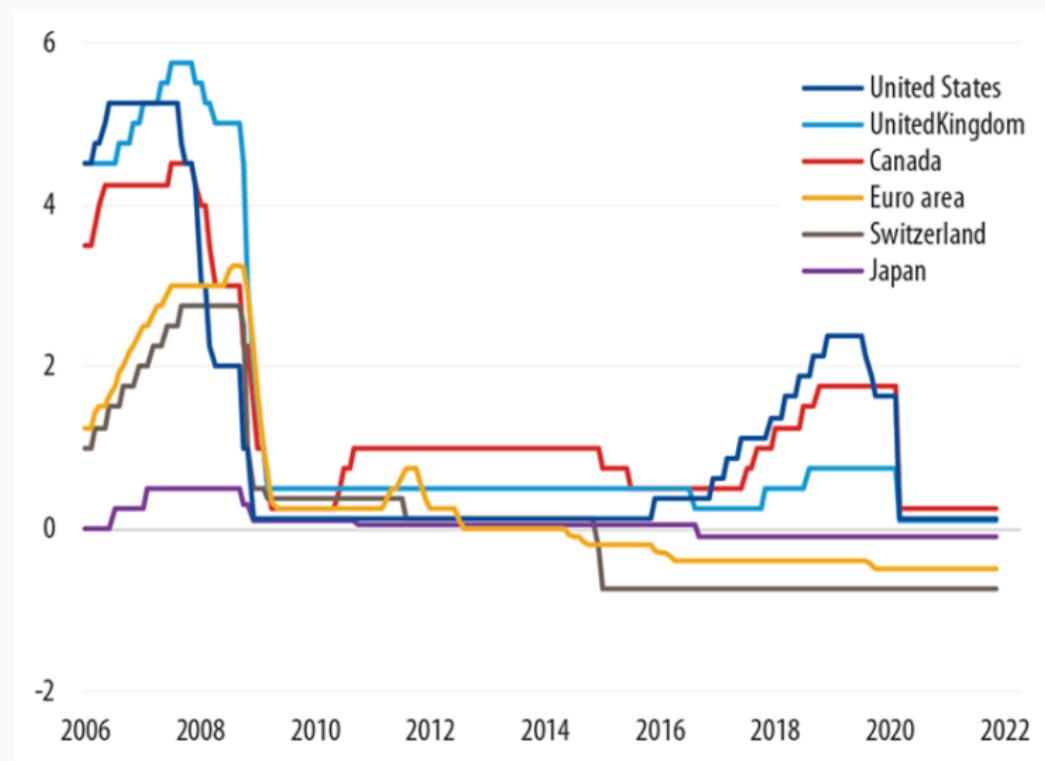
Central banks' mandates

- Price stability
 - E.g. ECB 2% inflation target over the medium term (ie. with overshoots allowed) (before 2021: 'below, but close to, 2%)'
- Economic support
 - TFEU Art. 127: ECB "shall support the general economic policies in the Union", if this is "without prejudice to the objective of price stability"
 - Fed 'dual mandate': stable inflation and maximum sustainable employment
- Other goals
 - Stable exchange rates; government lending; etc.

Central banks' policy tools

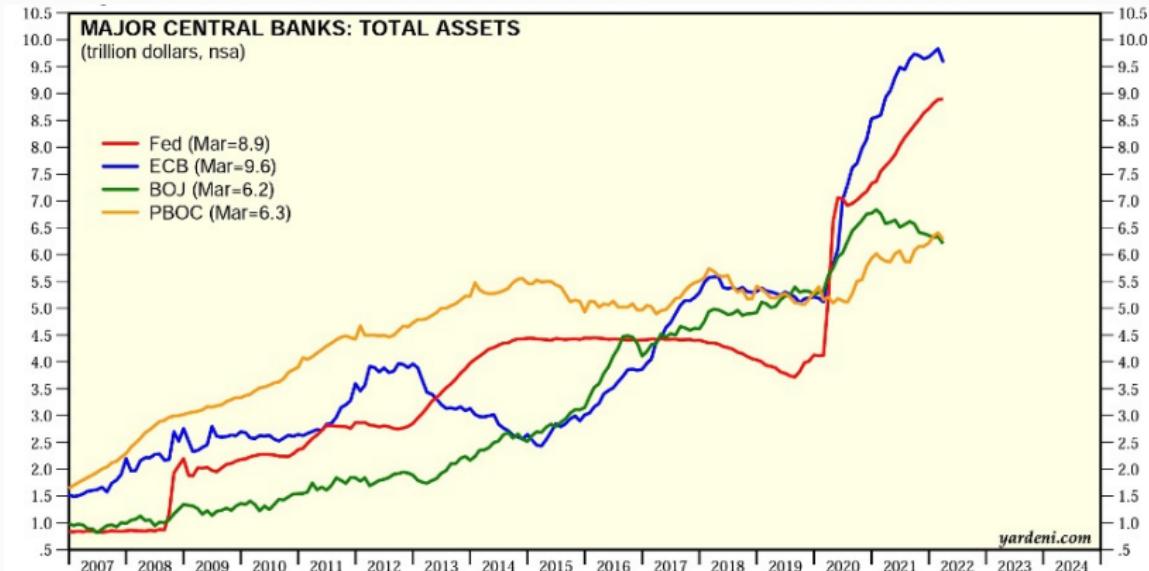
- Set the reference interest rate
 - Price at which commercial banks can borrow from CB → Drives (imperfectly) other rates and bank lending
 - Inflation increases → Rise interest rates (money more expensive)
 - Low inflation or growth → Cut interest rates (cheaper money)
- Other policy tools depending on jurisdiction and context
 - Reserve ratio requirements; Interests on excess reserves; Collateral requirements; Forward guidance; Foreign reserve management; etc.
 - Unconventional monetary policy: Quantitative Easing

Policy interest rates



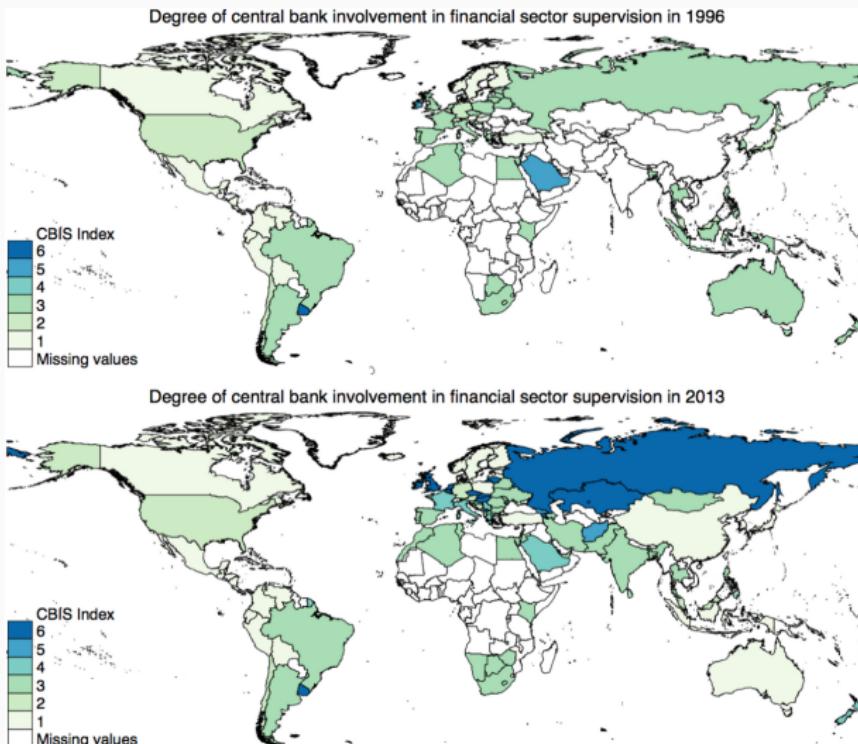
Evolution of policy rates of selected central banks. Source: IMF (2022) from BIS data

Quantitative easing and central bank balance sheets



Evolution of balance sheets of selected central banks. Source: [Yardeni Research \(2022\)](#)

The return of CB financial supervision



Central bank involvement in supervision (CBIS) index. Source: [Masciandaro and Romelli \(2018\)](#)

Indices of central bank independence

Selected indices of central bank independence

(main components of the indices)

Grilli, Masciandaro and Tabellini (1991)	Cukierman, Webb and Neyapti (1992)
Political independence	Legal independence
1. Governor not appointed by government	1. Chief Executive Officer (CEO): <ul style="list-style-type: none">term of office;appointed by;dismissed by;possibility of holding other offices in government.
2. Governor's term > 5 years	
3. All Board members not appointed by government	
4. Board term > 5 years	
5. No mandatory government representative on Board	
6. No government approval for monetary policy formulation	2. Policy formulation <ul style="list-style-type: none">Who formulates monetary policy?Who has the final word in the resolution of conflict?
7. Statutory requirement to pursue monetary stability	
8. Provisions to strengthen the central bank in the event of conflict with the government	
Economic independence	
1. Direct credit facility to government is: <ul style="list-style-type: none">not automatic;at market interest rates;temporary;for a limited amount.	3. The objectives of the central bank <ul style="list-style-type: none">Price stability is sole objective or one among others
2. Central bank does not participate in primary market for government debt	4. Limitations on lending to the government <ul style="list-style-type: none">Types of lending (advances, securitised lending)Terms of lending (maturity, interest, amounts)Who controls the lending terms?
3. Discount rate is set by central bank	
4. Banking supervision entrusted to central bank	
5. Banking supervision entrusted to central bank alone	

Sources: Grilli, Masciandaro and Tabellini (1991) and Cukierman, Webb and Neyapti (1992).

Central bank independence scores

Measures of central bank independence in G20 economies

(index value from 0 to 1)

Central bank of	Bodea and Hicks (2015)		Garriga (2016)	
	2005	2014	2005	2012
Argentina	0.78	0.73	0.82	0.77
Australia	0.31	0.31	0.35	0.35
Brazil	0.25	0.25	0.17	0.17
Canada	0.47	0.47	0.48	0.48
China	0.69	0.69	0.55	0.55
ECB	0.86	0.86*	0.80	0.80
India	0.25	0.25	0.26	0.26
Indonesia	0.95	0.95	0.83	0.83
Japan	0.44	0.44	0.55	0.55
Korea	0.40	0.40	0.44	0.44
Mexico	0.64	0.64	0.67	0.67
Russia	0.60	0.60	0.64	0.64
Saudi Arabia	n.a.	n.a.	0.42	0.42
South Africa	0.41	0.41	0.43	0.45
Turkey	0.80	0.80	0.86	0.86
United Kingdom	0.58	0.58	0.59	0.59
United States	0.51	0.51	0.40	0.40

Sources: Authors' own elaboration using the indices calculated by Bodea and Hicks (2015) and by Garriga (2016).

Central bank independence scores. Source: Dall'Orto Mas et al. (2020)

Financial supervisors

- Semi-autonomous agencies with prudential aims
 - Protection of financial service consumers; stability of markets
 - More micro- than macro-prudential
- Structured by markets
 - EU: European Banking Authority (EBA); European Securities and Markets Authority (ESMA); European Insurance and Occupational Pensions Authority (EIOPA)
 - China: China Banking and Insurance Regulatory Commission (CBIRC); China Securities Regulatory Commission (CSRC)

Basel III regulation

Capital					Liquidity
	Pillar 1		Pillar 2	Pillar 3	
	Capital	Risk coverage	Containing leverage	Risk management and supervision	Market discipline
All Banks	<p>Quality and level of capital</p> <ul style="list-style-type: none"> Raising minimum common equity to 4.5% of risk-weighted assets, after deductions. A capital conservation buffer comprising common equity of 2.5% of risk-weighted assets brings the total common equity standard to 7%. Constraints on a bank's discretionary distributions will be imposed when it falls into the buffer range. A countercyclical buffer within a range of 0–2.5% comprising common equity will apply when credit growth is judged to result in an unacceptable build-up of systematic risk. <p>Capital loss absorption at the point of non-viability</p> <p>Allowing capital instruments to be written off or converted to common shares if the bank is judged to be non-viable. This will reduce moral hazard by increasing the private sector's contribution to resolving future banking crises.</p>	<p>Revisions to the standardised approaches for calculating</p> <ul style="list-style-type: none"> credit risk; market risk; credit valuation adjustment risk; and operational risk <p>mean greater risk-sensitivity and comparability.</p> <p>Constraints on using internal models aim to reduce unwarranted variability in banks' calculations of risk-weighted assets.</p> <p>Counterparty credit risk</p> <p>More stringent requirements for measuring exposure; capital incentives to use central counterparties for derivatives; a new standardised approach; and higher capital for inter-financial sector exposures.</p> <p>Securitisations</p> <p>Reducing reliance on external ratings, simplifying and limiting the number of approaches for calculating capital charges and increasing requirements for riskier exposures.</p> <p>Capital requirements for exposures to central counterparties (CCPs) and equity investments in funds to ensure adequate capitalisation and support a resilient financial system.</p> <p>A revised output floor, based on Basel III standardised approaches, limits the regulatory capital benefits that a bank using internal models can derive relative to the standardised approaches.</p>	<p>A non-risk-based leverage ratio including off-balance sheet exposures is meant to serve as a backstop to the risk-based capital requirement. It also helps contain system-wide build-up of leverage.</p> <p>Supplemental Pillar 2 disclosure requirements address firm-wide governance and risk management, including the risk of off-balance sheet exposures and securitisation activities; sound compensation practices; valuation practices; stress testing; corporate governance and supervisory colleges.</p> <p>Interest rate risk in the banking book (IRRBB)</p> <p>Extensive guidance on expectations for a bank's IRRBB management process; enhanced disclosure requirements; strict threshold for identifying outlier banks; updated standardised approach.</p>	<p>Revised Pillar 3 disclosure requirements</p> <p>Consolidated and enhanced framework, covering all the reforms to the Basel framework. Introduces a dashboard of banks' key prudential metrics.</p>	<p>The Liquidity Coverage Ratio (LCR) requires banks to have sufficient high-quality liquid assets to withstand a 30-day stressed funding scenario that is specified by supervisors.</p> <p>The longer-term, structural Net Stable Funding Ratio (NSFR) is designed to address liquidity mismatches. It covers the entire balance sheet and provides incentives for banks to use stable sources of funding.</p> <p>The Committee's 2008 guidance Principles for Sound Liquidity Risk Management and Supervision takes account of lessons learned during the crisis. It is based on a fundamental review of sound practices for managing liquidity risk in banking organisations.</p> <p>Supervisory monitoring</p> <p>The liquidity framework includes a common set of intraday and longer-term monitoring metrics to assist supervisors in identifying and analysing liquidity risk trends at both the bank and system-wide level.</p>
SIBs	<p>The Committee identifies global systemically important banks (G-SIBs) using a methodology that includes both quantitative indicators and qualitative elements. In addition to meeting the Basel III risk-based capital and leverage ratio requirements, G-SIBs must have higher loss absorbency capacity to reflect the greater risks that they pose to the financial system. The Committee also developed principles on the assessment methodology and the higher loss absorbency requirement for domestic systemically important banks (D-SIBs).</p>				
	<p>Large exposures</p> <p>Large exposures regime established to mitigate systemic risks arising from interlinkages across financial institutions and concentrated exposures.</p>				

Basel III regulation. Source: Bank of International Settlements