Corporate scandals and the reliability of ESG assessments: evidence from an international sample

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Abstract This paper studies the reliability of environmental, social, and governance (ESG) assessments in the case of corporate scandals. Reliable disclosures on ESG assessments may reduce information asymmetries when it comes to due diligence, for instance. We use the press release of corporate scandals, which are seen as being unexpected events, and analyze ESG assessments before, during, and after the event year. We find a significant decline in retrospective controversy indicators during the period in which the scandals are released. Subsequent to the scandals, we document a rebound of these indicators. The assessments of forward-looking indicators indicate slightly significant increases during the scandal period. Moreover, our findings show that aggregated ESG assessments consisting of both retrospective and forward-looking indicators are useless when it comes to predicting corporate scandals. Therefore, the managerial implication of this paper recommends educating managers and investors upon how to obtain a comprehensive vision of the corporate social responsibility of a firm based on single ESG assessment indicators.

> Beyond the attempt to deceive customers and regulators, the [Volkswagen] scandal also highlights the failure of traditional valuation models – such as discounted cash flow – to capture the full range of risks companies face today. It also underlines the potential benefits of assessing companies with alternative

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data sets that highlight environmental, social, and governance (ESG) signals, flagging risks that traditional analytical tools aren't designed to identify (MSCI 2016).

1 Introduction

Due diligence, as a sub-discipline of corporate finance, has been expanded throughout assessments for non-financial criteria over the last few decades (Knecht and Reich 2014). Findings from behavioral finance research (Shiller 2005; Shleifer 2000; Thaler 1993, 2005) determine different types of non-financial criteria (investor sentiment), which cause stock prices to deviate from prices estimated under the market efficiency hypothesis. In particular, a large number of studies (Ioannou and Serafeim 2015; Fernández-Gago et al. 2016; Reverte 2016) coincides in their findings, being that non-financial aspects regarding the corporate social responsibility (CSR) of a firm have a significant impact on firm value. In order to provide decision makers with measures for CSR, rating agencies have started to value firms' CSR based on environmental, social, and governance (ESG) aspects.

For a precise external evaluation of a firm, a symmetric information structure is required. In general, ESG ratings have the potential to reduce information asymmetry (Diebecker and Sommer 2017). However, the highly variable and heterogeneous definition of CSR in international environments only exacerbates the problem of information asymmetry (Orlitzky 2013). Since, in most countries, CSR disclosure is voluntary and sanctions are lacking (Devinney 2009), more effective control and monitoring is required. Firms place great emphasis on being perceived as being good social market players and use the opportunity to present themselves as being more responsible than they really are (Laufer 2003). The importance of quality and the appropriate reporting of extra financial disclosure for firms is highlighted in several academic research articles (Frost and Seamer 2002; Gamerschlag et al. 2011). It is advisable for socially responsible investors to be cautious concerning the high level of information presented in CSR disclosure as even one aspect can affect the overall sustainability assessment.

For instance, this can be derived from the increased environmental impact of companies in terms of greenhouse gas emissions (Giannarakis et al. 2014). The authors suggest that reporting upon environmental information could be the first step toward mitigating specific internal business operations or external concerns. Finally, Giannarakis et al. (2014) find global reporting standards that can increase corporate transparency. Cormier et al. (2005) suggest that environmental disclosure is multidimensional and driven by complementary forces. Eccles et al. (2011) highlight the need for firms to recognize the growing market interest in non-financial information and ensure that they are providing it according to the specific informational needs of market participants. Finally, increases in sustainability disclosures driven by regulation are associated with increases in firm valuations, as reflected in Tobin's Q (Ioannou and Serafeim 2017). Thus, both the reliability and transparency of these ESG assessments are of major importance when increasing information efficiency (Kolk 2008; Escrig-Olmedo et al. 2014). Due to these

information asymmetry-reducing features, stakeholders increasingly demand for accountability in ESG reporting (O'Dwyer et al. 2011). Nevertheless, the procedures regulating ESG-related reliability and its contents are still in the developmental stage and include no concrete obligatory standards (Gürtürk and Hahn 2016). Since the ESG reporting market is diverse and virtually unregulated, the reliability of ESG assessments is rather opaque. Prior literature (cf. Mock et al. 2013; Zorio et al. 2013) indicates that further research is needed in order to understand to which extent different requirements may affect the quality of ESG assessments and to what extent differences in reporting quality exist among distinct sources of reporting (e.g., auditors, data providers). According to Hahn and Kühnen (2013), research on ESG reliability remains limited. Therefore, we make an attempt to contribute to the stream of research of sustainability accounting by providing a study on the reliability of ESG assessments with respect.

In order to stress the reliability of ESG assessments, we use scandals of publicly traded firms as unexpected events. In general, information upon fraud, bad working conditions, large rounds of dismissals, corruption, manipulation of financial statements, and ecological disasters caused by companies are released in the form of a surprise to the public. Therefore, we use the press release of corporate scandals as an unexpected event and analyze ESG assessments before, during, and after the event year in this study. In general, ESG assessments differ in terms of scope, i.e., measures for single topics, which we refer to as indicators, and overall assessments, which are usually aggregations of indicator scores. In order to study the impact of scandals on ESG assessments, we identify two types of indicators: retrospective and forward-looking indicators. On the one hand, retrospective indicators concern an ex-post evaluation, e.g., they process the CO_2 emission or the controversial media attention of a firm during the last year. On the other hand, forward-looking indicators concern the vision and strategy of a company, in that they measure the recent policies of a firm to improve its CSR. Therefore, forward-looking indicators act as proxies which estimate the risk of a scandal occurring in future periods. Our analysis is based on 67 corporate scandals in the period from 2004 through 2014. We use rating data from the specialized sustainability rating agency Asset4 as proxies for ESG assessments. In order to identify whether the scandals have a significant impact on changes in the ESG assessments, we apply the event study methodology. We calculate bootstrapped p values to capture the statistical limitations of small sample sizes.

We find a significant decline in retrospective indicators in the period during which the scandals are released to the public. After the release of the scandals, we document a rebound of the retrospective indicators up to a level which is slightly below the initial one. The assessments of forward-looking indicators display slightly significant increases during the scandal period. However, forward-looking indicators of firms which experience a scandal in the areas of product responsibility and environment show a significant decrease in the post scandal window. The managerial implications of our findings relate to the fact that, in general, the retrospective ESG assessments of Asset4 are reliable. However, since Asset4 awards retrospective indicators more importance in aggregated ratings than in forward-looking assessments, aggregated scores are inappropriate as proxies when forecasting the likelihood of corporate scandals. Decision makers, therefore, have to

be taught to consider single ESG assessment indicators in order to obtain a comprehensive vision of the CSR of a firm.

The remainder of this paper is structured as follows. In Sect. 2, we discuss the theoretical background and state our hypotheses. Section 3 contains the description of our sample and the data. Section 4 shows the results of our empirical tests. Section 5 contains a discussion on the results, limitations of ESG research, and future research avenues. Finally, Sect. 6 concludes.

2 Corporate scandals and corporate social responsibility

The generation of profits in a socially responsible way has become a major issue in management science. Accounting fraud, embezzlement, and further criminal corporate practices of, for instance, Enron, WorldCom, or Tyco at the beginning of the Twenty-first century have helped to attach more importance to corporate governance. Furthermore, ecological and humanitarian disasters such as the tsunami in Fukushima and the subsequent nuclear catastrophe sensitize the public in striving toward higher standards in CSR. Besides stakeholders, many investors consider the CSR of a firm when they make an investment decision. This has led to an enormous increase in assets under management of the socially responsible investments (EUROSIF 2014, 2016). In Europe, the assets under management (AuM) in socially responsible investments were 11 trillion Euros in December 2015. This means an increase of 110% compared with AuM in socially responsible investments in 2013. As the total amount of AuM in Europe are 21.4 trillion Euros (EFAMA 2017), approximately every second Euro was invested with respect to CSR issues at the end of 2015. Similarly, the US Social Investment Forum (USSIF) cited a figure of 8.72 trillion USD for the market size of sustainable, responsible, and impact investing in the United States in 2016, which is one-fifth of all investment dollars under professional management and a 33% increase since 2014 (USSIF 2016).

Chatterji et al. (2009) identify four motives for investors who wish to allocate their money in a socially responsible way. First, investing in a socially responsible way is a channel through which to express one's personality. Second, some investors believe that their investments are able to positively influence firms regarding CSR. Third, a portion of investors does not wish to participate in gain generated through unethical businesses such as gambling and tobacco, and therefore excludes whole sectors. The fourth motive is the belief that investments in firms with superior corporate social performance also reward investors with superior financial performance. All four motives have in common that investors aim to avoid investments with a high likelihood of being connected to corporate scandals. The motives are their personal conviction of being a good person and the financially-driven motivation linked to the belief that unethical firms are more greatly predisposed to stock price crashes (Kim et al. 2014; Utz 2017). In a similar vein, Kumar et al. (2016) show that firms with higher ESG standards exhibit lower level of volatility.

Empirical research on investors' motives for socially responsible investing (SRI) complete the theoretical perspective of Chatterji et al. (2009). Pasewark and Riley (2010) and Beal et al. (2005) show that investors consider personal values in addition

to financial factors in their investment decisions. Motivations of SRI, besides achieving a financial return, are firstly a desire to affect a social change, and, secondly, personal satisfaction. Several studies (Klonoski 1986; Haigh and Hazelton 2004; Beal et al. 2005; Graves et al. 2001; Rehbein et al. 2004) indicate that the power of retail and institutional investors to influence a social change is limited. Moreover, barriers such as the view of high volatility of SRI in combination with a short investment time horizon among private investors deter these investors from SRI although a high interest in investing in a sustainable way prevails (Paetzold and Busch 2014). Therefore, socially responsible investors prefer to use passive approaches as a channel to investing in a socially responsible way (Lewis and Mackenzie 2000). This is due to the fact that socially inappropriate investments are supposed to be excluded from socially responsible mutual funds. In this context, Jansson and Biel (2011) study the differences between motives of institutional and private investors. Private investors value environmental and social characteristics in their investment decisions (Jansson and Biel 2011). Fund managers in investment institutions, however, mainly follow their beliefs about the long-term returns of socially responsible investments as well as the possibility to reduce financial risks (Jansson and Biel 2011). This lower risk level is associated with investing in firms which have an environmentally and socially responsible profile (Jansson and Biel 2014).

Although fund managers in investment institutions focus on financial quantities in socially responsible investments, it is advisable for them to control environmental and social risks. Literature on mutual fund misconduct and fraud shows a significant decline in performance and significant investor redemptions following scandals (Chapman-Davies et al. 2014; Houge and Wellman 2005; Potter and Schwartz 2012). To prevent large money outflows, scandal funds reduce their expense ratios in order to retain and attract investors. Nevertheless, scandal funds experience financial constraints. Integrating an effective CSR risk management into the investment decision may minimize the likelihood of being exposed to corporate scandals and fulfills the intentions of Sparkes (2002) to combine social, environmental, and financial goals in SRI.[1] Multi-objective tools capture additional non-financial objectives (Hallerbach et al. 2004; Ballestero et al. 2012; Dorfleitner and Utz 2012; Utz et al. 2015) and satisfy the needs of socially responsible investors, which are not necessarily only financial wealth maximizers (Rivoli 1995; Beal and Goyen 1998; Getzner and Grabner-Kräuter 2004; Nilsson 2009; Oll et al. 2016). These models help investors to construct more sustainable mutual funds or portfolios based on quantitative measures for CSR.

Appropriate and reliable quantitative measures of environmental, social, and corporate governance aspects are of major importance for the identification of firms with a high level of CSR in multi-objective portfolio selection. Specialized rating agencies provide ESG ratings which allow an objective comparison among firms. These ratings have to be reliable in order to reduce existing information asymmetries (Windolph 2011). Less socially responsible firms may benefit from the fact that certain information is hard to verify. Hence, these firms are able to greenwash by publishing incomplete and partial information (Laufer 2003). Moreover, large firms more often report upon their sustainable performance (Fortanier et al. 2011; Gallo and

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[1] This argument is valid for both direct and passive investments.

Christensen 2011). Profitable firms can more easily afford the costs of extensive sustainability reporting and the consequences of disclosing potentially damaging information than less profitable firms (Prado-Lorenzo et al. 2009; Stanny and Ely 2008). Finally, Belal and Cooper (2011) and Nikolaeva and Bicho (2011) show that firms with a high level of CSR performance are more likely to provide sustainability reporting. Stakeholders face the task of recognizing those firms which truly operate in a socially responsible way. Therefore, practitioners and academics critically and continuously consider CSR assessments. Possible issues are a lack of standardization among the rating agencies, a lack of transparency of the applied rating approach, varying focuses, a big cap bias in the rating universes, and lacking independence of the rating agencies (Windolph 2011).

Existing research on CSR-related news addresses the impact on stock market returns. Event studies such as Cheung (2011), McWilliams et al. (1999), Moneva and Ortas (2008), Curran and Moran (2007), Fernandez-Izquierdo et al. (2009) and Marcus and Goodman (1989) converge regarding their findings, which are that information on high or low CSR, for instance measured by a sustainability index inclusion or exclusion, has no significant impact on stock market returns. However, event studies on the stock market reaction subsequent to corporate scandals (Long and Rao 1995; Nelson et al. 2008; Bernile and Jarrell 2009; Jain et al. 2010; Janney and Gove 2011; Jory et al. 2015) find harsh sanctions in terms of stock market price drops for firms experiencing a scandal. In general, event studies are a useful method for evaluating how new information affects a firm's stock price. The basis of this methodology is market efficiency. In the case of the semi-strong form of market efficiency, any new information will quickly influence the stock prices of affected firms (MacKinlay 1997). Nevertheless, socially responsible investors with multi-objective utility functions require 'efficiency' for all measures used as objectives. Therefore, in this study we try to fill the gap in management and finance studies regarding the impact of new information on measures for CSR, i.e., the reliability of measures for CSR.

Corporate scandals represent a possible channel which helps to reveal the reliability of ESG ratings. For instance, Volkswagen's status of inclusion in the Dow Jones Sustainability Index was confirmed only a few days before the emission scandal in September 2015 became public knowledge in the US (UmweltDialog 2015). Consequently, Volkswagen was delisted immediately afterwards (S&P Dow Jones Indices 2015). Nevertheless, the CSR ratings were inefficient in predicting this incident. In this paper, we address the question of whether ESG ratings fail to reduce information asymmetries with regard to scandals; in detail, whether ESG ratings are significantly adjusted immediately after the public release of a scandal. Scandals may have two different types of impact on a firm: First, they show weaknesses inside the firm, and second, they may encourage managers to improve firms' policies. Scandal firms, as well as other firms within the same sector, manifest indications towards improving their CSR (Heflin and Wallace 2015). This could also be due to the peer effect reported in Liua and Wu (2016).

Regarding the firms' weaknesses, scandals reveal areas of firms' strategies in which their social responsibility is insufficient. ESG assessments for these areas—if solidly determined before the scandal—should have low values indicating a weak CSR performance in the previous period. These areas correspond to what we refer to

as the retrospective indicators. Retrospective indicators value the levels of responsibility regarding ex-post considerations such as the CO_2 emissions during the last year. Under the assumption of a correct determination of the retrospective indicator scores, we do not expect the ESG assessments for retrospective indicators to decrease during the scandal period.

H1$_0$ During the scandal, the assessments of retrospective indicators do not decrease.

Following the empirical findings, on the one hand, larger and more profitable firms have more professional CSR reporting (Fortanier et al. 2011; Gallo and Christensen 2011; Prado-Lorenzo et al. 2009; Stanny and Ely 2008) and, on the other hand, firms with a good CSR performance report more extensively on this performance than firms with poor performance (Belal and Cooper 2011; Nikolaeva and Bicho 2011). ESG assessments appear to be biased through inappropriate reporting strategies and may undervalue CSR weaknesses in firms. Therefore, we expect corporate scandals to provide new, unexpected information yielding negative adjustments in ESG assessments.

H1$_a$ During the scandal, the assessments of retrospective indicators decrease.

From a long-term perspective, corporate scandals can act as a catalyst to implement changes that benefit investors (Jory et al. 2015). Silverman (2002) and Pillmore (2003) show examples of the subsequent measures undertaken by firms affected by corporate scandals to restore confidence among stakeholders: They appointed, amongst others, more independent directors to the board, eliminated staggered board elections, appointed only independent directors to the compensation, nominated an audit committee, barred auditors from nonaudit work, limited insider trading of the company's stock, capped severance packages for top executives, appointed a Chief Compliance Officer, and held staff meetings that emphasized morals and ethics at work. The implementation of such strategies in CSR is a longlasting development. Therefore, we also consider the post scandal period in our analysis and expect increasing assessments for retrospective indicator scores.

H2$_0$ After the scandal, the assessments of retrospective indicators do not increase.
H2$_a$ After the scandal, the assessments of retrospective indicators increase.

Besides retrospective indicators, rating agencies also value firms' strategic CSR policies. We refer to these prospective CSR aspects as forward-looking indicators. Mamingi et al. (2006) and Heflin and Wallace (2015) show that negative news on the ecological performance of a firm motivates the awareness of managers to increase social responsibility. In particular, firms with low ESG ratings put a lot of effort into increasing their ESG ratings. The firm involved in the scandal is probably the one which has the highest level of incentives to increase their strategy towards CSR. Our null hypothesis is, therefore, that firms with a proper and elaborated CSR strategy would, even in the event of experiencing a corporate scandal, continue their CSR strategy and do not increase ESG assessments. We test this against the hypothesis that, during a scandal, the ESG assessments for forward-looking indicators increase.

H3₀ During the scandal, the assessments of forward-looking indicators do not increase.

H3ₐ During the scandal, the assessments of forward-looking indicators increase.

Since benefits of the longlasting strategy changes, improvements, or an upgrade of monitoring policies may emerge in future periods, we expect increasing assessments for forward-looking indicator scores.

H4₀ After the scandal, the assessments of forward-looking indicators do not increase.

H4ₐ After the scandal, the assessments of forward-looking indicators increase.

3 Scandals and ESG ratings

3.1 Identification of scandals

We define a scandal as being a publicly unknown weakness in a firm which triggers a widespread debate when information about it is released to the public. We concentrate on publicly traded firms. According to recent research (e.g., Jory et al. 2015) on the impact of corporate events on firms' financial performance, we group possible scandals into four groups: Human rights abuse (e.g., Hillman and Keim 2001; Kappel et al. 2009), corporate crime (e.g., Strachan et al. 1983; Mitchell and Netter 1994; Fisman and Svensson 2007), product recalls (e.g., Davidson and Worrell 1992; Jarrel and Peltzman 1985; Chen et al. 2009; Gokhale et al. 2014), and ecological disasters (e.g., Marcus and Goodman 1989; Ferstl et al. 2012). After matching the identified scandals with the ESG ratings from Asset4, we wind up with a sample of 67 scandals during the period dating from 2004 through 2014. Appendix Table 8 contains a list and a brief description of all scandals.

3.2 Retrospective and forward-looking indicators

ESG assessments in this study are based on Asset4 data. Asset4 provides at least 750 single data point assessments for ESG aspects for an international cross-section including more than 5000 firms. The assessments are mainly based on publicly available information, for instance, from CSR reports of the firms, website announcements of NGOs, and reliable media channels. Asset4 clusters the single data points to 18 categories.[2] In order to test the reliability of the ESG assessments, we determine the isolated impact of each of the four groups of scandals (see Sect. 3.1) on the respective ESG assessment. We apply this scandal-

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[2] These 18 categories are clustered into four pillars. The first pillar, the corporate governance dimension, consists of five categories: Board functions, board structure, compensation policy, vision and strategy, and shareholder rights. The second pillar, the economic dimension, consists of three categories: Performance, shareholder loyalty, and client loyalty. The third pillar, the environment dimension, consists of three categories: Emission reduction, product innovation, and resource reduction. Finally, the fourth pillar, the social dimension consists of seven categories: Product responsibility, community, human rights, diversity and opportunity, employment quality, health & safety, and training & development.

score-matching to capture the scandal-related new information, which is represented to the highest extent by the ESG assessment in the scandal category. For these respective ESG assessments, we use the following four categories of the Asset4 data base: Human rights, which include child labor; community, which includes bribery, corruption, and fraud controversies; product responsibility, which includes product recalls and withdrawals; and finally emission reduction, which includes spills and pollution controversies. Asset4 assigns a score to each category. Each of these category scores is based on three different subcategories: Controversy scores, monitoring scores, and improvement scores. The scores of Asset4 range from zero to 100 with a higher score indicating a higher level of CSR. We focus on these four particular categories.

Investors who wish to allocate their money in a socially responsible way consider both an accurate evaluation of historical ESG performance and a close examination of the current management strategy (Chatterji et al. 2009). First, controversy scores reflect a retrospective consideration based on the media attention of respective negative events. Therefore, we consider controversy scores as being retrospective indicators. Second, corporate scandals can damage reputation. This may encourage managers to reconsider their company structure and adopt measures to improve a firm's CSR strategy. Each of the four considered category scores comprises, among other things, two prospective indicators (monitoring and improvement), which we employ as forward-looking indicators in our study.

Table 1 shows the distribution of scandals among industries. Firms operating in the consumer goods sector exhibit the highest number of scandals in our sample. Furthermore, firms from the financial sector show a high number of scandals, all of which are in the areas of bribery and corruption. The firms in the sectors of utilities, basic materials, and telecommunications have the lowest number of scandals. More than half of the scandals in our sample are bribery/corruption (community) scandals, 13% are pollution (emission reduction) scandals, 27% of the scandals are connected to human rights infringements, and 7% are product-related (product responsibility). Firms with bribery and corruption scandals have, on average, the lowest market value. Scandals such as child labor or bad working conditions appear to exist in firms with a very high number of employees.

4 Results

4.1 Empirical tests

We group each of the 67 scandals into one of the four panels, these being community, emission reduction, human rights, and product responsibility. According to the area of the scandal, we consider the respective ESG assessments 1 year before the scandal is released ($t - 1$), in the year of the release of the scandal (t), 1 year after the release of the scandal ($t + 1$), and 2 years after the release of the scandal ($t + 2$).

Figures 1 and 2 provide an initial indication of the pattern of the retrospective and the forward-looking indicators of the scandal firms in the event window. The

Table 1 Descriptive statistics of scandals

|	Community	Emission reduction	Human rights	Product responsibility	Total
Financials	14				14
Technology	3		5		8
Industrials	8		1		9
Consumer services	1		5		6
Healthcare	4	1	1	2	8
Utilities		2			2
Oil and Gas		5			5
Consumer goods	3		4	3	10
Basic materials	1	1	1		3
Telecommunications	1		1		2
Total	35	9	18	5	67
Market value (in bn USD)	62.0	151.9	144.2	119.9	
No. of employees (in 1000)	146.0	115.1	368.9	155.9	

Industries, market value, and number of employees of the scandal firms clustered with respect to the four areas of scandals

average scores of the retrospective indicators show a drop in the scandal year and a rebound in the subsequent year. In year 2 following the scandal, the retrospective indicators rise for all scandal types except product recalls/withdrawals. The pattern of the forward-looking indicators depends on the area in which the scandal occurs. The improvement indicator for human rights remains flat throughout the entire event window. Product responsibility and community experience an increase in the improvement score in the scandal year. While the improvement score of community remains at a higher level subsequent to the scandal, the improvement score of product responsibility drops in $t + 2$ to a level which is below the initial level from $t - 1$. The emission reduction improvement score decreases after the scandal year. Regarding all monitoring indicators with the exception of emission reduction category, an increasing trend persists throughout the entire event window.

We apply event study methodology to test statistical inferences. Our event window ranges from $[t - 1, t + 2]$. Year $t - 1$ constitutes our estimation period. Since the autocorrelation of ESG assessments is very high[3] and the average score of the cross-section is centered around 50 in each year, we use the ESG rating in $t - 1$ as the expected value for the ESG rating in t. The error term ϵ_i represents the difference between the respective ESG rating in the year of the release of the scandal ($ESG_{t,i}$) and the respective ESG rating 1 year before the release of the scandal ($ESG_{t-1,i}$) for scandal firm i.

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[3] The average autocorrelation in our sample over all ESG ratings and the entire time period from 2004 until 2015 is 0.81.

Fig. 1 This figure shows the ratings of the retrospective indicators 1 year prior to the release of the scandal ($t-1$), in the year of the release of the scandal (t), and both 1 and 2 years subsequent to the release of the scandal ($t+1$, $t+2$), respectively
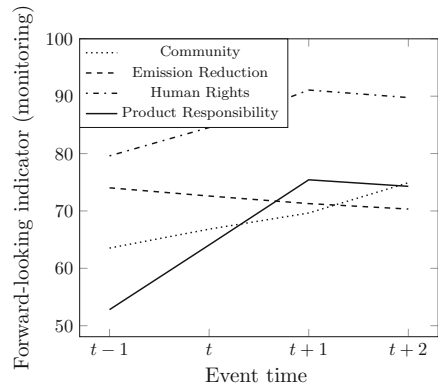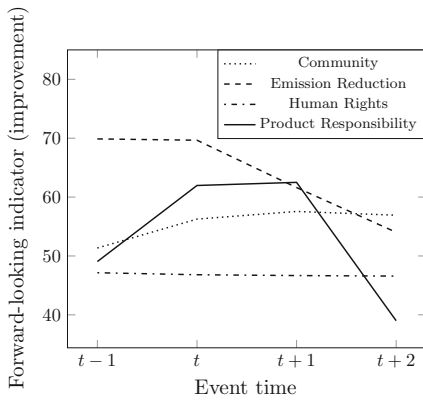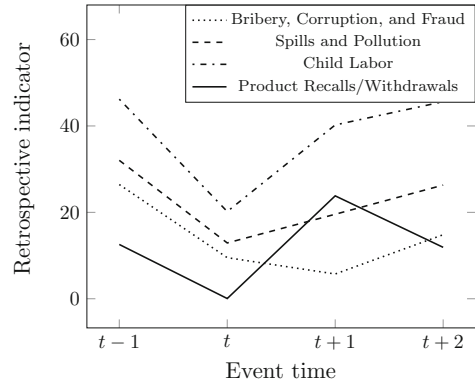
Fig. 2 This figure shows the ratings of the forward-looking indicators (left graph: improvement, right graph: monitoring) 1 year prior to the release of the scandal ($t-1$), in the year of the release of the scandal (t), and both 1 and 2 years subsequent to the release of the scandal ($t+1$, $t+2$) respectively

$$ESG_{t,i} = ESG_{t-1,i} + \epsilon_i, \qquad i = 1, \ldots, N$$

We test whether ϵ_i is significantly different to zero. We shift each quantity by one or two periods for our post event analysis. For instance, we use the ESG rating in t as the expected value for the ESG rating in $t+1$. Table 2 contains the results. In each panel, we take all firms which have experienced a scandal in the respective aspect of CSR. We rearrange the data in a way in which the release of the scandal happens in t. We check the respective category score of the panel, the central retrospective indicator of the panel, and both forward-looking indicators (improvement and monitoring). In order to capture the statistical limitation of a sample with a low number of firms, we apply the bootstrap methodology to generate robust, distribution independent p values. The p values are with respect to the following hypotheses: For the category score and the retrospective indicator, we check whether both ratings significantly decrease from $t-1$ to t and increase from t to $t+1$ and $t+2$, respectively. For both forward-looking indicators, we check whether

Table 2 This table reports upon the mean values of the respective category score, the respective controversy score, and the respective improvement and monitoring score

	μ_{t-1}	μ_t	μ_{t+1}	μ_{t+2}	$\mu_t - \mu_{t-1}$	$\mu_{t+1} - \mu_t$	$\mu_{t+2} - \mu_{t+1}$	$\mu_{t+2} - \mu_t$
Community								
Category score	70.84	60.98	59.07	69.52	−9.86***	−1.91	9.90***	9.52**
Bribery, corruption, and fraud controversy	26.44	9.51	5.73	14.82	−16.93***	−3.78	8.55***	6.49*
Improvement	51.35	56.26	57.56	56.92	4.91**	1.30	−0.41	1.05
Monitoring	64.53	66.83	69.64	74.92	2.30	2.81	5.52	8.65
Emission reduction								
Category score	79.68	74.21	72.09	70.48	−5.47***	−2.12	−1.61	−3.74
Spills and pollution controversy	32.04	12.92	19.56	26.31	−19.12**	6.64***	6.75***	13.39***
Improvement	69.88	69.66	61.62	54.02	−0.22	−8.04**	−7.61	−15.64**
Monitoring	74.03	72.60	71.28	70.33	−1.43	−1.33	−0.95**	−2.27
Human rights								
Category score	86.72	77.71	86.12	87.54	−9.01**	8.41*	2.01	9.18***
Child labor controversy	46.20	20.19	40.23	45.61	−26.01***	20.04**	6.87	26.09***
Improvement	47.15	46.81	46.67	46.58	−0.34	−0.15	−0.13**	−0.31***
Monitoring	79.60	84.54	91.06	89.76	4.94	6.53	−0.78***	6.49
Product responsibility								
Category score	69.77	74.12	54.54	63.22	4.35	−19.58	8.68***	−10.90
Product recalls/Withdrawals controversy	12.57	0.05	23.82	11.90	−12.52	23.77*	−11.91	11.86
Improvement	49.05	61.97	62.50	39.00	12.92*	0.53	−23.51**	−22.97**
Monitoring	52.80	64.07	75.43	74.29	11.27	11.36	−1.14***	10.22

These values are calculated for all firms which experience a scandal in the respective category. We display the mean values for 4 years: the year before the scandal was released, the year in which the scandal was released, and both 1 and 2 years after the release of the scandal. The last four columns contain the difference between the mean values. We apply bootstrap tests to generate p values (with 10,000 bootstrap samples). For the first two rows in each panel, we test H_0 against $\mu_t - \mu_{t-1} < 0$ and H_0 against $\mu_{t+\tau_1} - \mu_{t+\tau_0} > 0$ with $\tau_0, \tau_1 \in \{0, 1, 2\}$, $\tau_0 < \tau_1$. In the last two rows we apply the tests vice versa. *, **, and *** denote significance at a 10, 5, and 1% level respectively

ratings significantly increase from $t - 1$ to t and decrease from t to $t + 1$ and $t + 2$, respectively. The first four columns of Table 2 contain the average values of the respective scores of all firms in this panel. The last four columns display the differences $\mu_t - \mu_{t-1}$, $\mu_{t+1} - \mu_t$, $\mu_{t+2} - \mu_{t+1}$, and $\mu_{t+2} - \mu_t$.

The respective category score and the retrospective indicator score in the first three panels show a significant decrease in the ratings from $t - 1$ to t. The controversy rating of the product recalls and withdrawals in the product responsibility panel also shows a strong, yet insignificant, decline. This finding provides supporting evidence strong enough to reject hypothesis $H1_0$ for $H1_a$. Three of the retrospective indicators show a significant positive rebound in year $t + 1$ with only one retrospective indicator (product recalls and withdrawals) exceeding the initial level of $t - 1$. In the 2-year perspective, we find that all retrospective indicator scores increase (three of them significantly), compared with the respective score in the scandal year and therefore reject hypothesis $H2_0$ for $H2_a$. This pattern supports a reliable retrospective assessment of scandals by Asset4, since new information released to the analysts of Asset4 by scandals appears to be priced into the controversy assessments. Moreover, the absolute levels of the retrospective indicators in $t - 1$ are also below average. This is a strong indication of a firm's bad strategy according to the respective aspects. Nevertheless, the category ratings do not capture the risk of scandals appropriately in advance. For instance, firms involved in a scandal such as child labor have a high average human rights rating of 86.72 in the preceding year $t - 1$.

The forward-looking indicators exhibit somewhat weaker evidence. We find that firms in our sample make efforts to significantly increase the improvement score in the year when scandals related to community and product responsibility are released (rejection of hypothesis $H3_0$ for $H3_a$). We also detect an increase in the monitoring ratings in three panels (community, human rights, and product responsibility), which are all insignificant with p values around 12% when testing hypothesis $H3_0$ against $H3_a$. This indicates that firms which experience a scandal try to improve the firm's strategy in the respective category. Since corporate scandals may encourage managers to reconsider their structure and adopt measures to improve the firm's CSR strategy, we are faced with strategic corporate changes, which are unlikely to be implemented in the short run. Therefore, we also consider the change in forward-looking indicators 2 years after the scandal ($H4_0$ against $H4_a$). While improvement scores significantly decline throughout this period (except for community), firms are able to improve the monitoring for community, human rights, and product responsibility. In the emission reduction category, however, we find decreases in the forward-looking indicators during and after the scandals with a significant decline of the improvement ratings subsequent to the scandal. We also document a decrease in the improvement score of product recalls and withdrawals after the scandal.

4.2 Robustness tests

Although we provide clear evidence in favor of the aggregation level of retrospective and forward-looking indicators, the results for the aggregated category

scores are weaker. Nevertheless, managers and investors are more likely to prefer to consider aggregated numbers. Therefore, we also consider the ability of aggregated ratings for the environmental performance and the social performance in order to reduce information asymmetries. We apply the same analysis as in Sect. 4.1 for both the environment and the social pillar score. Table 3 contains the results. Except for two significant rating improvements in the 2-year perspective subsequent to the scandal, we cannot find any indications concerning the scandal in the aggregated scores. With respect to the findings of Hafenstein and Bassen (2016), which show that non-professional investors understand ESG as one single quantity and do not differentiate between categories at all, the highly aggregated scores are misleading for this category of investors. Moreover, the absolute levels of the environment and the social score of our scandal firms range from between 72 and 91. This is a range in which firms pretend to have a very high level of CSR. We identify an aggregation issue for ESG ratings with respect to information efficiency: The concentration of single ESG aspects in the aggregated ratings is crucial (Delmas and Blass 2010). For instance, in the human rights category of the Asset4 universe, the retrospective indicators carry a weight of 72.2%, while the total weight of the forward-looking indicators is 27.8% (Reuters 2013). Hence, the scores are strongly biased towards a retrospective perception.

Since one social pillar score comprises a large number of indicators and scandals mostly affect only one of the indicator scores, the pillar scores do not show a

Table 3 This table reports upon the mean values of social pillar scores of the environmental and the social dimension

	μ_{t-1}	μ_t	μ_{t+1}	μ_{t+2}	$\mu_t - \mu_{t-1}$	$\mu_{t+1} - \mu_t$	$\mu_{t+2} - \mu_{t+1}$	$\mu_{t+2} - \mu_t$
Community								
Environment	85.74	85.62	85.34	87.63	− 0.12	− 0.28	0.27	0.06
Social	83.07	82.67	82.08	84.61	− 0.40	− 0.59	0.93	0.72
Emission reduction								
Environment	79.69	78.17	78.24	78.39	− 1.51	0.07	0.15	0.21
Social	74.75	75.77	74.53	73.48	1.02	− 1.25	− 1.05	− 2.29
Human rights								
Environment	79.09	85.03	84.28	83.35	5.94	− 0.74	− 0.13	− 1.13
Social	72.35	74.05	75.31	78.11	1.70	1.26	1.43	3.18*
Product responsibility								
Environment	87.81	86.00	91.01	87.93	− 1.81	5.01**	− 3.08	1.93***
Social	90.61	90.18	91.68	91.20	− 0.43	1.50	− 0.48	1.02

These values are calculated for all firms which have experienced a scandal in the respective category. We display the mean values for 4 years: The year before the scandal was released, the year in which the scandal was released, and both 1 and 2 years after the release of the scandal. The last four columns show the difference between the mean values. We apply bootstrap tests to generate p values (with 10,000 bootstrap samples). For the first two rows in each panel, we test H_0 against $\mu_t - \mu_{t-1} < 0$ and H_0 against $\mu_{t+\tau_1} - \mu_{t+\tau_0} > 0$ with $\tau_0, \tau_1 \in \{0, 1, 2\}$, $\tau_0 < \tau_1$. *, **, and *** denote significance at a 10, 5, and 1% level, respectively

significant increase or decrease in the event period. Therefore, scandal firms often have high overall ESG ratings and are, for instance, considered for sustainability indices. To return to the points of criticism from Sect. 2, the issue of how to weight the different aspects appears to be the most prominent factor when stressing ESG ratings with scandals. Nevertheless, the ratings of Asset4 map the reality in the ESG ratings in an appropriate way, i.e., the scandals are correctly priced into the scores. Thus, the important task in educating managers and investors is to consider not only aggregated scores but also single controversy indicators regarding the awareness of corporate scandals.

5 Discussion

5.1 The scandal year kink in retrospective indicators

One major observation from Fig. 1 is the kink in the scores experience in scandal year t. All four types of scandals have a strong decreasing effect on the respective controversy score. The spill and pollution as well as the child labor controversy scores exhibit the shape we theoretically hypothesized on with a rebound of the score subsequent to the scandal year. The product recalls/withdrawals controversy score has the steepest increase in the year after the scandal. According to Souiden and Pons (2009), the best solution to prevent a loss in consumer loyalty to the manufacturer during a recall crisis is the implementation of a proactive strategy. In particular, in order to reduce the negative effects of a product recall, the company should react promptly to the first signals of product weaknesses, acting in a responsible way by underlying their sincere concern for their customers' health, and avoiding any opportunistic behavior (Magno 2012). These prompt and proactive strategies may be responsible for the rebound of the product recalls/withdrawals score in the first year subsequent to the scandal. However, these efforts have rather a short-term perspective, which results in an ease of the score in the second year following the scandal.

For firms with a scandal in the community area, we find a decrease in the controversy score even after the scandal year. Pfarrer et al. (2008) and the references therein identify a four-stage process of the reintegration with the organizational actions including (1) discovering the transgression, (2) explaining their wrongdoing, (3) serving penance by accepting punishment, and (4) internally and externally rehabilitating or rebuilding the organization's processes and legitimacy for corruptly and unethically acting firms. Moreover, Baucus and Baucus (1997) show that reduced financial performance caused by a scandal does not deter subsequent illegality. The decrease of the bribery, corruption, and fraud controversy score in the year subsequent to a scandal and the slight increase in the second year after a scandal are, to a certain extent, the results of the long-term perspective in the policy to improve a firm's bribery, corruption, and fraud control activities and the fact that firms appear not to learn from earlier scandals.

5.2 Dissent of the improvement scores

Within the forward-looking indicators, the improvement scores show contrary effects across the scandal types (see the left graph in Fig. 2). While the improvement scores of the emission reduction and the product responsibility category decrease after the scandals, the respective scores of community and human rights remain almost unchanged. We investigate a link of this finding to firm values of the respective scandal firms using annual market values in USD from Thomson Reuters. Table 4 shows a summary of these values.

While firms which experience a scandal in the area of community or human rights show no decline in market value, firms faced with a scandal in the emission reduction or product responsibility area have, on average, a decline in market value (-17.5 and -2.8%, respectively). A decrease in market value of firms which experience a recall is, for instance, due to large industry-wide spillovers in the form of sales losses from recall firms to companies that did not experience any recalls (see Freedman et al. 2012). To investigate this topic in more detail, we cluster all firms into two groups, one including all firms with scandals in community and human rights areas and the other including all firms with scandals in emission reduction and product responsibility areas. We then analyze two specifications of the model

$$\Delta MV(t+2, t) = \alpha + \beta_0 \cdot \text{scandal group} + \sum_i \beta_i \cdot \text{control}_i + \epsilon,$$

in which $\Delta MV(t+2, t)$ is the relative change in market value in the period ranging from the scandal year to 2 years later. 'Scandal group' is a dummy variable, which equals 1 if a firm experiences a community or human rights scandal and 0 if a firm experiences an emission reduction or product responsibility scandal. Finally, 'control' is a set of control variables. In the first specification, we use an empty set of control variables to show the single influence of the dummy variable 'scandal group' on the change in market value. Table 7 reports upon the results of ordinary least square regressions. The first column shows a significant positive coefficient for the 'scandal group' variable. Thus, firms with a scandal in the areas of community and human rights have a significantly higher rate of growth in market value than

Table 4 This table contains the average market value of the scandal firms in event time and billion USD separated into the four different scandal types

	t	$t+1$	$t+2$	$\Delta MV(t+2, t)$ (%)
Community	62.0	65.7	69.7	12.4
Emission reduction	151.9	129.2	125.3	-17.5
Human rights	144.2	158.2	166.6	15.5
Product responsibility	119.9	112.1	116.5	-2.8

The last column contains the relative change in market value between the event year and 2 years after the release of the corporate scandal

firms which experience a scandal in the area of emission reduction and product responsibility. Therefore, we find some indications to support the fact that firms with scandals in emission reduction and product responsibility have larger financial sanctions after the scandal than firms with scandals in community and human rights.

Since we can observe from Table 1 that firms from different industries are associated with different types of scandals, firms with scandals in emission reduction and product responsibility may thus be systematically different from firms with scandals in community and human rights. Therefore, we control for specific firm characteristics to capture their influences on the change in market value besides the scandal type. Since the change in market value is a measure for financial performance, we follow the literature on well-established determinants of stock returns to identify the controls for this analysis. First, since several studies (Schwert 1983; Fama and French 1992) document the predictive power of firm size for returns, we control for firm size, calculated as the natural logarithm of total assets. Next, we control for the debt ratio as a second determinant of stock returns (see Bhandari 1988). Further, we add the book-to-market value to the set of controls (Daniel and Titman 1997; Pontiff and Schall 1998). Following Cho and Pucik (2005) we also include the return on assets. Last, we add the dividend-to-price ratio as another determinant of stock returns (Fama and French 1988). We obtain annualized data for all controls from Datastream and Worldscope.[4] Table 5 summarizes our set of controls and provides detailed definitions and Table 6 contains the mean values of the control variables separated by the four different types of scandals.

The second column of Table 7 ('Model 2') contains the results for the second specification including all control variables listed above. We use the values of these control variables in the scandal year. The model is highly significant (p value $= 0.0000$) and explains a reasonable degree of variation in the relative change in market value ($R^2 = 0.4323$). The coefficient of the 'scandal group' variable confirms the finding from the first specification, although we control for several firm specific characteristics in this second specification. Firms which experience a scandal in the areas of community and human rights have a significantly higher relative growth in market value than firms which experience a scandal in the areas of emission reduction or product responsibility. This is derived from the significant positive coefficient of the scandal group dummy (0.3222, t statistic: 2.36). Thus, firms with scandals in the areas of emission reduction and product responsibility suffer, to a higher extent, in terms of market value compared with firms with scandals in community and human rights. Since Hong et al. (2012) and Rusinova and Wernicke (2016) show that more financially constraint firms reduce their engagement in CSR, the decrease in the improvement scores after emission reduction and product responsibility scandals is in line with these findings.

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[4] Since we did not receive the entire set of control variables for three firms, the sample size in this analysis amounts to 64 scandals.

Table 5 List of controls

Variable	Description
Size	Natural logarithm of total assets (WC02999)
Leverage	Total debt (WC03255) divided by total assets (WC02999)
Return on assets (ROA)	Return on assets (WC08326)
Dividend-to-price (DTP) ratio	Cash dividend paid total (WC04551) divided by market value of equity (MV)
Book-to-market (BTM) ratio	Common shareholders' equity (WC03501) divided by market value of equity (MV)

This table contains detailed definitions of the control variables used in Model 2. Datastream/Worldscope mnemonics are in parentheses where available

Table 6 Descriptive statistics on control variables

	Community	Emission reduction	Human rights	Product responsibility
Size	19.08	18.51	17.71	17.80
Leverage	0.265	0.195	0.162	0.276
Book-to-market ratio	1.094	0.445	0.425	0.360
Return on assets	0.030	0.083	0.117	0.122
Dividend-to-price ratio	0.029	0.026	0.023	0.034

This table reports upon the mean values of the control variables separated by the four types of scandals

Table 7 Market value and the type of scandals

This tables reports upon the results of ordinary least square regressions of the relative change in market value ($\Delta MV(t + 2, t)$) as a function of a dummy variable for the type of the scandal (scandal group) and control variables. The value of 1 in the dummy variable refers to community and human rights scandals and the value of 0 refers to emission reduction and product responsibility scandals. We run two model specifications with different sets of control variables. t-statistics are stated in parentheses, $*p<0.1$, $**p<0.05$, and $***p<0.01$

	Model 1	Model 2
Scandal group	0.4448***	0.3222**
	(2.79)	(2.36)
$Size_t$		− 0.0198
		(− 0.57)
$Leverage_t$		− 0.4928
		(− 1.17)
$BTM\ ratio_t$		0.3672***
		(4.84)
ROA_t		0.0101
		(1.27)
$DTP\ ratio_t$		0.0043
		(1.47)
Intercept	− 0.2039	− 0.0956
	(− 1.43)	(− 0.15)
N	64	64
R^2	0.1116	0.4323
p value	0.0070	0.0000

5.3 Decline in improvements versus progress in monitoring

Although the results of the monitoring scores show insignificant increase in the respective scandal category, the right graph in Fig. 2 indicates moderate growth in three (community, human rights, and product responsibility) of the four categories in contrast to the significantly decreasing improvement scores (see Table 2). An important feature in managing reputation risk and rebuilding reputation is monitoring (Sims 2009). Monitoring is a measure with which to increase credibility (Alles et al. 2004). Therefore, firms which experience a scandal increase monitoring since they are aware of possible further risks and in order to improve the reputation. The high absolute values of the monitoring score (above 50) and the slightly increasing trend also show this aspect for our scandal sample.

5.4 Managerial implications

The managerial implications of this research for financial markets concern, on the one hand, the way in which decision makers work with ESG data and, on the other hand, which improvements can be made to increase the utility of such ESG data for decision makers.

Our findings support the fact that the strategy of Asset4, which values retrospective ESG assessments, works properly. However, Asset4 awards retrospective indicators more importance in aggregated ratings than forward-looking assessments. Therefore, aggregated scores are inappropriate as proxies when forecasting the likelihood of corporate scandals. Attig et al. (2013) show that credit rating agencies award relatively high ratings to firms with high CSR. Therefore, the cost of financing is a function of several variables including CSR. Investors who are aware of the findings of our study may be suitably informed to address questions regarding the importance of retrospective versus forward-looking indicators. Retrospective indicators only have a limited ability when forecasting scandal risk. This lack of forecasting accuracy poses a potential risk of financial losses, in particular subsequent to scandals in emission reduction and product responsibility categories. Thus, the results of this paper suggest that managers and investors must be trained to consider single ESG assessment indicators in order to obtain a comprehensive vision of the CSR of a firm. Hence, the limitation of a rating agency predefined weighting among the indicators' scores could be dissolved by trained managers and investors who show a quick grasp of sophisticated rating approaches.

Additionally, reliable measures of CSR can play a prominent role in effective risk governance. The importance of risk governance rose with the settlement of the Capital Requirements Directive IV (CRD IV) of the European Union in 2013 and the consultation draft of MaRisk by the German Federal Financial Supervisory Authority (BaFin) in 2016. Transferred from financial accounting, an auditing process generally provides a reasonable safeguard against fraudulent and inaccurate reporting. Regulators and other stakeholders that are aware of a firm's deficiencies due to honest and comprehensive reporting on the firm's risk governance, can become involved in dialogues with a firm's management to address potential risks. Historical events such as the Bhoptan disaster in 1984, the Exxon Valdez oil spill in

1989, the Deepwater Horizon explosion in 2010, and the Volkswagen emission scandal in 2015, reveal high-level risk exposure due to unsustainable business activities. In such cases, proper risk governance could have prevented such incidents.

5.5 Future research avenues

This research could be extended in at least four directions: First, the application of a comparable study using ESG data from several different sustainability rating agencies may provide insights into different rating approaches. For instance, the Volkswagen emission scandal shows that several rating agencies were not aware of this possible risk. RobecoSam, the sustainability rating agency for the Dow Jones Sustainability, ranked Volkswagen AG as being the most sustainable automobile manufacturer in the world on September 11, 2015. One week later, on September 19, 2015, Volkswagen AG confessed to the manipulation accusations. Asset4 rated Volkswagen as being above average, overall. However, the consideration of certain important indicators such as the fraud controversies score (0.17 in 2014) provides clear indications of high sustainable risks. A comparison amongst different sustainability rating approaches would contribute to the development of reliable and high-quality ESG assessments, which is highly regarded by a large proportion of decision makers. Changes in rating methodologies may be one additional, possible issue worth discussing in further research.

Second, future research will be able to address questions of sustainability accounting and reporting. The Global Reporting Initiative (GRI) launched the GRI Standards, which will replace the G4 sustainability reporting guidelines, and will be required for all sustainability reports after July 1, 2018 (Global Reporting Initiative 2017). These guidelines may help to generate more reliable, relevant, and standardized information. This information supports all stakeholders in assessing opportunities and risks and therefore results in more informed decision-making. Mandatory ESG reporting with strict guidelines may increase the transparency among firms and make ESG assessments more independent of firm size or of past CSR performance. Earlier studies (Hess 2007, 2008; Laufer 2003) argue that voluntary reporting standards (such as the GRI) are insufficient in aiming to achieve corporate accountability since sustainability reporting is a tool of strategic management considerations. Moreover, further limitations of self-responsibility of firms in sustainability reporting comprise a low level of transparency, incomplete and irrelevant information for stakeholders, and a lack of comparability of sustainability reports (Dubbink et al. 2008). Therefore, a major research avenue addresses the topic of creating, for instance, based on financial reporting systems, a mandatory legal framework for sustainability reporting. According to Gürtürk and Hahn (2016), the large accounting firms increasingly adopt the International Standard on Assurance Engagements (IASE3000) in non-financial reporting. Further studies discuss the application of mandatory sustainability reporting standards based on GRI guidelines (Hess and Dunfee 2007; Levy et al. 2010) or raise objections to mandatory sustainability reporting due to, for instance, a lack of enforcement mechanisms (Brown et al. 2009; Levy et al. 2010). Ioannou and

Serafeim (2017) and Wang et al. (2016) are first attempts to analyze mandatory CSR reporting and find its positive impact on firm transparency and disclosure quantity and quality. In summary, regulation of sustainability reporting is still at an early developmental stage (Hess and Dunfee 2007) and therefore much emphasis of researchers and professionals is needed in order to increase the reliability and transparency of ESG assessments.

Third, our results in Sects. 4.1 and 5.2 show a significant difference in the consequences for financial and CSR measures after the scandal for certain types of scandals. Our research gives a first indication on the impact on the financial performance of a firm after the scandal. Existing studies on the financial influences of corporate scandals (Marcus and Goodman 1989; Ferstl et al. 2012; Jory et al. 2015) either focus on one certain event or do not take scandal specific characteristics into account. Future research may, in particular, consider such scandal specific characteristics in order to identify the channels of how a certain type of scandal has impact on a firm's financial and social performance.

Fourth, to increase the utility of ESG data for decision makers, more research has to be conducted on specific categories of ESG assessments and their impact on financial quantities. Existing research on the link between CSR and certain financial aspects have almost be conducted using aggregated numbers for ESG assessments. For instance, Kim et al. (2014) investigate the risk mitigation effect of high CSR according to stock price crash risk, Stellner et al. (2015) conduct a study on the relationship between CSR and credit risk, and Fatemi et al. (2017) focus on the relationship between CSR and firm value. Nevertheless, as our study shows, research based on aggregated numbers is insufficient in capturing certain specific effects. Some papers—such as Attig et al. (2013) for six dimensions of CSR, Dorfleitner et al. (2014) for 18 dimensions of CSR, or Edmans (2011) for employee satisfaction—address the complexity of ESG assessments. Nevertheless, many further open questions in this direction either remain or are revealed by this research.

5.6 Current limitations to research on ESG assessments

This study provides an initial systematic consideration of ESG ratings with an event study approach. As event studies generally use daily stock price data, we have to deal with data limitations since ESG ratings are available on an annual basis only. Therefore, the results of this study are an indication of how beneficial ESG ratings could be for due diligence and firm value. Further efforts of rating agencies to provide more granularity in time horizons (e.g., monthly assessments compared with annual ones) would improve the situation of academics and practitioners and their attempt to achieve robuster results.

The Asset4 ESG data is appropriate for this study for several reasons: First, it provides us with ESG ratings for a large international cross-section of firms. Second, Asset4 reports on data of certain levels such as an aggregated overall rating, pillar scores, category scores, and indicator scores. Third, each of these scores is a number of the distribution between 0 and 100 and therefore all scores have a minimum level of variability among the cross-section, which allows us to rank

different firms. Nevertheless, since the time-series of the Asset4 scores for a reasonable number of firms commences in 2003, we lose several earlier corporate scandals such as Exxon Valdez in 1989, Enron in 2001, and Bhopal in 1984. Scores with a longer time series of historical data such as MSCI KLD, have certain disadvantages such as no international data, only binary assessments, and changes in methodology, causing breaks in the time series. Compared with credit rating agencies such as Standard & Poors (established in 1941), sustainability rating agencies are very young and need to mature and to develop to reach a similar level of recognition as credit ratings.

The availability of ESG assessments starting in year 2003 leads to a relatively low number of observations when testing for statistical inference. Distributional assumptions and convergence characteristics for statistical tests may not be fulfilled through the utilization of such small samples. However, the application of bootstrap methodology allows us to estimate reliable p values and quantiles (Boos 2013) and therefore generates reliable implications.

6 Conclusion

ESG ratings have gained increasing popularity as indicators for firm risk and as measures to reduce information asymmetries in firm valuation during the last decades. Several scandals, such as the latest emission scandal of Volkswagen, have expedited the increase in claims for CSR to be included in mandatory firm reporting. However, the processing of how stakeholders and investors can use such reporting and how their access to this information is organized remains a central issue. As ESG issues are important, improvements of their measuring may help to gain a full understanding of what they mean for the future of business organizations (MacLean 2012). Specialized rating agencies have developed elaborate assessment tools with which to value firms with respect to their CSR. In this paper, we analyze the reliability of such CSR assessment with respect to unexpected scandals. We find that retrospective indicators significantly deteriorate in the year of the release of the scandal. This result is robust among different types of scandals. Subsequent to the scandal, these ratings experience a rebound. Indicators which concern the CSR strategy, such as monitoring or improvement, are more likely to increase during the scandal period. In general, the firms which are involved in a scandal score below average in retrospective indicators, although the aggregated category scores are significantly above average.

The significant decline in retrospective indicators shows that the methodology of Asset4 employed to capture negative media news works properly. Therefore, ESG ratings appear to be reliable, according to this aspect. Moreover, the increase of the forward-looking indicators in the community, the human rights, and the product responsibility panel in the scandal year confirm the assumption of Heflin and Wallace (2015). According to their theory, firms which experience a scandal, subsequently react with intensified strategic measures to improve their CSR.

Appendix

See Table 8.

Table 8 List of scandals

Corporate	First release	Description
ABB	2004	Pension scandal
ADECCO	2004	Accounting scandal
AIRBUS GROUP	2006	Suspicion of insider trading
ALCATEL-LUCENT	2010	Bribery payments
ALIBABA	2010	Methodical fraud against Alibaba dealers
APPLE	2010	Suicide wave and bad working conditions
APPLE	2012	Bad working, safety, and health conditions
APPLE	2013	Bad working, safety, and health conditions, child labor
BAE SYSTEMS	2004	Corruption
BAE SYSTEMS	2009	Corruption and bribery payments
BANK OF AMERICA	2008	Toxic property loans
BARCLAYS	2012	LIBOR manipulation
BASF	2010	Corruption
BAXTER INTL.	2008	Fatalities caused by tainted heparin in eleven countries
BILFINGER BERGER	2010	Bribery payments soccer world championship
BP	2010	Oil spill Gulf of Mexico
CHEVRON	2011	Oil spill Rio de Janeiro
CITIGROUP	2012	LIBOR manipulation
COCA COLA	2004	Child labor on sugar plantations
CREDIT SUISSE GROUP	2012	Tax scandal
DAIMLER	2010	Bribery payments
DEUTSCHE BANK	2012	LIBOR and EURIBOR manipulation
DEUTSCHE BANK	2012	CO_2 emission certificate scandal
DEUTSCHE TELEKOM	2008	Spying on own executives
EDF	2008	High uranium concentration in water around a nuclear power plant
EXXON MOBIL	2013	Oil spill in Arkansas
FOXCONN TECHNOLOGY	2012	Bad working, safety, and health conditions
GAP	2007	Child labor in India
GLAXOSMITHKLINE	2012	Illegal distribution practices for drugs
GLAXOSMITHKLINE	2013	Bribery of physicians
HSBC HOLDINGS	2012	LIBOR manipulation and money laundering
HYUNDAI MOTOR	2006	Corruption
INFINEON TECHNOLOGIES	2005	Bribery payments
INTERNATIONAL BUS.MCHS.	2011	Bribery payments China & South Korea

Table 8 continued

Corporate	First release	Description
JP MORGAN CHASE & CO.	2012	Deception of risks of high risk derivatives
JP MORGAN CHASE & CO.	2012	LIBOR manipulation
LONMIN	2012	Deadly end of miners' strike
MAN	2009	Bribery
MATTEL	2007	Toy recall due to toxic lead color
MERCK & COMPANY	2004	Recall Vioxx and increased heart attack risk
MICROSOFT	2010	Reproach of child labor at supplier KYE
MONSANTO	2007	Child labor
NESTLE	2008	Tainted milk powder in China
OLYMPUS	2011	Accounting fraud
PEGATRON	2013	Bad working, safety, and health conditions, child labor, and pollution
PETROCHINA	2005	Chemicals in drinkable water after an explosion in a chemistry factory
PFIZER	2004	Illegal marketing practices
PFIZER	2007	Unauthorized drug testing with children in Nigeria 1997
PHILIP MORRIS INTL.	2010	Child labor on tobacco plantation
ROCHE HOLDING	2009	Tamiflu
ROYAL BANK OF SCTL.GP.	2012	LIBOR manipulation
ROYAL DUTCH SHELL	2008	Oil spill in Nigeria
SAMSUNG ELECTRONICS	2012	Child labor
SIEMENS	2007	Bribery
SOCIETE GENERALE	2008	Jerome Kerviel
SOCIETE GENERALE	2012	LIBOR manipulation
TELIA COMPANY	2013	Bribery payments, corruption, and money laundering
TESCO	2010	Child labor at suppliers
TOKYO ELECTRIC POWER CO.	2011	Fukushima nuclear disaster
TOYOTA MOTOR	2009	Recall scandal in U.S.
UBS GROUP	2012	LIBOR manipulation
VOLKSWAGEN	2005	Bribery payments
WAL MART STORES	2009	Bad labor conditions and child labor
WAL MART STORES	2013	Child labor in textile factory in Bangladesh
WALT DISNEY	2010	Child labor at suppliers
WELLS FARGO & CO	2012	Property loan fraud
ZIJIN MINING GROUP	2010	Groundwater pollution through copper mine

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