

COUNTRY-LEVEL ESG PERFORMANCE AND CREDIT RISK IN HIGH-EMITTING SECTORS: EVIDENCE FROM EUROPEAN BANKS

Karolina Siwiec¹

¹*Faculty of Management, University of Warsaw*
k.siwiec@uw.edu.pl

Abstract: This article examines whether country-level ESG performance affects the credit quality of European banks' exposures to sectors highly contributing to climate change (HCCC sectors). A unique dataset combining granular NACE-level data from the EBA's European Data Access Portal with the LSEG Sustainable Sovereign Risk indicator is used to examine an unbalanced panel of 114 banks from 25 European countries over 14 quarterly periods, from Q3 2021 to Q4 2024. Fixed effects panel regression results consistently show that higher country-level ESG scores are associated with significantly lower NPL ratios in HCCC sectors, even after controlling for bank-level characteristics and time trends. A cluster analysis reveals that this relationship is particularly pronounced in countries with stronger ESG frameworks. The findings underscore the importance of institutional and regulatory ESG environments for the stability and credit quality of bank portfolios in high-emission sectors.

Keywords: ESG risk, Sustainable sovereign risk, Non-performing loans, NPL, Credit quality

INTRODUCTION

Carbon footprint and financed GHG emissions are measures that increasingly appear alongside core business KPIs. In the banking sector, attention is directed not only to direct emissions, but above all to indirect ones - greenhouse gas emissions financed through the capital that banks provide, such as emissions generated by companies to which a bank has extended credit. The scale of financed emissions is often underestimated. A key finding from a 2024 report illustrates the magnitude of this phenomenon: the financed emissions of 27 G7 banks, as reported at end-2022, exceeded the combined emissions of Germany, Italy, the United Kingdom, and France (ReCommon, 2024). Only when comparing a selected group of banks against the world's leading economies does the true scale of the issue become apparent.

A natural question arises as to which activities and sectors these emissions are associated with. One source of answers is data published directly by banks as part of ESG risk disclosures under Article 449a of the Capital Requirements Regulation. The reporting templates precisely define the requirement to disclose exposures to the sectors that highly contribute to climate change. The definition of these sectors is unambiguous - they are sectors A–I and L under the NACE classification.

This classification also forms the basis for the present article, which examines whether country-level ESG performance (variable: ESG_COUNTRY) reduces non-performing loan ratios (variable: HCCC_NPL_RATIO) in banks' exposures to sectors highly contributing to climate change. This represents a distinctive analytical approach, focusing not on the overall portfolio but on the sectors that, by generating the largest GHG emissions, are considered to have the greatest impact on climate change. European banks were analysed over the period 2021–2024 using a fixed effects panel regression. A cluster analysis was additionally conducted to better understand cross-country differences in both the ESG indicator and NPL ratios.

The results indicate that across all panel specifications, stronger country-level climate governance is consistently associated with significantly lower HCCC NPL ratios, even after controlling for banks' individual characteristics.

METHODOLOGY

The central research hypothesis formulated in this article states that higher country-level ESG performance is associated with lower credit risk in banks' exposures to HCCC sectors. Testing this hypothesis required constructing a dedicated database combining data on bank-level characteristics with data capturing ESG

risk at the country level. The former was sourced from the European Data Access Portal (EDAP) provided by the European Banking Authority, while the ESG data consist of the Sustainable Sovereign Risk indicator from LSEG.

The database EDAP determines the geographical scope of the analysis - European countries. This sample also allows the focus to be placed on countries subject to the same standards in terms of both financial reporting and sustainability reporting. The analysis covers 114 banks from 25 European countries. The data are quarterly, spanning the period from Q3 2021 to the end of 2024 (14 periods). The constructed dataset is a panel dataset, panel regression was therefore employed in the modelling. Seven models were estimated, with NPL_HCCC_RATIO - the share of non-performing loans in a bank's HCCC-sector portfolio (expressed as a percentage) - as the dependent variable, and ESG_COUNTRY, capturing sustainable country risk, as the explanatory variable. The structure of each model and the corresponding results are presented in Table 2 in Appendix. The estimated models are fixed effects models incorporating, depending on the specification, time effects and robust standard errors clustered at the bank level.

Additionally, given the differences in country profiles observed across the sample, a cluster analysis was conducted. The optimal number of clusters was identified using the silhouette coefficient, yielding two clusters.

FINDINGS

The results of the panel regression are presented in Table 2. Across all seven model specifications, ESG_COUNTRY enters with a negative and statistically significant coefficient, providing consistent support for the central research hypothesis. Holding a bank's individual characteristics constant, operating in a country with stronger ESG performance is associated with lower NPL ratios in sectors highly contributing to climate change. Among the bank-level control variables, size is the most consistently significant predictor - larger banks tend to exhibit lower HCCC NPL ratios. Models incorporating time fixed effects reveal a clear downward trend in HCCC NPL ratios over the sample period, with all time dummies from 2021Q4 onwards carrying negative and statistically significant coefficients.

The cluster analysis identified two distinct country groups (Table 1 in Appendix). Cluster 1 comprises 12 Northern and Western European countries, characterised by higher ESG country scores and lower NPL ratios in HCCC sectors. Cluster 2 consists of 12 Southern and Central-Eastern European countries with lower ESG scores and higher NPL ratios in sectors highly contributing to climate change.

The interaction term between the cluster variable and ESG_COUNTRY is negative and significant across models 5-7, indicating that the negative relationship between country-level ESG performance and HCCC NPL ratios is stronger for Cluster 1 countries.

CONCLUSIONS

This study provides evidence that country-level ESG performance is relevant to the credit quality of European banks' exposures to sectors highly contributing to climate change. Across all seven model specifications, higher ESG scores are associated with lower NPL ratios in HCCC sectors, while the cluster analysis indicates that this relationship is strongest in countries with more developed ESG frameworks.

These results point to the broader importance of the institutional and regulatory environment in shaping climate-related credit risk. For banks and supervisors, country-level ESG conditions may therefore offer additional information when assessing the vulnerability of loan portfolios exposed to high-emission activities. Conversely, weaker ESG frameworks may be linked to a greater risk of deteriorating asset quality in these sectors.

The analysis is constrained primarily by the relatively short observation period, as EDAP data are available only from Q3 2021. As longer time series become available, further research could test whether the

identified relationship persists across different economic conditions and examine the channels through which national ESG policies influence bank asset quality.

APPENDIX

Table 1 Number of observations, mean NPL_HCCC_RATIO and mean ESG_COUNTRY by country

Cluster	Country	Country name	Number of banks	Mean_NPL_HCCC_RATIO [%]	Mean_ESG_COUNTRY [pts]
Cluster 1	AT	Austria	5	3,57	78,47
	BE	Belgium	5	2,58	75,39
	DE	Germany	19	2,48	78,59
	DK	Denmark	3	1,68	82,19
	EE	Estonia	2	1,44	74,49
	FI	Finland	3	1,63	84,15
	FR	France	9	3,23	76,05
	IS	Iceland	3	2,74	83,36
	NL	Netherlands	7	3,35	80,10
	NO	Norway	3	2,30	89,77
	SE	Sweden	6	0,43	84,85
	SI	Slovenia	3	3,11	74,01
Cluster 2	CY	Cyprus	2	4,49	65,02
	ES	Spain	10	4,73	66,08
	GR	Greece	4	7,03	57,54
	HU	Hungary	2	3,93	68,16
	IE	Ireland	3	4,97	74,68
	IT	Italy	12	5,61	60,74
	LT	Lithuania	1	4,41	69,56
	LU	Luxembourg	1	5,79	75,78
	LV	Latvia	1	3,64	69,38
	MT	Malta	3	9,34	67,69
	PL	Poland	2	6,37	66,21
	PT	Portugal	3	6,36	69,00
	RO	Romania	2	6,23	62,54

Source: own elaboration

Table 2 Panel data regression results

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)
Dependent variable: NPL_HCCC_RATIO							
leverage_def	0.0248 (0.0355)	0.0248 (0.0514)	-0.0344 (0.0397)	-0.0344 (0.0642)	0.0789** (0.0367)	0.0789 (0.0542)	-0.0236 (0.0388)
size	-3.517*** (0.642)	-3.517*** (1.269)	-2.490*** (0.692)	-2.490** (1.187)	-3.608*** (0.636)	-3.608*** (1.310)	-1.351* (0.690)
cap_ratio	-0.162* (0.0933)	-0.162 (0.146)	-0.218** (0.0929)	-0.218 (0.162)	-0.174* (0.0924)	-0.174 (0.144)	-0.181** (0.0908)
loans_assets	-4.222* (2.426)	-4.222 (4.779)	1.337 (2.419)	1.337 (5.439)	-4.923** (2.406)	-4.923 (4.396)	0.965 (2.362)
ESG_COUNTRY	-0.364*** (0.0480)	-0.364*** (0.101)	-0.309*** (0.0489)	-0.309*** (0.107)	-0.255*** (0.0521)	-0.255*** (0.0945)	-0.123** (0.0531)
202109.Date			0 (.)	0 (.)			0 (.)
202112.Date			-0.557*** (0.200)	-0.557** (0.219)			-0.529*** (0.195)
202203.Date			-0.688*** (0.201)	-0.688*** (0.237)			-0.682*** (0.196)
202206.Date			-1.120*** (0.200)	-1.120*** (0.335)			-1.137*** (0.195)
202209.Date			-1.253*** (0.204)	-1.253*** (0.333)			-1.281*** (0.199)
202212.Date			-1.521*** (0.203)	-1.521*** (0.389)			-1.562*** (0.198)
202303.Date			-1.520*** (0.203)	-1.520*** (0.370)			-1.639*** (0.199)
202306.Date			-1.465*** (0.203)	-1.465*** (0.396)			-1.679*** (0.200)
202309.Date			-1.198*** (0.211)	-1.198*** (0.422)			-1.630*** (0.213)
202312.Date			-1.350*** (0.209)	-1.350*** (0.441)			-1.694*** (0.208)

202403.Date			-1.311*** (0.210)	-1.311*** (0.430)			-1.734*** (0.211)
202406.Date			-1.239*** (0.210)	-1.239*** (0.420)			-1.714*** (0.213)
202409.Date			-1.198*** (0.218)	-1.198*** (0.415)			-1.754*** (0.224)
202412.Date			-1.191*** (0.223)	-1.191*** (0.427)			-1.827*** (0.231)
0.cluster1					0 (.)	0 (.)	0 (.)
1.cluster1					0 (.)	0 (.)	0 (.)
0.cluster1#c.ESG_COUNTRY					0 (.)	0 (.)	0 (.)
1.cluster1#c.ESG_COUNTRY					-0.815*** (0.160)	-0.815*** (0.241)	-1.406*** (0.176)
_cons	72.72*** (8.203)	72.72*** (15.32)	57.87*** (8.547)	57.87*** (15.16)	102.6*** (10.01)	102.6*** (20.49)	95.49*** (9.581)
R^2 within	0.0712	0.0712	0.140	0.140	0.0896	0.0896	0.181
R^2 overall	0.150	0.150	0.193	0.193	0.336	0.336	0.341
Time effects	No	No	Yes	Yes	No	No	Yes
Robust standard errors	No	Yes	No	Yes	No	Yes	No

Number of observations 1414

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: own elaboration

L_2022324EN.01000101.xml. (n.d.). Retrieved 6 June 2026, from https://eur-lex.europa.eu/eli/reg_impl/2022/2453/oj/pol

ReCommon. (2024). *Unsupervised The carbon pollution of the world's largest banks*. Retrieved 29 July 2026, from https://www.banktrack.org/download/unsupervised_the_carbon_pollution_of_the_world_s_largest_banks/unsupervised.pdf

*Regulation (EU) 2024/1623 of the European Parliament and of the Council of 31 May 2024 amending Regulation (EU) No 575/2013 as regards requirements for credit risk, credit valuation adjustment risk, operational risk, market risk and the output floor*Text with EEA relevance. (n.d.).