

# Social Responsibility and Bank Resiliency

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May 2021

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## Abstract

We provide transatlantic evidence about the relation between social responsibility and resiliency in the banking industry. We analyse various measures of resiliency, an exposure measure (SRISK) and a contribution measure (Delta CoVaR) to systemic risk, as well as measures of systematic risk (beta) and insolvency risk (z-score). Social responsibility is measured by Thomson Reuters' ESG-scores and its pillars, both according to the older Asset 4 and the present TR ESG Refinitiv classification. We find that the social aggregate score significantly enhances resiliency in all dimensions and in both classifications. On the level of subcategories, we identify significant common resiliency enhancing factor proxies for long-term orientation, such as product responsibility and workforce training, while short-term objectives proxied by shareholder orientation tend to relate to lower levels of resiliency. Looking deeper into the components of each ESG pillar, we also discover significant transatlantic differences mainly related to the different organization of labour markets as well as the board structure.

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Keywords: ESG-scores, systemic risk, bank resiliency, financial stability, capital shortfall, sustainable banking

JEL Classifications: G12, G21, G24, M14

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# Social Responsibility and Bank Resiliency\*

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## Abstract

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## 1. Introduction

Banking business is a trust-based business as has become abundantly clear in the Great Financial Crisis even before the collapse of Lehman Brothers<sup>1</sup>. The rapid erosion of the trust of investors and even among banks did generate a near collapse of the financial system and forced central banks to stabilize the financial system and rebuild trust by massive liquidity provision. While the sources of trust are still debated, a number of contributing factors have been identified (see [Knell and Stix \(2015\)](#) [Fungacova, Hasan and Weill \(2019\)](#)). In this paper we take the view that banks' investments in social responsibility can be interpreted as trust building engagements.

We therefore ask the question to what extent such investments do affects banks' resiliency. Will higher scores of social responsibility enhance bank resiliency? And if so, are these effects uniform across the world? Is it true that banks that tend to invest more in social-responsible activities at the same time also reduce systemic risk exposure? Can banks hence be ranked according to some common measures of social responsibility and risk exposure? Or do banks trade off social responsibility against systemic risk exposure? In short, are ethical behavior and resiliency complements or substitutes in the banking sector?

Social responsibility can be measured by so-called ESG-ratings<sup>2</sup> that have been extensively made available by private data providers. We focus on the Thomson Reuters data base, which is widely used for research.<sup>3</sup> Quite generally, ESG ratings have become more and more important sources of information for investors in evaluating the impact of social responsible measures taken by a firm on its performance. This reflects the growing awareness of markets and the increasing importance of social and environmental issues and risks. Examples are seen in the UNEP Principles for Responsible Banking, published in 2018 encouraging freely signatory banks to align their business models to the latest global social and environmental directions. Similarly, the PRI initiative is attracting institutional investors and considerable amount of assets.

In order to measure resiliency we provide two measures of systemic risk and two measures of individual banking risk. In terms of systemic risk, we employ the capital shortfall measure SRISK of [Brownlees and Engle \(2017\)](#). SRISK estimates the amount of assets that are exposed to systemic risk in case the market experiences a period of prolonged stress. As a contribution measure, we employ Delta CoVaR

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<sup>1</sup>See [Gehrig \(2013\)](#), [Gehrig \(2015\)](#) and [Knell and Stix \(2015\)](#)

<sup>2</sup>ESG-ratings provide scores for firms' environmental and economic (E), social (S) and governance (G) activities.

<sup>3</sup>We provide an analysis based on the older classification Asset 4 as well as the present classification of TR ESG Refinitiv available since 2017.

by [Adrian and Brunnermeier \(2016\)](#), as the market Value-at-Risk conditional on a bank being in distress. Hence, it measures the contagion deriving from a bank being in distress to the whole banking system. Individual banking risk is measured by a dynamic market beta coefficient between the bank's return and the market return as a measure of systematic risk ([Engle \(2002\)](#)). A variant of Altman's well-established z-score in the version of [Fiordelisi and Marques-Ibanez \(2013\)](#) is our measure of banks' insolvency risk. Our analysis will largely concentrate on correlations. Causal statements are inherently more difficult to maintain due to reverse causality, since resilient banks tend to be more inclined to introduce social responsible policy measures anyway. The literature suggests that reverse causality is more likely to be found in the corporate governance dimensions, rather than in the social and environmental ones. Thus, more risky firms would have more incentives to strengthen their corporate governance ([Bouslah et al. \(2013\)](#)). We respond at least partially to this simultaneity issue, using a dynamic model that includes lagged explanatory variables.

We contribute towards the existing literature by applying ESG-relevant factors towards the above risk measures of European and US financial institutions, in particular to systemic risk which, to our best knowledge, has not been done yet. We answer the question if CSR measures help banks to improve their financial stability in times of financial distress. First, by application of the Thomson Reuters ESG scores, we are able to measure whether the financial endowment of an institution can be improved by its aggregate ethical behavior, and if it can, to which extent. Additionally, we are able to extract which ESG variables contribute towards the financial soundness of a firm and to which extent. Moreover, we analyze as first to our knowledge the impact of ESG measures on European and US financial institutions and highlight the differences between both continents. Finally, we are the first to the best of our knowledge who analyze the effect of the change in the ESG measurement methodology on the resiliency of the financial system.

We find that ESG factors do matter for systemic risk as well as individual banking risk. Indicators of long-term orientation, like product responsibility, investments in social and human rights or workforce training, significantly enhance resiliency. Instead, factors of short-term orientation, like profitability and shareholder loyalty, are related to lower resiliency.

Systematic transatlantic differences arise, particularly in the case of labor market organization as well as bank governance structure. Labor market organization implies a lower exposure to systemic risk for European banks, but at the same time also a lower contribution to systemic risk for US banks. We also find significant difference in the way ESG-factors affect systematic risk. While product responsibility and resource reduction reduce relative systematic risk of US banks, emission reduction, product innovation, health and safety policies and board structure reduce

relative systematic risk of European banks.

As concerns the drivers of the aggregate scores, the analysis benefits from the fact that the data provider of the ESG-scores has been changing the scoring method in 2017. This implies that we can still analyze the various drivers on the basis of the former classification (Asset4) which is the information that was available to market participants, and, therefore arguably affected their decisions and behaviour. But additionally, we can compare our results with the new TR ESG Refinitiv classification in terms of an ex-post analysis. Overall our results are robust with respect to the aggregate ESG scores. Concerning the changes in subcategories, the results are economically robust in the sense that different categories measured by indifferent sets of indices affect resiliency measures similarly, albeit not quantitatively exactly. We find that proxies for long-term orientation of business models are basically resiliency enhancing, while short-term profitability measure tend to reduce resiliency.

The paper is organized as follows: After a short survey of the literature in Section 2, Section 3 provides an overview of the sample and data. Section 4 presents the methodology used in the analysis and we set up the model for measuring the ESG score impact on our risk measures. The presentations of the results follows. We will present the results both for the Asset 4 classification in Section 5 and the TR ESG Refinitiv classification in Section 6. Section 7 concludes.

## 2. Literature

While there is a fast growing literature on ESG-investing, the focus of most research is on returns, return volatility and profitability. This literature has long addressed the impact of environmental, social and governance policies on the firms' performance (REG), dividing between two strands. The "agency view" considers managers' investments into corporate social responsibility as detrimental to shareholders (Benabou and Tirole (2010); Krueger (2015)). On the other hand, proponents of the "value-enhancing view" suggest that investments in social responsibility pay off maximizing shareholder wealth (Anginer et al. (2018), Ferrell et al. (2016), Albuquerque et al. (2020)). A prominent example is the study of Lins et al. (2017), who identify a high ESG score with "social capital" and basically "trust". They estimate extra returns of four to seven percent for high social capital firms. Only few papers address the issues of risk and resiliency.

In the case of the banking industry the question whether corporate social responsible behavior affects financial performance of banks has been studied by Cornett et al. (2016), who concludes that corporate social responsibility is rewarded by the market. They also find that bigger banks tend to pursue more CSR measure than small banks. Moreover, they show that larger banks face an increase in CSR strengths

and a steep drop in CSR concerns after 2009. Also [Akulov \(2015\)](#) discusses the implementation of ESG measures and sustainability strategies in the financial sector in Russia.

The issue of resiliency has been highlighted by the current pandemic. Recent studies by [Albuquerque et al. \(2020\)](#) and [Pagano et al. \(2020\)](#) focus on the profitability of ESG firms in the full stock market and find superior performance of ESG-firms. These findings are challenged by [Berg et al. \(2020\)](#) who demonstrate that the findings of [Albuquerque et al. \(2020\)](#) are highly dependent on their use of Refinitiv ESG II data, the Thomson Reuters ESG data available after a retrospective change in methodology in April 2020. They show that most results cannot be replicated on the basis of Refinitiv ESG I data, the data applying the methodology in use before April 2020. Thus, they show that no significant ESG effects can be measured on firm performance with the original scoring method. This finding asks the question about which scoring method did affect behaviour of market participants, if at all. It is evident that only Refinitiv ESG I was available to market participants prior to April 2020, when Refinitiv ESG II was suddenly (and surprisingly) introduced, retrospectively updating the variables. Also [Pagano et al. \(2020\)](#) focuses on returns. They do not aim at measuring resiliency in terms of risk measures but rather identifying resiliency with social-distancing measures at the workplace widely implemented by pandemic reaction policies. In contrast to those studies, our focus is precisely on the relation of risk measures as proxies of resiliency and their relation to ESG-scores, which are defined by Thomson Reuters.<sup>4</sup>

A few studies have analyzed similar relations between ESG-scores and specific risk measures. [Dorfleitner et al. \(2020a\)](#) and [Dorfleitner et al. \(2020b\)](#) have identified drivers of insolvency risk in a global sample of firms. [Chiaramonte et al. \(2020\)](#) analyze the impact of ESG in the insurance sector. [Bouslah et al. \(2013\)](#) analyze the relation between ESG components and systematic risk. None of these studies addresses issues of systemic risk.

Closest to our work is [Anginer et al. \(2018\)](#). In agreement with our results these authors find that shareholder-friendly policies, typically associated with a higher Corporate Governance score, tend to increase systemic risk of banks in both exposure risk (SRISK) and contribution risk (Delta CoVaR). However, these authors do not consider the other ESG dimensions, and therefore cannot identify proxies of long-term objectives as sources of resiliency.

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<sup>4</sup>At least Refinitiv ESG I is exogenous as viewed by market participants, while the reasons for reclassification under Refinitiv ESG II have not been made transparent, and, therefore, may to some extent emerge endogenously.



### 3. Sample and Data

#### 3.1. Sample

Our sample set comprises 152 European financial institutions and 105 USA financial institutions from 2004 to 2019. The data includes listed institutions covered by two databases: *Compustat North America and Global* and *Thomson Reuters Datastream ESG* database. We start selecting all banks and diversified institutions classified in the Compustat North America or the Compustat Global database. Then, we hand-match the available data with Thomson Reuters ESG database from Datastream.

We use daily Compustat market data and quarterly accounting data to estimate the systemic risk measure, following [Brownlees and Engle \(2017\)](#) approach. Compustat dataset also provides information on bank-level accounting data that we use as control variables, such as total assets, leverage, and net income.

For the European sample, we use the MSCI Europe index (Datastream data) as a equity market return benchmark, while we use the S &P 500 index for the Northern American sample. We take the yield of German federal bonds (Bundesbank data) and US T-Bill rates (Datastream data) respectively as risk free rates.

#### 3.2. ESG data

According to the Financial Times Lexicon ([Financial Times Lexicon \(2018\)](#)), ESG is defined as "*a generic term used in capital markets and used by investors to evaluate corporate behavior and to determine the future financial performance of companies.*" We use two sets of annual ESG data from Thomson Reuter. We downloaded old Asset 4 ESG score in 2017, and new TR ESG Refinitiv in October 2020. The first set (Asset4) classified CSR into four pillars: **Environmental performance**, **Social performance**, **Governance performance** and **Economic performance**; and aggregate them into an equal-weighted ESG score, A4IR. In order to evaluate the ESG score for each pillar, different categories are considered individually with different weights. The pillar *Environmental performance* encompasses the categories *Resource Reduction*, *Emissions Reduction*, and *Product Innovation*. The pillar *Social* consists of *Employment Quality*, *Health and Safety*, *Training and Development*, *Diversity*, *Human Rights*, *Community*, and *Product Responsibility*, whereas the pillar *Governance* includes *Board Structure*, *Compensation Policy*, *Board Functions*, *Shareholder Rights*, and *Vision and Strategy*. 210 financial institutions in our sample are covered by Asset4 ESG data, 114 European firms and 96 US firms.<sup>5</sup>

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<sup>5</sup>For more information about the methodology Asset4, you can refer to Refinitiv (2015) "ASSET4 ESG Data Glossary. February 2015.

In 2017, Thompson Reuter dismissed the previous categories and produced a new methodology, now called TR ESG Refinitiv. The methodology was further updated retrospectively on April 2020, therefore the data we downloaded refer to the new methodology, thus they were not available to the market participants before April 2020 (Berg et al. (2020)). The main changes consider the removal of the Economic pillar and a weighted aggregate ESG score. The three pillars, Environmental, Social and Governance, are composed respectively by the following categories: Resource use, Emission reduction and Innovation; Workforce, Human rights, Community and Product responsibility; and Management, Shareholders and CSR strategy. More financial institutions are covered by the new methodology compared to the old Asset4, therefore we could enlarge our dataset to 257 financial institutions, 152 European firms and 105 US firms.<sup>6</sup>

Tables 1 and 2 report a detailed listing of all ESG variables and definitions respectively up to 2018 (Asset4), and as of 2020 (TR ESG Refinitiv). Moreover, Tables 4 and 5 report the summary statistics of the scores and the correlation matrix between each pair in the two sets, and in the two geographical areas. The ESG scores are highly correlated at .78 and .86 for the US and Europe respectively. The subgroup show correlations from .59 (CG) to .89 (ENV) for the US and from .65 (CG) to .87 (SOC) for Europe.<sup>7</sup>

We conclude by showing the time evolution of the ESG scores (Asset4 data). Figures 1 to 5 report the evolution of the ESG aggregate score and the four pillars in Europe and in the USA. The figures reveal significant transatlantic differences, both in the aggregate ESG score and especially in the subgroups. While Europe scores significantly higher in the environmental and the social dimension, the US clearly dominates in the corporate governance dimension, both in levels as well as precision.

## 4. Methodology

### 4.1. Measures of Resiliency

We conduct our analysis on four measures of risk. We consider two measures of systemic risk, as exposure (SRISK) and contribution (Delta CoVaR); and two measures of systematic risk, as distance to default (Z-score) and sensitivity to market return (beta).

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<sup>6</sup>For more information about the new methodology and a comparison with the old Asset4 methodology, you can refer to TR (2017) "Thomson Reuters ESG Scores", November 2017, and to Refinitiv (2020) "Environmental, Social and Governance (ESG) scores from Refinitiv", April 2020.

<sup>7</sup>These numbers reflect that the reclassification affects mainly the corporate governance score. It also affects the intertemporal evolution of the scores. Details can be requested also for the full TR Refinitiv classification directly from the authors.

The SRISK measure, developed by [Brownlees and Engle \(2017\)](#), is an estimate of the capital required to recapitalize an institution at market prices after a prolonged crisis. It measures the market value of equity required to be issued at current prices to render the bank compliant again with capital regulation after a serious and protracted crisis. As such it is a direct market based measure of capital shortfall. Consequently, SRISK is a hybrid measure since it combines market information (price of seasoned equity) with book values (capital requirements). It considers the combined effect of the sensitivity of the bank returns to aggregate shocks, leverage and market capitalization of individual banks and the banking system at large. A bank is more likely to appear systemically risky if it faces a sizable capital shortfall in periods of depressed market conditions relative to good times when other banks are doing well (see [Gehrig \(2013\)](#)). SRISK for bank  $i$  in period  $t$  is then estimated as:

$$\begin{aligned} SRISK_{i,t} &= E_{t-1}[Capital\ shortfall_i|Crisis] \\ &= E_{t-1}[k(Debt_{i,t}) - (1-k)(1-LRMES_{i,t})Equity_{i,t}] \end{aligned} \quad (1)$$

where  $k$  is the prudential capital ratio, that we assume 8%; LRMES is the expected loss in equity value of bank  $i$ , if the market were to fall by more than a  $d = 40\%$  threshold within the next six months  $LRMES_{i,t} = 1 - \exp(\ln(1-d)\beta_{it})$ , and the market beta is a dynamic correlation coefficient between the bank's and the market returns. SRISK is estimated daily and then aggregated annually.

We follow [Adrian and Brunnermeier \(2016\)](#) in measuring the contribution to systemic risk, by use of Delta CoVaR. This purely market based systemic risk measure assesses the spillovers of distress from a given bank to the financial system. Hence, it measures the contagion deriving from a bank being in distress to the whole banking system. Using a quantile regression approach, we identify this distress event of firm  $i$  as an equity loss equal to its  $(1-\alpha)\%$  VaR, such as  $r_{it} = VaR_{it}(\alpha)$ , and CoVaR represents the maximum loss of the market return within the  $\alpha\%$ -confidence interval, conditionally on some event  $C(r_{it})$  observed for bank  $i$ :  $Pr(r_{mt} \leq CoVaR_t^{m|C(r_{it})}) = \alpha$ . Then, the \$Delta CoVaR of the bank  $i$  is then defined as the difference between the CoVaR of the financial system conditional on firm  $i$  being in distress and the CoVaR of the financial system conditional on firm  $i$  being in its median state, weighted by the bank's market capitalization:

$$\Delta CoVaR_{it}(\alpha) = -(CoVaR_t^{m|r_{it}=VaR_{it}(\alpha)} - CoVaR_t^{m|r_{it}=Median(r_{it})}) * MV \quad (2)$$

As its authors, we will transform Delta CoVaR to positive values. Moreover, Delta CoVaR is estimated daily and then aggregated annually.

Individual banking risk is measured both via the systematic risk as proxied by Beta and a measure of bank default. Distance-to-default is widely proxied in the

banking literature by the z-score (Boyd and Runkle (1993), Fiordelisi and Marques-Ibanez (2013)). It measures the distance of bank’s ROA to the insolvency threshold in multiples of standard deviations. This measure combines information on bank’s performance (ROA), leverage (equity-to-assets ratio), and risk (standard deviation of ROA). Higher values of z-score represent a larger distance-to-default. We estimate the following version of Z-score for each institution:

$$Z - score_{it} = \frac{ROA_{it} + E_{it}/TA_{it}}{\sigma_{ROA_i}} \quad (3)$$

Z-score is estimated quarterly, and then aggregated annually.

Finally, we estimate a dynamic market beta coefficient between the bank’s return and the market return. The return volatilities of each institution  $i$ ,  $\sigma_{i,t}$ , and of the market,  $\sigma_{m,t}$ , are estimated by an asymmetric GJR GARCH model (Glosten et al. (1993)). The correlation between each institution return and the European market index,  $\rho_{i,t}$ , is estimated by a Dynamic Conditional Correlation (DCC) model (Engle (2002)). The beta measure is estimated daily and then aggregated annually.

Figure 6 reports the evolution of the risk measures above in our time period, for Europe and the US separately. In terms of exposure to systemic risk the capital shortfall (SRISK) for European banks in our sample exceeds that of US banks considerably. In terms of the contribution measure Delta CoVaR, no significant transatlantic differences can be detected. But in terms of individual bank risk, the distance to default tends to be higher for European banks in our sample while the market beta tends to be lower.

#### 4.2. ESG policy measure contributions towards resiliency

In order to analyze the explanatory power of ESG scores on any of the resiliency measures  $RES \in \{\text{SRISK}, \Delta\text{Delta CoVaR}, \text{beta}, \text{z-score}\}$ , we regress separately the annual  $RES$  measure on each lagged categorical ESG, distinguishing the aggregate ESG score, the pillars and the sub-groups of each pillar. This allows us to extract the drivers of the  $RES$  levels.

Thus we set up three models. First, we use ESG aggregate score as proxy for social responsibility and regress  $RES_{i,t}$  for company  $i$  at time  $t$  on the lagged score  $ESG_{i,t}$  and the set of control variables  $X_{q,i,t-1}$ :

$$RES_{i,t} = \alpha + \gamma_p ESG_{i,t-1} + \gamma_0 RES_{i,t-1} + \sum_q \gamma_q X_{q,i,t-1} + \epsilon_{i,t}. \quad (4)$$

We control for a set of bank-specific and market variables as known determinants of SRISK (Gehrig and Iannino (2018b)),  $X_{q,i,t-1}$ : lagged total assets, leverage, net

income, market beta and Z-score.

Then, we disentangle the effect of the pillars of the ESG score and regress RES on the ENV-score, SOC-score, CG-score and EC-score, in order to identify which ESG category explains most of the systemic financial stability in times of financial distress:

$$\begin{aligned} RES_{i,t} &= \alpha + \gamma_{ENV} ENV_{i,t-1} + \gamma_{SOC} SOC_{i,t-1} + \gamma_{CG} CG_{i,t-1} + \gamma_{EC} EC_{i,t-1} \\ &+ \gamma_0 RES_{i,t-1} + \sum_q \gamma_q X_{q,i,t-1} + \epsilon_{i,t}. \end{aligned} \quad (5)$$

Finally, in order to have a more detailed insight on which categories of each pillar are sufficient to work as an effective policy measure to improve financial stability, we regress RES on the  $q$  sub-groups of each pillar:

$$\begin{aligned} RES_{i,t} &= \alpha + \sum_q \gamma_{ENV,q} ENV_{i,t-1}^{(q)} + \sum_q \gamma_{SOC,q} SOC_{i,t-1}^{(q)} \\ &+ \sum_q \gamma_{CG,q} CG_{i,t-1}^{(q)} + \sum_q \gamma_{EC,q} EC_{i,t-1}^{(q)} + \gamma_0 RES_{i,t-1} + \sum_q \gamma_q X_{q,i,t-1} + \epsilon_{i,t}. \end{aligned} \quad (6)$$

We recall,  $i$  is the counter for each financial institution,  $t$  represent year from 2004 to 2016, ESG is the weighted-average aggregate score for each firm and year,  $ESG_p$  represents the 4 pillars,  $ESG_k$  the categories in each pillar, and finally  $X_q$  represents the lagged bank-specific and market variables used as control: total assets, leverage, net income, market beta and Z-score. Tables 1 and 2 recall the pillars and sub-groups in each pillars for both the ESG datasets used.

We estimate the models by pooled regressions with country/state fixed effects to control for unobserved heterogeneity in a small sample, that could affect both ESG scores and systemic risk at the bank level (Gormley and Matsa (2014)).<sup>8</sup>

## 5. Impact of ESG on financial institutions based on Asset 4 data

We start this analysis on the basis of the original Asset 4 classification of Thomson Reuter, which was updated till 2017. Thompson Reuter introduced TR ESG Refinitiv in 2017 and then changed classification within Refinitiv again in April 2020. We will start with the presentation of the results of the original classification Asset

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<sup>8</sup>Given the short time dimension of the sample, we use also estimate our parameters by a GMM Arellano and Bond dynamic panel data estimator. Results are robust, therefore we omit their presentation in the paper. Moreover, we use a mixed-approach applying two levels such as firm and country levels. Similarly, the results are robust therefore we do not report them.

4, and then present results based on the classification of TR ESG Refinitiv 2020 in the next section.

It is useful to start with the aggregate scores and then continuously dig deeper into the various components in order to distill the economic structure.

### 5.1. Aggregate Scores

Let us start with the equally weighted aggregate ESG score. Table 6 reports the results of the panel data regression on the two systemic risk measures, SRISK (exposure measure) and Delta CoVaR (contribution measure), and on two measures of firm individual risk, market beta (systematic risk) and z-score (insolvency risk). Across the board, we find a strongly significant and resiliency-enhancing effect of the aggregate ESG score on all the risk measures. High ESG levels are related to a reduction in exposure as well as contribution to systemic risk, systematic risk and the risk of insolvency.

Moreover, we identify significant transatlantic differences. While European banks enjoy significantly lower exposure to systemic risk, the resiliency enhancing effect of ESG-rating is significantly lower than for the US. Also individual insolvency risk is significantly lower for European banks.

Importantly, we also find that firm size significantly reduces the positive resiliency-enhancing impact of ESG on all risk measures. In other words, ESG measures tend to be more effective in enhancing resiliency for smaller firms.

All the remaining controls such as systematic risk measured by banks' beta, insolvency risk measured by z-score, size, leverage, non-interest income generate the expected significant signs.

### 5.2. Pillars

By disentangling the components of the equal-weighted ESG score into its major pillars, ENV-score (environment), EC-score (economics), SOC-score (social) and CG-score (governance), Table 7 provides more information about the drivers of the aggregate findings. According to this decomposition, we find that the *social factor* greatly contributes to reducing systemic risk. Contribution risk is also significantly moderated by the environmental factor, while the *economic factor* actually increases contribution risk.

Interestingly, also *corporate governance* interacts positively with the European dummy variable, suggesting that European banks that score high on the governance dimension also tolerate higher capital shortfalls.

Interestingly, the *social factor* enhances both systemic risk factors for larger firms as can be read from the coefficient of the interaction term.

### 5.3. Subcategories

Finally, by zooming in on the individual score components we can identify the micro-interactions between rating scores and risk measures.

#### 5.3.1. Common Drivers

In this regard, Table 8 presents our main results. We find the strongest effects for the following components: (i) Customer/product responsibility, (ii) Society/human rights, (iii) Training and development/policy, and (iv) Profitability/shareholder loyalty.

*Customer/product responsibility* is associated with a lower capital shortfall and with lower systemic risk but has no effect on contribution risk. Surprisingly, it is also associated with higher risk of insolvency. All these direct effects are moderated when interacted with bank size. *Society/human rights* are generally associated with significantly lower capital shortfall as well as lower systematic risk but has no effect on contribution risk. Again the resiliency enhancing effect is weaker for larger banks. *Training and development/policy* significantly reduces contribution risk as well as systematic risk but has no significant effect on exposure risk. Again these effects are smaller for larger firms. *Profitability/shareholder loyalty* has a weak destabilizing effect on exposure risk while it tends to reduce insolvency risk weakly as well.

Interpreting the findings, it seems that proxies for longer management horizons tend to be associated with lower capital shortfall, such as *customer/product responsibility*, *society/human rights* and *training and development/policy*. These assets positively contribute to charter value, which tends to be preserved by higher capital buffers. However, the positive contributions to resiliency are lower for larger banks.

Profitability and shareholder loyalty, on the other hand tends to (weakly) increase exposure risk. This effect can be related to higher payout policies such as stock repurchases and dividends that extract buffer stock capital from the bank.<sup>9</sup>

#### 5.3.2. Transatlantic Comparison

It is also quite informative to compare the differential effects of ESG-subcategories on the different measures of resiliency between Europe and the US. By doing so, we find a number of interesting findings for the systemic risk measures of SRISK (1) and Delta CoVaR (2), as well as Z-score of default risk (4) on: (i) Employment quality/policy, (ii) board of directors/board structure, (iii) integration/vision and strategy.

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<sup>9</sup>See [Gehrig and Iannino \(2018b\)](#) for empirical evidence on European banks and [Gehrig and Iannino \(2018a\)](#) for insurance globally.



*Employment quality/policy* has differential effects across the Atlantic. While employment quality reduces exposure risk, it increases contribution risk for European banks relative to US banks. Otherwise employment quality/policy does not affect systematic risk and insolvency risk in a significant way. *The variable board of directors/board structure* has a significantly stabilizing differential effect for Europe. *Integration/vision and strategy* has a strongly destabilizing effect for Europe, suggesting a higher capital shortfall in Europe for banks that score high in that dimensions.

Accordingly, the main differences in the transmission of ESG-indicators into systemic risk measures across the Atlantic is related to the different organization of labor markets and differences in bank governance. Interestingly, the different organization of labor markets makes European banks relatively more vulnerable with respect to contribution risk and US banks with respect to exposure risk. On the other hand, the fact that board structure is stabilizing European banks relatively more than US bank, but not board function, suggests that co-determination laws in Europe may play a stabilizing role by including arguably long-term oriented stakeholders more broadly.

But most transatlantic difference can be detected in the contribution to systematic risk, i.e. beta (3). Here we find substantial differences in the way the different ESG-indicators affect bank resiliency. Sources of relatively lower systematic risk for US banks can be found in resource reduction, product responsibility and human rights; while for the European banks important drivers are emission reduction, product innovation, health and safety policy, board structure and performance.

Interestingly, the European dummy alone is significant only for the contribution risk Delta CoVaR (2).

## **6. Impact of ESG on financial institutions based on TR ESG Refinitiv**

Since the implementation of a new measurement method of ESG scores in 2017, the pillars of ESG scores have been calculated and aggregated differently. Therefore, in this subsection we present the impact of ESG measures on SRISK on European as well as U.S. banks and financial institutions considering the new ESG calculation regime with a one year time lag. We remark that this analysis exhibits an ex-post analysis of the effect of ESG measures on capital shortfall considering the new calculation method, since due to the unavailability of the ESG data with this new methodology prior to April 2020, banks and financial institutions weren't able to take the effects of ESG policy implementations into account (Berg et al. (2020)). Considering the incorporation of the new ESG measurement, the new data exhibits a significant different impact of the implementation of ESG measures on SRISK of European banks and U.S. banks. While the aggregate ESG score shows a



significant reduction in SRISK for U.S. banks, it indicates a significant increase of SRISK for European banks. We can see that the aggregate increase of SRISK for European banks can mostly be attributed to the negative effect of the Management Score, CSR Strategy Score, Shareholder Score, and Product responsibility Score on SRISK on a sub-level basis.

### 6.1. Aggregate Score

Looking at Table 9, again we find a strong and significant effect of ESG on both systemic risk measures. The effects on individual risk are less significant for systematic risk and insignificant for insolvency risk.

Again European banks tend to be more resilient on the basis of SRISK and z-score, but the effect of the ESG-score on SRISK is significantly lower than for US banks. On the other hand the ESG-score reduces systematic risk significantly more in Europe.

Again the resiliency enhancing influence of ESG is significantly weaker for larger banks.

So overall, there is little change across the two classification schemes. The changes only affect the weaker significance of the impact on individual bank risk under the TR ESG Refinitiv classification.

### 6.2. Subgroups

In terms of three ESG pillars, we see in Table 10 that the *social pillar* appears to reduce exposure risk significantly and also contribution risk. However, significance levels are lower than under the Asset 4 classification.

Unlike the Asset 4 classification, contribution risk is significantly moderated by *governance pillar*. There is no longer an environmental effect on systemic risk of banks.

The *governance pillar* also interacts positively with the Europe dummy for SRISK which implies that it has a relative risk enhancing effect for Europe.

Moreover, the *social pillar* is risk enhancing for larger banks on the dimensions of exposure, contribution and systematic risk. Again this is basically the same finding as under the Asset 4 classification.

### 6.3. Subcategories

Since the reclassification essentially affects the individual index subcategories a direct comparison between Asset 4 and TR ESG Refinitiv classifications is no longer

meaningful. Rather a comparison now requires an effect-based judgement of the underlying economic mechanisms.

With regard to direct effects, we find far less significant effects under the new TR ESG Refinitiv classification (Table 11). In fact, we observe that the management score reduces contribution risk; the CSR strategy score reduces exposure risk and less significantly contribution risk; the product responsibility score significantly reduces exposure and contribution risk; and the workforce score reduces exposure risk and insolvency risk as measured by z-score.

In terms of the transatlantic comparison, the following significant interactions with the European dummy. The management score increases relative exposure risk of European banks. We observe a strong risk enhancing effect on both systemic risk measures as well as beta. The emission score enhances insolvency risk of European banks. The community scores reduces contribution risk of European banks. The human rights score reduces systematic risk of European banks. Finally, the workforce score reduces bank insolvency risk stronger in Europe.

We also find the following significant interactions with bank size. The management score increases exposure risk of larger banks. The CSR strategy score reduces systematic risk more for larger banks. The environmental innovation score increases contribution risk of European banks. The product responsibility score has a strong risk enhancing effect on both systemic risk measures as well as systematic risk. The community scores increases contribution risk, systematic risk and insolvency risk for larger banks. Finally, the workforce score increases exposure risk and systematic risk while reducing insolvency risk for larger banks.

Overall a similar picture arises as under the Asset 4 categorization. Proxies for long-term objectives such as product responsibility or workforce considerations are related to resiliency and, hence, lower risk measures.

## 7. Conclusions

ESG matters! This is the strong evidence of our study on bank resiliency. We find that ESG has a stabilizing effect on systemic risk measures, both the exposure and the contribution measure, as well as individual risk measures for systematic risk and insolvency risk. In this sense adherence to the UNEP Principles for Responsible Banking clearly enhances bank resiliency.

As suggested by theory, it is particularly measures-related to long-term objectives like customer and product responsibility, investments in social institutions and workforce training that are resiliency-enhancing, while measures related to short-term profitability tend to increase risk and, hence, reduce resiliency.

In the transatlantic comparison the relative effectiveness of ESG measures differs considerably between Europe and the US. European banks benefit more from labor

market institutions and board structure in terms of systemic risk exposure, while US banks benefit from social/human rights, product responsibility and resource reduction.

Our results suggest that risk measures are the proper way to measure resiliency in the banking sector. We offer two main reasons: First, both measures of systemic risk as well as systematic risk and insolvency risk are significantly affected by ESG instruments. And second the relation between risk measures and ESG scores is robust relative to the redefinition of the ESG measures from Asset 4 to TR ESG Refinitiv. This result contrasts with the findings of [Albuquerque et al. \(2020\)](#) and [Berg et al. \(2020\)](#), who find that standard performance measures in terms of returns and return volatility are significantly affected by the scoring method.<sup>10</sup> Their findings comprise all industries and are not tailored to the banking industry.

Based on our results, we would predict that banks with higher ESG ratings will perform better and impose less prudential concerns to supervisory authorities during the current pandemic crisis.

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<sup>10</sup>[Berg et al. \(2020\)](#) argue that a reclassification has taken place in April 2020 even within the TR ESG Refinitiv classification. Our data refer to the classification of April 2020.

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## 8. Appendix

Table 1: Asset 4 ESG variables, 2018

Pillars	Name	Description
ESG score	Equal-Weighted ESG Rating	The Equal Weighted Rating reflects a balanced view of a company's performance in all four areas, economic, environmental, social and corporate governance
Corporate Governance	Corporate Governance	The corporate governance pillar measures a company's systems and processes, which ensure that its board members and executives act in the best interests of its long term shareholders. It reflects a company's capacity, through its use of best management practices, to direct and control its rights and responsibilities through the creation of incentives, as well as checks and balances in order to generate long term shareholder value.
	Board of Directors/Board Functions	The board of directors/board functions category measures a company's management commitment and effectiveness towards following best practice corporate governance principles related to board activities and functions. It reflects a company's capacity to have an effective board by setting up the essential board committees with allocated tasks and responsibilities.
	Board of Directors/Board Structure	The board of directors/board structure category measures a company's management commitment and effectiveness towards following best practice corporate governance principles related to a well balanced membership of the board. It reflects a company's capacity to ensure a critical exchange of ideas and an independent decision-making process through an experienced, diverse and independent board.
	Board of Directors/-Compensation Policy	The board of directors/compensation policy category measures a company's management commitment and effectiveness towards following best practice corporate governance principles related to competitive and proportionate management compensation. It reflects a company's capacity to attract and retain executives and board members with the necessary skills by linking their compensation to individual or company-wide financial or extra-financial targets.
	Integration/Vision and Strategy	The integration/vision and strategy category measures a company's management commitment and effectiveness towards the creation of an overarching vision and strategy integrating financial and extra-financial aspects. It reflects a company's capacity to convincingly show and communicate that it integrates the economic (financial), social and environmental dimensions into its day-to-day decision-making processes.
	Shareholders /Shareholder Rights	The shareholders/shareholder rights category measures a company's management commitment and effectiveness towards following best practice corporate governance principles related to a shareholder policy and equal treatment of shareholders. It reflects a company's capacity to be attractive to minority shareholders by ensuring them equal rights and privileges and by limiting the use of anti-takeover devices.
Economic	Economic	The economic pillar measures a company's capacity to generate sustainable growth and a high return on investment through the efficient use of all its resources. It is reflection of a company's overall financial health and its ability to generate long term shareholder value through its use of best management practices.
	Margins /Performance	The margins/performance category measures a company's management commitment and effectiveness towards maintaining a stable cost base. It reflects a company's capacity to improve its margins by increasing its performance (production process innovations) or by maintaining a loyal and productive employee and supplier base.

	Profitability /Shareholder Loyalty	The profitability/shareholders loyalty category measures a company's management commitment and effectiveness towards generating a high return on investments. It reflects a company's capacity to maintain a loyal shareholder base by generating sustainable returns through a focused and transparent long-term communications strategy with its shareholders.
	Revenue /Client Loyalty	The revenue/client loyalty category measures a company's management commitment and effectiveness towards generating sustainable and long-term revenue growth. It reflects a company's capacity to grow, while maintaining a loyal client base through satisfaction programmes and avoiding anti-competitive behaviours and price fixing.
Environmental	Environmental	The environmental pillar measures a company's impact on living and non-living natural systems, including the air, land and water, as well as complete ecosystems. It reflects how well a company uses best management practices to avoid environmental risks and capitalize on environmental opportunities in order to generate long term shareholder value.
	Emission Reduction	The emission reduction category measures a company's management commitment and effectiveness towards reducing environmental emission in the production and operational processes. It reflects a company's capacity to reduce air emissions (greenhouse gases, F-gases, ozone-depleting substances, NOx and SOx, etc.), waste, hazardous waste, water discharges, spills or its impacts on biodiversity and to partner with environmental organisations to reduce the environmental impact of the company in the local or broader community.
	Product Innovation	The product innovation category measures a company's management commitment and effectiveness towards supporting the research and development of eco-efficient products or services. It reflects a company's capacity to reduce the environmental costs and burdens for its customers, and thereby creating new market opportunities through new environmental technologies and processes or eco-designed, dematerialized products with extended durability.
	Resource Reduction	The resource reduction category measures a company's management commitment and effectiveness towards achieving an efficient use of natural resources in the production process. It reflects a company's capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management.
Social	Social	The social pillar measures a company's capacity to generate trust and loyalty with its workforce, customers and society, through its use of best management practices. It is a reflection of the company's reputation and the health of its license to operate, which are key factors in determining its ability to generate long term shareholder value.
	Customer /Product Responsibility	The customer/product responsibility category measures a company's management commitment and effectiveness towards creating value-added products and services upholding the customer's security. It reflects a company's capacity to maintain its license to operate by producing quality goods and services integrating the customer's health and safety, and preserving its integrity and privacy also through accurate product information and labelling.
	Society /Community	The society/community category measures a company's management commitment and effectiveness towards maintaining the company's reputation within the general community (local, national and global). It reflects a company's capacity to maintain its license to operate by being a good citizen (donations of cash, goods or staff time, etc.), protecting public health (avoidance of industrial accidents, etc.) and respecting business ethics (avoiding bribery and corruption, etc.).

Society Rights	/Human	The society/human rights category measures a company's management commitment and effectiveness towards respecting the fundamental human rights conventions. It reflects a company's capacity to maintain its license to operate by guaranteeing the freedom of association and excluding child, forced or compulsory labour.
Score - Diversity and Opportunity/Policy		Does the company have a work-life balance policy? AND Does the company have a diversity and equal opportunity policy?
Score - Employment Quality/Policy		Does the company have a competitive employee benefits policy or ensuring good employee relations within its supply chain? AND Does the company have a policy for maintaining long term employment growth and stability?
Score - Health & Safety /Policy		Does the company have a policy to improve employee health & safety within the company and its supply chain?
Score - Training and Development/Policy		Does the company have a policy to support the skills training or career development of its employees?

Table 1: The table reports the ESG variables used in the analysis, as classified by ASSET4 Equal Weighted Ratings (EWR). Data were downloaded in 2018, and are currently inactive variables, being substituted by a new TR categorization reported in Table 2. Data consists of 4 pillars: Environmental, Social, Governance and Economic performance. Each pillars reports the main categories of aggregation. Source: "ASSET4 ESG Data Glossary, February 2015".

Table 2: TR ESG variables, 2020

Pillars	Name	Description
Environmental	Resource use	The resource use score reflects a company's performance and capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management.
	Emissions reduction	The emission reduction score measures a company's commitment and effectiveness towards reducing environmental emissions in its production and operational processes.
	Innovation	The innovation score reflects a company's capacity to reduce the environmental costs and burdens for its customers, thereby creating new market opportunities through new environmental technologies and processes or eco-designed products.
Social	Workforce	The workforce score measures a company's effectiveness in terms of providing job satisfaction, a healthy and safe workplace, maintaining diversity and equal opportunities and development opportunities for its workforce.
	Human rights	The human rights score measures a company's effectiveness in terms of respecting fundamental human rights conventions.
	Community	The community score measures the company's commitment to being a good citizen, protecting public health and respecting business ethics.
	Product responsibility	The product responsibility score reflects a company's capacity to produce quality goods and services, integrating the customer's health and safety, integrity and data privacy.
Governance	Management	The management score measures a company's commitment and effectiveness towards following best practice corporate governance principles.
	Shareholders	The shareholders score measures a company's effectiveness towards equal treatment of shareholders and the use of anti-takeover devices.
	CSR strategy	The CSR strategy score reflects a company's practices to communicate that it integrates economic (financial), social and environmental dimensions into its day-to-day decision-making processes.

Table 2: The table reports the new categorization of ESG Pillars, as classified by TR after the change in methodology from ASSET4® Equal Weighted Ratings (EWR) to Thomson Reuters ESG Scores. Data were downloaded in 2020. Data consists of 3 pillars: Environmental, Social, and Governance performance. Each pillars reports the main categories of aggregation. Source: "Environmental, Social and Governance (ESG) scores from Refinitiv, April 2020".



Table 3: Other Variables

Variable	Description and Reference	Database
SRISK	Equation 13 (Brownlees and Engle, 2017, Acharya et al. 2012), where $k=0.08$ .	Compustat Global, Datastream and Bundesbank, own calc.
Delta CoVaR	Equation 8, estimated by quantile regression and empirical quantile at $\alpha=0.05$ (Adrian and Brunnermeier, 2017).	Compustat Global, Datastream and Bundesbank, own calc.
\$ Delta CoVaR	Delta CoVaR * market capitalization	Compustat Global, own calc.
Z-score	Equation 15 (Lepetit and Strobel, 2013)	Compustat Global, own calc.
Beta	Conditional dynamic market beta: $\rho_{im} * \sigma_i / \sigma_m$ , where $\rho_{im}$ , correlation coefficient between the bank's and the market returns, is estimated by Dynamic Conditional Correlation model (Engel, 2002), and the volatilities $\sigma$ are estimated by asymmetric GJR GARCH model (Glosten, Jagannathan and Runkle, 1993)	Compustat Global and Datastream, own calc.
Market Return	MSCI Europe index	Datastream
Stock return	Bank's log stock return	Compustat Global own calc.
Market value	(stock price * shares outstanding) standardized	Compustat Global, own calc.
Total Liabilities	Reported total liabilities	Compustat Global
Total Assets (TA)	Reported total assets	Compustat Global
Leverage (LVG)	(Total liabilities + Market capitalization) / Market capitalization	Compustat Global, own calc.
Net Income (NI)	Net consolidated income	Compustat Global

<sup>a</sup> This table reports detailed information on the data and variables used in the empirical analysis. It refers to the sources of the data and the data providers descriptions, when available.

Table 4: Summary statistics and correlation matrix between Asset4 ESG 2018 and TR Refinitiv 2020. USA (obs=1,153)

	ESG 2018	ESG 2020	ENV 2018	ENV 2020	SOC 2018	SOC 2020	CG 2018	CG 2002
ESG 2018	1							
ESG 2020	0.7828	1						
ENV 2018	0.8121	0.7442	1					
ENV 2020	0.6952	0.75	0.891	1				
SOC 2018	0.8731	0.7062	0.6596	0.5717	1			
SOC 2020	0.7427	0.8157	0.6744	0.672	0.7836	1		
CG 2018	0.567	0.544	0.3826	0.3296	0.3772	0.2913	1	
CG 2002	0.4429	0.7577	0.359	0.3337	0.3046	0.2888	0.587	1

	Asset4 2018				TR Refinitiv 2020				Diff
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	
ESG-SCORE	52.85121	25.52688	3.74	96.54	42.31527	15.8615	1.89	87.62	10.54
ENV-SCORE	34.8479	30.33044	8.44	96.4	16.33992	25.5122	0	95.3	18.51
SOC-SCORE	45.03046	25.0693	4.12	95.85	45.53673	17.9471	2.11	90.16	-0.51
CG-SCORE	71.24088	15.54694	5.06	97.25	48.97498	21.0569	1.46	93.02	22.27

<sup>a</sup> The table reports the summary statistics and the correlation matrix between the scores in the two datasets for USA banks: Asset4 ESG scores data downloaded in 2018 and TR Refinitiv data downloaded in 2020. We report each pair of variables: aggregate ESG scores (ESG), environmental scores (ENV), social (SOC), corporate governance scores (CG).

Table 5: Summary statistics and correlation matrix between Asset4 ESG 2018 and TR Refinitiv 2020. Europe (obs=1,225)

	ESG 2018	ESG 2020	ENV 2018	ENV 2020	SOC 2018	SOC 2020	CG 2018	CG 2002
ESG 2018	1							
ESG 2020	0.8554	1						
ENV 2018	0.9008	0.8088	1					
ENV 2020	0.7793	0.8099	0.8552	1				
SOC 2018	0.9027	0.8226	0.8199	0.722	1			
SOC 2020	0.8329	0.9115	0.793	0.7708	0.8745	1		
CG 2018	0.7394	0.6821	0.5687	0.5337	0.5542	0.5541	1	
CG 2002	0.6007	0.8127	0.5061	0.4598	0.5063	0.5334	0.6521	1

	Asset4 2018				TR Refinitiv 2020				Diff
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	
ESG-SCORE	64.43356	31.40516	2.57	98.32	50.39411	21.357	1.55	95.01	14.04
ENV-SCORE	62.47882	31.37633	8.44	97.38	40.76698	32.1277	0	98.15	21.71
SOC-SCORE	66.57168	29.05628	3.58	99.45	49.95678	23.7116	0.61	97.32	16.61
CG-SCORE	56.63782	27.91034	1.24	97.88	53.94699	23.9218	1.67	97.17	2.691

<sup>a</sup> The table reports the summary statistics and the correlation matrix between the scores in the two datasets for European banks: Asset4 ESG scores data downloaded in 2018 and TR Refinitiv data downloaded in 2020. We report each pair of variables: aggregate ESG scores (ESG), environmental scores (ENV), social (SOC), corporate governance scores (CG).

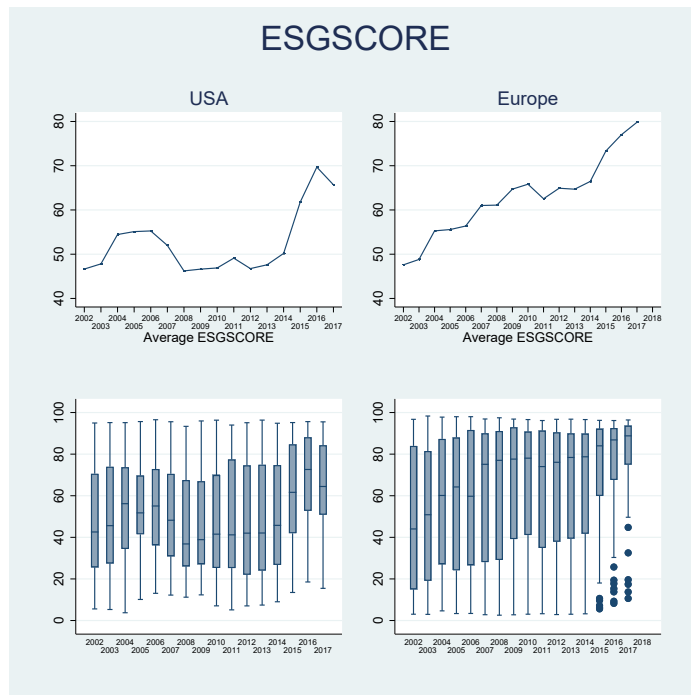


Figure 1: ESG scores in Europe and the USA. The Figure reports the average evolution (top frames) and box plots by year (bottom frames) of the ESG scores in Europe and the USA separately. Data: Asset4 2018.

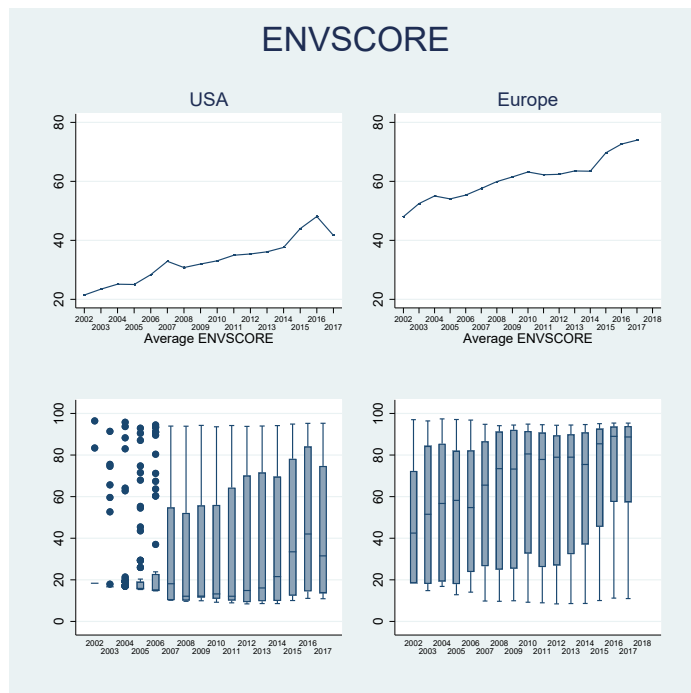


Figure 2: Environmental scores in Europe and the USA. The Figure reports the average evolution (top frames) and box plots by year (bottom frames) of the Environmental scores in Europe and the USA separately. Data: Asset4 2018.

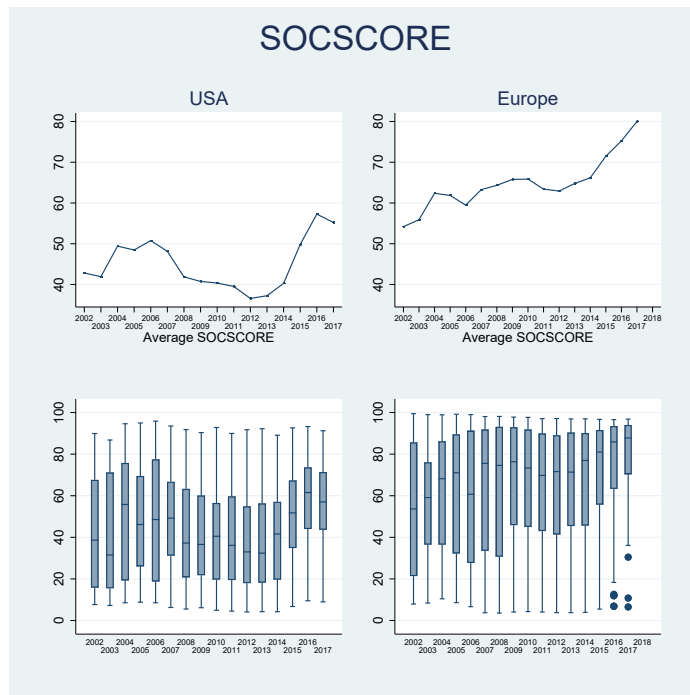


Figure 3: Social scores in Europe and the USA. The Figure reports the average evolution (top frames) and box plots by year (bottom frames) of the Social score in Europe and the USA separately. Data: Asset4 2018.

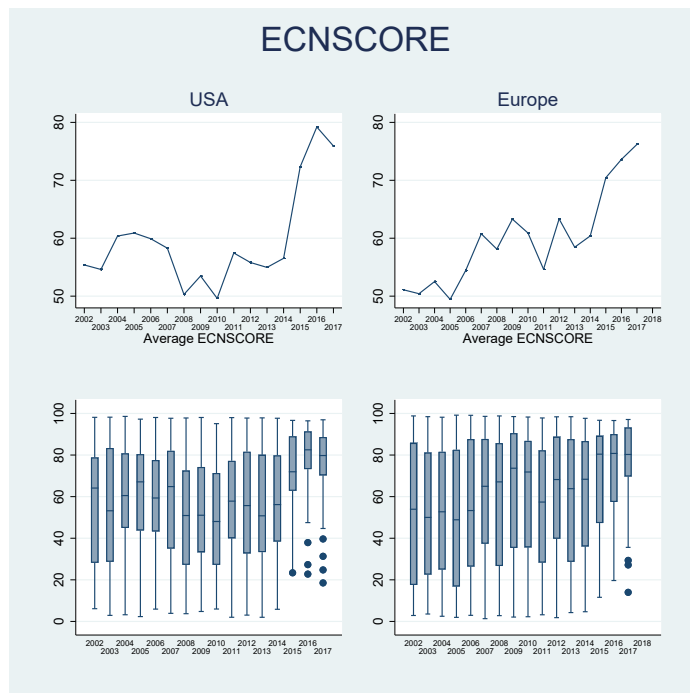


Figure 4: Economic scores in Europe and the USA. The Figure reports the average evolution (top frames) and box plots by year (bottom frames) of the Economic scores in Europe and the USA separately. Data: Asset4 2018.

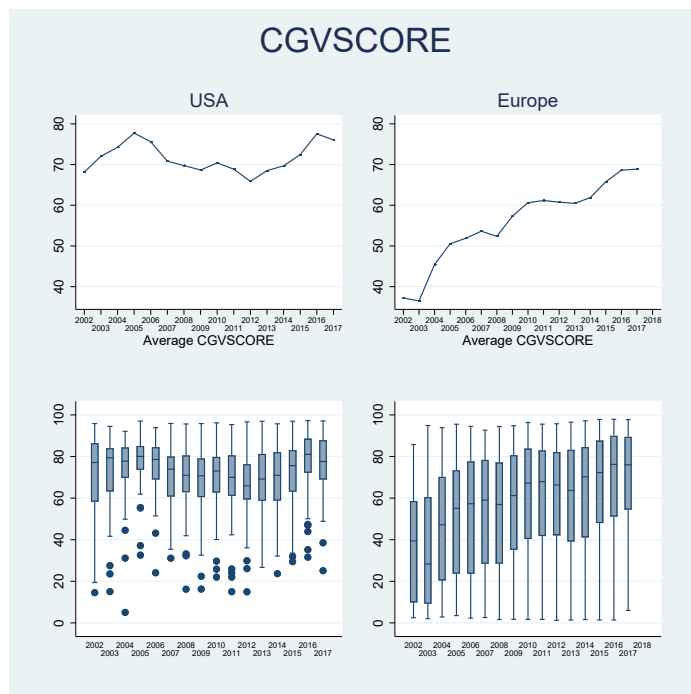


Figure 5: Corporate Governance scores in Europe and the USA. The Figure reports the average evolution (top frames) and box plots by year (bottom frames) of the Corporate Governance score in Europe and the USA separately. Data: Asset4 2018.

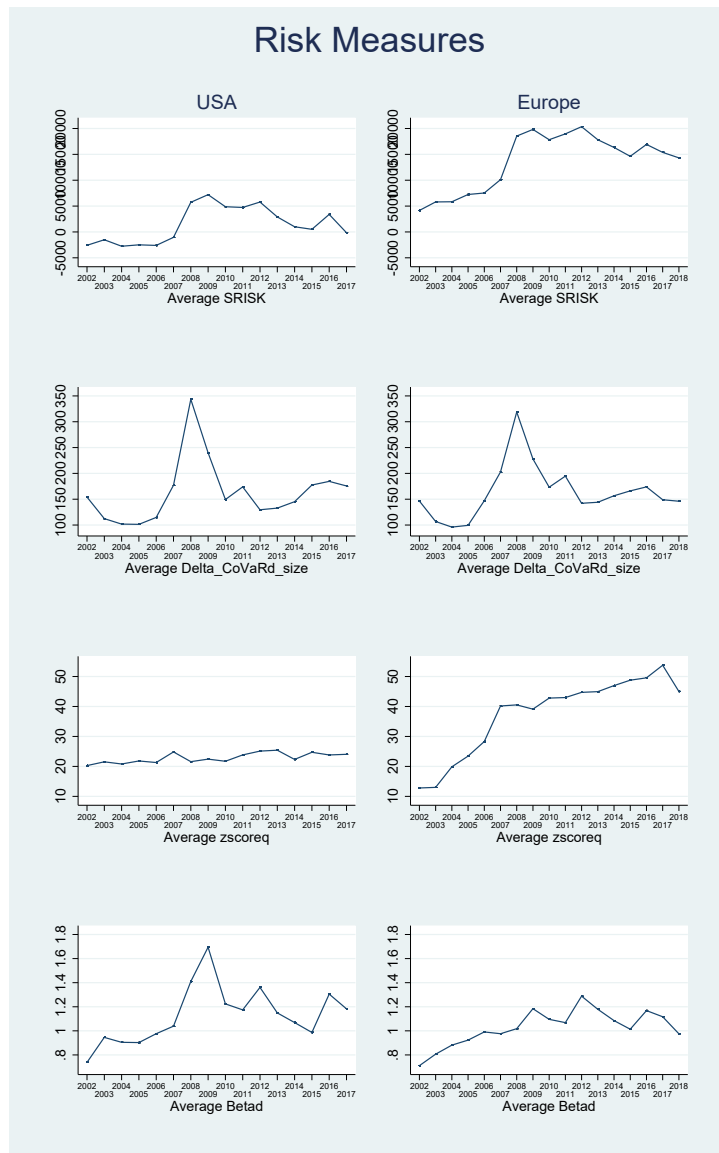


Figure 6: Risk measures in Europe and the USA. The Figure reports the average evolution of the risk measures used in the analysis: SRISK, Delta CoVaR, Z-score and market Beta.

Table 6: Panel data regressions on Equal-Weighted ESG score. (Asset 4 ESG data 2018)

	(1) SRISK	(2) \$ Delta CoVaR	(3) Beta	(4) Z-score
L. Equal-Weighted ESG Rating	-146.0*** (48.12)	-2.234*** (0.634)	-0.00274** (0.00112)	0.0699* (0.0414)
L. Equal-Weighted ESG Rating #Europe	51.02*** (15.28)	-0.0572 (0.251)	-4.12e-05 (0.000496)	-0.00778 (0.0110)
Europe	-2,202*** (839.7)	10.19 (11.67)	-0.0770 (0.0740)	4.707*** (1.061)
L. Equal-Weighted ESG Rating # L. ln(TA)	10.30** (4.877)	0.239*** (0.0588)	0.000317*** (0.000104)	-0.00672* (0.00395)
L. SRISK	0.927*** (0.0248)			
L. Z-score	-24.85*** (4.995)	-0.121* (0.0670)	-0.000755*** (0.000173)	0.951*** (0.0151)
L. Beta	-2,059*** (508.0)	-19.78** (8.315)	0.576*** (0.0236)	1.093** (0.488)
L. \$Delta CoVaR		0.738*** (0.0472)		
L. ln(TA)	-424.2 (268.5)	-2.125 (2.502)	-0.00210 (0.00727)	0.515* (0.281)
L. LVG	66.37*** (16.65)	-0.147 (0.115)	0.00196*** (0.000571)	-0.0259*** (0.00839)
L. NI	0.814*** (0.204)	0.0138*** (0.00354)	-8.28e-06*** (2.59e-06)	0.000114** (5.20e-05)
Constant	8,464*** (2,789)	49.99* (27.34)	0.500*** (0.0992)	-5.708** (2.747)
Country/State Effects	yes	yes	yes	yes
Observations	2,084	2,084	2,084	2,080
R2 adjusted	0.935	0.872	0.587	0.916
RMSE	7591	106.0	0.250	9.152
Number of banks	210	210	210	210

<sup>a</sup> The table reports the results of country fixed effects regressions of SRISK, Delta CoVaR, Beta and Z-score on the ESG aggregate scores, 2004 to 2017. As control variables we include the lagged dependent variables, and lagged bank-level information such as: market beta, Z-score, log of total assets (ln(TA)), leverage ratio (LVG) and net income (NI). We report robust standard errors in parenthesis. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 7: Panel data regressions on the 4 ESG Pillars. (Asset 4 ESG data 2018)

	(1)	(2)	(3)	(4)
	SRISK	\$ Delta CoVaR	Beta	Z-score
L. Environmental	3.111 (55.05)	-1.818*** (0.703)	-0.000917 (0.00160)	0.0677 (0.0561)
L. Social	-223.7*** (53.24)	-2.412*** (0.747)	-0.00236 (0.00186)	0.0479 (0.0731)
L. Corporate Governance	-6.631 (38.64)	0.553 (0.651)	0.00102 (0.00149)	-0.0489 (0.0525)
L. Economic	23.47 (35.26)	1.164** (0.476)	-0.000593 (0.00129)	-0.00763 (0.0428)
L. Environmental #Europe	16.42 (15.48)	-0.166 (0.216)	-0.000714 (0.000574)	-0.0278 (0.0189)
L. Social #Europe	13.67 (15.08)	-0.394 (0.258)	-0.000580 (0.000859)	0.0350 (0.0231)
L. Corporate Governance #Europe	47.57*** (17.68)	0.714*** (0.260)	0.000884 (0.000866)	0.00217 (0.0179)
L. Economic #Europe	-6.110 (14.10)	-0.166 (0.186)	0.000259 (0.000675)	-0.00719 (0.0174)
Europe	-3,317*** (1,265)	-9.730 (15.86)	-0.0824 (0.0886)	3.974*** (1.320)
L. Environmental # L. ln(TA)	-3.305 (5.301)	0.183*** (0.0663)	7.27e-05 (0.000144)	-0.00587 (0.00481)
L. Social # L. ln(TA)	21.96*** (5.178)	0.291*** (0.0763)	0.000307 (0.000188)	-0.00631 (0.00685)
L. Corporate Governance # L. ln(TA)	-2.581 (4.153)	-0.0951 (0.0706)	-6.96e-05 (0.000128)	0.00452 (0.00523)
L. Economic # L. ln(TA)	-1.765 (3.692)	-0.120** (0.0516)	6.18e-05 (0.000114)	0.00144 (0.00407)
L. SRISK	0.922*** (0.0270)			
L. Z-score	-24.09*** (5.133)	-0.0790 (0.0693)	-0.000789*** (0.000174)	0.950*** (0.0154)
L. Beta	-1,953*** (501.3)	-21.67** (8.455)	0.570*** (0.0238)	1.192** (0.493)
L. \$Delta CoVaR		0.722*** (0.0495)		
L. ln(TA)	-612.3 (372.3)	0.230 (3.683)	-0.00208 (0.00901)	0.401 (0.370)
L. LVG	66.37*** (17.63)	-0.278** (0.120)	0.00200*** (0.000593)	-0.0226*** (0.00863)
L. NI	0.814*** (0.208)	0.0141*** (0.00363)	-8.82e-06*** (2.69e-06)	0.000118** (5.38e-05)
Constant	10,884*** (3,743)	44.75 (38.35)	0.476*** (0.120)	-4.226 (3.689)
Country/State Effects	yes	yes	yes	yes
Observations	2,084	2,084	2,084	2,080
R2 adjusted	0.935	0.874	0.588	0.916
RMSE	7565	105.1	0.250	9.158
Number of banks	210	210	210	210

<sup>a</sup> The table reports the results of fixed effects regressions of SRISK, Delta CoVaR, Beta and Z-score on the ESG pillars scores: Environmental, Social, Corporate Governance and Economic, 2004 to 2017. As control variables we include the lagged dependent variables, and lagged bank-level information such as: market beta, Z-score, log of total assets (ln(TA)), leverage ratio (LVG) and net income (NI). We report robust standard errors in parenthesis. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



Table 8: Panel data regressions on the ESG Subcategories. (Asset 4 ESG data 2018)

	(1) SRISK	(2) \$ Delta CoVaR	(3) Beta	(4) Z-score
L. Emission Reduction	14.17 (66.08)	0.0354 (0.210)	0.164 (0.899)	-0.00413* (0.00225)
L. Product Innovation	12.33 (54.09)	0.0651 (0.0913)	-0.928 (0.778)	0.000349 (0.00162)
L. Resource Reduction	-35.18 (77.93)	0.0771 (0.171)	-1.306 (0.798)	-0.00105 (0.00212)
L. Customer /Product Responsibility	-183.2*** (57.88)	0.0261 (0.0522)	-2.198*** (0.652)	-0.00577*** (0.00140)
L. Society /Community	-39.76 (70.77)	0.0165 (0.0485)	0.424 (0.668)	0.000642 (0.00141)
L. Society /Human Rights	-194.1*** (53.61)	-0.0701 (0.0653)	-2.413*** (0.875)	-0.000708 (0.00166)
L. Diversity and Opportunity/Policy	42.68 (40.66)	0.0472 (0.0547)	-0.463 (0.520)	0.00158 (0.00142)
L. Employment Quality/Policy	74.15 (65.87)	0.0459 (0.0784)	-1.283* (0.666)	-0.000868 (0.00156)
L. Health & Safety /Policy	25.37 (41.35)	-0.0453 (0.0571)	0.561 (0.512)	0.00126 (0.00123)
L. Training and Development/Policy	-14.75 (30.80)	-0.0890** (0.0435)	-1.195*** (0.382)	0.00202* (0.00114)
L. Board of Directors/Board Functions	-27.05 (68.64)	0.0140 (0.0714)	-0.141 (0.858)	-0.00196 (0.00147)
L. Board of Directors/Board Structure	80.05 (62.79)	-0.0558 (0.0773)	0.0881 (0.802)	0.00185 (0.00142)
L. Board of Directors/Compensation Policy	-105.9* (63.61)	0.0300 (0.0603)	0.546 (0.638)	0.00202 (0.00130)
L. Integration/Vision and Strategy	9.302 (54.10)	-0.0615 (0.0794)	0.572 (0.768)	0.00350* (0.00188)
L. Shareholders /Shareholder Rights	-7.116 (39.28)	-0.0454 (0.0412)	0.739 (0.508)	-0.000992 (0.00106)
L. Margins /Performance	56.23 (40.44)	-0.0547 (0.0434)	1.683*** (0.519)	-0.000595 (0.00115)
L. Profitability /Shareholder Loyalty	82.04* (47.79)	-0.0117 (0.0461)	0.406 (0.512)	0.00178* (0.00106)
L. Revenue /Client Loyalty	-43.11 (39.78)	0.0597 (0.0470)	0.546 (0.509)	-0.000679 (0.00132)
L. Emission Reduction #Europe	-10.91 (20.86)	-0.0388 (0.0371)	-0.735* (0.376)	-0.000952 (0.00101)
L. Product Innovation #Europe	-21.28 (18.67)	-0.0229 (0.0182)	-0.668* (0.374)	-0.00136 (0.000890)
L. Resource Reduction #Europe	7.653 (21.66)	0.00773 (0.0313)	0.824** (0.408)	0.000923 (0.000909)
L. Customer /Product Responsibility #Europe	26.77 (19.42)	0.00318 (0.0161)	0.592** (0.274)	0.000931 (0.000637)
L. Society /Community #Europe	8.823 (16.87)	0.0144 (0.0175)	-0.195 (0.275)	-0.000222 (0.000650)
L. Society /Human Rights #Europe	20.17 (31.72)	-0.0218 (0.0136)	1.109** (0.510)	-0.000599 (0.000937)
L. Diversity and Opportunity/Policy #Europe	1.608 (10.67)	0.0396** (0.0193)	-0.108 (0.185)	0.000109 (0.000722)
L. Employment Quality/Policy #Europe	-37.44** (16.71)	0.0410** (0.0209)	-0.366 (0.299)	-0.00114 (0.000746)
L. Health & Safety /Policy #Europe	-0.421 (13.08)	-0.00861 (0.0156)	-0.334* (0.199)	0.000230 (0.000546)
L. Training and Development/Policy #Europe	-15.13* (8.683)	-0.0109 (0.0189)	-0.204 (0.133)	-0.00182*** (0.000515)
L. Board of Directors/Board Functions #Europe	-5.682 (14.92)	0.00618 (0.0259)	-0.416* (0.252)	-0.00118 (0.000846)
L. Board of Directors/Board Structure #Europe	3.251 (16.96)	-0.0176 (0.0259)	0.367 (0.231)	0.00254*** (0.000878)
L. Board of Directors/Compensation Policy #Europe	4.447 (18.29)	0.0157 (0.0164)	0.480 (0.324)	0.000260 (0.000791)
L. Integration/Vision and Strategy #Europe	69.74*** (23.23)	0.0232 (0.0268)	0.386 (0.386)	0.000952 (0.000910)
L. Shareholders /Shareholder Rights #Europe	11.03 (12.19)	-0.00190 (0.0123)	0.0152 (0.190)	-0.000428 (0.000525)
L. Margins /Performance #Europe	6.030 (12.00)	-0.00954 (0.0137)	-0.374* (0.196)	0.000108 (0.000552)
L. Profitability /Shareholder Loyalty #Europe	17.53 (17.25)	0.00403 (0.0140)	0.323 (0.227)	0.00114* (0.000634)
L. Revenue /Client Loyalty #Europe	-26.53* (14.99)	-0.0239* (0.0143)	-0.0100 (0.238)	-0.000195 (0.000577)
Europe	-1.537 (2,150)	3.605** (1.764)	-32.16 (27.59)	-0.0574 (0.111)

	(1)	(2)	(3)	(4)
L. Emission Reduction # L. ln(TA)	-0.0343 (6.160)	-0.00302 (0.0187)	0.0399 (0.0875)	0.000482** (0.000188)
L. Product Innovation # L. ln(TA)	-0.476 (5.135)	-0.00435 (0.00805)	0.133* (0.0730)	4.91e-05 (0.000128)
L. Resource Reduction # L. ln(TA)	3.546 (7.194)	-0.00841 (0.0157)	0.0661 (0.0765)	2.18e-05 (0.000187)
L. Customer /Product Responsibility # L. ln(TA)	16.29*** (5.627)	-0.00284 (0.00470)	0.185*** (0.0648)	0.000459*** (0.000121)
L. Society /Community # L. ln(TA)	3.443 (6.814)	-0.00154 (0.00454)	-0.0364 (0.0673)	3.10e-05 (0.000129)
L. Society /Human Rights # L. ln(TA)	16.35*** (4.776)	0.00680 (0.00546)	0.129 (0.0914)	0.000109 (0.000123)
L. Diversity and Opportunity/Policy # L. ln(TA)	-4.623 (4.101)	-0.00515 (0.00541)	0.0539 (0.0546)	-0.000190 (0.000130)
L. Employment Quality/Policy # L. ln(TA)	-4.209 (6.357)	-0.00594 (0.00745)	0.158** (0.0714)	0.000144 (0.000146)
L. Health & Safety /Policy # L. ln(TA)	-3.793 (3.836)	0.00426 (0.00508)	-0.0282 (0.0498)	-0.000189* (0.000105)
L. Training and Development/Policy # L. ln(TA)	3.210 (3.172)	0.00862** (0.00430)	0.154*** (0.0406)	-4.66e-05 (0.000105)
L. Board of Directors/Board Functions # L. ln(TA)	3.725 (7.097)	-0.00224 (0.00712)	0.0536 (0.0847)	0.000289** (0.000131)
L. Board of Directors/Board Structure # L. ln(TA)	-8.549 (6.073)	0.00600 (0.00740)	-0.0290 (0.0765)	-0.000294** (0.000124)
L. Board of Directors/Compensation Policy # L. ln(TA)	9.591 (6.389)	-0.00253 (0.00571)	-0.0850 (0.0723)	-0.000171 (0.000128)
L. Integration/Vision and Strategy # L. ln(TA)	-7.222 (5.000)	0.00578 (0.00686)	-0.0900 (0.0760)	-0.000412*** (0.000155)
L. Shareholders /Shareholder Rights # L. ln(TA)	-0.342 (3.961)	0.00398 (0.00386)	-0.0678 (0.0539)	0.000123 (9.56e-05)
L. Margins /Performance # L. ln(TA)	-6.937* (3.938)	0.00629 (0.00405)	-0.155*** (0.0544)	-1.22e-05 (9.91e-05)
L. Profitability /Shareholder Loyalty # L. ln(TA)	-9.137** (4.657)	0.00197 (0.00431)	-0.0704 (0.0522)	-0.000196** (9.24e-05)
L. Revenue /Client Loyalty # L. ln(TA)	7.029* (4.074)	-0.00593 (0.00430)	-0.0506 (0.0504)	0.000142 (0.000113)
L. SRISK	0.918*** (0.0305)			
L. Z-score	-21.82*** (5.328)	0.944*** (0.0163)	-0.0143 (0.0685)	-0.000700*** (0.000180)
L. Beta	-2.263*** (518.4)	1.179** (0.524)	-28.51*** (8.963)	0.541*** (0.0235)
L. \$Delta CoVaR			0.710*** (0.0519)	
L. ln(TA)	-597.7 (541.5)	0.104 (0.539)	-2.760 (5.643)	0.00591 (0.0133)
L. LVG	68.10*** (18.61)	-0.0182** (0.00881)	-0.290** (0.130)	0.00229*** (0.000589)
L. NI	0.864*** (0.223)	0.000106* (5.72e-05)	0.0145*** (0.00366)	-8.70e-06*** (2.51e-06)
Constant	10,827* (5,634)	-1.427 (5.353)	100.1* (59.10)	0.368** (0.167)
Country/State Fixed Effects	yes	yes	yes	yes
Observations	2,084	2,080	2,084	2,084
R2 adjusted	0.937	0.916	0.877	0.601
RMSE	7495	9.145	103.9	0.246
Number of banks	210	210	210	210

<sup>a</sup> The table reports the results of country fixed effects regressions of SRISK, Delta CoVaR, Beta and Z-score on the ESG Subcategories in each Pillars scores as listed in Table 1, 2004 to 2017. As control variables we include the lagged dependent variables, and lagged bank-level information such as: market beta, Z-score, log of total assets (ln(TA)), leverage ratio (LVG) and net income (NI). We report robust standard errors in parenthesis. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 9: Panel data regressions on the ESG score (TR ESG data 2020)

	(1)	(2)	(3)	(4)
	SRISK	\$ Delta CoVaR	Beta	Z-score
L. ESG Score	-155.4*** (53.09)	-3.052*** (0.880)	-0.00241* (0.00141)	-0.0524 (0.0344)
L. ESG Score #Europe	58.36** (24.94)	-0.189 (0.367)	-0.00140** (0.000699)	-0.0116 (0.0109)
Europe	-2,652** (1,107)	16.41 (15.42)	-0.0563 (0.0709)	3.991*** (0.796)
L. ESG Score # L. ln(TA)	10.08* (5.497)	0.334*** (0.0789)	0.000412*** (0.000122)	0.00250 (0.00323)
L. SRISK	0.928*** (0.0225)			
L. Z-score	-11.57*** (3.769)	-0.149*** (0.0526)	-0.000441*** (0.000140)	0.958*** (0.00846)
L. Beta	-2,029*** (438.1)	-22.62*** (6.878)	0.538*** (0.0203)	1.122** (0.461)
L. \$Delta CoVaR		0.732*** (0.0468)		
L. ln(TA)	-426.1* (242.9)	-4.027 (2.974)	-0.00970 (0.00644)	0.370* (0.201)
L. LVG	99.49*** (21.37)	-0.159 (0.141)	0.00364*** (0.000734)	-0.0339*** (0.00808)
L. NI	0.839*** (0.190)	0.0144*** (0.00338)	-7.24e-06*** (2.45e-06)	7.36e-05* (4.46e-05)
Constant	8,421*** (2,428)	68.22** (32.08)	0.558*** (0.0934)	-3.153 (2.050)
Country/State Effects	Yes	Yes	Yes	Yes
Observations	2,822	2,822	2,822	2,820
R2 adjusted	0.942	0.880	0.599	0.926
RMSE	6814	92.70	0.233	7.608
Number of banks	257	257	257	257

<sup>a</sup> The table reports the results of country fixed effects regressions of SRISK, Delta CoVaR, Beta and Z-score on the ESG score, 2004 to 2019. The data has been downloaded in September 2020 after the TR change in methodology of April 2020. As control variables we include the lagged dependent variables, and lagged bank-level information such as: market beta, Z-score, log of total assets (ln(TA)), leverage ratio (LVG) and net income (NI). We report robust standard errors in parenthesis. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 10: Panel data regressions on the ESG Pillars. (TR ESG data 2020)

	(1) SRISK	(2) \$ Delta CoVaR	(3) Beta	(4) Z-score
L. Environment Pillar Score	3.605 (74.88)	-0.604 (0.656)	-0.00169 (0.00136)	-0.00956 (0.0363)
L. Social Pillar Score	-135.1** (67.98)	-1.393* (0.756)	-0.00243 (0.00165)	-0.0129 (0.0494)
L. Governance Pillar Score	-63.11 (54.17)	-1.338** (0.560)	0.00137 (0.00134)	-0.0356 (0.0414)
L. Environment Pillar Score #Europe	34.79 (22.59)	0.286 (0.316)	0.000752 (0.000741)	-0.0319*** (0.0123)
L. Social Pillar Score #Europe	-14.92 (20.02)	-0.930*** (0.307)	-0.00267*** (0.000974)	0.0430** (0.0173)
L. Governance Pillar Score #Europe	37.90*** (13.02)	0.370* (0.203)	0.000409 (0.000618)	-0.0132 (0.0121)
Europe	-1,491 (1,147)	30.41** (15.05)	-0.0110 (0.0777)	3.273*** (0.969)
L. Environment Pillar Score # L. ln(TA)	-4.218 (6.753)	0.0285 (0.0516)	0.000102 (0.000114)	0.000856 (0.00316)
L. Social Pillar Score # L. ln(TA)	14.18** (6.423)	0.225*** (0.0797)	0.000457*** (0.000147)	-0.00145 (0.00465)
L. Governance Pillar Score # L. ln(TA)	4.057 (5.482)	0.119** (0.0584)	-0.000118 (0.000118)	0.00333 (0.00398)
L. SRISK	0.929*** (0.0239)			
L. Z-score	-10.52*** (3.366)	-0.138** (0.0547)	-0.000484*** (0.000147)	0.960*** (0.00871)
L. Beta	-2,003*** (439.2)	-22.85*** (7.023)	0.536*** (0.0205)	1.255*** (0.468)
L. \$Delta CoVaR		0.730*** (0.0471)		
L. ln(TA)	-693.5** (343.0)	-6.371* (3.375)	-0.00822 (0.00773)	0.361 (0.220)
L. LVG	100.3*** (22.96)	-0.132 (0.138)	0.00353*** (0.000758)	-0.0328*** (0.00816)
L. NI	0.827*** (0.192)	0.0144*** (0.00342)	-7.57e-06*** (2.53e-06)	7.71e-05* (4.38e-05)
Constant	9,765*** (3,591)	75.14** (33.52)	0.514*** (0.104)	-3.059 (2.280)
Country/State Effects	Yes	Yes	Yes	Yes
Observations	2,760	2,760	2,760	2,758
R2 adjusted	0.943	0.880	0.594	0.926
RMSE	6762	92.55	0.233	7.660
Number of banks	255	255	255	255

<sup>a</sup> The table reports the results of country fixed effects regressions of SRISK, Delta CoVaR, Beta and Z-score on the ESG Pillars, Environmental, Social and Governance, 2004 to 2019. The data has been downloaded in September 2020 after the TR change in methodology of April 2020. As control variables we include the lagged dependent variables, and lagged bank-level information such as: market beta, Z-score, log of total assets (ln(TA)), leverage ratio (LVG) and net income (NI). We report robust standard errors in parenthesis. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 11: Panel data regressions on the ESG subcategories. (TR ESG data 2020)

	(1) SRISK	(2) \$ Delta CoVaR	(3) Beta	(4) Z-score
L. Management Score	-17.03 (30.07)	-0.855** (0.355)	0.000896 (0.00101)	-0.0188 (0.0281)
L. CSR Strategy Score	-169.9*** (61.47)	-1.307* (0.705)	0.00108 (0.00131)	0.0356 (0.0485)
L. Shareholders Score	-57.23 (45.96)	-0.341 (0.420)	-0.00136 (0.000872)	-0.0318 (0.0272)
L. Emissions Score	-15.15 (52.66)	0.625 (0.810)	0.000441 (0.00152)	0.0621 (0.0540)
L. Environmental Innovation Score	32.89 (67.13)	-0.717 (0.803)	-0.00135 (0.00129)	-0.0153 (0.0284)
L. Resource Use Score	110.7** (51.98)	0.211 (0.668)	-0.000360 (0.00148)	-0.0370 (0.0481)
L. Product Responsibility Score	-56.24* (28.77)	-1.435*** (0.376)	-0.000813 (0.000899)	-0.0207 (0.0245)
L. Community Score	-11.35 (36.60)	-0.404 (0.478)	-0.00169 (0.00108)	0.0507* (0.0275)
L. Human Rights Score	43.40 (54.16)	0.508 (0.732)	0.00250* (0.00140)	-0.0196 (0.0327)
L. Workforce Score	-103.4** (51.52)	-0.526 (0.702)	-0.00312** (0.00146)	-0.121** (0.0585)
L. Management Score #Europe	16.20* (8.874)	0.209 (0.154)	-0.000124 (0.000457)	-0.00635 (0.00905)
L. CSR Strategy Score #Europe	110.4*** (28.82)	1.067** (0.543)	0.00178** (0.000749)	-0.0163 (0.0158)
L. Shareholders Score #Europe	11.93 (9.237)	0.0556 (0.153)	0.000752* (0.000426)	-0.00427 (0.00798)
L. Emissions Score #Europe	-6.779 (24.86)	-0.373 (0.473)	-0.000849 (0.000877)	-0.0355* (0.0190)
L. Environmental Innovation Score #Europe	-16.63 (33.07)	-0.324 (0.692)	-9.73e-05 (0.000903)	-0.0177 (0.0111)
L. Resource Use Score #Europe	-14.48 (26.86)	0.191 (0.575)	0.000904 (0.000944)	0.0172 (0.0172)
L. Product Responsibility Score #Europe	0.0386 (10.58)	-0.104 (0.179)	-0.000852 (0.000623)	0.00220 (0.00852)
L. Community Score #Europe	-18.59 (12.51)	-0.403** (0.179)	7.32e-06 (0.000606)	0.0149 (0.00992)
L. Human Rights Score #Europe	-23.24 (34.49)	0.00824 (0.550)	-0.00256*** (0.000865)	0.000526 (0.0116)
L. Workforce Score #Europe	0.566 (13.68)	-0.362 (0.241)	-0.000674 (0.000678)	0.0393** (0.0175)
Europe	-306.7 (1,105)	50.97*** (17.56)	-0.0522 (0.0804)	2.206** (1.085)
L. Management Score # L. ln(TA)	0.898 (3.133)	0.0768* (0.0394)	-4.46e-05 (9.03e-05)	0.00198 (0.00271)
L. CSR Strategy Score # L. ln(TA)	7.355 (5.175)	0.0384 (0.0654)	-0.000257*** (9.76e-05)	-0.00301 (0.00412)
L. Shareholders Score # L. ln(TA)	4.939 (4.514)	0.0326 (0.0426)	9.10e-05 (7.37e-05)	0.00300 (0.00259)
L. Emissions Score # L. ln(TA)	3.197 (4.607)	-0.0271 (0.0682)	6.97e-05 (0.000111)	-0.00529 (0.00462)
L. Environmental Innovation Score # L. ln(TA)	-2.151 (5.912)	0.0987** (0.0482)	0.000157** (7.84e-05)	0.00213 (0.00231)
L. Resource Use Score # L. ln(TA)	-11.38** (4.571)	-0.0559 (0.0634)	-9.04e-05 (0.000108)	0.00254 (0.00412)
L. Product Responsibility Score # L. ln(TA)	6.072** (2.709)	0.162*** (0.0386)	0.000175** (6.90e-05)	0.000795 (0.00229)
L. Community Score # L. ln(TA)	2.817 (3.479)	0.0785* (0.0458)	0.000201** (8.81e-05)	-0.00557** (0.00262)
L. Human Rights Score # L. ln(TA)	-2.639 (4.089)	-0.0630 (0.0574)	-4.50e-05 (8.82e-05)	0.00156 (0.00264)
L. Workforce Score # L. ln(TA)	9.840* (5.094)	0.0861 (0.0750)	0.000330** (0.000132)	0.0111** (0.00546)
L. SRISK	0.926*** (0.0247)			
L. Z-score	-10.83*** (3.284)	-0.151*** (0.0550)	-0.000468*** (0.000149)	0.960*** (0.00899)
L. Beta	-2,158*** (421.0)	-24.74*** (6.833)	0.525*** (0.0204)	1.376*** (0.480)
L. \$Delta CoVaR		0.720*** (0.0466)		

	(1)	(2)	(3)	(4)
L. ln(TA)	-989.2** (388.2)	-6.172 (4.645)	-0.0207** (0.00949)	-0.0845 (0.284)
L. LVG	105.6*** (22.65)	-0.159 (0.141)	0.00366*** (0.000757)	-0.0334*** (0.00815)
L. NI	0.827*** (0.188)	0.0145*** (0.00332)	-7.70e-06*** (2.51e-06)	7.12e-05 (4.44e-05)
Constant	11,803*** (3,892)	64.16 (45.79)	0.686*** (0.121)	1.260 (3.077)
Country/State Fixed Effects	Yes	Yes	Yes	Yes
Observations	2,820	2,820	2,820	2,818
R2 adjusted	0.944	0.882	0.604	0.927
RMSE	6748	91.65	0.231	7.596
Number of banks	257	257	257	257

<sup>a</sup> The table reports the results of country fixed effects regressions of SRISK, Delta Co-VaR, Beta and Z-score on the ESG Subcategories in each Pillars scores as listed in Table 1, 2004 to 2019. The data has been downloaded in September 2020 after the TR change in methodology of April 2020. As control variables we include the lagged dependent variables, and lagged bank-level information such as: market beta, Z-score, log of total assets (ln(TA)), leverage ratio (LVG) and net income (NI). We report robust standard errors in parenthesis. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

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