ESG factors in the performance of European banks

Impact of ESG factors on risks, capitalisation and performance of European banks

December 2024

Our analysis indicates that ESG factors can substantially affect the probability of default

Sample selection of SSM banks

The analysis of ESG factors is based on data from a sample of **39 large European banks**. These banks are **part of the Single Supervisory Mechanism (SSM)**, directly supervised by the European Central Bank (ECB). The data covers a nine-year period from **2014** to **2022**, because the ECB has categorized certain banks as significant for financial stability since 2014.

There were **filter criteria** applied: 27 institutions were excluded for being financial holding companies or mixed financial holding companies. Subsidiaries of banks outside the eurozone were excluded. Furthermore, 38 banks were removed as they have not been classified as SSM banks throughout the observation period.

Research design

Our analysis uses the UN IPCC report's probability scale to assess climate-related risks, indicating that such events are likely to occur and could increase banks' losses. At the same time, current accounting and supervisory models do not yet fully account for ESG factors, necessitating higher capital requirements in the future.

The impact of ESG factors on Expected Loss (EL), Unexpected Loss (UL), and Extreme Unexpected Loss (ExUL) is analyzed, shifting the loss distribution and affecting key financial metrics like Return on Assets (RoA) and Return on Equity (RoE).

Key results

The analysis shows **significant impacts of ESG factors on the analysed credit institutions' risks, capitalisation, and performance**.

ESG factors, especially environmental risks, can notably affect the probability of default (PD), leading to increased provisioning and changes in financial ratios. For instance, a one standard deviation increase in PD due to ESG factors requires a 66% rise in provisioning, costing around EUR 0.66 billion for SSM banks.

At the same time, banks are well capitalized and hold enough excess capital to absorb these additional costs.

The UN IPCC report provides expected probabilities of climate events

IPCC probability scale for climate events

- The IPCC uses a **probability scale** to express confidence in climate event predictions. Terms like "virtually certain," "extremely likely," and "very unlikely" are used to indicate the likelihood of climate-related events happening.
- For instance, **46%** of all assessments have a high probability between **90 and 100%**, meaning they are highly confident in those predictions.
- Examples of such assessments are "it is virtually certain that the stratosphere has cooled" (IPCC, 2021, p. 308), "the sea level rise in the oceans around Europe will most likely continue" (p. 1,843) and "it is very likely that precipitation in northern Europe will increase" (p. 1,839).

Scale	Probability scale	Probability of occurrence (%)	Number of ratings with respective scale	Relative share of ratings (%)
1	Exceptionally likely	99-100	503	12,78
2	Extremely likely	95-100	239	6,07
3	Very likely	90-100	1.050	26,68
4	Likely	60-100	1.973	50,14
5	More likely than not	>50-100	36	0,92
6	About as likely as not	33-66	1	0,03
7	Unlikely	0-33	43	1,09
8	Very unlikely	0-10	27	0,69
9	Extremly unlikely	0-5	20	0,50
10	Exceptionally unlikely	0-1	43	1,09
		Total	**3,935**	**100,0**

Limitations of the IPCC study

- The IPCC makes it clear that their findings are based on the current state of scientific understanding. The degree of confidence is categorized using terms such as "limited," "medium," or "robust," and is assessed based on the available evidence and level of agreement among scientists.
- The study refers to the IPCC report's climate risk assessments, but as an **ESG** study, it focuses almost exclusively on environmental (**climate**) factors, neglecting the broader social and governance dimensions.
- The use of IPCC probabilities and uncertainty language, which apply to physical hazards, is misleading in a credit risk context, as risk arises from the combination of these hazards with **vulnerability** (transmission channels) and **exposure**, which are not addressed.

The following analyses make use of the UN IPCC's findings and expectations published by the scientists in 2021*. Following the results, climate events are "expected" events that are very likely to occur.
If this is the case, the events will increase the probability of losses for banks in **a similar way to a deterioration in the economic situation.**

* Statements and forecasts of the IPCC Scientific Working Group I on Climate Change IPCC (2021, p. 34 to 2,212)

The existing accounting and supervisory models for credit losses do not determine ESG losses explicitly

Measurement of expected credit losses for non-performing and impaired assets

Parameter		IASB	FASB	BCBS	ESG factors
EAD/ LGD(%)	Estimation	Neutral estimate, taking into account forward-looking information, including macroeconomic factors		Downturn estimation	Downturn estimation
	Estimation period	12 months EL (stage 1), Lifetime ECL (stage 2)	Lifetime ECL	12 months EL	Lifetime ECL
PD	Sensitivity of the measuring cycle	Point-in-time estimate, taking into account forward-looking information, including macroeconomic factors		Economic cycles	Several economic cycles

Existing accounting and supervisory regulations do not adequately address the provisioning for expected losses due to ESG factors.

Both accounting standards and regulatory frameworks assume traditional methods can handle ESG-related risks, but this is not accurate.

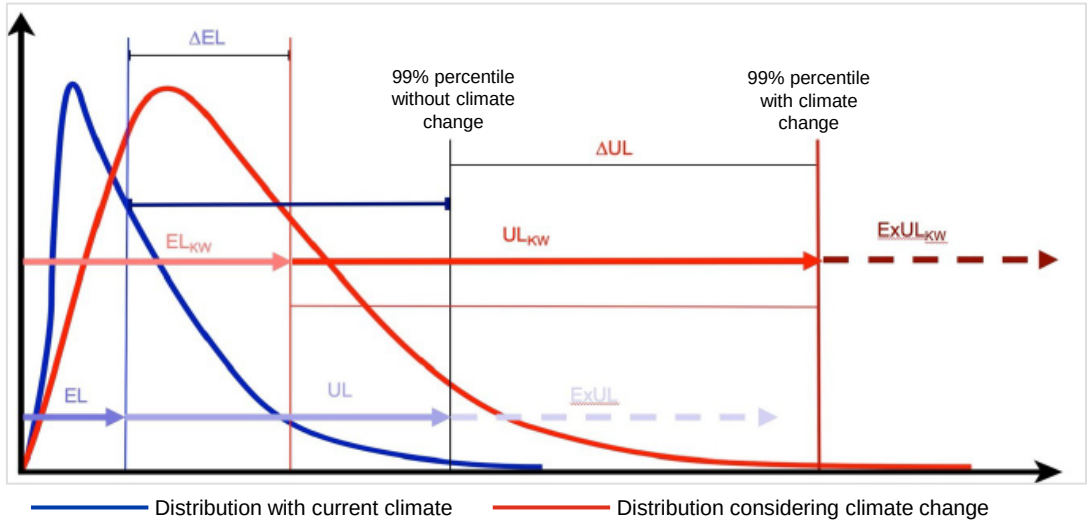
12-month PDs, commonly used by supervisory authorities, are inadequate for modelling long-term ESG risks. A **lifetime PD** might be more suitable to properly capture the impact of ESG factors.

In addition, the **long-term steady deterioration** of the climate assumed by climate scientists and its effects on **several economic cycles** and repercussions on the creditworthiness of customers must be analysed when assessing creditworthiness and provisioning.

There are three different types of losses that might be impacted by ESG factors: EL, UL, ExUL

Loss Type	Provisions (Accounting)	Pillar 1 Capital (Basel III)	Pillar 2 Capital (Supervisory)
Expected Loss (EL)	• Provisions based on ECL (IFRS 9) Staged approach (12-month or lifetime loss)	• No direct capital requirement for EL, but indirectly affects RWA	• Potential additional capital if provisions deemed inadequate (ICAAP review)
Unexpected Loss (UL)	• No provisions (covered by capital)	• 8% of RWA, with 6% Tier 1 capital Risk-weighted assets determined by standardized or IRB models	• Additional capital based on ICAAP review Supervisors may require more capital for specific risks
Extreme Unexpected Loss (ExUL)	• No provisions Risk managed through stress tests	• Not directly covered by Pillar 1	• Stress testing informs additional capital buffers (e.g., Pillar 2B) Countercyclical buffer may be imposed

Shift in banks' loss distribution due to climate change



The figure shows a **shift in banks' loss distribution** due to climate change. It suggests that **ESG factors** may shift the entire distribution of losses to the right, leading to a **significant increase in both expected and unexpected losses**. Thus, banks may face higher capital requirements in the future as climate-related risks become more prevalent.

Key assumptions

Due to the lack of data series on ESG factors, we assume that the average probability of default of a bank's assets (PD) increases by one standard deviation of the PD (base case) and by three SDs in the extreme case.

ESG factors and their impact on the Expected Loss (EL)

ESG impact on the expected loss

ESG factors **moderate** the relationship between customer creditworthiness and the level of **loan loss provisions** that banks need to hold. For example, if ESG risks increase, banks may need to **increase provisioning** due to a higher **probability of default (PD)** among borrowers affected by these factors.

$$RWAD_{i,t} = EAD_{i,t} \cdot LGD_{i,t} \cdot \left(N\left(\frac{G(PD_{i,t}) + \sqrt{R_{i,t}} \cdot G(0.999)}{\sqrt{1 - R_{i,t}}} \right) - PD_{i,t} \right) \cdot M_{i,t} \cdot 12.5$$

Impact of one standard deviation increase in PD

The table shows the effect of an increase in the **probability of default (PD)** by **one standard deviation** (**5%** for sampled banks) due to ESG factors on provisioning and key financial ratios.

- For sampled **SSM banks** in Europe, an increase of one standard deviation in PD would require an increase in **provisioning** by **around 66%**.
- This corresponds to an additional provisioning cost of approximately **EUR 0.66 billion** for SSM banks, or around **EUR 180 million** for German banks.

Effect on Return on Assets (RoA) and Return on Equity (RoE)

- The increase in provisioning significantly affects the profitability of banks:
  - **RoA** for SSM banks would fall by around **34%** and **RoE** would fall by **4%**.
  - For German banks specifically, the **metrics** would drop even more, by around **14%** and **41%** respectively**.**

Impact of an increase in the banks' probability of default by one standard deviation due to ESG factors on the provisioning ratio and performance

Sample of European SSM banks		SSM banks	whereof: 10 German banks
Probability of default (PD)	%	0,09	0,06
Ratio of loan loss provisions (LLP) to total assets (TA) (LLPTA)	%	0,29	0,12
Return on assets (ROA)	%	0,31	0.12
Return on equity (ROE)	%	3,86	1,91
Probability of default after PD increase (PD_A)	%	0,14	0,08
LLPTA after PD increase (LLPTA_A)	%	0,49	0,18
LLPTA due to PD increase	%	66,45	49,78
Return on assets after PD increase (ROA_A)	%	0,21	0,07
Return on equity after PD increase(ROE_A)	%	3,70	1,64
Decrease in ROA due to increase in PD	%	-33,59	-40,93
Decrease in ROE due to increase in PD	%	-4,12	-14,04

Notes: The values given are average values (mean values) of the variables for the respective banks in the sample. It is assumed that the PD increases in absolute terms by one standard deviation, i.e. by +0.04848 percentage points for the 39 SSM banks and analogously +0.01657 percentage points for the subgroup of 10 German banks. The increase in PD changes the value of the variable, which is indicated by the addition of "_A" to the respective abbreviation

ESG factors and their impact on Unexpected Losses (UL)

ESG impact on the unexpected loss

Banks need to consider how **ESG risks** can impact their traditional risk areas, such as **credit risk, market risk, and operational risk**. These risks also influence **unexpected losses**, which banks must manage to maintain financial stability.

The analysis focuses on the effect of **ESG risks** on the **probability of default (PD)** and, consequently, on banks' **risk-weighted assets (RWA)** and **core capital ratios**.

Impact of one standard deviation increase in PD on tier 1 capital ratios

- the average probability of default for SSM banks rises by **52%,** leading to a **39%** increase in risk-weighted assets (RWA) and Tier 1 capital (T1Q). This requires an additional **EUR 3 billion** to cover **EUR 51 billion** in RWAs.
- For the ten German banks, default probability rises by **28%**, increasing RWAs and T1Q by **21%**, necessitating **EUR 1.2 billion** for **EUR 20 billion** in RWAs.

Impact of three standard deviations (extreme case) on tier 1 capital ratios

- Default probability for SSM banks rises by **157%**, causing a **96%** increase in RWAs and T1Q, with an additional **EUR 8 billion** required to cover **EUR 127 billion** in RWAs.
- For German banks, default probability rises by **83%**, with RWAs and T1Q increasing by **57%**, requiring an additional **EUR 3 billion** for **EUR 55 billion** in RWAs**.**

Banks hold enough capital to absorb these additional costs. Currently, SSM banks maintain a core capital ratio of **16%**, significantly above the **6% minimum requirement**. Of their **EUR 19 billion** in core capital resources, SSM banks would have **EUR 8 billion** in the base case and **EUR 3 billion** in the worst-case scenario of excess capital that remains "free" and not subject to risk.

		Impact of one standard deviation increase in PD		Extreme Case: Impact of three standard deviations	
Sample of European SSM banks		**SSM banks**	**whereof: 10 German banks**	**SSM banks**	**whereof: 10 German banks**
Risk-weighted assets (RWA)	Mrd. EUR	132,00	97,20	132,00	97,20
Tier 1 capital (T1)	Mrd. EUR	19,00	15,00	19,00	15,00
Tier 1 capital ratio (T1Q)	%	15,95	16,20	15,95	16,20
Core capital requirement (MT1)	Mrd. EUR	7,92	5,83	7,92	5,83
Probability of default (PD)	%	0,09	0,06	0,09	0,06
Risk weight (RWAD)	%	38,02	28,72	38,02	28,72
PD after PD increase (PD_A)	%	0,14	0,08	0,24	0,11
Increase of PD	%	52,24	27,66	156,73	82,97
RWAD after PD increase (RWAD_A)	%	52,84	34,19	74,71	44,29
Increase of RWA after PD increase	%	38,96	20,94	96,48	56,67
RWA after PD increase (RWA_A)	Mrd. EUR	183,43	117,56	259,35	152,29
Core capital requirement after PD increase (MT1_A)	Mrd. EUR	11,01	7,05	15,56	9,14
Free core capital after increase (T1 free)	Mrd. EUR	7,99	7,95	3,44	5,86

ESG factors and Extreme Unexpected Losses (ExUL)

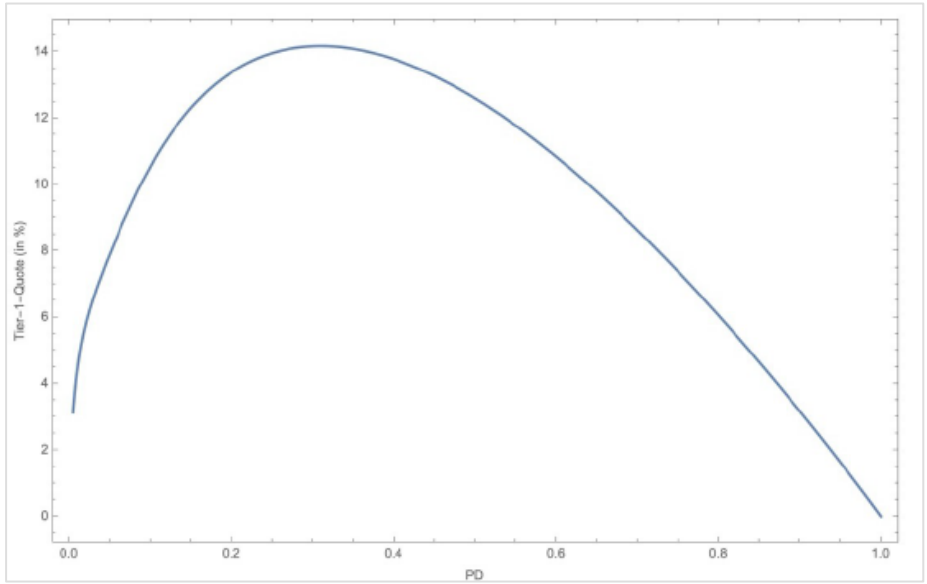
Extremely unexpected losses

When it comes to the issue of "extremely unexpected losses due to ESG factors" - or more precisely climate-related factors - the banks are ultimately on their own. No such events are listed in the IPCC's AR6 WGI report.

All conceivable weather and climate events with very large losses such as droughts, floods or severe storms are "expected" by climate scientists with a high degree of probability. At this point, however, we are talking about "extremely unexpected" events.

Examples of this for the entire world would be a surprise meteorite impact with a diameter of one kilometer, in which the sunlight disappears completely for a month, or a pan- demic with a dangerous virus. The eruption of the Laacher See volcano in the Eifel region, potentially the most dangerous active volcano in Germany, is another such event.

Impact of an “extreme” increase in the probability of default of banks due to ESG factors on the minimum core capital ratio



- **Expected Losses (EL)**: As **expected losses** increase, initially, both **unexpected losses (UL)** and **extreme unexpected losses (ExUL)** also increase.
- **Total Loss Limit**: Since a bank's total loss is capped (the bank cannot lose more than its entire exposure), as **EL** continues to rise, the room for **unexpected losses** (UL) and **extreme unexpected losses (ExUL)** decreases.
- **Impact on UL and ExUL**: After a certain point, when **EL** becomes significant, both **UL** and **ExUL** start to decrease because the total loss limit has been approached.
- **At Maximum Loss**: When the **probability of default (PD)** reaches **1** (i.e., when the bank expects a total loss of all its exposure), **UL** and **ExUL** drop to zero, as there are no unexpected losses left to account for—everything becomes part of the expected loss.
- In short, **ExUL** initially increases alongside **EL**, but as the probability of default increases further, both **UL** and **ExUL** decrease due to the total loss limit. At the extreme case where **PD = 1**, both **UL** and **ExUL** become zero, as all losses are expected.

Your Contact

Ullrich Hartmann - Partner
EMEA Banking and Capital Management Sustainability Leader

E-Mail: ullrich.hartmann@pwc.com
Tel: +49 175 2650257

Martin Neisen - Partner
Financial Services Governance, Risk and Compliance - Global Basel IV Leader

E-Mail: martin.neisen@pwc.com
Tel: +49 1515 3800865

Ariane Rupp – Director
Financial Services Sustainability

E-Mail: ariane.rupp@pwc.com
Tel: +49 171 7606561

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