em lyon business school

TRANSITION(S)

STRATEGY | FINANCE | TRAINING

A few administrative elements

Just a few elements

em lyon business school

- PLEASE SEND AN EMAIL BEFOREHAND IF YOU ARE GOING TO MISS THE SESSION!

- I am taking students who want to do PFE/PPP in the following areas :
  - Green Finance
  - Financial Economics
  - Energy Economics
  - Energy transition
  - + Entrepreunariat

- If you are interested, my company publishes a weekly newsletter with jobs / internships / alternance / VIE in the energy transition in the Region (and it's free) => https://lalisteverte.substack.com/

Evaluation

- Individual essay
- Pick one topic
- Present a written answer to the topic for October 31st at the latest (email to: coqueret@em-lyon.com or jb.vaujour@transitions.earth)
- Concision is valued: 10 pages maximum
- Should provide your assesment of the issue based on factual elements and/or calculations if required

- Carbon-related financial indicators and their limits
- Carbon pricing techniques used by listed companies
- Designing environmental stress tests for the banking sector
- **Micro study:** green portfolios: the case of European firms
- **Macro study:** the links between economic and ESG indicators
- Pick your own topic (to be validated with teacher first)

Green Finance:
from concepts to advanced instruments

Session 4: the banking system

Refresher

Main messages from previous sessions

- Climate risk is a systemic risk with high levels of uncertainty and non-trivial fat-tail risk (i.e. “green swan”)
- Climate risk cannot be fully priced-in
- Climate risk can be divided into different categories: physical, transition and reputational risk
- Contagion channels are a key factor in the transformation of a local (geography-wise or sector-wise) event in a full blown crisis
- Trillions of dollars need to be channelled from traditional sectors towards green sectors
- Significant regulatory efforts have been undertaken (CSDR, EuGB, Taxonomy…) in order to provide financial markets and investors with the necessary information to align their individual behaviour with the collective interest

- **Banks are at the conjunction of the economy, providing debt financing to companies and households and are thus exposed to climate change through their exposures; at the same time, they are the perfect conduit to spread a local crisis to a global, systemic level. How does the banking system tackle this ?**

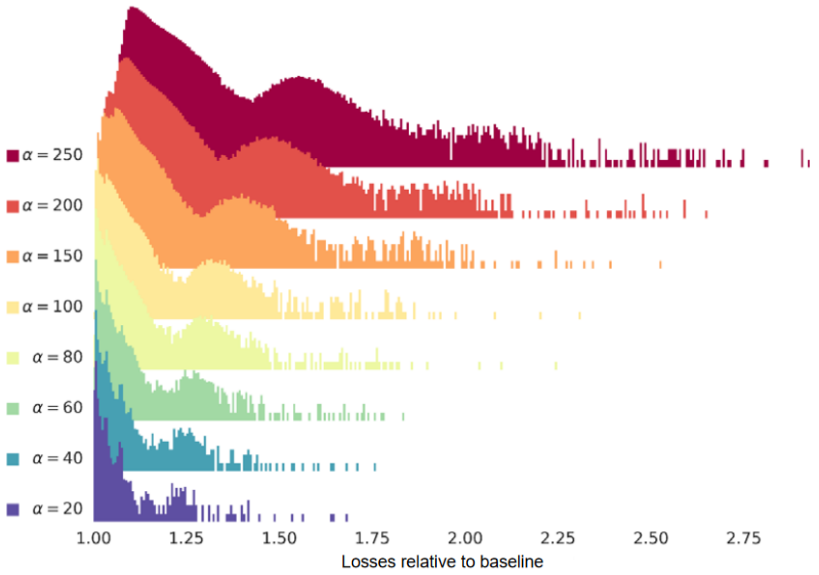
A few facts and figures

- Exposures to carbon-intensive firms represent 14% of banking balance sheets (ESRB, 2021)
- Natural hazards could impact up to 30% of euro area bank corporate exposures (ESRB, 2021)
- 70% of banking system credit exposures to firms subject to high or increasing physical risk hazards over the next decades are concentrated in the portfolios of only 25 banks (ESRB, 2021)
- Total financial exposure (banks + IF+ Insurance) to fossil fuels exceeds € 1 trillion and losses could amount to € 350-400 billion in an orderly transition scenario (ESRB, 2016; ECB, 2021)
- Losses from stranded assets could amount to € 6 trillion in a disorderly transition scenario (IRENA, 2017; ECB, 2021)

Figure 1

Banking system losses for different changes in carbon price

(alpha: change in carbon price; loss difference calculated as loss in simulation relative to baseline)



Sources: Supervisory Statistics, Urgentem and ECB calculations.
Notes: Results are based on a sensitivity study using a banking system interconnectedness model based on firm-level exposures and emissions of euro area large exposures. The quantifications assume full pass-through of the changes in carbon (alpha) price to firms and no reductions in firm emissions for different levels of carbon price. Data gaps in firm-level emissions are filled with country-sector averages. Firms' assets are impacted proportionally to their emissions, in turn affecting their PDs (Merton model). Loss distributions are based on 250,000 Monte Carlo simulations. Heights are log-densities.

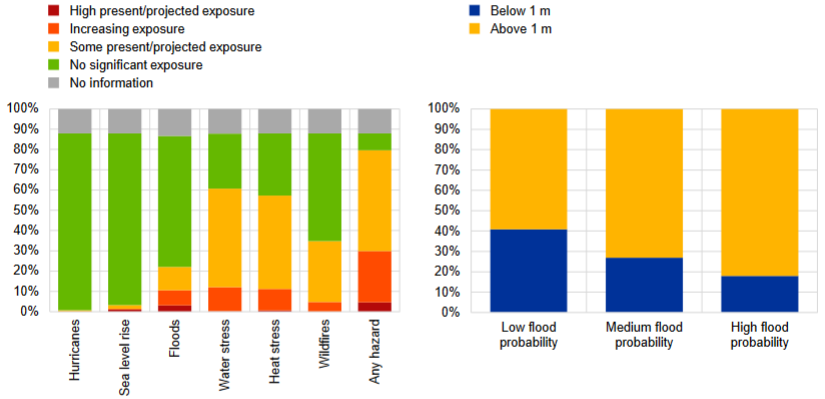
Source: ECB/ESRB Project Team on climate risk monitoring, Climate-related risk and financial stability, ESRB, July 2021, 119 pages.

A few facts and figures - Continued

Chart 2

Around 30% of euro area banking system credit exposures to NFCs are to firms exposed to high or increasing risk, while it is possible for low probability events to have a large impact

Share of euro area banks' credit exposures to firms by corporate physical risk level
(percentages of total bank exposures to NFCs)



Average flood depth for different flood probabilities

(percentages of bank exposures to NFCs with corresponding flood probability)

Sources: AnaCredit, Four Twenty Seven, JRC RDH and ECB calculations.
Notes: Bank loan exposure is taken from AnaCredit and matched with Four Twenty Seven data at corporate level. Credit exposures to NFCs above €25,000 are considered; total exposures amount to €4.2 trillion. 31% of exposures can be matched directly, 58% are matched using postcode-level aggregates of the Four Twenty Seven corporate level indicators and 11% cannot be matched this way due to missing geo-locational information in AnaCredit ("no information"). Right panel: The bars refer to euro area banking system exposures to NFCs located in areas with low, medium or high flood probability. See Data Supplement for details on the calculation of indicators and matching with AnaCredit exposures. Data as at December 2020.

Table 1

Estimation of protection gap for European countries for a set of key perils[28]

COUNTRY	Estimate of protection gap today All perils	Estimate of protection gap today Earthquake	Estimate of protection gap today Flood	Estimate of protection gap today Wildfire	Estimate of protection gap today Windstorm
EU	1.0	1.0	1.0	1.6	1.0
Austria	2.0	1.8	3.4	2.6	0.0
Belgium	1.7	1.3	1.9	2.0	1.6
Bulgaria	2.0	3.2	1.7	2.0	1.2
Croatia	2.4	2.8	2.0	3.0	1.6
Cyprus	1.9	2.5	1.0	3.0	1.0
Czech Republic	1.9	1.8	2.0	2.0	1.6
Denmark	0.0	0.0	0.0	0.0	0.0
Estonia	1.1	0.0	0.0	3.0	1.5
Finland	0.7	0.0	1.0	0.0	1.8
France	0.5	0.0	0.0	2.0	0.0
Germany	1.6	1.6	2.6	1.0	1.1
Greece	2.2	3.5	1.7	2.0	1.6
Hungary	1.3	1.3	1.9	1.0	1.1
Iceland	1.0	1.0	1.0	n/a	1.0
Ireland	0.7	0.0	0.0	1.0	1.9
Italy	2.4	3.5	1.7	2.0	2.5
Latvia	0.9	0.0	1.0	1.0	1.7
Lithuania	1.3	0.0	1.0	2.0	2.0
Liechtenstein	n/a	n/a	n/a	n/a	n/a
Luxembourg	1.6	1.3	2.0	2.0	1.1
Malta	2.3	2.8	1.7	3.0	1.6
Netherlands	1.9	2.0	4.0	0.0	1.6
Norway	0.0	0.0	0.0	0.0	0.0
Poland	1.6	2.0	1.0	1.0	2.3
Portugal	2.0	1.8	1.6	3.0	1.7
Romania	1.7	3.1	1.6	1.0	1.2
Slovakia	2.4	1.9	3.0	3.0	1.6
Slovenia	1.5	2.4	1.3	1.0	1.2
Spain	0.9	0.0	0.0	2.0	1.4
Sweden	0.4	0.0	0.0	0.0	1.6

0	No risk
1	Low risk
2	Low/medium risk
3	Medium/high risk
4	High risk
n/a	Not available

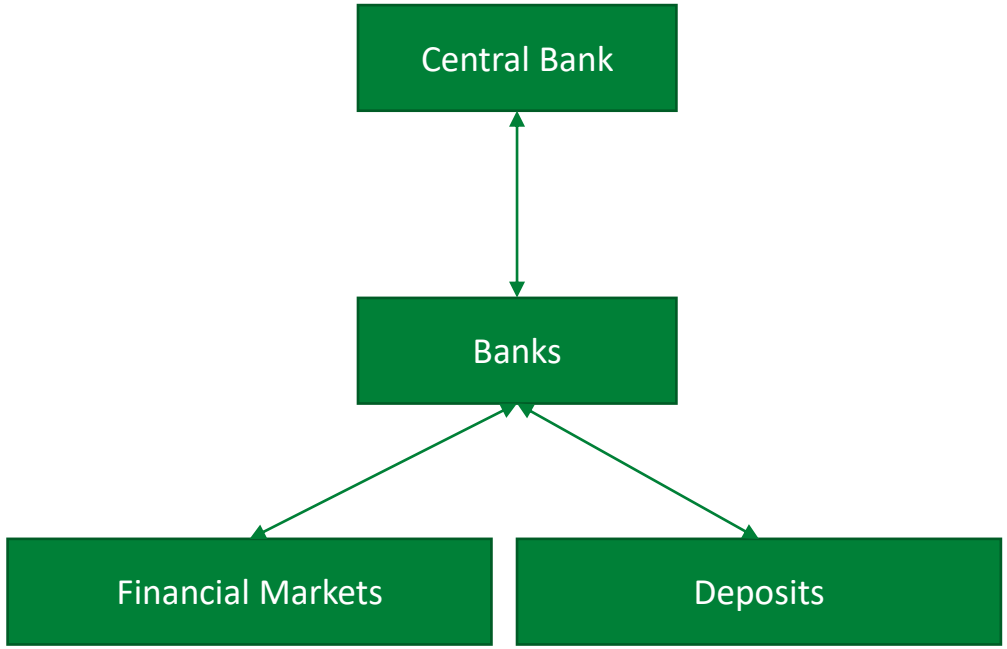
Source: EIOPA.
Note: A protection gap of below 3 is not expected to be material.

Source: ECB/ESRB Project Team on climate risk monitoring, Climate-related risk and financial stability, ESRB, July 2021, 119 pages.

The role and organisation of the banking sector

How does the banking sector work?

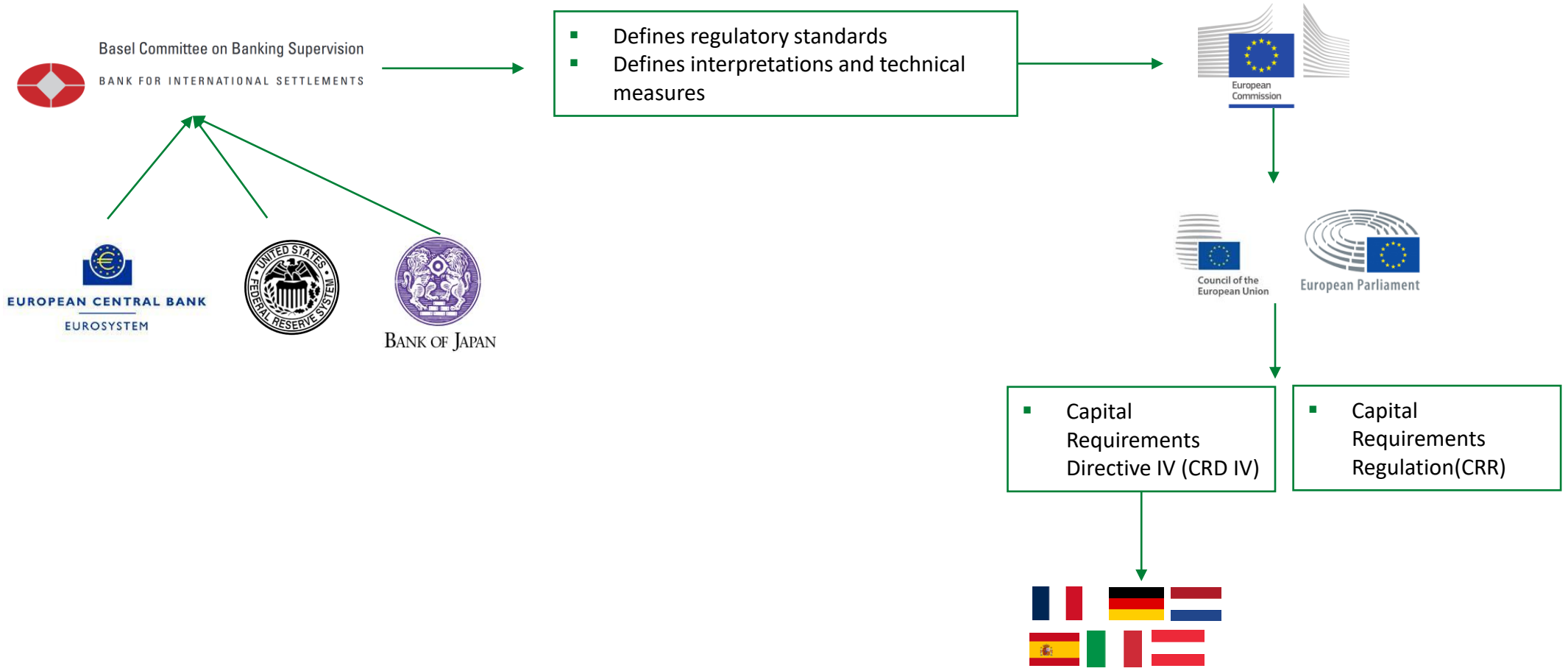
- The social function of the banking sector is to transfer liquidity from actors with excess savings to actors with investment needs
- To accomplish this, banks pool deposits from individual accounts and loan the money to households and companies
- There is a **temporal mismatch** between the two fluxes and the whole equilibrium rests on the assumption that depositors will not withdraw all their money at the same time
- Banks are **leveraged** companies, i.e. deposits are only a fraction of their resources
- Banks rely on financial markets to provide them with their day-to-day liquidity requirements
- In order to reduce the risk, Central Banks require banks to deposit a certain % of their total deposits in its accounts (**Minimum Required Reserves**, MRR)



In millions of euros	Notes	31 December 2021	31 December 2020
ASSETS			
Cash and balances at central banks		347,883	308,703
Financial instruments at fair value through profit or loss			
Securities	4.a	191,507	167,927
Loans and repurchase agreements	4.a	249,808	244,878
Derivative financial instruments	4.a	240,423	276,779
Derivatives used for hedging purposes	4.b	8,680	15,600
Financial assets at fair value through equity			
Debt securities	4.c	38,906	55,981
Equity securities	4.c	2,558	2,209
Financial assets at amortised cost			
Loans and advances to credit institutions	4.e	21,751	18,982
Loans and advances to customers	4.e	814,000	809,533
Debt securities	4.e	108,510	118,316
Remeasurement adjustment on interest-rate risk hedged portfolios		3,005	5,477
Financial investments of insurance activities	4.i	280,766	265,356
Current and deferred tax assets	4.k	5,866	6,559
Accrued income and other assets	4.l	179,123	140,904
Equity-method investments	4.m	6,528	6,396
Property, plant and equipment and investment property	4.n	35,083	33,499
Intangible assets	4.n	3,659	3,899
Goodwill	4.o	5,121	7,493
Assets held for sale	7.d	91,267	-
TOTAL ASSETS		**2,634,444**	**2,488,491**
LIABILITIES			
Deposits from central banks		1,244	1,594
Financial instruments at fair value through profit or loss			
Securities	4.a	112,338	94,263
Deposits and repurchase agreements	4.a	293,456	288,595
Issued debt securities	4.a	70,383	64,048
Derivative financial instruments	4.a	237,397	282,608
Derivatives used for hedging purposes	4.b	10,076	13,320
Financial liabilities at amortised cost			
Deposits from credit institutions	4.g	165,699	147,657
Deposits from customers	4.g	957,684	940,991
Debt securities	4.h	149,723	148,303
Subordinated debt	4.h	24,720	22,474
Remeasurement adjustment on interest-rate risk hedged portfolios		1,367	6,153
Current and deferred tax liabilities	4.k	3,103	3,001
Accrued expenses and other liabilities	4.l	145,399	107,846
Technical reserves and other insurance liabilities	4.j	254,795	240,741
Provisions for contingencies and charges	4.p	10,187	9,548
Liabilities associated with assets held for sale	7.d	74,366	-
TOTAL LIABILITIES		**2,511,937**	**2,371,142**
EQUITY			
Share capital, additional paid-in capital and retained earnings		*108,176*	*106,228*
Net income for the period attributable to shareholders		*9,488*	*7,067*
Total capital, retained earnings and net income for the period attributable to shareholders		**117,664**	**113,295**
Changes in assets and liabilities recognised directly in equity		*222*	*(496)*
Shareholders' equity		**117,886**	**112,799**
Minority interests	7.f	**4,621**	**4,550**
TOTAL EQUITY		**122,507**	**117,349**
TOTAL LIABILITIES AND EQUITY		**2,634,444**	**2,488,491**

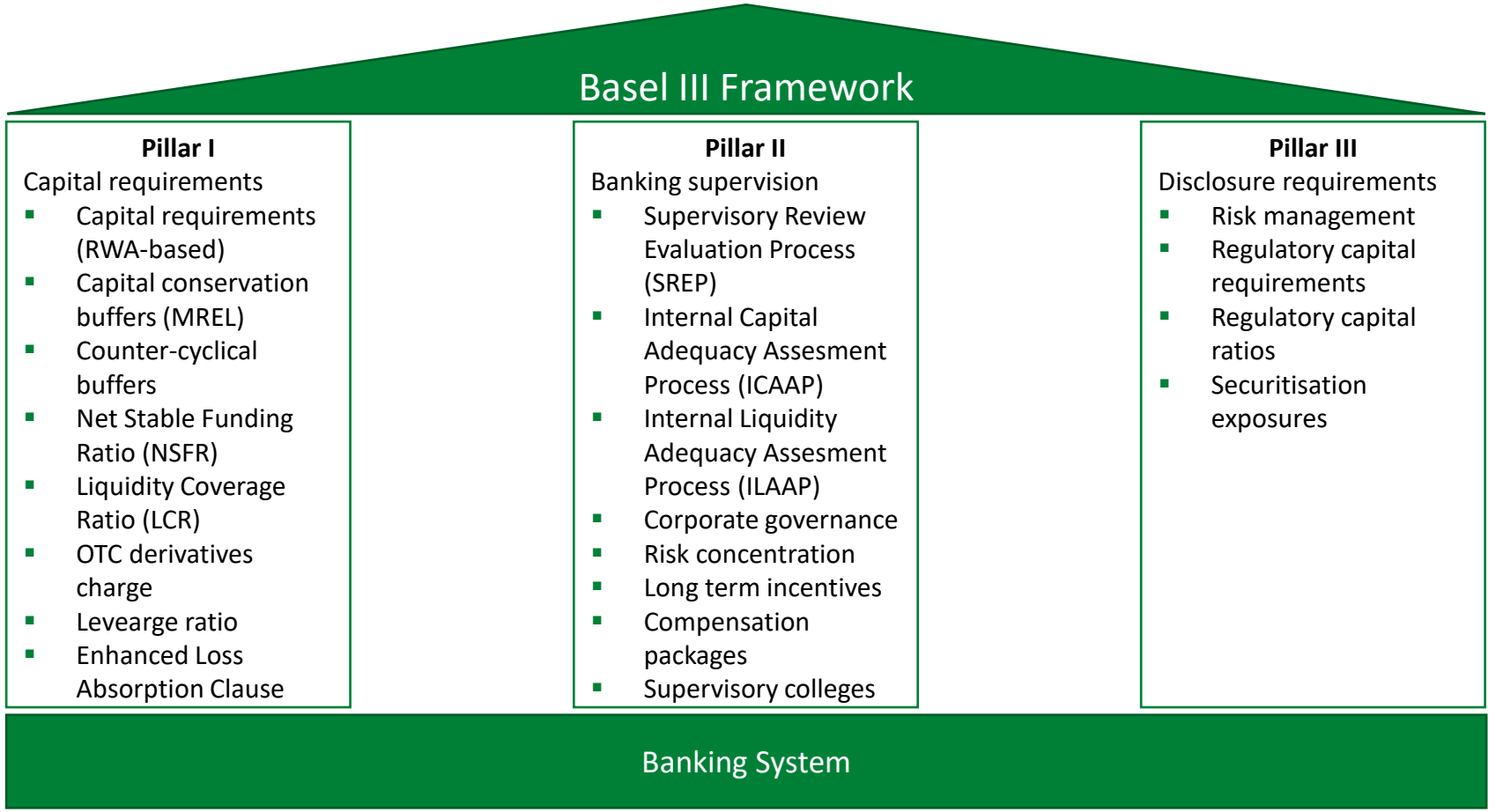
Source: BNPP Universal Registration Document 2021

Introduction to the Basel framework



Source: McKinsey & Company (2010). Impact of the financial crisis on carbon economics. Version 2.1 of the Global Greenhouse Gas Abatement Cost Curve. London: McKinsey & Company. | Vogt-Schilb, When starting with the most expensive option makes sense: Optimal timing, cost and sectoral allocation of abatement investment, Journal of Environmnental Economics and Management, 2018, 24 pages.

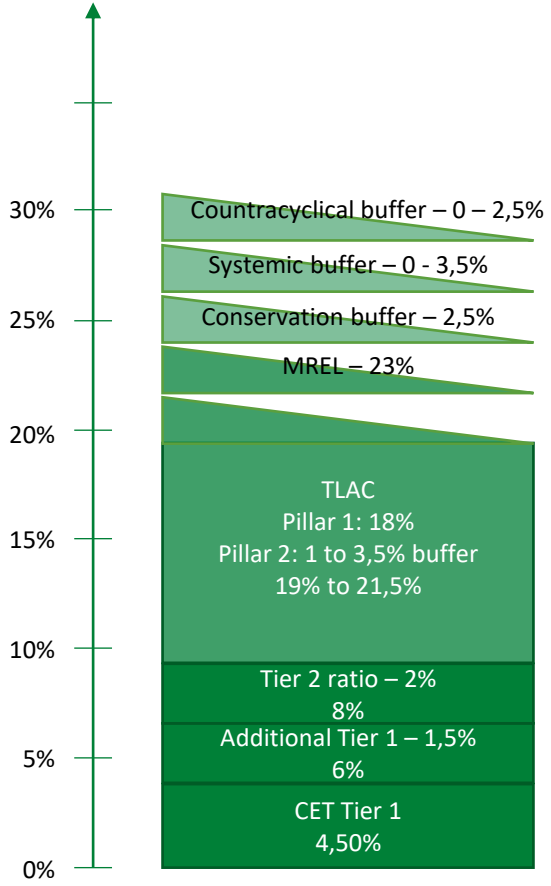
The three-pillar architecture



Source: Kern, Alexander, Stability and Sustainability in Banking Reform: Are Environmental Risks Missing in Basel III?, CISL & UNEPFI, 2014, 40 pages.

A focus on minimal capital requirements

- In order for banks to be able to absorb losses without immediately going into default, Basel regulations have introduced capital requirements, i.e. the obligation to finance a predetermined share of your assets through equity or stable instruments
- These requirements are expressed as a % of Risk Weighted Assets (RWA), these RWA can then be computed using a standard regulatory method or through the use of internal models



Source: https://www.sia-partners.com/fr/actualites-et-publications/de-nos-experts/mrel-et-tlac-derniere-ligne-droite-pour-les-dispositifs

EU KM1 – Key metrics

		a	b
	in € m. (unless stated otherwise)	Sep 30, 2021	Jun 30, 2021
	Available own funds (amounts)		
1	Common Equity Tier 1 (CET 1) capital	45,633	45,476
2	Tier 1 capital	53,751	53,595
3	Total capital	61,203	61,128
	Risk weighted exposure amounts		
4	Total risk-weighted exposure amount	350,733	344,945
	Capital ratios (as percentage of risk.weighted exposure amount)		
5	Common Equity Tier 1 ratio (%)	13.0	13.2
6	Tier 1 ratio (%)	15.3	15.5
7	Total capital ratio (%)	17.5	17.7
	Additional own funds requirements based on SREP (as a percentage of risk-weighted exposure amount)		
EU 7a	Additional own funds requirements to address risks other than the risk of excessive leverage (%)	2.5	2.5
	of which:		
EU 7b	to be made up of CET 1 capital (percentage points)	1.4	1.4
EU 7c	to be made up of Tier 1 capital (percentage points)	1.9	1.9
EU 7d	Total SREP own funds requirements (%)	10.5	10.5
	Combined buffer requirement (as a percentage of risk-weighted exposure amount)		
8	Capital conservation buffer (%)	2.5	2.5
EU 8a	Conservation buffer due to macro-prudential or systemic risk identified at the level of a Member State (%)	0.0	0.0
9	Institution specific countercyclical capital buffer (%)	0.0	0.0
EU 9a	Systemic risk buffer (%)	0.0	0.0
10	Global Systemically Important Institution buffer (%)	1.5	1.5
EU 10a	Other Systemically Important Institution buffer (%)	2.0	2.0
11	Combined buffer requirement (%)	4.5	4.5
EU 11a	Overall capital requirements (%)	15.0	15.0
12	CET 1 available after meeting the total SREP own funds requirements	24,376	24,909
	Leverage ratio		
13	Leverage ratio total exposure measure	1,104,816	1,100,432
14	Leverage ratio (%)	4.8	4.8
	Additional own funds requirements to address risks of excessive leverage (as a percentage of leverage ratio total exposure amount)		
EU 14a	Additional own funds requirements to address the risk of excessive leverage (%)	0.0	0.0
EU 14b	of which: to be made up of CET 1 capital (percentage points)	0.0	0.0
EU 14c	Total SREP leverage ratio requirements (%)	3.2	3.2
	Leverage ratio buffer and overall leverage ratio requirement (as a percentage of total exposure measure)		
EU 14d	Leverage ratio buffer requirement (%)	0.0	0.0
EU14e	Overall leverage ratio requirements (%)	3.2	3.2
	Liquidity Coverage Ratio		
15	Total high-quality liquid assets (HQLA) (Weighted value - average)	220,467	221,606
EU 16a	Cash outflows - Total weighted value	212,397	212,712
EU 16b	Cash inflows - Total weighted value	58,515	61,603
16	Total net cash outflows (adjusted value)	153,882	151,109
17	Liquidity coverage ratio (%)	143	147
	Net Stable Funding Ratio		
18	Total available stable funding	592,566	590,835
19	Total required stable funding	483,164	483,982
20	NSFR ratio (%)	123	122[1]

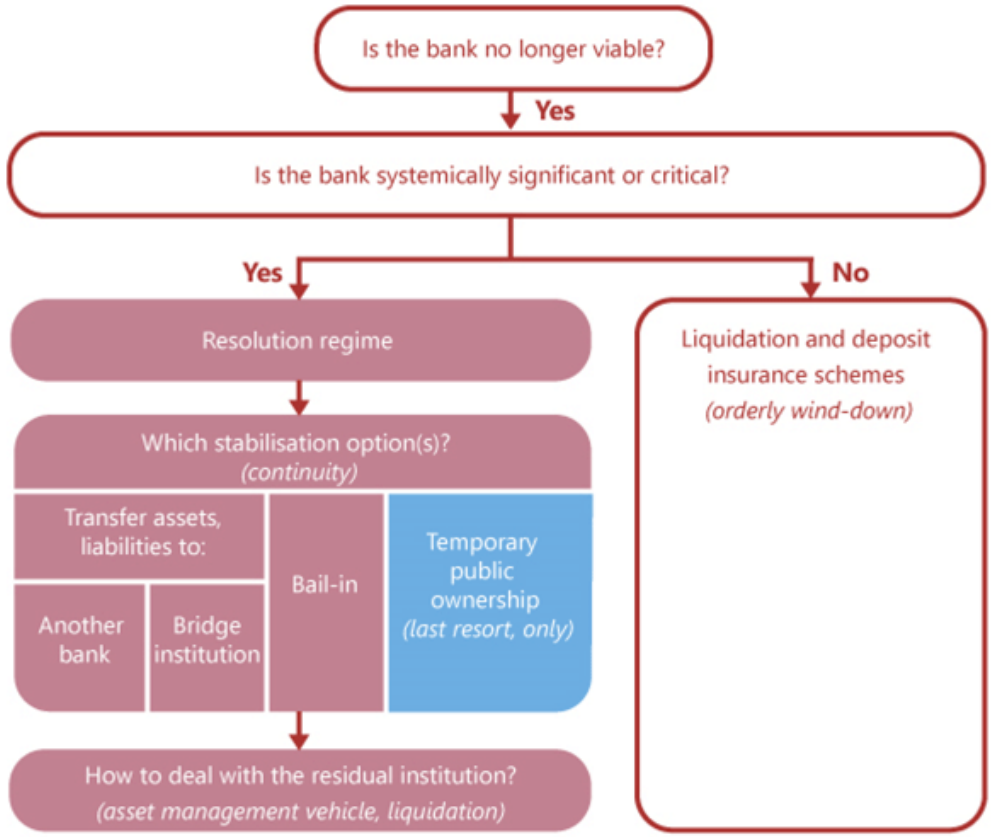
[1] NSFR has been updated for June 30, 2021

em lyon business school

Source: Deutsche Bank, Pillar 3 Report as of September 30, 2021

Preparing resolution in order to avoid contagion

- Following the financial crisis, the BIS and national authorities worked together to put an end to **too-big-to-fail**
- In the EU, a **Banking Union** was created, resting on three pillars: the **Single Supervisory Mechanism** (headed by the ECB), the **Single Resolution Mechanism** (headed by the SRB) and the **European Deposit Insurance Scheme**
- The SRM requires **global systemically-important banks** (G-SIBs) to prepare a resolution plan in which they detail the way their critical operations should continue to operate and how liquidity should be maintained in case of default
- This mechanism provides regulators (the SRB in this case) with the tools and options to avoid using public money to rescue a bank that would be in difficulty



Source: https://www.bis.org/fsi/fsisummaries/brf.htm

Analysis in relation with climate change

- A very robust prudential architecture has been set up both to reduce the amount of risk banks are taking and to prepare them for the worst possible outcomes
- Contagion risks and systemic risk have been at the heart of the global analysis and regulatory effort
- However, climate change was not specifically taken into account in the design of this architecture

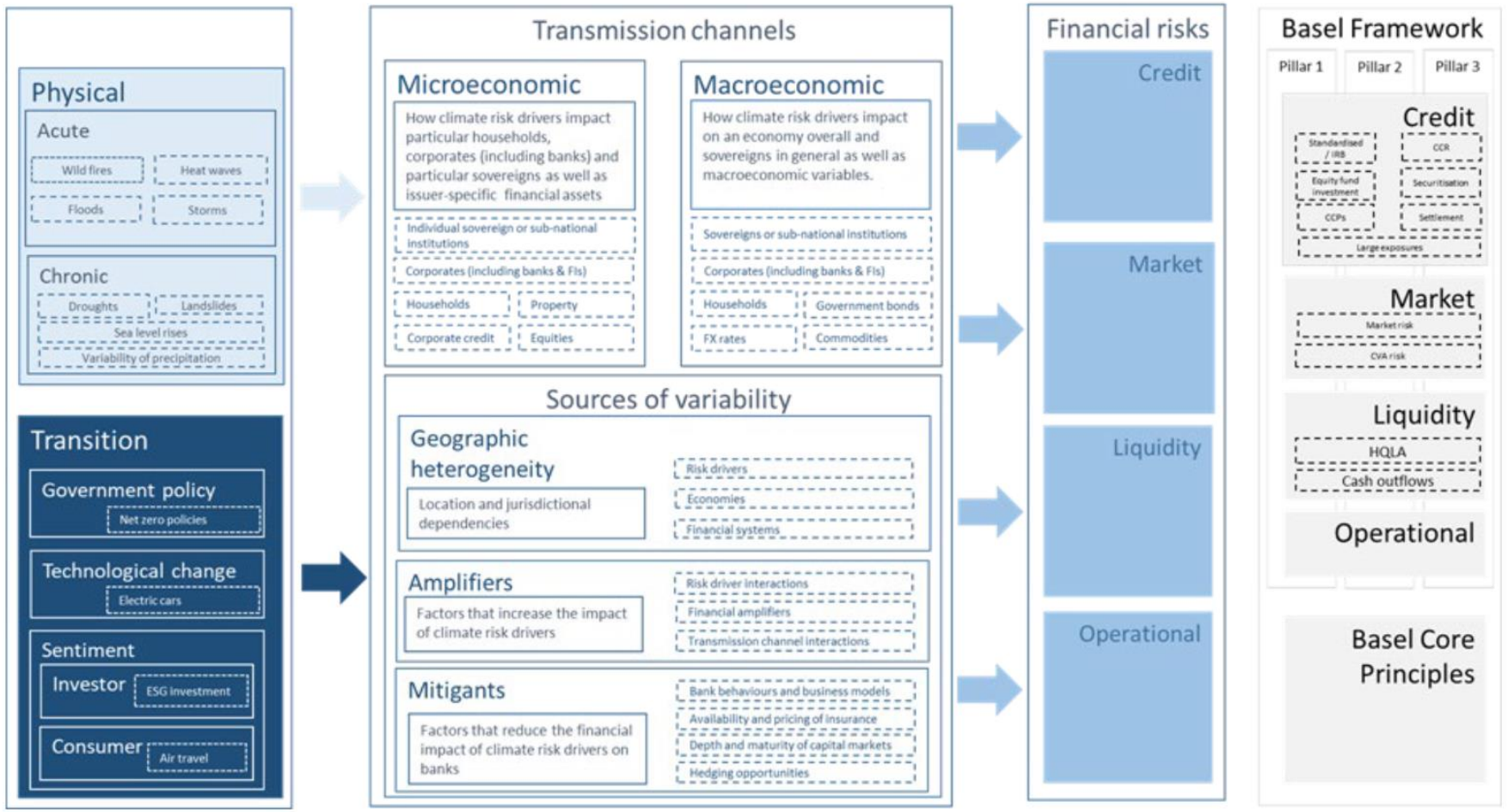
- **How robust is the prudential architecture when it comes to climate change risk?**

> *" ...the regulatory framework that governs today's banking system may not be being used to its full capacity [...] Basel III is arguably overlooking an important source of risk to the financial system and broader economy"*

Source: Kern, Alexander, Stability and Sustainability in Banking Reform: Are Environmental Risks Missing in Basel III?, CISL & UNEPFI, 2014, 40 pages.

How does climate risk fit in this architecture?

How does climate risk translate into financial risk?

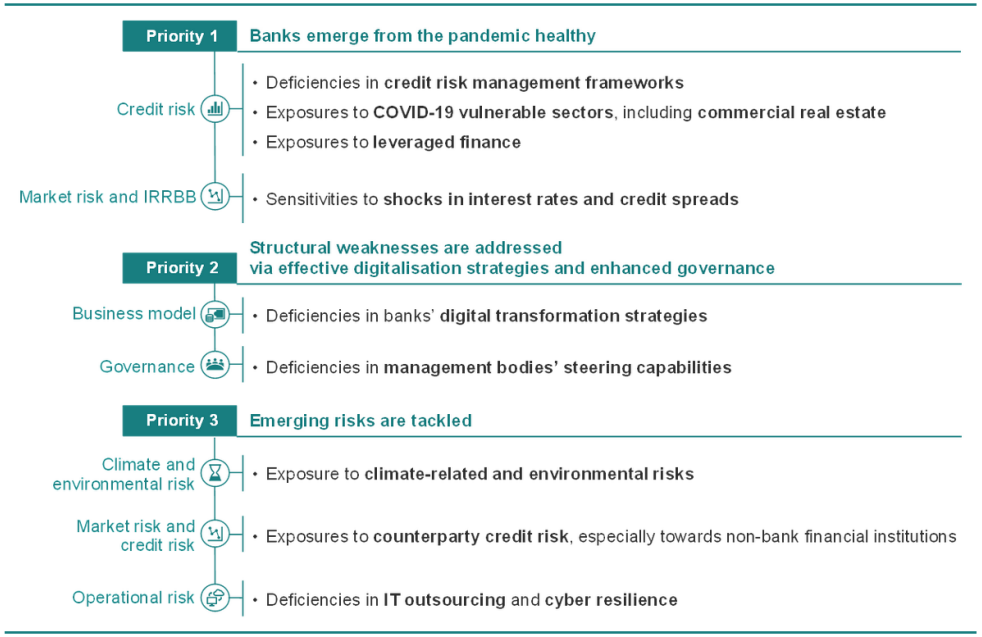


Source: Basel Committee on Banking Supervision, Climate-related risk drivers and their transmission channels, April 2021, 45 pages

The place of C&E risks in the European prudential architecture

- Climate change is a significant risk exposure for banks both through physical (firms located in high-risk areas) and transition risk channels (high-emitting firms)
- With the Paris Agreement, the adoption of the EU Green Deal and the Action Plan on financing sustainable growth, climate risk has come to the top of the regulatory agenda and of the SSM risk map
- In November 2020, the ECB published a Guide on climate-related and environmental (C&E) risks with a list of 13 expectations for significant banks
- The ECB ran an assessment of the compliance of 112 significant banks, totalling more than €24 trillion in assets, in 2021 and none are close to aligning their practices with the expectations
- Banks are aware of this (90% of reported practices are reported as non- or partially compliant) and some have taken important steps
- Overall, banks still have a blind spot for C&E risks and although some are deploying indicators and try to avoid the build-up of exposure, these efforts remain to have an effect on overall strategy

Supervisory priorities for 2022-2024 addressing identified vulnerabilities in banks



Source: ECB.
Notes: The figure shows the three supervisory priorities and the corresponding vulnerabilities to be addressed over the coming years through targeted activities by ECB Banking Supervision. Each vulnerability is associated with its overarching risk category. Supervisory activities addressing potential shocks to interest rates/credit spreads and exposures to counterparty credit risk should not be seen in isolation. They will complement and inform each other with a view to addressing broader financial market correction concerns.

Source: https://www.bankingsupervision.europa.eu/banking/priorities/html/ssm.supervisory_priorities2022~0f890c6b70.en.html

Box 1
Overview of ECB supervisory expectations

1. Institutions are expected to understand the impact of climate-related and environmental risks on the business environment in which they operate, in the short, medium and long term, in order to be able to make informed strategic and business decisions.
2. When determining and implementing their business strategy, institutions are expected to integrate climate-related and environmental risks that impact their business environment in the short, medium or long term.
3. The management body is expected to consider climate-related and environmental risks when developing the institution's overall business strategy, business objectives and risk management framework, and to exercise effective oversight of climate-related and environmental risks.
4. Institutions are expected to explicitly include climate-related and environmental risks in their risk appetite framework.
5. Institutions are expected to assign responsibility for the management of climate-related and environmental risks within the organisational structure in accordance with the three lines of defence model.
6. For the purposes of internal reporting, institutions are expected to report aggregated risk data that reflect their exposures to climate-related and environmental risks with a view to enabling the management body and relevant sub-committees to make informed decisions.
7. Institutions are expected to incorporate climate-related and environmental risks as drivers of existing risk categories into their existing risk management framework, with a view to managing, monitoring and mitigating these over a sufficiently long-term horizon, and to review their arrangements on a regular basis. Institutions are expected to identify and quantify these risks within their overall process of ensuring capital adequacy.
8. In their credit risk management, institutions are expected to consider climate-related and environmental risks at all relevant stages of the credit-granting process and to monitor the risks in their portfolios.
9. Institutions are expected to consider how climate-related and environmental events could have an adverse impact on business continuity and the extent to which the nature of their activities could increase reputational and/or liability risks.
10. Institutions are expected to monitor, on an ongoing basis, the effect of climate-related and environmental factors on their current market risk positions and future investments, and to develop stress tests that incorporate climate-related and environmental risks.
11. Institutions with material climate-related and environmental risks are expected to evaluate the appropriateness of their stress testing with a view to incorporating them into their baseline and adverse scenarios.
12. Institutions are expected to assess whether material climate-related and environmental risks could cause net cash outflows or depletion of liquidity buffers and, if so, incorporate these factors into their liquidity risk management and liquidity buffer calibration.
13. For the purposes of their regulatory disclosures, institutions are expected, to publish meaningful information and key metrics on climate-related and environmental risks that they deem to be material, with due regard to the European Commission's Guidelines on non-financial reporting: Supplement on reporting climate-related information.

Source: *https://www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.202011finalguideonclimate-relatedandenvironmentalrisks~58213f6564.en.pdf*

Assesment of the compliance with C&E expectations

em lyon business school

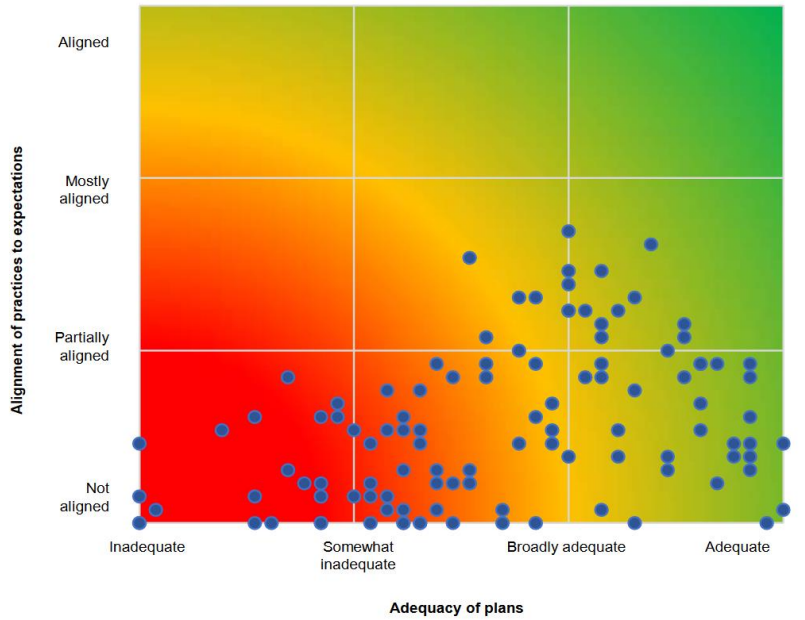
Overview of institutions that have integrated C&E risks into selected practices

Section	Expectation (1)	Selected practices (2)	Level of integration (3)
Business models	1.1.	The integration of C&E risks in the systematic monitoring of the business environment	39%
	2.1.	The use of C&E-related scenario analysis for the purpose of strategy setting	11%
	2.2.	The integration of C&E risks in business strategy by setting key performance indicators	25%
Governance and risk appetite	3.1.	The integration of C&E risks in the roles and responsibilities of the management body	43%
	6.3.	The integration of C&E risks into the risks reports to the management body	14%
	4.2.	The integration of key risk indicator(s) on C&E risks in the risk appetite statement	17%
	6.1.	The development of an approach to identify C&E data needs and to overcome gaps	7%
Risk management	8.1.	The integration of C&E risks in credit risk sector lending policies	46%
	8.2.	The integration of C&E risks in credit risk classification procedures for debtors	28%
	9.1.	The assessment of the impact of C&E risks on the continuity of its operations	50%
	10.	The integration of C&E risks into the transaction due diligence of the investment process	11%
	11.	The conduct of an (ad-hoc) C&E-related stress test or sensitivity analysis	23%
Disclosures	13.1.	The specification of the means and frequency of disclosing C&E risks in disclosure policies	6%

Source: Supervisory assessment based on institutions' responses to the request to perform a self-assessment and to develop implementation plans in the light of the ECB's Guide on climate-related and environmental risks.
Notes: (1) This column refers to the expectations set out in the ECB Guide under which the practices fall. (2) This overview of selected practices illustrates relevant trends across the sector. It should not be interpreted as suggesting a prioritisation from the supervisory point of view. (3) This is the percentage share of the 112 institutions that have integrated C&E risks into the corresponding practices.

The state of C&E risk management in the banking sector in terms of institutions' alignment with expectations and the adequacy of their plans to advance practices

(the y-axis describes the level of alignment of 112 institutions' practices to the supervisory expectations set out in the ECB Guide; the x-axis describes the level of adequacy of 112 institutions' implementation plans to address gaps in their practices)



Source: Supervisory assessment based on institutions' responses to the request to perform a self-assessment and to develop implementation plans in the light of the ECB's Guide on climate-related and environmental risks.
Note: Weighted average scores are plotted for the 13 supervisory expectations.

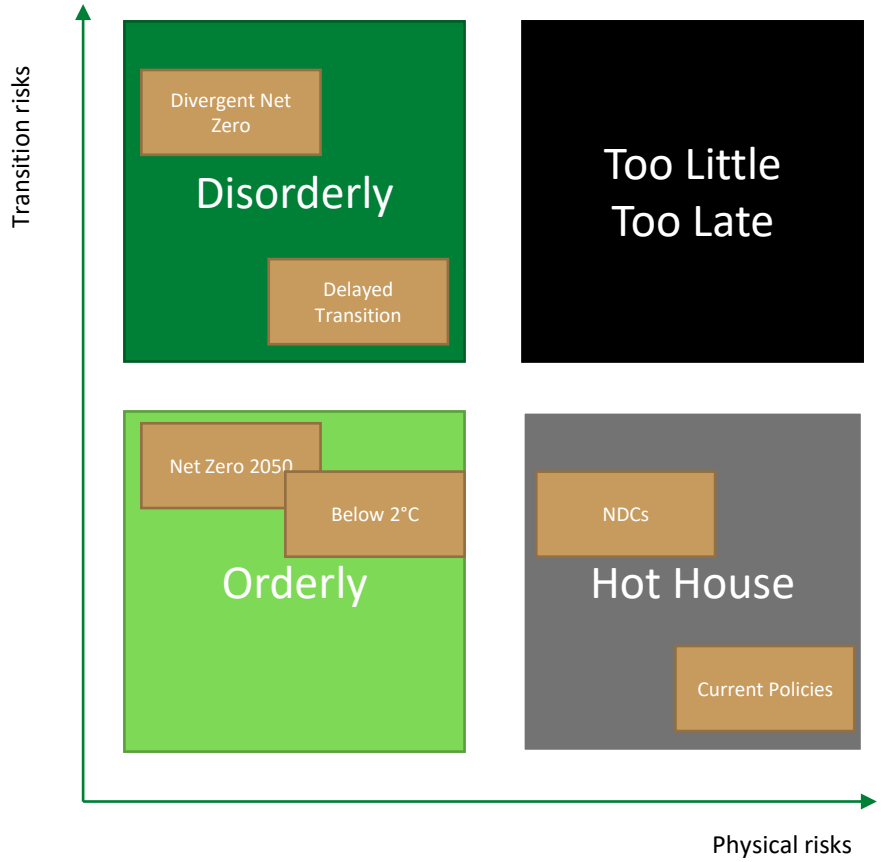
Source: https://www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.202111guideonclimate-relatedandenvironmentalrisks~4b25454055.en.pdf

An introduction to stress testing

- In parallel to this theoretical exercise, the ECB, in its supervisory role, decided to assess the resiliency of banks to the materialisation of climate change risks
- The best way to do this is through the organisation of a specific stress test, the same way as it does for financial and economic shocks
- A stress test is an exercise where a bank (individual stress tests), a sample of banks or all banks are confronted with **scenarios** aimed at assessing their response to specific shifts in their operating environment
- The purpose of those tests is to identify individual risks, contagion mechanisms and systemic effects.
- The results are then used for regulatory purposes (i.e. banks that did not reach certain thresholds have to undertake corrective measures), for comparison purposes (best practices, general statistics about the sector, policy documentation…) and for systemic risk prevention and analysis (data collection and monitoring)

Building scenarios

- After a pioneering exercise in 2021 by the ACPR, in 2022, the ECB organised the first climate risk stress test (constrained bottom-up) in order to collect actual data for bank exposures and to inform future policy decisions (i.e. a learning exercise, not a regulatory oversight test)
- The ECB based its exercise on the scenarios developed by the **Network for Greening of the Financial System** (NGFS)
- The fundamental hypothesis of these scenarios is that transition risks and physical risks run contrary and all scenarios are built in accordance
- Physical risks is estimated through the use of forward-looking integrated models (although feedback loops are not taken into account) while transition risk is estimated based on identified transition pathways



Source: Rapport Quinet 2019

Retained NGFS scenarios

Net Zero 2050

Net Zero 2050 is an ambitious scenario that limits global warming to 1.5 °C through stringent climate policies and innovation, reaching net zero CO_2 emissions around 2050. Some jurisdictions such as the US, EU and Japan reach net zero for all greenhouse gases by this point.
This scenario assumes that ambitious climate policies are introduced immediately. CDR is used to accelerate the decarbonisation but kept to the minimum possible and broadly in line with sustainable levels of bioenergy production. Net CO_2 emissions reach zero around 2050, giving at least a 50 % chance of limiting global warming to below 1.5 °C by the end of the century, with no or low overshoot (< 0.1 °C) of 1.5 °C in earlier years. Physical risks are relatively low but transition risks are high.

Click to collapse

Policy ambition	Policy reaction	Technology change	CDR	Regional policy variation
1.4°C	Immediate and smooth	Fast change	Medium-high use	Medium variation

Delayed Transition

Delayed Transition assumes global annual emissions do not decrease until 2030. Strong policies are then needed to limit warming to below 2 °C. Negative emissions are limited. This scenario assumes new climate policies are not introduced until 2030 and the level of action differs across countries and regions based on currently implemented policies, leading to a "fossil recovery" out of the economic crisis brought about by COVID-19. The availability of CDR technologies is assumed to be low pushing carbon prices higher than in Net Zero 2050. As a result, emissions exceed the carbon budget temporarily and decline more rapidly than in Well-below 2 °C after 2030 to ensure a 67 % chance of limiting global warming to below 2 °C. This leads to both higher transition and physical risks than the Net Zero 2050 and Below 2 °C scenarios.

Policy ambition	Policy reaction	Technology change	CDR	Regional policy variation
1.6°C	Delayed	Slow/Fast change	Low-medium use	High variation

Current Policies

Current Policies assumes that only currently implemented policies are preserved, leading to high physical risks.
Emissions grow until 2080 leading to about 3 °C of warming and severe physical risks. This includes irreversible changes like higher sea level rise. This scenario can help central banks and supervisors consider the long-term physical risks to the economy and financial system if we continue on our current path to a "hot house world".

Policy ambition	Policy reaction	Technology change	CDR	Regional policy variation
3°C+	None – current policies	Slow change	Low use	Low variation

Source: Rapport Quinet 2019

Results of the stress tests

- Some structural issues make it difficult for banks to report accurately : “common language” on GHG emissions (scope 3) and on energy performance certificates
- Considerable progress but many discrepancies, data gaps and deficiencies
- 60% of non-financial company interest income comes from the most polluting industries; banks need to gain better insight in their clients’ transition plans to mitigate transition risk
- Drought/Heat/Flood events could generate losses for some banks
- Limited amounts of losses in short term disorderly transition scenario but current methodology significantly underestimate risks
- Longer term scenarios (30 years) conclusions are subject to too much uncertainty at this time for specific conclusions to be drawn
- Banks need to improve their long-term climate and transition planning
- Over 60% of banks do not have a well-integrated climate risk stress-testing framework
- Climate risk is not properly factored in credit risk models

Chart 2

Module 3 scenarios and risk dimensions

	Exposures	Scenario	Projections[1]	Horizon	Credit risk	Market risk	Operational risk
Transition risk	Global	Short-term stress	Baseline	3 years (2022-2024)	Corporate loans (incl. SME, CRE) + mortgages	Bonds + stocks issued by NFCs[2] (incl. accounting and economic hedges)	Operational and reputational risks to be assessed via a qualitative questionnaire
			Stress				
		Long-term paths	Orderly	30 years (2030, 2040, 2050)	Corporate loans (incl. SME, CRE) + mortgages		
			Disorderly				
			Hot house				
Physical risk	EU countries	Drought & heat risk	Baseline	1 year (2022)	Corporate loans (incl. SME)	1.All projections with the exception of the long-term paths will be based on a static balance sheet. 2.The parent company needs to be an NFC, e.g. bonds issued by car financing company X are in scope.	
			Stress				
		Flood risk	Baseline	1 year (2022)	Mortgages + CRE loans		
			Stress				

Source: ECB, climate risk stress test 2022, methodology, October 2021.
Notes: CRE stands for commercial real estate; NFC stands for non-financial corporation; SMEs stands for small and medium-sized enterprises.

Source: https://www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.climate_stress_test_report.20220708~2e3cc0999f.en.pdf

The way forward

- It’s complicated!
- Quantitative modelling of the impact of C&E risks on financial risk is in its infancy
- Stress test results are hotly debated
- Should proceed with implementation of recommendations
- Competitiveness issues also arise
- Many propositions coexist to improve the resiliency of the financial system, involve central banks, channel financing towards the green transition but no consensus at this stage

Source: Rapport Quinet 2019

Questions?