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Article

Do sustainability risks affect credit ratings? Evidence from European Banks

Amfiteatru Economic Journal

Provided in Cooperation with:

The Bucharest University of Economic Studies

Suggested Citation: Samaniego-Medina, Reyes; Giraldez-Puig, Pilar (2022) : Do sustainability risks affect credit ratings? Evidence from European Banks, Amfiteatru Economic Journal, ISSN 2247-9104, The Bucharest University of Economic Studies, Bucharest, Vol. 24, Iss. 61, pp. 720-738, <https://doi.org/10.24818/EA/2022/61/720>

This Version is available at:

<https://hdl.handle.net/10419/281659>

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DO SUSTAINABILITY RISKS AFFECT CREDIT RATINGS? EVIDENCE FROM EUROPEAN BANKS

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Please cite this article as:

Samaniego-Medina, R., Giráldez-Puig, P., 2022. Do Sustainability Risks Affect Credit Ratings? Evidence from European Banks. *Amfiteatru Economic*, 24(61), pp. 720-738.

DOI: [10.24818/EA/2022/61/720](https://doi.org/10.24818/EA/2022/61/720)

Article History

Received: 30 March 2022

Revised: 21 May 2022

Accepted: 30 June 2022

Abstract

Targets defined in accordance with Environmental, Social and Governance (ESG) criteria confront the business world, particularly the banking industry, with new challenges. The aim of this paper is to study the effect of ESG controversies on the credit rating of the European banking sector, involving 65 European banks from 18 countries in the 2011-2020 period. This empirical study includes different approaches. Firstly, we apply an ordered logit model to ascertain the influence of ESG concerns on credit ratings. Secondly, we analyse the impact of ESG controversies on the probability of obtaining a better rating scale through the marginal effects. And finally, we use matching analysis to measure the real impact of ESG controversies on credit ratings. Our findings suggest that ESG controversies have a negative effect on credit rating. In addition, it is a relevant negative factor in the probability of obtaining a better rating in future reviews of credit assessments. Specifically, the lower the level of ESG controversies, the greater the probability of achieving the highest credit ratings. This research provides a comprehensive view of the impact of ESG controversies on credit ratings awarded to European financial institutions. European banks should take special care to avoid such controversies, as a source of reputational risk, when setting their policies so that their credit ratings would not be affected.

Keywords: banking sector, credit rating, environmental, social and governance (ESG), controversy.

JEL Classification: G21, G34, P34, Q56

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Introduction

The Covid19 pandemic is currently one of the most relevant concerns for governments and corporations alike. This pandemic, which is a crisis that affects the whole of humanity, has highlighted the importance of making progress in ESG considerations. Institutional investors are aware of this and consider these aspects in their investment decisions. In fact, the results of the survey carried out by EY (2021) on a panel of global institutional investors conclude that, since the pandemic, 90% of investors surveyed attach greater importance to companies' ESG performance when it comes to their investment strategy and decision-making.

The European Union (EU) intends to promote sustainability as a fundamental element for economic growth and the benefit of society through the *EU Action Plan on Sustainable Finance*. In this context, the banking sector is an important vehicle to achieve these objectives since it plays an essential role in economic development, by deciding how to allocate financial resources to different firms and sectors (Bencivenga and Smith, 1991). Thus, banks' involvement in CSR practices should, on the one hand, benefit the bank itself and, on the other hand, promote the adoption of sustainable practices by potential borrowers, exerting a positive impact on sustainable growth (Dorasamy, 2013).

This makes the financial sector unique when considering the effects of CSR practices (Forcadell and Aracil, 2017). In this regard, The *EU Sustainable Finance Disclosure Regulation* (SFDR) requires entities within the financial sector to disclose how sustainability risks are considered in their investment processes, the parameters they use to assess ESG factors, and how they analyse investment decisions that may have negative effects on sustainability factors (Morningstar, 2021). Scholars are aware of the importance of the financial sector for sustainability. In a bibliometric analysis of ESG performance in the banking industry, Galleta et al. (2022) find 271 articles about this issue, showing a considerably increase in the literature over the last decade.

From a regulatory standpoint, the EU is focusing on ESG risks rather than ESG opportunities. In this vein, the European Banking Authority (EBA) encourages banks to integrate ESG risks into their strategies, control systems and decision-making processes through its Action Plan on Sustainable Finance (EBA, 2019). Furthermore, by January 1st 2023, the SFDR is going to introduce new requirements for financial markets institutions, which focus precisely on the possibility of negative effects on environment and society, regardless of whether the investment strategy pursues a sustainable objective or not.

Overall, companies face different risks in relation to ESG. They must contribute to the achievement of ESG aims, while avoiding ESG controversies, i.e., irresponsible behaviour that has negative consequences on these objectives. ESG controversies are ESG-related news stories such as suspicious social behaviour and product-harm scandals that place a firm in the media spotlight and, by extension, attract investors' attention (Aouadi and Marsat, 2018; Cai et al., 2012). Regarding the financial sector, these controversies represent a new risk component along with credit, market, operational, liquidity and reputational risks (European Central Bank, 2021; Galleta and Mazzù, 2022; Mengze and Wei, 2015; Yu et al., 2018). As Galleta and Mazzù (2022) point out: ESG controversies represent an effective indicator to express the market's perception of firms' real compliance with ESG criteria because controversies are reported by the media.

Investors have also engaged on these issues, even more so since the COVID-19 pandemic. In fact, 74% of investors surveyed by EY (2021) stated they are now more likely to divest

based on poor ESG performance than they were prior to the COVID-19 pandemic and 86% are more likely now to hold an investment based on strong ESG performance. As EY (2021) reveals in its survey, institutional investors have vast experience in assessing risks such as credit or liquidity; however, evaluating climate risk is a relatively new discipline. Furthermore, assessing climate risk can be challenging; it is highly uncertain, sometimes difficult to quantify, and difficult to hedge against (because of the systemic and pervasive nature of climate risk). This problematic aspect can be extended to the other elements of the ESG acronym: social and corporate governance.

Recently, Moody's, Fitch Ratings and S&P, the three main international rating agencies, have made inroads into including ESG risks in their evaluations (Fitch Ratings, 2019; Standard & Poor's, 2019; Moody's, 2019). These developments are encouraged by the United Nations, which, with its Principles for Responsible Investment, urge credit agencies and investors to include sustainability criteria in their decision-making. Rating agencies, as experts in the assessment of credit risk, must now consider new risks in their assessments: ESG performance and ESG controversy. In this regard, Attig et al. (2013) find that credit rating agencies tend to award relatively high ratings to firms with good social performance.

Therefore, ESG objectives expose the corporate world in general and particularly the banking sector to new risks, mainly reputational, which can have an impact on credit risk. However, there is limited literature focusing on this issue. Through this paper, we are contributing to the existing literature by studying the way in which rating agencies consider these new risks when establishing their credit ratings particularly in the banking sector.

We focus our research on analysing the effect of ESG controversy on the credit ratings awarded in the European banking sector, which is particularly vulnerable to these risks, and confidence is a key factor in financial stability. We argue that ESG controversies negatively affect credit ratings and that this is a relevant factor in the probability of obtaining a better rating in future reviews of credit assessments.

To achieve our aims, we use a balanced panel dataset of 65 European banks from 18 countries (650 observations) with credit rating values available for the period between 2011 and 2020. We apply different empirical approaches. Firstly, and given that credit ratings are qualitative variables, we utilise an ordered logit model to ascertain the influence of ESG concerns on credit ratings. Secondly, we analyse whether ESG controversy is a relevant negative factor in the probability of obtaining a better rating through the marginal effects. Finally, we apply matching analysis to measure the real impact of ESG controversies on credit ratings.

Our findings suggest that ESG controversy has a negative effect on credit ratings. Specifically, the lower the level of ESG controversy, the greater the probability of achieving the highest credit ratings. The matching analysis confirms these findings.

To the best of our knowledge, given the multifaceted nature of ESG factors, little has been published about the link between ESG controversies and bank risk-taking (Galleta and Mazzù, 2022). This research contributes to the existing literature by providing a more comprehensive overview of the impact of ESG controversy on credit rating, as a credit risk measure, in the banking sector. Climate change, social inequalities or corporate misconduct are now, more than ever, aspects that can influence the reputation and business success of financial institutions. Banks should take special care to avoid such controversy so that their credit ratings are not affected.

The remainder of the paper is organised as follows: Section 2 reviews the most significant empirical studies and presents our research hypotheses. Section 3 describes the data and defines the explanatory variables and methodology used in the empirical research. Section 4 presents and discusses the results obtained, and section 5 summarises the results and draws conclusions.

1. Literature review and hypotheses development

1.1. ESG controversy and Credit Rating

The banking sector is key to the development of ESG objectives since it plays a crucial role in the allocation of resources in the economy: selecting investments, managing risks, and deciding who merits access to capital and what activities deserve to be financed (La Torre et al., 2021; Beck et al., 2010). Commitments to ESG are approached from three perspectives (Bătae et al., 2021; Gangi et al., 2019): 1) the efficient use of resources within the bank itself; where banks can reduce the use of resources such as energy and paper and mitigate the substantial indirect carbon emissions generated through business travel (Bătae et al., 2021); 2) the financing of environmentally conscious projects, incorporating environmental considerations into their lending policies (Bătae et al., 2021; Gangi et al., 2019); and 3) the reduction of the risk of lending funds to dirty industries (Bătae et al., 2021; Scholtens, 2009).

There are two opposing theories about the effect of ESG investing in the banking sector. According to stakeholder theory (Freeman, 1994), ESG-based banking should improve stakeholder satisfaction and enhance both financial performance and firm value (Di Tommaso and Thornton, 2020). In contrast, there is the agency perspective, where high ESG scores are associated with a reduction in bank value, consistent with the “overinvestment” view of ESG (Di Tommaso and Thornton, 2020).

The empirical evidence supports stakeholder theory applied to banking since ESG activities improve performance and reduce risk taking. In this respect, Buallay (2019) finds that ESG exerts a significant positive impact on the performance of listed banks in European Union countries.

Similar results are obtained by Shakil et al. (2019), who show a positive association between environmental and social performance and financial performance to emerging market banks. However, they find that governance performance does not influence financial performance.

With respect to ESG activities and their influence on risk-taking in the banking sector, previous studies have reported a negative relationship between the two variables. Di Tommaso and Thornton (2020) report, for a sample of European banks, that high ESG scores are associated with a modest reduction in risk-taking regardless of whether the banks are high or low risk-takers. Similar results are obtained by Bolton (2013) for US banks, and Neitzert and Petras (2019) for a sample of banks from different countries. In some concise research, Gangi et al. (2019) show that environmentally conscious banks have lower levels of insolvency risk; and Chiaramonte et al. (2021) find that banks with higher ESG scores are less risky. Specifically, environmental activism, the level of social engagement and fair governance practices reduces risk-taking. As an exception to these findings, Nițescu et al. (2020) find that when the return on assets and the leverage multiplier increases, the probability that a bank will implement ESG risk management decreases in the Romanian banking sector.

Similar results are obtained for the non-financial sector. Since ESG is considered the evolution of the concept of CSR (La Torre et al., 2021; Aguinis, 2011), the findings of Chava (2014), El Ghoul et al. (2011) and Goss and Roberts (2011) suggest that company engagement in environmental issues and, consequently, CSR, significantly lowers the cost of equity or debt, leading to better financing conditions (Cheng et al., 2014) and improving their credit rating (Jiraporn et al., 2014).

Along similar research lines, La Torre et al. (2021) find that the current approach taken by banking authorities, focusing on ESG risks rather than ESG opportunities, forces banks to adopt a new ESG business model. In this vein, Shakil et al. (2021) identify a significant positive relationship between board gender diversity and the ESG performance of US banks.

ESG controversy in the banking sector has been analysed from different approaches. In this regard, Shakil et al. (2021) report that ESG controversy does not have a significant effect on the relationship between board gender diversity and ESG performance using a US banks database. The findings of Bătae et al. (2021) suggest that larger banks that have better scores on environmental, social and governance aspects, considered separately, are involved in more controversies.

Corporate social irresponsibility (CSI), defined as the negative counterpart of CSR, is conceptually very similar to ESG controversy and has been equally analysed using different approaches. In this respect, Harjoto et al. (2021) find that stocks with no reputation risk, measured by means of no CSI events, earn higher abnormal returns than stocks with high reputation risk. In this vein, Kölbel et al. (2017) note that firms receiving higher CSI coverage face higher financial risk, analysing an international panel of 539 firms during 2008-2013.

The banking sector is not exempt from the risks involved in CSI. As Goss and Roberts (2011) conclude in their research, banks register CSR concerns as risks and respond with less attractive loan contract terms. Similarly, Chava (2014) concludes that lenders charge a significantly higher interest rate for bank loans granted to companies with environmental problems. Oikonomou et al. (2014) analyse 3,000 bonds issued by 742 firms and conclude that avoidance of controversies regarding the firm's workforce can materially reduce the risk premiums associated with corporate bonds and thus decrease the cost of corporate debt. Galletta and Mazzù (2022) show that banks with fewer ESG controversies take less risk due to their commitment to the implementation of ESG strategies.

Together, these studies outline that both ESG controversy and CSI confront companies and banks with new risks, and rating agencies are aware of this. Although this relationship has not been previously studied, there is similar previous research. For instance, Weber et al. (2010) find that the social performance of firms is relevant to the assessment of credit ratings in German banks.

ESG factor is a key aspect to consider by rating agencies. Different researchers suggest that there is a positive relationship between CSR and credit ratings (Attig et al., 2013; Kim and Kim, 2014; Lin et al., 2020). Chodnicka-Jaworska (2021) suggested that the methodology presented by credit rating agencies has changed, and ESG factors are one of the basic measures used to verify credit rating changes. Jiraporn et al. (2014) put forward a similar argument: Credit rating agencies are more likely to account for CSR benefits because they are sophisticated financial intermediaries with strong financial expertise and access to better information than the average investor.

The main objective of our research is to analyse whether rating agencies include irresponsible behaviour, measured by ESG controversy, in their ratings.

Despite the lack of previous studies analysing this relationship, we consider that ESG controversy is a decisive factor in credit risk, and, therefore, formulate the following hypothesis:

Hypothesis 1: ESG controversy has a negative effect on the credit ratings of banks.

1.2. ESG controversy and corporate reputation.

Certainly, ESG has a strong connection with corporate reputation (Cuadrado-Ballesteros et al., 2015) and can create competitive advantages (Lee and Faff, 2009; Gardberg and Fombrun, 2006).

Tăchiciu et al. (2020) show that there is a strong connection between reputational risk management and the public disclosure of information on the social and environmental impact of the company's activities: a good reputation requires the exercise of responsible behaviour. This might lead us to believe that negative publicity in relation to ESG due to irresponsible behaviour, i.e., ESG controversy, would have a negative effect on reputation and on variables such as firm value and financial performance. However previous research yields contradictory results. For instance, Aouadi and Marsat (2018) find that ESG controversies have no direct effect on firm value when they interact with corporate social performance; and DasGupta (2022) shows that ESG controversies have a positive mediating impact on the relationship between financial performance shortfalls and ESG performance. In relation to bank risk, Dell'Atti et al. (2017) confirm that the stronger a bank's reputation becomes, the lower its riskiness profile.

Given the close link between ESG controversy and corporate reputation, ESG controversy could jeopardise a financial institution's chances of achieving a certain rating. According to this idea, we state the following hypothesis:

Hypothesis 2: ESG controversy will have a negative impact on the likelihood of obtaining a better rating in future reviews of credit assessments.

2. Data and empirical methodology

2.1. Sample

Our sample is composed of EU banks from 18 countries for the period between 2011 and 2020 (table no. 1). We gathered data from the Refinitiv Eikon database, obtaining an initial sample of 146 banks that, after filtering for firms with information about ESG controversies and 5 years of credit ratings, yielded a final sample of 65 European banks in a balanced panel of 650 observations.

Table no. 1. Tabulation of countries

Country	Frequency	Percent.	Cumulative
Austria	30	4.62	4.62
Czech Republic	20	3.08	7.69

Country	Frequency	Percent.	Cumulative
Denmark	40	6.15	13.85
Finland	30	4.62	18.46
France	70	10.77	29.23
Germany	40	6.15	35.38
Greece	20	3.08	38.46
Hungary	10	1.54	40.00
Ireland	30	4.62	44.62
Italy	110	16.92	61.54
Netherlands	20	3.08	64.62
Poland	60	9.23	73.85
Portugal	20	3.08	76.92
Romania	20	3.08	80.00
Slovakia	20	3.08	83.08
Slovenia	20	3.08	86.15
Spain	60	9.23	95.38
Sweden	30	4.62	100.00

2.2. Variables

2.2.1. Dependent variable

As the dependent variable, we selected the ratings as reported by Moody's. According to the marginal effects from the ordered logit estimation, we obtained 4 cut-off points regarded as the thresholds to divide credit grades. Thus, we transformed ratings into a new score with 5 categories (*rating*). The highest score (5) belongs to triple and double A companies (Aaa to Aa3), whereas a score of 4 is given to firms with a rating ranging from A1 to A3. Firms with a rating of Baa1 to Baa3 are in 3rd place. The speculative rating corresponds to a value of 2 (Ba1 to Ba3) and 1 (from B1 to C).

2.2.2. Independent (x_i) and control variables (z_i)

We used the ESG controversies score (*esgcont*) calculated by Refinitiv Eikon. The annual score for each company ranges between 0 and 100 points, where 0 is the worst score and 100 means no controversies at all, so the higher the value of *esgcont*, the lower the level of controversies and vice versa. ESG controversies category score measures a company's exposure to environmental, social and governance controversies and negative events reported in global media.

Conscious that a bank's rating is not only affected by its ESG controversies score, we included other explanatory variables (z_i) in the regression models, namely: capital adequacy (*ca*) represents the value of highest-quality sources of capital which banks and other financial institutions are required to keep in order to be protected against bankruptcy, expressed in billions. It acts as a proxy for the ability of the bank to absorb unexpected losses (Baldwin et al., 2019; Rahman and Masngut, 2014); leverage, as a key issue for credit risk (Kasasbeh, 2021; Ullah et al., 2020), is captured through the debt to total assets ratio (*lev*). Loans to deposits ratio (*ltd*) is a proxy for the liquidity of banks (Van den End, 2016; Acharya and

Mora, 2015). A low value in this ratio could be troublesome for a bank's margins; high values could indicate a lack of liquidity and the need for extra funds to face possible defaults. Liquidity coverage (*lcr*) represents the ratio of high-quality liquid assets to a company's net cash outflows expected within 30 days in a liquidity stress scenario. The ratio is used to estimate risks arising from potential liquidity shortages (Cetina and Gleason, 2015; Hartlage, 2012). Firm size (*size*) reports the natural log of the bank's total assets, and GDP growth (*gdpgr*) encapsulates the country effect. All variables are presented in table no. 2.

Table no. 2. Variables definition and notation

Variable	Definition	Notation
Rating	Ordinal variable with five thresholds depending on the rating awarded by Moody's	<i>rating</i>
ESG controversies score	ESG controversies score Index ranging from 0 to 100, where 100 is the highest score, which means no controversy	<i>esgcont</i>
Capital adequacy	Value of highest-quality sources of capital which banks are required to keep in order to be protected against bankruptcy	<i>ca</i>
Leverage	Ratio of debt to equity	<i>lev</i>
Loan to deposits	Ratio of loan to deposits	<i>ltd</i>
Liquidity coverage	Ratio of high-quality liquid assets to net cash outflows expected within 30 days in a liquidity stress scenario	<i>lcr</i>
Firm size	Napierian logarithm of total assets as a proxy of firm size	<i>size</i>
GDP growth	Annual real GDP growth to capture country effect	<i>gdpgr</i>

2.3. Empirical strategy

Hypothesis 1 aims to find the effects of ESG controversies on banks' ratings. These ratings follow a ranking of discrete values from 1 to 5 where 5 is the best score and 1 represents the worst score. Therefore, we have to use a discrete choice model for ordered alternatives. Thus, we follow prior research (Mansoor et al., 2021; Lin et al., 2020; Berenguer et al., 2016; Greene and Hensher, 2010) and use an ordered logistic model. The reason for using ordered logistic regression (OLR) is that there is a continuous but unobserved variable Y_n , which is a linear function of X_s and a stochastic standard logistic variable (Greene and Hensher, 2010; Fullerton, 2009; Krull and MacKinnon, 2001). To offset any endogeneity issues potentially arising from simultaneity concerns, we lagged all independent endogenous variables by one year. Therefore, the model is as follows:

$$\text{Log} [\gamma_{ij}/(1 - \gamma_{ij})] = \theta + \beta_i x_{it-1} + \beta_j z_{it-1} + gdpgr_{it} + \varepsilon_i \quad (1)$$

where: γ_{ij} – categories of the rating;

β_i – parameters to be estimated;

$x_{i, t-1}$ – main independent variable, *esgcont_i*;

$z_{i, t-1}$ – set of bank characteristics (*ca*, *lev*, *ltd*, *lcr* and *size*);

gdpgr_{it} – macro-country effect (GDP growth);

ε_i – random disturbance term.

We also estimate the marginal effects – MEs – of ESG controversies to measure their real implications to test our second hypothesis. MEs are partial derivatives of the regression equation with respect to each variable in the model for each unit in the data. They explain changes in the probability of the dependent variable for a unit change in the regressor. The marginal effect on the probability of choosing alternative j when the regressor x_r changes is given by:

$$(\partial \Pr(\gamma_i=j))/(\partial x_{ir}) = \{F'(\alpha_{j-1}-x'_i\beta) - F'(\alpha_j-x'_i\beta)\} \beta_r \quad (2)$$

where F' is the probability density function of the logistic distribution.

3. Results

3.1. Descriptive statistics

For our sample, *rating* has a mean of 3.068 and a median of 3 around a basic investment grade (Baa). In fact, 41.25% of banks are in this category (table no. 1). The ESG controversies score varies from 0.51 to 100 with a mean of 82.62 and a median of 100, showing a high concentration of banks in the higher quartile of this scale. Our sample includes large as well as small firms in terms of capital adequacy and assets. The average leverage ratio is 2360.45 with a maximum of 1751.801 and a minimum of 0, indicating significant variation. Mean and median values for the loans to deposits ratio far exceed the minimum of 100% required to hold enough high-quality liquid assets that can be sold to fund banks during a 30-day stress scenario designed by regulators. GDP growth encompasses a wide variety of values given that our sample includes periods of crisis (from 2011 to 2016, and particularly 2020 with the Covid 19 pandemic). We report descriptive statistics for the variables analysed (table no. 3).

Table no. 3. Descriptive statistics

Variables	Obs.	Mean	Std. deviation	Median	Min	Max
<i>rating</i>	543	3.068	1.107	3	1	5
<i>esgcont</i>	421	80.62	29.601	100	0.51	100
<i>dcont</i>	421	0.174	0.379	0	0	1
<i>ca</i>	327	478.206	2033.674	83.14	1.524	23160
<i>lev</i>	616	2360.45	260.536	156.940	0	1751.801
<i>ltd</i>	621	96.404	34.142	90.92	2.76	294.2
<i>lcr</i>	162	162.51	57.7	149	69	468
<i>size</i>	631	25.256	2.353	25.24	12.6	30.78
<i>gdpgr</i>	650	0.968	3.484	0.3	-10.8	25.2

3.2. Results of the base regression model

Our results show a positive and significant effect for the absence of bad news and negative events on credit rating (table no. 4). Considering that, in *esgcont*, the higher the score, the lower the controversy, ESG controversy has a negative impact on credit rating. This confirms hypothesis 1: ESG controversy has a negative effect on a bank's credit rating. The Wald test of the joint significance on the regressors is significant, and the R2 coefficient is 0.53, which is acceptable. We also find significant effects for capital adequacy (*ca*), the loan to deposits

(*ltd*) and liquidity coverage (*lcr*) ratios, and firm size (*size*), which exert a positive impact on credit rating as expected. This result supports the risk mitigation view (Di Tommaso and Thornton, 2020) that links strong CSR performance to lower financial risk. It is also in line with Galleta and Mazzù (2022) who find evidence that banks with fewer ESG controversies take less risk, Kölbel et al. (2017), who find a positive relationship between CSI coverage and financial risk, and Harjoto et al. (2021), who connect the absence of CSI events with higher abnormal returns.

Table no. 4. Random effects ordered logistic regression of ESG controversies on credit rating

Rating	Coefficient	Std. errors	t-value	p-value	[95% Conf. interval]	
<i>esgcont_{t-1}</i>	0.047***	0.140	3.380	0.001	0.020	0.074
<i>ca_{t-1}</i>	0.0180***	0.003	6.450	0.000	0.012	0.023
<i>lev_{t-1}</i>	-0.003	0.004	-0.880	0.380	-0.010	0.004
<i>ltd_{t-1}</i>	0.033*	0.019	1.740	0.082	-0.004	0.071
<i>lcr_{t-1}</i>	-0.021**	0.009	-2.270	0.023	-0.038	-0.003
<i>size_{t-1}</i>	95.000**	0.473	2.010	0.045	0.023	1.877
<i>Gdpgr</i>	-0.210	0.161	-1.300	0.194	-0.526	0.107
<i>time dummies</i>	Yes					
R²	0.53					
Wald chi2	142.71***					

Notes: ***, ** and *: significant at the 1, 5 and 10 percent level.

Moreover, the significant values of marginal effects (table no. 5) prove how this effect is positive for the best categories of credit ratings, whereas it is negative for the lower ones. In other words, the lower the level of ESG controversy, the higher the likelihood of achieving the highest ratings, from A3 to Aaa (levels 4 and 5) considered within investment grade. Similarly, the lower the levels of such controversies, the lower the probability of achieving the lowest ratings, from Ba to C (levels 1 and 2) considered to be in the speculative category, and Baa (level 3) considered to be intermediate but with speculative characteristics (Moody's, 2021). This confirms hypothesis 2: ESG controversy has a negative impact on the probability of obtaining a better rating in the future. These findings are consistent with the need for a risk management framework for ESG activities proposed by EBA (2020, 2021) and the European Central Bank (2021).

Table no. 5. Marginal effects

Rating	dy/dx	Std. errors	z	P > z	[95% Conf. Interval]	
1 - C - B1	-0.000***	0.000	-3.550	0.000	-0.001	-0.000
2 - Ba3 - Ba1	-0.001**	0.000	-1.850	0.065	-0.001	-0.000
3 - Baa3 - Baa1	-0.001***	0.000	-3.980	0.000	-0.001	-0.000
4 - A3 - A1	0.001***	0.000	3.800	0.000	0.001	0.002
5 - Aa3 - Aaa	0.001***	0.000	3.260	0.001	0.000	0.001

Notes: ***, ** and *: significant at the 1, 5 and 10 percent level.

3.4. Selection bias

Finally, to address any concerns relating to the nature of the selection of sample firms, we apply propensity score matching (PSM) (Rosenbaum and Rubin, 1983) to study empirically any changes in credit ratings due to the existence of ESG controversies that affect banks' reputation. The sample is, thus, divided into two groups: the treatment group of banks with some kind of reputational damage (those with below-mean *esgcont*) and the control group of banks with an above-mean *esgcont* value. For this process, we divide our sample into high-low ESG controversy score groups, using a dummy variable (*dcont*) that takes the value of 1 for banks below the mean value for the ESG controversy score (82.62; see table no. 3); therefore, this variable is positive for banks with bad news in the media.

The evaluation problem is that the counterfactual outcome of not having any reputational issues is unobserved for the treated companies. Nevertheless, comparing firms with low/high *esgcont* is exposed to the presence of non-random sample selection; therefore, we use matching that allows us to find a set of firms with the same observable characteristics as the treated group. To consider the inference of causal effects for *esgcont* as valid, we assume that, in the absence of controversies, the outcome of the treated group would not have been different than the outcome of the control group.

To construct our control group of firms with high *esgcont*, we begin by estimating a model for the probability of getting a low score for ESG controversies (*dcont*=1). We use a probit model where we regress the dummy variable indicator of whether the firm has a low ESG controversy score during the sample period, controlling simultaneously for a number of other factors that potentially influence this probability. Therefore, the model is as follows:

$$\begin{aligned} dcont_{it} &= 1 \text{ if } \sigma + x_{it-1}\rho + dt + \varepsilon_{it} > 0 \\ &0 \text{ if } \sigma + x_{it-1}\rho + dt + \varepsilon_{it} \leq 0 \end{aligned} \quad (3)$$

where:

dcont_{it} – dummy variable that takes the value of 1 if the firm has an ESG controversy score below the mean value (82.62) and 0 otherwise;

x_{it-1} – vector of firm characteristics;

dt – denotes time dummies;

ε_{it} – error term, which we assume is normally distributed with variance σ^2_z .

In all regressions we use cluster-robust standard errors.

The results of the marginal effects (table no. 6) indicate that the likelihood of having a high level of ESG controversy is higher for larger, more leveraged banks; these results are in line with the findings of Bătae et al. (2021). While better capitalised, more liquid banks have a lower probability of having such controversies. Although we find some evidence that banks located in countries with larger GDP growth have a lower probability of controversy, these differences are not statistically significant. Overall, there is evidence of significant differences between the treatment and the control group that could make a difference in their credit ratings.

Table no. 6. Probit estimates to calculate propensity scores

Variables	Marginal effects	p-value
Ca	-0.001**	0.018
Lev	0.001**	0.041
Ltd	-0.007***	0.009
Size	0.294***	0.000
Lcr	-0.001	0.804
Gdpgr	-0.0049	0.663
time dummies		yes
Log pseudo likelihood		-56.82

Notes: ***, ** and *: significant at the 1, 5 and 10 percent level.

In order to construct the counterfactual group, we used caliper matching with replacement (using a 1% caliper) with the psmatch2 command (Leuven and Sianesi, 2003). Then we compare the credit ratings of banks with high and low ESG controversy scores matched and find no significant differences between the characteristics of both groups after the matching analysis. The absence of significance in the mean differences between the matched treatment and control firms (table no. 7) indicates that control and treatment groups are equivalent in their observable characteristics. This result is confirmed by the reduction in the pseudo R2 coefficient (from 0.416 to 0.059), the likelihood ratio test on the joint significance of all regressors, which rejects the null hypothesis that of all of them are equal to zero after matching (LR=3.29) and the decrease in the mean (from 58.3 to 30.8) and median bias (from 35.9 to 34.3).

Table no. 7. Test of balancing hypothesis

Variables		Treated	Control	t-test	p-value
ca	Unmatched	585.130***	222.200	5.250	0.000
	Matched	514.770	533.130	-0.120	0.901
lev	Unmatched	343.080	283.940	1.200	0.234
	Matched	365.470	363.730	0.020	0.986
ltd	Unmatched	97.978*	111.070	-1.680	0.095
	Matched	109.900	101.710	0.620	0.977
size	Unmatched	27.612***	25.362	8.010	0.000
	Matched	27.028	26.902	0.300	0.880
Lcr	Unmatched	148.000**	166.650	-2.150	0.033
	Matched	159.030	152.700	0.630	0.368
gdpgr	Unmatched	0.0216	0.574	-0.770	0.443
	Matched	-0.291	1.267	-1.270	0.163
Ps. R2	Unmatched				0.416
	Matched				0.059
LR chi2	Unmatched				74.50
	Matched				3.29
p>chi2	Unmatched				0.000
	Matched				0.656
MeanBias	Unmatched				58.3
	Matched				30.8
MedBias	Unmatched				35.9
	Matched				34.3

Notes: ***, ** and *: significant at the 1, 5 and 10 percent level.

Finally, the average treatment effect for the treated group (ATT) is -0.044, indicating that banks affected by bad news or events reported in the global media are negatively affected in their credit ratings. The consistency of these results continues to support hypothesis 1: ESG controversy has a negative effect on a bank's credit rating.

Conclusions

Society as a whole and the corporate world are facing a particularly turbulent period, where events such as the Russian war and COVID-19 are reinforcing the importance of ESG goals. Indeed, Europe, through the *REPowerEU* plan, aims to divest itself of Russian fossil fuel consumption by 2030, replacing it with less expensive, safer, and more sustainable energy. The banking industry plays a fundamental role in the development and achievement of these objectives since they decide how to allocate financial resources, and investors are, now more than ever, aware of this. Therefore, in this context, irresponsible ESG behaviour can be heavily penalised by stakeholders.

The purpose of this study is to determine how ESG controversy affects both credit ratings and the likelihood of obtaining a specific rating. To conduct our research, we use a balanced panel composed of 650 observations for 65 European banks from 18 countries for the period between 2011 and 2020.

This empirical study includes different tests. Firstly, we use an ordered logit model to ascertain the influence of ESG concerns on credit ratings. Secondly, we analyse the impact of ESG controversy on the probability of obtaining a better rating through the marginal effects. Finally, we apply matching analysis to measure the real impact of ESG controversies on credit ratings.

Our findings show that ESG controversy has a negative effect on banks' credit ratings and is a relevant negative factor in the probability of obtaining a better rating. Specifically, the lower the level of ESG controversy, the higher the likelihood of achieving the highest credit ratings. The matching analysis conducted supports these findings.

These conclusions have important implications for ESG policies in a sector which is key to maintaining international financial stability. Not only did the sovereign debt crisis highlight the interdependence of European countries on one another and on banks; it also revealed the importance of reputational risks for a trust-based sector.

The key difference for the banking sector is that ESG risks do not depend exclusively on what they do (e.g., failing to comply with new ESG regulatory requirements) but on their customers (e.g., funding environmental or socially irresponsible projects) giving rise, among others, to higher rates of default. Consequently, a second derivative of these results is related to the multiplicative effects of ESG controversies on reputational risk, since the credit rating directly influences the opinion of investors and stakeholders regarding the entity. For banks, *"sustainability is not just an ethical, but may soon enough also become an economic and existential question"* (KPMG, 2021). It is crucial and apt anticipation for active positioning and the integration of ESG risks into banks' risk management frameworks. It is also necessary to adjust business and risk strategies, making sure roles and responsibilities are fully transparent.

Since credit rating agencies are increasingly turning their focus towards sustainability issues, and society is especially sensitive to bad news about ESG, the avoidance of controversy must be a priority for European banks in order to maintain or improve their credit ratings. This supports the need for the integration of ESG risks into their risk management frameworks considering related issues in product design, pricing, and sales decisions.

Finally, there are certain limitations to this study that should be addressed in future research. Our study does not separate environmental, social or governance aspects regarding sustainability controversies. Additionally, this study includes banks from a variety of nations, each with its own set of government policies and culture values. Future research could consider how the country-culture profiles can contribute to reducing ESG controversies separately in its three pillars.

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