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## ► To cite this version:

Gamze Ozturk Danisman, Amine Tarazi. ESG activity and bank lending during financial crises. 2022. hal-03547104v1

**HAL Id: hal-03547104**

**<https://hal.science/hal-03547104v1>**

Preprint submitted on 28 Jan 2022 (v1), last revised 17 Oct 2022 (v2)

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# ESG activity and bank lending during financial crises

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*This draft: 20 January 2022*

*Preliminary version. Please do not quote without the permission of the authors*

## Abstract

This paper explores how banks' environmental, social, and governance (ESG) activities affect their lending during financial crises. We use a sample of 83 listed banks from 20 European countries for the 2002-2020 period and consider the global financial crisis of 2007-2009 and the European sovereign debt crisis of 2010-2012. We implement two-step system GMM dynamic panel data estimation techniques. We also address potential endogeneity issues using instrumental variables (IV) and two-stage least squares (2SLS) estimations by instrumenting ESG activity with board gender diversity. We find that lending falls to a lesser extent for banks with higher ESG scores during crisis times. Looking at the different potential channels shows that, during crises, banks more engaged in ESG activities are less affected in terms of credit and asset risk, and profitability. They also face a lower reduction in market funding, allowing them to downsize to a lesser extent during crises, and their deposit rates do not increase as much as in less ESG-engaged banks. Going deeper reveals that our findings are mainly driven by the environmental pillar component of ESG scores.

**JEL classification:** G01, G21, G30

**Keywords:** Environmental Social Governance (ESG) scores, Bank Lending, Bank Risk, Environmental pillar, Financial Crisis, European banks

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## Abstract

This paper explores how banks' environmental, social, and governance (ESG) activities affect their lending during financial crises. We use a sample of 83 listed banks from 20 European countries for the 2002-2020 period and consider the global financial crisis of 2007-2009 and the European sovereign debt crisis of 2010-2012. We implement two-step system GMM dynamic panel data estimation techniques. We also address potential endogeneity issues using instrumental variables (IV) and two-stage least squares (2SLS) estimations by instrumenting ESG activity with board gender diversity. We find that lending falls to a lesser extent for banks with higher ESG scores during crisis times. Looking at the different potential channels shows that, during crises, banks more engaged in ESG activities are less affected in terms of credit and asset risk, and profitability. They also face a lower reduction in market funding, allowing them to downsize to a lesser extent during crises, and their deposit rates do not increase as much as in less ESG-engaged banks. Going deeper reveals that our findings are mainly driven by the environmental pillar component of ESG scores.

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## 1. Introduction

There has been a heightened interest in corporate social responsibility (CSR) and environmental, social, and governance (ESG)<sup>1</sup> from researchers, practitioners, and regulators, especially after the 2007-2009 global financial crisis (GFC) and more recently in the wake of the COVID-19 pandemic. Firms are increasingly considering ways to mitigate the negative environmental and social impacts to address the emerging needs of society. There is a vast number of empirical studies on how ESG activities influence non-financial firm performance, and the findings are mixed. Some studies find that ESG activities boost firm performance by providing product differentiation and by reducing systematic risk (Albertini 2013; Friede et al., 2015; Broadstock et al., 2020; among others). Others claim that ESG activities might generate inefficiently allocated capital, lead to opportunity costs, and claim that the relationship is neutral or even negative (Devinney, 2009; Oikonomou et al., 2012; Dixon-Fowler et al. 2013; Santis et al., 2016; among others).

Despite a considerable body of literature on its influence on non-financial firms, whether and how ESG engagement impacts financial institutions, particularly banks, has been relatively less explored. Some recent studies have focused on how banks' ESG activity impacts bank value (Azmi et al., 2021) and bank stability (Di Tommaso and Thornton, 2020; Chiaramonte et al. 2021), also providing conflicting findings. This mixed evidence points to a need to better understand the conditions under which ESG activity is more likely to improve bank outcomes. In this paper, we explore how ESG activities affect banks' lending during financial crisis times.

Growing evidence supports the view that, during crisis times, non-financial firms with better ESG engagement have lower downside risk, and they are more resilient in terms of market performance (Lins et al. 2017; Albuquerque et al., 2020; Hoepner et al., 2021; Broadstock et al. 2021). Albuquerque et al. (2019) develop a theoretical model where ESG investments help firms improve their product differentiation, leading to a more loyal customer base and a lower price elasticity of demand in response to aggregate shocks. Very few studies focus on banks specifically; Cornett et al. (2016) and Chiaramonte et al. (2021) are some exceptions. These studies document that banks with higher ESG engagement have better financial performance and stability during crisis times, such as the GFC. But, whether and how ESG activities affect individual bank lending remains an open question. To the best of our knowledge, no studies explore this link.

Understanding how ESG activity affects bank lending, especially in crisis times, is essential because banks are greatly linked to environmental degradation through their lending activities. Banks rely on substantial resources from society, most of their funding originating from depositors. They play a crucial role in allocating funds by considering the needs and preferences of savers and investors into appropriate capital investments (Scholtens, 2006). With their role as financial intermediaries and credit providers, they contribute to the development of the economy (Levine 2005; Scholtens 2009). Financial crisis times are characterized by higher information asymmetries (Flannery et al., 2013). During such times, banks face an overall decrease in funding, and thus they prefer lending to borrowers with whom they have a longer lending relationship. Moreover, banks become more cautious to lend due to the potential increases in loan defaults, leading to an overall reduction in lending (Ivashina and Scharfstein, 2010; Lou and Yin, 2014; Cubillas and Suárez, 2018). Such

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<sup>1</sup> CSR and ESG are increasingly used interchangeably in the literature.

reductions in the credit supply in crisis times have severe implications on the real economy, propagating the overall decrease in investments or employment (Berger et al. 2020).

Banks' failure to integrate ESG considerations into their operations and financing would deteriorate the sustainability of the businesses financed through banks and would not be welcomed by investors. Critics of banks and some environmental lobby groups are skeptical of banks' real motives. They argue that banks have prioritized maximizing their profits in the short-term over longer-term sustainability goals; the recent subprime mortgage crisis is given as an example (Cornett et al., 2016). However, there is growing evidence that banks are addressing carbon risk within their lending decisions, incorporated through credit risk assessment criteria and the cost of debt (e.g., Jung et al. 2018; Herbohn et al. 2019). They also offer lower loan rates to firms with better corporate social responsibility performance (Cheung et al., 2018). Moreover, they are motivated to boost their corporate social responsibility reputation to attract more creditworthy borrowers (Wu and Shen, 2013; Herbohn et al., 2019). They offer savings accounts that support socially and environmentally responsible projects (Scholtens, 2009).

The theoretical literature on the potential relationship between ESG and firm value is based on two main opposing views. The "overinvestment view" states that managers tend to overinvest in ESG for their personal benefits arising from agency theory or to gain support from society, and these investments are accepted as a waste of resources (Cespa and Cestone 2007; Barnea and Rubin 2010). Meanwhile, the "stakeholder theory" asserts that ESG investments benefit all stakeholders and bring positive moral capital and advantage by lowering idiosyncratic risk, reducing the cost of capital, diminishing asymmetric information and agency costs (Godfrey 2005; El Ghouli et al. 2011; El Ghouli and Karoui 2017). Market participants would perceive that firms that invest in ESG would have lower risk, which would lower the cost of capital, diminish asymmetric information and agency costs (El Ghouli et al. 2011), decrease capital constraints, and improve access to finance (Cheng et al., 2014). If, as argued by the literature, firms with better ESG engagement are less severely impacted during crisis times than less engaged firms (Lins et al. 2017; Albuquerque et al., 2020; Hoepner et al., 2021; Broadstock et al. 2021), we should expect banks to more easily continue to fund such entities at the detriment of other firms. If banks are already engaged with firms with stronger ESG engagement, then we would also expect ongoing bank-firm relationships to be less likely interrupted and hence overall lending activities consequently less affected during turmoil.

In our empirical analysis, we use a sample of 83 European commercial banks and yearly data from 2002 to 2020. We investigate the influence of ESG activity on bank lending during financial crisis times, i.e., considering both the GFC in 2007-2009 and the sovereign debt crisis in 2010-2012. In our baseline estimations, to account for the dynamic nature of the lending activity, we conduct two-step system GMM dynamic panel data estimation techniques. Empirical studies testing the impact of ESG on firm performance or other outcomes suffer from identification issues. Indeed, whether ESG activities are actually beneficial for firms or whether more profitable firms engage in such activities simply because they can afford it remains an open question (Albuquerque et al., 2020). We address this empirical challenge by also conducting two-stage least squares (2SLS) estimations with instrumental variables. Specifically, we instrument ESG activity with board gender diversity. Our findings reveal that while all banks in our sample decrease their lending during crisis times, banks with higher ESG scores are less affected. Such banks can still continue to lend, whereas banks that are less ESG-engaged experience more difficulties in performing their

intermediation function. The findings are robust to alternative estimation methodologies and controlling for macro-economic conditions, as well as controlling for the COVID-19 health crisis.

To go deeper, we examine the channels through which ESG activity affects bank lending during times of crisis. Banks that are perceived as less affected by a rise in credit and asset risk are more likely to maintain their lending activities than their peers. The same would hold for institutions suffering from a lower fall in profitability during turmoil or whose depositors are less likely to run or require higher interest rates. The structure of bank funding during uncertain times also has an important effect on bank lending (Ritz and Walther, 2015). Banks that are more likely to attract depositors who withdraw their holdings from jeopardized banks will also be able to lend more (Cornett et al., 2011; Acharya and Naqvi, 2012; Barry et al., 2020). During crisis times, there is a dry-up in the wholesale funding, and banks face market funding liquidity shocks which are directly propagated into bank lending (Brei et al., 2013; De Haan and van den End, 2013). The market would be more confident to lend to banks that are perceived as safer and such banks would have more funding sources to continue their lending activities.

We document that while crisis times negatively affect credit risk and, more generally, asset risk for all banks, banks with stronger ESG engagement is less impacted, possibly explaining that lending can more easily continue to take place during stressed periods. We also document that banks with higher ESG scores face a relatively lower decrease in their profitability and that the depositors of these banks request a lower increase in deposit rates in crisis times. Such banks are also the ones that suffer less from a fall in market funding, and that downsize their balance sheet to a lesser extent during crises. We also perform some additional analysis and find that our findings are mainly driven by the environmental pillar component of the ESG score. As awareness of environmental issues is progressively increasing, it is not surprising that this component has the highest impact on lending in turbulent times (Azmi et al., 2021). Considering the strategic role banks play in funding environmental impact projects, investors are more likely to favor banks that focus on environmental issues such as climate change and air pollution. We also disentangle the crisis periods (GFC in 2007–2009 and the European sovereign debt crisis in 2010–2012) and focus on the COVID-19 pandemic in 2020. Our results mainly hold during the GFC period.

Our paper contributes to the literature in several ways. First, we contribute to the recently emerging field of research (Cornett et al. 2016; Chiaramonte et al., 2021; Broadstock et al., 2021) on the impact of ESG on bank performance in crisis times and provide further insights by documenting that banks with higher ESG engagement are less negatively affected in terms of lending during turbulent times. Second, we focus on European banks as an empirical context. European banks have pioneered sustainability implementations compared to those headquartered in other regions (Ho et al., 2012; Chiaramonte et al., 2021). In line with the rising importance of climate change and growing evidence of its financial impact on banks, there have been significant regulatory developments in Europe to improve non-financial information and diversity disclosure<sup>2</sup>. For instance, the Non-Financial Reporting Directive

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<sup>2</sup> The Non-Financial Reporting Directive (2014/95/EU) took place in 2014 and it necessitates some large companies, including banks, to provide information on how they work on social and environmental practices, how much they respect human rights or diversity on board of directors (Chiaramonte et al., 2021). Moreover, the European Central Bank (ECB) announced in November 2020 that banking stress tests starting from 2022 will capture climate-related risks (ECB, 2020). The ECB requires banks to properly manage and clearly disclose such risks.

(2014/95/EU) took place in 2014, and banking stress tests start to include climate-related risks in 2022. Third, we provide deeper insights on the channels of how ESG engagement might help banks to be less negatively impacted during crisis times. Our findings have important implications that support the regulatory initiatives regarding the improved disclosures on non-financial reporting. Better standards for ESG disclosures are increasingly helpful for financial decisions, and governments and regulators need to focus on the proliferation of policies and standards.

The rest of the paper is organized as follows. Section 2 presents the data, variables, and methodology. Section 3 discusses the empirical findings and Section 4 provides conclusions and policy implications.

## 2. Data, variables, and Methodology

### 2.1. Data sources and sample

Our bank-level data is from Thomson Reuters Refinitiv Eikon (formerly known as Datastream Eikon), and ESG related data is taken from the Thomson Reuters ASSET4 database. We focus on publicly listed commercial banks headquartered in European Union countries. We initially extracted bank-level data for 182 listed banks in Thomson Reuters Refinitiv Eikon. We restrict our sample to banks with annual ESG related data available between 2002 and 2020. We collect year-end observations over a relatively extended period, 2002–2020<sup>3</sup>. Our final sample is comprised of 83 publicly listed commercial banks from 20 European countries<sup>4</sup>. ESG related variables are extracted from the Thomson Reuters Refinitiv ASSET4 database. The data regarding country controls are taken from sources such as World Bank World Development Indicators and World Bank Global Financial Development Database.

### 2.2. Variables

A brief description of variables and summary statistics are presented in Table 1.

>>> INSERT TABLE 1 HERE<<<

#### Dependent variables

The main dependent variable to measure lending activity is the logarithm of the yearly growth rate of total loans (*LOANGRW*). For robustness, we also use the change in loans to total assets ratio calculated as the ratio of the year-to-year difference of total loans normalized by total assets at the beginning of the period ( $\Delta LOANS\_TA$ ). Table 1 indicates that the average lending growth in our sample is 5.26%.

#### ESG variables

ESG related variables are extracted from the Thomson Reuters ASSET4 database. The database contains scores that measure a company's environmental, social, and governance performance and commitment since 2002. These scores are based on publicly reported company-level data such as annual company reports and corporate social responsibility reports, stock exchange filings, and the news media. The scores are grouped into ten categories that form the three pillar scores and the combined score. This paper uses the

<sup>3</sup> We start the sample in 2002 because ESG scores are not available prior to that year.

<sup>4</sup> These countries are Austria, Belgium, Cyprus, Czech Republic, Denmark, Finland, France, Georgia, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Poland, Portugal, Romania, Spain, Sweden, and United Kingdom.

combined ESG score (*ESG*) and the three pillars (*ENV*, *GOV*, *SOC*). For the composite ESG scores, our main measure *ESG* is the level of ESG score, ranging from 1 to 100. For robustness, we also use the change in ESG score (*ESG CHANGE*) calculated as the annual percentage change in the ESG score. We observe in Table 1 that the average *ESG* in our sample is 49.05, with a standard deviation of 19.50, showing a high variability.

Figure 1 shows the behavior of *ESG* and *LOANGRW* through time between 2002 and 2020. We take the yearly averages of the variables to generate the series. Figure 1 shows that there is a strong decrease in lending during crisis times for the years between 2008 and 2012, covering both the GFC and the sovereign debt crisis. Meanwhile, there is an overall improvement in the average ESG scores of banks in our sample, consistent with the progressive increase in the awareness of environmental and social issues among banks.

<<<INSERT FIGURE 1 HERE<<<

In our additional analysis, we explore whether the components of ESG scores differently affect lending during crisis times. For this purpose, we use the three pillars of ESG scores. Specifically, the environmental pillar score (*ENV*) captures reported environmental performance and commitment regarding resource use, emissions, and innovation. The Governance pillar score (*GOV*) shows the governance-related information capturing the commitment to following best practice corporate governance principles and the effectiveness of equal treatment of shareholders. The social pillar score (*SOC*) considers workplace, human rights, community, and product responsibility-related activities. All indices range from 1 to 100. Table 1 shows that the average scores of *GOV* (54.18) and *SOC* (54.72) are higher than those of *ENV* (47.37). The standard deviation of *ENV* is also higher (33.43) than those of *GOV* and *SOC* (24.76 and 23.66, respectively), indicating a higher variation in the environmental performance scores of banks in Europe.

### Control variables

We control for a range of bank and country-level variables following the extant literature on the determinants of bank lending (Kim and Sohn, 2017; Ananou et al., 2021; Danisman et al., 2020; Demir and Danisman, 2021; Bilgin et al., 2021). Bank-level controls include the differences in bank size (*SIZE*) calculated as the natural logarithm of total assets; the share of non-performing loans in gross loans (*NPL*); and differences in capitalization (*CAPITAL*) calculated as the ratio of bank equity to total assets.

To account for differences in macroeconomic environments and banking markets, as country-level controls, we use GDP growth (*GDPGRW*) measured as annual GDP per capita growth, the inflation rate (*INFLATION*), and bank concentration (*CONCENTRATION*), calculated as the total assets of the five largest banks as a share of the total assets of all banks in the country (Soedarmono et al., 2013; Danisman and Demirel, 2019).

Table 2 presents the correlation coefficients among the independent variables in the baseline estimations, indicating no major collinearity issues.

>>> INSERT TABLE 2 HERE<<<



### 2.3. Methodology

Our regressions are conducted using yearly panel data estimations for the sample of 83 publicly listed commercial banks from 2002 to 2020. We explore the relationship between ESG activities and bank lending during crisis times in an empirical setting robust to potential endogeneity issues. Following Wintoki et al. (2012) and Chiaramonte et al. (2021), we use the system generalized method of moments (GMM) estimator built by Blundell and Bond (1998), and Arellano and Bover (1995) with Windmeijer corrected standard errors (Danisman and Tarazi, 2020)<sup>5</sup>.

System GMM combines the first differences with the level form, i.e., the regressions are estimated in levels and first differences simultaneously. The method reduces any biases and imprecision that would be associated with the first difference GMM. Meanwhile, it controls for heterogeneous endogeneity that might result from time-invariant variables. It captures the dynamic structure of the relationship between bank lending, ESG activity, and the crisis. We consider the lagged dependent variable as endogenous, and the rest of the explanatory variables as exogenous. We use the second and higher order lags and differences of the dependent variable as instruments to address endogeneity resulting from including the lagged dependent variable as an explanatory variable. We keep the number of instruments smaller than the number of groups (Roodman, 2009).

Our baseline specification to test the effects of ESG on bank lending in crisis times is as follows:

$$LOANGRW_{i,t} = LOANGRW_{i,t-1} + \beta_1 CRISIS_t + \beta_2 ESG_{i,t-1} * CRISIS_t + \beta_3 ESG_{i,t-1} + \beta_4 COVID_t + \theta' X_{i,t-1} + \vartheta' Y_{j,t-1} + \alpha_j + \varepsilon_{it} \quad (1)$$

where  $i$  stands for banks,  $j$  for countries, and  $t$  for years. All explanatory variables are lagged by one year to alleviate any potential reverse causality problems. Our main dependent variable is  $LOANGRW$ . We include the first lag of  $LOANGRW$  as an explanatory variable because first-order autocorrelation is present in the error terms.  $ESG$  stands for overall bank-level ESG scores.  $CRISIS$  is a binary indicator that equals one between 2007 and 2012, capturing both the GFC (2007-2009) and the European sovereign debt crisis (2010-2012), and zero otherwise. These two crises have originated in the credit markets, and are rooted in the financial sector, which has led to a broad mistrust for financial firms. Meanwhile, the COVID-19 pandemic started from public health concerns, not due to economic conditions (Albuquerque et al., 2020), and it should be treated differently than the two financial crises. But the potential negative impact of COVID-19 on bank lending also needs to be controlled in the estimations. For this purpose, we include the binary indicator variable,  $COVID$ , in Equation 1, which equals 1 for the year 2020 and 0 otherwise.

We include the interaction variable  $ESG*CRISIS$  in Equation 1 to explore the influence of ESG during crisis times. Our coefficient of interest is  $\beta_1 + \beta_2$ , i.e., the sum of the coefficients of the  $ESG*CRISIS$  and the  $CRISIS$  variables. A negative and significant  $\beta_1 + \beta_2$  and positive and significant  $\beta_2$  would show that lending falls for all banks in the sample during the crisis but to a significantly lesser extent for higher ESG banks.  $X$  stands for bank-level control

<sup>5</sup> As a robustness check, we also use a bank fixed-effects panel data regression model (as confirmed by the Hausman test) by clustering the standard errors at the bank level. Our results are available upon request, and they are broadly in line with the GMM findings.

variables and  $Y$  for country controls. We use country-fixed effects that greatly diminish omitted variable problems, such as differences in macroeconomic conditions, policy applications, and accounting and regulatory practices. Windmeijer-corrected robust standard errors are used when clustering the error terms.

While endogeneity concerns are mitigated in our estimations by including lagged independent variables in our regressions, there are other potential sources of endogeneity, such as omitted variables. To take this into account, in addition to dynamic panel data estimation with two-step system GMM estimators, we use instrumental variable (IV) regressions with two-stage least squares (2SLS) estimators. The ESG variable is taken as endogenous. Following Cornett et al. (2016), we use gender diversity in the board (*GENDERDIV*) as an instrumental variable. *GENDERDIV* is calculated as the total number of female directors divided by the total number of board members. *GENDERDIV* as an instrumental variable has ex-ante theoretical plausibility because gender diversity and ESG practices are likely to be highly positively correlated. There is a consensus in the literature that firms' sustainability performance is expected to increase with more women on the board (Gillan et al., 2021). A higher share of women on boards is documented to positively affect charitable contributions, concerns for climate change and environmental impact, and reputation-based CSR measures (Williams, 2003; Zhang et al., 2013; Brindelli et al., 2018). However, it is not clearly evident in the literature why gender diversity would be directly correlated to bank lending. We perform specification tests to validate the relevance and strength of our instrument.

### 3. Results

#### 3.1. Baseline results

The baseline findings are displayed in Table 3 over 2002–2020. The regressions are estimated using two-step system GMM estimators. The first lags of explanatory variables are used to mitigate any potential reverse causality issues. Robust-Windmeijer corrected standard are given in parentheses. Country fixed effects are included in all specifications. At the bottom of the table, we report the Hansen test p-values, the insignificance of the statistics confirming the validity of the instruments. Moreover, we provide AR(2) second-order autocorrelation tests at the bottom of the table, the insignificance of the statistics showing no second-order serial correlation in the error terms.

Model 1 presents the baseline estimations and uses *LOANGRW* as the dependent variable. We observe that the sum of the coefficients of *CRISIS* ( $\beta_1$ ) and *ESG \* CRISIS* ( $\beta_2$ ) presented at the bottom of the table is significant and negative at the 1% level. Meanwhile, the coefficient of the interaction term  $\beta_2$  is positive and significant at the 1% level, indicating that ESG activity mitigates the negative impact of the crisis period on bank lending. In terms of economic magnitude, we observe that a one-standard-deviation increase (19.50) in *ESG* in crisis times mitigates the decrease in bank lending by 3.2% ( $19.50 \times 0.164\%$ ), and the overall decrease in bank lending corresponds to -8.74% ( $-11.939\% + 3.2\%$ ). Model 2 uses an alternative dependent variable,  $\Delta LOANS\_TA$ , and Model 3 uses an alternative ESG proxy, *ESG CHANGE*. Our results continue to hold in both models 2 and 3.

On the whole, overall lending falls during crisis times but to a lesser extent for banks with higher ESG scores. If such banks have a larger base of borrowing firms highly engaged in ESG themselves, then such a result could be explained by the quality of bank borrowers

during crisis times. Indeed, if in line with Godfrey (2005), El Ghouli et al. (2011) and El Ghouli and Karoui (2017) ESG firms actually benefit from ESG investments specifically in terms of lower idiosyncratic risk and agency costs during crises, such banks have a better ability to maintain their lending relationships and support their borrowers.

Considering the impact of control variables, we observe that they generally have the expected signs. Specifically, bank lending is negatively associated with increased credit risk as proxied by higher non-performing loans. This is in line with prior evidence documenting the significant negative correlation between credit risk and bank lending behavior (Stepanyan and Guo, 2011; Ananou et al., 2021). Higher capitalization is negatively associated with bank lending. Specifically, banks might shrink their assets to meet higher capital levels, which would decrease the availability of bank lending (Hanson et al., 2011; Fang et al., 2020). We find that larger banks tend to have lower loan growth. This is in line with the notion that large banks can better achieve diversification in their asset portfolios. Thus, they are likely to hold a lower level of loans relative to total assets (Demsetz and Strahan, 1997). Small banks are better at collecting and acting on soft information than large banks, and large banks might be less willing to lend to firms with no financial records, leading to less lending overall (Berger et al., 2005; Berger and Udell, 2011). Moreover, our findings indicate that bank lending is higher for countries with higher GDP growth and lower inflation. Finally, lending falls during the COVID-19 pandemic, as would be expected.

>>> INSERT TABLE 3 HERE<<<

### 3.2. Robustness checks

Table 4 presents the findings of the robustness checks. We present the instrumental variable (IV) regressions findings with two-stage least squares (2SLS) estimators in Models 1 and 2. *ESG* is taken as endogenous and instrumented by gender diversity in the board (*GENDERDIV*). The instrument's validity is tested using the F-statistic<sup>6</sup> for the instrumental variable, which is 22.28 and significant at the 1% level, well above the weak instrument criteria, i.e., critical values (Stock and Yogo, 2005)<sup>7</sup>.

Models 1 and 2 present the first and second stage regressions, respectively. The first stage equation in Model 1 uses *ESG* as the dependent variable. The instrument for the variable *ESG* and other control variables are used to estimate the predicted *ESG* variable for each bank. We use panel data estimation techniques with bank fixed effects in Model 1 and implement the two-step system GMM dynamic panel data estimation techniques in Model 2, respectively. In Model 1, we observe the expected positive and significant effects of *GENDERDIV* on *ESG*. Next, in Model 2, the predicted *ESG* ( $\widehat{ESG}$ ) is included. Model 2 shows that the sum of coefficients of *CRISIS* and  $\widehat{ESG} * CRISIS$  is negative and significant at the 1% level while the coefficient for the interaction term keeps its significant and positive coefficient, confirming previous findings.

Models 3 and 4 use subsamples, and *HIGH ESG* indicates the subsample of banks whose *ESG* score is above the median (>49.93) and *LOW ESG* below the median, respectively. We continue to implement the two-step system GMM dynamic panel data estimation techniques. We observe that while the coefficients of *CRISIS* are negative and significant for both subsamples, the magnitude of the negative impact of the crisis on bank lending is higher for

<sup>6</sup> Since our model is exactly identified, i.e., we have one instrument only, tests of overidentifying restrictions such as the Sargan test is not available.

<sup>7</sup> The critical value for the Cragg–Donald statistic for 10% maximal size distortion is 19.93.

the subsample of banks whose ESG score is lower, providing additional support for earlier findings.

>>> INSERT TABLE 4 HERE<<<

### 3.3. Channels analysis

In this section, we investigate the possible reasons why higher ESG banks decrease lending to a lesser extent as compared to lower ESG banks during crisis times. We test for potential channels and explore the impact of ESG on bank risk, banks' pricing behavior, and the components of their balance sheets in crisis times. For this purpose, we estimate the following set of equations:

$$Y_{i,t} = Y_{i,t-1} + \beta_1 CRISIS_t + \beta_2 ESG_{i,t-1} * CRISIS_t + \beta_3 ESG_{i,t-1} + \beta_4 COVID_t + \theta' X_{i,t-1} + \vartheta' Y_{j,t-1} + \alpha_j + \varepsilon_{it} \quad (2)$$

where  $Y_{i,t}$  stands for the set of outcome variables, and the rest of the variables are as in Equation 1, except for bank-level controls ( $X_{i,t-1}$ ). Bank-level controls are adjusted to reflect the change in our dependent variables; they now include only *SIZE* and *CAPITAL*; *NPL* is excluded as a control.  $Y_{i,t}$  include sets of variables that capture bank risk, pricing, and the components of their balance sheets. Specifically, exploring the impact on bank risk, we consider the influence of *ESG* on credit risk measures such as the ratio of non-performing loans to gross loans (*NPL*) and the ratio of loan loss provisions to gross loans (*LLP*), and on asset risk using the standard deviation of *ROA* calculated using three-year rolling windows (*SDROA*). We next explore the impact on pricing behavior and on the balance sheet components, considering the following dependent variables: interest expense on deposits to total deposits (*INTEXP*), interest income on loans to total loans (*INTINC*), return on assets (*ROA*), the ratio of total liabilities to total assets (*TOTAL LIABILITIES*), the share of total deposits in total assets (*DEPOSITS*), the ratio of market funding to total assets (*MARKET FUNDING*), and change in total assets ( $\Delta$  *TOTAL ASSETS*), respectively. We calculate *MARKET FUNDING* as the share of assets funded by non-deposit liabilities, i.e., total liabilities excluding equity & total deposits, divided by total assets (Brei et al., 2013).

Table 5 displays the findings regarding bank risk. Models 1-3 use the following dependent variables: *NPL*, *LLP*, and *SDROA*, respectively. The sum of the coefficients of *CRISIS* and *ESG\*CRISIS* ( $\beta_1 + \beta_2$ ) are positive and significant at the 1% level in all models. Meanwhile, the coefficients of *CRISIS* ( $\beta_1$ ) are positive and significant at the 1% level and the coefficients of *ESG\*CRISIS* ( $\beta_2$ ) are negative and significant. This indicates that while all banks' credit risks (i.e., *NPL* and *LLP*) and asset risk (i.e., *SDROA*) are negatively affected in crisis times, banks with higher ESG scores are affected to a lesser extent. Hence, the fact that banks with higher ESG can more easily pursue their lending activities during crises is possibly driven by their lower exposure to asset and credit risk. Indeed, according to the stakeholder theory, ESG investments lower the perceived riskiness of firms and reduce agency and information asymmetry problems (Godfrey 2005; El Ghouli et al. 2011; El Ghouli and Karoui 2017). Because higher ESG banks are more involved in high ESG firms for their lending activities, consistently, their risk should be less affected during crisis times and consequently their lending.

>>> INSERT TABLE 5 HERE<<<

Table 6 presents the findings regarding pricing and the components of the balance sheet. Models 1-2 explore the impacts on pricing and use as proxies interest expense on deposits to total deposits (*INTEXP*) and interest income on loans to total loans (*INTINC*) as dependent variables. The findings at the bottom of the table show that the coefficient of  $\beta_1 + \beta_2$  is only positive and significant for *INTEXP* but not for *INTINC*. This indicates that while implicit deposit rates are higher for the whole sample of banks in crisis times, the increase is lower for banks with higher ESG scores. Meanwhile, the crisis has no significant impact on the interest income generated from loans for all banks. This indicates that depositors of banks with higher ESG scores require a lower increase in interest rates during turmoil, possibly because they are more confident than depositors in banks with lower ESG scores. This finding is in line with Azmi et al. (2021), who find a positive relationship between ESG and the net interest margin of emerging market banks. Higher ESG banks are perceived to be more transparent and less risky by investors in crisis times. Their depositors might be more tolerant of lower interest rate premia in exchange for better environmental performance (Azmi et al., 2021). This finding is also consistent with the predictions of the theoretical model of Albuquerque et al. (2019). In times of crisis, ESG activity helps banks differentiate their products, generate a more loyal customer base, and advance to lower price elasticity of demand.

Next, Models 3-7 investigate the impact of ESG on the return on assets (*ROA*), the ratio of total liabilities to total assets (*TOTAL LIABILITIES*), the share of total deposits in total assets (*DEPOSITS*), the ratio of market funding to total assets (*MARKET FUNDING*) and change in total assets ( $\Delta$  *TOTAL ASSETS*), respectively. The coefficients of  $\beta_1 + \beta_2$  are significantly negative, and the interaction terms are significantly positive for *ROA*, *TOTAL LIABILITIES*, *MARKET FUNDING*, and  $\Delta$  *TOTAL ASSETS*. This shows that while all banks experience a fall in profitability, total liabilities, market funding, and total assets, in crisis times, banks with higher ESG scores are significantly less affected in terms of profitability. They also downsize to a lesser extent by being less impacted by the fall in market funding. While the share of deposits in total liabilities remains unchanged for all banks during crisis times, ESG banks are able to limit the fall in their total assets by possibly more easily borrowing on the market, allowing them to cut lending to a lesser extent in crisis times.

Overall, our findings indicate that during crisis times, higher ESG banks decrease their lending to a significantly lesser extent because their credit and asset risk, profitability, and size are less affected than other banks. Banks with higher ESG involvement downsize their balance sheet to a lesser extent by borrowing more extensively on the market than other banks. Moreover, their deposit cost increases to a lesser extent than the deposit cost of low ESG banks in crisis times. This is possibly because banks with higher ESG scores are perceived as more transparent, contributing to increase depositors' trust (Azmi et al., 2021).

>>> INSERT TABLE 6 HERE<<<

### 3.4. Additional tests

For further insights, in this section, we perform additional tests. We first explore whether the components (the three pillars) of ESG scores differently affect lending during crisis times. We then disentangle the impact of ESG activity on bank lending for different crisis periods, i.e., for the subprime crisis in 2007–2009, the European sovereign debt crisis in 2010–2012, and the COVID-19 pandemic period in 2020.

Table 7 provides the findings of additional tests of the effect of ESG Components (i.e., environment, governance, and social pillar scores). We continue to use two-step system GMM estimators with robust Windmeijer-corrected standard errors. The dependent variable is *LOANGRW* in all specifications. Columns 1–3 use the components of the overall ESG score as independent variables of interest to better understand from which component the findings originate. We use the environmental pillar score (*ENV*), the governance pillar score (*GOV*), and the social pillar score (*SOC*) as independent variables of interest, respectively. For this purpose, we include the interaction terms *ENV \* CRISIS*, *GOV \* CRISIS*, and *SOC \* CRISIS* in the regressions. The sum of the coefficients of *CRISIS* and interaction terms (presented at the bottom of the table) are only significant and positive at the 1% level for the environmental pillar but not for the other components. Therefore, our main finding showing that banks are able to decrease their lending significantly less during turmoil times is driven by the environmental pillar. This result is in line Azmi et al. (2021) and Chiaramonte et al. (2021), who find that the environmental pillar component has the greatest positive effect on bank value and stability, respectively. As attention towards global warming and transition to sustainability has been progressively increasing, investors could be more concerned regarding banks' consideration of environmental matters in turbulent times. They would be more likely to prefer banks that focus and act on environmental issues when there is more uncertainty (Azmi et al. 2021, Chiaramonte et al., 2021).

>>> INSERT TABLE 7 HERE<<<

Table 8 displays the findings of additional analysis disentangling the crisis periods. Models 1 and 2 look at whether the relationship differs for the subprime crisis in 2007–2009 and the European sovereign debt crisis of 2010–2012. For this purpose, we use two dummy variables, *CRISIS 2008* and *CRISIS DEBT*. *CRISIS 2008* takes the value of 1 for 2007–2009, and 0 otherwise, and *CRISIS DEBT* takes the value of 1 for the years 2010–2012, and 0 otherwise. We interact these variables with *ESG* in Models 5 and 6. In addition, we explore whether the COVID-19 pandemic has any separate influence by interacting *ESG* and *COVID* variables in Model 7. While the sum of the coefficients of the crisis term and the ESG variable is significantly negative for all these three periods, the interaction term coefficient is only positive and significant for the case of the 2007–2009 subprime crisis. Our findings hence mainly originate from the GFC period. This might be because the subprime crisis had originated in the credit markets, and banks with higher ESG scores were able to decrease their lending less because of their lower risk as perceived by the investors (Chen et al. 2020; Zhou et al. 2021; Chiaramonte et al., 2021).

>>> INSERT TABLE 8 HERE<<<

#### 4. Conclusion

This paper investigates the relationship between European banks' environmental, social and governance (ESG) activities and their lending during times of financial crisis. In our regressions, we employ a sample of 83 listed banks from 20 European countries for the 2002-2020 period and use dynamic panel data estimation techniques with two-step system GMM estimators. We cover both the 2007-2009 global financial crisis (GFC) and the 2010-2012 European sovereign debt crisis. Our findings show that ESG activity mitigates the negative impact of crises on bank lending. Our results are robust to alternative specifications to address potential endogeneity issues (instrumental variables (IV) and two-stage least squares (2SLS) estimations). A deeper investigation shows that such a finding is mostly driven by the environmental pillar component of ESG and mainly holds during the global financial crisis of 2007-2009.

Higher ESG banks also suffer from a lower increase in credit risk and overall asset risk. They also experience a lower fall in profitability than their peers. Moreover, the depositors of such banks request a lower increase in deposit rates in crisis times. Banks with higher ESG activity are also the ones that face a lower reduction in market funding, allowing them to downsize their balance sheets to a lesser extent during crises. Such findings suggest that, during crisis times, higher ESG banks appear to be more successful in efficiently allocating resources for both demanders and providers of capital. They are perceived to be less risky and possibly more transparent, increasing depositors' trust. Such banks could hence also face a lower likelihood of runs.

Our findings reveal that improving the ESG engagement in the banking sector is not only beneficial in terms of decreasing the environmental and social impacts but also helps to mitigate the reduction in bank lending during turbulent times. Integrating sustainability practices in banks' internal operations requires a strong and dedicated commitment. Therefore, a longer time horizon is needed before banks can fully reap the benefits of ESG engagement on their performance.

Our findings also support the transition towards ESG activity of banks and the regulatory efforts in terms of better disclosures of non-financial information. Specifically, our findings support the recent regulatory changes in Europe brought by the Non-Financial Reporting Directive, requiring large banks to provide information on social and environmental practices and on how much they respect human rights or pay attention to diversity on their board of directors. As a future policy, regulatory bodies need to consider how to extend these requirements to smaller financial institutions.

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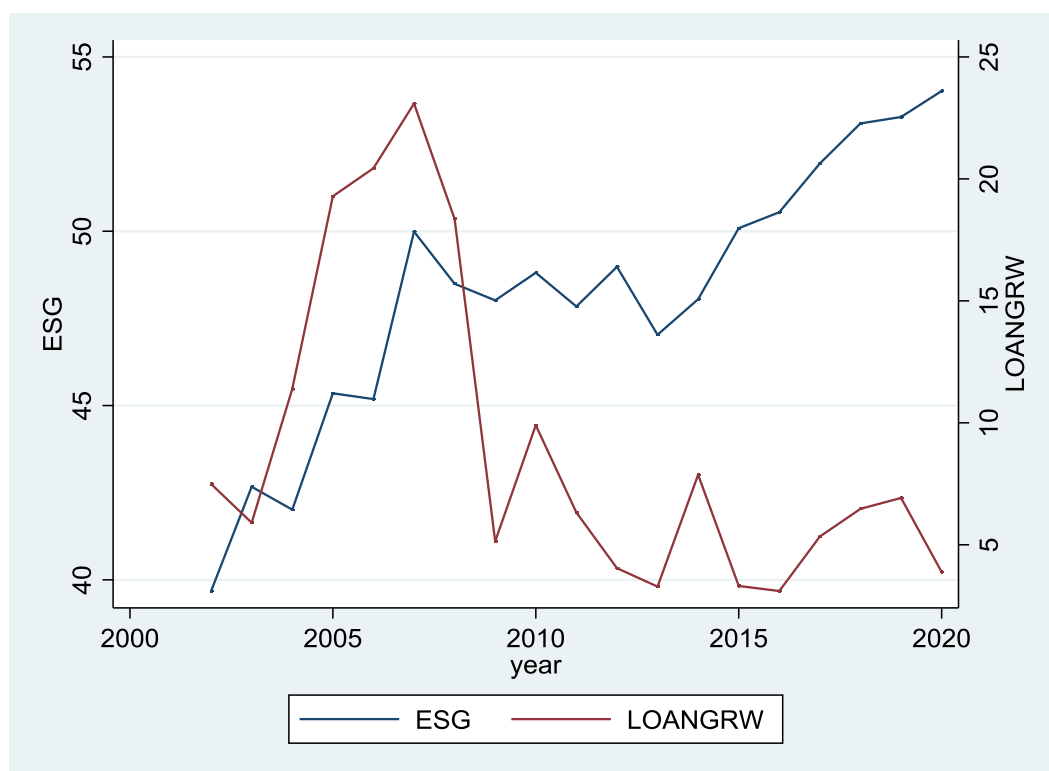
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**Figure 1: The behavior of ESG and loan growth through time**



Note: This figure shows the time series behavior of the variables *ESG* and *LOANGRW* between 2002-2020. We take the yearly averages of the variables to generate the series in the figure. The variables are generated from our sample of 83 listed banks from 20 European countries. *LOANGRW* is the average annual growth rate of total loans, and *ESG* is the average overall company score based on the environmental, social, and corporate governance pillars, respectively.

**Table 1 Variable descriptions and summary statistics**

Variable	Description	Obs	Mean	Min	Max	Median	Stand. Dev.
<b>Dependent variables</b>							
<i>LOANGRW</i>	Yearly logarithmic growth rate of total loans, $\ln(1 + (\text{Total loans at time } t - \text{Total loans at time } t-1) / \text{Total loans at time } t-1))$ . (Source: Thomson Reuters Refinitiv).	1286	8.53	-34.97	99.45	4.32	19.64
<i>ΔLOANS_TA</i>	The ratio of the year-to-year difference of the total loans normalized by total assets at the beginning of the period. (Source: Thomson Reuters Refinitiv).	1236	5.28	-25.76	55.98	2.43	12.47
<i>LLP</i>	The ratio of loan loss provisions to gross loans. (Source: Thomson Reuters Refinitiv).	1296	0.96	-0.62	6.44	0.63	1.14
<i>SDROA</i>	It is the standard deviation of <i>ROA</i> , calculated using three year rolling windows. (Source: Thomson Reuters Refinitiv).	1131	0.54	0.01	7.37	0.24	1.05
<i>INT EXPENSE</i>	The ratio of interest expense on deposits to total deposits. (Source: Thomson Reuters Refinitiv).	1245	0.02	0.00	0.13	0.02	0.02
<i>INT INCOME</i>	The share of interest income on loans to total loans. (Source: Thomson Reuters Refinitiv).	1229	0.04	0.00	0.14	0.04	0.02
<i>ROA</i>	Return on assets. (Source: Thomson Reuters Refinitiv).	1200	0.99	-5.78	5.81	0.95	1.29
<i>TOTAL LIABILITIES</i>	The ratio of total liabilities to total assets. (Source: Thomson Reuters Refinitiv).	1412	0.91	0.16	1.00	0.93	0.10
<i>DEPOSITS</i>	The ratio of deposits to total assets. (Source: Thomson Reuters Refinitiv).	1232	53.16	4.53	88.81	52.73	18.78
<i>MARKET FUNDING</i>	The ratio of market funding to total assets. We calculate market funding as the share of total assets funded by non-deposit liabilities, i.e., $(\text{total liabilities} - \text{shareholders equity} - \text{total deposits}) / \text{total assets}$ (Source: Thomson Reuters Refinitiv).	1346	0.40	0.03	0.93	0.40	0.21
<i>Δ TOTAL ASSETS</i>	The annual change in total assets normalized by average total assets in the current and previous years. (Source: Thomson Reuters Refinitiv).	1326	7.48	-25.93	63.97	5.29	14.69
<b>ESG variables</b>							
<i>ESG</i>	ESG Combined Score is an overall company score based on the environmental, social and corporate governance pillars. (Source: Thomson Reuters ASSET4)	1034	49.05	1.57	89.74	49.93	19.50
<i>ESG CHANGE</i>	The annual percentage change in the ESG score	950	3.65	-59.61	71.72	2.63	22.78
<i>ENV</i>	Environmental pillar score shows banks' environmental performance in resource use, emissions, and innovation. (Source: Thomson Reuters ASSET4)	1034	47.37	0	97.56	52.39	33.43

<i>GOV</i>	Governance pillar score represents governance performance in management, relationship with shareholders, and corporate social responsibility strategy. (Source: Thomson Reuters ASSET4)	1034	54.18	1.88	97.37	57.29	24.76
<i>SOC</i>	Social pillar score shows banks' commitments in workplace, human rights, community, and product responsibility. (Source: Thomson Reuters ASSET4)	1034	54.72	0.68	97.32	58.92	23.66
<b>Control Variables</b>							
<i>SIZE</i>	Natural logarithm of total assets (Source: Thomson Reuters Refinitiv).	1412	18.50	10.88	23.87	18.30	2.07
<i>CAPITAL</i>	Ratio of bank equity to total assets (Source: Thomson Reuters Refinitiv).	1262	20.11	1.38	97.87	16.89	13.67
<i>NPL</i>	Non-performing loans to gross loans (Source: Thomson Reuters Refinitiv).	1123	6.79	0.05	59.82	3.57	9.85
<i>COVID</i>	A binary indicator that equals one for 2020, and zero otherwise.	1577	0.05	0	1	0	0.22
<i>CRISIS</i>	A binary indicator that equals one for 2007-2012 that captures both global financial crisis of 2007-2009 and sovereign debt crisis of 2010-2012; and zero otherwise.	1577	0.26	0	1	0	0.44
<i>GDPGRW</i>	Annual GDP per capita growth (Source: World Bank World Development Indicators)	1577	1.24	-11.25	24.00	1.47	3.64
<i>CONCENTRATION</i>	5-bank asset concentration, calculated as the total assets of the three largest banks as a share of the total assets of all banks in the country (Source: World Bank Global Financial Development Database)	1560	65.65	0.00	100.00	75.93	31.41
<i>INFLATION</i>	Annual growth rate of the GDP implicit deflator. (Source: World Bank World Development Indicators)	1577	2.23	-4.67	23.15	1.85	2.36
<b>Instrumental variable</b>							
<i>GENDERDIV</i>	Total number of female directors on the board divided by the total number of board members (Source: Thomson Reuters ASSET4)	1010	19.44	0	61.54	17.65	14.57

Note: This table presents variables used in our empirical analysis, their brief descriptions, and summary statistics.

**Table 2: Correlations**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) <i>ESG</i>	1												
(2) <i>ESG CHANGE</i>	0.1831*	1											
(3) <i>ENV</i>	0.7209*	-0.0456	1										
(4) <i>GOV</i>	0.7136*	0.0665*	0.4561*	1									
(5) <i>SOC</i>	0.8292*	0.0201	0.7973*	0.5614*	1								
(6) <i>NPL</i>	-	0.0663*	-0.0286	-0.0493	0.1511*	0.0898*	1						
(7) <i>CAPITAL</i>	-	0.1481*	0.0084	0.1267*	0.1720*	0.2026*	0.1632*	1					
(8) <i>SIZE</i>	-	0.4148*	0.0706*	0.5404*	0.4065*	0.5091*	0.2601*	0.1213*	1				
(9) <i>GDPGRW</i>	-	0.0681*	0.033	0.1529*	-0.002	0.0824*	-0.0302	-0.0021	-0.028	1			
(10) <i>CONCENTRATION</i>	-	0.0694*	-0.0132	0.0671*	0.0768*	0.1334*	-0.0303	0.0924*	0.0158	0.1647*	1		
(11) <i>INFLATION</i>	-0.056	0.0165	0.0935*	0.0209	-0.0115	0.2407*	0.0403	0.0272	0.3433*	-0.0189	1		
(12) <i>CRISIS</i>	-0.0192	-0.0358	0.0536	-0.0131	-0.0378	0.0919*	0.0293	0.0161	0.2536*	0.2161*	-0.049	1	
										0.040		-	
(13) <i>COVID</i>	0.0634*	0.0134	0.0693*	0.0207	0.0852*	0.0094	-0.0374	0.0244	0.4974*	0.4956*	2	0.1409*	1

Note: This table displays the correlation matrix for the variables that are used in our baseline analysis, \* indicates significance at 0.05.



**Table 3: Effect of ESG on Bank lending- Baseline Estimations**

	(1) Baseline	(2) $\Delta LOANS\_TA$	(3) $ESG\ CHANGE$
<i>L.ESG</i>	0.043 (0.04)	0.018 (0.01)	
<i>CRISIS</i> ( $\beta_1$ )	-11.939*** (2.98)	-5.348*** (1.36)	-3.378*** (0.76)
<i>L.ESG *CRISIS</i> ( $\beta_2$ )	0.164*** (0.05)	0.050** (0.02)	
<i>L.ESG CHANGE</i>			-0.025 (0.02)
<i>L.ESG CHANGE *CRISIS</i> ( $\beta_3$ )			0.220*** (0.08)
<i>COVID</i>	-4.707*** (1.18)	-2.215*** (0.57)	-4.038*** (1.26)
<i>L.NPL</i>	-0.205*** (0.06)	-0.231*** (0.04)	-0.199*** (0.06)
<i>L.CAPITAL</i>	-0.132*** (0.05)	-0.009 (0.02)	-0.092* (0.05)
<i>L.SIZE</i>	-2.657*** (0.96)	-1.304** (0.65)	-0.958 (0.74)
<i>L. GDPGRW</i>	0.359** (0.14)	-0.017 (0.04)	0.273* (0.15)
<i>L. CONCENTRATION</i>	0.016 (0.02)	0.006 (0.01)	0.009 (0.02)
<i>L. INFLATION</i>	-0.509* (0.27)	-0.010 (0.15)	-0.969*** (0.33)
<i>L. <math>\Delta LOANS\_TA</math></i>		0.405*** (0.04)	
<i>L.LOANGRW</i>	0.392*** (0.04)		0.431*** (0.05)
Constant	54.996*** (13.64)	27.259** (12.69)	21.940* (12.10)
$\beta_1 + \beta_2$	-11.775***	-5.298***	
$\beta_1 + \beta_3$			-3.158***
Country FE	YES	YES	YES
Number of observations	774	765	718

Number of banks	75	74	73
Number of instruments	60	83	59
Hansen p-value	0.174	0.803	0.421
AR (2)	0.382	0.507	0.128

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Note: This table presents the baseline regression findings for the impact of ESG activity on bank lending in crisis times. We use a sample of 83 listed banks from 20 European countries and yearly data for the period 2002-2020. We implement the two-step system GMM dynamic panel data estimation techniques. The first lags of explanatory variables are used to mitigate any potential reverse causality. Country fixed effects are used in all models. The dependent variable is the annual growth rate of total loans, *LOANGRW*, in all models, except for Column 2. Column 2 uses  $\Delta LOANS\_TA$  as an alternative dependent variable calculated as the ratio of the year-to-year difference of the total loans normalized by total assets at the beginning of the period. *ESG* is the overall company score based on the environmental, social, and corporate governance pillars; *CRISIS* is a binary indicator that equals one for 2007-2012 captures both the global financial crisis of 2007-2009 and the sovereign debt crisis of 2010-2012, and zero otherwise; *ESG CHANGE* is the ratio of the year-to-year difference of ESG score normalized by ESG score at the beginning of the period; *COVID* is a binary indicator that equals one for 2020 and zero otherwise; *NPL* is the ratio of non-performing loans to gross loans; *CAPITAL* is the ratio of bank equity to total assets; *CONCENTRATION* is the 5-bank asset concentration in a country; *INFLATION* is the annual growth rate of the GDP implicit deflator. Windmeijer corrected standard errors are used when clustering the error terms and given in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 4: Effect of ESG on Bank lending- Robustness Checks**

	(1) IV First stage	(2) IV Second stage	(3) <i>HIGH ESG</i>	(4) <i>LOW ESG</i>
$L.\widehat{ESG}$		0.189** (0.09)		
$L.GENDERDIV$	0.186*** (0.04)			
$CRISIS (\beta 1)$	-0.268 (1.09)	-11.868* (5.98)	-2.756*** (0.45)	-4.727*** (1.19)
$L.\widehat{ESG} * CRISIS (\beta 2)$		0.182* (0.11)		
$COVID$	3.464 (2.44)	-4.764*** (1.28)	-4.187*** (1.21)	-5.304* (2.80)
$L.NPL$	0.142** (0.06)	-0.191*** (0.06)	-0.112*** (0.02)	-0.298*** (0.04)
$L.CAPITAL$	0.185*** (0.07)	-0.164*** (0.06)	-0.060** (0.03)	-0.081** (0.04)
$L.SIZE$	9.239*** (1.21)	-3.495*** (1.00)	-0.934*** (0.21)	-1.948*** (0.45)
$L. GDPGRW$	0.138 (0.17)	0.377* (0.15)	0.423*** (0.14)	-0.274*** (0.09)
$L. CONCENTRATION$	-0.045*** (0.02)	0.025 (0.02)	0.023* (0.01)	0.006 (0.02)
$L. INFLATION$	-0.229 (0.30)	-0.622* (0.31)	-0.410*** (0.13)	-0.155 (0.22)
$L.LOANGRW$		0.432*** (0.04)	0.656*** (0.04)	0.338*** (0.04)
Constant	-117.360*** (21.63)	61.377*** (13.94)	21.319*** (3.59)	44.763*** (8.94)
$\beta 1 + \beta 2$		-11.686**		
Country FE	NO	YES	YES	YES
Bank FE	YES	NO	NO	NO
R2 Adjusted	0.6269			

Number of observations	821	754	550	408
Number of banks	75	75	41	36
Number of instruments		60	40	31
Hansen p-value		0.163	0.510	0.957
AR (2)		0.554	0.089	0.485
F Statistic	22.28***			

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Note: This table presents the robustness analysis findings for the impact of ESG activity on bank lending in crisis times. We use a sample of 83 listed banks from 20 European countries and yearly data for the period 2002-2020. Columns 1 and 2 present the findings from the instrumental variable analysis. ESG variable is taken as endogenous, and it is instrumented by gender diversity in the board (GENDERDIV). Column 1 presents the first-stage regression results where the dependent variable is ESG, and Column 2 shows the second-stage estimation results for the dependent variable LOANGRW, respectively. Except for Column 1, we implement the two-step system GMM dynamic panel data estimation techniques. Column 1 uses panel data estimation techniques with bank fixed effects. The first lags of explanatory variables are used to mitigate any potential reverse causality. Country fixed effects are used in Models 2-4. Models 3 and 4 use subsamples, and *HIGH ESG* indicates the subsample of banks whose ESG score is above the median (>49.93) and *LOW ESG* below the median, respectively. Windmeijer corrected standard errors are used when clustering the error terms and given in parentheses. \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

**Table 5: Channels Estimations-The impact on bank risk**

	(1) <i>NPL</i>	(2) <i>LLP</i>	(3) <i>SDROA</i>
<i>L.ESG</i>	-0.005 (0.01)	-0.003** (0.00)	-0.002*** (0.00)
<i>CRISIS</i> ( $\beta 1$ )	1.241*** (0.34)	0.370*** (0.07)	0.172*** (0.02)
<i>L.ESG</i> * <i>CRISIS</i> ( $\beta 2$ )	-0.018*** (0.01)	-0.002* (0.00)	-0.001** (0.00)
<i>COVID</i>	0.035 (0.20)	0.553*** (0.08)	0.081*** (0.02)
<i>L.CAPITAL</i>	-0.010 (0.01)	0.002 (0.00)	0.024*** (0.00)
<i>L.SIZE</i>	0.402** (0.18)	0.068** (0.03)	-0.063*** (0.02)
<i>L. GDPGRW</i>	-0.194*** (0.03)	-0.013*** (0.00)	-0.048*** (0.00)
<i>L. CONCENTRATION</i>	0.009*** (0.00)	0.001* (0.00)	0.001*** (0.00)
<i>L. INFLATION</i>	0.047 (0.03)	0.018 (0.01)	-0.007 (0.01)
<i>L.NPL</i>	0.869*** (0.00)		
<i>L.LLP</i>		0.633*** (0.02)	
<i>L.SDROA</i>			0.629*** (0.00)
Constant	-9.402** (4.09)	-1.420** (0.71)	0.696** (0.31)
$\beta 1 + \beta 2$	1.223***	0.368***	0.171***
Country FE	YES	YES	YES
Number of observations	778	846	767
Number of banks	76	80	75
Number of instruments	59	60	68
Hansen p-value	0.589	0.206	0.136

AR (2)	0.839	0.893	0.205
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Note: This table presents the regression findings for channels analysis regarding the impact of ESG on bank risk in crisis times. We use a sample of 83 listed banks from 20 European countries and yearly data for the period 2002-2020. We implement the two-step system GMM dynamic panel data estimation techniques. The first lags of explanatory variables are used to mitigate any potential reverse causality. Country fixed effects are used in all models. Models 1 and 2 use the following dependent variables: the ratio of non-performing loans to gross loans (*NPL*) and the ratio of loan loss provisions to gross loans (*LLP*). Model 3 uses *SDROA* that is the standard deviation of *ROA* calculated using three-year rolling windows. Windmeijer corrected standard errors are used when clustering the error terms and given in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 6: Channels Estimations- Effects on the pricing and the components of the balance sheet**

	(1) <i>INT EXPENSE</i>	(2) <i>INT INCOME</i>	(3) <i>ROA</i>	(4) <i>TOTAL LIABILITIES</i>	(5) <i>DEPOSITS</i>	(6) <i>MARKET FUNDING</i>	(7) <i>Δ TOTAL ASSETS</i>
<i>L.ESG</i>	-0.0000 (0.00)	-0.0000 (0.00)	-0.0006 (0.00)	-0.0001*** (0.00)	0.0121 (0.01)	-0.0006*** (0.00)	-0.0313** (0.01)
<i>CRISIS (β1)</i>	0.043*** (0.00)	0.004 (0.00)	-0.4890*** (0.11)	-0.037** (0.00)	-0.5280 (0.66)	-0.0183*** (0.00)	-3.0267*** (0.87)
<i>L.ESG *CRISIS (β2)</i>	-0.001*** (0.00)	0.000* (0.00)	0.0048*** (0.00)	0.001* (0.00)	-0.0070 (0.01)	0.006*** (0.00)	0.0304* (0.02)
<i>COVID</i>	-0.0029*** (0.00)	-0.0036*** (0.00)	-0.5466*** (0.06)	0.0039*** (0.00)	-0.3839 (0.44)	0.0038 (0.00)	0.9324 (0.61)
<i>L.CAPITAL</i>	0.0001*** (0.00)	0.0001* (0.00)	0.0074*** (0.00)	0.0002** (0.00)	-0.0308* (0.02)		-0.0467*** (0.01)
<i>L.SIZE</i>	0.0001 (0.00)	-0.0009 (0.00)	-0.1305*** (0.03)	0.0016*** (0.00)	-0.2118 (0.17)	0.0076*** (0.00)	
<i>L. GDPGRW</i>	0.0003*** (0.00)	0.0006*** (0.00)	-0.0018 (0.00)	0.0004*** (0.00)	0.0867* (0.05)	-0.0008** (0.00)	0.1047* (0.05)
<i>L. CONCENTRATION</i>	-0.0000*** (0.00)	-0.0000 (0.00)	0.0009** (0.00)	0.0000 (0.00)	0.0014 (0.00)	0.0001*** (0.00)	-0.0278*** (0.01)
<i>INFLATION</i>	0.0670*** (0.01)	0.0000 (0.00)	0.0770*** (0.01)	-0.0006** (0.00)	-0.0893 (0.07)	0.0013** (0.00)	0.3470*** (0.05)
<i>L. Dependent variable</i>	0.7716*** (0.01)	0.7301*** (0.02)	0.2557*** (0.02)	0.9989*** (0.02)	0.9498*** (0.02)	0.7613*** (0.01)	0.1994*** (0.02)
<i>Constant</i>	-0.0067 (0.01)	0.0253** (0.01)	3.0602*** (0.65)	-0.0174 (0.02)	7.5779* (4.30)	-0.0678* (0.04)	8.4468*** (0.86)
β1+ β2	0.042***	0.004	-0.4842***	-0.036**	-0.535	-0.0123***	-2.9963***
Country FE	YES	YES	YES	YES	YES	YES	YES
Number of observations	810	811	818	873	838	924	852
Number of banks	77	78	80	82	81	81	81
Number of instruments	59	60	60	60	41	73	63
Hansen p-value	0.1580	0.1506	0.1187	0.5676	0.3850	0.6314	0.4045
AR (2)	0.068	0.9279	0.6514	0.0607	0.0234	0.9381	0.2739

Note: This table presents the regression findings for channels analysis regarding the impact of ESG on bank pricing and the components of the balance sheet in

crisis times. We use a sample of 83 listed banks from 20 European countries and yearly data for the period 2002-2020. We implement the two-step system GMM dynamic panel data estimation techniques. The first lags of explanatory variables are used to mitigate any potential reverse causality. Country fixed effects are used in all models. Models 1-7 use the following dependent variables: interest expense on deposits to total deposits (*INTEXP*), interest income on loans to total loans (*INTINC*), return on assets (*ROA*), the ratio of total liabilities to total assets (*TOTAL LIABILITIES*), the share of total deposits in total assets (*DEPOSITS*), the ratio of market funding to total assets (*MARKET FUNDING*), and change in total assets ( $\Delta$  *TOTAL ASSETS*) respectively. Windmeijer corrected standard errors are used when clustering the error terms and given in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



**Table 7: Additional analysis- ESG pillars**

	(1) ENV	(2) GOV	(3) SOC
L.ENV	-0.036*** (0.01)		
<i>CRISIS</i> ( $\beta_1$ )	-6.884*** (1.58)	-2.456 (2.54)	-7.034*** (2.10)
<i>L.ENV</i> * <i>CRISIS</i> ( $\beta_2$ )	0.063** (0.03)		
L.GOV		0.012 (0.02)	
<i>L.GOV</i> * <i>CRISIS</i> ( $\beta_3$ )		-0.019 (0.04)	
<i>L.SOC</i>			-0.060*** (0.02)
<i>L.SOC</i> * <i>CRISIS</i> ( $\beta_4$ )			0.060 (0.04)
<i>L.LOANGRW</i>	0.367*** (0.04)	0.399*** (0.04)	0.370*** (0.04)
<i>L.NPL</i>	-0.217*** (0.04)	-0.217*** (0.04)	-0.226*** (0.04)
<i>L.CAPITAL</i>	-0.080** (0.04)	-0.076** (0.04)	-0.091** (0.04)
<i>L.SIZE</i>	-1.022*** (0.27)	-1.174*** (0.29)	-0.954*** (0.24)
<i>L.GDPGRW</i>	0.229 (0.14)	0.270* (0.14)	0.262* (0.14)
<i>L.CONCENTRATION</i>	0.001 (0.01)	0.007 (0.01)	0.004 (0.01)
<i>L.INFLATION</i>	-0.439*** (0.16)	-0.476*** (0.18)	-0.456*** (0.17)
Constant	29.399*** (4.93)	29.274*** (5.58)	29.804*** (4.74)
$\beta_1 + \beta_2$	-6.821***		
$\beta_1 + \beta_3$		-2.475	
$\beta_1 + \beta_4$			-6.974***
Country FE	YES	YES	YES

Number of observations	774	774	774
Number of banks	75	75	75
Number of instruments	42	42	42
Hansen p-value	0.149	0.119	0.138
AR (2)	0.404	0.371	0.445

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Note: This table presents the regression findings for the impact of ESG components (environmental pillar (*ENV*), governance pillar (*GOV*), and social pillar (*SOC*) scores) on bank lending in crisis times. We use a sample of 83 listed banks from 20 European countries and yearly data for the period 2002-2020. We implement the two-step system GMM dynamic panel data estimation techniques. The dependent variable is the annual growth rate of total loans, *LOANGRW*, in all models. The first lags of explanatory variables are used to mitigate any potential reverse causality. Country fixed effects are used in all models. Windmeijer corrected standard errors are used when clustering the error terms and given in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 8: Additional analysis- Disentangling the crisis periods**

	(1) <i>CRISIS 2008</i>	(2) <i>CRISIS DEBT</i>	(3) <i>COVID</i>
<i>L.ESG</i>	0.070 <sup>*</sup> (0.04)	0.081 <sup>**</sup> (0.04)	0.081 <sup>*</sup> (0.04)
<i>CRISIS 2008</i> ( $\beta_1$ )	-17.329 <sup>***</sup> (4.48)	-5.022 <sup>***</sup> (0.96)	-5.019 <sup>***</sup> (0.96)
<i>L.ESG</i> * <i>CRISIS 2008</i> ( $\beta_2$ )	0.237 <sup>***</sup> (0.09)		
<i>CRISIS DEBT</i> ( $\beta_3$ )	-2.629 <sup>***</sup> (0.69)	-3.668 <sup>*</sup> (1.99)	-2.519 <sup>***</sup> (0.73)
<i>L.ESG</i> * <i>CRISIS DEBT</i> ( $\beta_4$ )		0.022 (0.03)	
<i>COVID</i> ( $\beta_5$ )	-4.824 <sup>***</sup> (1.18)	-4.938 <sup>***</sup> (1.18)	-7.918 <sup>*</sup> (4.19)
<i>L.ESG</i> * <i>COVID</i> ( $\beta_6$ )			0.053 (0.06)
<i>L.NPL</i>	-0.219 <sup>***</sup> (0.06)	-0.209 <sup>***</sup> (0.06)	-0.208 <sup>***</sup> (0.06)
<i>L.CAPITAL</i>	-0.139 <sup>***</sup> (0.04)	-0.132 <sup>***</sup> (0.04)	-0.133 <sup>***</sup> (0.04)
<i>L.SIZE</i>	-2.800 <sup>***</sup> (1.02)	-2.812 <sup>***</sup> (1.00)	-2.814 <sup>***</sup> (1.00)
<i>L.GDPGRW</i>	0.368 <sup>***</sup> (0.13)	0.346 <sup>**</sup> (0.14)	0.338 <sup>**</sup> (0.14)
<i>L.CONCENTRATION</i>	0.018 (0.02)	0.019 (0.02)	0.018 (0.02)
<i>L.INFLATION</i>	-0.578 <sup>**</sup> (0.25)	-0.516 <sup>**</sup> (0.26)	-0.532 <sup>**</sup> (0.26)
<i>L.LOANGRW</i>	0.421 <sup>***</sup> (0.04)	0.420 <sup>***</sup> (0.04)	0.422 <sup>***</sup> (0.04)
Constant	55.561 <sup>***</sup> (14.02)	54.398 <sup>***</sup> (14.07)	54.406 <sup>***</sup> (13.88)
$\beta_1 + \beta_2$	-17.092 <sup>***</sup>		
$\beta_3 + \beta_4$		-3.646 <sup>*</sup>	

$\beta 5 + \beta 6$			-7.865*
Country FE	YES	YES	YES
Number of observations	774	774	774
Number of banks	75	75	75
Number of instruments	61	61	61
Hansen p-value	0.171	0.152	0.149
AR (2)	0.326	0.318	0.314

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Note: This table presents additional tests and disentangles the impact of ESG activity on bank lending for different crisis periods, i.e., for the subprime crisis in 2007–2009, the European sovereign debt crisis in 2010–2012, and the COVID-19 pandemic period in 2020. We use a sample of 83 listed banks from 20 European countries and yearly data for the period 2002–2020. We implement the two-step system GMM dynamic panel data estimation techniques. The first lags of explanatory variables are used to mitigate any potential reverse causality. Country fixed effects are used in all models. The dependent variable is the annual growth rate of total loans, *LOANGRW*, in all models. *CRISIS 2008* takes a value of 1 for 2007–2009, and 0 otherwise, and *CRISIS DEBT* takes 1 for the years 2010–2012, and 0 otherwise. *COVID* is a binary variable that equals 1 for the year 2020 and 0 otherwise. Windmeijer corrected standard errors are used when clustering the error terms and given in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$