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Doing Safe by Doing Good: ESG Investing and Corporate Social Responsibility in the U.S. and Europe

Christina E. Bannier* Yannik Bofinger† Björn Rock‡

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Abstract

This paper examines the profitability of investing according to environmental, social and governance (ESG) criteria in the U.S. and Europe. Based on data from 2003 to 2017, we show that a portfolio long in stocks with the highest ESG scores and short in those with the lowest scores yields a significantly negative abnormal return. Interestingly, this is caused by the strong positive return of firms with the lowest ESG activity. As we find that increasing ESG scores reduce firm risk (particularly downside risk), this hints at an insurance-like character of corporate social responsibility: Firms with low ESG activity need to offer a corresponding risk premium. The perception of ESG as an insurance can be shown to be stronger in more volatile capital markets for U.S. firms, but not for European firms. Socially responsible investment may therefore be of varying attractiveness in different market phases.

JEL Classification: G11; G32; G34; O16; Q56

Keywords: ESG; corporate social responsibility; sustainability; downside risk; insurance; Fama-French model; dynamic panel GMM estimation

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1 Introduction

Over the past few years, non-financial activities such as those concerning environmental, social and governance (ESG) issues have become increasingly important for corporate managers. The latest UN Global Compact-Accenture CEO study in 2016 reports that 95 percent of the more than 1,000 participating CEOs from all over the world see it as a personal responsibility to ensure that their company has a core purpose and role in society (United Nations, 2016). This development has been paralleled by an increasing interest of financial market participants to invest sustainably: According to the 2018 Global Sustainable Investment Review, the amount of assets invested along ESG criteria reached $30.7 trillion globally; sustainable investment in the U.S. makes up 25.7% of total managed assets, in Europe the proportion is even higher at 48.8% (USSIF, 2019).

Despite this tremendous interest in corporate social responsibility (CSR) and socially-responsible investing, empirical research has struggled to establish a clear relation between firms' CSR activities[1] and their financial performance. Depending on the type of financial performance measured, the methodology and data used, positive, null and negative relations have been derived (Margolis, Elfenbein, and Walsh, 2009). Consistently positive effects tend to be obtained from only a limited set of performance measures that refer predominantly to ex-ante, i.e. implicit, measures of capital costs (cf. Dhaliwal et al., 2011; Ghoul et al., 2011). With regard to realized, i.e. ex-post, returns on investments in ESG-active firms, the empirical results are rather inconclusive (Renneboog, Horst, and Zhang, 2008b). Some studies report that investing based on social-responsibility screens leads to higher returns than conventional investments (cf. Kempf and Osthoff, 2007; Statman and Glushkov, 2009; Edmans, 2011). Others show that this investment style is financially costly as so-called "sin-stocks" deliver superior returns (Fabozzi et al, 2008; Hong and Kacperczyk, 2009; Luo and Balvers, 2017) and that financial markets react negatively to increases in ESG activity (Krüger, 2015). Recent research by Riedl and Smeets (2017) even demonstrates that socially responsible investors "are willing to forgo financial performance in order to invest in accordance with their social preferences".

The observed disparity in empirical results may be caused by different factors. Prime among them is the question of how to best measure corporate ESG activity. Even though there are different providers of ESG ratings or scores, their methodologies and coverages seem to diverge (Dorfleitner, Halbritter, and Nguyen, 2015), leading to inconclusive assessments of corporate ESG actions. Some of the early studies on the corporate level furthermore appear to have been plagued by methodological problems (Margolis and Walsh, 2001). Measurement errors, omitted variables

[1] In the following, we will refer to corporate actions aimed at sustainability as CSR or ESG activitiy interchangeably.

or reverse causality easily trigger endogeneity, which, unless appropriately dealt with, may lead to biased estimates. Among the omitted variables, the legal background in which companies operate seems to play a particularly important role. This is because it determines the disclosure requirements of firms, as such affecting the basis for any ESG measurement. In addition, the legal background is related to the shareholder vs. stakeholder orientation of companies (cf. Shleifer and Vishny, 1997; Bottenberg et al., 2016), which may influence the perception of ESG activity by investors and, thus, determine its effects on cost of capital and firm value (Dhaliwal, Li, Tsang, and Yang, 2014). Studies at the portfolio level furthermore tend to follow established investment practice and assign companies to the sustainable and non-sustainable group according to negative or norms-based screens (Renneboog, Horst, and Zhang, 2008a). Analyses based on such a dichotomous treatment of corporate social responsibility hence disregard the full information content of ESG ratings, with respective consequences for the derived relationship between sustainability and performance.

In correspondence with these issues, our study tries to examine the link between CSR activity and financial performance from a broad and robust perspective: We consider the full range of ESG ratings and study their effect on both the portfolio level and the corporate level. To do so, we employ one of the largest databases of ESG scores provided by Thomson Reuters, an enhancement and replacement of the ASSET4 database, that covers more than 7,000 publicly listed companies globally. Its ratings methodology employs a percentile rank scoring model comprising 400 different data points, ratios and analytics that are expressed in 178 critical measures. The ESG score combines information from three pillars: environmental, social and corporate governance. Due to the high database depth which reduces selection bias and allows for a differentiated evaluation, the Thomson Reuters ESG scores have been employed in several empirical studies so far (cf. Ioannou and Serafeim, 2012; Cheng et al., 2013; Hawn and Ioannou, 2016; Monti et al., 2018). They also appear to be relatively consistent with other large ESG databases such as the one by Bloomberg (Dorfleitner, Halbritter, and Nguyen, 2015). Our analysis considers both the comprehensive ESG score and the three individual components' scores for each firm in our sample. In order to account for the legal background of a company, we differentiate between firms' geographical affiliation and collect an unbalanced panel of companies headquartered in the U.S. and in Europe that received ESG scores by Thomson Reuters over the time period 2003 to 2017. We consider potential endogeneity issues by employing a dynamic panel regression model approach in the analyses on the firm level, where the system GMM estimation allows to alleviate endogeneity concerns due to the lag structure of the dependent variable.

Starting from the portfolio level, a Carhart (1997) four factor analysis shows that holding a

portfolio that is long in stocks of firms with the strongest ESG scores and short in firms with the weakest ESG scores yields a negative abnormal return ("alpha") of -27.8 basis points per month in the U.S. portfolio and of -30.5 basis points for the European portfolio. Digging deeper into the data, we find that this negative excess return is not driven by a negative return from investing in ESG-active firms but rather by an extremely strong positive return from investing in firms that unfold only weak ESG activity.

In order to gain a better understanding of these portfolio performance results, we go on and examine the effects of ESG activity on the corporate level. We follow earlier studies by Jo and Na (2012), Diemont, Moore, and Soppe (2015) and Monti, Pattitoni, Petracci, and Randl (2018) and analyze the impact of ESG activity on financial risk. Essentially, we test the hypothesis that corporate sustainability offers an insurance-like protection in case of negative events such as regulatory changes, legal infringements or switches in consumer tastes, as originally proposed by Godfrey (2005) and Godfrey, Merrill, and Hansen (2009) and subsequently maintained by Jagannathan, Ravikumar, and Sammon (2017) and Albuquerque, Koskinen, and Zhang (2018). As these negative events are rare, difficult to diversify and may have devastating effects on the affected companies, the consideration of downside risks becomes particularly important. We therefore consider both standard risk measures (such as stock volatility and idiosyncratic risk) and proxies for tail risk (such as (conditional) value at risk and lower partial moments) calculated from companies' stock prices. We find that basically all of these risk measures are significantly reduced when ESG scores increase, though the effects are larger in size for the U.S. sample than for the European firm sample. Dissecting the ESG score into its constituent components shows that the results for U.S. firms are driven by the environmental dimension, whereas for European firms the social component triggers the risk-reducing effects.

As the employed risk proxies are based on the market's perception of firms' ESG activities, we also test whether the observed risk-reducing effects are moderated by the surrounding market volatility. The underlying argument is based on Lins, Servaes, and Tamayo (2017) and Monti, Pattitoni, Petracci, and Randl (2018) who show that corporate investment in social capital is perceived more beneficially in crisis periods, when trust is generally low. In a similar vein, Nofsinger and Varma (2014) demonstrate that socially-responsible mutual funds deliver superior returns by reducing downside risks in crisis phases, and Diemont, Moore, and Soppe (2015) report a significant relation between certain types of corporate social responsibility and tail risks only in extreme market conditions. Indeed, we observe that the risk-reducing effect of ESG activity is significantly amplified by the general market volatility for the sample of U.S. firms. For European firms, in contrast, there is no moderating effect of market volatility on the ESG-risk relation. It hence seems

to be the case that investors perceive the risk from lacking corporate social responsibility to be heightened by the general volatility on U.S. stock markets. In low-volatility markets, in contrast, the risk of CSR-"inactivity" hardly concerns investors in U.S. companies.

In subsequent analyses, we try to strengthen the validity of our results by considering different proxies for firm risk. According to the insurance argument, ESG activities help to avoid the occurrence of rare but potentially severe firm-specific events (Jagannathan, Ravikumar, and Sammon, 2017). In the extreme, these downside risks may lead to a default of the firm. We therefore examine the effect of firms' ESG activities on various measures of default risk. For the U.S. sample, we find our earlier results confirmed: Higher ESG scores lead to lower market-based proxies of default risk. For the European sample, however, there is no significant association between ESG scores and default risk.

Our results unequivocally point to capital markets perceiving and pricing the risk of lacking corporate social responsibility. Nevertheless, the question remains whether and when the lower risk of socially responsible firms translates into real outcomes. Following the arguments in Eccles, Ioannou, and Serafeim (2014), we allow for a certain time period to pass between the reported ESG activities and any potential performance or value effects. Similarly to Servaes and Tamayo (2013), Hawn and Ioannou (2016) and Albuquerque, Koskinen, and Zhang (2018), we examine the effect of corporate social responsibility on Tobin's Q as a comprehensive measure of firm value. Considering time lags of between 1 and 4 years, we observe that higher ESG ratings go along with higher Tobin's Q for all lag lengths in the U.S. sample. For European firms, in contrast, the effect is strongest for 1 and 2 year time lags, though, again, the size of the effect is much smaller than for the U.S. sample.

Overall, our results may be taken as an indication that corporate social responsibility indeed offers an insurance-like protection that is taken into account by investors on capital markets: Doing good via sustainable corporate policies dampens (downside) risks and therefore strengthens firms' stability. Companies that show a lack in ESG activity therefore need to offer investors a risk premium over and above the one due to firm-specific size, value or momentum-based risk. Interestingly, the perceived risk-reducing effect of corporate social responsibility may be amplified by the prevailing volatility on the market: At least for U.S. firms, the dampening effect of ESG activity on firm risk is perceived most strongly when markets are very volatile. Low-volatility phases such as the time period from 2011 to 2017 and the corresponding decrease in attractiveness of a sustainability risk insurance may therefore help to explain the comparably low growth of ESG investment on U.S. capital markets in recent years.

The remainder of this paper is structured as follows. Section 2 presents the data and delineates

the variables construction. Section 3 outlines the econometric methodology and presents the main empirical results. Section 4 provides additional tests to enhance the validity of our results and Section 5 concludes.

2 Data

2.1 Data sources

Our analysis combines data from different sources. ESG scores are available from Thomson Reuters EIKON in the form of an enhancement and replacement of the earlier ASSET4 database. The ESG database provides annual ESG ratings on more than 7,000 firms globally and goes back to 2003. Of the total number of rated firms, we consider all publicly listed companies in the U.S. and in Europe that are benchmarked against the S&P500 and Stoxx Europe 600 at their market capitalization. Table 1 reports the development of the number of firms with an ESG score from Thomson Reuters in our dataset between 2003 and 2017. Despite the fact that the largest U.S. and European firms have been among the first to receive an ESG assessment, the number of rated firms in our dataset increases over time as more indices have been included to Thomson Reuters' coverage.[2]

[2]It should be noted that there is a drop in the number of rated firms from 2016 to 2017 that is particularly strong in the U.S. sample. As we downloaded the data in late 2018, we believe that there might be belated additional entries for 2017 that we were, unfortunately, unable to consider in our analysis. As we see no structural reasons, we remain confident that our results will not be biased because of this smaller number of observations in the most recent year of out data collection.

Table 1: Firm sample distribution per year

U.S.			Europe		
Year	N	%	Year	N	%
2003	290	2.81%	2003	337	2.82%
2004	406	3.93%	2004	534	4.46%
2005	465	4.50%	2005	640	5.35%
2006	472	4.57%	2006	657	5.49%
2007	507	4.91%	2007	716	5.98%
2008	654	6.33%	2008	768	6.42%
2009	734	7.11%	2009	809	6.76%
2010	779	7.55%	2010	846	7.07%
2011	794	7.69%	2011	884	7.38%
2012	794	7.69%	2012	895	7.48%
2013	793	7.68%	2013	903	7.54%
2014	795	7.70%	2014	949	7.93%
2015	968	9.38%	2015	1071	8.95%
2016	1210	11.72%	2016	1090	9.11%
2017	663	6.42%	2017	872	7.28%

Annual firm level data and daily stock price returns are downloaded via Datastream. The daily data on stock prices are used to calculate equity-market based risk measures. In addition, measures of default risks (credit default swap (CDS) spread, distance-to-default (DTD)) are received from the Risk Management Institute of the National University of Singapore (CRI, 2019). Corporate credit ratings are taken from Standard & Poor's. The factors for the four factor model are downloaded from Kenneth French's website.

In order to reduce the impact of outliers, we follow Lehn, Patro, and Zhao (2007) and winsorize the firm-level variables at the 1% level. Similarly to Monti, Pattitoni, Petracci, and Randl (2018), we do not winsorize the ESG rating data as these are subject to a multitude of different checks by Thomson Reuters and appear sufficiently reliable in this respect. Our final dataset consists of 10,324 firm-year observations in the U.S. sample and 11,971 firm-year observations in the European sample. Table 2 shows the further sample breakdown according to country, Table 3 according to industry. As can be seen from the tables, the largest number of firms in the European sample is headquartered in UK, followed by France, Germany, Switzerland and Sweden. Regarding the industry breakdown, both the U.S. and the European sample feature the largest number of firms in the financial, industrial and cyclical consumer goods and services industry. The U.S. sample, however, shows a larger fraction of firms in technology, the European sample a larger fraction in basic materials and telecommunications services.

Table 2: Firm sample distribution per country

U.S.			Europe (cont'd)		
Country	N	%	Country	N	%
United States of America	10324	100.00%	Isle of Man	7	0.06%
			Italy	535	4.47%
Europe			Jersey	44	0.37%
Country	N	%	Luxembourg	89	0.74%
Austria	211	1.76%	Malta	9	0.08%
Belgium	322	2.69%	Monaco	7	0.06%
Cyprus	31	0.26%	Netherlands	468	3.91%
Czech Republic	41	0.34%	Norway	232	1.94%
Denmark	335	2.80%	Poland	223	1.86%
Finland	347	2.90%	Portugal	100	0.84%
France	1139	9.51%	Romania	2	0.02%
Germany	1047	8.75%	Russia	336	2.81%
Gibraltar	2	0.02%	Spain	559	4.67%
Greece	222	1.85%	Sweden	704	5.88%
Guernsey	30	0.25%	Switzerland	916	7.65%
Hungary	37	0.31%	Ukraine	8	0.07%
Ireland; Republic of	367	3.07%	United Kingdom	3601	30.08%
			Europe (Total)	11971	

Table 3: Firm sample distribution per industry

U.S.			Europe		
Industry	N	%	Industry	N	%
Energy	765	7.41%	Energy	874	7.30%
Basic materials	702	6.80%	Basic materials	1211	10.12%
Industrials	1424	13.79%	Industrials	2265	18.92%
Cyclical consumer goods & Services	1704	16.51%	Cyclical consumer goods & Services	1882	15.72%
Non-cyclical consumer goods & Services	647	6.27%	Non-cyclical consumer goods & Services	811	6.77%
Financials	2300	22.28%	Financials	2703	22.58%
Healthcare	880	8.52%	Healthcare	691	5.77%
Technology	1260	12.20%	Technology	566	4.73%
Telecommunications services	112	1.08%	Telecommunications services	458	3.83%
Utilities	492	4.77%	Utilities	510	4.26%
No assigned industry	38	0.37%			

2.2 Variables description

In the following, we will describe the variables that enter the firm-level analysis of ESG activity. We will start by considering the dependent variables, risk measures and firm value, before describing

the ESG score and its constituent parts afterwards and the control variables at the end. Descriptive statistics of the variables are presented in Table 4.

2.2.1 Dependent variables

The firm-level analyses consider measures of firm risk and value as dependent variables. With regard to risk measures, we differentiate between equity-based and credit (or default) risks. Among equity-based risk measures, we consider the stock volatility σ and the idiosyncratic risk σ_ϵ as standard risk variables. Annual stock volatility is calculated from daily stock returns. Idiosyncratic risk of company i in year t is derived as the volatility of the stock that is not explained by the company's β according to the capital asset pricing model: $R_{it} = r_f + \beta_i * RMRF_t + \epsilon_{it}$. We therefore first estimate the company's β, where the S&P 500 and the Stoxx Europe 600 are used as the respective market indices. The risk-free rate is approximated by the one-month government bond rate. Idiosyncratic risk σ_ϵ is then calculated as $\sqrt{Var(\epsilon_{it})}$.

In addition to these two standard equity-risk measures, our analysis aims at recognizing that ESG-related risks may be extreme in nature, i.e. rare and large (Jagannathan, Ravikumar, and Sammon, 2017). We therefore also try to capture the risks of these extreme events in the form of value at risk (VaR) and expected shortfall or conditional value at risk ($CVaR$). The VaR measures the predicted maximum loss over a given horizon within a specific confidence interval (Jorion, 2007). We follow Monti, Pattitoni, Petracci, and Randl (2018) and calculate it as the 0.05-quantile based on the empirical daily return distribution for every year. The CVaR corresponds to the mean value of returns below the VaR-threshold. In the same vein as Hoepner, Oikonomou, Sautner, Starks, and Zhou (2016), we capture further downside risks via lower partial moments ($LPMs$) of the second and third order *LPM(0,2)* and *LPM(0,3)*. We calculate these based on the return distribution below the 0%-return-threshold (Bawa, 1975; Fishburn, 1977). To be able to compare our results metrically, we calculate the square root of the LPM(0,2) and the cube root of LPM(0,3).

Downside risks also arise on the credit side, if a firm is unable to pay its obligations and therefore faces bankruptcy. In order to capture this default risk, we analyze a company's one and five-year credit default swap (CDS) spread as well as its distance-to-default (DTD). As approximation of the CDS spread we use the CRI (2019) "actuarial spread" which is constructed without upfront fee. This spread measures the costs of an insurance against a default of the company over a one, respectively five, year period. The DTD is calculated using volatility-adjusted leverage based on the Merton (1974) model. It measures the distance between the default point and the expected value of a firm's assets. A higher distance-to-default hence implies a lower probability of default. As both the CDS spreads and the distance-to-default reflect market-based perceptions of risk we extend the

analysis by including also corporate *credit ratings* provided by Standard & Poor's. These credit ratings portray an external perspective on a firm's creditworthiness that is explicitly independent of the current position in the firm's business cycle (i.e. rating-through-the-cycle methodology, cf. Löffler, 2004; Kiff et al., 2013). We convert the letter combination of credit ratings into an ordinal scale following Klock, Mansi, and Maxwell (2005), where a triple-A rating is assigned a value of twenty-two and a D-rating a value of one.

Finally, we employ *Tobin's Q* to assess the effect of management decisions, in our case ESG activities, on firm value. Tobin's Q is generally defined as the market value of a firm divided by its replacement costs. We follow Chung and Pruitt (1994) and calculate Q as the sum of the market capitalization of common stock, the liquidating value of the preferred stock and the book value of debt divided by total assets.

As can be seen from Table 4, the U.S. and the European firm sample to not much vary with respect to equity-based risk measures. The European firms do seem to represent a lower credit risk, however. This shows both in the much lower CDS spreads and the higher average credit rating. Tobin's Q, in contrast, appears to be slightly higher for U.S. firms on average.

2.2.2 ESG scores

We follow recent work (cf. Ioannou and Sefarim, 2012; Cheng et al., 2013; Hawn and Ioannou, 2016, Monti et al., 2018) and employ the *ESG score* provided by the Thomson Reuters Eikon database as our main explanatory variable. As a replacement of the earlier ASSET4 database, the Thomson Reuters ESG score is one of the most comprehensive reflections of a company's ESG activity. ESG ratings are available for more than 7,000 companies worldwide and comprise an environmental, social and governance pillar. It should be noted that coverage of the Thomson Reuters ESG database has evolved over time with the constituents of ever more stock-market indices being included, irrespective of their CSR communication strategy. The data is therefore much less affected by selection bias as compared to other providers of ESG ratings (Desender and Epure, 2015).

Based on more than 400 measures collected annually from companies' public disclosures, the environmental component considers issues such as resource use, emissions, and innovation, the social component focuses on the workforce, human rights, community and product responsibility while the governance component is concerned with management issues, shareholder relations and CSR strategy. As percentile rank scores, all environmental and social categories are benchmarked against Thomson Reuters Business Classifications Industry Group, while the governance categories are benchmarked against the respective Country Group (Thomson Reuters, 2019). Our main

analyses employ the comprehensive ESG score per firm as main explanatory variable, but we also consider the individual pillars' scores in additional analyses.

With regard to the distribution of ESG scores in our sample, we find the average ESG total score to be slightly lower for the U.S. sample (at 50.8) than for the European sample (56.7). This is also mirrored in the scores for the individual components: The mean scores are higher for the European sample with respect to the environmental (61.1 vs. 47.8) and the social pillar (59.1 vs. 52.1). Only the governance pillar takes approximately the same average score value in the two geographies.

2.2.3 Control variables

With regard to control variables, we follow the earlier empirical literature and employ standard firm characteristics for the analyses on the firm level (Capon et al., 1990; Brailsdorf et al., 2002; Tittmann and Wessels, 1988). These characteristics include firm *Leverage* (proxied as the ratio of total assets to total liabilites), firm *Size* (proxied as the natural logarithm of total assets), firm *Profitability* (proxied by operating income divided by total assets), *Growth* perspectives (proxied as the growth rate of total sales) as well as firm *Efficiency* (proxied by total revenues divided by total assets). When investigating the relationship between ESG and firm risk, we add risk-specific control variables following Hoepner, Oikonomou, Sautner, Starks, and Zhou (2016) such as the *Dividend Yield*.

We follow Monti, Pattitoni, Petracci, and Randl (2018) and winsorize the control variables at 1% in order to limit the influence of outliers. As can be seen from Table 4, the distribution of control variables in is very similar in the U.S. and the European sample. The only difference concerns the dividend yield, which is on average higher for European than for U.S. firms.

Table 4: Descriptive statistics

	U.S.			EU		
	Firm-year obs.	Mean	Std. dev.	Firm-year obs.	Mean	Std. dev.
Risk measures and firm value						
Sigma	10054	2.05191	1.158586	11846	2.047147	1.030153
IdiosyncSigma	10054	0.8790474	0.6244586	11846	1.074047	0.7685565
VaR	10042	3.207559	1.835301	11840	3.224098	1.628767
CVaR	10042	4.549415	2.593998	11840	4.530653	2.348906
LPM (0,2)	10054	2.014898	1.08571	11845	2.026559	1.012953
LPM (0,3)	10054	2.605577	1.480867	11845	2.601389	1.422893
CDS1Y spread	9883	12.43814	35.96619	10445	11.69023	18.96858
CDS5Y spread	9883	25.16677	35.52201	10445	17.50044	15.01912
DTD	9881	6.376737	3.413092	10546	5.475579	3.239699
Credit rating	7231	13.85797	2.77509	4504	14.67651	2.82252
Tobin's Q	8019	2.101022	1.359688	9344	1.778112	1.287574
ESG variables						
ESG score	10324	50.78279	16.75922	11971	56.72254	16.25569
Environmental pillar score	7524	47.80097	22.21441	9511	61.13985	21.28115
Social pillar score	7524	52.14256	19.53416	9511	59.12456	20.90271
Governance pillar score	7524	50.90215	21.31767	9511	50.68008	20.5814
Control variables						
Leverage	10223	0.6084854	0.2174105	11927	0.6130684	0.2201798
Growth	10194	0.0874486	0.2101158	11884	0.0793336	0.245467
Profitability	10221	0.0915869	0.0836727	11911	0.0794521	0.0781677
Efficiency	10224	0.778956	0.6802555	11927	0.7519308	0.6042375
Size	10224	16.03221	1.438818	11927	16.02434	2.080782
Dividend yield	10066	1.697217	1.812576	11846	2.779078	2.38761

3 Empirical analysis

The question whether socially responsible investment delivers excess returns will in the following be studied via employment of a Carhart (1997) four factor estimation model. This allows to consider both the abnormal return from a long-short portfolio, i.e. a portfolio that is long in stocks of firms with the highest ESG scores and short in those with the lowest, and to examine the sensitivity of portfolio returns towards ESG scores more generally. Afterwards, we will try to relate these portfolio results with an examination of the association between ESG activity and risk on the corporate level. The latter analyses will be based on dynamic panel estimations to be described below.

3.1 Socially responsible investment returns

The analysis of differences in stock returns has a long history in financial research. Fama and French (1993) identify three main risk factors (market, size and value) that drive stock returns. Carhart (1997) later introduced momentum as a fourth factor. In order to investigate the impact that ESG-related risks may have on stock returns, we follow their methodologies and control for the respective market, size, value and momentum factors. Similar to Gompers, Ishii, and Metrick (2003), who study the impact of governance-based risks on stock returns, we build equally-weighted portfolios of firms with varying ESG scores, separately for the U.S. and the Europe firm sample. More precisely, we rank the companies in the U.S. respectively European sample according to their ESG scores in every year and dissect each sample into quintiles, Q1 (lowest ESG ratings) to Q5 (highest ESG ratings). The corresponding portfolios are re-allocated according to the companies' ESG scores in each year. We then run the following regression equation for each quintile portfolio using monthly portfolio returns:

$$R_{it} - r_{ft} = \alpha_i + \beta_{1i} * RMRF_t + \beta_{2i} SMB_t + \beta_{3i} HML_t + \beta_{4i} Mom_t + \epsilon_{it} \tag{1}$$

R_{it} denotes the monthly portfolio return of the respective quintile portfolio. r_{ft} is the monthly risk-free rate and $RMRF$ represents the CAPM or market factor, where the risk-free rate is subtracted from the market return. SMB_t, HML_t and Mom_t represent the size, book-to-market and momentum factors taken from Kenneth French's data. The regression intercept α_i is our variable of interest, as it can be interpreted as the abnormal return due to ESG activity. Equation (1) is estimated for each quintile individually.

In addition to estimating alphas for each of these ESG quintile portfolios, we also construct a difference portfolio out of the most ESG-active companies and the most ESG-inactive companies. This portfolio amounts to a long position in the highest ESG quintile (Q5) and a short position in the lowest ESG quintile (Q1). It is again re-allocated according to the companies' ESG levels every year. In this model, R_t denotes the return difference of the high ESG-rated portfolio and the low ESG-rated portfolio. The intercept alpha in the regression can then be interpreted as the abnormal return of investing in a portfolio of high ESG-rated companies and going short in a portfolio with low ESG-rated companies:

$$R_t = \alpha + \beta_1 * RMRF_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 Mom_t + \epsilon_t \tag{2}$$

Tables 5 and 6 present the portfolio performance results for the U.S. and European sample, respectively. For the U.S. case, we find that investing into the most ESG-active companies, i.e. the top 20 percent, yields no significant abnormal excess return. Investing into the four quintiles

of firms with lower ESG scores, in contrast, delivers a significantly positive α. Interestingly, the portfolio of firms with the lowest ESG ratings yields the strongest excess return. As a consequence, we see that the difference portfolio that is long in the 20% most ESG-active firms and short in the 20% most ESG-inactive firms yields a highly significant negative alpha. More precisely, investing into a long-short portfolio based on companies' ESG activity delivers a negative alpha of -27.8 basis points per month for the U.S. sample.

Table 5: Four-factor model, U.S. sample

This table presents the four-factor regressions of equally-weighted monthly returns from firm portfolios sorted by their respective ESG score in the U.S. Subdivided into quintiles, Q5 represents the companies with the highest ESG scores (top 20%) while Q1 comprises the companies with the lowest ESG scores (lowest 20%). Portfolios are reallocated annually. The difference portfolio represents a portfolio that buys Q5 companies and sells short Q1 companies. Coefficients are estimated using a standard OLS regression. Explanatory variables are *RMRF*, *SMB*, *HML* and *Mom*. The effect of the intercept (α) shows the excess return of the respective portfolio. Standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

	α	RMRF	SMB	HML	Mom	Obs.	Adjust. R^2
Difference PF	-0.278***	-0.0222	-0.290***	0.0515	0.0335	180	0.227
(Q5-Q1)	(0.0967)	(0.0274)	(0.0444)	(0.0418)	(0.0313)		
Q5	0.0803	1.042***	0.0592**	0.0752***	-0.116***	180	0.972
	(0.0571)	(0.0162)	(0.0263)	(0.0247)	(0.0185)		
Q4	0.211**	1.091***	0.251***	0.122***	-0.215***	180	0.928
	(0.106)	(0.0301)	(0.0489)	(0.0460)	(0.0344)		
Q3	0.250***	1.091***	0.349***	0.101***	-0.188***	180	0.952
	(0.0870)	(0.0246)	(0.0400)	(0.0376)	(0.0281)		
Q2	0.289***	1.108***	0.409***	0.0439	-0.169***	180	0.947
	(0.0927)	(0.0262)	(0.0426)	(0.0401)	(0.0300)		
Q1	0.359***	1.064***	0.349***	0.0237	-0.150***	180	0.934
	(0.0975)	(0.0276)	(0.0448)	(0.0422)	(0.0315)		

The results for the European sample are very similar. Here, the monthly abnormal return from the long-short portfolio is even more strongly negative at -30.5 basis points. Again, this result is driven by the particularly strong positive excess return from the portfolios with low ESG scores. These portfolios' excess returns are even larger than for the U.S. sample.

Table 6: Four-factor model, European sample

This table presents the four-factor regressions of equally-weighted monthly returns for firm portfolios sorted by their respective ESG score in Europe. Subdivided into quintiles, Q5 represents the companies with the highest ESG scores (top 20%) while Q1 comprises the companies with the lowest ESG scores (lowest 20%). Portfolios are reallocated annually. The difference portfolio represents a portfolio that buys Q5 companies and sells short Q1 companies. Coefficients are estimated using a standard OLS regression. Explanatory variables are *RMRF*, *SMB*, *HML* and *Mom*. The effect of the intercept (α) shows the excess return of the respective portfolio. Standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

	α	RMRF	SMB	HML	Mom	Obs.	Adjust. R^2
Difference PF	-0.305***	-0.0252	-0.649***	0.0494	0.0516*	180	0.461
(Q5-Q1)	(0.101)	(0.0220)	(0.0527)	(0.0543)	(0.0294)		
Q5	0.200	0.675***	-0.0959	0.195**	-0.171***	180	0.787
	(0.169)	(0.0367)	(0.0879)	(0.0906)	(0.0490)		
Q4	0.339**	0.707***	0.149*	0.177*	-0.235***	180	0.804
	(0.171)	(0.0371)	(0.0890)	(0.0917)	(0.0496)		
Q3	0.341*	0.728***	0.393***	0.0623	-0.224***	180	0.779
	(0.183)	(0.0397)	(0.0953)	(0.0982)	(0.0531)		
Q2	0.567***	0.741***	0.473***	0.0684	-0.199***	180	0.786
	(0.181)	(0.0393)	(0.0943)	(0.0972)	(0.0526)		
Q1	0.505***	0.700***	0.553***	0.146	-0.222***	180	0.786
	(0.180)	(0.0390)	(0.0936)	(0.0965)	(0.0522)		

According to these portfolio-level results, firms with lower ESG activity offer a higher investment return than firms with stronger ESG activity, both in the U.S. and in Europe. Interpreted as a compensation for risk, these higher returns indicate a higher riskiness of firms with lower corporate social responsibility assessments. In order to test this indication, however, we need to examine the relation between ESG activity and risk on the corporate level. In the following, we will therefore conduct firm level analyses that consider both standard risk measures and proxies for downside risk as dependent variables. The latter are particularly suitable to capture extreme risks that corporate social responsibility might help to insure against.

3.2 ESG effects on firm risk

Our main firm-level analyses examine the effect of ESG activity on firm risk. Even though the relation between corporate social responsibility and risk may be slightly less prone to endogeneity

problems than the relation between CSR and firm value, we nevertheless cannot exclude that biases would result from simple panel regressions. It may be conceivable, for instance, that higher riskiness induces firms to engage more strongly in sustainability policies to protect themselves against adverse developments so that simultaneity issues introduce endogeneity with the corresponding results for the robustness of the estimation. In order to deal with these concerns, we resort to dynamic panel regressions that are estimated with a system GMM approach following Arellano and Bover (1995) and Blundell and Bond (1998). As the lagged dependent variable is included as an additional regressor in these models, both autoregressive memory in the risk measures and simultaneity problems in the ESG-risk relationship are considered, so that the reliability of the inference is enhanced (Roberts and Whited, 2013). Furthermore, robust standard errors introduced by Windmeijer (2005) are employed in the estimation. The general model can be illustrated as follows:

$$y_{it} = \beta_1 y_{it-1} + \beta_2 ESG_{it} + \beta_3 x_{it} + \upsilon_i + \varphi_t + \epsilon_t \tag{3}$$

Here, y_{it} represents the respective dependent variable on which to evaluate the impact of ESG activity. $y_{i,t-1}$ is the corresponding variable lagged by one period. $ESG_{i,t}$ represents the firm-specific and time-dependent ESG score. The coefficient of interest is β_2, as it measures the impact of ESG on firm risk. $x_{i,t}$ is a vector of control variables. υ_i and φ_t are time-constant firm effects and firm-constant time effects that are unobservable. ϵ_t denotes the error term in the regression. We report two-step estimation results with a heteroscedasticity weighting matrix. Level variables are instrumented with lagged first-differenced terms in this approach.

Table 7 reports the results from the dynamic panel regression where different equity-based firm risk measures are employed as dependent variables. As can be seen, the ESG score reduces firm risk, both for U.S. firms and for European firms. For the U.S. sample, all risk measures are significantly reduced by an increase in firms' ESG activity apart from the idiosyncratic risk. A similar result is obtained also for the European sample, but there is also no significant effect of the ESG score on LPM(0,3). In general, however, we see that an increasing ESG score leads to a significant reduction in both realized stock volatility and in tail risks such as value at risk or expected shortfall. The size of the risk-reducing effect is much stronger for U.S. firms than for European firms. For instance, an increase in the ESG score by one point leads to an average decrease in value at risk by 3.3% for a U.S. firm and by 1.1% for a European firm.

Table 7: ESG effects on equity risk - Total ESG score

This table presents the dynamic panel estimation of the effects of the *ESG score* on companies' equity risk in the U.S. and the European sample. Coefficients are estimated using the two-step Arellano and Bover (1995) / Blundell and Bond (1998) GMM system estimator. The dependent variables are the stock volatility σ, idiosyncratic risk σ_ϵ, *VaR*, *CVaR* as well as the second and third order lower partial moments (*LPM(0,2)* and *LPM(0,3)*). Lagged DV denotes the lagged value of the respective dependent variable. Standard errors are robust and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

	U.S.						Europe					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
	σ	σ_ϵ	VaR	CVaR	LPM (0,2)	LPM (0,3)	σ	σ_ϵ	VaR	CVaR	LPM (0,2)	LPM (0,3)
Lagged DV	0.553***	0.441***	0.527***	0.467***	0.513***	0.446***	0.459***	0.373***	0.415***	0.369***	0.412***	0.343***
	(0.0213)	(0.0329)	(0.0200)	(0.0215)	(0.0214)	(0.0234)	(0.0206)	(0.0312)	(0.0209)	(0.0207)	(0.0210)	(0.0225)
ESG score	-0.0200***	-0.00133	-0.0331***	-0.0467***	-0.0201***	-0.0229***	-0.00635***	-0.00156	-0.0110***	-0.0127**	-0.00503**	-0.00486
	(0.00357)	(0.00130)	(0.00579)	(0.00860)	(0.00351)	(0.00478)	(0.00239)	(0.00136)	(0.00400)	(0.00573)	(0.00246)	(0.00355)
Leverage	3.068***	0.524***	4.586***	7.123***	2.996***	3.491***	2.378***	1.095***	3.831***	4.500***	1.985***	2.227***
	(0.417)	(0.151)	(0.679)	(0.988)	(0.406)	(0.522)	(0.352)	(0.229)	(0.588)	(0.816)	(0.336)	(0.455)
Growth	-0.141	-0.135**	-0.00337	0.0421	-0.0686	-0.104	-0.0148	-0.117**	0.186	0.217	0.0720	0.0305
	(0.152)	(0.0596)	(0.229)	(0.360)	(0.147)	(0.211)	(0.0777)	(0.0523)	(0.135)	(0.206)	(0.0802)	(0.119)
Profitability	-1.743**	-0.587**	-3.267**	-3.113	-1.449*	-2.088*	-1.544**	-1.203***	-1.317	-2.548*	-1.464**	-1.528*
	(0.822)	(0.296)	(1.299)	(1.960)	(0.802)	(1.108)	(0.612)	(0.408)	(0.956)	(1.400)	(0.593)	(0.829)
Size	-0.211**	-0.0490	-0.233*	-0.346	-0.143	-0.206*	-0.0566	0.0474	-0.0644	-0.0871	-0.0385	0.0861
	(0.0878)	(0.0364)	(0.142)	(0.220)	(0.0908)	(0.124)	(0.0686)	(0.0501)	(0.0953)	(0.145)	(0.0662)	(0.104)
Dividend yield	0.437***	0.0325	0.748***	1.125***	0.414***	0.504***	0.215***	0.0624***	0.410***	0.559***	0.227***	0.283***
	(0.0535)	(0.0207)	(0.0827)	(0.125)	(0.0477)	(0.0673)	(0.0125)	(0.00804)	(0.0219)	(0.0299)	(0.0123)	(0.0171)
Constant	2.767**	0.960*	2.979	4.054	1.790	2.965	0.364	-0.821	-0.00824	0.646	0.278	-1.536
	(1.341)	(0.554)	(2.114)	(3.297)	(1.367)	(1.887)	(1.002)	(0.810)	(1.412)	(2.189)	(0.990)	(1.568)
Firm-year Obs.	8,664	8,664	8,654	8,654	8,664	8,664	10,528	10,528	10,522	10,522	10,526	10,526
Obs.	1,072	1,072	1,071	1,071	1,072	1,072	1,109	1,109	1,109	1,109	1,109	1,109
χ^2	956.6	244.0	885.6	678.3	814.2	551.4	923.2	241.5	836.9	701.5	824.0	608.1

Our findings hence support and enhance the results by Monti, Pattitoni, Petracci, and Randl (2018). They consider the impact of environmental and social components of corporate social responsibility on equity risks and find a clear-cut decreasing effect on standard risk measures but not on VaR. Moreover, they do not consider firms from different geographical areas, respectively the corresponding jurisdictions, in isolation as we do.

So far, we have seen that firms' ESG activities in total help to reduce the risks perceived on equity capital markets. As the total ESG score is composed of three different pillars, however, it would be interesting to see whether the ESG-risk relation is driven by a particular ESG component and whether the importance of the individual pillars is different for the U.S. sample as compared to the European sample. In order to answer these questions, we rerun the earlier analysis and replace the total ESG score with the individual scores for the environmental, the social and the governance pillar. As these pillars should be seen as orthogonal, reflecting mutually exclusive subcategorical aspects of the total ESG score, we use them as explanatory variables simultaneously in one regression. For reasons of brevity, the following table reports only the coefficients on the different ESG components' scores, even though the analyses contain the same set of control variables as before.[3]

As can be seen from Table 8, the overall negative effect of ESG activity on firm risk in the U.S. sample is driven in total by the environmental pillar. For the European sample, in contrast, the overall negative effect on risk results solely from the social pillar. The fact that there is no overlap in the role that the different ESG components play in the U.S. sample and the European sample underlines the importance to account for these geographical differences when studying the effect of corporate social responsibility. Obviously, environmental concerns appear to be much more important for U.S. companies whereas social issues play a much stronger role for European firms. As the distribution of firms over industries is quite homogeneous in the two samples (see Table 3), this observation seems to be driven by varying concerns of equity market investors.

[3]It should be noted that the number of observations in these estimations is slightly lower as Thomson Reuters does not break down the total ESG rating into the three ESG pillars for all companies.

Table 8: ESG effects on equity risk - Individual ESG pillars

This table presents the dynamic panel estimation of the effects of the ESG pillar scores on companies' equity risk in both the U.S. and Europe. Coefficients are estimated using the two-step Arellano and Bover (1995) / Blundell and Bond (1998) GMM system estimator. The dependent variables are the stock volatility σ, idiosyncratic risk σ_ϵ, *VaR*, *CVaR* as well as the second and third order lower partial moments (*LPM(0,2)* and *LPM(0,3)*). Control variables are the lagged dependent variable, Leverage, Growth, Profitability, Size and Dividend yield, but are not reported for the sake of brevity. Standard errors are robust and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

	U.S.					
	(1)	(2)	(3)	(4)	(5)	(6)
	σ	σ_ϵ	VaR	CVaR	LPM (0,2)	LPM (0,3)
Env. pillar	-0.0186***	-0.00195	-0.0308***	-0.0440***	-0.0184***	-0.0195***
	(0.00375)	(0.00129)	(0.00622)	(0.00896)	(0.00362)	(0.00483)
Soc. pillar	0.00260	0.000508	0.00852	0.00942	0.00315	0.00205
	(0.00316)	(0.00111)	(0.00535)	(0.00782)	(0.00320)	(0.00442)
Gov. pillar	-0.000857	0.00125	-0.00458	-0.00449	-0.00144	-0.00249
	(0.00231)	(0.000834)	(0.00375)	(0.00556)	(0.00224)	(0.00309)
Firm-year Obs.	6,261	6,261	6,251	6,251	6,261	6,261
Obs.	832	832	831	831	832	832
χ^2	793.4	205.2	742.3	577.0	705.9	500.1

	Europe					
	(1)	(2)	(3)	(4)	(5)	(6)
	σ	σ_ϵ	VaR	CVaR	LPM (0,2)	LPM (0,3)
Env. pillar	0.00232	7.65e-05	0.00211	0.00184	0.00125	0.00161
	(0.00211)	(0.00123)	(0.00368)	(0.00505)	(0.00214)	(0.00300)
Soc. pillar	-0.00601***	-0.00216**	-0.0100***	-0.00921*	-0.00383**	-0.00309
	(0.00198)	(0.00102)	(0.00319)	(0.00473)	(0.00194)	(0.00281)
Gov. pillar	-0.000564	0.00106	0.000484	-0.000190	-0.000166	-0.00125
	(0.00162)	(0.000937)	(0.00257)	(0.00372)	(0.00158)	(0.00224)
Firm-year Obs.	8,374	8,374	8,368	8,368	8,372	8,372
Obs.	882	882	882	882	882	882
χ^2	727.8	203.1	630.9	531.4	649.0	478.2

3.3 The role of volatility

Our measures of firm risk are based on the perception of investors regarding the equity-market returns of companies. As perceptions tend to be influenced by the surrounding market environment, the question arises whether there are further market-based moderating factors for the ESG-risk

relation that we have derived so far. Indeed, Lins, Servaes, and Tamayo (2017) who take CSR activity as a proxy for firms' social capital show that the positive effect of social capital on stock returns is particularly high during the financial crisis. Quite similarly, Monti, Pattitoni, Petracci, and Randl (2018) demonstrate that the link between CSR activity and firm risk has been particularly strong in the time period after the financial crisis, while they do not find any association before the crisis. Similarly, Diemont, Moore, and Soppe (2015) hint at the role that extreme market conditions play for the relation between individual items of corporate social responsibility and tail risks.

In order to assess whether the surrounding market volatility influences the ESG-risk relation in our dataset, we approximate the market volatility by the annual volatility of the respective equity stock index, i.e. the S&P 500 for the U.S. sample and the Euro Stoxx 600 for the European sample. As we are interested in the moderating role of volatility, we do not only consider this variable as another explanatory factor in our regressions but also include an interaction term with the ESG score. If volatility does play the stipulated moderating role, the interaction term should show a significant effect on firm risk. Table 9 presents the results.

Table 9: ESG effects on equity risk - The moderating role of market volatility

This table presents the dynamic panel estimation of the effects of *ESG score* as well as *Index Volatility* of the S&P500 and Stoxx Europe 600 on companies' equity risk in both the U.S. and Europe. Coefficients are estimated using the two-step Arellano and Bover (1995) / Blundell and Bond (1998) GMM system estimator. The dependent variables are the stock volatility σ, idiosyncratic risk σ_ϵ, *VaR*, *CVaR* as well as the second and third order lower partial moments (*LPM(0,2)* and *LPM(0,3)*). Lagged DV denotes the lagged value of the respective dependent variable. Standard errors are robust and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

	U.S.						Europe					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
	σ	σ_ϵ	VaR	CVaR	LPM (0,2)	LPM (0,3)	σ	σ_ϵ	VaR	CVaR	LPM (0,2)	LPM (0,3)
Lagged DV	0.213***	0.408***	0.156***	0.122***	0.156***	0.137***	0.273***	0.353***	0.191***	0.178***	0.221***	0.196***
	(0.0140)	(0.0329)	(0.0127)	(0.0140)	(0.0135)	(0.0157)	(0.0153)	(0.0308)	(0.0148)	(0.0154)	(0.0159)	(0.0167)
ESG score	0.00146	5.98e-05	0.00406	0.0110**	0.00265	0.00310	-0.00961***	0.00225	-0.0137***	-0.0144**	-0.00676***	-0.00568
	(0.00234)	(0.00165)	(0.00361)	(0.00562)	(0.00232)	(0.00359)	(0.00257)	(0.00175)	(0.00420)	(0.00634)	(0.00261)	(0.00367)
Index Vol.	1.647***	0.185***	2.818***	4.001***	1.641***	2.053***	0.866***	0.405***	1.745***	2.343***	0.927***	1.202***
	(0.105)	(0.0668)	(0.176)	(0.254)	(0.101)	(0.146)	(0.114)	(0.0794)	(0.199)	(0.311)	(0.116)	(0.167)
ESG*Index Vol.	-0.00813***	-0.00168	-0.0125***	-0.0201***	-0.00831***	-0.0105***	0.00193	-0.00390***	0.000226	0.000307	0.000773	0.000326
	(0.00191)	(0.00118)	(0.00321)	(0.00469)	(0.00187)	(0.00271)	(0.00184)	(0.00120)	(0.00322)	(0.00499)	(0.00186)	(0.00268)
Leverage	1.403***	0.497***	1.684***	3.099***	1.265***	1.667***	1.421***	0.847***	1.964***	2.273***	1.073***	1.157***
	(0.203)	(0.148)	(0.297)	(0.494)	(0.194)	(0.301)	(0.238)	(0.222)	(0.372)	(0.533)	(0.235)	(0.327)
Growth	-0.160*	-0.0898	-0.0705	-0.0536	-0.0685	-0.0749	-0.0799	-0.107**	0.0539	0.0609	-0.00521	-0.0477
	(0.0833)	(0.0595)	(0.123)	(0.194)	(0.0798)	(0.123)	(0.0588)	(0.0533)	(0.0931)	(0.145)	(0.0579)	(0.0918)
Profitability	-1.387***	-0.549*	-1.989***	-1.889*	-1.083***	-1.190*	-1.133***	-1.288***	-0.690	-2.329**	-1.186***	-1.512**
	(0.407)	(0.285)	(0.600)	(1.006)	(0.404)	(0.613)	(0.412)	(0.423)	(0.602)	(0.957)	(0.416)	(0.616)
Size	0.0390	-0.0268	0.0944	0.150	0.0617	0.0691	0.0474	0.0334	0.237***	0.203	0.0800	0.0968
	(0.0490)	(0.0395)	(0.0679)	(0.119)	(0.0469)	(0.0721)	(0.0516)	(0.0479)	(0.0728)	(0.124)	(0.0562)	(0.0866)
Dividend yield	-0.0561*	0.0189	-0.0529	-0.00788	-0.0321	-0.0198	0.0529***	0.0349***	0.110***	0.188***	0.0746***	0.113***
	(0.0319)	(0.0225)	(0.0435)	(0.0688)	(0.0238)	(0.0392)	(0.00951)	(0.00911)	(0.0142)	(0.0211)	(0.00861)	(0.0133)
Constant	-1.083	0.493	-2.170**	-4.019**	-1.397*	-1.592	-0.784	-0.758	-3.906***	-3.179*	-1.222	-1.463
	(0.774)	(0.611)	(1.058)	(1.849)	(0.728)	(1.112)	(0.783)	(0.784)	(1.150)	(1.890)	(0.857)	(1.315)
Firm-year Obs.	8,664	8,664	8,654	8,654	8,664	8,664	10,528	10,528	10,522	10,522	10,526	10,526
Obs.	1,072	1,072	1,071	1,071	1,072	1,072	1,109	1,109	1,109	1,109	1,109	1,109
χ^2	1801	225.7	1914	1648	1661	1404	1933	494.0	1997	1791	1891	1581

As can be seen, the market volatility itself has a highly significant positive effect on firms' equity risk, both for the U.S. and the European sample. Interestingly, while the ESG score keeps its negative impact on risk in the European case, it loses significance for the U.S. sample. Instead, the interaction of the ESG score with the market volatility shows a highly significant negative coefficient for U.S. firms. Obviously, therefore, the risk-reducing effect of ESG activities for U.S. firms is dependent on the surrounding market volatility. The higher the volatility is on the equity market, the more strongly do investors perceive the risk-reducing impact of corporate ESG activities. If the market is fully stable, in contrast, investors do not appear to see U.S. firms' ESG engagement as an effective tool to reduce firm risk, as neither standard risk measures nor proxies for tail risks are decreased. For European firms, in contrast, the general market volatility does not moderate the perception of ESG activities as insurance-like instruments: Here, the interaction term of the ESG score and the market volatility does not show a significant effect on firm risk, so that the risk-reducing effect of corporate social responsibility remains independent of the surrounding market volatility.

It should be noted that our results are confirmed if, instead of employing the market volatility as another explanatory variable to be interacted with the ESG score, we subdivide the sample into different time periods around the financial crisis. Particularly in the period 2011 to 2017, i.e. after the financial crisis, where equity capital markets have been extremely stable, we find no risk-reducing effects of ESG activities for the U.S. sample, while the results are relatively stable in the European firm sample.[4] Investors hence seem to perceive the stabilizing impact of corporate social responsibility for U.S. companies particularly in times when markets are prone to strong volatility.

4 Further results

In order to enhance the validity of our results, we conduct several additional tests. First, we examine a second set of proxies for firm risk to test whether ESG activities also reduce these risk measures. As our results regarding the risk effects of corporate social responsibility portray a lack of ESG engagement as a risk driver that should increase firms' cost of capital and hence reduce firm value, we try to assess in a second step the value-increasing effect of strong ESG activities. As ESG provisions may take some time before their firm-value effects show, we need to account for time lags in analyzing the ESG-value relation. This differentiates these analyses from the examination of the ESG-risk relation.

[4]The corresponding results are available from the authors upon request.

4.1 ESG effects on credit risk

If ESG activity truly acts as an insurance against extreme events, then a default of the firm should also become less likely. We therefore test whether corporate social responsibility also has an effect on measures of default risk. In this respect, we analyze one-year and five-year CDS spreads, respectively, and distance-to-default as dependent variables in our dynamic panel data framework. Moreover, we investigate the ESG effect on S&P's credit ratings to allow also for the perspective of a credit rating agency. As agency ratings are based on a through-the-cycle rating methodology that filters out the effect of short-term business movements on default risk, this latter proxy of default risk may indeed differ from the market-based measures of credit risk. Results are derived again from a system GMM estimation in a dynamic panel approach.

The estimation results illustrated in Table 10 show that ESG efforts significantly reduce firm's market-based default risks in the U.S. sample. This shows particularly strongly for the short-term proxy of default risk, the one-year CDS spread. As the distance-to-default also increases significantly with increasing ESG activity, this may also be interpreted as higher corporate social responsibility reducing credit risk. Interestingly, S&P credit ratings are unaffected by ESG efforts. For the European sample, in contrast, we observe no significant effect at all of ESG activities on default risk. In essence, these additional results hence confirm our earlier results for the U.S. sample: Stronger ESG activity reduces market-based measures of risk, taken both from equity and debt markets. For European firms, though, the risk-reducing impact of corporate social responsibility appears to be perceived only on the equity market.

Table 10: ESG effects on credit risk

This table presents the dynamic panel estimation of the effects of *ESG score* on companies' credit risk in both the U.S. and Europe. Coefficients are estimated using the two-step Arellano and Bover (1995)/Blundell and Bond (1998) GMM system estimator. The dependent variables are the five-year *CDS Spread*, the *DTD* and the *Credit Rating* of the companies' debt - rated by the rating agency Standard & Poor's. Lagged DV denotes the lagged value of the respective dependent variable. Standard errors are robust and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

	U.S.				Europe			
	(1) CDS1Y	(2) CDS5Y	(3) DTD	(4) Credit Rating	(1) CDS1Y	(2) CDS5Y	(3) DTD	(4) Credit Rating
Lagged DV	0.284***	0.250***	0.397***	0.884***	0.175***	0.350***	0.355***	0.870***
	(0.0290)	(0.0311)	(0.0211)	(0.0364)	(0.0225)	(0.0274)	(0.0218)	(0.0423)
ESG score	-0.205***	-0.119*	0.0195**	0.000564	-0.0528	-0.0475	0.0110	0.000216
	(0.0682)	(0.0674)	(0.00797)	(0.00169)	(0.0416)	(0.0331)	(0.00718)	(0.00215)
Leverage	70.11***	37.13***	-6.570***	-1.313***	53.93***	37.91***	-8.370***	-2.326***
	(13.10)	(9.355)	(0.902)	(0.326)	(8.795)	(6.316)	(1.072)	(0.472)
Growth	12.98***	8.933**	-1.019***	0.159*	7.372***	6.288***	-1.098***	0.139*
	(4.127)	(4.296)	(0.285)	(0.0904)	(2.038)	(1.541)	(0.281)	(0.0782)
Profitability	-68.58***	-100.4***	3.294*	4.445***	-9.309	-23.16**	3.159*	4.143***
	(22.50)	(19.87)	(1.875)	(0.653)	(15.14)	(10.50)	(1.752)	(0.910)
Size	0.522	-1.179	0.682***	0.155**	2.185	2.775**	0.458***	-0.139
	(3.569)	(3.174)	(0.216)	(0.0623)	(2.102)	(1.318)	(0.173)	(0.0879)
Constant	-27.26	27.16	-4.355	-0.482	-55.85*	-52.51***	0.424	5.472***
	(56.06)	(48.63)	(3.143)	(0.962)	(31.74)	(20.12)	(2.529)	(1.999)
Firm-year obs.	8,497	8,497	8,496	6,245	9,310	9,310	9,388	3,998
Obs.	1,056	1,056	1,055	753	940	940	951	434
χ^2	198.0	129.4	481.3	887.9	146.3	311.6	480.7	1158

4.2 ESG effects on firm value

So far, we have derived evidence that stronger corporate social responsibility reduces the risk perceived on financial markets. Stated differently, firms with low ESG ratings are seen as exhibiting particularly high risks. Corresponding with these results from firm-level analyses, we have also observed that investing into a portfolio of firms with low ESG scores yields particularly high returns, which may be interpreted as the offering of high risk premia. So far, however, both the portfolio and firm-level analyses have only examined the contemporaneous relation between corporate social responsibility as measured by Thomson Reuter's ESG score and investment returns, respectively risk perceptions on financial markets. The question still remains, however, whether and when the lower risk of ESG-active companies translates into a tangible positive effect on firm value. In order to answer this final question, we therefore run a dynamic panel estimation on firm value where, in

addition to considering a contemporaneous relation, we lag the ESG score for one to four years. We follow Luo and Bhattacharya (2006) and Servaes and Tamayo (2013) and employ Tobin's Q as a proxy for firm value. Defined as the market value of a firm divided by its replacement costs, Tobin's Q represents a comprehensive measure of value created by management decisions or corporate policies.

Table 11 shows the results from dynamic panel regressions where we employ the ESG score in different formats: contemporaneously or lagged by one to four years. As can be seen, the ESG score significantly increases firm value irrespective of the time lag that we allow between the ESG score and the firm value measurement for the U.S. sample. The size of the coefficients is slightly higher for the lagged ESG scores as compared to the contemporaneous score, but all show a significantly positive effect. If we use all ESG scores, i.e. the contemporaneous as well as the four lagged versions (model (6)), in one regression, we see that the one- and four-year lagged scores seem to be most important. From this we may conclude that higher ESG activity of U.S. firms truly translates into higher firm value, where the effect is immediately noticeable but is nevertheless positively sustained also over the following years.

For European firms, we do not find a significant impact of the ESG score on Tobin's Q in the same year. However, the lagged ESG score impacts firm value positively, peaking statistically and economically with a two-year lag. Taken all lagged and the contemporaneous ESG score together (model (6)) the view changes a bit. Here, a significantly positive effects is observed both for the contemporaneous ESG activity and for the first two lagged ESG scores .

Table 11: Dynamic panel regressions of ESG score with lag structure on firm value

This table presents the dynamic panel estimation of the effects of the *ESG score* on firm value proxied as *Tobin's Q* in both the U.S. and Europe. The models 1 to 5 include different lagged ESG scores as explanatory variables, ranging from the ESG score in the same year (Model 1) to the lagged ESG score 4 years prior (Model 5). The sixth Model includes the same year's ESG score as well as all 4 lagged ESG scores. Coefficients are estimated using the two-step Arellano and Bover (1995) / Blundell and Bond (1998) GMM system estimator. Lagged DV denotes the lagged value of the respective dependent variable. Standard errors are robust and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

	U.S.						Europe					
	(1) Tobin's Q	(2) Tobin's Q	(3) Tobin's Q	(4) Tobin's Q	(5) Tobin's Q	(6) Tobin's Q	(1) Tobin's Q	(2) Tobin's Q	(3) Tobin's Q	(4) Tobin's Q	(5) Tobin's Q	(6) Tobin's Q
Lagged DV	0.494***	0.502***	0.543***	0.525***	0.547***	0.547***	0.528***	0.541***	0.538***	0.512***	0.509***	0.514***
	(0.0482)	(0.0485)	(0.0431)	(0.0490)	(0.0577)	(0.0589)	(0.0630)	(0.0624)	(0.0666)	(0.0693)	(0.0805)	(0.0822)
ESG score	0.00397**					0.00252	-0.000476					0.00400**
	(0.00166)					(0.00189)	(0.00144)					(0.00160)
ESG score 1Y		0.00721***				0.00338**		0.00373***				0.00254*
		(0.00160)				(0.00164)		(0.00139)				(0.00140)
ESG score 2Y			0.00692***			0.00201			0.00584***			0.00271**
			(0.00178)			(0.00190)			(0.00141)			(0.00126)
ESG score 3Y				0.00707***		0.00224				0.00301*		0.000893
				(0.00178)		(0.00159)				(0.00158)		(0.00134)
ESG score 4Y					0.00719***	0.00376**					0.00291*	0.00137
					(0.00180)	(0.00156)					(0.00151)	(0.00130)
Leverage	0.238	0.240	0.462**	0.430*	0.322	0.288	0.256	0.255	0.324	0.257	0.269	0.355
	(0.214)	(0.210)	(0.222)	(0.225)	(0.253)	(0.251)	(0.259)	(0.255)	(0.270)	(0.293)	(0.334)	(0.323)
Growth	-0.0153	-0.0156	-0.0986	-0.109	-0.151*	-0.126	-0.164**	-0.162**	-0.133*	-0.227***	-0.204**	-0.210**
	(0.0718)	(0.0712)	(0.0776)	(0.0818)	(0.0859)	(0.0887)	(0.0664)	(0.0659)	(0.0759)	(0.0809)	(0.0878)	(0.0896)
Profitability	0.875	0.855	0.952*	0.815	0.795	0.705	1.228**	1.304**	1.196**	1.190**	1.301**	1.458**
	(0.572)	(0.567)	(0.507)	(0.535)	(0.499)	(0.497)	(0.564)	(0.556)	(0.572)	(0.581)	(0.642)	(0.634)
Efficiency	-0.0979	-0.0928	-0.103	-0.0775	0.00771	0.00631	0.169*	0.165*	0.196*	0.262***	0.302***	0.300***
	(0.108)	(0.109)	(0.116)	(0.119)	(0.125)	(0.132)	(0.0962)	(0.0960)	(0.107)	(0.102)	(0.110)	(0.115)
Size	-0.288***	-0.317***	-0.294***	-0.190**	-0.127	-0.205**	-0.307***	-0.333***	-0.346***	-0.249***	-0.215**	-0.278***
	(0.0686)	(0.0680)	(0.0656)	(0.0741)	(0.0782)	(0.0901)	(0.0838)	(0.0843)	(0.0892)	(0.0856)	(0.0842)	(0.104)
Constant	5.164***	5.459***	4.906***	3.261***	2.214*	3.145**	5.256***	5.408***	5.448***	4.082***	3.512**	3.943**
	(1.110)	(1.105)	(1.067)	(1.202)	(1.272)	(1.439)	(1.370)	(1.381)	(1.471)	(1.391)	(1.384)	(1.636)
Firm-year obs.	6,926	6,926	6,089	5,379	4,739	4,719	8,318	8,318	7,469	6,689	5,948	5,905
Obs.	854	854	738	660	636	634	864	864	809	768	733	731
χ^2	248.9	259.6	309.0	205.8	133.4	146.7	319.2	319.8	248.1	198.6	121.6	134.8

5 Conclusion

Our paper considers the attractiveness of ESG investing in the U.S. and in Europe using data between 2003 and 2017. Based on analyses at the portfolio level and at the firm level, we find that corporate social responsibility shows insurance-like characteristics: Investing into a portfolio that is long in ESG-active firms and short in ESG-inactive firms delivers a highly significant negative abnormal return of between -28 and -31 basis points per month. Firms with low ESG scores offer a highly significant excess return, i.e. a risk premium over and above a potential premium for size, value and momentum-based risk.

This finding at the portfolio level is supported by firm-level results that show that higher ESG activity reduces the firm risk perceived on financial markets. We observe that both standard risk measures and proxies for downside risk decrease with increasing ESG ratings. While these results hold for both U.S. and European firms, the underlying drivers appear to be different: For U.S. firms, we see that the environmental component in ESG activity play the most important role for reducing risk, while for European firms it seems to be the social component.

As earlier research has shown that the beneficial conception of corporate social responsibility may be strongest in extreme market phases, we also test whether the insurance-linked perception of ESG activity is dependent on the overall volatility on the market. Indeed, we find this to be the case for U.S. firms: For them, the risk-reducing effect of ESG activity is strengthened by the general market volatility. In Europe, in contrast, this is not the case.

While our portfolio results show that a lack of corporate social responsibility is penalized by financial markets so that low ESG firms are required to offer higher returns to compensate for the higher risk, the question remains whether the lower risk of ESG-active firms eventually leads to higher firm value. In further firm-level analyses we find this indeed to be the case. More precisely, we see that the value-increasing effect of ESG activity stretches over several years for both U.S. and European firms.

Our analysis hence does not only deliver a robust answer to the question whether ESG-based investing may help to derive superior portfolio returns. We also show that corporate social responsibility has slightly different effects on U.S. as compared to European firms. While in both cases, CSR shows distinct insurance-like characteristics so that capital markets perceive firms with higher ESG activity as safer, the drivers of this risk-reducing effect are different. Moreover, the employment of an ESG-based risk factor for portfolio performance evaluation may deviate between a U.S. and a European portfolio as for the former the general market volatility needs to be considered. In the U.S. any ESG risk premium appears to gain importance in more volatile market phases. Irrespective of the surrounding market conditions, however, our study leads us to conclude that

corporate social responsibility not only allows to "do safe by doing good" but also to (eventually) "do well by being safe".

References

Albuquerque, R., Y. Koskinen, and C. Zhang (2018): "Corporate Social Responsibility and Firm Risk: Theory and Empirical Evidence," *Management Science*.

Arellano, M., and O. Bover (1995): "Another look at the instrumental variable estimation of error-components models," *Journal of Econometrics*, 68(1), 29–51.

Bawa, V. S. (1975): "Optimal rules for ordering uncertain prospects," *Journal of Financial Economics*, 2(1), 95–121.

Blundell, R., and S. Bond (1998): "Initial conditions and moment restrictions in dynamic panel data models," *Journal of Econometrics*, 87(1), 115–143.

Bottenberg, K., A. Tuschke, and M. Flickinger (2016): "Corporate Governance Between Shareholder and Stakeholder Orientation," *Journal of Management Inquiry*, 26(2), 165–180.

Brailsford, T. J., B. R. Oliver, and S. L. H. Pua (2002): "On the relation between ownership structure and capital structure," *Accounting and Finance*, 42(1), 1–26.

Capon, N., J. U. Farley, and S. Hoenig (1990): "Determinants of Financial Performance: A Meta-Analysis," *Management Science*, 36(10), 1143–1159.

Carhart, M. M. (1997): "On Persistence in Mutual Fund Performance," *The Journal of Finance*, 52(1), 57–82.

Cheng, B., I. Ioannou, and G. Serafeim (2013): "Corporate social responsibility and access to finance," *Strategic Management Journal*, 35(1), 1–23.

Chung, K. H., and S. W. Pruitt (1994): "A Simple Approximation of Tobins q," *Financial Management*, 23(3), 70.

CRI (2019): "Credit Research Initiative of the National University of Singapore," http://rmicri.org, Retrieved on 2-27-2019.

Desender, K., and M. Epure (2015): ""Corporate Governance and Corporate Social Performance: Boards, Ownership and Institutions"," *Academy of Management Proceedings*, 2015(1), 16433.

Dhaliwal, D., O. Z. Li, A. Tsang, and Y. G. Yang (2014): "Corporate social responsibility disclosure and the cost of equity capital: The roles of stakeholder orientation and financial transparency," *Journal of Accounting and Public Policy*, 33(4), 328–355.

Dhaliwal, D. S., O. Z. Li, A. Tsang, and Y. G. Yang (2011): "Voluntary Nonfinancial Disclosure and the Cost of Equity Capital: The Initiation of Corporate Social Responsibility Reporting," *The Accounting Review*, 86(1), 59–100.

Diemont, D., K. Moore, and A. Soppe (2015): "The Downside of Being Responsible: Corporate Social Responsibility and Tail Risk," *Journal of Business Ethics*, 137(2), 213–229.

Dorfleitner, G., G. Halbritter, and M. Nguyen (2015): "Measuring the level and risk of corporate responsibility – An empirical comparison of different ESG rating approaches," *Journal of Asset Management*, 16(7), 450–466.

Eccles, R. G., I. Ioannou, and G. Serafeim (2014): "The Impact of Corporate Sustainability on Organizational Processes and Performance," *Management Science*, 60(11), 2835–2857.

Edmans, A. (2011): "Does the stock market fully value intangibles? Employee satisfaction and equity prices," *Journal of Financial Economics*, 101(3), 621–640.

Fabozzi, F. J., K. Ma, and B. J. Oliphant (2008): "Sin Stock Returns," *The Journal of Portfolio Management*, 35(1), 82–94.

Fama, E. F., and K. R. French (1993): "Common risk factors in the returns on stocks and bonds," *Journal of Financial Economics*, 33(1), 3–56.

Fishburn, P. C. (1977): "Mean-Risk Analysis with Risk Associated with Below-Target Returns," *American Economic Review*, 67(2), 116–126.

Ghoul, S. E., O. Guedhami, C. C. Kwok, and D. R. Mishra (2011): "Does corporate social responsibility affect the cost of capital?," *Journal of Banking & Finance*, 35(9), 2388–2406.

Godfrey, P. (2005): "The relationship between corporate philanthropy and shareholder wealth: A risk management perspective," *Academy of Management Review*, 30(4), 777–798.

Godfrey, P. C., C. B. Merrill, and J. M. Hansen (2009): "The relationship between corporate social responsibility and shareholder value: an empirical test of the risk management hypothesis," *Strategic Management Journal*, 30(4), 425–445.

Gompers, P., J. Ishii, and A. Metrick (2003): "Corporate Governance and Equity Prices," *The Quarterly Journal of Economics*, 118(1), 107–156.

Hawn, O., and I. Ioannou (2016): "Mind the gap: The interplay between external and internal actions in the case of corporate social responsibility," *Strategic Management Journal*, 37(13), 2569–2588.

Hoepner, A. G. F., I. Oikonomou, Z. Sautner, L. T. Starks, and X. Zhou (2016): "ESG Shareholder Engagement and Downside Risk," *SSRN Electronic Journal*.

Hong, H., and M. Kacperczyk (2009): "The price of sin: The effects of social norms on markets," *Journal of Financial Economics*, 93(1), 15–36.

Ioannou, I., and G. Serafeim (2012): "What drives corporate social performance? The role of nation-level institutions," *Journal of International Business Studies*, 43(9), 834–864.

Jagannathan, R., A. Ravikumar, and M. Sammon (2017): "Environmental, Social, and Governance Criteria: Why Investors are Paying Attention," NBER Working Paper 24063.

Jo, H., and H. Na (2012): "Does CSR Reduce Firm Risk? Evidence from Controversial Industry Sectors," *Journal of Business Ethics*, 110(4), 441–456.

Kempf, A., and P. Osthoff (2007): "The Effect of Socially Responsible Investing on Portfolio Performance," *European Financial Management*, 13(5), 908–922.

Kiff, J., M. Kisser, and L. Schumacher (2013): "Rating Through-the-Cycle: What does the Concept Imply for Rating Stability and Accuracy?," *IMF Working Papers*, 13(64), 1.

Klock, M. S., S. A. Mansi, and W. F. Maxwell (2005): "Does Corporate Governance Matter to Bondholders?," *Journal of Financial and Quantitative Analysis*, 40(04), 693.

Krüger, P. (2015): "Corporate goodness and shareholder wealth," *Journal of Financial Economics*, 115(2), 304–329.

Lehn, K., S. Patro, and M. Zhao (2007): "Governance indexes and valuation: Which causes which?," *Journal of Corporate Finance*, 13(5), 907–928.

Lins, K. V., H. Servaes, and A. Tamayo (2017): "Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis," *The Journal of Finance*, 72(4), 1785–1824.

Luo, H. A., and R. J. Balvers (2017): "Social Screens and Systematic Investor Boycott Risk," *Journal of Financial and Quantitative Analysis*, 52(1), 365–399.

Luo, X., and C. B. Bhattacharya (2006): "Corporate Social Responsibility, Customer Satisfaction, and Market Value," *Journal of Marketing*, 70(4), 1–18.

Margolis, J. D., H. A. Elfenbein, and J. P. Walsh (2009): "Does it Pay to Be Good...And Does it Matter? A Meta-Analysis of the Relationship between Corporate Social and Financial Performance," *Hardvard Business School*.

Margolis, J. D., and J. P. Walsh (2001): *People and Profits? The Search for a Link between a Company's Social and Financial Performance*. P. Mahwah, NJ: Lawrence Erlbaum Associates,.

Merton, R. C. (1974): "On the pricing of corporate debt: The risk structure of interest rates," *The Journal of Finance*, 29(2), 449–470.

Monti, A., P. Pattitoni, B. Petracci, and O. Randl (2018): "Does Corporate Social Responsibility Impact Risk?," *SSRN Electronic Journal*.

Nofsinger, J., and A. Varma (2014): "Socially responsible funds and market crises," *Journal of Banking & Finance*, 48, 180–193.

Renneboog, L., J. T. Horst, and C. Zhang (2008a): "The price of ethics and stakeholder governance: The performance of socially responsible mutual funds," *Journal of Corporate Finance*, 14(3), 302–322.

——— (2008b): "Socially responsible investments: Institutional aspects, performance, and investor behavior," *Journal of Banking & Finance*, 32(9), 1723–1742.

Riedl, A., and P. Smeets (2017): "Why Do Investors Hold Socially Responsible Mutual Funds?," *The Journal of Finance*, 72(6), 2505–2550.

Roberts, M. R., and T. M. Whited (2013): "Endogeneity in Empirical Corporate Finance1," in *Handbook of the Economics of Finance*, pp. 493–572. Elsevier.

Servaes, H., and A. Tamayo (2013): "The Impact of Corporate Social Responsibility on Firm Value: The Role of Customer Awareness," *Management Science*, 59(5), 1045–1061.

Shleifer, A., and R. W. Vishny (1997): "A Survey of Corporate Governance," *The Journal of Finance*, 52(2), 737–783.

Statman, M., and D. Glushkov (2009): "The Wages of Social Responsibility," *Financial Analysts Journal*, 65(4), 33–46.

Thomson Reuters (2019): "ESG Data - ESG Score Methodology," https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/esg-scores-methodology.pdf, Retrieved on 2-27-2019.

Titman, S., and R. Wessels (1988): "The Determinants of Capital Structure Choice," *The Journal of Finance*, 43(1), 1–19.

United Nations (2016): "UN Global Compact-Accenture CEO study," .

USSIF (2019): "2018 Global Sustainable Investment Review," .

Windmeijer, F. (2005): "A finite sample correction for the variance of linear efficient two-step GMM estimators," *Journal of Econometrics*, 126(1), 25–51.

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